Stantec

100-401 Wellington Street West
Toronto ON M5V 1E7

Addendum

EMHAS Relocation and ED Expansion
Guelph General Hospital
Guelph, Ontario

Addendum No:	2
Date:	June 21, 2024

This addendum is to be read with and constitutes part of the tender document.

Instructions:

1. Amend your copy of the tender/quotation/proposal in accordance with the detail below
2. Retain one copy for your file; sign and return a second copy and attach to your submission as confirmation that the Addendum was taken into account in your bid submission.
3. Failure to sign and return this form may result in a non-compliant bid.

Details of the Addendum:

A- Specification:
- a. 03 48 00 - Architectural Precast Fabrications [ADD2]
- b. 03 10 00 - Concrete Formwork [ADD2]
- c. 03 15 00 - Concrete Accessories [ADD2]
- d. 03 20 00 - Concrete Reinforcement [ADD2]
- e. 03 30 00 - Cast in Place Concrete [ADD2]
- f. 05 12 00 - Structural Steel [ADD2]
- g. 05 31 00 - Steel Roof Deck [ADD2]
- h. 05 32 00 - Steel Floor Deck [ADD2]
- i. 07 46 19 - Metal Cladding Systems [ADD2]
- j. 08 87 00 - Applied Films [ADD2]
- k. 09 78 00 - Interior Wall Paneling [ADD2]
- l. 10 28 00 - Washroom and Miscellaneous Accessories [ADD2]
- m. 31 63 33 - Micropiles [ADD2]
- n. 32 14 13 Unit Paving [ADD2]

B- Architectural drawings PH100, PH101, A201 A303.1
- a. Sheet # A001:
  - i. Revise partition types.
- b. Sheet # PH010:
  - i. Revise sequencing diagram.
- c. Sheet # PH100
  - i. Remove G5 reference to crawl space
  - ii. Revise G4
  - iii. Revise extent of sequences 4&5
  - iv. Revise 6-L3-05 and add 6-L3-06
- d. Sheet # PH101
  - i. Remove G5
  - ii. Add AHU delivery path
  - iii. Add sequence and highlight for housekeeping closet

e. Sheet # PH102
    i. Remove G5
    ii. Revise G4
f. Sheet # A101
    i. Revise OBC matrix
g. Sheet # A103
    i. Revise janitor's closet partitions to 0hrs
h. Sheet # A222
    i. Revise lift pit and stairs location
    ii. Add annotation to concrete curb
    iii. Illustrate electrical ductbank
i. Sheet # A303.1
    i. Revise housekeeping closet partition types
j. Sheet # A502
    i. Change L3 east wall to EW-CP-ST
k. Sheet # A610
    i. Change wall type on details 4,8,9&13 to EW-CP-ST
    ii. Graphics
l. Sheet # A611
    i. Delete detail 3
    ii. Revise detail 12
    iii. Graphics
m. Sheet # A620
    i. Graphics
n. Sheet # A623
    i. Change wall type on details 3,4&6 to EW-CP-ST
o. Sheet # 625
    i. Revise detail 7/A605
    ii. Revise detail 1/A605
    iii. Revise detail 2/A605

C- Provide revisions to the structure of work in accordance with the attached structural addendum No.2.

D- Provide revisions to the mechanical and electrical scope of work in accordance with the attached mechanical and electrical addendum No.2.

End of addendum No.2

Concrete Formwork

PART 1 - GENERAL

1.1 General Requirements

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

.3 Obtain a copy of CSA Standard A23.1, and maintain on site.

1.2 Description

.1 Related Work Specified in Other Sections:

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Excavation and Backfill	Section 31 23 10
.4	Concrete Accessories	Section 03 15 00
.5	Concrete Reinforcement	Section 03 20 00
.6	Cast-In-Place Concrete	Section 03 30 00
.7	Concrete Floor Finishes	Section 03 35 00
.8	Grout	Section 03 37 00
.9	Supply of Anchor Bolts, Plates and Accessories for Structural Steel Work (to be Built into Forms)	Section 05 12 00
.10	Preparing Concrete Surfaces to Receive Dampproofing and Waterproofing	Section 07 12 00
.11	Mechanical Items (to be Built into Forms)	Division 21, 22 & 23
.12	Electrical Items (to be Built into Forms)	Division 26, 27 & 28

.2 Work Installed but Supplied under Other Sections

.1 Install materials specified to be supplied under other Sections of these project specifications. Materials include but are not limited to:

.1 Fabricated components, anchors, ties, anchor bolts, cast-in miscellaneous items, expansion joint components, subframes, bearing plates, sleeves and other inserts to be built into forms.

.2 Waterproof expansion joints for parking decks.

.3 Non-waterproof expansion joints for parking decks.

.2 Ensure installation is to satisfaction of trades concerned and of Consultant prior to placing concrete.

.3 Co-operation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section.

.4 Co-operation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section**.**

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.5 Cooperation with Inspection and Testing Company:

.1 Provide free access to Work.

.6 Architectural Concrete:

.1 Architectural concrete shall mean concrete surfaces designated as “architectural concrete” in Contract Documents. Sandblasted and bush-hammered surfaces shall be considered as architectural concrete.

1.3 Quality Assurance

.1 Reference Standards & Publications:

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first three standards listed below.

.3 The following reference standards shall govern Work of this Section, except where they are in conflict with requirements imposed by this Specification, in which case the latter shall govern. Standards referenced by following Standards apply but are not necessarily repeated in following list:

.1 2012 OBC, “Ontario Building Code”.

.2 CSA-A23.1-19, “Concrete Materials and Methods of Concrete Construction”.

.3 CSA-A23.3-19, “Design of Concrete Structures for Buildings”.

.4 ACI 117-10, Standard Specifications for Tolerances for Concrete Construction and Materials, American Concrete Institute.

.5 ACI 350-20, "Code Requirements for Environmental Engineering Concrete Structures".

.6 CSA-O86.14 (R2019), "Engineering Design in Wood (Limit States Design)".

.7 CSA-O121-17 (R2022), "Douglas Fir Plywood".

.8 CSA-O151-17 (R2022), "Canadian Softwood Plywood".

.9 CSA-S269.1-16 (R2021), "Falsework and Formwork".

.10 CAN/CSA-S269.2-16 (R2021), "Access Scaffolding for Construction Purposes".

.11 American Society for Testing and Materials (ASTM) where noted.

.12 Provincial safety standards where applicable.

.13 Conform to applicable safety regulations for erection, maintenance and removal of formwork.

.2 Qualifications:

.1 Formwork design engineer shall be insured against professional liability in accordance with section 74 subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable.

.3 Design of Formwork:

.1 Assume full responsibility for complete structural design and construction of formwork in accordance with CSA Standard S269.1.

.2 Perform structural design of formwork for suspended concrete structural members by a professional engineer experienced in design of formwork and licensed to practise at location of Project. His responsibility shall include design of formwork and shoring, review of drawings related to this Work, field review of formwork construction including stripping and reshoring, and when requested by regulatory agencies, or Consultant, submission of written reports of site review of formwork and shoring.

.4 Regulations:

.1 Abide by current bylaws and regulations of the province and/or municipality in which Work is located, and abide by current laws and regulations with regard to public safety.

.2 Regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers' Compensation Board and other applicable acts administered by authority having jurisdiction of the province apply to Work of this Section.

.5 Safety

.1 Carry out concrete formwork in accordance with the Ontario Building Code and current Occupational Health and Safety Act construction safety regulations.

.6 Tolerances:

The indicated tolerances govern unless otherwise specified. Concrete construction shall meet the specified tolerances. Tolerances are not cumulative. The most restrictive tolerance controls. Plus (+) tolerance increases the amount of dimension to which it applies, or raises a level alignment. Minus (-) tolerance decreases the amount of dimension to which it applies, or lowers a level alignment. A nonsigned tolerance means + or - . Where only one signed tolerance is specified (+ or -), there is no limit in the other direction.

.1 Definitions:

Arris – The line, edge, or hip in which two straight or curved surfaces of a body, forming an exterior angle, meet; a sharp ridge, as between adjoining channels of a Doric column.

Bowing – The displacement of the surface of a planar element from a plane passing through any three corners of the element.

Clear distance – In reinforced concrete, the least distance between the surface of the reinforcement and the referenced surface, i.e., the form, adjacent reinforcement, embedment, concrete, or other surface.

Concealed surface – Surface not subject to visual observation during normal use of the element.

Cover – In reinforced concrete, the least distance between the surface of the reinforcement and the outer surface of the concrete.

Flatness – The degree to which a surface approximates a plane.

Lateral alignment – The location relative to a specified horizontal plane or line, or to a point in a horizontal plane.

Level alignment – The location relative to a specified horizontal plane.

Levelness – The degree to which a line or surface parallels horizontal.

Relative alignment – The distance between two or more elements in any plane, or the distance between adjacent elements, or the distance between an element and a defined point or plane.

Tolerance – The permitted variation from a given dimension or quantity. The range of variation permitted in maintaining a specified dimension. A permitted variation from location or alignment.

Specified surface, plane, or line – A surface, plane, or line specified by the Contract Documents; specified planes and lines may slope and specified surfaces may have curvature.

Vertical alignment – The location relative to specified vertical plane or a specified vertical line or from a line or plane reference to a vertical line or plane. When applied to slabs, ramps, or other nominally horizontal surfaces established by elevations, vertical alignment is defined as the vertical location of the surface relative to the specified profile grade and specified cross slope.

Warping – The displacement of the surface, portion, or edge of a planar element from a plane passing through any three corners of the element.

Class of Surface:

Class A – For surfaces prominently exposed to public view where appearance is of special importance.
Class B – Coarse-textured concrete-formed surfaces intended to receive plaster, stucco, or wainscoting.
Class C – General standard for permanently exposed surfaces where other finishes are not specified.
Class D – Minimum quality surface where roughness is not objectionable, usually applied where surfaces will be concealed.

.2 Footings:

.1 Lateral Alignment:

- Eccentricity measured from centre of gravity of footing as cast to the centre of gravity as specified; 0.02 times width of footing in direction of misplacement, but not more than .... 50 mm (2”)
- Supporting masonry .... 12 mm (1/2”)

.2 Level alignment:

- Top of footings supporting masonry..... ..... 12 mm (1/2”)
- Top of other footings..... .....+12 mm (+1/2)
  -50 mm (-2”)

.3 Cross-sectional dimensions:

- Horizontal dimension of formed members..... ..... +50 mm (+2”)
  -12 mm (-1/2”)

- Horizontal dimension of unformed members cast against soil:
  - 600 mm (2 ft) or less .... +75 mm (+3”)
    -12 mm (-1/2”)
  - greater than 600 mm (2 ft) but less than 1.8 m (6 ft)..... ..... +150 mm (+6”)
    -12 mm (-1/2”)
  - over 1.8 m (6 ft)..... ..... +300 mm (+12”)
    -12 mm (-1/2”)

.4 Vertical dimension (thickness) ..... -5 percent

.5 Relative alignment:

- Footing side and top surfaces may slope with respect to the specified plane at a rate not to exceed the following amount in 3 m (10 ft) .... 25 mm (1”)

.3 Other Cast-in-Place Concrete:

.1 Vertical Alignment:

For heights 30 m (100 ft) or less:
- Lines, surfaces, and arises..... ..... 25 mm (1”)
- Outside corner of exposed corner columns and control joint grooves in concrete exposed to view .... 12 mm (1/2”)

For heights greater than 30 m (100 ft):
- Lines, surfaces, and arises 1/1000 times the height, but not more than..... ..... 150 mm (6”)
- Outside corner of exposed corner columns and control joint grooves in concrete, 1/2000 times the height, but not more than .... 75 mm (3”)

.2 Lateral Alignment:

- Members..... ..... 25 mm (1”)
- In slabs, centreline location of openings 300 mm (1 ft) or smaller, and edge location of larger openings..... ..... 12 mm (1/2”)
- Sawcuts, joints, and weakened plane embedments in slabs..... ..... 20 mm (3/4”)

.3 Level alignment:

- Top of slabs:
  - Elevation of slabs-on-grade..... ..... 20 mm (3/4”)
  - Elevation of top surfaces of formed slabs before removal of supporting shores..... ..... 20 mm (3/4”)

- Elevation of formed surfaces before removal of shores ....20 mm (3/4”)

- Lintel, sills, parapets, horizontal grooves, and other lines exposed to view ....12 mm (1/2”)

.4 Cross-sectional dimensions:

- Members, such as columns, beams, piers, walls (thickness only), and slabs (thickness only):
  - 300 mm (12”) dimension or less .... +10 mm (+3/8”)
    -6 mm (-1/4”)

  - more than 300 mm (12”) dimension but not over 1000 mm (36”) dimension .... +12 mm (+1/2”)
    -10 mm (-3/8”)

  - over 1000 mm (36”) dimension .... +25 mm (+1”)
    -20 mm (-3/4”)

.5 Relative Alignment:

- Stairs
  - Difference in height between adjacent risers .... 3 mm (1/8”)
  - Difference in width between adjacent treads .... 6 mm (1/4”)

- Grooves
  - Specified width 50 mm (2”) or less .... 3 mm (1/8”)
  - Specified width more than 50 mm (2”) but not more than 300 mm (12”) .... 6 mm (1/4”)

- Formed surfaces may slope with respect to the specified plane at a rate not to exceed the following amounts in 3 m (10 feet):
  - Vertical alignment of outside corner of exposed corner columns and control joint grooves in concrete exposed to view .... 6 mm (1/4”)
  - All other conditions .... 10 mm (3/8”)

- The offset between adjacent pieces of formwork facing material shall not exceed:
  Class of Surface:
  Class A .... 3 mm (1/8”)
  Class B .... 6 mm (1/4”)
  Class C .... 12 mm (1/2”)
  Class D .... 25 mm (1”)

.6 Openings through members:

- Cross-sectional size of opening .... -6 mm (-1/4")
  +25 mm (+1")
- Location of centreline of opening .... 12 mm (1/2")

.7 Quality Control

.1 The Contractor's professional engineer responsible for design of formwork is to inspect fabrication and erection of formwork in accordance with PEO Guidelines for Performing Structural Engineering for Buildings.

.2 The Contractor shall not assign responsibility of coordination of forming and placing other required material. Ensure full-time qualified superintendent representing the Contractor is in attendance to inspect and check all phases of this Work.

1.4 Submittals

.1 General

.1 Submit proposed joint details, locations and construction procedures. Include waterstop, crack inducer, reglet, sealant and joint filler products as required.

.2 Submit responses to site review reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

.2 Professional Liability Insurance:

.1 Submit proof of formwork design engineer's professional liability insurance coverage specified in paragraph 1.3.2.

.3 Shop Drawings

.1 Submit shop drawings of formwork, shoring and re-shoring in accordance with Section 01 30 00 and as specified below. Copies of portions or all of the structural drawings will not be accepted as shop drawings.

.2 Each shop drawing submitted shall bear the seal and signature of the Professional Engineer responsible for formwork design.

.3 Indicate: materials, sizes, grades, methods of construction, arrangement of joints, ties, shores, falsework, dimensions, spacings, schedule of erection, rate and sequence of concrete placement, stripping requirements and design parameters.

.4 Submit shop drawings to Consultant of exposed concrete formwork if requested by the Consultant indicating placement joints, control joints, lay out of panels, form ties, corner details, and false joint patterns and all proposed tie patterns.

.5 Clearly indicate all pertinent dimensioning, arrangements of joints, location of reglets, reveals and tie patterns; type, extent and locations of items to be built into concrete.

.6 Where complicated inward sloped forms are required, indicate construction methods and materials proposed to achieve clean, smooth or straight concrete lines and smooth even surfaces free from bugholes, honeycombs and cold joints.

.7 Sleeving Drawings:

.1 Submit drawings showing sleeves of all disciplines required through floors, roof and other structural members.

.2 Submit drawings showing size and spacing of conduits and piping, if requested by Consultant.

.3 Coordinate with other Divisions prior to submittal.

.8 Prior to submission to Consultant, Contractor shall review all shop drawings. By this review, Contractor represents to have determined and verified all field data, site conditions, materials, catalogue number and similar data, and to have checked and coordinated each shop drawing with requirements of Work and of Contract Documents. Contractor's review of each shop drawing shall be indicated by stamp, date and signature of the Contractor's representative.

.9 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.10 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review is intended as an assistance to the Contractor and will be for conformity to design concept and for general arrangement, and shall not relieve the Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of Contract Documents.

.11 Contractor shall make changes in shop drawings, which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of revisions other than those requested by Consultant.

.12 Do not commence placing sleeves, conduits or piping before drawings have been reviewed and Consultant's comments incorporated on drawings issued to site.

.13 Assume responsibility for accuracy of Work. Review of submitted shop drawings does not relieve Contractor from compliance with requirements of Contract Documents.

.14 Fabrication and construction that commences prior to shop drawing review by the Consultant is at the Contractor's risk.

.15 Submit shop drawings as follows:

- 1 copy for review before any Work commences.

- 1 additional copies of shop and erection drawings for distribution as directed by Consultant.
- 1 copy of reviewed shop and erection diagrams to Inspection and Testing Company

.16 Required by Regulatory Agencies:

Submit shop drawings bearing signature and seal of Professional Engineer responsible for formwork design, as may be required by regulatory agencies. Proceed with construction of formwork only with their approval.

1.5 Delivery, Storage and Handling

.1 Deliver all materials to the site in bundles easily identified and properly marked.

.2 Store and handle all material on site in a manner to prevent damage and contamination.

.3 Protect formwork to prevent functional damage and damage to faces affecting appearance of concrete surfaces exposed to view.

.4 Prevent damage to fibre column forms, and protect against moisture.

1.6 Payment

.1 Payment for the work of this Section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials, and equipment necessary to complete the Work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

PART 2 - PRODUCTS

2.1 Unit Prices

.1 Unit prices requested as part of the Tender shall include formwork materials, erection, bracing, shoring, incorporation of built-in items, release agent, stripping and removing, and preparation and submittal of necessary shop and erection drawings.

.2 Unit prices to be applied to the net area difference.

.3 Submit unit prices with the Tender Form for the addition and deletion of the following:

.1	Slab formwork	Per m^2
.2	Column formwork (square or rectangular)	Per m^2
.3	Round column formwork	Per m^2
.4	Footing formwork	Per m^2
.5	Beam formwork	Per m^2

.6 Wall and grade beam formwork — Per m^2

.7 Architectural concrete formwork — Per m^2

2.2 Materials

.1 Generally in accordance with Reference Standards.

.2 Formwork materials brought on site shall be new.

.3 Plywood:

.1 Generally:

Douglas fir conforming to CSA-O121 or softwood conforming to CSA-O151, minimum thickness of 17.0 mm, as required to resist design loads imposed upon forming system. Finished one side, fabricated specially for use as concrete form panels, with sealed edges. Sound, undamaged sheets with clean, true finish.

.2 For concrete surfaces exposed to view, provide panels smooth and free of defects which would be reproduced as concrete blemishes.

.3 Where surfaces receive architectural finishing, such as sandblasting or bush-hammering, use coated or overlaid form panels: as Sylvaform by Weyerhaeuser Company.
Re-use no more than five times. Allow Consultant to inspect before each use.

.4 Lumber: Fir or spruce species, #2 Grade or better, conforming to CSA-O141 and to design requirements of CSA-O86.1 to resist applied loads required of forming system.

.5 Anchorage devices (including nails, bolts, spikes and lag screws): Sized to ensure all formwork loadings are adequately resisted. Nails, spikes and staples conforming to CSA-B111, galvanized or phosphatized.

.6 Steel forms: Minimum 1.6 mm (1/16”) well matched, tight fitting and adequately stiffened to support weight of concrete without deflection.

.7 Form ties for concrete below grade or exposed to weather.

.1 Snap off metal ties with spreader washer, 50 mm (2”) length cone to resist all forces.

.8 Form ties for concrete with unexposed finishes or concrete covered by an applied architectural finish:

.1 Snap off metal ties, with spreader washer, to resist all forces, that will break off approximately 15 mm (5/8”) below the surface and permit a flush finish.

.9 Form ties for exposed concrete including painted and/or epoxy-coated concrete, unless specifically exempted on Drawings or in room finish schedules:

.1 Removable ties to resist all forces that will permit a recessed or flush finish. Pattern to be symmetrical to approval of Consultant.

.2 Snap off metal ties, with spreader washer, 50 mm (2") length cone to resist all forces to permit a recessed finish. Pattern to be symmetrical to approval of Consultant.

.3 Metal type of fixed or adjustable length to resist all forces, with plastic cones, free of defects that will leave holes larger than 30 mm (1 1/8") in concrete surface and compatible with plugs. Pattern to be symmetrical to approval of Consultant.

.10 Form tie hole sealant: One-component polymeric sealant. Natural grey or colour to match concrete.

.11 Form release agent: Colourless, non-staining, non-volatile type. For architectural exposed concrete finishes, use low viscosity agent to eliminate bugholes.

.12 Fillets for chamfered corners: Minimum 12 mm x 12 mm (½" x ½") wood.

.13 Forms for Concrete Joists: reusable metal forms, fabricated of gauge to provide adequate strength and of profile approved by Consultant.

.14 Round Column Fibre Forms:

.1 Designed to resist all imposed loads.

.2 If not available in metric, notify Consultant of proposed substitution and obtain approval.

.1 To produce smooth surface without fins, of uniform texture and appearance.
:Burke Smooth Tube with PVC liner, by Aluma International.
:Poli-Permaform with polystyrene liner, by Perma Tubes Ltd.

.2 To produce smooth surface without fins.
:Sonotube Seamless fibre form, strippable type, by Sonoco Limited.

.3 Strippable fibre forms
:Sonotube "A" Coated, by Sonoco Limited.

.4 Fibre forms for concealed surfaces.
:Sonotube "W" Coated, by Sonoco Limited.

.5 Metal forms
To resist all loads.

.15 Void form: Closed celled expanded polystyrene complete with void spaces specifically designed to allow frost heave and swelling of soil under concrete without inducing uplift on concrete. Structurally sufficient to support weight of wet concrete 150 mm (6") thick.

.16 Void forms: Honeycomb cellular core structure manufactured from Kraft fibre. Top and sides protected with wax coated corrugated board, and bottom unprotected, with minimum compliance strength of 0.12 MPa, 150 mm (6") thick.
:Wamat (by Shearmat Structures Ltd., Winnipeg, Manitoba), distributed by National Concrete Accessories (Acrow-Richmond), Rexdale, Ontario. (Note one to two week delivery period).

.17 Grade beam and wall void form protection: Provide polyethylene protection under biodegradable void form as required to protect void form from moisture and premature failure prior to placing concrete.

.18 Structural slab on grade void form protection: Provide plywood or hard board as required over void form to protect form from crushing under construction activities and reinforcement chairing.

.19 Void protection: Wood preserved pressure treated plywood, 12 mm (½") thick by 250 mm (10" ea.) high each side of biodegradable void form to ensure void space.

.20 Vertical Drainage Pans: Prefabricated high-impact polymeric drain core with bonded non-woven geotextile fabric.

:Terra Drain 600, by Terrafix Geosynthetics Inc., Rexdale, Ontario
:Delta-Drain 6000, by Cosella Drain Products, Beamsville, Ontario
:Grace Hydroduct 200, by W.R. Grace & Co., Cambridge, Mass.
:Wet Drain 5035, by W.R. Meadows of Canada Ltd.

.21 Joint Tape: Non-staining, water impermeable, self-release, as approved by Consultant.

PART 3 - EXECUTION

3.1 General

.1 Perform concrete formwork and falsework in accordance with requirements of CSA-A23.1 unless indicated otherwise on Drawings.

3.2 Earth Forms

.1 Earth forms are not acceptable.

.2 Where soil conditions are suitable, earth forms for wall foundations may be used with Geotechnical Engineer's and Consultant's approval.

.3 Trim edges of excavation vertical and smooth. Completely remove trimmings. Increase concrete cover as required.

.4 Install wood stringers for suspension of reinforcement.

.5 Install wood forms where earth form sides have collapsed.

3.3 Formwork Erection

.1 Verify lines, levels and centres before proceeding with formwork. Ensure that dimensions agree with Drawings.

.2 Ensure that supplied equipment, hardware, and items to be cast-in will fit concrete dimensions.

.3 Construct formwork, shoring and bracing accurately to meet design and code requirements so that resultant finished concrete conforms to shapes, lines, levels and dimensions indicated on Drawings.

.4 Provide bracing to ensure stability of formwork as a whole. Prop or strengthen previously constructed elements liable to be overstressed by construction loads.

.5 Arrange and assemble formwork so as to permit easy dismantling and stripping so that concrete is not damaged during its removal.

.6 Align joints and make watertight to prevent leakage of grout or cement paste and disfigured appearance of concrete. Keep form joints to a minimum. Obtain approval of Consultant for location of form joints in exposed work.

.7 Chamfer external corners and edges of columns when exposed or as noted.

.8 Construct formwork to maintain concrete tolerances in accordance with CSA-A23.1, Clause 10 and paragraph 1.3.6.

.9 Camber beams: 0.2% of span unless otherwise noted.

.10 ams: 0.2% of span unless otherwise noted.

.11 Camber slabs: 0.1% of span for all spans over 3 m (10 ft).

.12 Do not re-use formwork with surface defects that will impair appearance of finished concrete. Do not patch formwork. Meet requirements of Part 2 of this Section when re-using formwork.

.13 Bed mud sills on sand, gravel or crushed stone placed over unfrozen, dry, solid and stable subgrade.

.14 Provide recesses in top of foundation walls at doors and openings to allow slab to bear on walls.

.15 Forms for Surfaces to be Waterproofed:

.1 Construct forms with joints taped and edges backed to prevent separation of plywood panels at joints.

.2 For metallic or chemical waterproofed surfaces, form continuous reglets at junctions of floors and walls and at other locations noted on Drawings.

.16 Forms for Architectural Concrete Surfaces or Surfaces which will be Exposed or Painted:

.1 The intent of this Section is to ensure that formwork is of high quality to result in exposed concrete surfaces free of unsightly cold joints, blemishes, bugholes, honeycombing and cracking. Acceptable symmetrical joint patterns are mandatory.

.2 Formwork to be in accordance with CSA-A23.1, Clause 28.

.3 Allow Consultant to inspect and approve each section of formwork prior to placing reinforcement.

.4 Construct panels with full size plywood sheets as far as possible, and continuous and level horizontal joints, unless otherwise indicated on Drawings.

.5 Back edges of plywood to prevent separation of plywood panels at joints.

.6 Construct corners so that concrete is not placed against panel edges.

.7 Seal joints between panels including corners with joint tape to prevent bleeding of fines.

.8 Where tie marks will show, place ties in regular pattern as approved by Consultant or as indicated on Drawings.

.9 Reuse forms only if their surfaces are not marred in any manner and where established pattern of holes can be maintained with no alteration to panels.

.10 Control joint and placement break spacings outlined on structural drawings are maximum allowable. More frequent spacings may be required to conform to architectural requirements.

.11 ntrol joint and placement break spacings outlined on structural drawings are maximum allowable. More frequent spacings may be required to conform to architectural requirements.

.12 All horizontal and vertical joints are to result in satisfactory symmetrical pattern approved in advance of forming by Consultant.

.13 Horizontal joints are to extend on all sides of a given space or spaces at the same elevation, unless otherwise detailed.

.14 Allow for horizontal joints at the top of all openings, and extend as required, unless otherwise detailed.

.15 as required, unless otherwise detailed.

.16 Allow for vertical joints each side of openings, and extend to underside of slabs or deck unless otherwise detailed.

.17 Horizontal reglets to be placed on both sides of placement breaks in walls, railings, beams and/or slabs.

.18 V-joints or reglets in walls and railings to also extend over top of the wall or railing.

.19 Provide V-joints and reglets to forms at vertical and horizontal placement breaks and as noted or detailed. Caulk V-joint and reglet formwork to prevent bleeding of fines from concrete.

.20 Replace damaged forms and forms with poor surfaces with new material as directed by the Consultant.

.17 Vertical Drainage Pans:

.1 Install vertical drainage pans with 100% continuous covering of all foundation wall exterior surfaces. Install and secure in place in accordance with manufacturer's instructions over surface that has been prepared in accordance with manufacturer's recommendations.

.2 Top of drain pans to be 150 mm (6") below final grade.

.3 Install moulding strips at terminated edges to preclude materials from entering the core.

.4 Fasteners and sealants to manufacturer's specifications.

.5 Lap and seal membrane and drainage core as per manufacturer's recommendations.

.6 Manufacturer's representative to visit site periodically during installation and confirm in writing that installation is in accordance with manufacturer's instructions. Inspection shall include review of substrate, review of finished product for appropriate fasteners, and sealing of overlap joints.

.18 Caissons and Piles

.1 Verify top of pile and caisson elevations. Cut down piles or caissons or increase lengths as required to proper elevations. Ensure piles or caissons project into grade beams and pile caps as indicated on Drawings.

.2 Remove loose concrete, soil inclusions and laitance from tops of piles or caissons. Ensure tops of piles or caissons are clean and of sound concrete.

.19 Elevation Survey:

.1 Before every pour of slabs spanning more than 8 m, as agreed with Consultant, survey area and record elevation of top surface of soffit formwork at each column or other permanent support, at mid-point between columns, and at centre of each bay area.

.2 Provide Consultant with one copy of formwork elevation survey before each pour.

.20 Advise Consultant when an area of formwork will be ready for review. Allow sufficient time for review before starting concrete placing.

3.4 Built-In Work

.1 Form openings and build in anchors, inserts, sub-frames, sleeves, miscellaneous metal items, flashing reglets and similar items furnished under Work of other Sections, which are indicated on Drawings and on shop drawings of other trades, and as required for proper completion of Project.

.2 Accurately locate and set in place items that are to be cast directly in concrete.

.3 Coordinate Work of other Sections and cooperate with the trade involved in forming and/or setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts. Do not perform Work unless specifically indicated on Drawings or approved prior to installation.

.4 Do not place anchor bolts, sleeves and inserts into freshly placed concrete.

.5 Install concrete accessories in accordance with Drawings and manufacturer's recommendations, straight, level and plumb. Ensure adequate support to prevent movement during concrete placement.

.6 Do not embed wood in concrete.

.7 Anchor Bolts:

.1 Use template to position anchor bolts.

.2 Tie anchor bolts securely in position to prevent movement during concrete placing.

.3 Verify that anchor bolts have specified projection above concrete.

.8 Openings or Sleeves Not Shown on Structural Drawings:

.1 Obtain Consultant's written approval before forming openings or sleeves through columns and beams, or through slabs within 1 m (3'-3") of their supports.

.2 Obtain Consultant's written approval before forming openings or sleeves larger than 200 mm (8") square in any location.

.3 Do not relocate or interfere with bottom bar structural integrity reinforcement which extends from column to column. Report any interferences to Consultant.

.4 Conform to requirements of CSA A23.1, Section 13.5.

.9 Embedded Pipe or Conduit Not Shown or Detailed on Structural Drawings:

.1 Obtain Consultant's written approval before placing conduit or pipe which would be embedded in finished structure.

.2 Conform to requirements of CSA A23.1, Section 13.5.

.3 So as not to impair the required strength of the structure, the following criteria are to be followed:

.1 Where conduit or pipes pass by a column stay at least two times the thickness of the slab and drop away from the column.

.2 Where conduits or pipes terminate adjacent to a column or wall, bring the conduit or pipe in toward the column/wall as close to 90 degrees to the face of the column as possible within two times the thickness of the slab and drop away from the column.

.3 Maximum size of conduit in structural slabs is 1/5 of solid portion of slab thickness, and where more than two are adjacent to each other, they are to be spaced the greater of 100 mm (4") or 3 diameters apart.

.4 The total of depth of conduits and pipes crossing over each other is to be less than one third the thickness of the slab.

.5 Place conduit in the middle third of the thickness of the slab. Do not allow conduit or pipe to lay directly on the reinforcing steel.

.6 Do not allow conduit or pipes to run adjacent to parallel reinforcing bars.

.7 Do not run conduit or pipes longitudinally in a beam without specific approval of (Consultant). Pass through beams at right angles to the span of the beam.

.8 Where conduits or pipes pass through beams, stay at lest twice the depth of the beam away from the supports.

.9 Do not run conduit or pipes in the slab beside a drop or beam within twice the depth of the slab from the edge of the drop or beam.

.10 No conduits or sleeves are to run through shear walls or columns without the specific approval of Consultant.

.10 Confirm that built-in items that penetrate surface waterproofing are installed to meet requirements of waterproofing trade.

3.5 Construction & Expansion Joints

.1 Construction joints in addition to those indicate on Drawings may be required to execute Work in accordance with concrete placing schedule. Provide such construction joints without extra compensation.

.2 Prepare surface of concrete in accordance with CSA A23.1, Clause 20.1, Construction Joint, to produce a bonded concrete joint.

.3 Form construction and expansion joints with bulkheads to ensure straight lines.

.4 Immediately before subsequent pour at a construction joint, remove bulkhead and tighten forms so that concrete surfaces will be on same plane with no overlapping of concrete.

.5 Review with Consultant and Structural Engineer proposed location and details of construction joints in walls, columns, beams, slabs and other structural elements.

.6 Construction Joints

.1 Construction joints shall present appearance of normal form panel joint.

.2 Install continuous shear key in construction joints in walls and framed floors which are 150 mm (6") or more thick. Form keys 40 mm (1½") deep by 1/3 of member thickness, unless noted otherwise.

.3 Locate construction joints in framed floors or grade beams at point in span where shear will be equal to zero (normally at midspan under uniformly distributed load).

.4 Locate construction joints in concrete slabs supported by steel beams at centre of steel beam.

.5 Provide vertical construction joints in walls at not more than 23 m (75 ft) centre to centre, and in exposed-to-the-exterior retaining walls and grade beams at not more than 12 m (40 ft) centres. Locate construction joints directly over centroid of pile, caisson or pile cap. In walls immediately above and below floor construction joints.

.6 Provide construction joints at centre of span of suspended slabs, beams and joists, adequately doweled and keyed. Maximum concrete placement length for structural slabs to be 30 m (100 ft) unless otherwise detailed. Refer to Drawings for construction joint details.

.7 Provide construction joints in slabs on grade, at maximum 24 m (80 ft) or as detailed.

.8 Provide construction joints in walls that are watertight at spacing not to exceed 10 m (33 ft) with locations approved prior to construction.

.9 Construction Joints in Unrestrained Slabs on Ground

.1 Slabs may be placed continuous from outside edge to outside edge, outside edge to expansion joint, or from expansion joint to expansion joint, unless shown otherwise.

.10 Construction Joints in Suspended Slabs Restrained by Connecting Walls

.1 Place slab in alternate strips with the larger dimension of any single placement no greater than the following:

.1 10 m (33 ft) for slabs forming part of liquid holding structure.

.2 15 m (50 ft) for slabs of other than liquid holding structure.

.2 Locate construction joints in suspended slabs near the middle quarter of the spans of slabs and beams, unless indicated otherwise on the

Drawings. If a beam intersects a girder at this location, offset the construction joint in the slab and girder by a distance equal to two times the width of the beam.

.11 Construction Joints in Walls

.1 Locate construction joints 2 m (6'-6") minimum away from junction of two or more walls, a column or beam supported on wall, nearest edge of an opening wider than 600 mm (24"), and a construction joint in a slab on which the wall rests.

.2 Place wall in alternate portions with a distance between vertical construction joints not exceeding the following:

.1 10 m (33 ft) for walls forming part of liquid holding structure.

.2 15 m (50 ft) for walls of other than liquid holding structure.

.12 Roughen surface of construction joints immediately upon removal of formwork to sound concrete, apply an epoxy bonding agent prior to placing fresh concrete.

.7 Expansion Joints:

.1 Install expansion joints in locations and as detailed and noted on Drawings.

.2 In exterior cantilever retaining walls locate expansion joints at 12 m (40 ft) centres, maximum.

3.6 Cleaning Forms

.1 Clean forms as erection proceeds to remove foreign matter. Remove cuttings, shavings and debris from within forms. Flush completely with water or compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

.2 During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out completed forms unless formwork and concrete construction proceed within a heated enclosure. Use compressed air or other means to remove foreign matter.

.3 Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain. Close temporary ports or openings with tight-fitting panels, flush with inside of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

3.7 Treatment of Formwork Surfaces

.1 Form Release Agent:

.1 Coat formwork with form release agent before reinforcement, anchors, accessories, and other built-in items are installed, in accordance with manufacturer's recommendations.

.2 Do not coat plywood forms pretreated with release agent.

.3 On surfaces to receive finish materials, adhesives, sealers, paint or other coatings or materials, use a compatible release agent.

3.8 Stripping of Formwork

.1 Elevation Survey:

.1 Before removing shores prior to stripping soffit forms, survey pour area and record elevation of finished concrete top surface in same locations as specified in paragraph 3.3.19.

.2 Provide Consultant with copy of survey.

.2 Comply with CSA-S269.1 for dismantling all falsework.

.3 Do not remove forms, shores and bracing until concrete has gained sufficient strength to carry its own weight, construction loads and design loads that are liable to be imposed upon it.

.4 Arrange forms to allow removal without removal of principal shores where these are required to remain in place.

.5 Be responsible for safety of structure, both before and after removal of forms, until concrete has reached its specified 28 day strength.

.6 Strip formwork for soffits of beams, slabs and other spanning members which support weight of concrete only when concrete has reached its specified 28 day strength, except as specified hereafter.

.7 Formwork may be stripped when concrete has reached 75% of specified 28 day strength, but only in accordance with re-shoring procedures, specified in this Section.

.8 Verify strength by field cylinders or insert type tests in accordance with ASTM C900-T.

.9 Remove formwork progressively and in accordance with code requirements so that no shock loads or unbalanced loads are imposed on structure.

.10 Strip formwork on vertical surfaces when concrete has hardened sufficiently that no damage will result from stripping operations but not before a minimum of three days from final concrete placement to prevent rapid loss of moisture from concrete.

.11 Leave plywood forms in place as long as possible to permit maximum shrinkage away from concrete.

.12 Remove formwork at architectural concrete surfaces after other formwork has been removed, to prevent damage to surfaces.

.13 Do not remove plywood formwork by jerking loose, by metal pinch bars, hammers or tools. Use wood wedges and gradually force panels loose.

.14 Take particular care not to damage external corners when stripping formwork.

.15 When forms are stripped during curing period, cure and protect exposed concrete in accordance with Section 03 30 00.

3.9 Re-Shoring

.1 Re-shore concrete when formwork is stripped, as follows:

.1 When floor is to support weight of newly placed concrete from floor(s) above during construction, re-shore and maintain in place as specified in paragraph 3.9.7.

.2 When floor is not required to support weight of newly placed concrete from floor(s) above during construction, and formwork is stripped before specified 28 day strength is attained, re-shore and maintain in place until specified 28 day strength is reached.

.2 Submit for Consultant's review proposed schedule for stripping, methods of re-shoring, and controls to prove that 75% of specified 28 day strength of concrete has been reached.

.3 Re-shore in two directions so that no large areas of Work are permitted to support their own weight.

.4 Locate re-shores at midspan of members, but at no greater spacing than 3 m (10 ft) centres.

.5 Place each tier of shoring concentric with the one below.

.6 Tighten re-shores to carry weight of new construction and any load imposed thereon. Do not overstress new construction by overtightening.

.7 Leave at least two storeys of shores or re-shores in place beneath framed floors which support weight of newly placed concrete above, and until newly placed concrete has reached at least 75% of its specified 28 day strength.

3.10 Certification

.1 At the completion of formwork and shoring, certify all formwork components fabricated and erected by the Contractor under seal and signature of Contractor's professional engineer responsible for this Work.

.2 Certify that formwork, shoring and components are capable of supporting construction loads and forces required to complete cast-in-place concrete Work.

.3 Certify that formwork, shoring and components are fabricated and erected in accordance with reviewed shop drawings.

3.11 Defective Work

.1 Variations in excess of specified tolerances and failure of materials or workmanship to meet requirements of this specification will be considered defective Work performed by this Section.

.2 Replace defective Work, as directed by Consultant.

.3 Contractor shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient. Costs for additional inspection, testing, review and redesign to be deducted from Contract Value.

.4 Movement and displacement of formwork during construction, variations in excess of specified tolerances and marked and disfigured surfaces will be considered defective Work performed by this Section.

.5 Reconstruct defective formwork and replace concrete and reinforcement placed in defective formwork at no additional cost to Owner.

END OF SECTION

Concrete Accessories

PART 1 - GENERAL

1.1 General Requirements

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

1.2 Description

.1 Related Work Specified in Other Sections

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Excavation and Backfill	Section 31 23 10
.4	Excavated Caissions	Section 31 63 23
.5	Concrete Forms	Section 03 10 00
.6	Concrete Reinforcement	Section 03 20 00
.7	Cast-In-Place Concrete	Section 03 30 00
.8	Special Concrete Finishes	Section 03 35 00
.9	Concrete Floor Finishes	Section 03 35 00
.10	Grout	Section 03 37 00
.11	Supply of Anchor Bolts, Plates and Accessories for Structural Steel Work (to be Built into Forms)	Section 05 12 00
.12	Preparing Concrete Surfaces to Receive Dampproofing and Waterproofing	Section 07 12 00 and
.13	Below-Grade Vapour Barrier	Section 07 26 16
.14	Mechanical Items (to be Built into Forms)	Division 21, 22 and 23
.15	Electrical Items (to be Built into Forms)	Division 26, 27 and 28

.2 Work Supplied but Installed under Other Sections

.1 Supply materials specified to be installed under other Sections of these project specifications. Materials include but are not limited to:

.1 Fabricated components, anchor bolts, bearing plates, sleeves and other inserts to be built into concrete.

.2 Ensure installation is to satisfaction of trades concerned and of Consultant.

.3 Cooperation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section.

.4 Co-operation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section**.**

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.5 Cooperation with Inspection and Testing Company:

.1 Provide free access to Work.

1.3 Quality Assurance

.1 Reference Standards & Publications:

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first three standards listed below.

.3 The following reference standards shall govern Work of this Section, except where they are in conflict with requirements imposed by this Specification, in which case the latter shall govern. Standards referenced by following Standards apply but are not necessarily repeated in following list:

.1 2012 OBC, “Ontario Building Code”.

.2 CSA-A23.1-19, “Concrete Materials and Methods of Concrete Construction”.

.3 CSA-A23.3-19, “Design of Concrete Structures for Buildings”.

.11 Ontario Provincial Standard Specification OPSS 1010, “Aggregates – Base, Subbase, Select Subgrade, and Backfill Material (2013 Edition)”.

.12 Ontario Provincial Standard Specification OPSS 1212, “Hot-Poured Rubberized Asphalt Joint Sealing Compound (2021 Edition)”.

.13 ASTM C309-19, “Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete”.

.14 ASTM D1751-18, “Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)”.

.15 ASTM D1752-18, “Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction”.

.16 ASTM E154/ E154M-08a (R2019), “Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs”.

.17 .ASTM E96/ E96M-22ae1, “Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials”.

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

.19 ASTM E1745-17 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

.20 ASTM F1249-20 Standard Test Method for Water Vapor Transmission Rate through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

.21 American Society for Testing and Materials (ASTM) where noted.

.22 American Concrete Institute Detailing Manual (ACI 315-18) where noted.

.23 Provincial safety standards where applicable.

.24 Conform to applicable safety regulations for erection, maintenance and removal of formwork.

.2 Regulations

.1 Abide by current bylaws and regulations of province and/or municipality in which Work is located, and abide by current laws and regulations with regard to public safety.

.2 Regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers’ Compensation Board and other applicable acts administered by authority having jurisdiction of province apply to Work of this Section.

.3 Safety

.1 Carry out concrete accessories work in accordance with the Ontario Building Code and current Occupational Health and Safety Act construction safety regulations.

.4 Source Quality Control:

.1 Inspection and testing materials and fabrication of Work of this Section, and field quality control specified elsewhere in this Section, may be performed by an Inspection and Testing Company appointed by Consultant.

.2 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of this specification.

.3 Inspection and Testing Company shall be certified by Canadian Welding Bureau, to CSA W178.1, Category 1, Buildings.

.4 Welding inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W178.2.

.5 Payment for specified Work performed by Inspection and Testing Company will be made from cash allowance specified in Section 01 20 00.

.6 Provide access for inspection to all places where Work is manufactured, stockpiled or installed.

1.4 Submittals

.1 Submit data on concrete accessories specified or proposed.

.2 Submit proposed joint details, locations and construction procedures. Include waterstop, crack inducer, reglet, sealant and joint filler products as required.

.3 Submit proposed procedures for applying separate floor topping.

.4 Submit responses to site review reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

.5 Submit samples of:

.1 PVC waterstop, spliced horizontal and vertical crosses, tees, and ells.

.2 Joint fillers.

.3 Neoprene waterstop expansion joint system.

.4 Hydrophilic waterstop.

.5 Aluminum expansion joint system.

.6 Neoprene compression seal.

.6 Submit three copies of manufacturer’s product data sheets including installation, application, and maintenance instructions for:

.1 PVC waterstops.

.2 Neoprene waterstop expansion joint system.

.3 Neoprene compression seal system.

.4 Foamed PVC joint filler.

.5 Preformed joint filler.

.6 Asphalt-impregnated fibre board.

.7 Adhesive for expansion joint filler.

.8 Concrete inserts.

.9 Hydrophilic waterstop.

.10 Aluminum expansion joint system.

.7 Shop Drawings

.1 Submit shop drawings of accessories where required in accordance with Section 01300 indicating where used and how accessories are to be placed and as specified below. Copies of portions or all of the structural drawings will not be accepted as shop drawings.

.2 Clearly indicate all pertinent dimensioning, arrangements and locations of concrete accessories.

.3 Master Plan(s) of Concrete Placements

.1 Before submitting shop drawings of formwork, falsework and reinforcing bars, submit master plan(s) showing separate concrete placements and locations of construction joints, including proposed construction joints in addition to those indicated on Drawings.

.4 Expansion and Construction Joints

.1 Submit shop drawings of joints.

.2 For each expansion joint and construction joint with waterstop, submit an elevation or section taken through the plane of the joint showing the walls and slabs at the joint. Show details of waterstops, sizes, types, and splices at intersections. Submit details of method securing waterstops in place, other details required for construction of a watertight joint, details of preformed joint fillers, joint fillers, sealants, adhesives, and other appurtenances.

.5 Inserts

.1 Submit shop drawings detailing location, size, and type of concrete inserts, and lintel anchor wedge inserts.

.2 Indicate shop coatings, galvanizing, or surface treatments.

.6 Neoprene Waterstop Expansion Joint System

.1 For each expansion joint containing a neoprene waterstop expansion joint system, submit an elevation or section taken through the plane of the joint showing the walls and slabs at the joint. Show details of waterstop system, sizes, types, and splices at intersections. Submit details of method of securing waterstop system in place, and all details required for construction of a watertight joint.

.7 Aluminum Expansion Joint System

.1 For each expansion joint containing an aluminum expansion joint system, submit an elevation or section taken through the plane of the joint showing the walls and slabs at the joint. Show details of system including material, sizes, types and splices at intersections. Submit details of method of securing expansion joint system in place, and all details for construction of a watertight joint.

.8 Prior to submission to Consultant, Contractor shall review all shop drawings. By this review, Contractor represents to have determined and verified all field data, and to have checked and coordinated each shop drawing with requirements of Work and of Contract Documents. Contractor's review of each shop drawing shall be indicated by stamp, date and signature of the Contractor's representative.

.9 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.10 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review is intended as an assistance to the Contractor and will be for conformity to design concept and for general arrangement, and shall not relieve the Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of Contract Documents.

.11 Contractor shall make changes in shop drawings, which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of revisions other than those requested by Consultant.

.12 Fabrication and construction that commences prior to shop drawing review by the Consultant is at the Contractor's risk.

.13 Submit shop drawings as follows:

- 1 copy for review before any Work commences.
- 1 additional copy of shop and erection drawings for distribution as directed by Consultant.
- 1 copy of reviewed shop and erection diagrams to Inspection and Testing Company.

1.5 Sample Panels

.1 Provide concrete accessories for placement in a sample formwork panel for each architectural concrete surface receiving special treatment, painted finish or exposed finish as a result of formwork. Construct 2400 x 2400 in size to fully indicate special treatment or finish required, and include V-joints, reglets, cone ties and tie pattern and other patterns detailed.

.2 Approved sample concrete panels shall be considered basis of quality for accessory work. Locate where directed.

1.6 Delivery, Storage and Handling

.1 Deliver concrete accessories supplied under Work of this Section to those responsible for their installation, to location they direct, and to meet construction schedule.

.2 Exercise care in storing and handling materials of this Section. Handle and store concrete accessories so that no damage, contamination or corrosion is caused to stored or erected Work, or to other property.

.3 Co-ordinate Work of this Section with Work specified in other Sections, and arrange to deliver and concrete accessories in accordance with construction schedule.

1.7 Quality Control

.1 Contractor is not to assign responsibility of coordination of concrete accessories and placing required material. Ensure a full-time qualified superintendent representing Contractor is in attendance to inspect and check all phases of this Work.

1.8 Inspection and Testing of Drilled Anchors

.1 Test drilled anchors by a testing firm certified in accordance with CSA-A283, retained and paid for by the Owner and approved by Consultant in accordance with Section 01 40 00 of these specifications.

.2 Provide casual labour to testing firm's field personnel for purpose of obtaining and handling sample materials. Provide free access to all portions of Work, and cooperate with testing firm.

.3 Test anchors to 150% of the tension working load noted on Drawings or by manufacturer's rated allowable tensile load.

.4 Minimum testing:

For 500 anchors or more, test 5% of anchors
For 100 to 499 anchors, test 7% of anchors
For 50 to 99 anchors, test 10% of anchors
For 20 to 49 anchors, test 14% of anchors
For 10 to 19 anchors, test 20% of anchors
For 1 to 9 anchors, test 33% of anchors.

.5 Additional testing, paid for by the Contractor, will be required if failures occur.

PART 2 - PRODUCTS

Unit Prices

.1 Unit prices requested as a part of the Tender shall include Work erected in place, and preparation and submittal of necessary shop and erection drawings.

.2 Unit prices to be applied to the net area difference.

Materials

.1 Generally in accordance with Reference Standards.

.2 Concrete accessories brought on site shall be new.

.3 Concrete Form Accessories:

.1 Vapour barrier and accessories:

.1 Refer to Section 07 26 16.

.2 Lintel and Shelf Angle Anchors: hot-dipped galvanized, built-in, adjustable, with askew head bolts, washers and nuts.

.1 Peerless Wedge Adjustable Anchor Slot by NCA/Acrow Richmond.

.3 Dovetail anchor slots: Minimum 1.6 mm (1/16") thick galvanized, glass fibre filled.

.4 Galvanized metal key joint: Thickness 0.60 mm (0.025") sized to suit slab on grade thickness for construction and control joints.

.5 Expansion joints: Eva-Cap or approved equal.

.4 Waterstop Accessories

.1 PVC Waterstop to CGSB 41-GP-35M, types 2 and 3. Purpose made, minimum 14 MPa tensile strength, -50°C to 80°C working temperature rating.

.1 Construction Joints, Internal Waterstop.
150 mm (6") wide, ribbed, tapered thickness varying from 9.5 mm (3/8") minimum near centre to 6.4 mm (¼") minimum near edge.
:Wirestop PVC Waterstop type FR-6380, with steel wire fastening loops, by DRE Industries Inc., Etobicoke, Ontario.
:Vinylex PVC Waterstop type RB6-38, by Dayton Superior Canada Ltd., Rexdale, Ontario.
:Epseal PVC Waterstop type 6380, by W.R. Meadows of Canada Ltd.
:CPD Type 5.
:Greenstreak Style 732.
:Vinylex Corp. No. RB6-38H.

.2 Construction Joints, External Waterstop.
240 mm (9.5") wide by 4.5 mm (0.18") thick.
:Vinylex PVC Waterstop type RS-532, by Dayton Superior Canada Ltd., Rexdale, Ontario.
:CPD Type 61.
:Vinylex Corp. No. BS9-532.
:Greenstreak Style 937.

.3 Expansion Joints, Internal Waterstop.
229 mm (9") wide, ribbed, with centre bulb; tapered thickness varying from 9.5 mm (3/8") minimum near centre, to 6.4 mm (¼") minimum near edge, with 20 mm (3/4") inside diameter centre bulb.
:Wirestop PVC Waterstop type CR-9380, with steel wire fastening loops, by DRE Industries Inc., Etobicoke, Ontario.
:Vinylex PVC Waterstop type RLB-38, by Dayton Superior Canada Ltd., Rexdale, Ontario.
:Sternseal PVC Waterstop type 7c, by The Sternson Group, Brantford, Ontario.
:Epseal PVC Waterstop, type no. 9380G, by W.R. Meadows of Canada Ltd.
:CPD Type 7C.
:Greenstreak Style 738.
:Vinylex Corp. No. RB9-38.

.4 Expansion Joints, Exterior Waterstop.
240 mm wide.
:CPD Type 62
:Vinylex Corp. No. BSE9-532.
:Greenstreak Style 938.

.5 Neoprene Waterstop Expansion Joint System:

.1 Jeene Structural Sealing Joint System supplied by Watson Bowman Acme Limited.

.6 Hydrophilic Waterstop:

.1 Adela Ultra Seal MC-2010M as manufactured by Asahi Denka Kogyo K.K.

.5 Copper Strip:

0.549 mm (16 oz.) thick cold rolled, to ASTM B152. The following supply flat stock copper sheet.
:Roy Metal Sales, Concord, Ontario
:Drummond McCall, Hamilton, Ontario

.6 Stainless Steel Strip:

0.91 mm (20 ga) thick stainless steel, grade 304
:National Concrete Accessories (Acrow-Richmond), Rexdale, Ontario.

.7 Aluminum Expansion Joint:

:BI-25 Aluminum Expansion Joint system with natural rubber seals and epoxy injection hose system as per MTO Std. Dwgs. SS113 and SS113-12 as manufactured by A.J. Braun Manufacturing Ltd., Kitchener, Ontario.

.8 Expansion Joint Filler and Isolation Joint Filler:

.1 Bituminous Type:

Premoulded, resilient, non-extruding, asphalt impregnated fibre, to ASTM D1751.

.2 Non-Bituminous Type:

Premoulded, resilient, non-extruding, to ASTM 1752, and compatible with polysulphide urethane, polyepoxide urethane, or neoprene sealants, as applicable.

.9 Bonding Agents

.1 Bonding agent:

.1 Latex emulsion.

.2 Bonding agent: High polymer resin emulsion mixed with cement, mortar or grout to form a water resistant adhesive bond.

.3 Concrete Curing, Sealing Compounds and Hardener Accessories

.4 Floor Hardener:

.1 Metallic Hardener: Ferrous aggregate premixed with Portland cement and plasticizers.

:Ferroplate, by SIKA Canada Ltd.
:Masterplate 200, by Master Builders Ltd.

.2 Non-Metallic Hardener: Natural and synthetic materials with Mohs hardness 7 minimum, premixed with Portland cement.

:Durag Premium, by SIKA Canada Ltd.
:Mastercron, by Master Builders Ltd.

.11 Sandblasting Accessories

.1 Sandblast sand: Fine granular material, hard, strong durable mineral particles conforming to CSA-A179-94.

.2 Sandblast equipment: Capable of delivering 5.6 m^3 (200 cft) of free air at 0.69 MPa pressure, complete with filters, hoses and nozzles that can be regulated to ensure an even finish as approved by Consultant.

.12 Sealers

.1 Penetrating silane sealer:

:Hydrozo Enviroseal 20, by Harris Specialty Chemicals Inc., Burlington, Ontario.
:SM Deck Seal, by Canadian Barrier Ltd., Carp, Ontario.
:Saltguard 12%, by Construction Products Distribution Services, Concord, Ontario.
:Stifel S, by Dayton Superior Ltd., Rexdale, Ontario.
:Hydrozo Silane 40 IPA, by Harris Specialty Chemicals Inc., Burlington, Ontario
:Masterseal SL 40, by Master Builders.
:Cappar Capseal U.

.2 Pigmented sealer:

:Cappar concrete sealer Capseal A50.
:Acrytite by Sternson.

Colour to be determined by Consultant.

.13 Sealants:

.1 Hot-Poured Asphalt:

For use with bituminous type joint filler: rubberized asphalt compound, to OPSS 1212.
:Hi-Spec Hot Poured Joint Sealant, by W.R. Meadows of Canada Ltd.
:Sealz No. 6165 Hot Poured Joint Sealant, by Hydrotech Membrane Corporation.

.2 Cold Poured Liquid Neoprene:

For use with non-bituminous joint filler.
:Gardox, by W.R. Meadows of Canada Limited.

.3 Elastomeric Sealant:

For use with non-bituminous type joint filler.

.1 Two component polysulphide, or two component polyepoxide urethane, in colour selected by Consultant, to CGSB Specification CAN/CGSB-19.24.
:For horizontal joints: THC 900, by Tremco Ltd.
:For vertical joints: Dymeric, by Tremco Ltd.

.2 Or one part urethane, in colour selected by Consultant, to CAN/CGSB-19.13.

.4 Sealant in Conjunction with Dampproofing:

:Plastic cutback asphalt to CAN/CGSB-37.5.

.14 Control Joint Filler:

.1 For control joints in interior floors, approved semi-rigid joint filler, to protect against slab edge breakdown:

.1 For sawcuts made with “Soff-Cut®” saw:

:Loadflex SC Plus, by SIKA Canada Ltd.
:Euco 700, by The Euclid Chemical Company, Rexdale, Ontario.

.2 For other sawcuts and joints:

:Loadflex, by SIKA Canada Ltd.

.2 For control joints in exterior floors left exposed.

:Elastomeric sealant as specified in above subparagraph 2.2.13.3.

.15 Dampproofing:

.1 For use in temperatures above 5°C (40°F).

:Mineral colloid asphalt emulsion, to CAN/CGSB-37.2.

.2 For use in temperatures 5°C (40°F) and below

:Asphalt cutback, unfilled, to meet CGSB 37-GP-6Ma.

.16 Non-Slip Inserts:

Fine aluminum oxide, standard strips, 6 mm (¼”) wide, 10 mm (3/8”) deep.

.17 Curing Blanket:

Amoco Propex #4551, white colour, by Amoco Propex, Hawkesbury, Ontario.

.18 Tie Hole Plugs

.1 Precast concrete plugs: To fit cone holes formed by compatible form ties. Colour and texture to match surrounding concrete.

.19 Concrete Inserts

.1 Concrete inserts: Inserts with plastic setting plugs by NCA/Acrow-Richmond Ltd., or Dayton Superior Canada Limited.

.2 Structural connection inserts: Inserts with plastic setting plugs; LF-W by NCA/Acrow-Richmond Ltd., or F-42 by Dayton Superior Canada Limited.

.3 Loop ferrule inserts: Inserts with plastic setting plugs; SLFW by NCA/Acrow-Richmond Ltd., for F-42 by Dayton Superior Canada Limited.

.4 Lifting eye bolt: LEB by NCA/Acrow-Richmond Ltd., or F-49 by Dayton Superior Canada Limited.

PART 3 - EXECUTION

3.1 General

.1 Perform concrete accessories Work in accordance with requirements of CSA-A23.1 unless indicated otherwise on Drawings.

.1 Examination

.1 Verify and approve alignment and levels of supporting members before laying roof deck. Do not proceed with erection until conditions are made satisfactory.

.2 Erection

.1 Notify Consultant and Inspection and Testing Company a minimum of 24 hours prior to installing concrete accessories to allow for inspection.

3.4 Formwork Erection

.1 Ensure that supplied accessories, hardware, and items to be cast-in will fit concrete dimensions.

.2 Ensure concrete surfaces of construction joints are properly prepared for application of bonding agents prior to placing fresh concrete.

.3 Provide continuous waterstop at all construction joints in water retaining structures and structures with high ground water level to 1000 mm (36”) above the water level and not less than locations noted on Drawings.

3.5 Forming of Architectural and Exposed Concrete

.1 The intent of this Section is to ensure the accessories for formwork are of a high quality resulting in concrete surfaces free of unsightly cold joints, blemishes, bugholes, honeycombing and cracking.

.2 Allow Consultant to inspect and approve accessories placed in formwork prior to placing concrete.

.3 Ensure that horizontal and vertical reglets to be placed in formwork are acceptable for joint sealants.

.4 Ensure that V-joints and reglets in forms at all vertical and horizontal placement breaks are acceptable for joint sealants.

.5 Fill exterior V-joints and reglets in walls below grade or where waterproofing is specified with an approved cementitious waterproofing or other approved waterproofing material.

3.6 Concrete Accessories

.1 Install concrete accessories in accordance with Drawings and manufacturer's recommendations, straight, level and plumb. Ensure adequate support to prevent movement during concrete placement.

.2 Install concrete inserts with plastic setting plugs.

.3 Install waterstops continuous without displacing reinforcement. Do not nail through waterstops. Heat seal joints watertight.

.4 Wire waterstop to reinforcing to prevent folding during concrete placement.

.5 Self Angle Anchors: Install anchors as indicated on Drawings and shop drawings, and tighten nuts and bolts at each anchor.

.6 Dovetail Anchor Slots:

.3 Build in dovetail anchor slots for masonry anchors in locations directed by mason.

.4 Install dovetail anchor slots for full height of vertical concrete surfaces faced with masonry that exceed a height of 400 mm (16") and that are not waterproofed.

.5 Install slots continuous and vertical at 600 mm (24") centres maximum, with at least one slot at each surface 600 mm (24") or less in width.

3.7 Construction and Expansion Joints

.1 PVC Waterstops in Construction and Joints

.1 Provide continuous waterstop at construction joints in water retaining structures and structures with high ground water level to 1000 mm (36") above the water level and not less than locations noted on Drawings.

.2 Provide and install internal PVC waterstops specified in paragraph 2.2.4.1.1 at construction joints in walls which retain earth, and in construction joints in tunnel slabs.

.3 struction joints in walls which retain earth, and in construction joints in tunnel slabs.

.4 Provide and install external PVC waterstops specified in paragraph 2.2.4.1.2 at below grade construction joints, on earth face of walls which retain earth.

.5 Use prefabricated factory-made sections at junctions (at “L”, “T”, “cross” & “transition” joints), for both flat and vertical junctions as applicable, to form a continuous unbroken seal.

.6 Place waterstops with equal embedment each side of joint.

.7 Join waterstops in floors to waterstops in walls.

.8 Heat seal joints in PVC waterstops to make watertight, using mitred joints, in accordance with manufacturer’s instructions.

.9 Do not displace reinforcement when installing waterstops.

.10 Tie edges to adjacent reinforcing bars to prevent displacement during concrete placement.

.11 Hydrophilic Waterstops in Construction Joints

.12 Install waterstops in strict accordance with manufacturer’s printed specifications and recommendations.

.13 Installation shall not proceed when work areas are flooded to the extent that would cause hydrophilic waterstop to hydrate; nor when precipitation can be responsibly anticipated before hydrophilic waterstop can be properly installed or protected.

.14 Clean all debris, dirt and rocks from dry concrete surface. Concrete to be free of large voids and projections.

.15 Apply adhesive, 3M-2141 bonding agent to prepared concrete surface and allow to set approximately 15 minutes or until tacky.

.16 Press the entire length of hydrophilic waterstop firmly against primed surface. Verify a minimum of 50 mm (2”) of concrete coverage will be maintained over entire placement of waterstop. Place in maximum practicable lengths to minimize coil and joints.

.17 Overlap ends a minimum 50 mm (2”) when joining.

.18 When working with wet concrete, nail hydrophilic waterstop in place using concrete nails placed 250-300 mm (10”-12”) apart.

.19 Pour and vibrate concrete. Whenever possible do not pour concrete directly on waterstop or allow vibrator to come in direct contact with waterstop.

.20 Provide and install waterstops at construction joints as indicated on Drawings.

.21 Construction Joints at Junction of Old and New Work:

.22 Install continuous copper strip (flat sheet material specified in paragraph 0**Error! Reference source not found.**) waterstop, for full length of joint between old and new construction, shaped as detailed on Drawings, and with joints lapped and soldered to be watertight.

.23 Cut dovetail chase to receive strip in existing structure with carborundum wheel.

.24 Embed strip in chase with solidly packed metallic or chemical waterproofing grout.

.25 Expansion Joints

.26 PVC Waterstops in Expansion Joints

.27 Provide and install PVC waterstops with centre bulb specified in paragraph 0.4.4.3, in expansion joints in foundation walls, walls retaining earth, and floor framing.

.28 Use prefabricated factory-made sections at junctions (at “L”, “T”, “cross” & “transition” joints), for both flat and vertical junctions as applicable.

.29 Place waterstops with equal embedment each side of joint.

.30 Join waterstops in floors to waterstops in walls.

.31 Heat seal joints in PVC waterstops to make watertight, using mitred joints, in accordance with manufacturer’s instructions.

.32 Tie edges to adjacent reinforcing bars to prevent displacement during concrete placement.

.33 Fill joints at each side of waterstop with premoulded expansion joint filler specified in paragraph 0.8. For joints to be caulked, stop joint filler 45 mm (1.75”) back of concrete face, to allow for backer rod and sealant.

.34 Install and anchor expansion joint hardware supplied under Work of this Section.

.35 Expansion Joints at Junctions of Old and New Work

.36 Install continuous copper strip (flat sheet material specified in paragraph 0**Error! Reference source not found.**) waterstop, for full length of joints between old and new construction, shaped as detailed on Drawings, and with joints lapped and soldered to be watertight.

.37 Cut dovetail chase to receive strip in existing structure with carborundum wheel.

.38 Embed strip in chase with solidly packed metallic or chemical waterproofing grout.

.39 Install finish hardware as detailed on Drawings.

.40 Provision for Future Extension:

.41 Install continuous PVC waterstop with centre bulb, for full length of junction between new and future construction, and heat seal joints to make watertight.

.42 Provide protection boxes, hardware, and fasteners as required to protect end of waterstop at expansion and construction joints for future expansion.

.43 Slab-on-Grade Isolation Joints:

.44 Install 12 mm (½") thick premoulded joint filler specified in paragraph 0**Error! Reference source not found.**, around perimeter of slabs-on-grade at junction of vertical surfaces, equipment bases and where indicated on Drawings.

.45 Install joint filler for full depth of slabs.

.46 Install joint filler to within 28 mm (1.125") of top of slab where sealant is indicated.

.47 Preformed Joint Fillers

.48 Affix self-expanding cork to face of concrete immediately prior to second placement. Remove coatings and debris. Keep cork dry to prevent premature expansion of cork.

.49 Provide foamed PVC joint filler in dry areas.

.50 Horizontal Expansion Joints

.51 Seal top of horizontal expansion joints of liquid holding structures with sealant. Remove spills or overflows.

.52 Neoprene Waterstop Expansion Joint System

.53 Provide at locations shown on Drawings.

.54 Assemble intersections, splice, and install waterstop in accordance with manufacturer's printed instructions.

.55 Aluminum Expansion Joint System

.56 Provide at locations shown on Drawings.

.57 Install system in accordance with manufacturer's shop drawings and printed instructions.

.58 Epoxy injection as per manufacturer's instructions.

.59 Neoprene Compression Seal System

.60 Provide at locations shown on Drawings.

.61 Assemble intersections, splice and install compression seal in accordance with manufacturer's printed instructions.

3.8 Placing Concrete

.1 Ensure accessories and hardware and other items to be cast into concrete are placed securely and will not cause undue hardship in placing concrete.

.2 Ensure accessories and hardware, inserts, embedded parts, formed expansion and contraction joints and other critical items are not disturbed during concrete placement.

.3 Ensure waterstop is securely wired to reinforcing to prevent folding or movement during concrete placement. Maintaining the integrity and correct position of waterstop is critical to the performance of the structure.

3.9 Vapour Barrier

.1 Refer to Section 07 26 16

3.10 Field Quality Control

.1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:

.1 Verification of material properties.

.2 Verification that erection and fastening comply with Contract Documents.

.3 General inspection of coating touch-up.

3.11 Cleaning

.1 Repair, remove and clean drips and smears resulting from Work of this Section on exposed, finished surfaces or surfaces to be subsequently finished.

.2 Hose down sandblasted surfaces. Brush thoroughly with stiff broom to remove dust and loose particles.

3.12 Defective Work

.1 Variations in excess of specified tolerances and failure of materials or workmanship to meet requirements of this specification will be considered defective Work performed by this Section.

.2 Replace defective Work, as directed by Consultant.

.3 Replace damaged accessories where exposed to view.

.4 Contractor shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient or fails to meet the shop or fieldwork drawing details. Costs for additional inspection, testing, review and redesign to be deducted from Contract Value.

END OF SECTION

Concrete Reinforcement

PART 1 - GENERAL

1.1 General Requirements

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

.3 Obtain a copy of CSA Standard A23.1, and maintain on site.

1.2 Description

.1 Sections which Specify Reinforcement Installed in Compliance with This Section.

.1	Excavated Caissons	Section 31 63 23
.2	Concrete Sidewalks and Curbs	Section 32 13 15

.2 Related Work Specified in Other Sections

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Excavation and Backfill	Section 31 23 10
.4	Concrete Formwork	Section 03 10 00
.5	Concrete Accessories	Section 03 15 00
.6	Cast-In-Place Concrete	Section 03 30 00
.7	Concrete Floor Finishes	Section 03 35 00
.8	Grout	Section 03 37 00

.9 Equipment bases, exterior catch basins and manholes and similar Work specified for inclusion under mechanical and electrical Work. Division 21, 22, 23, 26, 27 & 28

.3 Work Installed but Supplied under Other Sections

.1 Install materials specified to be supplied under other Sections of these project Specifications. Materials include but are not limited to:

.2 Ensure installation is to satisfaction of trades concerned and of Consultant prior to placing concrete.

.4 Cooperation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section.

.5 Cooperation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section.

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.6 Cooperation with Inspection and Testing Company:

.1 Provide free access to Work.

1.3 Quality Assurance

.1 Reference Standards and Publications:

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first three standards listed below.

.3 The following reference standards shall govern Work of this Section, except where they are in conflict with requirements imposed by this Specification, in which case the latter shall govern. Standards referenced by following Standards apply but are not necessarily repeated in following list:

.1 2012 OBC “Ontario Building Code”.

.2 CSA-A23.1-19, “Concrete Materials and Methods of Concrete Construction”.

.3 CSA-A23.3-19, “Design of Concrete Structures for Buildings”.

.4 CAN/CSA-G30.18-21, “Carbon Steel Bars for Concrete Reinforcement”.

.5 CAN/CSA-G164-18, “Hot Dip Galvanizing of Irregularly-Shaped Articles”.

.6 CSA-W186-21, “Welding of Reinforcing Bars in Reinforced Concrete Construction”.

.7 ASTM D3963/D3963M-21, “Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars”.

.8 American Society for Testing and Materials (ASTM) where noted.

.9 American Concrete Institute Detailing Manual (ACI 315-18) where noted.

.10 Concrete Reinforcing Steel Institute (CRSI) where noted.

.11 Reinforcing Steel Institute of Canada (RISC), “Manual of Standard Practice, Metric Supplement” where noted.

.12 Provincial safety standards where applicable.

.2 Regulations

.1 Abide by current bylaws and regulations of province and/or municipality in which Work is located, and abide by current laws and regulations with regard to public safety.

.2 Regulations of the Minister of Labour, Occupational Health and Safety Act, the Workers' Compensation Board and other applicable acts administered by the authority having jurisdiction of the province apply to Work of this Section.

.3 Safety

.1 Carry out concrete reinforcement Work in accordance with Ontario Building Code and current Occupational Health and Safety Act construction safety regulations.

.4 Qualifications

.1 The applicator for epoxy-coating of reinforcing steel shall be certified under CRSI Voluntary Certification Program for Fusion Bonded Epoxy Coating Applicator Plants.

.2 Undertake welding of reinforcement only by fabricator or Subcontractor approved by Canadian Welding Bureau to requirements of CSA Standard W186.

.5 Source Quality Control:

.1 Inspection and testing materials and fabrication of Work of this Section, and field quality control specified elsewhere in this Section, may be performed by an Inspection and Testing Company appointed by Consultant.

.2 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of this specification.

.3 Identify and correlate reinforcing steel from Canadian mills with test reports for compliance with requirements specified.

.4 Test unidentified reinforcing steel at expense of Contractor. Perform testing for each 1 tonne (ton) or part thereof supplied for incorporation in Work.

.5 Payment for specified work performed by Inspection and Testing Company will be made by Owner.

.6 Provide access for inspection to all places where Work is manufactured, stockpiled or installed.

1.4 Submittals

.1 General

.1 Submit copies of mill certificate test reports of reinforcement if requested by Consultant.

.2 Submit results of ladle analysis of all reinforcement to be spliced by welding, and submit manufacturer's information and test reports for mechanical splices of all reinforcement to be mechanically spliced.

.3 Submit proof that applicator of epoxy coating is certified by the manufacturer and that the applicator is certified under the CRSI Voluntary Certification Program for Fusion-Bonded Epoxy Coating Applicator Plants.

.4 Submit responses to site review reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

.2 Shop Drawings

.1 Submit shop drawings, including placing drawings and bar lists, in accordance with Section 01 30 00 and as specified below. Copies of portions or all of the structural drawings will not be accepted as shop drawings.

.2 Prepare placing drawings and bar lists in accordance with the American Concrete Institute (ACI) Detailing Manual, the Reinforcing Steel Institute of Canada (RSI) Reinforcing Steel Manual of Standard Practice, and the typical details included with Contract documents.

.3 Prepared placing drawings to minimum scale of 1:50 (¼" = 1'-0").

.4 Submit placing drawings and bar lists sufficiently detailed and dimensioned to permit correct placement of reinforcement and accessories without reference to the architectural or structural Drawings.

.5 Clearly indicate bar sizes, bending and cut lengths, spacings, locations and quantities of reinforcing steel and wire fabric. Submit bending and cutting schedules and supporting and spacing devices.

.6 Use large scale details for areas of congested reinforcement.

.7 Show reinforcement, including dowels, in elevation on placing drawings for wall reinforcement.

.8 Show concrete cover to reinforcement.

.9 Show location of construction joints.

.10 Indicate type of chair where concrete is exposed to view, in accordance with paragraph 2.2.2.6.

.11 Prior to submission to Consultant, Contractor shall review all shop drawings. By this review, Contractor represents to have determined and verified all field data, and to have checked and coordinated each shop drawing with requirements of Work and of Contract documents. Contractor's review of each shop drawing shall be indicated by stamp, date and signature of the Contractor's representative.

.12 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.13 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review is intended as an assistance to the Contractor and will be for conformity to design concept and for general arrangement, and shall not relieve the Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of Contract Documents.

.14 Contractor shall make changes in shop drawings, which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of revisions other than those requested by Consultant.

.15 Do not commence fabrication of reinforcement before drawings have been reviewed and Consultant's comments incorporated on drawings issued to fabricating shop. Fabrication and construction that commences prior to shop drawing review by the Consultant is at the Contractor's risk.

.16 Submit shop drawings as follows:

- 1 copy for review before any Work commences.
- 1 additional copy of shop and erection drawings for distribution as directed by Consultant.
- 1 copy of reviewed shop and erection diagrams to Inspection and Testing Company.

.3 Samples

.1 Submit samples of accessories.

.4 Inspection Reports:

.1 Base inspection and testing upon Contract Drawings, Specifications and reviewed shop and placing drawings bearing Stantec review stamp.

.2 Report immediately to Consultant, by phone, any deviations from the Contract Drawings, giving recommendations for further testing deemed necessary. No modifications to be made or instructions given without prior approval of Consultant.

.3 Submit reports at least weekly when shop and site Work of this Section is in progress. At beginning of each report, state whether Contract Requirements have been met and list separately conditions not meeting requirements.

.4 Distribute inspection reports as follows:

- 1 copies to Consultant.
- 1 copy to Consulting Structural Engineer.
- 1 copies to Contractor.

.5 Sign report by inspector who performs inspection, and describe progress of Work, deficiencies found and corrective actions taken.

.6 Include an ongoing deficiency list of outstanding items from previous reports; indicate date of first observation, comment on status and date of corrective action, and comment on status.

.7 Issue final report at end of the applicable phases of Work signifying that Work is in overall conformity with Contract Documents and reviewed shop drawings.

1.5 Delivery, Storage and Handling

.1 Deliver materials to site in bundles easily identified and properly marked.

.2 Store and handle material on site in a manner to prevent damage and contamination.

.3 Do not straighten or re-bend any reinforcement.

.4 Do not use any reinforcement that has been kinked or bent on site.

.5 Epoxy-Coated Bars:

.1 Protect epoxy-coated bars, with a suitable covering on drive rolls on shear beds, and back-up barrels on benders.

.2 Do not drop or drag bars.

.3 Use only systems with padded contact areas.

.4 Lift bar bundles with strong back, spreader bar, multiple pick up points or supports, or platform bridge, to prevent bar to bar abrasion from sags.

.5 Use nylon slings or padded wire rope slings.

.6 Store above ground on wooden or padded supports or other non-abrasive cribbing to prevent sagging.

.7 Do not place other materials on top of stored bars.

.8 Store away from long-term direct sunlight.

.9 Cover as required.

1.6 Quality Control

.1 Contractor shall not assign responsibility of coordination of placing reinforcing steel and placing other required material. Ensure a full-time qualified superintendent representing the Contractor is in attendance to inspect and check all phases of this Work.

1.7 Inspection and Testing of Reinforcement

.1 Provide casual labour to testing firm's field personnel for purpose of obtaining and handling sample materials. Provide free access to all portions of Work, and cooperate with testing firm.

.2 Provide samples of reinforcement and epoxy coated reinforcement as delivered to site. State that epoxy coating meets specified standards and manufacturer's requirements.

.3 Testing firm shall take at least one tension test and one bend test for each bar size for each batch of 5 tonnes or less in accordance with CAN/CSA-G30.18.

.4 Testing firm is to test 10% of all specified reinforcement products.

.5 Testing firm to certify, in writing, that reinforcement meets the specified requirements.

1.8 Payment

.1 Payment for Work of this Section shall be on a lump sum basis as tendered which shall be full compensation for all labour, materials, and equipment necessary to complete the Work, including all subsidiary and incidental items thereto for which separate payment is not elsewhere provided.

1.9 Alternative Prices

PART 2 - PRODUCTS

2.1 Unit Prices

.1 Unit prices requested as a part of the Tender shall include detailing, materials, bending, placing and cleaning.

.2 Unit prices to be applied to the net area difference.

2.2 Materials

.1 Generally:

.1 In accordance with Reference Standards.

.2 Bar Reinforcing Steel:

.1 Bar areas are 100 mm^2, 200 mm^2, 300 mm^2, 500 mm^2, 700 mm^2, 1,000 mm^2, 1,500 mm^2, and 2,500 mm^2 for bar designations 10M, 15M, 20M, 25M, 30M, 35M, 45M and 55M respectively. Be aware that some sources produce bars of same designation but with significantly smaller areas, and such bars shall not be used without written permission of Consultant and appropriate adjustments in number of bars.

.2 Reinforcing steel: To CAN/CSA-G30.18,400 MPa yield grade deformed billet steel bars.

.3 Reinforcing steel to be welded with short bending radii: To CAN/CSA-G30.18, 400W MPa yield grade special low alloy deformed billet steel for welding. The equivalent carbon content is not to exceed 0.5. Grade 400W is also to be used where the bending radius is smaller than recommended standards.

.4 Welded steel wire fabric: To CSA-G30.5, flat sheets, not rolls.

.5 Welded deformed steel wire fabric: To CSA-G30.15, flat sheets, not rolls.

.6 Chairs, bolsters, bar supports, spacers: Adequate for strength and support of reinforcing. Where concrete is exposed to view, exposed to elements or where rust is possible; use plastic, plastic-tipped or non-corrosive material, or precast concrete made from concrete of equal strength and durability of concrete to be

placed. Chairs used shall not result in voids or unacceptable appearance in exposed concrete surfaces.

.7 Slab on grade chairs and bar supports: Precast concrete, plastic chairs, or subject to approval concrete masonry block or brick of correct height. Metal pipe, stone or wood are not acceptable.

.8 Tie wire: Minimum 1.6 mm (1/16") annealed type or patented system approved by Consultant.

.9 High strength reinforcing bar: Deformed, threaded type high strength reinforcing bar with an ultimate strength of 1035 MPa, complete with nuts, couplers, plates and other required accessories.

.10 Deformed threaded normal strength reinforcing bars: To ASTM A615 with a yield strength of 517 Mpa, complete with nuts, couplers, plates and other required accessories.

.11 Mechanical Connection Compression Splice Couplers:

To develop 125 percent of yield strength of bar in compression and concentrically align bars.
:CADWELD C16 Series Compression Only splices, by Erico Inc.
:Lenton Splice, including plastic internal coupler thread protector and plastic bar end thread protector, by Erico Inc.

.12 End Bearing Splices:

To concentrically align bars and meet requirements of CSA Standard A23.3 Clause 12.16.6.
:PRE-SET, by Stircon Products, distributed by Harris Rebar Inc.
:SPEED SLEEVE, by Erico Inc.

.13 Mechanical Connection Tension Splice Couplers:

To develop 125 percent of yield strength of bar in tension.
:PortaFORGE, by Stricon Products Ltd., distributed by Harris Rebar Inc.
:Lenton Splice, including plastic internal coupler thread protector and plastic bar end thread protector, by Erico inc.

.14 Fusion bonded epoxy-coated reinforcing steel: From Ministry of Transportation of Ontario (MTO) approved sources, in accordance with ASTM D3963/D3963M and additionally to be primed or treated with conversion coating before epoxy coating, in accordance with MTO requirements.

.15 Supports for epoxy-coated reinforcement:

.1 Wire bar supports shall be coated with epoxy or plastic compatible with concrete for distance of at least 50 mm from point of contact with epoxy-coated reinforcement.

.2 Support bars and spreader bars shall be epoxy coated reinforcement.

.3 Tie wire shall be minimum 1.6 mm (1/16") annealed wire coated with epoxy, plastic or nylon.

.16 Patching material for epoxy coated reinforcement: Use approved compatible epoxy coating material applied in strict accordance with manufacturer's instructions.

.17 Ducts for post-tensioning: Mortar-tight galvanized corrugated metal tubes not less than 6 mm (¼") larger in internal diameter than bar to be enclosed. Provide pipes, vents, connections, grout fittings and other requirements for injection of grout after tensioning.

2.3 Fabrication of Concrete Reinforcement

.1 Fabricate reinforcement hooks, bends, laps and similar details to CSA-A23.1, ACI Detailing Manual 315 and Metric Supplement of the Reinforcing Steel Institute of Canada (RISC) Manual of Standard Practice and in accordance with Drawings and Specifications and the reviewed shop drawings.

.2 Fabricate reinforcing steel only in permanent fabricating shop, unless otherwise approved by Consultant.

.3 Verify dimensions of existing Work prior to commencing fabrication.

.4 Verify all drawing dimensions and conditions prior to commencing fabrication.

.5 Bend reinforcement cold unless otherwise approved by Consultant.

.6 Tag reinforcing bars to indicate placement as designated on shop drawings.

.7 Provide padded contact surfaces for systems for handling epoxy-coated bars, to prevent damage to coating.

.8 Provide column and wall dowels from foundations using same reinforcing as in columns and walls, unless noted otherwise on Drawings.

.9 Provide horizontal, L-shaped corner bars with legs minimum 600 mm (24") of same cross section and spacing as horizontal bars to a maximum size of 20M or welded wire fabric around wall and grade beam corners, unless otherwise detailed on Drawings.

.10 Provide additional support bars as required to support main reinforcement indicated.

.11 Provide stirrup support bars sized to match stirrup size in hooks or corners of beam stirrups, unless noted otherwise on Drawings.

.12 Provide 10M "U" spacers at 3 m (10 ft) on centre horizontally and 1.5 m (5 ft) on centre vertically to hold wall reinforcing mats in position.

.13 Provide mesh over electrical conduit, ductwork or piping buried in slabs with strips of 102 x 102 x MW13.3 x MW13.3 welded wire fabric 300 mm (12") each side. If principal slab reinforcement is placed above conduit, then place strips under conduit. Position of reinforcing steel takes precedence over conduit, ductwork or piping.

.14 Splices:

.1 Provide splices only where specifically indicated on Drawings.

.2 Locate reinforcing splices not indicated on Drawings at points of minimum stress. Location of splices shall be approved by Consultant.

.3 Refer to structural Drawings for minimum splices. Splices to be Class A unless noted otherwise.

.4 Stagger alternate mechanical splices 750 mm apart.

.5 Stagger alternate end bearing splices 750 mm apart.

.6 Install on threaded splices, plastic internal coupler thread protector and plastic bar end thread protector.

Spec Note: Check that locations of tension and compression mechanical splices or end bearing splices are shown on Drawings.

.15 Mechanical Connection Compression Splices and End Bearing Splices in Column Reinforcement:

.1 For column bars larger than No. 35, provide mechanical connection compression splices, or end bearing splices.

.2 For end bearing splices cut bearing faces of bars square, with abrasive wheel and jig to provide flat surface meeting requirements of CSA Standard A23.3 Clause 12.16.6.

.16 Mechanical Connection Tension Splices in Column Reinforcement:

.1 Provide mechanical tension splices where indicated on Drawings.

.17 Weld reinforcement where indicated and only by an organization certified under requirements of CSA-W186. Do not weld reinforcing at any location without written approval of Consultant.

.18 Test all welded reinforcement splices unless noted. Such testing to be paid for by Contractor.

.19 Carry column reinforcing at locations noted two storeys high. If desired, Contractor may weld reinforcing with appropriate tests or use approved mechanical splices to develop full tension force.

.20 Provide minimum reinforcing to slabs on grade unless otherwise noted: 100 mm (4”) slabs 305 x 305 x MW66.7 x MW66.7 “step through” mesh. 125 mm (5”) and 150 mm (6”) thick slabs 305 x 305 x MW100 x MW100 “step through” mesh. An alternative using tied reinforcing steel providing the equivalent reinforcing value will be considered if approved in writing by Consultant.

.21 Lap adjacent sheets of welded steel wire fabric to provide an overlap of at least one cross wire spacing plus 50 mm (2”).

PART 3 - EXECUTION

3.1 General

.1 Perform concrete reinforcement Work in accordance with requirements of CSA-A23.1, unless indicated otherwise on Drawings.

3.2 Examination

.1 Examine formwork to verify that it has been completed and adequately braced in place before commencing to place reinforcement.

3.3 Placing Reinforcing Steel

.1 Place reinforcing steel in accordance with CSA-A23.1, Clause 12, CSA-A23.3, typical details, and as indicated on Drawings.

.2 Place reinforcement within the more stringent tolerances of sentence above and ±6 mm (¼") for slab steel and ±12 mm (½") for other steel. Bends and end of bars to be within 50 mm of specified location. Adequately support and secure reinforcement to prevent movement within the allowable tolerances before and during placing of concrete.

.3 Place and secure reinforcement in its correct position prior to placing concrete. Do not adjust or place reinforcement in freshly placed concrete.

Spec Note: Engineer to make sure details have been added to drawings.

.4 Reinforce around openings as noted on structural Drawings.

.5 Supply and place necessary support accessories, whether specifically detailed or not, to ensure proper placement of reinforcing steel.

.6 Use non-corrosive or non-stain supports for reinforcing when concrete is exposed.

.7 Support slab on grade, structural slab and pile cap reinforcement at 900 mm maximum on centre.

.8 Supply bar support chairs for top reinforcing bars in sufficient quantity to not exceed 900 mm average spacing in each direction.

.9 Supply chairs to support temperature reinforcing or mesh to maintain minimum covers specified.

.10 Ensure supports are such that they are not forced into supporting formwork or soil and do not break or collapse from weight of reinforcement and other construction loads.

.11 Supply horizontal reinforcing spacers in walls to ensure reinforcing does not move during placement.

.12 Support reinforcement laterally in pairs on opposite faces of walls, columns and beams.

.13 Provide minimum concrete cover to reinforcing steel in accordance with CSA-A23.1, Clause 12.6 except where indicated on Drawings and typical details.

.14 At concrete surfaces to receive bush-hammered finish, provide additional cover of 6 mm (¼") unless otherwise indicated on Drawings.

.15 Where a structural concrete member is required to have a fire-resistance rating as identified on Drawings or in Specifications, provide minimum concrete cover to reinforcing steel in accordance with Chapter 2 of the Supplement to the National Building Code, "Fire Performance Ratings".

.16 Do not re-bend or straighten reinforcing steel after initial fabrication, unless so indicated on Drawings or in written instructions of Consultant.

.17 Ensure reinforcing is clean, free of loose scale, dirt, oil, rust and other foreign coatings.

.18 Place reinforcement for interior and exterior slabs on grade as indicated on Drawings. Place and support uniformly above centre line of slab, and have a minimum concrete top cover of 40 mm interior, 50 mm exterior.

.19 Place reinforcing for slab on grade on precast concrete chairs or other approved supports at correct height.

.20 Obtain written approval from Consultant prior to cutting of reinforcing to accommodate openings, or embedded items or to accommodate precast concrete, structural steel or timber connections. Allow for additional splice material which may be required to reinforce these cut bars as directed by Consultant.

.21 Tie, do not weld, reinforcement in place.

.22 Install mechanical connection splices and end bearing splices in accordance with manufacturer's instructions.

.23 Metal Filled Sleeve Splices:

.1 Remove dirt, loose mill scale and rust from end surfaces of sleeved bars.

.2 Secure bars in concentric alignment with ends separated by 3 mm (1/8") to 6 mm (¼").

.3 Install filler metal so that space between ends of bars and voids in sleeve are filled.

.4 Confirm that sound filler metal is present at both ends of sleeve and at entry port.

.24 End-Bearing Splices:

.1 Remove dirt, loose mill scale and rust from bar surfaces to be enclosed by splice, at time of installation. Remove burrs that may separate bearing faces.

.2 Rotate upper bar to provide most complete contact between bearing faces.

.3 Install a cloaking sleeve to hold spliced bars in secure alignment, and with an inspection hole opposite contact faces facing outwards.

.4 Face sleeved flanges or projections to inside of column.

.5 Provide reducer inserts when spliced bars differ by one bar size.

.6 Verify by physical measurement that bar ends terminate in flat surfaces within 1.5 degrees of a right angle to the axis of bar, and are fitted within 3 degrees of full bearing.

.29 Reinforcement for Separate Topping:

.1 Reinforce separate toppings 50 mm thick and over.

.2 Reinforce with flat sheets of welded steel wire fabric:

:102 x 102 MW13.3 x MW13.3 for toppings 50 mm to 75 mm thick.
:102 x 102 MW18.7 x MW18.7 for toppings over 75 mm to 100 mm thick.
:10M @ 300 each way for toppings over 100 mm thick.

.3 Place wire fabric 40 mm below finished concrete surface.

.30 Epoxy-Coated Reinforcement:

.1 Provide epoxy-coated bars for reinforcement that is within 100 mm of top surface of slabs of walkways, roads, driveways, parking areas, loading docks and ramps thereto, including chair bars, and bars extending into slab from columns, walls, balustrades and curbs.

.2 Provide epoxy-coated top and bottom bars, dowels, and stirrups, in parking structure floor areas not protected by membrane, including stairs, landings, lobbies, curbs, and islands, and within 1000 mm of expansion joints.

.3 Repair all visible damage and bare areas including bar ends. Remove loose or deleterious material. Remove any rust by blast cleaning. Coat area with epoxy provided by epoxy-coated bar supplier.

.4 Do not use bars with more than 1 percent of surface area covered by patching material.

.5 Sheared and cut ends to be coated with patching material.

.6 Approved mechanically spliced reinforcement to have all parts coated with patching material.

.7 Approved welded spliced reinforcement to have all welds and splice material coated with patching material.

.8 Increase bending radii of epoxy-coated reinforcement in accordance with recognized standards to ensure coating does not crack.

.31 Concrete Fireproofing:

.1 Encase structural steel members with concrete where indicated on structural Drawings or where noted “C.F.” on Drawings.

.2 Completely wrap members with 102 x 102 MW9.2 MW9.2 welded steel wire fabric. For interior beams less than 450 mm deep, fabric may be wrapped around bottom flange only.

3.4 Adjusting and Cleaning

.1 Adjust and secure reinforcement in correct position immediately before concrete is placed.

.2 Remove contaminants which lessen bond between concrete and reinforcement.

3.5 Field Quality Control

.1 Provide competent supervisor, with at least three years experience in reinforcement placement, to direct placement of reinforcement.

.2 Inspect placement of reinforcement for conformance with Drawings and Specifications, before each concrete placement, and correct as necessary.

.3 Be aware that Consultant's periodic review of selected areas of reinforcement are for verification of conformity to design concept and general arrangement only, and shall not relieve Contractor of responsibly for quality control, errors, or omissions, or conformance with requirements of Contract Documents.

.4 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:

.1 Identify and correlate reinforcing steel with test results.

.2 Test unidentified reinforcing steel.

.3 General inspection of reinforcing steel placement size.

3.6 Defective Work

.1 Incorrectly fabricated, misplaced, or omitted reinforcement, variations in excess of specified tolerances and failure of materials or workmanship to meet requirements of this specification will be considered defective Work performed by this Section.

.2 Replace or adjust defective Work, before concrete is placed as directed by Consultant.

.3 Replace or strengthen concrete Work which is deficient as a result of incorrectly fabricated, misplaced, or omitted reinforcement, which was not corrected before concrete was placed.

.4 Contractor shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient or fails to meet the Drawings, or shop or field work drawing details. Costs for additional inspection, testing, review and redesign to be deducted from Contract Value.

END OF SECTION

Cast-in-Place Concrete

PART 1 - GENERAL

1.1 General Requirements

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

.3 Contractor shall obtain a copy of CSA Standards A23.1, and A23.2 and maintain on site.

1.2 Description

.1 Sections Which Specify Concrete Work Performed in Compliance with This Section:

.1	Excavated Caissons	Section 31 63 23

.2 Related Work Specified in Other Sections

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Excavation and Backfill	Section 31 23 10
.4	Steel Pipe Pile Foundations	Section 31 62 00
.5	Drainage	Section 33 46 00
.6	Concrete Accessories	Section 03 15 00
.7	Concrete Reinforcement	Section 03 20 00
.8	Concrete Floor Finishes	Section 03 35 00
.9	Grout	Section 03 37 00
.10	Supply of Anchor Bolts, Plates and Accessories for Structural Steel Work (to be Cast in Concrete)	Section 05 12 00
.11	Metal Fabrications (to be Cast in Concrete)	Section 05 50 00
.12	Metal Stairs	Section 05 51 00
.13	Preparing Concrete Surfaces to Receive Dampproofing and Waterproofing	07 11 00 07 14 16 07 11 00
.14	Process Items (to be Cast in Concrete)	Division 11 and 14
.15	Mechanical Items (to be Cast in Concrete)	Division 21, 22 and 23

.16 Electrical Items (to be Cast in Concrete) Division 26, 27 and 28

.17 Equipment bases, exterior catch basins and manholes and similar Work specified for inclusion under mechanical and electrical Work

Division 21, 22, 23, 26, 27 and 28

.3 Work Installed but Supplied under Other Sections

.1 Install materials specified to be supplied under other Sections of these project Specifications. Materials include but are not limited to:

.1 Fabricated components, anchor bolts, bearing plates, sleeves and other inserts to be built into concrete.

.2 Ensure installation is to satisfaction of trades concerned and of Consultant prior to placing concrete.

.3 Cooperation with Work of Other Sections:

.1 Check project Drawings and specifications for requirements of other Sections, which will affect installation of Work of this Section.

.4 Cooperation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section.

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.5 Cooperation with Inspection and Testing Company:

.1 Contractor to provide casual labour to Inspection and Testing Company's field personnel for purpose of obtaining and handling sample materials. Provide free access to all portions of Work, and cooperate with the Inspection and Testing Company.

.2 Contractor to advise Inspection and Testing Company a minimum of 24 hours in advance of concrete placement.

.3 Contractor to provide properly designed temperature-controlled storage boxes for test cylinders, as specified in CSA-A23.2-3C, for a period of at least 24 hours and further protection from adverse weather and mishandling until removed from site. Contractor to provide a max-min thermometer for each storage box. Storage in a portable building that will be used by Contractor's personnel or Consultant during first 24 hour storage period will not be permitted. Storage facilities shall be provided, installed, checked and approved before any concrete may be placed.

.6 Architectural Concrete:

.1 Architectural concrete shall mean concrete surfaces designated as "architectural concrete" in Contract Documents. Sandblasted and bush-hammered surfaces shall be considered as architectural concrete.

1.3 Quality Assurance

.1 Reference Standards and Publications:

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first three standards listed below.

.3 The following reference standards shall govern work of this Section, except where they are in conflict with requirements imposed by this Specification, in which case the latter shall govern. Standards referenced by following Standards apply but are not necessarily repeated in following list:

.1 2012 OBC, "Ontario Building Code".

.2 CSA-A23.1-19, "Concrete Materials and Methods of Concrete Construction".

.3 CSA-A23.2-19, "Methods of Test for Concrete".

.4 CSA-A23.3-19, "Design of Concrete Structures for Buildings".

.5 ACI 117-10, Standard Specifications for Tolerances for Concrete Construction and Materials, American Concrete Institute.

.6 CSA-A283-2000, "Qualification Code for Concrete Testing Laboratories".

.7 CAN/CSA-A363-M88 (R1996) "Cementitious Hydraulic Slag".

.4 ASTM D3963/D3963M-21, "Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel".

.1 ASTM C260/C260M-10a(2016), "Standard Specification for Air-Entraining Admixtures for Concrete".

.2 ASTM C494/C494M-19e1, "Standard Specification for Chemical Admixtures for Concrete".

.3 American Society for Testing and Materials (ASTM) where noted.

.4 American Concrete Institute Detailing Manual (ACI 315R-18) where noted.

.5 Concrete Reinforcing Steel Institute (CRSI) where noted.

.6 Reinforcing Steel Institute of Canada (RISC), "Manual of Standard Practice, Metric Supplement" where noted.

.7 Provincial safety standards where applicable.

.8 Conform to applicable safety regulations for erection, maintenance and removal of formwork.

.2 Regulations

.4 Abide by current bylaws and regulations of province and/or municipality in which Work is located, and abide by current laws and regulations with regard to public safety.

.5 Regulations of the Minister of Labour, Occupational Health and Safety Act, Workers' Compensation Board and other applicable acts administered by authority having jurisdiction of province apply to Work of this Section.

.3 Safety

.4 Carry out cast-in-place concrete work in accordance with Ontario Building Code and current Occupational Health and Safety Act construction safety regulations.

.4 Qualifications:

.4 Undertake concrete finishing only by member organizations of Concrete Floor Contractors Association of Ontario.

.5 Tolerances:

.4 In accordance with ACI 117; definitions for tolerance terminology and tolerances for formed concrete surfaces are recapitulated in Section 03 10 00, Concrete Formwork.

.5 Difference between elevation of high point and low point in specified area not to exceed:

In any bay up to 100 m^2 (1100 ft^2):	12 mm (½")
In any bay up to 400 m^2 (4300 ft^2)	25 mm (1")

.6 F-Number System:

.1 Finish floor slabs to meet following tolerance classification in accordance with CSA Standard A23.1, Clause 22.1.3 and Table 16.

:Class A – Conventional Smooth
:Class B – Conventional Non-slip
:Class C – Moderately Flat
:Class D - Flat

.7 Measure FL levelness tolerance at 72 ± 12 hours after completion of floor finishing, on formed slabs before removal of shores and on slabs-on-grade.

.8 Straightedge Method:

.1 Finish floor slabs to meet following tolerances when measured at 72 ± 12 hours after completion of floor finishing, before shores are removed from formed slabs, by placing a freestanding unleveled straightedge anywhere on slab and allowing it to rest on two high spots. Gap between straightedge placed on two high spots and floor surface not to exceed:

3 m (10 ft) straightedge	8 mm (5/16”)
2 m (6 ft) straightedge	4 mm (3/16”)

.6 Sample for Floor Finishing:

.4 Finish and cure an area of floor slab where directed by Consultant to provide sample of finish and curing procedures for approval.

.5 Provide new sample area until finish is approved.

.6 If liquid membrane curing compound is to be used on Project, determine and apply correct quantity required to meet rate of coverage recommended by manufacturer for measured test area.

.7 Approved sample will provide standard by which subsequent finishing will be judged and will be incorporated into Work.

.7 Job Mock-Up of Formed Surface:

.4 Provide and place specified concrete for Project and to meet requirements of mock-up specified in Section 03 10 00, Concrete Formwork.

.5 Provide additional mock-up area for architectural finishing samples. Finish portions of area in varying degrees of sandblasting to provide acceptable finish for approval of Consultant. Finish portions of area in varying degrees of bush-hammering to provide acceptable finish for approval of Consultant.

.6 Approved mock-up will provide standard by which subsequent Project Work will be judged acceptable.

.8 Source Quality Control:

.4 Both source quality control and field quality control specified elsewhere in this Section, may be performed by an Inspection and Testing Company appointed by Consultant.

.5 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of this Specification.

.6 Inspection and Testing Company shall be certified under CSA Standard A283, Qualification Code for Concrete Testing Laboratories, for Category 1 Certification.

.7 Payment for specified Work performed by Inspection and Testing Company will be made by Owner.

.8 Provide access for inspection to all places where Work is manufactured, stockpiled or installed.

.9 Perform Work of source quality control in accordance with CSA Standard A23.2 and to include:

.1 Verification that ready-mix supplier is qualified to supply concrete in accordance with Specification.

.2 Review of proposed concrete mix designs.

.3 Sampling, inspection, and testing of materials as may be required.

1.4 Submittals

.1 Submit proposed mix design for concrete and grout mix types to Consultant for approval a minimum of two weeks prior to their initial use.

.2 Provide supporting evidence of compliance with requirements. Review of mix design does not relieve Contractor from responsibility for compliance with Contract Documents.

.3 Submit data sheets for proposed pre-mixed grouts to Consultant for review.

.4 Submit samples of fine and coarse aggregate and all admixtures proposed for concrete mixes to the testing firm's laboratory if requested by Consultant.

.5 Prior to conducting trial mixes, submit data on specified or proposed concrete admixtures with mix design to Consultant for approval. Data is to confirm the compatibility of the water reducing admixture, superplasticizer, air entraining agent, cement, fly ash and silica fume where used.

.6 Submit copies of mill certificate test reports of cement and silica fume if requested by Consultant.

.7 Submit proposed joint details, locations and construction procedures. Include waterstop, crack inducer, reglet, sealant and joint filler products as required.

.8 Submit proposed curing procedures.

.9 Submit proposed methods of protection of concrete when air temperatures are expected to be above 25°C or below 5°C.

.10 Submit proposed procedures for applying separate floor topping.

.11 Inspection and Testing Reports:

.1 Inspection and Testing Company shall:

.1 Base inspection and testing upon Contract Drawings, specifications and concrete mix design submissions.

.2 Report results of tests immediately to Contractor. Contractor is responsible for ensuring that concrete meets requirements of Specifications.

.3 Report immediately to Consultant, by phone, any deviations from above, giving recommendations for further testing deemed necessary. No modifications to be made or instructions given without prior approval of Consultant.

.4 Submit to Consultant and Contractor certified copies of test results. Include the following information with the results:

.1 Name of the project.

.2 Date of sampling.

.3 Mix design, specified strength, slump and air content, class of exposure.

.4 Name of supplier, truck and ticket number.

.5 Time batched and time sample taken.

.6 Identification of sampling and testing technician.

.7 Cement type and admixtures used.

.8 Exact location in structure of concrete sampled.

.9 Ambient air and concrete temperatures.

.10 Nominal aggregate size.

.11 Water added and personnel authorizing additional water.

.12 Concrete density.

.13 Test strength of cylinder.

.14 Type of failure if test fails to meet specification.

.5 Certify, in writing, that concrete meets specified requirements.

.6 Submit to Consultant a final report certifying that concrete is in accordance with Contract Documents. Submit report under seal and signature of a professional engineer registered in the Province of Ontario.

.7 Distribute inspection reports as follows:

- 2 copies to Consultant.
- 1 copy to Consulting Structural Engineer.
- 2 copies to Contactor.

.8 Sign report by inspector or technician who performs inspection or test.

.12 Submit responses to site review reports stating that all reported defects and deficiency items were corrected or stating what action was taken.

.13 Joint Location Drawings:

.1 Submit drawings showing proposed location of control joints in slab-on-grade, where not shown on Drawings.

1.5 Project Records

.1 Concrete Pour Records:

.1 Record time, date, delivery slip serial number, and location in building of each concrete pour, and identify related test cylinders. Keep these records on site until Project is completed.

.2 Delivery Records:

.1 File duplicate copies of concrete delivery slips on which shall be recorded: supplier, serial number of slip, date, truck number, contractor, project, class of exposure, cementing materials content, air content, volume in load, and time of first mixing of aggregate, cementing materials and water.

.3 Record Drawings:

.1 Record on a set of Drawings:

.1 Time and date of each pour

.2 High and low ambient air temperatures during each pour

.3 Date of removal of forms in each area

.4 Founding elevations of all foundation elements.

.5 Variations of foundation Work from that indicated on Drawings.

.2 Make record drawings available for Consultant’s inspection at all times.

1.6 Sample Panels

.1 Cast concrete against sample formwork panels. Obtain approval by Consultant of resultant surface finish prior to erecting subsequent forms.

.2 Include a repaired area on the sample for approval by Consultant.

.3 Changes in concrete mix proportions, source of material or construction materials are subject to new samples and approval of Consultant.

.4 The approved sample concrete panels shall be considered basis of quality for finished Work. Locate where directed.

.5 Sample panels to remain exposed to view for duration of concrete Work.

1.7 Delivery, Storage and Handling

.1 Deliver materials supplied under Work of this Section to site in bundles easily identified and properly marked to locations directed, and to meet construction schedule.

.2 Exercise care in storing and handling materials of this Section on site in manner to prevent damage and contamination.

1.8 Job Conditions

.1 Environmental Conditions:

In addition to Cold Weather and Hot Weather Requirements of CSA Standard A23.1, the following shall apply to Work of this Section:

.1 Provide protection or heat, or both, so that temperature of concrete at surfaces is maintained at not less than 21°C (70°F) for three days after placing, not less than 10°C (50°F) for the next two days and above freezing for the next two days.

.2 Do not permit alternate freezing and thawing for fourteen days after placing.

.3 Vent exhaust gases from combustion type heaters to atmosphere outside using protection enclosures.

.4 Provide protection to maintain concrete continuously moist during curing period.

.5 For field cured cylinders representing strength development of in-situ concrete, provide same specified hot and cold weather protection for storage of each concrete compression specimen as for concrete from which it was taken, until it is sent to testing laboratory.

.6 Do not place concrete when it is raining. Should rain commence during placing, cover freshly placed concrete.

.7 Do not place bonded toppings on rough slabs that are less than 15°C (60°F).

.8 Do not grout at ambient air temperatures or concrete surface temperatures less than 5°C (40°F), or when temperature is forecast to fall to less than 5°C (40°F) within 24 hours of grouting.

.9 Do not apply sealants at ambient air temperatures or concrete surface temperatures less than 5°C (40°F).

.2 Protection:

.1 Protect floor slabs, and concrete surfaces exposed to view or on which finishes are to be applied, from grease, oil, and other items which will affect appearance of concrete, or impair bond of toppings or finish materials.

1.9 Quality Control

.1 Contractor shall not assign responsibility of coordination of placing required material and placing concrete. Ensure a full-time qualified superintendent representing Contractor is in attendance to inspect and check all phases of Work.

1.10 Aggregate Tests

PART 2 - PRODUCTS

2.1 Unit Prices

.1 Unit prices requested as a part of the Tender shall include concrete, placing, curing, finishing, and preparation and submittal of necessary mix designs.

.2 Unit prices to be applied to the net volume difference.

2.2 Materials

.1 Generally:

.1 In accordance with Reference Standards.

.2 Cementing Materials

.1 Portland cement: to CAN/CSA-A5, Type 10 – normal. Cement shall not contain total sodium oxide equivalent in excess of 0.6% by mass and the tri-calcium aluminate content shall be between 6% and 10%.

.3 Supplementary Cementing Material

.1 Fly ash shall be Type F pozzolan and shall meet requirements identified in CAN/CSA-A23.5 with following additional requirements:

.1	Minimum $Si0_2$ and $A1_20_3$ and Fe_20_3 content	70%
.2	Maximum retained on 45 NM sieve	20%
.3	Maximum loss of ignition	4%
.4	Maximum Na_20 equivalent	3%
.5	Maximum Ca0 content	8%

.2 Cementitious Hydraulic Slag: to CSA Standard CAN/CSA-A23.5.

.4 Aggregates

.1 For concrete mix types, fine aggregate shall conform to requirements identified in CSA-A23.1 for specified exposure class.

.1 Fine aggregate tested in accordance with CSA Test Method A23.-7A, "Organic Impurities in Sands for Concrete", shall produce colour not darker than standard colour (Organic Plate Number 3). Aggregate producing colour darker than standard colour will be rejected; provisions 5.3.3.2(a) and (b) of CSA-A23.1-M shall not apply.

.2 For slabs-on-grade, fineness modulus of fine aggregate shall be between 2.7 and 3.1.

.2 For all concrete mix types, the coarse aggregate shall conform to requirements identified in CSA-A23.1 for specified exposure class. Aggregate shall meet Group 1 gradation requirements listed in Table 2 of CSA-A23.1.

.1 20 mm (3/4") to 5 mm (No. 4 sieve) except as specified below.

.2 For Slabs-on-Grade:

.1 Abrasion loss not to exceed 35%.

.2 Petrographic number of aggregate not to exceed 125 when tested in accordance with ASTM C295, as conducted by Ministry of Transport of Ontario.

.3 For Slabs-on-Grade 125 mm (5") and Thicker:

.1 40 mm (1½") to 5 mm (No. 4 sieve); combine at least two of the single sizes specified in Table 2 Group II of CSA Standard A23.1, one of which is to be 40 mm (1½"), to obtain maximum bulk density (unit weight) and optimum grading, in accordance with an approved procedure.

.4 For Slabs Over Open Web Steel Joists (OWSJ), Waffle Slabs and Bonded Toppings 50 mm (2") Thick and Less: 12 mm (½") to 5 mm (No. 4 sieve).

.5 For Columns Less Than 300 mm (12") in Least Dimension, or Less Than 95,000 mm^2 (150 in^2) in cross-sectional areas: 10 mm (3/8") to 5 mm (No. 4 sieve).

.3 Traprock Aggregate:

.1 Hard, fine-grained igneous rock with "lath-like" crystals interflocked; having a loss in 5 cycles of no more than 5% by weight when tested for soundness by magnesium sulphate in accordance with CSA Test Method A23.2-9A, a maximum absorption of 1% when tested in accordance with ASTM C127, and a maximum petrographic number of 100.

.4 Aggregates shall not react with alkalies in cement to an extent that results in excessive expansion of concrete.

.5 Source of aggregate and method of manufacture or production, including type of equipment used, shall not be altered for duration of project following acceptance of aggregate.

.6 Lightweight aggregates for structural light weight concrete to conform to ASTM C330.

.7 Do not use light weight aggregates in concrete for exposure classes F and C.

.5 Water

.1 Water for use in concrete production and curing shall be clean and free from injurious amounts of oil, acid, alkali, soluble chlorides, organic matter, sediment or any other deleterious substances as per CSA-A23.1.

.6 Admixtures

.1 Conform to Reference Standards for chemical and air-entraining admixtures.

.2 Provide only admixtures that are free of chlorides.

.3 Air-entraining admixtures shall conform to requirements of ASTM C260. Admixture shall be of uniform consistency and quality within each container and from shipment to shipment.

.4 Water-reducing admixtures shall conform to requirements of ASTM C494, Type A or D. Admixture shall be of uniform consistency and quality within each container and from shipment to shipment.

.5 Superplasticizers, if approved by Consultant, (high-range water reducers) shall conform to requirements of ASTM C494, Type F or G.

.6 When requested, provide evidence acceptable to Consultant that superplasticizer does not increase shrinkage of concrete.

.7 Gunite

.1 Portland cement: To CAN/CSA-A5, Normal, Type 10.

.2 Water and aggregates: To ACI 506.2-77.

.8 Polypropylene Fibre Reinforcing:

:M/D fibrilated polypropylene fibres, Fibremesh by Master Builders Technologies.

.9 Steel Fibres:

:Dramix ZC 60 x 1.00, by Dramicon Inc.

:Eurosteel 60-100, by Nu-Tech Fiber-Con Inc., Toronto, Ontario.

.10 Granular Underbed for Slabs-on-Grade:

.1 20 mm (3/4") clear limestone, proof rolled for compaction, compacted thickness 150 mm (6") under slabs 125 mm (5") or less, 200 mm (8") under thicker slabs.

2.3 Concrete Mixes

.1 Concrete:

.1 Contractor shall design concrete mixes and shall pay for costs associated with development of mix designs.

.2 Contractor shall supply concrete in accordance with CSA-A23.1, Clause 4.1, Table 5, Alternative 1 and Tables 1, 2 and 4, except that additional requirements of this Specification and concrete mix table on Drawings shall also apply.

.3 Only such materials or blends of materials that will result in a uniform colour of exposed surfaces shall be used.

.4 Concrete mixes that will be placed by concrete pump shall be designed for pumping.

.5 In event that slump and/or air content are outside specified tolerance range as determined by inspection and testing firm appointed by Consultant, Consultant may, at his sole discretion, accept a proposal for one adjustment of the deficient condition as an alternate to rejection.

.6 Maximum placement temperature of 18°C is specified to ensure that concrete temperatures do not exceed 60°C during curing, that temperature gradients do not exceed 20°C total and temperature rise or drop do not exceed a maximum heating and cooling rate of 2°C/hour. Maximum placement temperature may be increased to 25°C provided above temperature requirements are met.

.7 Incorporate cementitious hydraulic slag as follows:

.1 Class of exposure C-1 with 25 percent of Portland cement replaced with cementitious hydraulic slag: for parking garage floors, and walls, balustrades and columns adjacent thereto, and footings. Conform to additional requirements of CSA Standard S413, Parking Structures, Clause 6.1.

.2 Class of exposure C-2 with 25 percent of Portland cement replaced with cementitious hydraulic slag: for pavements, sidewalks, curbs and gutters.

.3 Class of exposure F-2 with 25 percent of Portland cement replaced with cementitious hydraulic slag: for basement walls and basement slabs, and for exposed exterior beams, columns, walls and slabs.

.8 Supply concrete in accordance with CSA-A23.1 with properties as noted on Drawings

.9 Slabs-on-Grade:

.1 Use Type 20 Portland cement, or replace 25 percent of Type 10 Portland cement with cementitious hydraulic slag. When mean daily temperature is less than 10°C, reduce Portland cement replacement to 10 percent.

.2 Use water/cementing materials ratio of 0.45 maximum.

.3 Use aggregates specified in paragraphs 2.2.4.1 and 2.2.4.2.

.4 Cementing materials content 320 kg/m^3 (515 lb/yd^3).

.5 Modulus of rupture 3.5 MPa (510 psi) average, 3.0 MPa (435 psi) minimum.

.6 Slump at delivery, before addition of superplasticizer, 50 mm (2”); add superplasticizer, not water, to bring slump to level acceptable to floor finisher for placement.

.10 Refer to Section 02365 for concrete mix for expanded base concrete piles.

.11 Water-soluble chloride ion content in exposure class C-1 concrete before exposure shall not exceed 0.06% by mass of cementing material.

.12 Aggregate size specified is maximum nominal allowance. Contractor may use smaller nominal size to ease placing. Air content may have to be increased for smaller aggregate to meet exposure class requirements.

.13 Ensure aggregate does not react with alkalis in the cement or produce excessive expansion in concrete. Conform to Appendix B of CSA-A23.1.

.14 Cement: Use Type 10, except use Type 50 for concrete in contact with soil.

.15 Minimum cement content:

.1 380 kg/m^3 (total cementitious material) for Type A.

.2 350 kg/m^3 for watertight or liquid-retaining structures.

.3 335 kg/m^3 for exterior exposed concrete slabs.

.4 335 kg/m^3 for concrete exposed to salts.

.5 335 kg/m^3 for decks without silica fume, stairs and shallow footings in parking structures.

.6 335 kg/m^3 for Type 50 cement.

.16 Slump: No slumps outside the range of maximum or minimum will be permitted without written permission of Consultant. Supply slumps at 20 mm below maximum.

.17 Air Content: All mix types with exposure classifications shall be air-entrained in accordance with concrete mix table on Drawings and CSA-A23.1.

.18 Air dry unit weight: minimum 2300 kg/m^3 (145 lbs/ft^3) adjusted proportionally for maximum air content listed in CSA Standard A23.1, clause 4.4.4, Table 4.

.19 Use water-reducing admixture in concrete.

.20 Do not change concrete mix proportions or source material for exposed concrete without written approval of Consultant.

.21 Conform to CSA-A23.1 for architectural exposed concrete.

.22 Use accelerating admixtures in cold weather only when approved by Consultant. If approved, use of admixtures will not relax cold weather placement requirements.

.23 Do not use calcium chloride or admixtures containing calcium chloride.

.24 Use set-retarding admixtures during hot weather with written approval of Consultant to prevent cold joints in concrete.

.25 Use admixtures in strict accordance with manufacturer's recommendations.

.26 Do not use non-specified admixtures unless approved in writing by Consultant. Where superplasticizers are thus approved, ensure mix designs are correctly adjusted for placement, strength, durability and air content requirements.

.27 Columns:

.1 Incorporate superplasticizer to provide 200 mm (8") slump concrete for columns.

.28 Documentation indicating compatibility of water reducing admixture, air entraining admixture, superplasticizing admixture (if any), cement, silica fume (if any) and fly ash (if any) shall be submitted upon request with mix design for review by Consultant.

.29 Polypropylene Fibre Reinforced Concrete:

.1 Provide polypropylene fibres in concrete at 0.9 g/m^3 (1.15 lb/yd^3) in accordance with manufacturer's instructions.

.30 Steel Fibre Reinforced Concrete:

.1 Provide cementing materials content of 285 kg/m^3 (480 lb/yd^3), a water/cementing materials ratio less than 0.50, and 25 kg/m^3 (42 lb/yd^3) of steel fibres (specified in paragraph 2.2.9). Supply concrete with slump of 50 mm (2") and incorporate superplasticizer at dosage sufficient to provide 100 mm (4") slump.

.31 Floor Hardeners:

.1 Confirm that concrete mix contains only materials compatible with floor hardener.

.32 Sulphate Exposure:

.1 Provide concrete mix in accordance with Clause 4.1.1.6, Table 3 of CSA Standard A23.1, for concrete subject to sulphate attack, including caissons, and other concrete in contact with soil.

.2 Submit evidence, and material samples if requested, acceptable to Inspection and Testing Company to verify that proposed concrete mix design will produce specified quality of concrete.

.2 Structural Semi-Low Density Concrete:

.1 Provide concrete incorporating pelletized slag aggregate and having air dry unit weight of 2000 kg/m^3 (125 lbs/ft^3) adjusted proportionally for maximum air content listed in CSA Standard A23.1, Clause 4.3.4.2, Table 4.

.3 Concrete Toppings

.1 Provide topping with minimum 28 day compressive strength of 30 MPa.

.2 For floors left exposed and noted as traprock finish: Provide topping with traprock aggregate specified in sub-paragraph 2.2.4.3, and with minimum 28 day compressive strength of 35 MPa and maximum slump of 50 mm (2”).

.4 Architectural Concrete:

.1 For concrete designated as architectural concrete:

.1 Obtain aggregate and cement from same source at same time, for entire Project.

.2 Use tools and handling equipment that are absolutely clear of rust, salts, hardened concrete, and other harmful and foreign material.

.5 **Grout**

.1 Dry Pack Grout Under Steel Plates and Where Grout Thickness Does Not Exceed 75 mm (3”):

.1 Mix one part Portland cement to two parts concrete sand that conforms to CSA Standard A23.1, with only sufficient water that mix will retain its shape when made into ball by hand.

.2 Dry Pack Grout for Underpinning and Where Grout Thickness Equals or Exceeds 75 mm (3”):

.1 Mix one part Portland cement, one and one-half (1½) parts concrete sand and two parts of 10 mm (3/8”) pea gravel, with only sufficient water that mix will retain its shape when made into ball by hand.

.6 Premixed Grout:

.1 Mix with water in accordance with manufacturer’s printed instructions.

.1 Non-Shrink Metallic:
:Embeco 636 Grout, by Master Builders Ltd.
:Ferrogrout 939 Premix, by The Sternson Group, Brampton, Ontario

.2 Non-Shrink Non-Metallic:
:CG-86, by W.R. Meadows of Canada Limited.
:Masterflow 713 Grout, by Master Builders Ltd.
:M-Bed Standard Premix, by SIKA Canada Ltd.
:SIKA 212 by W.R. Meadows of Canada Ltd.

.3 Flowable Grout Non-Metallic Shrinkage Compensating:
:M-Bed Superflow, by the SIKA Canada Ltd.
:Masterflow 713, by Master Builders Ltd.
:In-Pakt Pre-Mix, by C.C. Chemicals Limited.
:V3 by W.R. Meadows of Canada Ltd.
:SIKA 212 HP by SIKA Caada Ltd.

.4 Epoxy grout: Non-shrink, high strength compound consisting of epoxy resins, hardeners and non-metallic aggregate for exterior use. Pre-mixed in strict accordance with manufacturer's instructions to obtain minimum compressive strength of 100 MPa in 28 days.

.5 Cement grout: Non-shrink compound consisting of cement, sand, water and approved admixtures in accordance with CSA-A23.1, Clause 4.2. Mixed with sufficient water for placement and hydration, capable of developing minimum compressive strength of 25 MPa in 7 days and 35 MPa in 28 days. Grout exposed to freezing shall be air-entrained 7 to 10%.

.6 Dry pack grout: Non-shrink compound consisting of non-metallic aggregate and water. Mixed with sufficient water for mixture to make a sound, solid pack and capable of developing compressive strength of 35 MPa at 28 days.

.7 Non-shrink grout: Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents. Pre-mixed in strict accordance with manufacturer's instructions to obtain minimum compressive strength of 16 MPa in 24 hours and 50 MPa in 28 days. Acceptable non-shrink grouts:

.1 Masterflow 713 Grout.

.2 Master Builders Set Non-Shrink Grout.

.3 Sika Grout 212.

.4 M-Bed Standard Grout.

.5 CPD Non-Shrink Grout.

.6 Sonogrout.

.7 CG-86 by W.R. Meadows.

2.4 Storage and Handling of Materials

.1 Cement and silica fume to be stored in a suitable weather-tight building that will protect these materials from dampness. Cement and silica fume to be free from lumps at all times during use in the Work. Cement and silica fume stored for length of time resulting in hardening or formation of lumps not to be used in Work.

.2 Aggregates shall be handled so as to prevent segregation and to obtain uniformity of materials. Separated aggregates and aggregates secured from different sources shall be piled in separate stockpiles. Site of stockpiles shall be cleaned of foreign materials and shall be reasonably level and firm. If aggregates are placed directly on ground, material shall not be removed from stockpile within 150 mm (6") of ground level. This material is to remain undisturbed to avoid contaminating aggregate with ground material.

2.5 Equipment

.1 Vibrators for Concrete Reinforced with Epoxy-Coated Bars:

.1 Kevlar/Polyurethane rubber headed vibrator manufactured by Oztec Industries Inc., and distributed by Castlefield Electric Tool Ltd., Toronto; Mega Industries Inc., Mississauga; and Nick's Power Tools Ltd., Weston, Ontario

PART 3 - EXECUTION

3.1 General

.1 Perform cast-in-place concrete Work in accordance with requirements of CSA-A23.1, unless indicated otherwise on Drawings.

3.2 Examination

.1 Confirm that subgrade of compacted fill conforms to requirements specified for backfilling before placing slab underbed.

.2 Confirm that surfaces on which concrete is to be placed are free of frost and water before placing.

.3 Confirm that reinforcement, dowels, control joints, inserts and all other built-in Work are in place and secured before placing concrete.

3.3 Preparation for Slabs-on-Grade

.1 Granular Underbed:

.1 Obtain Geotechnical Consultant's written confirmation that prepared subgrade is acceptable for placement of granular underbed.

.2 Place granular underbed over entire area of building and proof roll.

.3 Obtain Geotechnical Consultant's confirmation that thickness, elevation and proof rolling of granular underbed are acceptable.

.4 Remove foreign materials from underbed and forms before placing concrete.

3.4 Placing Concrete

.1 Notification:

.1 Notify Consultant at least 24 hours before commencing to place concrete, and 24 hours before wall forms are closed in. Regardless of any requirement of Reference Standards to inspect all of the work prior to placing concrete, field review of construction will be in accordance with Sampling Program. Allow time for corrective work for areas of unusual formwork and congested reinforcement.

.2 Notify geotechnical engineer to inspect and verify soil conditions and bearing pressures of all foundation elements prior to placing concrete for mudslabs or foundations.

.3 Do not place concrete against frozen ground, frozen concrete or frosted forms.

.4 Place concrete in accordance with CSA-A23.1, Clause 7 and as specified herein.

.5 Beams, Girders, Columns:

.1 Place beams, girders, brackets, column capitals and haunches monolithically with floor system.

.6 Concrete Placed over Open Web Steel Joists:

.1 Transport and spread concrete over joist construction in a manner to prevent lateral deflection and twisting of joists.

.7 Concrete Fireproofing:

.1 Encase structural steel members with concrete, where indicated on Structural Drawings or where noted “C.F.” on Drawings.

.2 Provide concrete of same strength as adjacent concrete framing. Provide 50 mm (2”) minimum cover.

.8 Skim Slabs-on-Grade:

.1 Place 75 mm (3”) thick skim slab of 15 MPa concrete over compacted underbed, where indicated on Drawings.

.9 Fibre Reinforced Concrete:

.1 Arrange for fibre supplier’s representative to be present to review initial mixing and placing of concrete incorporating fibres.

.10 Future Extension:

.1 Where pockets, chases, anchors, angle irons and other hardware are indicated on structural Drawings to allow for future lateral extension, grease exposed structural steel work and fill pockets and chases with 10 MPa concrete.

.11 In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and set solidly with non-shrink grout or as specified on Drawings. Holes for inserts shall be thoroughly cleaned.

.12 Ensure hardware and other items to be cast into concrete are placed securely and will not cause undue hardship in placing concrete.

.13 Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints and other critical items are not disturbed during concrete placement.

.14 Revise, re-seat and correct improperly positioned reinforcing hardware and other embedded items immediately before concrete placement.

.15 Ensure specified concrete cover around reinforcing is maintained.

.16 Ensure waterstop is securely wired to reinforcing to prevent folding or movement during concrete placement. Maintaining the integrity and correct position of waterstop is critical to the performance of the structure.

.17 Do not place concrete older than 2 hours from batch time.

.18 Do not add water after batching unless in strict accordance with CSA-A23.1, Clause 5.2.4.3.2 and such that concrete conforms with specified mix design parameters.

.19 Where concrete is placed on an inclined surface, placing operation is to begin at lower end of the slope and progress upward unless otherwise permitted by Consultant.

.20 Place concrete and screed in accordance with lines and levels indicated on Drawings.

.21 Place concrete in approximate horizontal layers such that each lift can be vibrated into the previous lift.

.22 Maximum vertical free fall of concrete is not to exceed 1200 mm (4 ft) in unexposed work or 800 mm (2’-8”) in exposed work. Confine concrete with a suitable vertical drop pipe to prevent segregation.

.23 Place concrete directly into its final position in forms. Do not spread concrete with vibrators.

.24 Compact concrete thoroughly by mechanical vibrators. Ensure concrete is worked around reinforcement, embedded items and into all areas and corners of forms.

.25 Use internal vibrators in sections that are sufficiently large, and supplement with external type in event that satisfactory surfaces can not be obtained.

.26 Check and re-adjust formwork to required lines and levels during placement of concrete.

.27 Place concrete as a continuous operation, stopping only at construction joints.

.28 Allow a minimum of three days between adjacent concrete placements, unless otherwise noted.

.29 Place concrete in watertight structures with extreme care and extra effort.

.30 Consolidate and screed floors and slabs on grade level in accordance with CSA-A23.1, Clause 7, maintaining surface flatness as required for final floor finish. Pitch to drains 20 mm per meter nominal or as indicated on Drawings.

.31 Provide slopes away from vertical surfaces such as columns, walls and balustrades on parking deck structural slabs.

.32 Use cold weather concreting methods in accordance with CSA-A23.1, Clause 7.4.2.5 when mean daily temperature falls below 5°C, and use hot weather methods when the mean temperature rises above 25°C.

.33 Maintain accurate records of concrete placement. Record date, location of placement, quantity, air temperature and test samples taken.

3.5 Placing of Architectural and Exposed Concrete

.1 Place concrete in maximum horizontal lifts of 400 mm (16”). Limit length of concrete placement to prevent cold joints.

.2 Do not place concrete from one end for full height of placement.

.3 Use sufficient vibration equipment and methods to ensure dense, smooth concrete lines and surfaces free from bugholes, honeycombs and cold joints.

.4 Ensure vibrator penetrates each layer of fresh concrete to prevent stratification.

.5 In hot weather, use set retarding agents to prevent cold joints with permission of Consultant.

3.6 Separate Concrete Toppings

.1 General:

.1 Prepare surface of previously-placed concrete substrate in accordance with CSA-A23.1, Clause 7.6.4, to create a roughened surface for adequate bond. Do not use acid unless approved by Consultant. Remove any loosened or delaminated concrete.

.2 Be aware that thickness of topping shown on Drawings is a minimum and actual thickness will be greater to account for cambers or deflections of supporting floor.

.3 Remove dust from prepared surface by vacuuming after surface is dry.

.4 Contact Consultant for inspection of prepared surface prior to application of grout coat or bonding agent.

.5 Thoroughly saturate concrete substrate with clean water for a minimum of 12 hours, and allow to surface-dry. Remove any standing water after saturation period.

.6 Apply cement/sand grout coat on substrate immediately prior to placing topping with properties and application in accordance with CSA-A23.1, Clause 7.6.4.2.2.

.7 Apply an approved bonding agent to substrate in accordance with manufacturer's instructions.

.2 Placing and Compaction of Topping:

.1 Place concrete topping to required lines and levels indicated on Drawings to tolerance of +5 mm (3/16") to -0 mm (-0"), unless stricter tolerances are specified elsewhere. Place before grout coat stiffens or within timing per bonding agent's manufacturer's instructions.

.2 Place each section in one continuous operation.

.3 Take special precautions against plastic shrinkage cracking, whenever rapid drying of topping may occur, in accordance with CSA Standard A23.1, Clause 7.4.

.4 Finish and moist-cure topping as specified in other clauses. Any joints in substrate are to be matched in topping.

.5 Tensile bond strength between topping and substrate shall be minimum 0.9 MPa at 28 days as tested in accordance with CSA Test Method A23.2-6B by an independent inspection and testing agency at a frequency of one test for each 200 m^2 (2000 ft^2) or less of area.

.6 Control Joints in Topping:

.1 Provide control joints for topping directly over construction joints in base slab.

.2 Provide control joints in toppings over precast slabs, on centre lines of supporting members, and at 5 m (18 ft) maximum spacing parallel to span of slabs.

.3 In all other respects, comply with sawcut control joint requirements for slabs-on-grade.

3.7 Finishing Concrete

.1 Floor Finishing

.1 Refer to Section 03 35 00 for concrete floor finishes.

.2 Floor, Roof, Stair Treads, and Other Slab Surfaces:

.1 Perform finishing operations on plastic concrete surfaces in accordance with CSA Standard A23.1, Clause 7, and as specified herein.

.2 Be aware that finishing while bleed water is on surface, or adding water or cement to surface, are causes of scaling and dusting and are strictly forbidden.

.3 Be aware that concrete for this project contains slag cement which delays concrete set and onset of bleeding.

.4 Refer to Drawings, Schedules, and other Sections of Specification, for required finishes and concrete toppings.

.5 Verify with those responsible for Work of other Sections, that proposed finish is satisfactory for application of their materials.

.6 Finish floors to match approved sample

.7 Screed surface to an even, level, or sloped surface, to elevations indicated on Drawings or required for specified finishes and concrete toppings.

.8 Monolithic Concrete Toppings:

.1 Screed rough slab to level 25 mm (1") below finished floor. Apply topping while rough slab is still plastic.

.9 Tile, Terrazzo, or Bonded Concrete Topping:

.1 Screed slab to level below finished floor necessary to accommodate finish material or topping. For bonded concrete topping, wire broom surface in accordance with CSA Standard A23.1, Clause 7.6.4. For tile or terrazzo, wire broom surface to texture approved by tile or terrazzo trade. Finish to conventional smooth classification.

.10 Covered or Painted Floor Surfaces:

.1 Provide smooth steel trowelled surface, free from ridges, trowel marks or undulations, for floors that are to be painted, or to receive permanent architectural covering, such as carpet, wood, resilient flooring, sheet flooring, and fluid or trowel applied flooring.

.11 Exposed Floor Surfaces or Present Roof/Future Floor:

.1 Provide hard, smooth, dense, steel trowelled surface, free from blemishes, and of uniform appearance.

.12 Non-Slip Floor Surfaces:

.1 Provide swirl trowel final finish of texture acceptable to Consultant.

.13 Hardened Floor Finish:

.1 Apply premixed material specified in Section 03 15 00, prepackaged hardener, to total of 5 kg/m^2 (1 lb/ft^2) of floor surface.

.2 Apply in two shakes, of half total specified amount in each shake; the second shake at right angles to the first.

.3 Finish as specified for "Exposed Floor Surfaces", sub-paragraph 3.7.2.11.

.4 Follow manufacturer's special finishing instructions if concrete is air entrained.

.14 Insulation Board or Built-Up Roofing:

.1 Hand or mechanical float surface to uniform texture, free from hollows, bumps and ridges. Finish to moderately flat classification.

.15 Fluid Elastomeric Waterproofing Membrane:

.1 Provide smooth steel trowel surface, free from ridges, trowel marks, or undulations to specified slope, ensuring positive slope into drains. Do not overwork surface to prevent scaling. Use no more than a single pass of trowel. Do not complete finishing until all bleed water has evaporated.

.2 Finish to moderately flat classification.

.3 Do not finish too smoothly.

.4 Arrange for waterproofing trade to inspect finish after first area is completed and to reinspect until finish conforms to their requirements.

.16 Hot Applied Rubberized Asphalt Waterproofing Membrane, or Self-Adhering Rubberized Asphalt Sheet:

.1 Hand or mechanical float surface to uniform texture, free from hollows, bumps, sharp edges, and ridges to the specified slope, ensuring positive slope into drains. Do not overwork surface to prevent scaling. Use no more than a single pass of trowel. Do not complete finishing until all bleed water has evaporated.

.2 Finish to moderately flat classification.

.3 Do not finish too smoothly.

.4 Arrange for waterproofing trade to inspect finish after first area is completed, and to reinspect until finish conforms to their requirements.

.17 Dust-proofing agents: Apply in strict accordance with manufacturer's recommendations.

.18 Shotblast:

.1 Shotblast floor surfaces that are to receive:
:fluid elastomeric membrane
:penetrant sealer

.2 Provide light sandblast to areas not accessible to shotblast equipment, such as near vertical surfaces. Do not shotblast or sandblast until at least 28 days after placing concrete.

.3 Control Joints in Slabs-on-Grade:

.1 Sawcut control joints along column grid lines and additionally so that spacing does not exceed 30 times slab thickness, except where concrete mix incorporates 40 mm (1½") aggregate proportioned to provide maximum bulk

density in accordance with paragraph 2.2.4.2.2, sawcut so that spacing does not exceed 40 times slab thickness.

.2 Sawcut before slab temperature starts to fall but commence within 18 hours of placement.

.3 For slabs placed in longitudinal strips, sawcut transversely in sequence at half, then quarter, then eighth points.

.4 Use 4 mm (3/16") diamond tipped saw blades.

.5 Sawcut unreinforced slabs to a depth of 0.25 slab thickness, fibre reinforced slabs to 0.33 slab thickness.

.4 Joint Filler in Control Joints in Slabs-on-Grade:

.1 For floors which will be covered with finish materials which conceal joint: clean residue from floor and joint, grind joints and cracks to within tolerances prior to filling, fill with latex-sand-cement mortar worked into joint, or place fine silica sand in bottom of joint and fill top 12 mm (½") of joint with specified control joint filler to flush top with surface; do not overfill. Ensure tile and terrazzo joints are coordinated with sawcut control joints to prevent cracking.

.2 s to prevent cracking.

.3 For permanently exposed floors: protect, prepare and fill joint in accordance with following sub-paragraphs.

.1 Keep off floor, construction traffic which may erode concrete at edges of sawcuts.

.1 Do not fill joints until as long as possible after placing slab, but in no case less than 90 days and after heating system is turned on.

.2 Arrange for representative of joint filler manufacturer to be present for a period of time at commencement of Work to verify that proper procedures are being employed.

.3 Clean sawcut residue from floor.

.4 Clean residue from joint by power washing with 9 MPa (1200 psi) water jet and let dry.

.5 Install joint filler to thoroughly dry surfaces only, at ambient air temperatures above 5°C (40°F).

.6 For interior floors, fill joints full depth with semi-rigid joint filler specified in Section 03 15 00; do not overfill.

.7 For floors exterior to building, install polyethylene backer rod, of diameter 25 percent greater than joint width, flush with top of floor, to exclude dirt. Immediately prior to filling joint, depress backer rod to bottom of joint and fill with elastomeric sealant specified in Section 03 15 00. Do not overfill.

.8 Cut off any overpour of filler on adjacent slab surface after filler has hardened.

.9 Immediately prior to handover of building, re-examine joint for separation of filler from slab. Clean separations with compressed air and fill.

.5 Finishing Formed Surfaces

.1 Finish concrete in accordance with CSA-A23.1, Clause 7.7.3. Ensure all concrete finishes are uniform.

.2 Rough-Form Finish: Concrete surfaces not exposed to view. Seal tie holes with non-shrink grout, repair defects and remove fins exceeding 5 mm.

.3 Smooth-Form Finish: Concrete surfaces exposed to view including ceilings and soffits. Surfaces shall be smooth, hard and uniform texture free from raised grain, torn surfaces, worn edges, patches, dents or other defects impairing texture. Seal tie holes with non-shrink grout, repair defects and remove fins.

.4 Smooth-Rubbed Finish: Concrete surfaces exposed to view to be painted as noted on Drawings. Seal tie holes with non-shrink grout, repair defects and remove fins. Rub wetted surface with carborundum brick within six hours of removing forms to obtain uniform colour and texture.

.5 Do not parge unless approved by Consultant.

.6 Waterproofed Surfaces Form Finish: Concrete surfaces to be waterproofed. Surfaces to have an open capillary system, cracks cleaned, holes filled and honeycombing prepared. Surfaces to be free from raised grain, torn surfaces, worn edges, patches, ridges, depressions, dents or other defects impairing the application or effectiveness of waterproofing. Seal tie holes with waterproofing, repair defects as recommended by manufacturer of waterproofing and remove all fins.

.7 Exposed Smooth-Form Finish: Concrete surfaces exposed to view and liquid face of liquid-retaining structures not being waterproofed. Surfaces shall be smooth, hard and of uniform texture free from raised grain, torn surfaces, worn edges, patches, dents or other defects impairing the texture. Seal tie holes with non-shrink grout, except use waterproofing on liquid face of liquid-retaining structures, repair defects and remove all fins.

.8 in, torn surfaces, worn edges, patches, dents or other defects impairing the texture. Seal tie holes with non-shrink grout, except use waterproofing on liquid face of liquid-retaining structures, repair defects and remove all fins.

.9 Obtain Consultant’s approval of exposed concrete. Regrind or otherwise correct surfaces Consultant has not approved, and to his satisfaction.

.10 Plugs at Recessed Ties:

.1 Clean tie holes to remove all foreign matter.

.2 Coat plugs by dipping in adhesive and insert in hole.

.3 Remove excess adhesive immediately with thinner which will not stain concrete, as recommended by manufacturer.

.11 Elastomeric Membrane:

.1 Provide light sandblast finish to vertical surfaces, where fluid elastomeric waterproofing membrane turns up vertical surface.

.7 Curb Edging:

.1 Finish external corners of curbs rounded and smooth.

.8 Architectural Finishing:

.1 Submit evidence that finishing contractor has at east three years of experience in this type of finishing.

.2 Sandblast concrete surfaces to medium texture evenly over each surface and consistently throughout Project to match approved mock-up.

.3 Protect other surfaces and equipment against damage resulting from sandblasting operations.

.4 Use material that will minimize environmental contamination.

.5 Bush-hammer concrete surfaces to medium texture evenly over each surface and consistently throughout Project to match approved mock-up. Take care to avoid breaking external corners of bush-hammered concrete.

.6 Remove debris from finishing operations.

3.7 Curing, Sealing and Protection

.1 Cure and protect concrete in accordance with CSA-A23.1, Clause 7 and as specified herein.

.2 Be aware that proper curing is essential for concrete, and failure to cure properly causes scaling, dusting and lack of durability.

.3 Initial curing: Keep concrete surfaces continuously moist and cure at minimum temperature of 10°C for three days or for time required to obtain 35% of required 28 day strength.

.4 Final curing: Immediately following initial curing and before concrete has dried, maintain curing to ensure required strengths and durability are obtained. Moist cure the following concrete at a minimum temperature of 10°C for times noted or for time required to obtain 70% of the 28 day strength.

.1 Foundation concrete exposed to sulphate attack shall be continuously moist cured for a minimum of seven days.

.2 Exterior exposed concrete shall be continuously moist cured for a minimum of seven days.

.3 Parking decks and concrete to be exposed to salts shall be continuously moist cured for a minimum of seven days.

.5 Additional curing: Moist cure the following concrete at minimum temperature of 10°C for times noted.

.1 Reinforced massive sections shall be continuously moist cured for minimum of seven days.

.2 Unreinforced massive sections shall be continuously moist cured for minimum of ten days.

.3 Liquid retaining structures shall be moist cured for minimum of 10 days. Loosen wooden forms to allow water to run down inside.

.6 Protect concrete from sudden temperature changes as noted in CSA-A23.1, Table 14.

.7 Acceptable curing methods:

.1 Ponding or continuous sprinkling.

.2 Absorptive mat or fabric kept continuously wet (curing blanket or wet burlap).

.3 Continuous steam vapour mist bath not exceeding 70°C.

.4 Curing compounds approved by Consultant for type and rate of application.

.5 Waterproof paper or plastic film.

.6 Watertight forms left in place. Wood forms are not considered watertight unless coated or sealed to prevent moisture absorption.

.7 Other moisture-retaining method approved by Consultant.

.8 Curing Compound Method:

.1 Use curing and sealing compound specified in Section 03 15 00 except:

.1 On surfaces to receive epoxy or similar paint finish, toppings, hardeners or other types of bonded finishes.

.2 On surfaces to which architectural finishes will be adhered, the adhesives for which are incompatible with the curing compound.

.3 Air-entrained concrete for exterior slabs and sidewalks placed between October 1 and April 1.

.2 Select water-based compound except in colder weather when temperatures are such that manufacturer recommends solvent-based compound.

.3 Apply curing and sealing compound in accordance with manufacturer's instructions, increasing application rate as necessary to cover surface completely.

.4 Where curing compounds are approved, apply in two applications at right angles to each other.

.5 Confirm that coatings and curing compound are compatible.

.9 Plastic Film Method:

.1 Where curing compound method cannot be used, cure finished floor surfaces not exposed to freezing and thawing or deicing chemicals as follows:

.1 Cover with 0.15 mm(6 mil) thick polyethylene sheets.

.2 Lap edges 100 mm (4") minimum and seal laps.

.3 Leave in place for "Basic Curing Period" in accordance with CSA Standard A23.1 Clause 21.1.2, but in no case for less than three days, and not less than seven days for exposed warehouse and industrial floor surfaces.

.10 Curing Blanket or Wet Burlap Method:

.1 For parking garage floors; exterior sidewalks, pavements and curbs; and other finished concrete surfaces that will be exposed to freezing and thawing or deicing chemicals:

.1 Cover with curing blanket specified in Section 03 15 00, or wet burlap overlaid with 0.102 mm (4 mil) thick polyethylene, and maintain in place for the "Additional Curing for Durability" period in accordance with CSA Standard A23.1 Clause 7.4.1.6, but in no case for less than seven days.

.2 Wet blanket or burlap regularly to maintain in moist condition. Do not allow to dry out.

.11 Protect freshly placed and consolidated concrete against damage or defacement from curing methods or adverse weather conditions.

.12 Exterior concrete to be protected and allowed to air dry for 30 days prior to application of de-icing chemicals.

.13 Cure coloured concrete with material recommended by the manufacturer of the coloring agent.

.14 Do not use water curing during freezing weather.

.15 During hot weather, begin curing process immediately after finishing. Use continuous water or absorptive mats.

3.9 Defective Concrete (Non-Architectural)

.1 Immediately after removing forms, all concrete surfaces are to be inspected, and any imperfect joints, voids, stone pockets or other defective areas as specified are to be reported to Consultant at once and repaired before concrete is thoroughly dry. Defective areas are to be chipped away to a depth of not less than 25 mm with edges

perpendicular to the surface. Area to be repaired and a space at least 150 mm wide entirely surrounding it shall be wetted to a saturated surface dry condition to prevent absorption of water from the repair material.

.2 Repair shall be made of the same material and of same proportions as used for the original concrete, except that coarse aggregate is to be omitted and cement added to match the colour of the surrounding concrete. Amount of mixing water shall be as little as is consistent with requirements for handling and placing. Mortar shall be re-tempered without addition of water by allowing it to stand for a period of one hour, during which time it shall be mixed with a trowel to prevent setting.

.3 Repair material shall be thoroughly compacted into place and screeded off to leave the repair slightly higher than the surrounding surface. It is then to be left undisturbed for a period of one to two hours to permit initial shrinkage before being finally finished. Repair shall then be finished to match adjoining surface and cured to requirements noted in this Specification.

.4 Watertight structures with honeycombing or embedded debris are not acceptable. Remove and replace concrete between construction joints.

.5 Report any shapes and lines outside the specified tolerances and repair or correct as directed by Consultant.

3.10 Grouting for Steel Members

.1 Provide and place grout under column base and beam bearing plates. Cooperate with other trades that supply and set plates.

.2 Damped concrete surfaces immediately before installing grout.

.3 Install grout in a manner to ensure positive bearing of full area of steel plate.

.4 Use non-shrink and shrinkage-compensating grouts only when grout will be contained against expansion and self-disintegration.

.5 Slope grout beyond edge of plate at 45 degrees.

.6 Provide same environmental protection and curing as specified for concrete.

.7 Do not use flowable grout at beam bearing plates unless otherwise indicated, or approved by Consultant

3.11 Grout

.1 Mix to flowable consistency, and apply in accordance with manufacturer’s instructions.

.2 Install epoxy grout in all pockets during erection.

.3 Install cement grout in all sleeves.

.4 Install non-shrink grout as required.

3.12 Sealers

.1 Silane Sealer

.1 Apply penetrant silane sealer specified in Section 03 15 00, to vertical surfaces, to a height of 1 m (3'-3") above floor, and from top of footing, or bottom of grade beams, to 1 m (3'-3") above slab-on-grade in garage.

.2 Lightly sandblast surfaces to receive penetrant sealer, within 72 hours before applying sealer.

.3 Verify surfaces are dry, and concrete is at least 28 days old, before applying sealer.

.4 Apply at manufacturer's recommended coverage rate.

.5 Application to be by an approved applicator competent in application of sealers in strict accordance with manufacturer's recommendations and directions.

.2 Interior floor sealer: To be applied by an approved applicator competent in application of sealers in strict accordance with manufacturer's recommendations and directions.

.3 strict accordance with manufacturer's recommendations and directions.

3.13 Sealants

.1 Sealant:

.1 Joints exposed to view in walls and slabs with elastomeric sealant specified in Section 03 15 00, in colour selected by Consultant.

.2 Joints not exposed to view in walls with cold poured liquid neoprene sealant specified in Section 03 15 00.

.3 Joints not exposed to view in slabs with hot poured asphalt specified in Section 03 15 00, or cold poured liquid neoprene sealant specified in Section 03 15 00.

.2 Apply sealant to thoroughly dry surfaces only, at ambient air temperatures above 5°C (40°F).

.3 Confirm that preformed joint filler and backer rod are compatible with sealant.

.4 Seal control joints in slab-on-grade in accordance with paragraph 3.7.4.

.5 Seal other joints in accordance with following:

.1 Do not commence joint preparation until concrete is at least 28 days old.

.2 Thoroughly clean sides of joints with mason's router, or power saw, equipped with double blade where necessary to suit joint width.

.3 Blow clean with compressed air with oil trap on line, or vacuum clean.

.4 Install backer rod of diameter 25 percent greater than joint width, and of type recommended by sealant manufacturer to be compatible with sealant. Locate backer rod to provide for sealant depth of one-half joint width, but not less than 12 mm (1/2").

.5 Prime joint if required, as recommended by sealant manufacturer.

.6 Seal base of form tie holes in exposed concrete surfaces using approved sealant.

.7 Place cementitious waterproofing in below-grade wall construction joint reglets.

3.14 Dampproofing

.1 Apply dampproofing specified in Section 03 15 00, to entire surface of earth face of exterior and interior foundation walls with earth on one side only. Apply dampproofing from exterior grade level down to and including top surface of footing.

.2 At temperatures above 5°C (40°F), apply approved mineral colloid asphalt emulsion in accordance with CAN/CGSB-37.3, at rate of 1 l/m^2 (2 gallons per 100 ft^2) for each of two coats.

.3 At temperatures of 5°C (40°F) and below, apply approved unfilled asphalt cutback in accordance with CGSB 37-GP-12Ma at rate of 1 l/m^2 (2 gallons per 100 ft^2) for each of two coats.

.4 Obtain Consultant's approval of dampproofing before backfilling.

3.15 External Fastening and Coring

.1 Do not core concrete without prior written approval of Consultant.

.2 Do not drill inserts or drive power actuated fasteners into structural concrete without prior written approval of Consultant.

3.16 Carbon Monoxide Equipment

.1 Do not place concrete for floor slabs if carbon monoxide producing equipment has been in operation in the building or temporary enclosure during 12 hours preceding start of concreting.

.2 Provide positive ventilation during 12 hours preceding start of concreting.

.3 Unless directly used for concrete placing, do not operate carbon monoxide producing equipment in the building or temporary enclosure during or within 24 hours after completing finishing of any floor slab section.

3.17 Testing of Watertightness of Concrete Structures

.1 Test in accordance with ACI 350.1-01, Tightness Testing for Environmental Engineering Concrete Structures and its Commentary.

.2 Do not proceed with watertightness test until concrete structure is completed and concrete has attained specified strengths.

.3 Fill all structures to contain liquid with clean water prior to application of membrane or waterproofing and prior to placement of joint sealants. Fill tanks and channels only to design level elevations as directed by Consultant.

.4 Leave for a minimum of 72 hours prior to testing for leakage.

.5 Measure any loss of water or leakage for the period required by ACI 350.1.

.6 Supply and dispose off site all water required for this purpose at Contractor's expense.

.7 Allow for evaporation from tanks in accordance with ACI 350.1.

.8 Where permissible, an allowable leakage shall be measured as a drop in water elevation over 24 hour period and will be determined based on actual service intended for the structure being tested. Allowable leakage for the respective structure shall be in accordance with the following table. No leakage or sweating whatsoever of the structure adjoining or forming part of the tunnels or pumphouses will be permitted. All tunnels and pumphouses shall be completely watertight. Structures shall not be backfilled until testing is complete unless otherwise permitted by Consultant.

.9 Maximum allowable leakage for the various structures is tabulated as follows:

Item	Maximum Allowable Leakage in a 24 Hour Period
Tank walls or channel walls adjacent to or making up tunnels or pumphouses subject to external high groundwater or stored liquids	Nil (HST – NML)
Channels, clarifier, fermenter and bioreactor tanks (walls not adjacent to tunnels or pumphouses	.10 of 1% of liquid volume (HST – 100)

.10 Locate and repair all leaks at Contractor's expense.

.11 Plug and make completely watertight all visible leaks in items requiring nil leakage at Contractor's expense.

.12 Remedy all leaks in excess of maximum specified at Contractor's expense. Re-test structure at Contractor's expense after repairing until leakage is less than maximum specified.

.13 Test each cell of multi-cell tanks individually.

.14 Testing to conform to Chapter 2 of ACI 350.1.

3.18 Field Quality Control

.1 Inspection and Testing Company, when appointed as specified for Source Quality Control elsewhere in this Section, shall perform sampling, inspection and testing of concrete Work at site.

.2 Perform sampling, inspection and testing in accordance with CSA Standard A23.2, and to include:

.1 Making of standard slump tests.

.2 Obtaining of three (3) standard specimens for strength tests from each 100 40 m^3 of concrete, or fraction thereof, of each mix design of concrete placed in any one day.

.3 Placing pull-out type inserts in accordance with ASTM C900-T when the temperature is likely to fall below 5°C within 48 hours after placing concrete and no provisions have been made to heat the concrete to greater than 10°C.

.4 Taking one additional test cylinder during cold weather concreting and cure on job site under same conditions as the concrete it represents.

.5 Verification that test specimens are stored within an enclosure, maintained at specified temperatures.

.6 Moist curing and making compression tests of each set of three specimens, one (1) at seven days and two (2) at twenty-eight days.

.7 Making of modulus of rupture tests at 90 days.

.8 Verification of air content of air-entrained concrete and sump for each set of cylinders taken.

.9 Verification of unit weight of semi-low density concrete by the volumetric methods, making one test for each 100 m^3 (130 yd^3) place.

.10 Samples of concrete to be taken as close to point of final deposit in form as possible, at end of pipe when pumping is used.

.3 Inspection and Testing Company is not authorized to revoke, relax, enlarge or release any requirements of Specifications, nor to approve or disapprove any portion of Work.

.4 Inspection and Testing Company is to advise placing crews to halt placing of adverse concrete immediately, and thereafter notify Contractor to reject the concrete. Execution, or lack of execution, of this request shall be recorded.

.5 Reject and do not place concrete with slumps greater than maximum specified, air content lower than minimum specified and concrete over 2 hours from batch time.

.1 Inspection and Testing of Unit Masonry Core Fill

.1 Clauses pertaining to inspection and testing of concrete contained in this Specification shall apply to unit masonry grout, unless noted otherwise.

.2 Inspection and Testing Company shall take a minimum of three (3) test cylinders, one slump test and one entrained air test for each 20 m^3 placed or portion thereof for project having more than 20 m^3 of grout and for each 10 m^3 placed or portion thereof for project having less than 20 m^3 and not less than one (1) test in any one day of grout placed.

.3 Reject and advise Contractor to not place job site-mixed grout over 1.5 hours from mixing time.

.2 Inspection and Testing of Grout

.1 In accordance with ASTM C109, provide at least two (2) cube tests on all types of non-shrink grout used. Provide at least 5 tests of cement grout but maximum one (1) test per day.

.3 Inspection and Testing of Gunite

.1 Take a minimum of three cores for each day's operation or 200 m^3 of material placed, and test in accordance with ASTM C42.

.4 Inspection for Tolerances:

.1 Confirm that concrete work meets tolerance requirements specified in paragraph 1.3.5.

.2 Use the elevation survey records of elevations of soffit form surfaces and finished concrete surfaces specified in Section 03 10 00 and this Section as basis for judging compliance.

.3 Use approved aluminium straightedge to judge compliance with specified slab finish tolerances, except use dipstick equipment where F-number tolerance is specified.

.5 Slabs-on-Grade:

.1 Monitor on a random basis acceptable to Consultant, that slab is being sawcut before slab temperature starts to fall.

.2 Observe application of curing compound to sample slab, recording rate of application.

3.19 Cleaning

.1 Repair, remove and clean all drips and smears resulting from the work of this Section on exposed, finished surfaces or surfaces to be subsequently finished.

.2 Hose down sandblasted surfaces. Brush thoroughly with a stiff broom to remove all dust and loose particles.

.3 Remove from building site excess and waste materials, mock-up panels, test areas, and debris resulting from Work of this Section. Leave premises in a condition acceptable to Consultant before completion of Work.

3.20 Defective Work

.1 Variations in excess of specified tolerances, failure of materials or workmanship, and marked and disfigured surfaces will be considered defective Work performed by this Section.

.2 Replace or modify concrete that is out of place, or does not conform to lines, detail or grade as directed by Consultant.

.3 Replace or repair defectively placed or finished concrete as directed by Consultant.

.4 Contract shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient. Cost for additional inspection, testing, review and redesign to be deducted from Contract Value.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Precast concrete Base fabrications to profiles as indicated.

.2 Steel inserts and anchors for precast installation.

1.2 References

.1 Definitions:

.1 Hairline cracks:

.1 Surface cracks of minute width, visible but not measurable by ordinary means.

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 Shop drawings:

.1 Submit engineered shop drawings, including seismic design, connections and restraint.

.4 Samples:

.1 Submit precast concrete samples, in sizes as directed by the *Consultant* of the specified finish for review by the *Consultant*.

1.4 Quality Assurance

.1 Qualifications:

.1 *Subcontractor*:

.1 Has proven experience in the design and manufacture of precast concrete.

.2 Has adequate finances, equipment, plant and skilled personnel to expeditiously detail, fabricate and install the work of this section as required by the *Contract Documents*.

.2 Manufacturer:

.1 Manufacturer shall be qualified in accordance with CSA A23.4-16.

.2 The manufacturer shall be responsible for the design, connections, and installation of the precast concrete units.

1.5 Delivery, Storage, and Handling

.1 Design and cast lifting devices into the units to ensure that they will be safely and efficiently handled. Lifting devices shall be so arranged that they do not have to be removed or, if they must be removed, they shall be arranged so that they are readily filled.

.2 Stack units on properly cushioned supports to protect the edges.

.3 Do not permit units to contact earth or other staining influences or to rest on corners.

.4 Protect stockpiles against inclement weather.

.5 Protect holes and reglets against water and ice in freezing weather.

PART 2 - PRODUCTS

2.1 Performance/Design Requirements

.1 Design and construct precast concrete work in accordance with CSA A23.4-16.

.2 Slope top surfaces of exterior precast minimum 2%.

2.2 Materials

.1 Precast concrete units:

.1 Cement, water reducer, air entrainment, sand, aggregates, water admixture: to CSA A23.4-16 and CAN/CSA A23.1/A23.2-09.

.2 Aggregate: in conformance with CSA-A23.1-09 and shall be tested for soundness prior to manufacture in accordance with CSA A23.4-16.

.3 Sand: Silica or sandstone sand of approved source, as selected by *Consultant*.

.4 Admixture: in accordance with CSA-A23.1-09. Introduce admixtures to concrete at time of batching in accordance with the manufacturer's recommendations. Admixtures shall be subject to the approval of the *Consultant*.

.5 Reinforcing steel: billet steel bars conforming to CAN/CSA G30.18-09. Reinforcing larger than 6 mm (1/4") diameter shall be deformed bars conforming to the same standard. Welded wire mesh shall conform to ASTM A1064 / A1064M-17. Galvanize reinforcing with less than 25 mm (1") cover.

.6 Metal precast anchor and hardware finish:

.1 For metal anchors and hardware located at or below finished grade: Stainless steel Type 304/316.

.2 For metal anchors and hardware located exterior to the air barrier membrane: Stainless steel Type 304/316

.7 Water: in accordance with CSA-A23.1-09.

.8 Concrete: minimum compressive strength of 35 MPa at twenty eight (28) days. Precast concrete units shall contain entrained air controlled at 5% minimum.

.9 Forms: constructed of approved concrete, steel or fibreglass reinforced plastic or high density overlaid plywood conforming to CSA O121-08 to obtain a high quality of the finish.

.10 Stainless steel setting rods, sized as required to receive parapet caps and sills.

.11 Non-shrink grout and setting mortar: Non-shrink 2-component setting type epoxy mortar as manufactured by Sika, WR Meadows, Master Builders Solutions, or approved alternative.

.2 Finish on exposed surfaces of precast concrete shall be dark grey ~~or white~~, to *Consultant's* selection, with smooth sandblast finish and as follows: [Revised by Addendum No.2]

.1 Colour and Texture: to later selection by *Consultant*.

PART 3- EXECUTION

3.1 Installation

.1 Erect precast concrete units in accordance with CSA A23.4-16 and this Standard shall apply to precast concrete units required under this section.

.2 Set work plumb, true and square with joints parallel and uniform. Vertical and horizontal joints 12.7 mm (1/2") wide maximum as detailed.

.3 Where tolerances will interfere with work of other Sections that will force other work to be out of plumb or deviate from straight lines shown on drawings, *Provide* remedial work for this defect at no additional cost to the *Owner*.

.4 Set dowels into full contact with non-shrink grout in accordance with engineered shop drawings.

.5 Set precast into full contact with non-shrink mortar in accordance with engineered shop drawings.

.6 Joints between precast and between precast and adjacent materials: Apply sealant in accordance with Section 07 92 00.

.7 Supply adequate information on handling and installation methods.

3.2 Field Quality Control

.1 Conduct quality control in accordance with Section 01 45 00.

.2 Rejection of work:

.1 Concrete units containing concrete which have failed to meet required strength requirements will be rejected. Units fabricated out-of-square, out-of-dimension, without proper reinforcement, proper opening or inserts, shall be rejected.

.2 Damaged, chipped, rust stained, and discoloured panels shall be replaced, patched or refinished with original face matrix materials.

.3 Except for hairline cracks, units which have become cracked or broken will be rejected.

3.3 Adjusting and Cleaning

.1 Remove, as work progresses, excess or foreign materials that would set on or become difficult to remove from finished surface.

.2 At completion, clean exposed surfaces of precast units. Remove dirt and other extraneous matter. Do not use acidic cleaners.

END OF SECTION

.1 General Conditions and Division 1, General Requirements, shall govern given Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

1.1 Description

.1 Work Supplied by this Section, but Installed by Others:

.1	Anchor rods and cast-in anchorages	Section 03 10 00
.2	Loose bearings, bases and anchorages	Section 03 30 00
.3	Loose bearings, built in anchors and loose lintels	Section 04 20 00

.2 Related Work Specified in Other Sections:

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Grouting Baseplates and Bearing Plates on Cast-in-Place Concrete	Section 03 30 00
.4	Steel Joists	Section 05 21 00
.5	Steel Roof Deck	Section 05 31 00
.6	Miscellaneous Metals	Section 05 50 00
.7	Manufactured Roofing and Siding	Section 07 61 113 & 07 46 19
.8	Intumescent Coatings	Section 09 84 50
.9	Painting	Section 09 91 00

.3 Co-operation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section.

.4 Co-operation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section.

.5 Professional Liability Insurance:

.1 Submit proof of connection design Engineer’s professional liability insurance coverage specified in this Section.

.6 Calculations:

.1 Submit design calculations if requested by Consultant.

1.2 Quality Assurance

.1 Reference Standards and Publications:

.1 The following Reference Standards shall govern Work of this Section, except where they are in conflict with requirements imposed by this specification, in which case the latter shall govern. Standards referenced by following Standards apply, but are not necessarily repeated in the following list.

.2 All standards to be latest issue at time of tender.

.3 Provide one copy on site of the first two standards listed below:

.1 2012 OBC, “Ontario Building Code”.

.2 CAN/CSA-S16-19, “Limit States Design of Steel Structures”.

.3 CSA S136-16 (R2021), “North American Specification for the Design of Cold-Formed Steel Structural Members”.

.4 CSA-G40.20-13/G40.21-13 (R2018), “General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels”.

.5 CAN/CSA-G164-18, “Hot Dip Galvanizing of Irregularly Shaped Articles”.

.6 CSA-W47.1-19, “Certification of Companies for Fusion Welding of Steel Structures”.

.7 CSA-W59-18, “Welded Steel Construction”.

.8 CSA-W178.1-18, “Certification of Welding Inspection Organizations”.

.9 CSA-W178.2-18, “Certification of Welding Inspectors”.

.10 CSA-W186-21, “Welding of Reinforcing Bars in Reinforced Concrete Construction”.

.11 ASTM A307-21, “Standard Specification for Carbon Steel Bolts and Studs, 60000 psi Tensile Strength.”.

.12 ASTM F3125/F3125M-22, “Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength ”.

.13 ASTM A449-14(2020), “Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength General Use”.

.14 ASTM A653/A653M-20, “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process”.

.15 ASTM A1011/A1011M-18a, “Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength”.

.16 ANSI/AISC 303-22 American Institute of Steel Construction (AISC) Code of Standard Practice for Steel Buildings and Bridges, Section 10, Architectural Exposed Structural Steel

.2 Qualifications:

.1 Undertake welding by fabricators and erections certified by the Canadian Welding Bureau under CSA-W47.1, Division 1 or 2.1 only.

.2 Fabricate structural steel only by a Fabrication Member of the Canadian Institute of Steel Construction.

.3 Fabricator shall incorporate own Quality Verification Program conforming to CSA Standard Z299.3.

.4 Connections Designed by Consultant:

Submission of shop and erection Drawings for connections, which have been detailed on Drawings by Consultant, represents acceptance by Contractor that connection can be executed successfully.

.5 Other Connections:

.1 Design of other connections which cannot be selected from standard designs tabulated in CISC Handbook of Steel Construction: by a Professional Engineer, licensed in the Province of Ontario, experienced in structural steel connection design.

.2 Consultant will review connection arrangement to verify general conformance with overall design concept of structure.

.3 Connection design Engineer to be insured against professional liability accordance with section 74 subsection [1] of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection [2] is not acceptable. Provide a minimum of $2,000,000 coverage.

.3 Design:

.1 Connections:

.1 Connection Design: to CAN/CSA-S16.1 to resist all loads and forces shown on the Drawings and as noted below.

.2 Provide bolted or welded connections, unless shown otherwise on Drawings.

.3 Use high strength bolts, except that A307 bolts may be used for connections of roof purlins, bridging, girts and trimmer beams not connecting to columns, unless otherwise noted on Drawings.

.4 Design bolted bearing connections with threads included in the shear plane unless otherwise stated on erection Drawings.

.5 Use slip resistant connections for bolted joints designed to resist reversible forces, impact loads, seismic or wind loads, crane loads, tension loads and oversized and slotted holes not designed for movement.

.6 Provide tension adjustment hardware at rod type bracing and at flat bar type bracing.

.7 Do not permit connections to encroach on clearance lines required for installation of Work other Sections.

.8 Working points are centerline intersections of beams, columns, bracing members and baseplates.

.2 Beam Connections:

.1 Design connections to resist reaction of beam, when beam is loaded to maximum flexural capacity under uniformly distributed load, unless reaction or connection detail is shown on Drawings. For composite beam construction, use flexural capacity of composite section based on 100 percent shear connection of beam to slab.

.2 Provide flexible beam connections for unrestrained members in accordance with CSA S16.1, unless shown otherwise on Drawings.

.3 Select connections, wherever possible, from standard designs tabulated in current edition of CISC Handbook of Steel Construction, except that length of beam web angles shall not be less than half the depth of beam, and single angles shall not be used for beams deeper than 600mm.

.4 Provide direct connections to flanges of interior and exterior perimeter beams to restrain twisting but maintain flexibility in primary plane of bending.

.3 Tolerances:

.1 In accordance with CSA-S16.1. Erect shelf angles and members to which frames of windows, doors and louvers are connected directly and which are attached to steel frame, within a tolerance of 3 mm plus or minus, and with abutting ends of members at same level.

.4 Random Splicing:

.1 Obtain in writing from Consultant, prior to commencement of shop drawings, special requirements that will be imposed as a necessary condition of acceptance of members with randomly located butt-welded splices.

.5 Source Quality Control:

.1 Inspection and testing of materials and shop fabrication of Work of this Section, and field quality control specified elsewhere in this Section, may be performed by an Inspection and Testing Company appointed by Consultant.

.2 Provide access for inspection to all places where Work is being undertaken or stockpiled.

.3 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the Specification.

.4 Inspection and Testing Company shall be certified by Canadian Welding Bureau to CSA W178.1, Category 1, Buildings.

.5 Welding inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W 178.2, to minimum level 2 certification.

.6 Payment for specified Work performed by Inspection and Testing Company will be made from cash allowance specified in Section 01 20 00.

.7 Include in the contract sum, cost of inspection and testing of splices introduced by fabricator in steel sections at random locations.

.8 Inspection and Testing Company when appointed shall carry out shop and field inspection to verify:

.1 Structural materials and paint conform to Specifications. Mill test reports, properly correlated to the materials, will be accepted in lieu of physical tests of structural materials.

.2 Fabrication and welding conforms to Specifications and dimensioned shop drawings.

.3 Shop painting, and cleaning and preparation for same, conform to specified requirements.

.4 Surfaces inaccessible for cleaning and painting after assembly are treated before assembly.

.5 For surfaces painted with zinc-rich paint or zinc primer, specified surface preparation is followed, and specified paint thickness is applied.

.6 Non-destructive Testing of Bolted Connections:

.1 Carry out non-destructive testing of bolted connections chosen at random as follows:

- 10% ? 20% ? 25% of snug-tight bolted connections, minimum 2 bolts per inspected connection.
- 10%? 20%? 25% of pretensioned bolted connections, minimum 2 bolts per inspected connection.

.7 Non-destructive Testing of Welded Connections:

.1 Carry out non-destructive testing of welded connections chosen at random as follows:

- 10%? 20%? 25%? of moment connections involving use of fillet welds, by magnetic particle inspection.

- All moment connections and all connections in direct tension involving use of Full Penetration Groove welds, by ultrasonic testing.
- Where moments are transferred by either fillet welds or groove welds into end plates in “T” joint configurations, examine base metal for lamellar tearing or cracking, by ultrasonic testing, for all connections.
- Welded studs. Bend tests 1 in 100, studs, visual 100% of studs.

.8 Additional costs for extra testing and inspection due to deficiencies to be paid by Contractor.

1.3 Submittals

.1 Qualifications:

.1 Submit in writing evidence of qualification for welding under CWB.

.2 Submit evidence of ability to weld reinforcing steel in accordance with CSA-W186.

.2 Professional Liability Insurance:

.1 Submit proof of connection design Engineer’s professional liability insurance specified in this Section.

.3 Calculations:

.1 Submit design calculations if requested by Consultant.

.4 Shop Drawings:

.1 Professional Engineer responsible for connection design shall either sign and seal each shop drawing submitted, or shall submit a signed and sealed letter at commencement of shop drawing preparation stating he will assume responsibility for compliance of connections with this Specification.

.2 Submit erection diagrams and shop details, fully detailed and dimensioned, with complete information necessary so that steel may be fabricated and erected without reference to Drawings. Indicate openings on the erection drawings and coordinate with the trades concerned. Copies of portions of the structural drawings will not be accepted as shop drawings.

.3 Where new Work connects to existing construction, determine existing conditions and all dimensions on site, including verification of all dimensions on Drawings. Report any necessary adjustments to Consultant.

.4 Submit for review erection drawings, typical details of connections and any special connections, before preparation of shop drawings.

.5 Submit typical details of connections and any special connections for review before preparation of shop drawings.

.6 Include whether snug-tight or pre-tensioned high-strength bolts are to be used, and whether threads are to be included or excluded from shear plane.

.7 Show splice locations and details.

.8 Indicate colour of primer and number of coats.

.9 Prior to submission to Consultant, Contractor shall review all shop drawings. By this review, Contractor represents to have determined and verified all field measurements, site conditions, materials, catalogue numbers and similar data, and to have checked and coordinated each shop drawing with the requirements of Work and of Contract Documents. Stamp, date and signature of the Contractor's representative shall indicate contractor's review of each shop drawing.

.10 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.11 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review is intended as an assistance to the Contractor and will be for conformity to design concept and for general arrangement, and shall not relieve Contractor of responsibility for errors and omissions in shop drawings or of responsibility for meeting all requirements of Contract Documents.

.12 Contractor shall make changes in shop drawings, which Consultant may require, consistent with Contract Documents, and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of revisions other than those requested by Consultant.

.13 Fabrication prior to receipt of shop drawing review comments is at the risk of this Section.

.14 Shop drawings refers to detailed shop drawings for all individual members and associated erection and fieldwork Drawings.

.15 Submit shop drawings as follows:

- 1 copy of erection diagrams, shop and fieldwork drawings for review before any Work commences
- 1 copy additional copies of shop, fieldwork and erection drawings for distribution as directed by Consultant.
- 1 copy of reviewed shop, fieldwork and erection diagrams to Inspection and Testing Company.

.16 Submit shop drawings in accordance with Section 01 30 00.

.5 Erection Procedures: Submit to Consultant or regulatory authorities for review, diagrams showing methods of erection proposed, if so directed by Consultant or regulatory authorities.

.6 Paint Performance: If requested by Consultant, submit paint manufacture's certification that paint conforms to CISC/CPMA Standard specified, or other requirements specified and its compatibility with topcoats specified elsewhere.

.7 Quality Verification Manual: Submit quality verification manual in accordance with this Section, before award of contract.

.8 Inspection Procedure and Reports:

Inspection and Testing Company shall:

.1 Submit Inspection Procedure.

.1 Submit to Consultant procedure, which shall be followed to verify compliance with the Drawings and Specifications. Include details of any random sampling procedures, general instructions given to inspectors and special instructions pertaining to aspects peculiar to this Project. Submission of this procedure shall not relieve Inspection and Testing Company of responsibility to confirm that completed structural steelwork complies with above requirements.

.2 Submit reports at least weekly when shop and site Work of this Section is in progress.

.3 Distribute inspection reports as follows:

- 2 copies to Consultant;
- 1 copy to Consulting Structural Engineer;
- 1 copy to Contractor;
- 1 copy to Steel Fabricator.

.4 Sign report by inspector who performs inspection, and describe progress of Work, deficiencies found and corrective actions taken.

.5 Include deficiency list of outstanding items from previous reports, indicate date of first observation and date of corrective action, and comment on status.

1.4 Storage and Handling

.1 Deliver products that are supplied only under Work of this Section to trades responsible for their installation, to location they direct, and to meet construction schedule.

.2 Exercise care in storing and handling all materials of this Section. Handle and store structural steel so that no damage or corrosion is caused to stored or erected Work, or to other property.

.3 Protect architecturally exposed steel during fabrication, handling, storage and erection to prevent marring of surfaces exposed to view, by marking, bending, denting, or coarse grinding.

PART 2 – PRODUCTS

Unit Prices

.1 Unit prices requested as part of Tender shall include Work erected in place, and preparation and submittal of shop drawings.

.2 Unit prices shall serve as a basis for computing value of additional or deleted Work and alterations, including cutting and reinforcing of holes, performed as Changes to Work.

.3 Base estimate of steel tonnage on CISC standard method of computing weights. Use net dimensions of shapes and plates, without allowance for weight variations due to mill tolerances.

.4 Unit prices to be applied to net mass difference per category.

Materials

.1 Provide new materials in accordance with Reference Standards, of strength and quality noted on Structural Drawings.

.2 Cold Formed Channel's:

- Fabricate from hot rolled sheet to ASTM A570.A570M, Grade 50.
- Fabricate from zinc-coated sheet to ASTM A653/A653M, Structural Quality Grade 50 Class 1.

.3 Anchor rods: to ASTM A307, and to typical details on Drawings.

.4 Welded Studs: to ASTM A108.

.5 Galvanizing:

.1 Zinc coating CAN/CSA G164 with a minimum coating of ??600 ??700 ??900 g/m^2.

.6 Paint:

.1 Shop Coat Paint, for steel that will not receive finish coat: to CISC/CPMA Standard 1-73a, “A Quick-Drying One-Coat Paint for Use on Structural Steel”.

.2 Prime Paint: to meet requirements of CISC/CPMA 2-75, “A Quick-Drying Primer for Use on Structural Steel”.

.3 Inorganic Zinc Primer:

- Carbo Zinc 11, by Corrosion Service Co. Ltd.
- Dimetcote 9, by Ameron Canada Inc., Oakville, and Ontario
- Catha-Coat 304L, by ICI-Devoe (Glidden) Ltd.

.4 Zinc-Filled Epoxy Polyamide Primer:

- Carboline 658, by Corrosion Service Co. Ltd.
- Amercoat 68A, by Ameron Canada Inc., Oakville, Ontario
- Catha-Coat 313, by ICI-Devoe (Glidden) Ltd.

.5 Zinc-Rich Paint – Organic, Ready Mixed:

- Galvafroid, by W. R. Meadows Ltd.
- Catha-Coat 13034, by ICI-Devoe (Glidden) Ltd.

.7 Sliding Bearings:

.1 Steel upper sole plate, with stainless steel lower face with #10 mirror finish. Stainless steel to bear on pure virgin Teflon surfaced lower pad of reinforced elastomer of smaller dimensions than sole plate, as designed and supplied by:

- Structural Tech Corporation, Sarnia, Ontario
- Goodco Ltd., Markham, Ontario

.8 Floor Grating:

.1 Galvanized, welded steel, of adequate strength and stiffness to support loadings given on Drawings, with maximum deflection of 1/180 of span, and with banded ends.

- Type W/F, by Borden Products Canada Ltd.
- Type 19-2, by Fisher & Ludlow.

Fabrication

.1 Fabricate Work of this Section in accordance with CSA-S16.1, and as specified below.

.2 Notify Consultant and Inspection and Testing Company a minimum of 24 hours prior to fabricating any steel to allow for inspection.

.3 Accurately cut and mill column ends and bearing plates to assure full contact of bearing surfaces prior to welding.

.4 Seal all hollow structural sections with suitable cap plates or by welding all around to adjoining members.

.5 Provide 10 mm plate stiffeners each side of beam where continuous over supports.

.6 Provide 10 mm plate stiffener one side of beam at all bearing connections.

.7 Camber horizontal members as noted on Drawings.

.8 Weld reinforcing steel where indicated. Weld in accordance with applicable requirements of CSA-W186. Do not weld reinforcing at any location without written approval of the Consultant.

.9 Holes:

.1 Punch holes 11 mm to 28 mm diameter as required for attaching the Work of other Sections to structural steel members. Locate holes so that no appreciable reduction of strength of members is caused,

.2 Provide holes for pipes and ducts, and reinforce openings as indicated on Drawings. Cutting of holes or openings in structural members in shop or field will not be permitted except with written approval of Consultant.

.3 Provide effective drainage holes to prevent accumulation of water in tubular members.

.10 Base Plates:

.1 Provide single base plates. Do not use separate levelling plates for columns.

.11 Welded Studs:

.1 Install accordance with CSA W59, Appendix H.

.12 Architecturally Exposed Steelwork:

.1 Fabricate and maintain straightness of structural steelwork which will be left exposed to view as finished surface, in accordance with American Institute of Steel Construction Code of Standard Practice for Steel Buildings and Bridges, Section 10, Architecturally Exposed Structural Steel, and as follows:

.1 Continuously seal weld connections exposed on exterior or interior of building.

.2 Finish exposed welds smooth and flush with adjacent surfaces.

.3 Remove mill marks, identification marks and surface imperfections, smooth and flush with adjacent surface.

.4 Do not mar surface with grind marks that are clearly visible after painting.

.5 Do not use stitch welds where welding is exposed to view.

.13 Masonry Anchors:

.1 Provide masonry strap anchors welded to structural steel.

.2 Provide for attachment of adjustable flexible anchors that are supplied by mason.

.3 Provide wall anchors for beams bearing on masonry or concrete.

.14 Lintels:

.1 Provide 150 mm minimum bearing for angle lintels, and bolt or weld together upstanding legs of angle lintels at 600 mm centre.

.15 Cleaning Steel:

.1 Clean steel, whether it is to be painted or not, to the degree required by CISC/CPMA 1-73a, except as specified below.

.2 Clean steel, which is specified to be painted to CISC/CPMA 2-75 in accordance with that Standard.

.3 Clean steel which is specified to receive an organic zinc-filled epoxy primer, or zinc-rich paint, or inorganic zinc primer, in accordance with SSPC-SP 6, Commercial Blast Cleaning.

.16 Painting:

.1 Paint interior steel surfaces that are not specified to receive top coat or zinc primer or zinc-rich paint, with one coat of paint to CISC/CPMA 1-73a.

.2 Prime interior steel surfaces that are specified in Section 09 91 00 to be finish painted, and are not specified to receive zinc primer, with one coat of prime paint to CISC/CPMA 2-75.

.3 Prime steel surfaces specified on Drawings to receive inorganic zinc primer, or zinc-filled epoxy polyamide primer, with one coat to an average dry film thickness of 65 microns and a minimum dry film thickness of 50 microns

.4 Paint steel surfaces exterior to the building vapour barrier and not specified to be galvanized or painted with zinc primer, with two coats of zinc-rich paint specified in paragraph 0.6.5, applied to an average dry film thickness of 38 microns per coat and a minimum dry film thickness of 23 microns per coat.

.5 Do not paint:

- Surfaces and edges within 50 mm of field welds.
- Surfaces encased in, or in contact with concrete, including the top flange of beams supporting cast-in-place slabs.
- Surfaces to be spray fireproofed.

.6 Apply paint in accordance with manufacturer's published directions.

.7 Paint steel in shop under cover and keep under cover until paint has dried.

.8 Primers to be different and distinctive colour for each coat used.

.17 Galvanizing:

.1 Galvanize lintels, brick support angles, architectural block support angles, and other members indicated as galvanized on Drawings, after shop welding is complete.

PART 3 – EXECUTION

3.1 Examination

.1 Verify, before delivery of structural steel, that Work of other Sections on which Work of this Section is dependent is correctly installed and located.

3.2 Preparation

.1 Supply Anchor rods, base and bearing plates and other members to be built in under Work of other Sections as Work progresses. Co-operate with installers of this Work and provide instructions for its setting.

.2 Where new Work connects to existing construction, determine site conditions and dimensions accurately in field. Report any necessary adjustments to Consultant.

3.3 Erection

.1 Notify Consultant and Inspection and Testing Company a minimum of 24 hours prior to erecting any structural steel to allow for inspection.

.2 Do not field cut or alter structural members without the written approval of the Consultant. Report to the Consultant every failure of material to fit together properly and submit proposed corrective measures. Corrective measures must be approved by the Consultant.

.3 Comply with requirements of Reference Standards and requirements of regulatory authorities, in erection of Work of this Section.

.4 Make adequate provision for horizontal and vertical erection loads and for sufficient temporary bracing, to maintain structure safe, to keep structural frame plumb and in true alignment until completion of erection, and installation of permanent bracing, masonry, concrete work, and floor and roof decks which provide stability to completed building.

.5 Provide temporary steel members as may be required for erection purposes and remove when no longer required.

.6 Beam Bearing Plates and Column Base Plates:

.1 Set beam bearing plates and column base plates, at proper elevation, true and level, with steel shims, ready for grouting as specified under Work of other Sections.

.2 Install sliding bearings specified in paragraph 0.7 in accordance with manufacturer's recommendations.

.7 Floor Grating:

Weld or security fasten at least two bearing bars of each grating panel specified in paragraph 0.8, to every supporting steel beam unless otherwise noted.

.8 Erect architecturally exposed steel in accordance with specified requirements of AISC Code of Standard Practice, Section 10, Architecturally Exposed Structural Steel.

3.4 Quality Control

.1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:

.1 Inspection of erection and fit-up, including placing, plumbing, levelling and temporary bracing and conformance with specified tolerances.

.2 Inspection of bolted connections, including verification that A307, A325/A325M snug tight only bolts, and A325/A325M pretensioned bolts have been used appropriately, and that threads are excluded from shear plane where required.

.3 Inspection of welded joints, including slag removal.

.4 General inspection of field cutting and alterations; report immediately to Consultant, alterations or cutting not shown on reviewed shop drawings.

.5 General inspection of shop coating touch-up.

.6 Inspection of zinc primer and zinc-rich paint, including surface preparation and coating thickness.

3.5 Coating Touch-Up

.1 Clean welds to remove all residues from electrodes.

.2 After erection is complete, give one coat of touch-up paint to field bolts, field connections, burnt areas, and abrasions or damage to prime coats.

.1 Use a compatible primer to touch-up 1-73a or 2-75 shop-applied primer.

.2 Use compatible organic zinc-filled epoxy primer to touch-up inorganic or organic zinc primer.

.3 Use a compatible zinc-rich paint to touch-up shop or field applied zinc-rich paint.

.4 Give areas of bare metal on galvanized members two coats of zinc-rich paint.

3.6 Defective Work

.1 Variations in excess of specified tolerances, and failure of materials or workmanship to meet requirements of this specification, will be considered defective Work performed by this Section.

.2 Replace defective Work, as directed by Consultant.

.3 Contractor shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient, or fails to meet the shop or fieldwork drawing details. Costs for additional inspection testing, review and redesign to be deducted from Contract Value.

.4 The Consultant may order further testing, inspection and analysis at any time. In this instance, the Owner will pay for those tests, inspections or analysis that meet the specified requirements, and the Contractor will pay for those that do not.

END OF SECTION

Steel Roof Deck

PART 1 - GENERAL

1.1 General Requirements

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

1.2 Description

.1 Work Supplied by this Section but Installed by Others:

.1	Install anchorage assemblies	Section 03 10 00
.2	Install anchorage assemblies	Section 04 20 00

.2 Related Work Specified in Other Sections:

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Concrete Formwork	Section 31 10 00
.4	Cast-in-Place Concrete	Section 03 30 00
.5	Unit Masonry	Section 04 20 00
.6	Structural Steel	Section 05 12 00
.7	Steel Joists	Section 05 21 00
.8	Painting	Section 09 90 00

.3 Co-operation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section.

.4 Co-operation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section**.**

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.5 Cooperation with Inspection and Testing Company:

.1 Provide free access to Work.

1.3 Quality Assurance

.1 Reference Standards & Publications:

.1 All standards to be latest issue at time of tender.

.2 Provide one copy on site of the first four standards listed below.

.3 The following reference standards shall govern Work of this Section, except where they are in conflict with requirements imposed by this Specification, in which case the latter shall govern. Standards referenced by following Standards apply but are not necessarily repeated in following list:

.1 2012 OBC, “Ontario Building Code”.

.2 “The Supplement to the National Building Code of Canada”, 2020 Edition.

.3 CSSBI 10M–18, “Standard for Steel Roof Deck”, Published by Canadian Sheet Steel Building Institute.

.4 CSA S136-16 (R2021), “North American Specification for the Design of Cold-Formed Steel Structural Members”.

.5 CSA-W178.1-18, “Certification of Welding Inspection Organizations”.

.6 CSA-W47.1-19, “Certification of Companies for Fusion Welding of Steel Structures”.

.7 CSA-W178.2-18, “Certification of Welding Inspectors”.

.8 ASTM Standard A653/A653M-22, “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process”.

.9 FM Global Loss Prevention Data Sheets 1-28 (2022), 1-28R/1-29R (1998), 1-29 (2022) and 1-54 (2021).

.10 FM Global Approval Guide.

.2 Regulations:

.1 Abide by current bylaws and regulations of the province and/or municipality in which the Work is located, and abide by the current laws and regulations with regard to public safety.

.3 Qualifications:

.1 Undertake welding only by organizations certified under Division 2.1 or higher, by Canadian Welding Bureau under CSA Standard W47.1. Part of the Work may be sublet to a Division 3 firm, provided that the Division 1 or 2.1 firm retains the responsibility for the Work. Welders to be certified for deck welding by Canadian Welding Bureau.

.2 Design of steel roof deck shall be by a Professional Engineer licensed in the Province of Ontario with a minimum of 5 years Canadian experience in steel roof deck design.

.3 Steel deck design engineer shall be insured against professional liability in accordance with Section 74 Subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with Subsection (2) is not acceptable. Provide a minimum of $2,000,000 coverage.

.4 Consultant will review general arrangement to verify general conformance with overall design concept of structure.

.4 Design:

.1 Design steel roof deck as part of system specified in Section 07630. Design for loads imposed by roofing system and its fasteners.

.2 Design roof deck and fasteners in conformance with CSSBI 10M Article 8.6.

.3 Design roof deck and fasteners to support dead plus live loads shown on Drawings and concentrated loads stipulated on the drawings and in NBC Table 4.1.6.B, and for not less than the load nor more than the deflection stipulated in CSSBI 10M Clause 8.6.5.

.4 Limit roof deck deflections to the lesser of following:

- Live load L/360 or 20 mm
- Total load L/240 or 20 mm

.5 Design roof deck and fasteners to resist the following minimum gross unfactored uplifts, where widths of “s”, “c” and “r” areas are defined in the Supplement to the National Building Code of Canada, Commentary B, Figure B-9.

Canopies.....2.00 kPa (42 psf)
Edge strips “s” ..... 1.25 kPa (26 psf)
Corner areas “c” ..... 2.38 kPa (50 psf)
Other roof areas “r” .....1.00 kPa (20 psf)

Dead load of roof deck construction may be deducted from these uplifts, after applying relevant load factors for wind load, and dead load resisting uplift.

.6 Design roof deck and fasteners to resist the following minimum gross unfactored uplifts, where widths of "s", "c" and "r" areas are defined in the Supplement to the National Building Code of Canada, Commentary B, Figure B-9.

Canopies..... 2.00 kPa
Edge strips "s"..... 1.52 kPa
Corner areas "c" ..... 2.64 kPa
Other roof areas "r" ..... 1.25 kPa

Dead load of roof deck construction may be deducted from these uplifts, after applying relevant load factors for wind load, and dead load resisting uplift.

.7 For FM Global approval of 76 mm (3") deck, be aware that FM Global limits the unfactored weld capacity for 0.76 mm (22ga./0.030") deck to 1.825 kN, 2.336 kN, and 2.825 kN (410 pounds, 525 pounds, & 635 pounds) for 12.5 mm, 16 mm, and 19 mm diameter puddle welds respectively. These capacities may be multiplied by 1.21 and 1.57 for 0.91 mm (20ga./0.36") and 1.22 mm (18 ga./0/048") decks, respectively.

.8 Design roof deck and fastening, including side lap fastening, fastenings to continuous diaphragm boundary elements and vertical lateral load resisting elements, for diaphragm action and to resist diaphragm shears shown on Drawings.

.9 Steel decking is to be rigid enough and connected sufficiently to provide lateral support for the top chord or flange of the supporting elements.

.10 In addition to the forgoing requirements, conform to FM Global Loss Prevention Data Sheets 1-28, 1-28R/1-29R, 1-29, & 1-54, including but not restricted to wind uplift loading, minimum concentrated load recommendations (including deflection limitations under this loading), fastening, and deck geometry and thickness.

.11 Verification of design capacities by calculation to be made available on request.

.5 Suspended Loads:

Do not suspend ceilings, lights, ducts, piping, or any other item from steel roof deck.

.6 Requirements of Regulatory Agencies:

.1 Fabricate and install roof deck, which forms part of a required fire rated system exactly as specified in Underwriter's Laboratories test design specification that validates required rating.

.7 Tolerances:

.1 Comply with requirements of CSSBI 10M, Clause 5.2.

.2 Lay and position roof deck within a tolerance of plus or minus 12 mm (1/2") with respect to edges of deck parallel to flutes and centrelines of columns and building exterior lines.

.8 Source Quality Control:

.1 Inspection and testing materials and fabrication of Work of this Section, and field quality control specified elsewhere in this Section, may be performed by an Inspection and Testing Company appointed by Consultant.

.2 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of this specification.

.3 Inspection and Testing Company shall be certified by Canadian Welding Bureau, to CSA W178.1, Category 1, Buildings.

.4 Welding inspectors and supervisors shall be certified by Canadian Welding bureau to CSA W178.2.

.5 Payment for specified Work performed by Inspection and Testing Company will be made by Owner.

.6 Provide access for inspection to all places where Work is manufactured, stockpiled or installed.

1.4 Submittals

.1 Qualifications:

.1 Submit in writing evidence of qualification for welding under CWB.

.2 Professional Liability Insurance:

.1 Submit proof of design Engineer's professional liability insurance coverage specified in paragraph 1.3.1.2

.3 Shop Drawings:

.1 Submit shop and erection drawings in accordance with Section 01 30 00 and as specified below. Copies of portions or all of the structural drawings will not be accepted as shop drawings.

.2 Each shop drawing submitted shall bear the seal and signature of the Professional Engineer responsible for roof deck design.

.3 Indicate: design loading; including snow, rain, uplift and diaphragm loadings; concentrated loads required by NBC; thickness and steel grade of material; zinc coating designations; layout of units; framing and supports; required minimum bearing; anchorages; size, spacing and type of fastening to meet uplift and diaphragm action; openings and their reinforcement; accessories; and details of construction, including warping of deck to provide slopes for drainage.

.4 Prior to submission to Consultant, Contractor shall review all shop drawings. By this review, Contractor represents to have determined and verified all field data, and to have checked and coordinated each shop drawing with requirements of Work and of Contract Documents. Contractor's review of each shop drawing shall be indicated by stamp, date and signature of the Contractor's representative.

.5 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.6 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review is intended as an assistance to the Contractor and will be for conformity to design concept and for general arrangement, and shall not relieve the Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting all requirements of Contract Documents.

.7 Contractor shall make changes in shop drawings, which Consultant may require, consistent with Contract Documents and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of revisions other than those requested by Consultant.

.8 Fabrication and construction that commences prior to shop drawing review by the Consultant is at the Contractor's risk.

.9 Show on the shop drawings the FM Global recommendations including fastening type, size, and spacing for side laps and to supports, and a statement that the deck and its installation are designed to meet FM Global recommendations.

.10 Submit shop drawings as follows:

- 1 copy for review before any Work commences.
- 1 additional copy of shop and erection drawings for distribution as directed by Consultant.
- 1 copy of reviewed shop and erection diagrams to Inspection and Testing Company.

.11 Submit shop and erection drawings in accordance with Section 01 30 00.

.4 Mechanical Fasteners:

.1 Submit supporting evidence of mechanical fastener capacity to resist uplift, deck diaphragm action, and corrosion.

.2 Submit evidence of mechanical fastener's conformance to FM Global recommendations.

.3 Submit samples of mechanical fasteners.

.5 Steel Deck:

.1 Submit evidence that steel deck is FM Global approved.

.6 Inspection Reports:

.1 Inspection and Testing Company shall:

.1 Base inspection and testing upon Contract Drawings, specifications and reviewed shop and erection drawings bearing Stantec review stamp.

.2 Report immediately to Consultant, by phone, any deviations from the Contract Drawings, giving recommendations for further testing deemed necessary. No modifications to be made or instructions given without prior approval of Consultant.

.3 Submit reports at least weekly when shop and site Work of this Section is in progress. At beginning of each report, state whether Contract Requirements have been met and list separately conditions not meeting requirements.

.4 Distribute inspection reports as follows:

- 2 copies to Consultant.
- 1 copy to Consulting Structural Engineer.
- 2 copies to Contractor.

.5 Sign report by inspector who performs inspection, and describe progress of Work, deficiencies found and corrective actions taken.

.6 Include an ongoing deficiency list of outstanding items from previous reports; indicate date of first observation, comment on status and date of corrective action, and comment on status.

.7 Issue final report at end of the applicable phases of work signifying that work is in overall conformity with Contract Documents and reviewed shop drawings.

1.5 Storage and Handling

.1 Deliver anchorages supplied under Work of this Section to those responsible for their installation, to the location they direct, and to meet construction schedule.

.2 Exercise care in storing and handling materials of this Section. Handle and store roof deck so that no damage or corrosion is caused to stored or erected Work, or to other property.

.3 Comply with requirements of CSSBI 10M, Clause 8.10.

.4 Co-ordinate Work of this Section with Work specified in other Sections for structural bearing members, and arrange to deliver and install steel roof deck in accordance with erection schedule of bearing members. Install steel roof deck at proper times to serve as safety planking during steel erection.

PART 2 - PRODUCTS

2.1 Unit Prices

.1 Unit prices requested as a part of the Tender shall include Work erected in place, and preparation and submittal of necessary shop and erection drawings.

.2 Unit prices to be applied to the net area difference.

2.2 Materials

.1 Sheet Steel:

- To ASTM A653M and CSA S136.
- Grade “230” minimum.
- Base steel nominal thickness 0.76 mm (0.030”) or greater.

- Minimum zinc coating designation ZF75.

- Minimum zinc coating designation Z275.

.2 Prefinished Sheet Steel:

- To ASTM A653M and CSA S136.
- Grade “230” minimum.
- Basic steel normal thickness 0.76 mm (0.030”) or greater.
- Minimum zinc corrosion designation Z275.

- 8000 Series.
- 10000 Series.
- Elite Series.
- Metallic Series.
- Barrier Series, Classification 200.
- Barrier Series, Classification 300.

- Prefinished one side only
- Prefinished two sides

.3 Verify that finish or treatment of zinc coated steel coil provided by steel mill is not detrimental to adhesion of paint system specified for steel roof deck in Division 9.

.4 Zinc-Rich Paint: to CGSB Specification CAN/CGSB-1.181.

.5 Fasteners:

.1 Approved, corrosion resistant, of adequate capacity to resist uplift and diaphragm shear forces when test strengths are evaluated in accordance with procedures adopted by the Steel Deck Institute, St. Louis, Missouri.

.2 In addition to foregoing, fasteners shall be FM GLOBAL-Approved.

.6 Sound Absorbent Filler: Glass fibre, density of 17.6 kg/m^3 (1.1 lb/ft^3) shaped to fit profile of flutes.

.7 Acoustical Closures: 25 mm (1") thick closed cell foam rubber, profiled to decking.

.1 Comply with requirements of CSSBI 10M, Clause 5.

2.3 Fabrication

.1 Fabricate roof deck in accordance with Drawings and specifications and reviewed shop drawings.

.2 Comply with requirements of CSSBI 10M, Clause 5.

.3 Fabricate deck with 150 mm (6") flute spacing, and with maximum 64 mm (2.4") width of rib opening (rib opening measured at top of rib, not bottom), in accordance with FM Global Data Sheet 1-28.

.4 Acoustic Deck:

.1 Fabricate acoustic deck with rib webs perforated with 3mm (1/8") diameter holes staggered at 10mm (3/8") centres.

.5 Reinforcement for Openings:

.1 Provide reinforcement for openings in accordance with CSSBI 10M, Clause 8.7.

PART 3 - EXECUTION

3.1 Examination

.1 Verify and approve alignment and levels of supporting members before laying roof deck. Do not proceed with erection until conditions are made satisfactory.

3.2 Erection

.1 Notify Consultant and Inspection and Testing Company a minimum of 24 hours prior to erecting any steel roof deck to allow for inspection.

.2 Comply with requirements of CSSBI 10M, Clauses 7 and 8.7 and as specified herein.

.3 Use mechanical fasteners in areas to receive prefinished steel deck.

.4 Cutting and Fitting:

.1 Cut and fit roof deck and accessories around projections through roof.

.2 Make cuts square with neatly trimmed edges.

.5 Provide suitable deck support for all top edges of unsupported flutes where deck is trimmed parallel to flutes.

.6 Closures:

.1 Install sheet metal closures to match steel deck material in flutes where indicated on Drawings and where required to close openings, as at junction of walls and partitions with deck.

.2 Install sheet metal covers plates at changes of deck direction, and at ridges and valleys.

.3 Secure closures and cover plates by either sheet metal screws or welding.

.4 Install acoustical closures in locations with acoustic deck above walls and partitions.

.7 Slide Lap Fastening:

.1 Fasten side laps as required to meet design requirements of paragraph 1.3.3, but not less than the requirements of CSSBI 10M, clause 8.7.

.2 Provide additional fasteners as necessary to meet recommendations of FM Global Data Sheet 1-28.

.8 Fastening to Supports:

.1 Fasten deck to supports as required to meet design requirements of paragraph 1.4.3, but not less than the requirement of CSSBI 10M, Clause 8.7.

.2 Fasten deck to perimeter members parallel to flutes with 20 mm (3/4") diameter fusion welds at 300 mm (12") maximum centres and as required to meet requirements of paragraph 1.4.3.

.3 Provide additional fasteners as necessary to meet recommendations of FM Global Data sheet 1-28.

.9 Install prefinished steel deck after finish painting of supporting members. Co-ordinate with Section 09 90 00.

3.3 Field Quality Control

.1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:

.1 Verification of grade of steel, material thickness, depth and dimensions of profile and zinc coating thickness.

.2 Verification of reinforcement at openings.

.3 Verification that bearing, erection and fastening comply with Contract Documents.

.4 General inspection of coating touch-up.

.5 Pry tests of roof deck welds to supports.

3.4 Coating Touch-Up

.1 After erection, wire brush, clean and paint welding areas, rust spots, and scratched or otherwise damaged areas of zinc coating on deck and shop-applied prime paint of structural members.

.2 Apply two coats of zinc-rich paint to zinc coated areas specified above.

.3 Apply one coat of primer paint to prime painted areas specified above. Verify that touch-up paint is same type as shop coat.

.4 Apply one coat of primer paint and matching topcoat to minor paint-damaged prefinished deck areas. Verify that touch-up paint is same type and matching colour to shop paint.

3.5 Defective Work

.1 Variations in excess of specified tolerances and failure of materials or workmanship to meet requirements of this specification will be considered defective Work performed by this Section.

.2 Replace defective Work, as directed by Consultant.

.3 Replace bent, warped, dented, punctured or weld-perforated deck where exposed to view.

.4 Contractor shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient or fails to meet the shop or fieldwork drawing details. Costs for additional inspection, testing, review and redesign to be deducted from Contract Value.

END OF SECTION

Steel Floor Deck

PART 1 - GENERAL

1.1 General Requirements

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed by brackets apply for Project for which Drawings are in imperial units.

1.2 Description

.1 Work Supplied by This Section but Installed by Others:

.1	Install anchorage assemblies	Section 03 10 00
.2	Install anchorage assemblies	Section 04 20 00

.2 Related Work Specified In Other Sections:

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Concrete Formwork	Section 03 10 00
.4	Concrete Reinforcement	Section 03 20 00
.5	Cast-in-Place Concrete	Section 03 30 00
.6	Unit Masonry	Section 04 20 00
.7	Structural Steel	Section 05 12 00
.8	Steel Joists	Section 05 21 00
.9	Steel Roof Deck	Section 05 31 00
.10	Painting	Section 09 90 00

.3 Co-operation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section.

.4 Co-operation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section.

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.5 Cooperation with Inspection and Testing Company:

.1 Provide free access to Work.

1.3 Quality Assurance

.1 Reference Standards:

.1 All Standards to be latest issue at time of tender.

.2 Provide one copy on site of the first three standards listed below.

.3 The following Reference Standards shall Govern Work of this Section, except where they are in conflict with requirements imposed by this Specification, in which case the latter shall govern. Standards referenced by following Standards apply but are not necessary repeated in following list:

.1 2012 OBC, “Ontario Building Code”.

.2 “The Supplement to the National Building Code of Canada”, 2020 Edition.

.3 CSSBI 12M-18, “Standard for Composite Steel Deck”, Published by the Canadian Sheet Steel Building Institute.

.4 ASTM Standard A653/A653M-22, “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process”.

.5 CAN/CGSB –1.181-99, ”Ready-Mixed Organic Zinc-Rich Coating”.

.6 CSA C22.2 No. 79:16 (R2021), ”Cellular Metal and Cellular Concrete Floor Raceways and Fittings”.

.7 CSA S16.1-19, ”Design of Steel Structures”.

.8 CSA S136-16 (R2021), “North American Specification for the Design of Cold Formed Steel Structural Members”.

.9 CSA W47.1:19, “Certification of Companies for Fusion Welding of Steel”.

.10 CSA W178.1-18, “Certification of Welding Inspector Organizations”.

.11 CSA W178.2-18, “Certification of Welding Inspectors”.

.2 Regulations:

.1 Abide by current bylaws and regulations of the province and/or municipality in which the Work is located, and abide by the current laws and regulations with regard to public safety.

.3 Qualifications:

.1 Undertake welding only by organizations certified under Division 2.1 or higher, by Canadian Welding Bureau under CSA Standard W47.1. Part of the work may be sublet to a Division 3 firm, providing that the Division 1 or 2.1 firm retains the responsibility for the Work. Welders to be certified for deck welding by Canadian Welding Bureau.

.2 Design of steel floor deck, shall be by a Professional Engineer licensed in the Province of Ontario, with a minimum of five years of Canadian experience in steel floor deck design.

.3 Steel deck design engineer shall be insured against professional liability in accordance with Section 74 Subsection (1) of Regulation 941 of the Ontario Professional Engineers Act. The alternative of compliance with subsection (2) is not acceptable. Provide a minimum of $2,000,000 coverage.

.4 Consultant will review general arrangement to verify general conformance with overall design concept of structure.

.4 Design:

.1 Design floor deck (either composite or non-composite as indicated on Drawings) in conformance with CSSBI 12M, Articles 7.6 and 7.7 and CSSBI S3, for loading indicated on Drawings, including concentrated loads stipulated on the drawing and in NBC Table 4.1.6.B. Design deck for unshored conditions wherever possible.

.2 Limit floor deck deflections to the lesser of the following:

- Live load L/360 or 20 mm
- Total load L/240 or 20 mm

.3 Steel decking is to be rigid enough and connected sufficiently to provide lateral support for the top chord or flange of the supporting elements.

.4 Design floor deck and fastenings, including side lap fastening, for diaphragm action and to resist shears shown on Drawings.

.5 Verification of design capacities by calculation to be made available on request.

.5 Requirements of Regulatory Agencies:

.1 Fabricate and install floor deck, which forms part of a required fire rated system exactly as specified in Underwriter's Laboratories test design specification that validates required rating.

.6 Tolerances:

.1 Comply with requirements of CSSBI 12M.

.2 Lay and position floor deck within a tolerance of plus or minus 12 mm (½") from its location shown on the Drawings, relative to centreline of columns and building exterior lines.

.7 Source Quality Control:

.1 Inspection and testing of materials and fabrication of Work of this Section, and field quality control specified elsewhere in this Section, may be performed by an Inspection and Testing Company appointed by Consultant.

.2 Review provided by Inspection and Testing Company does not relieve Contractor of his sole responsibility for quality control over Work. Performance or non-performance of Inspection and Testing Company shall not limit, reduce, or relieve Contractor of his responsibilities in complying with the requirements of the specification.

.3 Inspection and Testing Company shall be certified by Canadian Welding Bureau, to CSA W178.1, Category 1, Buildings.

.4 Welding inspectors and supervisors shall be certified by Canadian Welding Bureau to CSA W178.2.

.5 Payment for specified Work performed by Inspection and Testing Company will be made from cash allowance specified in Section 01 20 00.

.6 Provide access for inspection to all places where work is being done or stockpiled prior to shipment.

1.4 Submittals

.1 Qualifications:

.1 Submit in writing evidence of qualification for welding under CWB.

.2 Professional Liability Insurance:

.1 Submit proof of connection design engineer's professional liability insurance specified in paragraph 1.4.2.3.

.3 Shop Drawings:

.1 Submit shop and erection drawings in accordance with Section 01 30 00 and as specified below. Copies of portions of the structural drawings will not be accepted as shop drawings.

.2 Each shop drawing submitted shall bear the seal and signature of Professional Engineer responsible for floor deck design.

.3 Indicate: design loading, including diaphragm loads; concentrated loads required by OBC; concrete strength; material grade and thickness; zinc coating designation; UL fire rating and test design specification number if applicable; whether deck is inverted; required minimum bearing; layout of units; framing and supports; anchorages; size and spacing and type of fastening to meet diaphragm action; openings and their reinforcement; accessories; details of flashings or closures at openings and columns; edge forms to retain plastic concrete; and details of construction.

.4 Prior to submission to Consultant, Contractor shall review all shop drawings. By this review, Contractor represents to have determined and verified all field measurements, site conditions, materials, catalogue numbers and similar data, and to have checked and coordinated each shop drawing with the requirements of Work and of Contract Documents. Contractor's review of each shop drawing shall be indicated by stamp, date and signature of the Contractor's representative.

.5 At time of submission, Contractor shall notify Consultant in writing of any deviations in shop drawings from requirements of Contract Documents.

.6 Consultant will review and return shop drawings in accordance with an agreed schedule. Consultant's review is intended as an assistance to the Contractor and will be for conformity to design concept and for general arrangement, and shall not relieve Contractor of responsibility for errors and omissions in shop drawings or of responsibility for meeting all requirements of Contract Documents.

.7 Contractor shall make changes in shop drawings, which Consultant may require, consistent with Contract Documents, and resubmit unless otherwise directed by Consultant. When resubmitting, Contractor shall notify Consultant in writing of revisions other than those requested by Consultant.

.8 Fabrication and construction that commences prior to shop drawing review by the Consultant is at the Contractor's risk.

.9 Submit shop drawings as follows:

- 1 copy for review before any Work commences.
- 1 additional copy of shop and erection drawings for distribution as directed by Consultant.
- 1 copy of reviewed shop and erection drawings to Inspection and Testing Company.

.10 Submit shop and erection drawings in accordance with Section 01 30 00.

.4 Inspection Reports:

.1 Inspection and Testing Company shall:

.1 Base inspection and testing upon Contract Drawings, specifications and reviewed shop and erection drawings bearing Stantec review stamp.

.2 Report immediately to Consultant, by phone, any deviations from the Contract Drawings, giving recommendations for further testing deemed necessary. No modifications to be made or instructions given without prior approval of Consultant.

.3 Submit reports at least weekly when shop and site Work of this Section is in progress. At beginning of each report, state whether Contract Requirements have been met and list separately conditions not meeting requirements.

.4 Distribute inspection reports as follows:

- 1 copy to Consultant.
- 1 copy to Consulting Structural Engineer.
- 1 copy to Contractor.

.5 Sign report by inspector who performs inspection, and describe progress of Work, deficiencies found and corrective actions taken.

.6 Include an ongoing deficiency list of outstanding items from previous reports, indicate date of first observation, comment on status and date of corrective action, and comment on status.

.7 Issue final report at end of the applicable phases of work signifying that work is in overall conformity with Contract Documents and reviewed shop drawings.

1.5 Storage and Handling

.1 Deliver anchorages supplied under Work of this Section to those responsible for their installation, to the location they direct, and to meet construction schedule.

.2 Exercise care in storing and handling materials of this Section. Handle and store floor deck so that no damage or corrosion is caused to stored or erected Work, or to other property.

.3 Comply with requirements of CSSBI 12M, clause 7.11.

.4 Co-ordinate Work of this Section with Work specified in other Sections for structural bearing members, and arrange to deliver and install steel floor deck in accordance with erection schedule of bearing members. Install steel floor deck at proper times to serve as safety planking during steel erection.

PART 2 – PRODUCTS

2.1 Materials

.1 Sheet Steel:

- To ASTM A653/A653M and CSA S136.
- Grade “230” minimum
- Base steel nominal thickness 0.76 mm (0.030”) or greater.

- Minimum zinc coating designation ZF75.

.2 Zinc-Rich Paint: to CGSB Specification CAN/CGSB-1.181.

2.2 Fabrication

.1 Fabricate floor deck in accordance with Drawings and specifications and reviewed shop drawings.

.2 Comply with requirements of CSSBI 12M, Clause 5.

.3 Provide sheet steel angles, curbs, cover plates, flashings at junctions of columns, openings and walls with concrete slabs, and similar locations to prevent leakage of concrete topping; cell closures; fasteners; stiffeners; and accessories as required.

.4 Reinforcement for Openings:

.1 Separate framing will be supplied under Work of Section 05 12 00 for holes with dimensions across flutes greater than 300 mm (12”).

.2 Reinforce openings from 150 mm (6”) to 300 mm (12”) across flutes, with 51 x 51 x 6.4 mm (2” X 2” X ¼”) structural steel angles in direction perpendicular to flutes at both ends of opening, and extended 450 mm (1’- 6”) past each side of opening.

.3 Weld angles to deck with 25 mm (1”) long welds on each side 150 mm (6”) centres.

.5 Composite Non-Cellular Floor Deck:

.1 Provide bond between deck and concrete by deformations rolled into vertical webs.

.2 Profile as dimensioned in catalogue load tables.

.3 End Joints: swaged for 50 mm (2”) overlap and to provide faces of deck in same plane.

.4 Invert deck where indicated on Drawings.

PART 3 - EXECUTION

3.1 Examination

.1 Verify and approve alignment and levels of supporting members before laying floor deck. Do not proceed with erection until conditions are made satisfactory.

3.2 Erection

.1 Notify Consultant and Inspection and Testing Company a minimum of 24 hours prior to erecting any steel floor deck to allow for inspection.

.2 Comply with requirements of CSSBI 12M, Clauses 6 and 7.8, and as specified herein.

.3 Placing Floor Deck Units:

.1 Place units with cells aligned end to end and to provide a minimum bearing on structural steel members of 45 mm (1.75”).

.2 Do not force units into place causing them to distort.

.3 Lap ends of non-cellular panels no less than 50 mm (2”).

.4 Cutting and Fitting:

.1 Cut and fit floor deck and accessories around projections through floor.

.2 Make cuts square with neatly trimmed edges.

.5 Reinforcement:

.1 Reinforce all elements at top and bottom by a continuous web of sheet metal the same thickness as deck, where elements are cut longitudinally 50 mm (2”) or more from a vertical web.

.2 Provide suitable deck support for all top edges of unsupported flutes where deck is trimmed parallel to flutes.

.3 Reinforce holes cut in floor deck in field as specified under article 2.2, Fabrication.

.6 Studs:

.1 In accordance with CSA W59, Annex H.

.2 Weld stud shear connectors through steel deck to steel framing below.

.7 Closures and Flashing:

.1 Install sheet metal closures to match steel floor deck material where indicated on Drawings and seal ends of cell raceways at junctions between deck, and columns, walls, openings, where deck panels change direction and similar locations.

.2 Install sheet metal flashing to contain concrete at edge of slab, columns, for side and end concrete forms at holes through floor and at perimeter of building and similar locations where other construction does not perform this function.

.3 Secure closures and flashing by either sheet metal screws or welding.

3.3 Field Quality Control

.1 Inspection and Testing Company, when appointed as specified in Source Quality Control elsewhere in this Section, shall perform:

.1 Verification of grade of steel, deformations in composite deck sections, material thickness, depth and dimensions of profile and zinc coating thickness.

.2 Verification that bearing, erection and fastening and, if applicable, special requirements for electrical raceways, comply with Contract Documents.

.3 Verification of UL ratings.

.4 General inspection of coating touch-up.

3.4 Coating Touch-Up

.1 For deck surfaces permanently exposed to view in finished structure:

.1 After erection, wire brush, clean and paint welding areas, rust spots, and scratched or otherwise damaged areas of zinc coating on deck and shop-applied prime paint on structural members.

.2 Apply two coats of zinc-rich paint to zinc coated areas specified above.

.3 Apply one coat of prime paint to prime painted areas specified above. Verify that touch-up paint is same type as shop coat.

3.5 Defective Work

.1 Variations in excess of specified tolerances, and failure of materials of workmanship to meet requirements of this specification, will be considered defective work performed by this Section

.2 Replace defective Work, as directed by Consultant.

.3 Replace bent, warped, dented, punctured or weld-perforated deck where exposed to view.

.4 Contractor shall pay for additional inspection and testing, redesign, corrective measures, and related expenses if Work is deficient or fails to meet the shop or fieldwork drawing details. Costs for additional inspection, testing, review and redesign to be deducted from Contract Value.

END OF SECTION

Section revised by Addendum No.2

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Prefinished metal siding system; MP1.

.2 Prefinished metal soffit; SF2.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordinate with installers of wall mounted items, equipment, and mechanical and electrical work so that installation will not subvert the integrity of the cladding system.

.2 Coordinate interface, transition, lapping, flashings and compatibility of membranes with work of Section 07 27 00.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

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 Shop drawings:

.1 Submit engineered shop drawings, including seismic design, connections and restraint.

.2 Indicate dimensions, cladding profiles, attachment and anchoring materials and methods, trim and closure pieces, fascia, material finishes and colours, and related work.

.3 Indicate methods to achieve watertight assembly, including sealants, penetration seals, drainage path of moisture from within assembly to exterior of envelope.

.4 Samples:

.1 Submit 2 - 915 mm x 1220 mm (36" x 48") size samples of cladding materials, of each colour and profile specified.

1.4 Quality Assurance

.1 Qualifications:

.1 *Subcontractor*:

.1 Has adequate equipment, and skilled workers to perform the work expeditiously.

Section revised by Addendum No.2

.2 Has successfully completed installations similar to that specified during a period of at least the immediate past 5 years.

1.5 Delivery, Storage, and Handling

.1 Store materials at temperatures recommended by manufacturer.

.2 Store bundles of panels raised on pallets, and sloped to drain.

.3 Package materials and identify on attached labels the manufacturer, contents and material specification number.

.4 Store flammable solvent-base liquids away from excessive heat and open flame. Primer contains solvent. Do not use near open flame.

1.6 Field Conditions

.1 Comply with CSSBI's installation requirements.

PART 2 - PRODUCTS

2.1 Performance/Design Requirements

.1 Design to CAN/CSA S136-16 and building code.

.2 Design for expansion and contraction of component materials of the *Work* produced by an exterior surface temperature range of -35°C to +60°C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.3 Design cladding system to accommodate and withstand the following without permanent deformation or damage to, or failure of, cladding system or building structure:

.1 Deflection of cladding system due to uniformly distributed specified loads shall not exceed L/90 of the span for walls.

.2 Movement within cladding system, and between cladding system and building structure.

.3 Cladding system dead loads, snow loads, ice loads, and wind loads, and combinations thereof, in accordance with the building code.

.1 Design wind loads shall be based on at least 1/50 hourly wind pressure values as indicated in building code and greater values as required, to maximum allowable deflection without permanent deformation.

.4 Design to allow positive drainage of condensation occurring within cladding system to exterior of building envelope or drainage outlet.

.5 Design to allow positive drainage of water to exterior of building envelope or drainage outlet.

.6 Design metal systems to the Architectural Sheet Metal Manual by SMACNA unless otherwise indicated.

.7 Design wall system and secondary support structure to accommodate specified erection tolerances of the structure.

Section revised by Addendum No.2

.8 Design system to meet tolerances specified.

2.2 Materials

.1 Preformed steel cladding; fabricated from preformed sheet metal as follows:

.1 Metal sheet:

.1 Zinc coated sheet steel: sheet steel to ASTM A653/A653M-13 with coating designation Z275 (G90) to ASTM A924/A924M-22a unless otherwise indicated.

.1 Preformed metal minimum thickness for prefinished metal siding: 0.76 mm (22 gauge) base steel nominal thickness.

.2 Preformed metal minimum thickness for prefinished metal soffit: 0.61 mm (24 gauge) base steel nominal thickness.

.2 Accessories and hardware: Zinc coated steel to meet specified requirements of ASTM A123/A123M-13, hot dip galvanized after fabrication.

.3 Acceptable profile:

.1 MP1; Prefinished metal siding:

.1 Basis of design: Vicwest ‘AD 300R’.

.2 Colour: ~~to later selection by *Consultant*.~~To match Vicwest “Cambridge White 56161”

.2 SF2; Prefinished metal soffit:

.1 Basis of design: Vicwest ‘Bellara Steel Siding Plank 135’, 20% perforated.

.2 Colour: Cambridge White.

.2 Thermally broken façade substructure:

.1 System shall provide façade substructure with the following attributes:

.1 Thermally broken.

.2 Meet requirements of the building code for non-combustible construction.

.3 Adjustable to permit façade alignment tolerances.

.4 Corrosion resistant performance.

.5 Suitable for rear ventilated rain screen façade design.

.2 Z-girt and sub-girts: Preformed Z275 galvanized metal sheet, 1.22 mm (18 gauge) minimum base steel nominal thickness, notched for drainage, to ASTM A653/A653M-13, Grade A.

.3 Thermally broken spacer systems:

.1 Basis of design:

.1 IsoClip ‘Thermal Isolation Clip’.

Section revised by Addendum No.2

.3 Accessories: exposed trim, end and flute closures, cap pieces, flashings, and the like, of same metal material and finish, and colour as prefinished metal panels, unless otherwise indicated.

.4 Insulation:

.1 Semi-rigid in accordance with Section 07 21 00.

.5 Air barrier membrane: in accordance with Section 07 27 00.

.6 Exposed sealants: in accordance with Section 07 92 00.

.7 Gaskets: soft, pliable, cold weather grade, PVC foam, extruded profile for outer sheet.

.8 Fasteners:

.1 Self-drilling, Type 304 stainless steel.

.2 Head finish:

.1 Type 304 stainless steel, in concealed locations.

.2 Prepainted metal, colour to match prefinished metal panels in exposed locations.

2.3 Metal Finishes

.1 Prefinished sheet finish:

.1 MP1; Prefinished metal siding:

.1 Painted finish: Silicone modified polyester, with ceramic pigments and other select inorganic pigments, 2-coat system.

.1 Coating shall exhibit zero cracking, chipping, or peeling (lose adhesion) that is visible in ordinary outdoor visual observations (within 10 metres to the unaided naked eye) for 40 years from date of installation. This does not include minute fracturing that may occur during the normal fabrication process.

.2 Coating chalk more than a number 8 rating in vertical installations and shall not chalk in excess of a number 6 rating in non-vertical installations, in accordance with ASTM D-4214-98 method A at any time for 30 years from date of installation, 30.5 yrs from application of coating.

.3 Coating shall not change colour more than 5.0 Hunter ΔE units in vertical installations and not more than 7.0 Hunter ΔE units in non-vertical installations, in accordance with ASTM D2244-16.

.4 Acceptable *Products*:

.1 ArcelorMittal Dofasco ‘Perspectra Plus Series’.

.2 Baycoat ‘Perspectra Plus Series’.

.3 Sherwin-Williams ‘WeatherXL’.

.4 Vicwest ‘WeatherXL’.

.5 Substitutions: in accordance with Section 01 25 00.

Section revised by Addendum No.2

.2 SF2; Prefinished metal soffit:

.1 Acceptable *Product*:

.1 Vicwest ‘Signature’.

.2 Substitutions: in accordance with Section 01 25 00.

2.4 Fabrication

.1 Form to profiles indicated on drawings and to conform to reviewed shop drawings.

.2 Construct panel lines, breaks, and angles sharp and true, and surfaces free from warp and buckle.

.3 Allow for structural movements within the systems, and to accommodate thermal expansion and contraction between panels and structural members.

.4 Ensure that metal panels are free of steel contamination from rollers.

.5 Fabricate siding panel systems to prevent entry of water into building and from collection within system assembly.

.6 Join intersecting parts together to provide tight, accurately fitted joints with adjoining surfaces in true planes.

.7 Fabricate formed and notched metal closures to close-off flutes at exterior. Seal also with neoprene foam filler.

.8 Cooperate with applicable sections to ensure coordination required for proper installation of work of this section in conjunction with and incorporated with other work.

.9 Fabricate metal cladding panels in one length; maximum 6000 mm (20') for horizontal application; 12000 mm (40') for vertical application; unless otherwise indicated.

.10 Prefinished metal panel terminations shall not have a raw metal edge or exposed fasteners. Panel ends for non-corrugated panels shall be folded.

PART 3- EXECUTION

3.1 Examination

.1 Take measurements at the *Place of the Work* to ensure that the work of this section is fabricated to fit structure, surrounding construction, around obstructions and projections in place.

.2 Verify that backup construction is aligned for proper installation of prefinished metal panel system before commencing erection.

3.2 Air Barrier Membrane Application

.1 Install in accordance with manufacturer's written installation requirements and in accordance with Section 07 27 00.

.2 Surfaces must be smooth, clean dry and free from loose contaminants. Brushing and/or scraping of block and concrete surfaces may be required to adequately prepare surface.

.3 Apply primer for membrane work.

.4 Wrap openings with membrane returning to inside face of openings.

.5 Ensure air barrier seals into adjacent systems for complete air barrier to building envelope.

.6 Seal around materials penetrating membrane in accordance with manufacturer's written requirements.

3.3 Insulation

.1 Install insulation in accordance with manufacturer's written installation requirements and in accordance with Section 07 21 00.

.2 Cut backs of pieces as required to fit over projecting anchors, fastenings or similar protrusions. Fit boards with tight joints around obstructions, openings, corners, and structural members.

.3 Apply insulation to ensure total and complete coverage of surfaces indicated to be insulated, and in direct contact with such surfaces.

.4 Use largest possible dimensions to reduce number of joints.

3.4 Cladding System Installation

.1 Erect systems complete with flashings forming part of the system, clips, fasteners, closures and sealant to meet same design criteria as specified for fabrication.

.2 Erect panels in straight lines that are true, level, square, and plumb to comply with installation tolerances.

.3 Attachment system: Allow for free and noiseless vertical and horizontal thermal movement due to expansion and contraction for material temperature range. Buckling of panels, opening of joints, undue stress on fasteners, failure to sealants or any other detrimental effects due to thermal movement is not permitted. Allow for ambient temperature at time of fabrication, assembly and erection procedures.

.4 Anchor cladding securely per engineering recommendations and in accordance with reviewed shop drawings to allow for necessary thermal movement, wind loading and structural support.

.5 Install sealant between work of this section and work of other sections to meet specified requirements of Section 07 92 00 and to provide a watertight installation.

.6 Cut, flash, and apply sealant to system penetrations. Seal around materials penetrating metal cladding watertight.

.7 Install various components within cladding assembly to provide positive controlled drainage of moisture to exterior of building envelope or drainage outlet.

.8 Conceal fasteners.

.9 Do not install component parts that are observed to be defective, including warped, bowed, dented, and broken members.

.10 Obtain panel symmetry whenever possible relative to openings in both vertical and horizontal plane.

.11 Break form metal flashings to profile required, in maximum lengths.

Section revised by Addendum No.2

.12 Install head and sill flashings, edge trim, cap pieces and other formed profiles as applicable and detailed.

.13 Apply sealant to face of supports for top and bottom closure flashings and at supports for perimeter closure flashings and returns.

.14 Do not cut, trim, weld or braze component parts during erection in manner that would damage finish, decrease strength or result in a visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

.15 Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

.16 Protect surface of metals in contact with concrete, mortar, plaster or other cementitious surface with isolation coating.

.17 Install metal soffits in accordance with Engineered shop drawings for support of system. Install liner metal soffit panels in accordance with 09 54 23.

3.5 Metal Cladding Installation Tolerances

.1 Maintain the following installation tolerances:

.1 Maximum variation from plane or location shown on reviewed shop drawings: 20 mm (3/4")/10 m (32.8’) of length and up to 30mm (1-1/6")/100 m (328’) maximum.

.2 Maximum offset from true alignment between two adjacent members abutting end to end or side-by-side, in line: 1 mm (0.039").

.3 Flatness: Maximum deviation from flatness shall be 3.2 mm (1/8") in 1520 mm (5’) on panel in any direction for assembled units.

3.6 Adjusting and Cleaning

.1 After erection, touch up coatings removed or damaged during erection.

.2 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

.3 Wash down exposed interior and exterior surfaces using solution of mild domestic detergent in warm water, applied with soft clean wiping cloths. Wipe interior surfaces clean as part of final clean-up.

.4 Remove excess sealant with recommended solvent.

3.7 Protection

.1 Protect prefinished steel during fabrication, transportation, storage at the *Place of the Work* and erection, in accordance with CSSBI Standards.

END OF SECTION

Applied Films

Section added by Addendum No.2

PART 1- GENERAL

1.1 Summary

.1 Section includes:

.1 Translucent film; applied to interior glazing.

1.2 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 Samples:

.1 Submit 3 - 200 mm x 200 mm (8" x 8") samples of each specified film type, pattern and colour.

1.3 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 77 00.

.2 Operation and maintenance data:

.1 Submit maintenance and cleaning instructions for incorporation into operating and maintenance manuals.

.2 Instruct *Owner's* representative on proper care and maintenance for work of this section.

1.4 Quality Assurance

.1 Qualifications:

.1 *Subcontractor*: Shall have 5 years' experience, minimum, in application of *Products* specified.

1.5 Delivery, Storage, and Handling

.1 Package materials and identify on attached labels the manufacturer, contents and material specification number.

1.6 Field Conditions

.1 Conform to manufacturer's written documented temperatures, relative humidity, and substrate moisture content and temperature for application of materials of this section.

1.7 Warranty

.1 Warrant work of this section in accordance with Section 01 78 36.

.2 Extended warranty:

.1 Film manufacturer's product warranty.

.1 Duration: 6 years.

PART 2 - PRODUCTS

2.1 Performance/Design Requirements

.1 Applied film shall function as intended, and exhibit none of the following:

.1 Bubbling.

.2 Cracking.

.3 Crazing.

.4 Delamination.

.5 Discolouration.

.6 Peeling.

2.2 Materials

.1 Applied films; translucent:

.1 Acceptable *Product*:

.1 3M 'Dusted White Crystal'.

.2 Substitutions: in accordance with Section 01 25 00.

PART 3- EXECUTION

3.1 Examination

.1 Examine glass surfaces to receive film and verify that they are free from defects and imperfections which will affect the final appearance of installed film. Correct such deficiencies before starting film application.

3.2 Preparation

.1 Prepare surfaces for film application in accordance with film manufacturer's written requirements.

.2 Window and window framing will be cleaned thoroughly with a neutral cleaning solution. Surface of glass shall be bladed with industrial razor to ensure the removal of any foreign contaminants in accordance with film manufacturer's instructions.

.3 Towelling or other absorbent material shall be placed on the window sill or sash to absorb moisture accumulation generated by the film application.

3.3 Installation

.1 Applied film; interior application:

Section added by Addendum No.2

.1 Apply film to indicated surface of glazing units in accordance with film manufacturer’s written requirements, applied plumb, true and level over clean glazing, without air bubbles, wrinkles, blisters, and other defects.

.2 After installation, applied film shall be flat with no obvious concentrations of moisture, free of creases, free of tears, with no moisture dimples when viewed under normal conditions.

.3 Film edges shall be cut neatly and square at a uniform distance of 1.5 mm (1/16") to 0.79 mm (1/32") from frame.

3.4 Adjusting and Cleaning

.1 Clean film and glass surfaces so they are free of foreign matter using cleaners recommended by film manufacturer.

3.5 Protection

.1 Comply with manufacturer's written requirements respecting protection.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Interior wall paneling; WP1, WP2, WP3, WP4, WP5.

1.2 Administrative Requirements

.1 Coordination:

.1 Coordination of work: coordinate layout, penetrations and installation of work of this section with work of other sections.

.2 Conduct a pre-installation meeting in accordance with Section 01 31 19.

1.3 Submittals

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

.2 *Product* data:

.1 Submit *Product* data sheets for *Products* proposed for use in the work of this section.

.3 Shop drawings:

.1 Submit shop drawings to show layout, treatment at walls, and other objects. Indicated details of proposed treatment where materials meet other materials.

.4 Samples:

.1 Submit 305 mm x 305 mm (12"x 12") sample of wall panel showing each finish and colour.

.2 Submit samples of each accessory type product specified.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 77 00.

.2 Operation and maintenance data:

.1 Submit manufacturer’s operation and maintenance instructions for inclusion in the operation and maintenance manuals.

.2 Submit panel manufacturer’s maintenance and cleaning video for each type of wall paneling system.

1.5 Quality Assurance

.1 Qualifications:

.1 Installers / applicators / erectors:

.1 *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.

.2 Fabricator solid surfacing: Fabrication to be performed by a solid surface manufacturer's certified fabricator.

.2 Mock-ups:

.1 *Provide* full size system mock-up of each wall panel system type, for review and acceptance by *Consultant*. Locate at the *Place of the Work* where directed by the *Consultant*.

PART 2 - PRODUCTS

2.1 Design Requirements

.1 Where WP is indicated with a ‘H’ on drawings indicates partial height of 1200 mm AFF. Locations where scheduled or indicated.

.2 Colour match sealants at vertical joints unless otherwise indicated.

2.2 Interior Wall Panel Systems

.1 WP1; Wall Protection Type 1:

.1 Semi rigid sheet wall protection in PVC or PETG with trims. Minimum thickness of 1.5mm (0.060”).

.1 Performance/design requirements:

.1 Resistant to certain bacterial and fungal growth in accordance with ASTM G21 and G22.

.2 Chemical and stain resistance in accordance with ASTM D1308.

.3 Panel to panel colour match: Delta Ecmc of no greater than 1.0 using CIELAB color space.

.4 Impact strength: tested for impact using a ram-type impact test in accordance with ASTM F476.

.5 Flammability: CAN/ULC S102.2-10, FSV <25.

.2 Height: full height, except where indicated or scheduled.

.3 Finish: Suede Texture.

.4 Colour:

.1 WP1a: to match Acrovyn White #949.

.5 Acceptable *Products*:

.1 Construction Specialties ‘Acrovyn’.

.2 IPC ‘Palladium’.

.3 Substitutions: in accordance with Section 01 25 00.

.2 Joint sealant: Panel manufacturer's sealant, colour clear or to match to panels to later selection by *Consultant*. Butt joint seams and seal with colour matched sealant.

.3 Panel fixing method: Panel manufacturer's adhesive. Colour to match panel.

.4 Preformed corner trim to match adjacent panel.

.2 WP2; Wall Protection Type 2:

.1 Solid surfacing sheet:

.1 Homogenous (not coated, acrylic laminated or composite construction), filled material containing methyl methacrylate.

.2 Flammability: CAN/ULC S102.2-10, FSV <25.

.3 Nominal sheet thickness: 6 mm (1/4") minimum.

.4 Height: full height, except where indicated or scheduled.

.5 Colours:

.1 WP2a: to match Corian 'Glacier White'.

.2 WP2b: to match Corian 'Cameo White' (Field).

.3 WP2c: to match Corian 'Elegant Grey' (Accent).

.6 Acceptable *Products*:

.1 Dupont 'Corian'.

.2 Aristech 'Avonite'

.3 Substitutions: in accordance with Section 01 25 00.

.2 Seams to be glued with joint adhesive by panel manufacturer.

.3 Panel fixing method: As recommended by panel manufacturer.

.3 WP3; Wall Protection Type 3:

.1 Thickness: minimum 2.5 mm.

.2 Height: full height, where indicated:

.3 WP3a, WP3c, WP3f, WP3g:

.1 Acceptable *Product*:

.1 Altro 'Whiterock Wall Designs'.

.2 Description: Extruded semi-rigid virgin PVCu sheet.

.1 Impact resistance: ASTM D5420-16, exceeds 198 inch lbs.

.2 UV exposure: tested to ASTM G154-16.

.3 Flame spread:

.1 Maximum values in accordance with CAN/ULC-S102-10:

.1 Flame Spread Value (FSV): 10.

.2 Smoke Developed Value (SDV): 260.

.4 Surface finish: Satin.

.5 Colours:

.1 WP3a: Warm Woodgrain 9904.

.2 WP3c: Summer Weave 9908.

.3 WP3f: Autumn Weave 9910.

.4 WP3g: White Mineral 9905.

.6 Accessories:

.1 Joint strips: to later selection by *Consultant*.

.2 Transition strips: to later selection by *Consultant*.

.3 Start and edge strip: to later selection by *Consultant*.

.4 WP3b, WP3e~~, WP3k~~: [Revised by Addendum No.2]

.1 Acceptable *Product*:

.1 Altro ‘Whiterock Matte’.

.2 Description: Extruded semi-rigid virgin PVCu sheet.

.1 Impact resistance: ASTM D5420-16, exceeds 160 inch lbs.

.2 Fungi resistance: zero, to ASTM G21-15.

.3 Mold resistance: 10, to ASTM D3273-16.

.4 Antimicrobial: HACCP certified.

.5 UV exposure: tested to ASTM G154-16.

.3 Flame spread:

.1 Maximum values in accordance with CAN/ULC-S102-10:

.1 Flame Spread Value (FSV): 10.

.2 Smoke Developed Value (SDV): 300.

.4 Surface finish: Lightly textured.

.5 WP3b: ‘H’ denoted partial height at 1220 mm AFF.

.6 Colours:

.1 WP3b: Pearl FT/41.

.2 WP3e: Almond FT/32.

.3 ~~WP3k: Colour to later selection by *Consultant*.~~ [Deleted by Addendum No.2]

.7 Accessories:

.1 Joint strips: 2-Part Joint Strip.

.2 Transition strips: 1-Part Transition Strip.

.3 Start and edge strip: 2-Part Start and Edge Strip.

.4 Double sided tape: type as recommended by product manufacturer.

.5 WP3d:

.1 Acceptable *Product*:

.1 Altro Whiterock PopArt Matte.

.2 Description: Extruded semi-rigid PVC sheet with graphic printed directly to sheet, complete with matte finish protective coating.

.3 Custom image to later selection by *Consultant*.

.6 Panel fixing method: As recommended by panel manufacturer.

.7 Accessories:

.1 Prefabricated corners.

.2 Welding rod: as recommended by panel manufacturer.

.3 Sealant: type as recommended by panel manufacturer.

.4 Panel cleaning materials: as recommended by panel manufacturer.

.4 WP4; Wall Protection Type 4:

.1 FRL:

.1 Thickness: 1.9 mm (0.075”).

.2 Flame spread:

.1 Maximum values in accordance with CAN/ULC-S102-10:

.1 Flame Spread Value (FSV): 5.

.2 Smoke Developed Value (SDV): 70.

.3 Acceptable *Product*:

.1 Panolam Surface Systems ‘FRL Wall Protection Panels.

.2 Substitutions: in accordance with Section 01 25 00.

.2 WP4a; full height:

.1 Brand: Panolam/Pionite:

.2 Colour: White Elm FW591.

.3 Finish: Textured/Suede.

.3 WP4b:

.1 Height: full height, except where indicated or scheduled.

.2 Brand: Panolam/Pionite.

.3 Colour: Winter White FS573.

.4 Finish: Textured/Suede.

.2 WP4c:

.1 Brand: Panolam.

.2 Colour to later selection by *Consultant* to coordinate with adjacent wall graphic.

.3 Finish: Textured/Suede.

.4 WP4d-1/WP4d-2/WP4d-3: full height.

.1 Brand: Panolam.

.2 Custom digitally printed FRL. Graphic images to later selection by *Consultant*.

.3 Sealant: clear or colour matched sealant at vertical joints to later selection by *Consultant*.

.5 WP4f:

.1 Brand: Panolam/Pionite.

.2 Colour: Navy Blue FS740.

.3 Finish: Textured/Suede.

.6 Trims:

.1 Manufacturer's standard moulding profiles, except as follows:

.1 Where WP4d-1 wraps around a wall corner, provide Schluter Jolly edge trim at vertical edge.

.7 Adhesive: type as recommended by panel manufacturer.

.8 Sealant; pick-proof, in accordance with Section 07 92 00.

.5 WP5; Wall Protection Type 5:

.1 Description: Rigid and antibacterial PVC wall system with solid colour and textured surface.

.2 Thickness 2 mm.

.3 Height: Full height unless otherwise indicated or scheduled.

.4 Finish: Matte.

.5 Colours:

.1 WP5a: Sage 0044.

.2 WP5b: Chalk 0001.

.3 WP5c: Glacier 0016.

.6 Flammability: CAN/ULC S102.2-10, FSV <25.

.7 Acceptable *Product*:

.1 GerFloor ‘SPM Wall Protection Decochoc’.

.2 Substitutions: in accordance with Section 01 25 00.

.8 Panel fixing method: As recommended by panel manufacturer.

.9 Accessories:

.1 Adhesive: type as recommended by panel manufacturer.

.2 Welding rod: as recommended by panel manufacturer.

.3 Sealant: type as recommended by panel manufacturer.

PART 3- EXECUTION

3.1 Installation

.1 Maintain top to bottom grain direction, uniformly.

.2 Ensure adequate adhesive transfer by thoroughly rolling entire panel surface using a wall roller.

.3 Allow 1.6 mm (1/16”) gap at panel joints, ceiling, door and window frames, pipes, baseboards, and projections to accommodate panel expansion. Seal joints and gaps full with colour matched sealant, and tool concave to match accepted mockup.

.4 Seal transition trim between panels with silicone sealant. Allow required gap between top of flash-coved flooring and panels to accommodate expansion.

.5 Seal transition strip to flash-coved sheet flooring with matching sealant. Allow required gap between top of flash-coved flooring and panels to accommodate expansion.

.6 Check substrates for adhesion. Maintain at least 100% coverage of direct transfer of adhesive between panels and panel substrate.

3.2 Installation Tolerances

.1 Panel joints within 1.6 mm (1/16”) of plumb and at terminations within maximum joint variation of 1.6 mm (1/16”)

3.3 Field Quality Control

.1 Manufacturer’s field review: in accordance with Section 01 45 00.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

.1 Washroom and miscellaneous accessories (CS/CI).

.2 Coordination and installation of washroom accessories as supplied by *Owner* (OS/CI).

.2 Section excludes:

.1 MIR 1; frameless mirror: in accordance with Section 08 80 00.

1.2 Administrative Requirements

.1 Coordination:

.1 Supply manufacturer's handling instructions, anchorage information, roughing-in dimensions, templates and service requirements for installation of the work of this section, and assist or supervise, or both, the setting of anchorage devices and construction of other work incorporated with *Products* specified in this section in order that they function as intended.

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 Samples:

.1 Submit 3 samples of each finish specified.

.4 Shop drawings:

.1 Include plans, elevations, hardware, and installation details.

1.4 Closeout Submittals

.1 Submit closeout submittals in accordance with Section 01 77 00.

.2 Operation and maintenance data:

.1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.

1.5 Delivery, Storage, and Handling

.1 Package or crate, and brace products to prevent distortion in shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings.

.2 Deliver products to location at the *Place of the Work* designated by *Contractor*.

PART 2 - PRODUCTS

2.1 Accessories

.1 Incorporate reinforcing, fastenings and anchorage required for building-in of *Products*.

.2 Washroom accessories; locations as indicated or scheduled (CS/CI).

.1 BCT 1; Baby change station:

.1 Typical allocation: Family washroom, universal washroom.

.1 Polypropylene, surface mounted.

.1 ASI ‘9012’.

.2 ASI ‘9014’.

.3 Bobrick ‘KB300’.

.4 Bradley ‘9612’.

.2 Grab bars:

.1 Straight grab bars:

.1 GB1:

.1 Typical allocation: Horizontally behind toilets in 2 pc and 3 pc accessible and universal washrooms; vertically either side of accessible urinals.

.2 Length: 610 mm (24”).

.3 Acceptable *Products*:

.1 ASI ‘3801-24P’.

.2 Bobrick ‘B-6806.99 x 24’.

.3 Bradley ‘Bradex 812-2, 001-24’.

.2 ~~GB1B:~~ [Deleted by Addendum No.2]

~~.1 Heavy duty grab bar, horizontal or vertical orientation, tested to support minimum 1000 lbs.~~

~~.2 Length: 610 mm (24”).~~

~~.3 Acceptable *Products*:~~

~~.1 Bradley ‘812-2, 001-24’.~~

~~.2 Substitutions: in accordance with Section 01 25 00.~~

.3 GB4:

.1 Orientation: Vertical.

.2 Length: 600 mm (24”).

.3 Acceptable *Products*:

.1 Gamco ‘Grab Bar Straight 150 Series’.

.2 Substitutions: in accordance with Section 01 25 00.

.2 L-shaped grab bars:

.1 GB3:

.1 Typical allocation: Next to toilets in 2 pc and 3 pc accessible and universal washrooms.

.2 Size: 760 mm x 760 mm (30” x 30”).

.3 Acceptable *Products*:

.1 ASI ‘3804-P’.

.2 Bobrick ‘B-6898.99 30x30’.

.3 Bradley ‘812-2, 057’.

.3 GB5- MH; Grab bar, MH, horizontal, no pass through:

.1 Typical allocation: High risk washrooms.

.2 Length: 610 mm (24”).

.3 Acceptable *Product*:

.1 Kingsway Grab Bar ‘KG270-272’.

.2 Substitutions: in accordance with Section 01 25 00.

.4 GB3-MH, ~~GB6-MH;~~ Grab bar; MH, L-shape, no pass through: [Revised by Addendum No.2]

.1 Typical allocation: High risk washrooms.

.2 Size: 760 mm x 760 mm (30” x 30”).

.3 Acceptable *Product*:

.1 Kingsway Grab Bar ‘KG279C.

.2 Substitutions: in accordance with Section 01 25 00.

.3 JS 1; Janitor’s shelf with mop holders:

.1 Typical allocations: Housekeeping rooms/closets

.2 Acceptable *Products*:

.1 ASI ‘1315-4’.

.2 Bobrick ‘B-224’.

.3 Bradley ‘9933’.

.4 Mirrors:

.1 MIR 2:

.1 Type 304 Stainless steel angled framed mirrors:

.2 Acceptable *Products*:

.1 ASI ‘0600-2436’.

.2 Bobrick ‘B-2908 2436’.

.3 Bradley ‘780-2436-2’.

.2 MIR3-MH:

.1 Typical allocations: MH Washrooms.

.2 Acceptable *Products*:

.1 ASI ‘105-14’.

.2 Bobrick ‘B942’.

.3 Bradley ‘SA05’.

.3 Substitutions: in accordance with Section 01 25 00.

.5 Clothes/robe hook:

.1 RH 1; single hook:

.1 Typical allocations: Staff WRs, Offices, Meeting Rooms.

.2 Acceptable *Products*:

.1 ASI ‘7340-S’.

.2 Bobrick ‘B-6717’.

.3 Bradley ‘9114’.

.2 RH1-MH; dual hook:

.1 Acceptable *Product*:

.1 Kingsway ‘KG177 Anti-Ligature Dual Coat Hook rack’.

.2 Substitutions: in accordance with Section 01 25 00.

.3 RH 2-MH; collapsible hook:

.1 Typical allocations: MH washrooms, all MH Spaces where indicated.

.2 Acceptable *Product*:

.1 Kingsway ‘KG180 Anti-Ligature Single Coat Hook’.

.2 Substitutions: in accordance with Section 01 25 00.

.6 Shelves:

.1 SHLF 2; metal:

.1 Size: 127mm (5”) depth x 457mm (18”) length

.2 Typical allocations: WRs and Housekeeping rooms.

.3 Acceptable *Products*:

.1 ASI ‘0692-518’.

.2 Bobrick ‘B-298x18’.

.3 Bradley '755-18'.

.2 SHLF 3-MH:

.1 Shelf, recessed, stainless steel.

.2 Typical allocations: WRs, MH.

.3 Acceptable *Product*:

.1 ASI '130 Recessed Shelves'.

.2 Substitutions: in accordance with Section 01 25 00.

.3 Washroom accessories supplied by *Owner* installed by *Construction Manager* locations as indicated or scheduled (OS/CI):

.1 CHDIS-1:

.1 Acceptable *Product*:

.1 SJS 'Diversey J-Fill QuattroSelect Dispensing System – SafeGap'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 GD 1; Glove Dispenser:

.1 Glove dispenser, holder for 3 sizes of gloves.

.2 Acceptable *Products*:

.1 Clear PETG:

.1 Medline 'MDS193096B Clear PETG horizontal glove box holder'.

.2 Bowman 'GP-015 – Glove Box Dispenser – Triple'.

.3 Hand sanitizer dispenser:

.1 HS 1:

.1 Typical application throughout; All will be surface mounted (not in recessed cubby)

.2 Colour: to later selection by *Consultant*.

.3 Acceptable *Product*:

.1 Gojo 'ADX-12 Dispenser, Model 8884-06'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 ~~HS 2 - MH:~~[Deleted by Addendum No.2]

~~.1 Hand sanitizer dispenser, sloped top, touch free activated, surface mounted, with no floor/wall protector.~~

~~.2 Typical application MH spaces.~~

~~.3 Acceptable *Product*:~~

~~.1 Gojo 'Purell LTX Behavioural Health Dispenser'.~~

~~.2 Substitutions: in accordance with Section 01 25 00.~~

.4 Paper towel dispensers:

.1 PTD1; Paper towel dispenser for paper towel rolls, larger scale, no touch:

.1 Colour: Dark grey.

.2 Acceptable *Product*:

.1 Cascades Pro 'Tandem – Mechanical No-Touch Roll Towel Dispenser, Model C340'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 PTD 2-MH; Paper towel dispenser, surface mounted, anti-ligature, lockable:

.1 Typical allocations: MH washrooms.

.2 Acceptable *Product*:

.1 Behavioral Safety 'Ligature Resistant Toilet Paper Dispenser, #TR230'.

.2 Substitutions: in accordance with Section 01 25 00.

.5 S/C 1; Sharps containers:

.1 Sharps containers – Medium size, surface mounted

.2 Typical allocation: bedrooms, exam rooms, etc.

.3 Acceptable *Product*:

.1 Daniels 'S14 - 1.35Gallon Reusable Sharps Container'.

.2 Substitutions: in accordance with Section 01 25 00.

.6 Soap dispenser:

.1 SD 1; surface mounted:

.1 Typical allocation: Sinks including Hand Hygiene Stations

.2 Acceptable *Product*:

.1 Gojo 'ADX-12 Dispenser, Model 8884-06'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 SD 2-MH: Soap dispenser, manual.

.1 Acceptable *Product*:

.1 Kingsway Group 'KG07 Manual Soap Dispenser'.

.2 Substitutions: in accordance with Section 01 25 00.

.7 SDH1; Soap/shampoo dish/holder:

.1 Typical allocation: Shower Areas

.2 Colour: to later selection by *Consultant*.

.3 Acceptable *Product*:

.1 Gojo 'ADX-12 Dispenser, Model 8884-06'.

.2 Substitutions: in accordance with Section 01 25 00.

.8 Toilet tissue roll holders:

.1 TPH 1:

.1 Toilet paper holder, surface mounted, smaller scale, double rolled side by side.

.2 Typical allocations: Public and staff washroom.

.3 Colour: Smoke.

.4 Acceptable *Product*:

.1 Georgia-Pacific 'Sofpull Centerpull Mini Side-by-Side Tissue Dispenser, GP56516'.

.2 Substitutions: in accordance with Section 01 25 00.

.2 TPH 2-MH:

.1 Toilet paper holder, recessed.

.2 Typical allocations: MH Washrooms.

.3 Acceptable *Products*:

.1 Kingsway 'KG13 Ligature Resistant Toilet Roll Holder'.

.2 Substitutions: in accordance with Section 01 25 00.

2.2 Fabrication

.1 Fabricate *Products* with materials and component sizes, metal gauges, hardware, reinforcing, anchors, and fastenings of adequate strength to ensure that washroom accessories will remain free of warping, buckling, opening of joints and seams, and distortion within limits of intended use.

PART 3 - EXECUTION

3.1 Preparation

.1 Verify that rough-in dimensions and blocking or back-up has been provided to comply with product manufacturer's written requirements.

3.2 Installation of Washroom and Miscellaneous Accessories

.1 Supply manufacturer's handling instructions, anchorage information, roughing-in dimensions, templates and service requirements for installation of the work of this section, and assist or supervise, or both, the setting of anchorage devices and construction of other work incorporated with *Products* specified in this section in order that they function as intended.

.2 Comply with product manufacturers written requirements.

.3 Install and secure fixtures rigidly in place using expansion shields in solid masonry or concrete, toggle bolts in hollow masonry or sheet metal screws at metal studs.

.4 Insulate surfaces to prevent electrolytic action due to contact with dissimilar metals, or concrete or masonry as applicable. Use bituminous paint or other approved means.

.5 Install on built-in concealed solid backing materials. Grab bar installation shall be able to withstand 250 kg downward force.

.6 Verify locations and mounting heights with *Consultant* before roughing-in.

3.3 Barrier Free Installation Heights

.1 Install accessories to permit operable parts and controls to be accessed in accordance with authorities having jurisdiction.

3.4 Installation Tolerances

.1 Install accessories plumb, level, straight, tight and secured, centred between joints on masonry and tile walls to the following maximum tolerances:

.1 Plumb and level: 3 mm (1/8").

.2 Variation from indicated position: 3 mm (1/8").

3.5 Adjusting and Cleaning

.1 Verify under work of this section that installed *Products* function properly, and adjust them accordingly to ensure satisfactory operation. Test mechanisms, hinges, locks, and latches and adjust and lubricate to ensure washroom accessories are in perfect working order.

.2 Do not remove protective coatings until final cleaning, or earlier if directed by *Consultant*.

.3 Refinish damaged or defective work so that no variation in surface appearance is discernible. Refinish work at *Place of the Work* only if approved.

END OF SECTION

Micropiles

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 General Conditions and Division 1, General Requirements, shall govern Work of this Section.

.2 Quantities and dimensions enclosed in brackets apply to Project for which Drawings are in imperial units.

1.2 DESCRIPTION

.1 Work Installed by this Section but Supplied by Others:

.1	Concrete Reinforcement: to supply steel reinforcement	Section 03 20 00

.2 Related Work Specified in Other Sections:

.1	Submittals and Shop Drawings	Section 01 33 00
.2	Quality Control	Section 01 40 00
.3	Excavation	Section 31 23 10
.4	Shoring	Section 31 41 00
.5	Concrete Formwork	Section 03 10 00
.6	Concrete Reinforcement	Section 03 20 00
.7	Cast-In-Place Concrete:	Section 03 30 00
.8	Geotechnical Report	Section 00 30 00

.3 Co-operation with Work of Other Sections:

.1 Check project Drawings and Specifications for requirements of other Sections, which will affect installation of Work of this Section

.2 Inform those performing Work of other Sections, in writing or by schedules, of requirements for materials and built-in items supplied by other Sections.

.4 Co-operation with Consultant:

.1 Before commencing Work, review with Consultant, Work performed under this Section.

.2 Schedule Work to allow sufficient time and access for Consultant to carry out periodic field review.

.5 Co-operation with Inspection and Testing Company:

.1 Provide free access to Work.

.6 This work shall consist of constructing micropiles as shown on the contract plans and approved working drawings and as specified herein. The micropile specialty Contractor is responsible for furnishing of all design, materials, products, accessories, tools, equipment, services,

transportation, labor and supervision, and manufacturing techniques required for design, installation and testing of micropiles and pile top attachments for this project.

.7 The selected micropile Contractor shall select the micropile type, size, pile top attachment, installation means and methods, estimate the ground-grout bond value and determine the required grout bond length and final micropile diameter. The micropile Contractor shall design and install micropiles that will develop the load capacities indicated on the contract plans. The micropile load capacities shall be verified by verification and proof load testing as required and must meet the test acceptance criteria specified herein.

.8 Where the imperative mood is used within this specification, “The Contractor shall” is implied.

1.3 MICROPILE CONTRACTOR’S EXPERIENCE REQUIREMENTS AND SUBMITTALS

.1 The micropile Contractor shall be experienced in the construction and load testing of micropiles and have successfully constructed at least five (5) projects in the last five (5) years involving construction totaling at least 100 micropiles of similar capacity to those required in these plans and specifications.

.2 The Contractor shall have previous micropile drilling and grouting experience in soil/rock similar to project conditions. The Contractor shall submit construction details, structural details and load test results for at least three previous successful micropile load tests from different projects of similar scope to this project.

.3 The Contractor shall assign an Engineer to supervise the work with experience on at least three (3) projects of similar scope to this project completed over the past five (5) years. The Contractor shall not use consultants or manufacturers’ representatives to satisfy the supervising Engineer requirements of this section. The on-site foremen and drill rig operators shall also have experience on at least three (3) projects over the past five (5) years installing micropiles of equal or greater capacity than required in these plans and specifications.

.4 The micropiles shall be designed by a Registered Professional Engineer with experience in the design of at least three (3) successfully completed micropile projects over the past five (5) years, with micropiles of similar capacity to those required in these plans and specifications. The micropile designer may be either an employee of the Contractor or a separate Consultant designer meeting the stated experience requirements.

.5 At least 45 calendar days before the planned start of micropile construction, the Contractor shall submit the completed project reference list and a personnel list. The project reference list shall include a brief project description with the owner’s name and current phone number and load test reports. The personnel list shall identify the micropile system designer (if applicable), supervising project Engineer, drill rig operators, and onsite foremen to be assigned to the project. The personnel list shall contain a summary of each individual’s experience and be complete enough for the Consultant to determine whether each individual satisfies the required qualifications. The Consultant will approve or reject the Contractor’s qualifications within 15 calendar days after receipt of a complete submission. Additional time required due to incomplete or unacceptable submittals will not be cause for time extension or impact or delay claims. All costs associated with incomplete or unacceptable submittals shall be borne by the Contractor.

.6 Work shall not be started, nor materials ordered, until the Consultant’s written approval of the Contractor’s experience qualifications is given. The Consultant may suspend the Work if the Contractor uses non-approved personnel. If work is suspended, the Contractor shall be fully liable for all resulting costs and no adjustment in contract time will result from the suspension.

1.4 DEFINITIONS

.1 **Admixture**: Substance added to the grout to control bleed and/or shrinkage, improve flowability, reduce water content, or retard setting time.

.2 **Alignment Load (AL)**: An initial load applied to micropile during testing to keep the testing equipment correctly positioned (Typically 5% maximum test load).

.3 **Bonded Length**: The length of the micropile that is bonded to the ground and conceptually used to transfer the applied axial loads to the surrounding soil or rock. Also known as the load transfer length.

.4 **Bond-breaker**: A sleeve placed over the steel reinforcement to prevent load transfer.

.5 **Casing**: Steel tube introduced during the drilling process in overburden soil to temporarily stabilize the drill hole. This is usually withdrawn as the pile is grouted, although in certain types of micropiles, some casing is permanently left in place to provide added pile reinforcement.

.6 **Centralizer**: A device to support and position the reinforcing steel in the drill hole and/or casing so that a minimum grout cover is provided.

.7 **Consultant**: The Owner or Owner's authorized agent.

.8 **Contractor**: The person/firm responsible for performing the micropile work.

.9 **Coupler**: The means by which load capacity can be transmitted from one partial length of reinforcement to another.

.10 **Creep Movement**: The movement that occurs during the creep test of a micropile under a constant load.

.11 **Design Load (DL)**: The maximum ULS factored load expected to be applied to the micropile during its service life.

.12 **Encapsulation**: A corrugated or deformed tube protecting the reinforcing steel against corrosion.

.13 **Free (Unbonded) Length**: The designed length of the micropile that is not bonded to the surrounding ground or grout.

.14 **Geotechnical Bond Design Strength**: For Ultimate Limits States (ULS) or Load Factor Design (LFD), computed as the nominal grout-to-ground bond strength multiplied by a geotechnical resistance factor φ_g. Use:

.1 $\varphi_g = 0.6$ for compression loading

.2 $\varphi_g = 0.4$ for tension loading

.15 **Micropile**: A small-diameter, bored, cast-in-place composite pile, in which the applied load is resisted by steel reinforcement, cement grout and frictional grout/ground bond.

.16 **Maximum Test Load**: The maximum load to which the micropile is subjected during testing

.17 **Nominal Grout-to-Ground Bond Strength**: The estimated ultimate geotechnical unit grout-to-ground bond strength selected for use in design.

.18 **Overburden**: Material, natural or placed, that may require cased drilling methods to provide an open borehole to underlying strata.

.19 **Post-grouting**: The injection of additional grout into the load transfer length of a micropile after the primary grout has set. Also known as regrouting or secondary grouting.

.20 **Primary Grout**: Portland-cement-based grout injected into the micropile hole prior to or after the installation of the reinforcement to direct the load transfer to the surrounding ground along the micropile.

.21 **Proof Load Test**: Incremental loading of a production micropile, recording the total movement at each increment.

.22 **Reinforcement**: The steel component of the micropile that accepts and/or resists applied loadings.

.23 **Sheathing**: Smooth or corrugated piping or tubing that protects the reinforcing steel against corrosion.

.24 **Spacer**: A device to separate elements of a multiple-element reinforcement.

.25 **Ultimate Load (UL)**: Micropile load corresponding to the nominal grout-to-ground bond strength for the pile configuration and dimensions.

.26 **Verification Load Test**: Pile load test performed to verify the design of the pile system and the construction methods proposed, prior to installation of production piles. Test piles are typically constructed to full scale or may be scaled for practical testing purposes.

1.5 REFERENCED CODES AND STANDARDS

.1 The following publications form a part of this specification to the extent indicated by the references. The latest publication as of the issue date of this specification shall govern, unless indicated otherwise:

.2 American Society for Testing and Materials (ASTM) & American Association of State Highway and Transportation Officials (AASHTO)

.1 ASTM A36, A572, AASHTO M183, M223 - Structural Steel

.2 ASTM A1064, AASHTO M55 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

.3 ASTM A252 - Welded and Seamless Steel Pipe Piles

.4 ASTM A615, AASHTO M31 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement

.5 ASTM A722 - Uncoated High-Strength Steel Bar for Prestressing Concrete

.6 ASTM A775 - Epoxy -Coated Reinforcing Steel Bars

.7 ASTM A934 - Epoxy-Coated Prefabricated Steel Reinforcing Bars

.8 ASTM C33, AASHTO M80 - Concrete Aggregates

.9 ASTM C109 - Compressive Strength of Hydraulic Cement Mortar

.10 ASTM C188, AASHTO T133 - Density of Hydraulic Cement

.11 ASTM C144 - Aggregate for Masonry Mortar

.12 ASTM C150. AASHTO M85 - Portland Cement

.13 ASTM C494, AASHTO M194 - Chemical Admixtures for Concrete

.14 ASTM D1143 - Method of Testing Piles Under Static Axial Compressive Load

.15 ASTM D1784 - Polyvinyl Chloride (PVC) Pipe (Class 13464-B)

.16 ASTM D3350, AASHTO M252 - Polyethylene Corrugated Tubing

.17 ASTM D3689 - Method of Testing Individual Piles Under Static Axial Tensile Load

.18 ASTM D3966 Standard Test Method for Piles Under Lateral Load

.19 AASHTO T26 Quality of Water to be Used in Concrete

.3 Canadian Codes

.1 CSA W59-18, “Welded Steel Construction”.

.2 CSA W186-21, “Welding of Reinforcing Bars in Reinforced Concrete Construction”.

.3 CSA G40.20-13/G40.21-13(R2018), “General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels”.

.4 CSA S16-19, “Design of Steel Structures”.

.5 CSA W48-18 (R2023), “Filler Metals and Allied Materials for Metal Arc Welding”.

.6 CSA 47.1-19, “Certification of Companies for Fusion Welding of Steel”.

.4 American Society of Civil Engineers (ASCE):

.1 ASCE 20-96 - Standard Guidelines for the Design and Installation of Pile Foundations.

.5 Deep Foundations Institute (DFI)

.1 Guide to Drafting a Specification for High Capacity Drilled and Grouted Micropiles for Structural Support, 1st Edition, Copyright 2001 by the Deep Foundation Institute (DFI).

.6 U.S. Department of Transportation, Federal Highway Administration (FHWA)

.1 FHWA-SA-97-070 - Micropile Design and Construction Guidelines Manual

.2 NHI-05-039 - Micropile Design & Construction

1.6 CONSTRUCTION SITE SURVEY

.1 Before bidding the Work, the Contractor shall review the available subsurface information and visit the site to assess the site geometry, equipment access conditions, and location of existing structures and above ground facilities.

.2 The Contractor is responsible for field locating and verifying the location of all utilities shown on the plans prior to starting the Work. Maintain uninterrupted service for those utilities designated to remain in service throughout the Work. Notify the Consultant of any utility locations different from shown on the plans that may require micropile relocations or structure design modification.

.3 Prior to start of any micropile construction activity, the Contractor and Consultant shall jointly inspect the site to observe and document the pre-construction condition of the site, existing structures and facilities.

1.7 MICROPILE DESIGN REQUIREMENTS

.1 The micropiles shall be designed to meet the specified loading conditions, as shown on the contract plans and approved working drawings. Design the micropiles and pile cap connections using the Service Load Design (SLD) procedures contained in the FHWA “Micropile Design and Construction Guidelines Manual”, Report No. FHWA-SA-97-070.

.2 The required geotechnical resistance factors (for ULS or LFD Design) shall be in accordance with the project specific geotechnical report and the FHWA manual, unless specified otherwise. Estimated soil/rock design shear strength parameters, unit weights, applied foundation loadings, slope and external surcharge loads, corrosion protection requirements, known utility locations, easements, right-of-ways and other applicable design criteria will be as shown on the plans or specified herein.

.3 Steel pipe used for micropile permanent casing shall incorporate an additional 1.6 mm thickness of sacrificial steel for corrosion protection, unless specified otherwise.

.4 Where required as shown on the contract plans, corrosion protection of the internal steel reinforcing bars, consisting of either encapsulation, epoxy coating, or grout, shall be provided. Where permanent casing is used for a portion of the micropile, encapsulation shall extend at least 1.5 m into the casing.

1.8 MICROPILE DESIGN SUBMITTALS.

.1 At least 21 calendar days before the planned start of micropile structure construction, submit complete design calculations and working drawings to the Consultant for review and approval. Include all details, dimensions, quantities, ground profiles, and cross-sections necessary to construct the micropile structure. Verify the limits of the micropile structure and ground survey data before preparing the detailed working drawings.

.2 The drawings and calculations shall be signed and sealed by the contractor’s Professional Engineer, previously approved by the Consultant. If the micropile contractor uses a third party design engineer to prepare the design, the micropile contractor shall still have overall contract responsibility for both the design and the construction.

1.9 DESIGN CALCULATIONS

.1 Design calculations shall include, but not be limited to, the following items:

.1 A written summary report which describes the overall micropile design.

.2 Applicable code requirements and design references.

.3 Design calculation sheets (both static and seismic) with the project number, micropile structure location, designation, date of preparation, initials of designer and checker, and page number at the top of each page.

.4 Micropile structure critical design cross-section(s) geometry including soil/rock strata and water levels and location, magnitude and direction of design applied loadings, including slope or external surcharge loads.

.5 Design criteria including, soil/rock shear strengths (friction angle and cohesion), unit weights, and ground-grout bond values and micropile drill-hole diameter assumptions for each soil/rock strata.

.6 Load and resistance factors used in the design on the ground-grout bond values, surcharges, soil/rock and material unit weights, steel, grout, and concrete materials.

.7 Seismic design earthquake acceleration coefficient.

.8 Design notes including an explanation of any symbols and computer programs used in the design.

.9 Pile to footing connection calculations.

1.10 WORKING DRAWINGS

.1 The working drawings shall include all information required for the construction and quality control of the piling. Working drawings shall include, but not be limited to, the following items unless provided in the contract plans:

.1 A plan view of the micropile structure(s) identifying:

.1 A reference baseline and elevation datum.

.2 The offset from the construction centerline or baseline to the face of the micropile structure at all changes in horizontal alignment.

.3 Beginning and end of micropile structure stations.

.4 Right-of-way and permanent or temporary construction easement limits, location of all known active and abandoned existing utilities, adjacent structures or other potential interferences. The centerline of any drainage structure or drainage pipe behind, passing through, or passing under the micropile structure.

.5 Subsurface exploration locations shown on a plan view of the proposed micropile structure alignment with appropriate reference base lines to fix the locations of the explorations relative to the micropile structure.

.2 An elevation view of the micropile structure(s) identifying:

.1 Elevation view showing micropile locations and elevations; vertical and horizontal spacing; batter and alignment and the location of drainage elements (if applicable).

.2 Existing and finish grade profiles both behind and in front of the micropile structure.

.3 Design parameters and applicable codes.

.4 General notes for constructing the micropile structure including construction sequencing or other special construction requirements.

.5 Horizontal and vertical curve data affecting the micropile structure and micropile structure control points. Match lines or other details to relate micropile structure stationing to centerline stationing.

.6 A listing of the summary of quantities on the elevation drawing of each micropile structure showing pay item estimated quantities (if applicable).

.7 Micropile typical sections including micropile spacing and inclination; minimum drillhole diameter; pipe casing and reinforcing bar sizes and details; splice types and locations; centralizers and spacers; grout bond zone and casing plunge lengths (if used); corrosion protection details; and connection details to the substructure footing, anchorage, plates, etc.

.8 A typical detail of verification and production proof test micropiles defining the micropile length, minimum drillhole diameter, inclination, and load test bonded and unbonded test lengths (if applicable).

.9 Details, dimensions, and schedules for all micropiles, casing and reinforcing steel, including reinforcing bar bending details.

.10 Revise the drawings when plan dimensions are changed due to field conditions or for other reasons. Within 30 days after completion of the work, submit as-built drawings to the Consultant. Provide revised design calculations signed by the approved Registered Professional Engineer for all design changes made during the construction of the micropile structure.

1.11 CONSTRUCTION SUBMITTALS

.1 Work other than test pile installation shall not begin until the construction submittals have been received, reviewed, and accepted in writing by the Consultant. Provide work plan, schedule, welding procedure, headroom requirements and surface water control plan at least 21 calendar days prior to initiating micropile construction.

.2 Provide mill reports as the work progresses for each delivery.

.3 Provide grout plan and load test plan at least seven days prior to start of micropile load testing or incorporation of the respective materials into the work.

.4 Work Plan: Detailed step-by-step description of the proposed micropile construction procedure, including personnel, testing and equipment to assure quality control. This step-by-step procedure shall be shown on the working drawings in sufficient detail to allow the Consultant to monitor the construction and quality of the micropiles.

.5 Schedule: Proposed start date and time schedule and micropile installation schedule providing the following:

.1 Micropile number

.2 Micropile design load

.3 Type and size of reinforcing steel

.4 Minimum total bond length

.5 Total micropile length

.6 Micropile top footing attachment

.6 Welding procedure: If welding of casing is proposed, submit the proposed welding procedure, certified by a qualified welding specialist.

.7 Information on headroom and space requirements for installation equipment that verify the proposed equipment can perform at the site.

.8 Surface Water Control Plan describing how surface water, drill flush, and excess waste grout will be controlled and disposed.

.9 Certified mill test reports for the reinforcing steel or coupon test results for permanent casing without mill certification. The ultimate strength, yield strength, elongation, and material properties composition shall be included. For API N-80 pipe casing, coupon test results may be submitted in lieu of mill certification.

.10 Proposed Grouting Plan. The grouting plan shall include complete descriptions, details, and supporting calculations for the following:

.1 Grout mix design and type of materials to be used in the grout including certified test data and trial batch reports.

.2 Methods and equipment for accurately monitoring and recording the grout depth, grout volume and grout pressure as the grout is being placed.

.3 Grouting rate calculations, when requested by the Consultant. The calculations shall be based on the initial pump pressures or static head on the grout and losses throughout the placing system, including anticipated head of drilling fluid (if applicable) to be displaced.

.4 Estimated curing time for grout to achieve specified strength. Previous test results for the proposed grout mix completed within one year of the start of grouting may be submitted for initial verification and acceptance and start of production work. During production, grout shall be tested in accord with PART 3.

.5 Procedure and equipment for Contractor monitoring of grout quality.

.11 Load Testing Plan: Detailed plans for the proposed micropile load testing method. This shall include all drawings, details, and structural design calculations necessary to clearly describe the proposed test method, reaction load system capacity and equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and pile top movements in accordance with Section 3.12, Pile Load Tests.

.12 Calibration reports and data for each test jack, pressure gauge and master pressure gauge and electronic load cell to be used. The calibration tests shall have been performed by an independent testing laboratory, and tests shall have been performed within 90 calendar days of the date submitted. Testing shall not commence until the Engineer has reviewed and accepted the jack, pressure gauge, master pressure gauge and electronic load cell calibration data.

1.12 PRE-CONSTRUCTION MEETING

.1 A pre-construction meeting will be scheduled by the Contractor and held prior to the start of micropile construction. The Consultant, prime Contractor, micropile specialty Contractor, micropile designer, excavation Contractor and geotechnical instrumentation specialist (if applicable) shall attend the meeting. Attendance is mandatory. The pre-construction meeting will be conducted to clarify the construction requirements for the work, to coordinate the construction schedule and activities, and to identify contractual relationships and delineation of responsibilities amongst the prime Contractor and the various Subcontractors – specifically those pertaining to excavation for micropile structures, anticipated subsurface conditions, micropile installation and testing, micropile structure survey control and site drainage control.

PART 2 - MATERIALS

.1 Furnish materials new and without defects. Remove defective materials from the jobsite at no additional cost. Materials for micropiles shall consist of the following:

.1 **Admixtures for Grout**: Admixtures shall conform to the requirements of ASTM C494/AASHTO M194. Admixtures that control bleed, improve flowability, reduce water content, and retard set may be used in the grout, subject to the review and acceptance of the Engineer. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations and anchorage covers. Accelerators are not permitted. Admixtures containing chlorides are not permitted.

.2 **Cement**: All cement shall be Portland cement conforming to ASTM C lSO/AASHTO M85, Types II, III or V.

.3 **Centralizers and Spacers**: Centralizers and spacers shall be fabricated from schedule 40 PVC pipe or tube, steel, or material non-detrimental to the reinforcing steel. Wood shall not be used. Centralizers and spacers shall be securely attached to the reinforcement; sized to position the reinforcement within 10 mm of plan location from center of pile; sized to allow grout tremie pipe insertion to the bottom of the drillhole; and sized to allow grout to freely flow up the drillhole and casing and between adjacent reinforcing bars.

.4 **Encapsulation**: Encapsulation (double corrosion protection) shall be shop fabricated using high-density, corrugated polyethylene tubing conforming to the requirements of ASTM D3350/AASHTO M252 with a nominal wall thickness of 0.8 mm. The inside annulus between the reinforcing bars and the encapsulating tube shall be a minimum of 5 mm and be fully grouted with non-shrink grout conforming to PART 2.

.5 **Epoxy Coating**: The minimum thickness of coating applied electrostatically to the reinforcing steel shall be 0.3 mm. Epoxy coating shall be in accordance with ASTM A775 or ASTM A934. Bend test requirements are waived. Bearing plates and nuts encased in the pile concrete footing need not be epoxy coated.

.6 **Fine Aggregate**: If sand - cement grout is used, sand shall conform to ASTM C 144/AASHTO M45.

.7 **Grout**: Neat cement or sand/cement mixture with a minimum three (3)-day compressive strength of 14 MPa and a 28day compressive strength of 28 MPa per AASHTO T106/ASTM C109.

.8 **Grout Protection**: Provide a minimum 25 mm grout cover over bare or epoxy coated bars (excluding bar couplers) or minimum 12 mm grout cover over the encapsulation of encapsulated bars.

.9 **Permanent Casing Pipe**: Permanent steel casing/pipe shall have the diameter and at least minimum wall thickness shown on the approved Working Drawings. The permanent steel casing/pipe:

.1 Shall meet the Tensile Requirements of ASTM A252, Grade 3, except the yield strength shall be a minimum of 345 MPa to 552 MPa as used in the design submittal.

.2 May be new “Structural Grade” (a.k.a. “Mill Secondary”) steel pipe meeting above but without Mill Certification, free from defects (dents, cracks, tears) and with two (2) coupon tests per truckload delivered to the fabricator.

.10 For permanent casing/pipe that will be welded, the following material conditions apply:

.1 The carbon equivalency (CE) as defined in AWS D1.1, Section X15.1, shall not exceed 0.45, as demonstrated by mill certifications

.2 The sulfur content shall not exceed 0.05%, as demonstrated by mill certifications

.11 For permanent casing/pipe that will be shop or field welded, the following fabrication or construction conditions apply:

.1 The steel pipe shall not be joined by welded lap splicing

.2 Welded seams and splices shall be complete penetration welds

.3 Partial penetration welds may be restored in conformance with AWS D1.1

.4 The proposed welding procedure certified by a welding specialist shall be submitted for approval

.12 Threaded casing joints shall develop at least the required nominal resistance used in the design of the micropile.

.13 **Plates and Shapes**: Structural steel plates and shapes for pile top attachments shall conform to CSA G40.21 Grade 350.

.14 Reinforcing Bars: Reinforcing steel shall be deformed bars in accordance with ASTM A615/AASHTO M31, Grade 420 or Grade 520 or ASTM A722/AASHTO M275, Grade 1035. When a bearing plate and nut are required to be threaded onto the top end of reinforcing bars for the pile top to footing anchorage, the threading may be continuous spiral deformed ribbing provided by the bar deformations (e.g., Dywidag or Williams continuous threadbars) or may be cut into a reinforcing bar. If threads are cut into a

reinforcing bar, the next larger bar number designation from that shown on the Plans shall be provided, at no additional cost. All bars to be double corrosion protected.

.15 Bar tendon couplers, if required, shall develop the ultimate tensile strength of the bars without evidence of any failure.

.16 Sheathing: Smooth or corrugated plastic sheathing, including joints, shall be watertight. Polyvinyl chloride (PVC) sheathing shall conform to ASTM D1784, Class 13464-B.

.17 Water: Water used in the grout mix shall conform to AASHTO T26 and shall be potable, clean, and free from substances that may be injurious to cement and steel.

PART 3 - EXECUTION

.1 Site drainage control.

.1 The Contractor shall control and properly dispose of drill flush and construction related waste, including excess grout, in accord with the standard specifications and all applicable local codes and regulations. Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost. Upon substantial completion of the Work, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Consultant, pipes or conduits that are left in place may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.

.2 Excavation

.1 Coordinate the work and the excavation so the micropile structures are safely constructed. Perform the micropile construction and related excavation in accordance with the Plans and approved submittals. No excavations steeper than those specified herein or shown on the Plans will be made above or below the micropile structure locations without written approval of the Engineer.

.2 Immediately contact the Consultant if unanticipated existing subsurface structures are discovered during excavation or drilling. Suspend work in these areas until remedial measures meeting the Consultant’s approval are implemented.

.3 Micropile Allowable Construction Tolerances

.1 Centerline of piling shall not be more than 75 mm from indicated plan location.

.2 Pile shall be plumb within 2% of total-length plan alignment.

.3 Top elevation of pile shall be plus 25 mm or minus 50 mm maximum from vertical elevation indicated.

.4 Centerline of reinforcing steel shall not be more than 15 mm from indicated location.

.4 Micropile Installation

.1 The micropile Contractor shall select the drilling method, the grouting procedure and the grouting pressure used for the installation of the micropiles. The micropile Contractor

shall also determine the micropile casing size, final drillhole diameter and bond length, and central tendon reinforcement steel sizing necessary to develop the specified load capacities and load testing requirements. The micropile Contractor is also responsible for estimating the grout take. There will be no extra payment for grout overruns.

.2 Drilling

.1 The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, without causing damage to any overlying or adjacent structures or services. The drillhole must be open along its full length to at least the design minimum drillhole diameter prior to placing grout and reinforcement.

.2 Temporary casing or other approved method of anchor drillhole support will be required in caving or unstable ground to permit the anchor shaft to be formed to the minimum design drillhole diameter. The Contractor's proposed method(s) to provide drillhole support and to prevent detrimental ground movements shall be reviewed by the Consultant. Detrimental ground movement is defined as movement which requires remedial repair measures. Use of drilling fluid containing bentonite is not allowed.

.3 Ground Heave or Subsidence

.1 During construction, the Contractor shall observe the conditions vicinity of the micropile construction site on a daily basis for signs of ground heave or subsidence. Immediately notify the Consultant if signs of movements are observed. Contractor shall immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile structure is adversely affected, or if adjacent structures are damaged from the drilling or grouting. If the Consultant determines that the movements require corrective action, the Contractor shall take corrective actions necessary to stop the movement or perform repairs. When due to the Contractor's methods or operations or failure to follow the specified/approved construction sequence, as determined by the Consultant, the costs of providing corrective actions will be borne by the Contractor. When due to differing site conditions, as determined by the Consultant, the costs of providing corrective actions will be paid as Extra Work.

.4 Pipe Casing and Reinforcing Bars Placement and Splicing

.1 Reinforcement may be placed either prior to grouting or placed into the grout - filled drillhole before temporary casing (if used) is withdrawn. Reinforcement surface shall be free of deleterious substances such as soil, mud, grease or oil that might contaminate the grout or coat the reinforcement and impair bond. Pile cages and reinforcement groups, if used, shall be sufficiently robust to withstand the installation and grouting process and the withdrawal of the drill casings without damage or disturbance.

.2 The Contractor shall check pile top elevations and adjust all installed micropiles to the planned elevations.

.3 Centralizers and spacers (if used) shall be provided at 3 m centers maximum spacing. The upper and lower most centralizer shall be located a maximum of 1.5

m from the top and bottom of the micropile. Centralizers and spacers shall permit the free flow of grout without misalignment of the reinforcing bar(s) and permanent casing. The central reinforcement bars with centralizers shall be lowered into the stabilized drillhole and set. The reinforcing steel shall be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole. Contractor shall redrill and reinsert reinforcing steel when necessary to facilitate insertion.

.4 Lengths of casing and reinforcing bars to be spliced shall be secured in proper alignment and in a manner to avoid eccentricity or angle between the axes of the two lengths to be spliced. Splices and threaded joints shall meet the requirements of PART 2. Threaded pipe casing joints shall be located at least two casing diameters (OD) from a splice in any reinforcing bar. When multiple bars are used, bar splices shall be staggered at least 0.3 meters.

.5 Grouting

.1 Micropiles shall be primary grouted the same day the load transfer bond length is drilled. The Contractor shall use a stable neat cement grout or a sand cement grout with a minimum 28-day unconfined compressive strength of 28 MPa. Admixtures, if used, shall be mixed in accordance with manufacturer's recommendations. The grouting equipment used shall produce a grout free of lumps and undispersed cement. The Contractor shall have means and methods of measuring the grout quantity and pumping pressure during the grouting operations. The grout pump shall be equipped with a pressure gauge to monitor grout pressures. A second pressure gauge shall be placed at the point of injection into the pile top. The pressure gauges shall be capable of measuring pressures of at least 1 MPa or twice the actual grout pressures used, whichever is greater. The grout shall be kept in agitation prior to mixing. Grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout shall be injected from the lowest point of the drill hole and injection shall continue until uncontaminated grout flows from the top of the pile. The grout may be pumped through grout tubes, casing, hollow-stem augers, or drill rods. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed the grout level is brought back up to the ground level before the next length is removed. The tremie pipe or casing shall always extend below the level of the existing grout in the drillhole. The grout pressures and grout takes shall be controlled to prevent excessive heave or fracturing of rock or soil formations. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout.

.2 The grout shall be injected from the lowest point of the drill hole and injection shall continue until uncontaminated grout flows from the top of the pile. The grout may be pumped through grout tubes, casing, hollow-stem augers, or drill rods. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed the grout level is brought back up to the ground level before the next length is removed. The tremie pipe or casing shall always extend below the level of the existing grout in the drillhole. The grout pressures and grout takes shall be controlled to prevent excessive heave or fracturing of rock or soil formations. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout.

.3 Grout within the micropiles shall be allowed to attain the required design strength prior to being loaded.

.4 If the Contractor elects to use a postgrouting system, Working Drawings and details shall be submitted to the Consultant for review.

.6 Grout Testing

.1 Grout within the micropile verification and proof test piles shall attain the minimum required three (3)-day compressive strength of 14 MPa prior to load testing. Previous test results for the proposed grout mix completed within one year of the start of work may be submitted for initial verification of the required compressive strengths for installation of pre-production verification test piles and initial production piles. During production, micropile grout shall be tested by the Contractor for compressive strength in accordance with AASHTO T106/ASTM C109 at a frequency of no less than one set of three 50-mm grout cubes from each grout plant each day of operation or per every 10 piles, whichever occurs more frequently. The compressive strength shall be the average of the 3 cubes tested.

.2 Grout consistency as measured by grout density shall be determined by the Contractor per ASTM C188/AASHTO T133 or API RP-13B-1 at a frequency of at least one test per pile, conducted just prior to start of pile grouting. The Baroid Mud Balance used in accordance with API RP-13B-1 is an approved device for determining the grout density of neat cement grout. The measured grout density shall be as indicated on working drawings provided by the Contractor.

.3 Grout samples shall be taken directly from the grout plant. Provide grout cube compressive strength and grout density test results to the Consultant within 24 hours of testing.

.7 Micropile Installation Records

.1 Contractor shall prepare and submit to the Consultant full-length installation records for each micropile installed. The records shall be submitted within one work shift after that pile installation is completed. The data shall be recorded on the micropile installation log included at the end of this specification. A separate log shall be provided for each micropile.

.5 Pile Load Tests

.1 Perform verification and proof testing of piles at the locations specified herein or designated by the Consultant. Perform compression load testing in accord with ASTM D1143 and tension load testing in accord with ASTM D3689, except as modified herein.

.2 The maximum verification and proof test loads applied to the micropile shall not exceed 80% of the structural capacity of the micropile structural elements, to include steel yield in tension, steel yield or buckling in compression, or grout crushing in compression. Any required increase in strength of the verification test pile elements above the strength required for the production piles shall be provided for in the contractor’s bid price.

.3 The jack shall be positioned at the beginning of the test such that unloading and repositioning during the test will not be required. When both compression and tension

load testing is to be performed on the same pile, the pile shall be tested under compression loads prior to testing under tension loads.

.4 For convenience of testing and set-up, pile testing may be performed in tension, regardless of the governing load, with reference to the maximum governing load, unless specified otherwise.

.5 Testing Equipment and Data Recording

.1 Testing equipment shall include dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame. The load cell is required only for the creep test portion of the verification test. The contractor shall provide a description of test setup and jack, pressure gauge and load cell calibration curves in accordance with the Submittals Section.

.2 Design the testing reaction frame to be sufficiently rigid and of adequate dimensions such that excessive deformation of the testing equipment does not occur. Align the jack, bearing plates, and stressing anchorage such that unloading and repositioning of the equipment will not be required during the test.

.3 Apply and measure the test load with a hydraulic jack and pressure gauge. The pressure gauge shall be graduated in 500kPa increments or less. The jack and pressure gauge shall have a pressure range not exceeding twice the anticipated maximum test pressure. Jack ram travel shall be sufficient to allow the test to be done without resetting the equipment. Monitor the creep test load hold during verification tests with both the pressure gauge and the electronic load cell. Use the load cell to accurately maintain a constant load hold during the creep test load hold increment of the verification test.

.4 Measure the pile top movement with a dial gauge capable of measuring to 0.025 mm. The dial gauge shall have a travel sufficient to allow the test to be done without having to reset the gauge. Visually align the gauge to be parallel with the axis of the micropile and support the gauge independently from the jack, pile or reaction frame. Use a minimum of two dial gauges when the test setup requires reaction against the ground or single reaction piles on each side of the test pile.

.5 The required load test data shall be recorded by the Engineer.

.6 Verification Load Tests

.1 Perform pre-production verification pile load testing to verify the design of the pile system and the construction methods proposed prior to installing any production piles.

.2 Verification load tests shall be performed to verify that the Contractor installed micropiles will meet the required tension load capacities and load test acceptance criteria and to verify that the length of the micropile load transfer bond zone is adequate. The micropile verification load test results must verify the Contractor’s design and installation methods, and be reviewed and accepted by the Consultant prior to beginning installation of production micropiles. Installation of production piles should not proceed until all verification test results have been reviewed and accepted by the Consultant.

.3 Piles used for pre-production testing should not remain in place for usage as production piles unless reviewed and accepted by the Consultant. Test piles to be removed or cut-off and abandoned following completion of testing.

.4 Verification Test Pile Configuration and Construction

.1 The drilling-and-grouting method, casing size, and drill size for the verification test pile(s) shall be identical to those specified for the production piles at the given locations. The verification test micropile structural steel sections shall be sized to safely resist the maximum test load.

.2 Test verification piles can be full-scale (same configuration and dimensions as production piles) or they may be scaled to allowable practical limitations of testing equipment and materials, at the sole discretion of the Consultant.

.3 Where verification test piles are scaled:

.1 Effective bond length shall be no less than 50% of the production pile bond and a minimum of 1.5m.

.2 Maximum test load for verification testing shall be scaled to test for the corresponding nominal grout-to-ground bond strength

.5 Verification Test Quantities and Location

.1 Two (2) sacrificial verification test piles shall be constructed in conformance with the approved Working Drawings.

.2 Verification test pile(s) shall be installed at the locations proposed by the Contractor and approved by the Consultant. Test piles are to be located such that their installation and performance is representative of production piles, and in locations that will not interfere with production pile installation.

.6 Verification Test Loading Schedule

.1 Test verification piles to a maximum test load corresponding to the nominal grout-to-ground bond strength based on the test pile configuration (full-scale or scaled) or Ultimate Load (UL).

LOAD	HOLD TIME
AL	1 min
0.10UL	1 min
0.15UL	1 min
0.20UL	1 min
0.25UL	1 min

0.30UL	1 min
0.35UL	1 min
0.40UL	1 min
0.45UL	1 min
0.50UL	1 min
0.55UL	1 min
0.60UL	1 min
0.65UL	1 min
0.70UL	1 min
0.75UL	1 min
0.80UL	1 min
0.85UL	1 min
0.90UL	1 min
0.95UL	1 min
1.00UL	CREEP TEST (10min to 60min)
0.80UL	1 min
0.60UL	1 min
0.40UL	1 min
0.20UL	1 min
AL	1min

.2 The verification pile load tests shall be made by incrementally loading the micropile in accordance with the load schedule for the governing load(s):

.3 The alignment load (AL) shall not exceed 5% of the UL. Dial gauges shall be reset to zero after the initial AL is applied.

.4 The test load shall be applied in increments of 10 percent of the UL. Each load increment shall be held for a minimum of 1 minute. Pile top movement shall be measured at each load increment. The load-hold period shall start as soon as each test load increment is applied. Unloading shall be applied in decrements of 20% of the UL.

.5 The verification test pile shall be monitored for creep at the maximum test load (1.00UL): hold the pile load for 10min and record displacement at 0, 1, 2, 3, 4, 6, 10 minutes. If net creep from 1 to 10 minutes exceeds 1.0mm, hold for additional 50min with displacement readings at 20, 30, 50, and 60 minutes

.7 The acceptance criteria for micropile verification load tests are:

.1 At the end of the creep test at the maximum test load, test piles shall have a creep rate not exceeding 2.0mm/log cycle time. The creep rate shall be linear or decreasing throughout the creep load hold period.

.2 Failure does not occur at the maximum test load. Failure is defined as load at which attempts to further increase the test load simply result in continued pile movement.

.3 The Consultant will provide the Contractor written confirmation of the micropile design and construction within seven (7) working days of the completion of the verification load tests. This written confirmation will either confirm the capacities and bond lengths specified in the Working Drawings for micropiles or reject the piles based upon the verification test results.

.8 Verification Test Pile Rejection

.1 If a verification tested micropile fails to meet the acceptance criteria, the Contractor shall modify the design, the construction procedure, or both. These modifications may include modifying the installation methods, increasing the bond length, or changing the micropile type. Any modification that necessitates changes to the structure shall require the Consultant's prior review and acceptance. Any modifications of design or construction procedures or cost of additional verification test piles and load testing shall be at the Contractor's expense. At the completion of verification testing, test piles shall be removed down to the elevation specified by the Consultant.

END OF SECTION

UNIT PAVING

PART 1- GENERAL

1.1 Summary

.1 ASTM International

.1 ASTM C136-[13], Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 ASTM C979/C979M-[10], Standard Specification for Pigments for Integrally Colored Concrete.

.2 CSA Group

.1 CSA A23.1/A23.2-[09], Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-[04(R2009)], Mortar and Grout for Unit Masonry.

.3 CSA A231.1/A231.2-[06(R2010)], Precast Concrete Paving Slabs/Precast Concrete Pavers.

.4 CSA A283-[06(R2011)], Qualification Code for Concrete Testing Laboratories.

1.2 Action and Informal Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [precast concrete unit paving] and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit full size sample of each type of paver.

.4 Test and Evaluation Reports:

.1 Submit following sampling and testing data:

.1 Sieve analysis for gradation of bedding and joint material.

.2 Unit paver sampling and testing.

.3 Evaluation of [cleaning] [sealing] compound.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.3 Quality Assurance

.1 Qualifications:

.1 Installer: company or person specializing in precast concrete paver installations approved by manufacturer with minimum 5 years of experience.

.2 Mock-ups:

.1 Construct 3 x 3 m area mock-up.

.2 Mock-up will be used:

.1 To judge quality of work, substrate preparation, operation of equipment and material application.

.2 To determine surcharge of bedding layer, joint sizes, lines, laying patterns, colours and texture.

.3 Allow 24 hours for inspection of mock-up before proceeding with work.

.4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.4 Delivery, Storage and Handling

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

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

.2 Store and protect precast concrete units from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2- PRODUCTS

2.1 Concrete Pavers

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

.2 Deliver, store and handle materials in accordance with Section 01 61 00 - with Deliver, store and handle materials in accordance with Section 01 61 00 - with Deliver, store and handle materials in accordance with Section 01 61 00 - with For mechanically installed concrete pavers, laying panels should be supplied with spacer bars on each unit. Bars ensure correct joint width between pavers. Spacer bars also help prevent contact of the edges with adjacent pavers and subsequent chipping.

.3 Concrete pavers: to CSA A23.1/A23.2 and as follows:

.1 350mm x 546mm x 60mm ‘Umbriano’ by Unilock unit paver in Winter Marvel colour.

.2 360mm x 360mm x 60mm ‘Umbriano’ by Unilock unit paver in Winter Marvel colour.

.3 180mm x 360mm x 60mm ‘Umbriano’ by Unilock unit paver in Winter Marvel colour

.4 Standard end, corner, border units as required.

.4 Manufactured in moulds, with spacers, suitable for installation and delivered on site in cubes of laying panels.

.5 Pigment in concrete pavers: to ASTM C979/C979M. Select sand for bedding and joint material, in accordance with local quality and availability.

2.2 Bedding and Joint Material

.1 Use the following for bedding sand in areas subject to heavy vehicular traffic such as main urban thoroughfares, exposed to more than 1.5 million 80 kN equivalent axles over the pavement life, and in port, industrial and airport applications.

.2 Determine bedding sand hardness as follows:

.1 Randomly select single 1.4 kg sample from sand source.

.2 Dry sample for 24 hours at 115 degrees C to 121 degrees C.

.3 Obtain 3 sub-samples each weighing 0.2 kg by passing original sample several times through riffle box.

.4 Carry out seive analysis test on each sub-sample in accordance with CSA A23.1/A23.2.

.3 Remix each sub-sample and place in nominal litre capacity porcelain jar with two (2) 25 mm diameter steel ball bearings weighing 75 +/-5 g each. Rotate each jar at 50 rpm for six 6 hours. Repeat sieve analysis. Record individual and average sieve analysis.

.4 For each sample tested, maximum increase in percentages passing each sieve and maximum individual percent passing is in accordance with table as follows:

Sieve Size	Maximum Increase	Maximum Passing
0.075 mm	2%	2%
0.150 mm	5%	15%
0.300 mm	5%	35%

.5 Bedding and joint sand: clean, non-plastic, free from deleterious or foreign matter, natural or manufactured from crushed rock or gravel. Do not use limestone screenings or stone dust.

.6 Joint sand shall be Polymeric sand.

.7 Gradation: to CSA A23.1/A23.2, Table 4 - Grading Limits for Fine Aggregate, and CAN/CSA-A179 as follows:

Sieve Designation	% Passing for Bedding Sand	Joint Sand
10 mm	[100]	
5 mm	[95-100]	[100]
2.5 mm	[80-100]	[95-100]
1.25 mm	[50-90]	[60-100]
630 microns	[25-65]	
600 microns	[35-80]	
315 microns	[10-35]	
300 microns	[15-20]	
160 microns	[2-10]	
150 microns	[2-15]	

2.3 Edge Restraints

.1 For structural curbs, use 2.3.1. For restraining curb, select 2.3.2 or 2.3.3.

.2 Edge restraints shall be as noted on plans and details.

.3 Consult Interlocking Concrete Pavement Institute Tech Spec 3 - Edge Restraints for Interlocking Concrete Pavement, for guidance to select appropriate restraint type.

.4 Structural curbs: See Site Civil drawings details and specifications.

2.4 Cleaning Compound

.1 Manufacturers may void warranty on precast concrete pavers if cleaning compounds are used. Consult Interlocking Concrete Pavement Institute Tech Spec 5 - Cleaning and Sealing Interlock Concrete Pavement: A Maintenance Protection Guide.

.2 Clear, organic solvent, designed and recommended by manufacturer for cleaning concrete pavers of contamination encountered.

.3 Acid based chemical detergent, designed and recommended by manufacturer for removal of contamination encountered on pavers.

PART 3- EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for precast concrete unit paving installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Consultant.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 Structural Surface

.1 Ensure that structural surface preparation is specified to provide surface for installation of pavers.

.2 Verify that structural surfaces conform to levels and compaction required for installation of unit pavers. If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

.3 Verify that top of structural surface (top of base) does not exceed plus or minus 10 mm of grade over 3 m straightedge.

.4 Ensure that structural surface is not frozen or standing water is present during installation.

3.3 Structural Curbs

.1 Verify that structural curbs conform to elevations and alignments required for installation of unit pavers. If discrepancies occur, notify Consultant and do not commence work until instructed by Consultant.

3.4 Installation of Edge Restraints

.2 Install restraints true to grade, in accordance with manufacturer's recommendations.

3.5 Placing of Bedding Material

.1 Ensure bedding material is not saturated or frozen at all times until installation is complete.

.2 Spread and screed material on structural surface to achieve 25 mm compacted thickness after vibrating pavers in place. Do not use joint sand for bedding sand.

.3 Do not disturb screeded material. Do not use bedding material to fill depressions in structural surface.

3.6 Installation of Concrete Pavers

.1 Generally, the space between pavers should be between 2 to 5 mm wide.

.2 Lay pavers to patterns indicated. Joints between pavers: as recommended by manufacturer.

.3 Use appropriate end, edge and corner stones. Saw cut pavers to fit around obstructions and at abutting structures.

.4 Installation by mechanical equipment:

- .1 Prepare installation sequence and obtain approval of sequence by Consultant.
- .2 Place paver pallets and other materials without exceeding load bearing capacity, or otherwise detrimentally affecting installations.
- .3 Run equipment approved for installation only on paving surfaces vibrated in place.
- .4 Complete installation after placing each 100 square metres or after placing each 5 m width of installation.
- .5 Inspect pavers and remove chipped, broken or otherwise damaged pavers if structural performance or aesthetics is adversely compromised as directed by Consultant.
- .6 Replace pavers removed without altering layout and structural quality.

.5 Use a low amplitude, high frequency plate compactor capable of at least 22 kN centrifugal compaction force to vibrate pavers into bedding sand.

.6 Inspect, remove, and replace chipped, broken and damaged pavers.

.7 Sweep dry joint sand material into joints.

.8 Settle sand by vibrating pavers with plate compactor.

.9 Continue application of joint material and vibrating of pavers until joints are full. Do not vibrate within 1 m of unrestrained edges of pavers.

.10 Complete installation to within 1 m of laying face, with sand-filled joints, at completion of each work day.

.11 Sweep off excess joint material when installation is complete.

.12 Proof roll street pavements with at least two passes of a 10 T rubber-tired roller.

.13 Final surface elevations not to exceed plus or minus 10 mm under 3 m long straightedge.

.14 Surface elevation of pavers: 3 to 4 mm above adjacent drainage inlets, concrete collars or channels.

.15 Ensure conformance of final elevations.

3.7 Precast Concrete Unit Cleaning

.1 Cleaning is requirement prior to sealing.

.2 Carry out cleaning at times and conditions recommended by manufacturer of cleaning compound and as directed by Consultant.

.3 Remove and dispose of loose, extraneous materials from surfaces to be cleaned.

.4 Apply cleaning compounds appropriate for removal of various contaminants encountered in accordance with manufacturer's recommendations.

.5 Final surface to be free of contamination.

3.8 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 00 – Cleaning and Waste Management.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning and Waste Management.

END OF SECTION

CURTAIN WALL / WINDOW TYPES

SFT- STOREFRONT ASSEMBLY

SFT STOREFRONT ASSEMBLY - HEAD & JAMB MULLION

SFT STOREFRONT ASSEMBLY - MID MULLION

SFT STOREFRONT ASSEMBLY - CORNER MULLION

XCW : EXISTING CURTAIN WALL ASSEMBLY - 133mm BACK SECTION (SITE VERIFY)
- 65 mm WIDE x 133 mm DEEP INTERIOR FRAME
- 25mm PRESSURE CAP HORIZONTAL MULLION
- 25mm PRESSURE CAP VERTICAL MULLION

STOREFRONT / CW / WINDOW GLASS PANEL TYPES

REFER TO BUILDING ELEVATIONS SHEETS FOR LOCATIONS

VGL1 - VISION GLASS, CLEAR (EXTERIOR STORE FRONT) **(INSULATED GLASS UNIT)**
- 8mm CLEAR GLASS WITH CERAMIC FRIT -HEAT-STRENGTHENED- BIRD FRINDLY ON SURFACE LOW E COATING ON SURFACE 2
- 13mm AIR CAVITY WITH ARGON FILL
- 8mm CLEAR GLASS EXTERIOR LITE, HEAT-STRENGTHENED

VGL2 - VISION GLASS, CLEAR (EXTERIOR DOORS) **(INSULATED GLASS UNIT)**
- 6mm EXTERIOR LITE, HEAT-STRENGTHENED, LOW E-COATING ON SURFACE 2
- 13mm AIR CAVITY WITH ARGON FILL
- 6mm CLEAR HEAT-STRENGTHENED (HS) INTERIOR LITE

VGL3 - COMBINED IGU (WITH 120MIN FRR)
INNER IGU: 123MIN FIRE RESISTIVE GLAZING, LOW E-COATING
OUTTER IGU: REFER TO GL3

SPL - ALUMINUM METAL SPANDREL
PREFINISHED ALUMINUM PANEL
25mm AIR GAP
FILL CAVITY WITH SPANDREL INSULATION - MIN. 100mm
GALVANIZED METAL (UNLESS NOTED OTHERWISE)

VG - SPANDREL PANEL GLASS
INSULATED GLASS - VISION UNIT

"X" PREFIX DENOTES EXISTING

CLADDING TYPES

CP1	CERAMIC PANEL CLADDING - COLOUR 1
CP2	CERAMIC PANEL CLADDING - COLOUR 2
MP1	METAL PANEL, FLAT, COLOUR 1
AL1	ALUMINUM PANELS COLOUR 1
PC1	PRECAST CONCRETE

INTERIOR GLAZING TYPES

GL1-	NOT USED
GL2-	TEMPERED LAMINATED GLASS
GL3-	FIRE RESISTIVE RATED, IMPACT SAFETY RESISTANT, HEAT BARRIER GLASS
GL4-	ACID ETCHED TEMPERED GLASS
GL5-	INTEGRATED BLINDS GLAZING, GLSM MOTORIZED
GL6-	INTEGRATED BLINDS FIRE FIRE PROTECTION RATED (PYROSTOP 45 MIN GLAZING)
GL7-	LOW-IRON TEMPERED AND LAMINATED GLASS WITH DIGITALLY PRINTED IMAGE (DIGITAL FRIT TECHNIQUE)
GL8-	LOW-IRON TEMPERED AND LAMINATED
GL9-	NOT USED
GL10-	NOT USED
GL11-	ONE-WAY MIRRORED GLASS
GL12-	CERAMIC FRIT GLASS
GL13-	NOT USED
GL 14- BPIGL1	POLYCARBONATE PLASTIC BACK-PAINTED LOW-IRON GLASS

LAYER LINE STYLES

- A/V BARRIER & SILICON MEMBRANE
- BELOW GRADE VAPOUR BARRIER MEMBRANE
- ROOFING/ WATERPROOFING MEMBRANE

HATCH PATTERNS

CONCRETE
CONCRETE MASONRY UNIT
MASONRY - VENEER
STONE
GRANULAR
SAND
EARTH
WOOD
PLYWOOD
STEEL
GYPSUM
GLAZING
RIVER STONE
DRAINAGE BOARD
MILLWORK

INSULATION TYPES & PATTERNS

INSUL-1, INSUL-7
SEMI-RIGID INSULATION BOARD

INSUL-2, INSUL-6
RIGID INSULATION BOARD

INSUL-3
HIGH DENSITY EPS INSULATION BOARD

INSUL-4
SEMI-RIGID INSULATION BOARD

INSUL-5
FOAMED-IN-PLACE FILLER INSULATION

INSUL-8
BATT INSULATION, UNFACED MINERAL FIBRE BATTS

EXTERIOR WALL TYPES

GRAPHIC	ASSEMBLY	NOTES
	EW-MP-CMU: EXTERIOR WALL - ROLL-FORMED STEEL PANELS ON CMU • 38mm ROLL-FORMED METAL PANELS • 22mm AIR SPACE • 150mm R25 INSULATION SEMIRIGID (**INSUL-1**), SUBFRAMING ON THERMALLY BROKEN CLIPS • CONT. SELF ADHERING AIR/VAPOUR BARRIER • 190mm CMU, REFER TO STRUCT.	REFER TO ELEVATIONS AND SPECIFICATION FOR CORRUGATED STEEL FINISH
INTERIOR EXTERIOR	**EW-CP-ST**: WALL - CERAMIC PANELS ON STUD BACKING • 30mm CERAMIC PANELS • 25mm AIR SPACE • 150mm R25 INSULATION SEMIRIGID (**INSUL-1**), SUBFRAMING ON THERMALLY BROKEN CLIPS • CONT. SELF ADHERING AIR/VAPOUR BARRIE • 16mm EXTERIOR SHEATHING BOARD • 152mm COLD FORMED ENGINEERED STUDS @ 400mm O.C. • INTERIOR FINISH - 16mm ABUSE RESISTANT GYPSUM BOARD	REFER TO ELEVATIONS AND SPECIFICATION FOR CERAMIC FINISH
INTERIOR EXTERIOR	**EW-MP-ST**: WALL - ROLL-FORMED STEEL PANELS ON BACKING • 38mm ROLL-FORMED METAL PANELS • 22mm AIR SPACE • 150mm R22 INSULATION SEMIRIGID (**INSUL-1**), SUBFRAMING ON THERMALLY BROKEN CLIPS • CONT. SELF ADHERING AIR/VAPOUR BARRIE • 16mm EXTERIOR SHEATHING BOARD • 152mm COLD FORMED ENGINEERED STUDS @ 400mm O.C. • INTERIOR FINISH - 16mm ABUSE RESISTANT GYPSUM BOARD	REFER TO ELEVATIONS AND SPECIFICATION FOR CORRUGATED STEEL FINISH
INTERIOR EXTERIOR	**EW-BR-CMU**: EXTERIOR WALL - BRICK ON CMU • BRICK • 25mm AIR SPACE • CONT. SELF ADHERING AIR/VAPOUR BARRIER • 190mm CMU, REFER TO STRUCT.	
INTERIOR EXTERIOR	**EW-PC-CONC**: WALL-PRECAST CONCRETE BASE • 100mm PRECAST CONCRETE PANEL • 25 AIR SPACE • THERMALLY ISOLATED STAINLESS STEEL DOWEL AND ANCHOR SPACING TO SUPPORT CLADDING • 100mm RIGID INSULATION (**INSUL-2**) (XPS) (2 LAYERS) • WATERPROOFING MEMBRANE • CAST IN PLACE CONCRETE - REFER TO STRUCTURAL	ABOVE GRADE
INTERIOR EXTERIOR	**FW1-CONC**: WALL • SHEET DRAINAGE BOARD WITH FILTER CLOTH • 75mm RIGID INSULATION (**INSUL-2**) • 3 mm PROTECTION BOARDS • WATERPROOFING MEMBRANE • CONCRETE FOUNDATION WALL REFER TO STRUCTURAL DRAWINGS	BASEMENT WALL

ROOF TYPES

EXTERIOR MIN 2 % SLOPE TO DRAIN INTERIOR	**R1**: STEEL DECK ROOF W/ TAPERED INSULATION - STONE TOPPING • 50mm STONE BALLAST • DIFFUSION MEMBRANE • INSULATION 150mm (6") MIN. R-35 (**INSUL-6**) • DRAINAGE BOARD • 2 PLY MODIFIED BITUMINOUS MEMBRANE ROOFING • 3.2mm COVER BOARD • TAPERED INSULATION • VAPOUR BARRIER MEMBRANE • 16mm EXTERIOR GRADE SHEATHING BOARD • STEEL DECK (REFER TO STRUCTURE)	

SLAB ON GRADE

	SOG: SLAB ON GRADE • CONCRETE SLAB ON GRADE (SOG), REFER TO STRUCTURE • BELOW GRADE VAPOUR BARRIER MEMBRANE, MIN. 15 mils • 100mm RIGID INSULATION, HIGH DENSITY-XPS (1200mm FROM INNER EDGE OF CONC. CURB) • 150mm DRAINAGE LAYER CONSISTING OF 20mm COMPACTED CLEAR STONE • GEOTEXTILE FILTER CLOTH	

EXTERIOR SOFFIT TYPES

	SF-1: METAL PANELS SOFFIT • STRUCTURAL DECK AND FRAMING • 92 STRUCTURAL STEEL STUD FRAMING @ 400 O/C • HAT CHANNEL FRAMING @ 400 O/C • 32mm ALUMINUM PANEL WITH VENT	NEW ENTRANCE CANOPY

REFERENCE SYMBOLS LEGEND

DETAIL CALL-OUT

DETAIL NUMBER
SHEET ON WHICH DETAIL IS SHOWN

EXTERIOR ELEVATION
ELEVATION NUMBER
SHEET ON WHICH ELEVATION IS SHOWN

INTERIOR ELEVATION
ELEVATION NUMBER
SHEET ON WHICH ELEVATION IS SHOWN

BUILDING SECTIONS
SECTION NUMBER
SHEET ON WHICH SECTION IS SHOWN

WALL SECTIONS
SECTION NUMBER
SHEET ON WHICH SECTION IS SHOWN

WALL DETAIL SECTION
SECTION NUMBER
SHEET ON WHICH SECTION IS SHOWN

FLOOR OR ROOF LEVEL NAME
VERTICAL ELEVATION
CEILING TYPE
CEILING HEIGHT (AFF)
DOOR OPENING NUMBER
GLAZED SCREEN NUMBER
GENERAL SHEET NOTE
NORTH ARROW
DRAWING REVISION
ROOM TAG
ROOM NAME
PROGRAM NUMBER
ROOM NUMBER
ROOM AREA
PROGRAM AREA
WINDOW TAG
WINDOW TYPE
PROGRAM AREA
EXTERIOR WALL TAG
PARTITION / FURRING TYPE
GLAZING TYPE
FRIT / SHADING TREATMENT

INTERIOR PARTITION LEGEND

GYPSUM FURRING TYPES

FURRING TYPE	
F0	15mm GYPSUM BOARD LAMINATED TO SUBSTRATE TO 152mm ABOVE HIGHEST ADJACENT FINISHED CEILING
FB1	16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 22mm METAL FURRING 406mm ON CENTRE FACE OF SUBSTRATE
FD1 **FD1S**	16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 41mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"
FE1 **FE1S**	16mm GYPSUM BOARD TO TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 64mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"
FF1 **FF1S**	16mm GYPSUM BOARD TO TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 92mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"
FF2 **FF2S**	2 LAYERS OF16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 92mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"
FG1 **FG1S**	16mm GYPSUM BOARD TO TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 92mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"
FG2 **FG2S**	2 LAYERS OF16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE 152mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE / FURRING TYPE LEGEND

PG4S-F60
- FIRE RESISTANCE RATING (ex - 60 min.)
- BATT ACOUSTIC INSULATION
- LAYER OF GYPSUM BOARD (ex - 4 LAYERS)
- SIZE OF METAL STUD (ex - 152mm METAL STUD)
- PARTITION TYPE (P DENOTE PARTITION TYPE, F DENOTE FURRING TYPE)

STUD SIZES

D: 41 mm
E: 64 mm
F: 92 mm
G: 152 mm
H: 203 mm
J: 152+41 mm
M: 64 mm C-H STUD

GYPSUM PARTITION TYPES

PARTITION TYPE	FIRE RESISTANCE	STC
PF2 PF2S	N/A	N/A 45
PF2-F00 PF2S-F00	SMOKE SEPARATION	N/A 45
PF2-F60 PF2S-F60	**60 minutes,** ULC No: W407	N/A 45

16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
92mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PF3 PF3S	N/A	N/A 45
PF3-F00 PF3S-F00	SMOKE SEPARATION	N/A 50

2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
92mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PF4 PF4S	N/A	N/A 50
PF4-F00 PF4S-F00	SMOKE SEPARATION	N/A 50
PF4-F60 PF4S-F60	**60 minutes,** ULC No: W415	N/A 50
PF4-F90 PF4S-F90	**90 minutes, ULI No:** U413	N/A 50
PF4-F120 PF4S-F120	**120 minutes,** ULC No: W453	N/A 50

2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
92mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PG2 PG2S	N/A	N/A 50
PG2-F00 PG2S-F00	SMOKE SEPARATION	N/A 50

16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
152mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PG3 PG3S	N/A	N/A 50
PG3S-F00	SMOKE SEPARATION	N/A

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2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
152mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PG4 PG4S	N/A	N/A 50
PG4-F60 PG4S-F60	**60 minutes,** ULC No: W415	N/A 50
PG4-F120 PG4S-F120	**120 minutes,** ULC No: W415	

2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
152mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PH4 PH4S	N/A	N/A 50
PH4 PH4S	N/A	N/A 50

2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
203mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PJ4 PJ4S	N/A	N/A 50

2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
152mm METAL STUDS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
41mm HORIZONTAL METAL FURRING CHANNELS 406mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
INSULATION WHERE TYPE INCLUDES THE SUFFIX "S"

PARTITION TYPE	FIRE RESISTANCE	STC
PM3	N/A	N/A
PM3-F00	SMOKE SEPARATION	N/A
PM3-F60	**60 minutes,** ULC No: W452	39
PM3-F120	**120 minutes,** ULC No: W452	38

13

2 LAYERS OF 16mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
25mm GYPSUM BOARD TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE
64mm C-H STUDS 610mm ON CENTRE TO UNDERSIDE OF CONCRETE SLAB / STEEL DECK ABOVE

TYPE	WIDTH	FIRE RESISTANCE	STC RATING	PROPERTIES	CONFIG.
CMU-190	190mm	N/A	50	NORMAL WEIGHT	HOLLOW
CMU-190-F90		1.5 HR	50	NORMAL WEIGHT	HOLLOW
CMU-190-F120		2 HR	46	LIGHT WEIGHT	HOLLOW

U/S OF SLAB, DECK OR STRUCTURE
NON HARDENING SOUND SEALANT
190mm CMU PARTITION NON LOAD BEARING
TOP OF SLAB

SUFFIX LEGEND:

- THE WORD "PARTITIONS" IN THIS LEGEND DENOTES PARTITIONS, FURRINGS AND CEILINGS AS APPLICABLE.

- "**A**" SUFFIX DENOTES THE SUBSTITUTION OF 16mm ABUSE-RESISTANT GYPSUM BOARD (STUD SIDE) AND 16mm IMPACT RESISTANCE GYPSUM BOARD (OUTER SIDE) IN LIEU OF THE GYPSUM BOARD SPECIFIED BY THE PARTITION TYPE.
- FOR PRTITIONS WITH SUFFIX "**AA**" SUBSTITUTE THE GYPSUM BOARD ON BOTH SIDES OF THE PARTITIONS.
- WHERE "**A**" OR "**AA**" DENOTED PROVIDE HEAVIER 18 GAUGE METAL STUDS AS SPECIFIED IN METAL SUPPORT ASSEMBLIES AT ALL PARTITIONS, WELD STUDS TO TRACKS.ENSURE REQUIRED STC RATING IS MAINTAINED. SPACE SUDTS AT 300mm O.C.
- MAINTAIN RATINGS FOR FIRE RATED PARTITION TYPES BY USING FIRE RATED ABUSE-RESISTANT AND IMPACT RESISTANCE GYPSUM BOARD.
- "S" SUFFIX DENOTES ACOUSTIC INSULATION FOR THE FULL HEIGHT OF THE PARTITION.

NOTES:

THE WORD "PARTITIONS" IN THIS LEGEND DENOTES PARTITIONS, FURRINGS AND CEILINGS AS APPLICABLE.

1. WHERE NUMBER OF GYPSUM BOARDS ARE NOT THE SAME ON EITHER SIDE OF STUD IN A PARTITION ASSEMBLY, THE SIDE WITH WALL TAG IS WITH GREATER NUMBER OF GYPSUM BOARDS.

2. ALL ACOUSTIC WALLS (DENOTED WITH SUFFIX "S")SHOULD BE SLAB TO SLAB CONSTRUCTION AND ALL PARTITION JOINTS SHOULD BE SEALED WITH NON-HARDENING ACOUSTICAL SEALANT. ALL PENETRATIONS THROUGH ACOUSTIC WALLS SHOULD BE SLEEVED AND SEALED.

3. FOR WASHROOMS, SHOWERS, HOUSEKEEPING CLOSETS (ROOMS), SOILED ROOMS WITH WALL PROTECTION AND ALL WET AREAS, SUBSTITUTE 16mm MOISTURE RESISTANT GYPSUM BOARD FOR THE GYPSUM BOARD LAYERS SPECIFIED BY THE PARTITION TYPE. ENSURE MOISTURE RESISTANT TYPE X GYPSUM BOARD IS PROVIDED WHERE REQUIRED.

4. WHERE PARTITIONS TYPES ARE INDICATED WITH FIRE RESISTANCE RATING, SUBSTITUTE GYPSUM BOARD(S) WITH TYPE "X" GYPSUM BOARD(S) AS REQUIRED TO COMPLY WITH ULC DESIGN.

5. PROVIDE BACKING AND REQUIRED REINFORCING FOR SIGN TYPES LISTED ON SIGNAGE SET OF DRAWINGS.

SYMBOLS

CR CARDREADER
PP PUSH PLATE
IC INTERCOM
CLOCK (CLOCK ELAPSED, CENTRAL, START- STOP)
ELECTRICAL DEVICE ZONE FOR REFERENCE ONLY
FIRE HOSE CABINET
FD FLOOR DRAIN
RD ROOF DRAIN
CG CORNER GUARDS
WP WALL PROTECTION

ELECTRICAL SYMBOLS - CEILING MOUNTED FIXTURES & EQUIPMENT

FEATURE LUMINAIRE
LED LUMINAIRE - NORMAL POWER
LED LUMINAIRE - EMERGENCY POWER
LED LUMINAIRE - EMERGENCY POWER
FLUORESCENT RECESSED
DOWNLIGHT RECESSED
SMOKE DETECTOR
FS FIRE ALARM SPEAKER
FS FIRE ALARM SPEAKER - STROBE
OCCUPANCY SENSORS
OCCUPANCY SENSOR
RC ROOM CONTROL - DIMMING
FIRE ALARM
WALL WASH DOWNLIGHT
EX EXIT SIGN WITH OR WITHOUT DIRECTIONAL ARROWS CEILING MOUNTED

MECHANICAL SYMBOLS- CEILING MOUNTED FIXTURES & EQUIPMENT

LINEAR SLOT DIFFUSER
SUPPLY DIFFUSER/GRILLE/REGISTER
RETURN GRILLE/REGISTER
EXHAUST GRILLE/REGISTER
INSTITUTIONAL SPRINKLER HEAD
UPRIGHT SPRINKLER HEAD
CONCEALED SPRINKLER HEAD
SUPPLY SIDEWALL GRILLE

CEILING TYPES

ACT-1	610 X 1220 MM STANDARD ACT
ACT-2	NOT USED.
ACT-3	610 X 1220 MM ACOUSTIC SECURITY CEILING
ACT-4	760 X 760 MM LARGE FORMAT ACOUSTIC CEILING TILE W/ 100MM WIDE TECHNICAL PANELS
ACT-5	610 X 1220 MM MOISTURE RESISTANT ACT
ACT-6	610 X 610 MM MOISTURE RESISTANT ACT
GB-1	GYPSUM BOARD CEILING
GB-2	GYPSUM BOARD CEILING - MOISTURE RESISTANT
GB-3	GYPSUM BOARD CEILING - IMPACT RESISTANT & MOISTURE RESISTANT
GB-4	GYPSUM BOARD CEILING - IMPACT RESISTANT
GB-5	FIRE RATED SMOKE SEALED GYPSUM BOARD CEILING
F-1	FEATURE CEILING
EXP	EXPOSED CEILING
CLG-WDLK	WOOD-LOOK CEILING PLANKS

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Notes

15	ISSUED FOR ADDENDUM No.2		2024.06.21
12	ISSUED FOR TENDER		2024.06.07
11	ISSUED FOR PRE-TENDER		2024.05.27
9	ISSUED FOR BUILDING PERMIT		2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION		2024.02.23
4	ISSUED FOR COSTING AND GGH REVIEW		2023.12.21
3	ISSUED FOR 60% CONSTRUCTION DOCUMENTS		2023.10.26
1	ISSUED FOR MOH STAGE 2.2 SUBMISSION		2023.06.09
2	ISSUED FOR DD COSTING AND CLIENT REVIEW		2023.03.29
Issued/Revision		By	Appd. YYYY.MM.DD

File Name: N/A | Author Dwn. | Designer Dsgn. | Checker Chkd. | 03/22/23 YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project
GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

Title
INTERIOR AND EXTERIOR ASSEMBLIES, SYMBOLS AND MATERIAL LEGENDS

Project No. 140022022 | Scale As indicated

Revision 15 | Drawing No. A001

- THE CONSTRUCTION SEQUENCING CHART AND PHASING DRAWINGS INDICATE A CONCEPTUAL CONSTRUCTION SEQUENCE AND THE RELATIONSHIP BETWEEN PHASES. THIS INFORMATION IS PROVIDED TO THE CONTRACTOR AS A BASIS OF INFORMATION FROM WHICH THE CONTRACTOR SHALL DEVELOP HIS DETAILED PHASING AND CONSTRUCTION SCHEDULE.

- THE PHASE SEQUENCE DOES NOT DESCRIBE THE CONSTRUCTION PROCESS IN ITS ENTIRETY OR DESCRIBE ALL CONSTRUCTION CONSEQUENCES OF THE PHASE SEQUENCE. IT REMAINS THE CONTRACTOR SOLE RESPONSIBILITY TO SCHEDULE ALL ASPECTS OF THE CONSTRUCTION WITHIN THE GENERAL REQUIREMENTS DESCRIBED HEREIN.

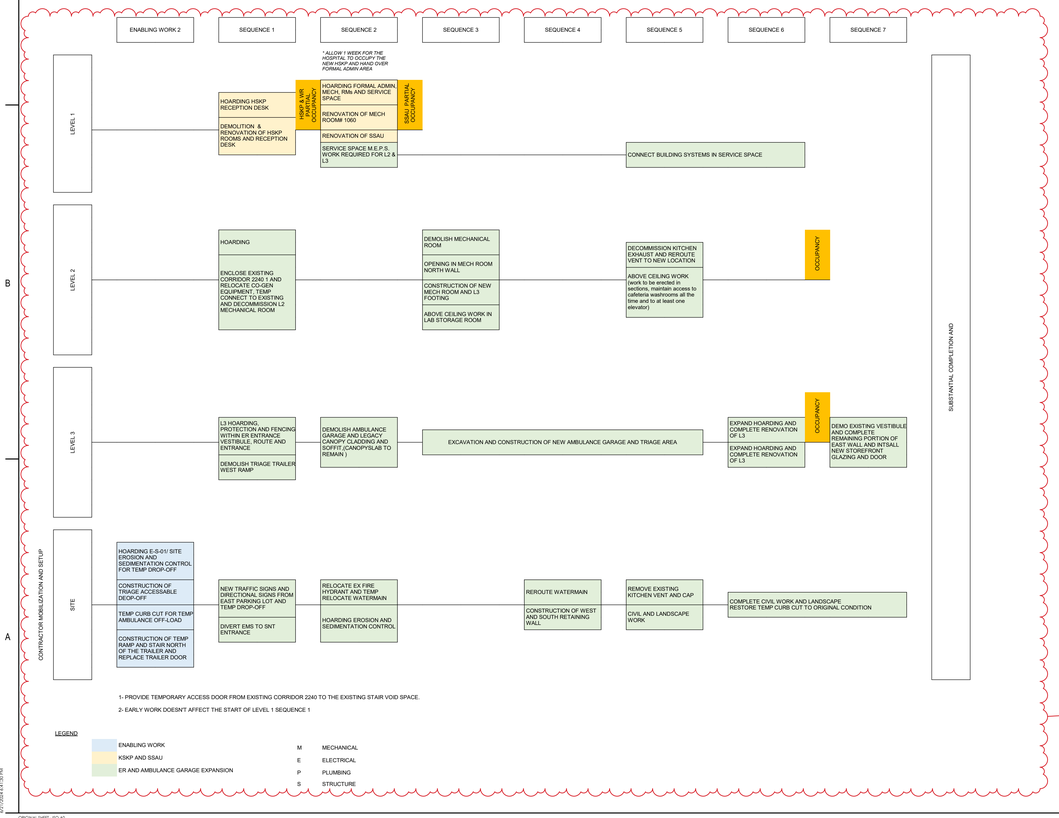
- ALL AREAS OF NEW CONSTRUCTION AND RENOVATIONS SHALL BE FULLY SEPARATED FROM OWNER OCCUPIED SPACES BY PERMANENT OR TEMPORARY PARTITIONS. PARTITIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS INDICATED IN CSA Z317.13-12 AND OWNER'S INFECTION CONTROL POLICY.

- PRIOR TO COMMENCEMENT OF WORK OF EACH PHASE, PROJECT CO SHALL PREPARE TEMPORARY EXITING PLAN, SUBMIT TO AND OBTAIN APPROVAL FROM LOCAL BUILDING DEPARTMENT. AT DISCRETION OF BUILDING DEPARTMENT OFFICIALS AND OWNER, SHARED EXITS MAY BE ACCEPTABLE.

-THE WORK FOR EACH PHASE MAY INCLUDE WORK OUTSIDE THE BOUNDARIES SHOWN ON THE PHASING DRAWINGS TO COMPLETE CONSTRUCTION AND ENSURE PROPER FUNCTIONING OF ALL BUILDING SYSTEMS FOR THAT AREA.

- AT THE END OF EVERY PHASE, THE CONTRACTOR MUST COMPLETE WORK IN ORDER THAT THE HOSPITAL FOR THAT AREA IS FULLY OPERATIONAL FOR INTENDED USE AND READY FOR THE HOSPITAL OCCUPANCY ACCEPTABLE TO THE OWNER, CONSULTANTS AND AUTHORITIES HAVING JURISDICTION BEFORE PROCEEDING WITH THE NEXT SEQUENCE OR PHASE. AT THE COMPLETION OF THE ENTIRE WORK, THE CONTRACTOR SHALL APPLY FOR SUBSTANTIAL COMPLETION OF THE ENTIRE PROJECT. THIS MAY INVOLVE ADDITIONAL WORK AND REBALANCING IN THE PREVIOUSLY COMPLETED PHASES.

- AT THE COMPLETION OF EACH PHASE AND EACH SEQUENCE WITH THE PHASE OF THE WORK, THE CONTRACTOR SHALL OBTAIN AN OCCUPANCY PERMIT IN ACCORDANCE WITH 2.4.3 - OCCUPANCY OF UNFINISHED BUILDING OF THE OBC. IN ADDITION TO THE LEVEL OF COMPLETION REQUIRED FOR THE OCCUPANCY PERMIT, THE LEVEL OF COMPLETION MUST BE SATISFACTORY TO THE OWNER FOR THE HOSPITAL OCCUPANCY, INCLUDING BUT NOT LIMITED TO COMPLETION OF CEILINGS, PAINTING, INSTALLATION OF THE CONTRACTOR INSTALLED EQUIPMENT, FLOOR FINISHES, CEILING FINISHES, TRIM, COVER PLATES AND ALL OTHER FINISHES AND COMPONENTS AND DEFICIENCIES INCLUDING COMMISSIONING OF SYSTEMS WHETHER TEMPORARY OR PERMANENT, FULLY FUNCTIONING AND TESTED MEDICAL GASES, ALL SAFETY INSPECTIONS, AIR BALANCING AND SERVICES. WORK MUST BE COMPLETED SO THAT THE OWNER CAN USE THE SPACE FOR THE INTENDED USE, INCLUDING PATIENT OCCUPANCY. DOCUMENTATION REQUIRED TO BE SUBMITTED UNDER THE CONTRACT, TOGETHER WITH WRITTEN PROOF, ACCEPTABLE TO THE OWNER AND THE CONSULTANT, THAT THE WORK HAS BEEN PERFORMED IN CONFORMANCE WITH THE REQUIREMENTS OF MUNICIPAL, GOVERNMENTAL AND UTILITY AUTHORITIES HAVING JURISDICTION. FOR FINAL PHASE OF WORK, FAILURE TO SUBMIT ALL OF THE FOREGOING MATERIALS AND DOCUMENTATION IN CONFORMANCE WITH THE CONTRACT DOCUMENTS SHALL BE GROUNDS FOR THE CONSULTANT TO REJECT THE CONTRACTOR APPLICATION FOR SUBSTANTIAL COMPLETION OF THE WORK.



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KEY PLAN

Notes

15	ISSUED FOR ADDENDUM No.2		2024.06.21
13	ISSUED FOR TENDER		2024.06.07
9	ISSUED FOR BUILDING PERMIT		2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION		2024.02.23
4	ISSUED FOR COSTING AND DGH REVIEW		2023.12.21
No.	Issued/Revision	By	Appd YYYY.MM.DD

File Name: N/A | Author Dwn. | Designer Dsgn. | Checker Chkd. | 12/14/23 YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project

GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

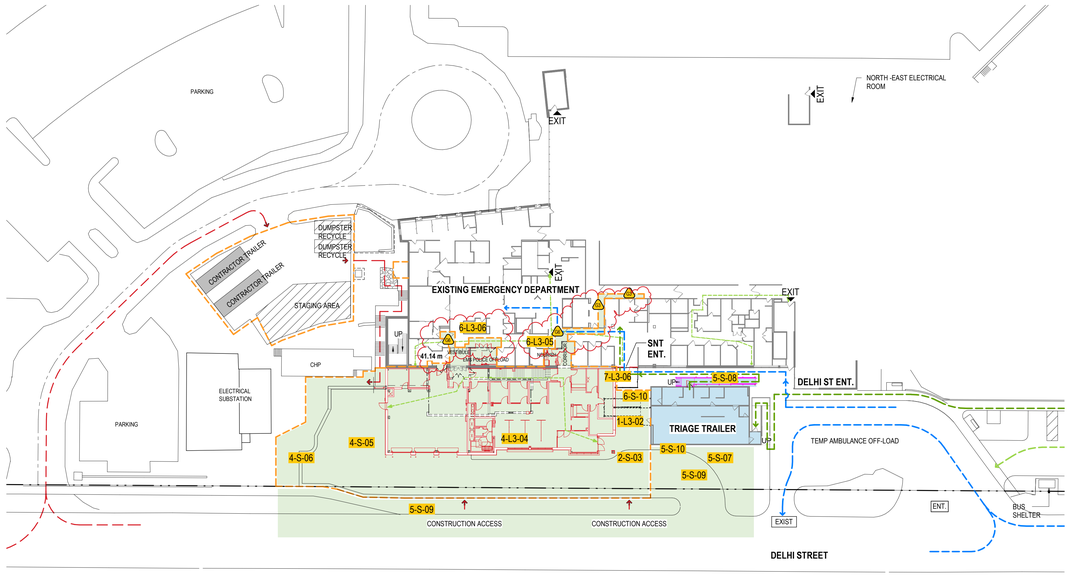
115 DELHI STREET, GUELPH ON N1E 4J4

Title

PHASE 1- SEQUENCING DIAGRAM

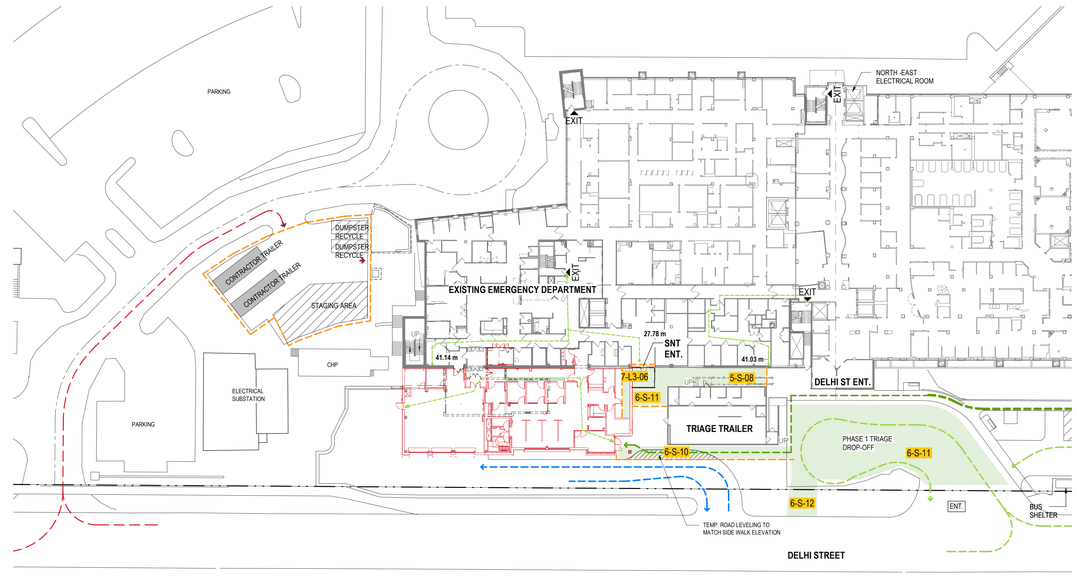
Project No. 140022022 | Scale

Revision 15 | Drawing No. PH010



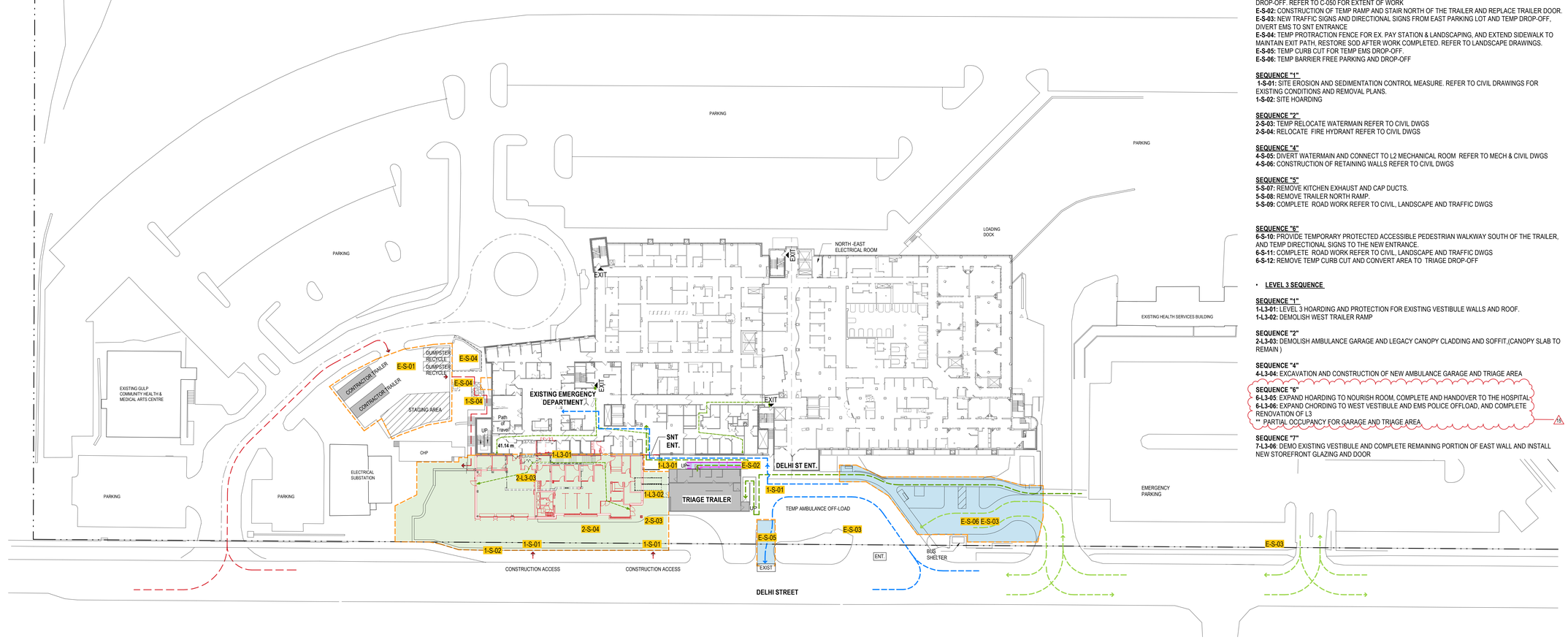
2 PHASE 1 - SITE AND LEVEL 3 SEQUENCE 4&5

PH100 1 : 400



3 PHASE 1 - SITE AND LEVEL 3 SEQUENCE 6&7

PH100 1 : 400



1 PHASE 1 - SITE AND LEVEL 3 ENABLING WORK, SEQUENCE 1&2

PH100 1 : 400

NOTES:

G1- OFF-HOURS MATERIAL AND WASTE ACCESS. ALL TOOLS AND EQUIPMENT MUST BE THOROUGHLY CLEANED AND DUST-FREE BEFORE TRANSPORTING THROUGH THE HOSPITAL
G2- OFF-HOURS WORK
G3- TEMP HOARDING TO BE CONSTRUCTED IN SECTIONS AND REMOVED AS REQUIRED BY GC.
G4- ROUTE FOR DELIVERY OF NEW AHU
G6: REMOVABLE PLOY HOARDING, TO BE REMOVED AT THE END OF DAILY CONSTRUCTION WORK. COVER UNFINISHED WORK AND CLEAN THE WORK AREA.

SITE SEQUENCE

ENABLING WORK
E-S-01: MOBILIZATION, SITE SETUP, HOARDING, SITE EROSION AND SEDIMENTATION CONTROL FOR TEMP DROP-OFF. REFER TO C-050 FOR EXTENT OF WORK
E-S-02: CONSTRUCTION OF TEMP RAMP AND STAIR NORTH OF THE TRAILER AND REPLACE TRAILER DOOR.
E-S-03: NEW TRAFFIC SIGNS AND DIRECTIONAL SIGNS FROM EAST PARKING LOT AND TEMP DROP-OFF, DIVERT EMS TO SNT ENTRANCE
E-S-04: TEMP PROTRACTION FENCE FOR EX. PAY STATION & LANDSCAPING, AND EXTEND SIDEWALK TO MAINTAIN EXIT PATH, RESTORE SOD AFTER WORK COMPLETED. REFER TO LANDSCAPE DRAWINGS.
E-S-05: TEMP CURB CUT FOR TEMP EMS DROP-OFF.
E-S-06: TEMP BARRIER FREE PARKING AND DROP-OFF

SEQUENCE "1"
1-S-01: SITE EROSION AND SEDIMENTATION CONTROL MEASURE. REFER TO CIVIL DRAWINGS FOR EXISTING CONDITIONS AND REMOVAL PLANS.
1-S-02: SITE HOARDING

SEQUENCE "2"
2-S-03: TEMP RELOCATE WATERMAIN REFER TO CIVIL DWGS
2-S-04: RELOCATE FIRE HYDRANT REFER TO CIVIL DWGS

SEQUENCE "4"
4-S-05: DIVERT WATERMAIN AND CONNECT TO L2 MECHANICAL ROOM REFER TO MECH & CIVIL DWGS
4-S-06: CONSTRUCTION OF RETAINING WALLS REFER TO CIVIL DWGS

SEQUENCE "5"
5-S-07: REMOVE KITCHEN EXHAUST AND CAP DUCTS.
5-S-08: REMOVE TRAILER NORTH RAMP.
5-S-09: COMPLETE ROAD WORK REFER TO CIVIL, LANDSCAPE AND TRAFFIC DWGS

SEQUENCE "6"
6-S-10: PROVIDE TEMPORARY PROTECTED ACCESSIBLE PEDESTRIAN WALKWAY SOUTH OF THE TRAILER, AND TEMP DIRECTIONAL SIGNS TO THE NEW ENTRANCE.
6-S-11: COMPLETE ROAD WORK REFER TO CIVIL, LANDSCAPE AND TRAFFIC DWGS
6-S-12: REMOVE TEMP CURB CUT AND CONVERT AREA TO TRIAGE DROP-OFF

- **LEVEL 3 SEQUENCE**

SEQUENCE "1"
1-L3-01: LEVEL 3 HOARDING AND PROTECTION FOR EXISTING VESTIBULE WALLS AND ROOF.
1-L3-02: DEMOLISH WEST TRAILER RAMP

SEQUENCE "2"
2-L3-03: DEMOLISH AMBULANCE GARAGE AND LEGACY CANOPY CLADDING AND SOFFIT,(CANOPY SLAB TO REMAIN)

SEQUENCE "4"
4-L3-04: EXCAVATION AND CONSTRUCTION OF NEW AMBULANCE GARAGE AND TRIAGE AREA

SEQUENCE "6"
6-L3-05: EXPAND HOARDING TO NOURISH ROOM, COMPLETE AND HANDOVER TO THE HOSPITAL
6-L3-06: EXPAND CHORDING TO WEST VESTIBULE AND EMS POLICE OFFLOAD, AND COMPLETE RENOVATION OF L3
** PARTIAL OCCUPANCY FOR GARAGE AND TRIAGE AREA

SEQUENCE "7"
7-L3-06: DEMO EXISTING VESTIBULE AND COMPLETE REMAINING PORTION OF EAST WALL AND INSTALL NEW STOREFRONT GLAZING AND DOOR

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KEY PLAN

N

PHASING LEGEND

EXISTING
NEW
TEMPORARY

Notes

CONSTRUCTION HOARDING
PEDESTRIAN / PATIENT TRAFFIC
PUBLIC TRAFFIC
EMS TRAFFIC
CONSTRUCTION TRAFFIC
CONSTRUCTION AREA
CONSTRUCTION HOARDING VESTIBULE

1-L1-05
UNIQUE #
LOCATION
S: SITE, L1: LEVEL 1, L2: LEVEL 2, L3: LEVEL 3
SEQUENCE # (E: ENABLING WORK)

PHASING GENERAL NOTES:

1. PHASING DIAGRAMS INDICATED ARE FOR REFERENCE PURPOSES ONLY AND MAY NOT INCLUDE THE FULL EXTENT OF THE PHASING AND DEMOLITION SCOPE OF WORK.

2. REFER TO SPECIFICATION FOR CONSTRUCTION RELATED HEALTHCARE FACILITY PROCEDURE AND CONSTRUCTION PROGRESS DOCUMENTATION.

3. COORDINATE EXTENT AND LOCATION OF PHASING AND DEMOLITION WITH DOCUMENTS BY OTHER DISCIPLINES PRIOR TO COMMENCING ANY WORK.

4. HOARDING SHOWN SCHEMATIC, CG TO HOARD AREAS AS REQUIRED TO ENSURE SAFETY AND PRIVACY OF THE HOSPITAL STAFF AND VISITORS.

5. ALL NOISY WORK AND WORK CAUSING VIBRATION TO BE PERFORMED OUTSIDE OF NORMAL OPERATING HOURS UNLESS OTHERWISE INDICATED.

6. MECHANICAL AND ELECTRICAL COORDINATION
PRIOR TO THE COMMENCEMENT OF ANY WORK, CONTRACTOR TO INFORM HOSPITAL OF MECHANICAL AND ELECTRICAL SHUTDOWNS REQUIRED TO COMPLETE WORK. GENERAL CONTRACTOR TO ENSURE INTEGRITY OF EXISTING FIRE RATED GYPSUM BOARD ENCLOSURE OF EXISTING DUCTWORK IN CEILING SPACE. GENERAL CONTRACTOR TO COORDINATE DEMOLITION OF CEILINGS AND REDUNDANT MECHANICAL SERVICES WITH EXISTING SERVICES TO REMAIN. PROVIDE IMMEDIATE PROTECTION OF OPENINGS IN FIRE RATED ENCLOSURE DUE TO PROTECT ACCESS OF FIRE TO FLOOR LEVEL ABOVE

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4	ISSUED FOR COSTING AND DGH REVIEW			2023.12.21
Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	11/28/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

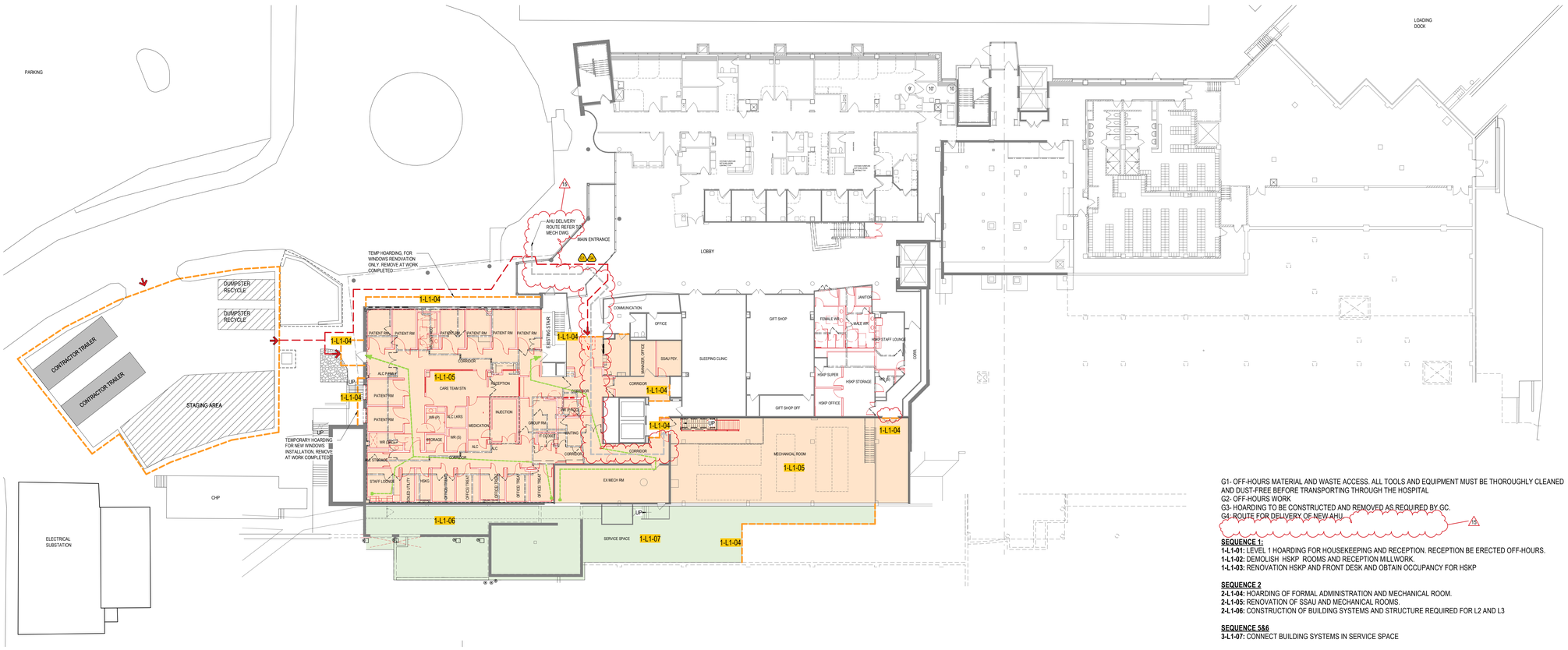
Client/Project
GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

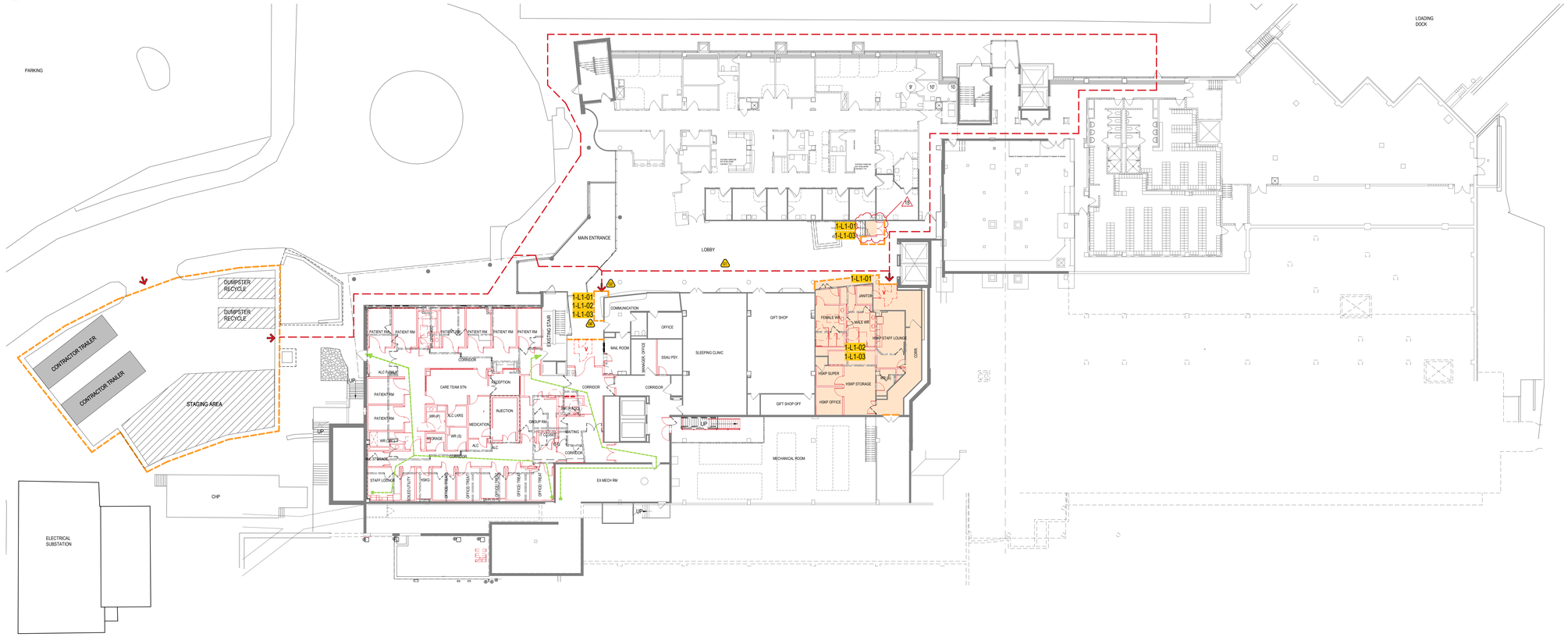
Title
PHASE 1- SITE & LEVEL 3 CONSTRUCTION SEQUENCING

Project No.	Scale
140022022	As indicated
Revision	Drawing No.
15	PH100



2 PH101 PHASE 1- LEVEL 1 - SEQUENCE 2, 5&6

1 : 200



1 PH101 PHASE 1- LEVEL 1 - SEQUENCE 1

1 : 200

G1- OFF-HOURS MATERIAL AND WASTE ACCESS. ALL TOOLS AND EQUIPMENT MUST BE THOROUGHLY CLEANED AND DUST-FREE BEFORE TRANSPORTING THROUGH THE HOSPITAL
G2- OFF-HOURS WORK
G3- HOARDING TO BE CONSTRUCTED AND REMOVED AS REQUIRED BY GC.
G4- ROUTE FOR DELIVERY OF NEW AHU

SEQUENCE 1:
1-L1-01: LEVEL 1 HOARDING FOR HOUSEKEEPING AND RECEPTION. RECEPTION BE ERECTED OFF-HOURS.
1-L1-02: DEMOLISH HSKP ROOMS AND RECEPTION MILLWORK.
1-L1-03: RENOVATION HSKP AND FRONT DESK AND OBTAIN OCCUPANCY FOR HSKP

SEQUENCE 2
2-L1-04: HOARDING OF FORMAL ADMINISTRATION AND MECHANICAL ROOM.
2-L1-05: RENOVATION OF SSAU AND MECHANICAL ROOMS.
2-L1-06: CONSTRUCTION OF BUILDING SYSTEMS AND STRUCTURE REQUIRED FOR L2 AND L3

SEQUENCE 5&6
3-L1-07: CONNECT BUILDING SYSTEMS IN SERVICE SPACE

Stantec

Stantec Architecture Ltd.
100-401 Wellington Street West
Toronto, M5V 1E7
Tel: (416) 596-6686 • www.stantec.com

Consultant

KEY PLAN

N

PHASING LEGEND

EXISTING
NEW
TEMPORARY

Notes

CONSTRUCTION HOARDING
PEDESTRIAN / PATIENT TRAFFIC
PUBLIC TRAFFIC
EMS TRAFFIC
CONSTRUCTION TRAFFIC
CONSTRUCTION AREA
CONSTRUCTION HOARDING VESTIBULE

1-L1-05
UNIQUE #
LOCATION
S: SITE, L1: LEVEL 1, L2: LEVEL 2, L3: LEVEL 3
SEQUENCE # (E: ENABLING WORK)

PHASING GENERAL NOTES:

1. PHASING DIAGRAMS INDICATED ARE FOR REFERENCE PURPOSES ONLY AND MAY NOT INCLUDE THE FULL EXTENT OF THE PHASING AND DEMOLITION SCOPE OF WORK.

2. REFER TO SPECIFICATION FOR CONSTRUCTION RELATED HEALTHCARE FACILITY PROCEDURE AND CONSTRUCTION PROGRESS DOCUMENTATION.

3. COORDINATE EXTENT AND LOCATION OF PHASING AND DEMOLITION WITH DOCUMENTS BY OTHER DISCIPLINES PRIOR TO COMMENCING ANY WORK.

4. HOARDING SHOWN SCHEMATIC, CG TO HOARD AREAS AS REQUIRED TO ENSURE SAFETY AND PRIVACY OF THE HOSPITAL STAFF AND VISITORS.

5. ALL NOISY WORK AND WORK CAUSING VIBRATION TO BE PERFORMED OUTSIDE OF NORMAL OPERATING HOURS UNLESS OTHERWISE INDICATED.

6. MECHANICAL AND ELECTRICAL COORDINATION:
PRIOR TO THE COMMENCEMENT OF ANY WORK, CONTRACTOR TO INFORM HOSPITAL OF MECHANICAL AND ELECTRICAL SHUTDOWNS REQUIRED TO COMPLETE WORK. GENERAL CONTRACTOR TO ENSURE INTEGRITY OF EXISTING FIRE RATED GYPSUM BOARD ENCLOSURE OF EXISTING DUCTWORK IN CEILING SPACE. GENERAL CONTRACTOR TO COORDINATE DEMOLITION OF CEILINGS AND REDUNDANT MECHANICAL SERVICES WITH EXISTING SERVICES TO REMAIN. PROVIDE IMMEDIATE PROTECTION OF OPENINGS IN FIRE RATED ENCLOSURE DUE TO PROTECT ACCESS OF FIRE TO FLOOR LEVEL ABOVE.

15	ISSUED FOR ADDENDUM No.2			2024.06.21
12	ISSUED FOR TENDER			2024.06.07
9	ISSUED FOR BUILDING PERMIT			2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
4	ISSUED FOR COSTING AND DGH REVIEW			2023.12.21
Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	11/22/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project
GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

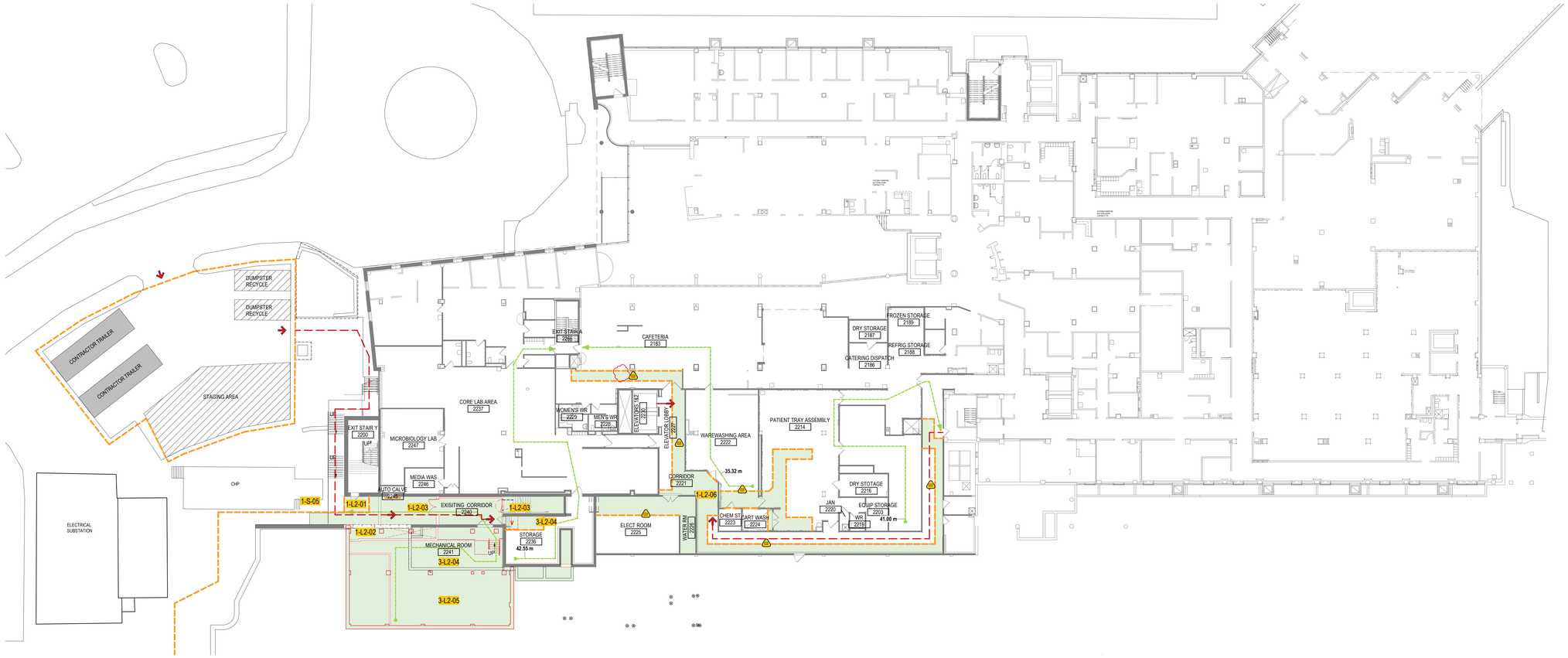
Title
PHASE 1 - LEVEL 1 CONSTRUCTION SEQUENCING

Project No.	Scale
140022022	As indicated
Revision	Drawing No.
15	PH101

G1- OFF-HOURS MATERIAL AND WASTE ACCESS. ALL TOOLS AND EQUIPMENT MUST BE THOROUGHLY CLEANED AND DUST-FREE BEFORE TRANSPORTING THROUGH THE HOSPITAL
G2- OFF-HOURS WORK
G3- TEMP HOARDING TO BE CONSTRUCTED IN SECTIONS AND REMOVED AS REQUIRED TO MAINTAIN EXISTING AND HOSPITAL DAILY OPERATION.
G4- ROUTE FOR DELIVERY OF NEW AHU

SEQUENCE 1:
1-L2-01: MAINTAIN ACCESS FOR EXIT STAIR AND SAFE EXTERIOR PASSAGE TO STREET LEVEL (LEVEL 1).
1-L2-02: HOARDING
1-L2-03: CONSTRUCTION OF WEST WALL AND DOOR OF EXISTING CORRIDOR 2240 AND RELOCATE CO-GEN EQUIPMENT REFER TO MEP DRAWINGS PROVIDE TEMPORARY DOOR TO COMPLETE WORK IN THE EXISTING STAIR SPACE.

SEQUENCE 3:
3-L2-04: DEMOLITION EXISTING MECHANICAL ROOM.
3-L2-05: CONSTRUCTION OF AMBULANCE GARAGE FOOTING AND NEW MECHANICAL ROOM
3-L2-06: ABOVE CEILING MEP WORK, WORK TO BE ERECTED IN SECTIONS TO MINIMIZE DISRUPTION TO REGULAR FACILITY OPERATION, ACCESS TO PUBLIC WASHROOMS TO BE MAINTAINED AT ALL TIMES, AT LEAST ACCESS TO ONE ELEVATOR HAS TO BE AVAILABLE FOR USE ALL TIMES.



1 PH102 **PHASE 1, LEVEL 2 SEQUENCE 1,4&6**
1 : 200

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Consultant

KEY PLAN

N

PHASING GENERAL NOTES:

1- PHASING DIAGRAMS INDICATED ARE FOR REFERENCE PURPOSES ONLY AND MAY NOT INCLUDE THE FULL EXTENT OF PHASING AND DEMOLITION SCOPE OF WORK.

2- REFER TO SPECIFICATION SECTIONS 01 11 10 CONSTRUCTION RELATED INFECTION CONTROL, 01 31 40 CONSTRUCTION SEQUENCING, 01 33 00 CONSTRUCTION PROGRESS DECONTAMINATION, 01 37 00 EXISTING PREMISE PROCEDURES, 01 38 00 SPECIAL HOSPITAL PROCEDURES AND 02 82 00 HAZARDOUS MATERIAL ABATEMENT.

3- COORDINATE EXTENT OF WORK AND LOCATION OF PHASING AND DEMOLITION WITH DOCUMENTS BY OTHER DISCIPLINES PRIOR TO COMMENCING ANY WORK.

4- MECHANICAL AND ELECTRICAL COORDINATION:
PRIOR TO THE COMMENCEMENT OF ANY WORK, CONTRACTOR TO INFORM HOSPITAL OF MECHANICAL AND ELECTRICAL SHUT DOWNS REQUIRED TO COMPLETE WORK. GENERAL CONTRACTOR TO ENSURE INTEGRITY OF EXISTING FIRE RATED GYPSUM BOARD ENCLOSURE IF THE EXISTING DUCTWORK IN CEILING SPACE. GENERAL CONTRACTOR TO COORDINATE DEMOLITION OF CEILING AND REDUNDANT MECHANICAL SERVICES WITH EXISTING SERVICES TO REMAIN. PROVIDE IMMEDIATE PROTECTION OF THE OPENING IF FIRE RATED ENCLOSURES DUE TO PROTECT ACCESS OF FIRE TO FLOOR ABOVE.

PHASING LEGEND:

EXISTING
NEW
TEMPORARY
CONSTRUCTION HOARDING
PEDESTRIAN / PATIENT TRAFFIC
PUBLIC TRAFFIC
EMS TRAFFIC
CONSTRUCTION TRAFFIC
CONSTRUCTION AREA
CONSTRUCTION HOARDING VESTIBULE

1-L1-05
- UNIQUE #
- LOCATION
  S: SITE, L1: LEVEL 1, L2: LEVEL 2, L3: LEVEL 3
- SEQUENCE # (E. ENABLING WORK)

PHASING GENERAL NOTES:

1. PHASING DIAGRAMS INDICATED ARE FOR REFERENCE PURPOSES ONLY AND MAY NOT INCLUDE THE FULL EXTENT OF THE PHASING AND DEMOLITION SCOPE OF WORK.

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3. COORDINATE EXTENT AND LOCATION OF PHASING AND DEMOLITION WITH DOCUMENTS BY OTHER DISCIPLINES PRIOR TO COMMENCING ANY WORK.

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5. ALL NOISY WORK AND WORK CAUSING VIBRATION TO BE PERFORMED OUTSIDE OF NORMAL OPERATING HOURS UNLESS OTHERWISE INDICATED.

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15	ISSUED FOR ADDENDUM No.2			2024.06.21
13	ISSUED FOR ADDENDUM No.1			2024.06.14
12	ISSUED FOR TENDER			2024.06.07
9	ISSUED FOR BUILDING PERMIT			2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
4	ISSUED FOR COSTING AND IGGH REVIEW			2023.12.21
Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	11/27/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project
GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

Title
PHASE 1 - LEVEL 2 CONSTRUCTION SEQUENCING

Project No. 140022022	Scale As indicated
Revision 15	Drawing No. PH102

ONTARIO BUILDING CODE DATA MATRIX

Revised: 2016.10.04

PART 3 - FIRE PROTECTION, OCCUPANT SAFETY AND ACCESSIBILITY

OBC REFERENCE [1]

Name of Practice	Stantec Architecture Ltd.	
Address 1	100-401 Wellington Street West Toronto ON M5V 1E7	
Address 2		
Contact	Tim Eastwood, OAA	
Name of Project	Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion	
Location/Address	115 DELHI STREET, GUELPH ON N1E 4J4	
Date		Seal & Signature

3.00	BUILDING CODE VERSION	O.Reg. 332/12			LAST AMENDMENT	O.Reg. 30/23		
3.01	PROJECT TYPE	Addition and Renovation Interior renovation and addition. Renovation of the emergency department mental health unit and housekeeping on Level 1 Addition to the mechanical room on Level 2. Renovation and expansion of the emergency department and entrance and ambulance garage on Level 3						[A] 1.1.2.
3.02	MAJOR OCCUPANCY CLASSIFICATION	OCCUPANCY			USE			3.1.2.1.(1)
		B2	Care and Treatment Occupancies		Hospital			
		-	-					
		-	-					
3.03	SUPERIMPOSED MAJOR OCCUPANCIES	NO						3.2.2.7.
		-						
3.04	BUILDING AREA (m²)	DESCRIPTION			EXISTING	NEW	TOTAL	[A] 1.4.1.2.
					6476.00	659.00	7,135.0	
		TOTAL			6,476.0	659.0	7,135.0	
3.05	GROSS AREA...	DESCRIPTION			EXISTING	NEW	TOTAL	[A] 1.4.1.2.
		Level 1			4130.00	0.00	4,130.0	
		Level 2			6282.00	188.00	6,470.0	
		Level 3			6298.00	659.00	6,957.0	
		TOTAL			16,710.0	847.0	17,557.0	
3.06	MEZZANINE AREA (m²)	DESCRIPTION			EXISTING	NEW	TOTAL	3.2.1.1.
		N/A			-	-	-	
		TOTAL			-	-	-	
3.07	BUILDING...	7	STOREYS ABOVE GRADE			19.12	(m) ABOVE GRADE	[A] 1.4.1.2. &
			STOREYS BELOW GRADE					3.2.1.1.
3.08	HIGH BUILDING	Yes						3.2.6
3.09	NUMBER OF STREETS/ FIREFIGHTER ACCESS	1	STREET(S)					3.2.2.10. & 3.2.5.
3.10	BUILDING CLASSIFICATION (SIZE AND CONSTRUCTION RELATIVE TO OCCUPANCY)	3.2.2.38.	Group B, Division 2 or Division 3, Any Height, Any Area, Sprinklered					3.2.2.20-83.
		-	-					
		-	-					
3.11	SPRINKLER SYSTEM	Required			PROVIDED:	Entire Building		3.2.1.5. &
		DESCRIBE						3.2.2.17.
3.12	STANDPIPE SYSTEM	Required						3.2.9.
3.13	FIRE ALARM SYSTEM	Required			TYPE PROVIDED	-		3.2.4.
3.14	WATER SERVICE/ SUPPLY IS ADEQUATE	Yes						
3.15	CONSTRUCTION TYPE	RESTRICTIONS	Noncombustible Required					3.2.2.2.20.-83.
		ACTUAL	Noncombustible		HEAVY TIMBER CONSTRUCTION		N/A	3.2.1.4.
3.16	IMPORTANCE CATEGORY	Post-Disaster			-			4.1.2.1.(3), Tl 4.1.2.1.B.
3.17	SEISMIC HAZARD INDEX (IE, Fa/Sa...	0.80	Seismic Design Not Required for Table 4.1.1.8. Items 6 to 21					4.1.8.18.(1)
3.18	OCCUPANT LOAD	FLOOR LEVEL/AREA			OCCUPANCY TYPE	BASED ON	OCCUPANT LOAD (PERSONS)	3.1.17.
		Level 3			B2	Design of space	65	
		TOTAL					65	
3.19	BARRIER-FREE DESIGN	Yes						3.8.
3.20	HAZARDOUS SUBSTANCES	-						3.3.1.2. & 3.3.1.19.
3.21	REQUIRED FIRE RESISTANCE RATINGS	HORIZONTAL ASSEMBLY				RATING (H)	SUPPORTING ASSEMBLY (H)	NONCOMBUSTIBLE IN LIEU OF RATING?	3.2.2.20.-83, 3.2.1.4.
		FLOORS OVER BSMT				2.00		-	
		FLOORS				2.00		-	
		MEZZANINE						-	
		ROOF						-	
3.22	SPATIAL SEPARATION	WALL	EBF AREA (m2)	L.D. (m)	L/H OR H/L	REQUIRED FRR (H)	CONSTRUCTION TYPE	CLADDING TYPE	3.2.3.
		North	N/A			-	-	-	
		South	220.0	6.63	5.15/42.72	45 min	Noncombustible Req'd	Noncombustible Req'd	
		East	72.9	6.65	5.84/12.48	45 min	Noncombustible Req'd	Noncombustible Req'd	
		West	N/A	>9	N/A	-	Noncombustible Req'd	Noncombustible Req'd	
3.23	PLUMBING FIXTURE REQUIREMENTS	RATIO:	MALE:FEMALE = 50:50 EXCEPT AS NOTED OTHERWISE						3.7.4.
		FLOOR LEVEL/AREA			OCCUPANT LOAD	OBC SENTENCE	FIXTURES REQUIRED	FIXTURES PROVIDED	
		Refer GGH Occupant Load Summary				3.7.4.4			
3.24	ENERGY EFFICIENCY	COMPLIANCE PATH	Prescriptive Path						
		CLIMATIC ZONE:	6						
3.25	NOTES								
		1	ALL REFERENCES ARE TO DIVISION B OF THE OBC UNLESS PRECEDED BY [A] FOR DIVISION A AND [C] FOR DIVISION C						

Ontario Building Code Data Matrix, Part 3
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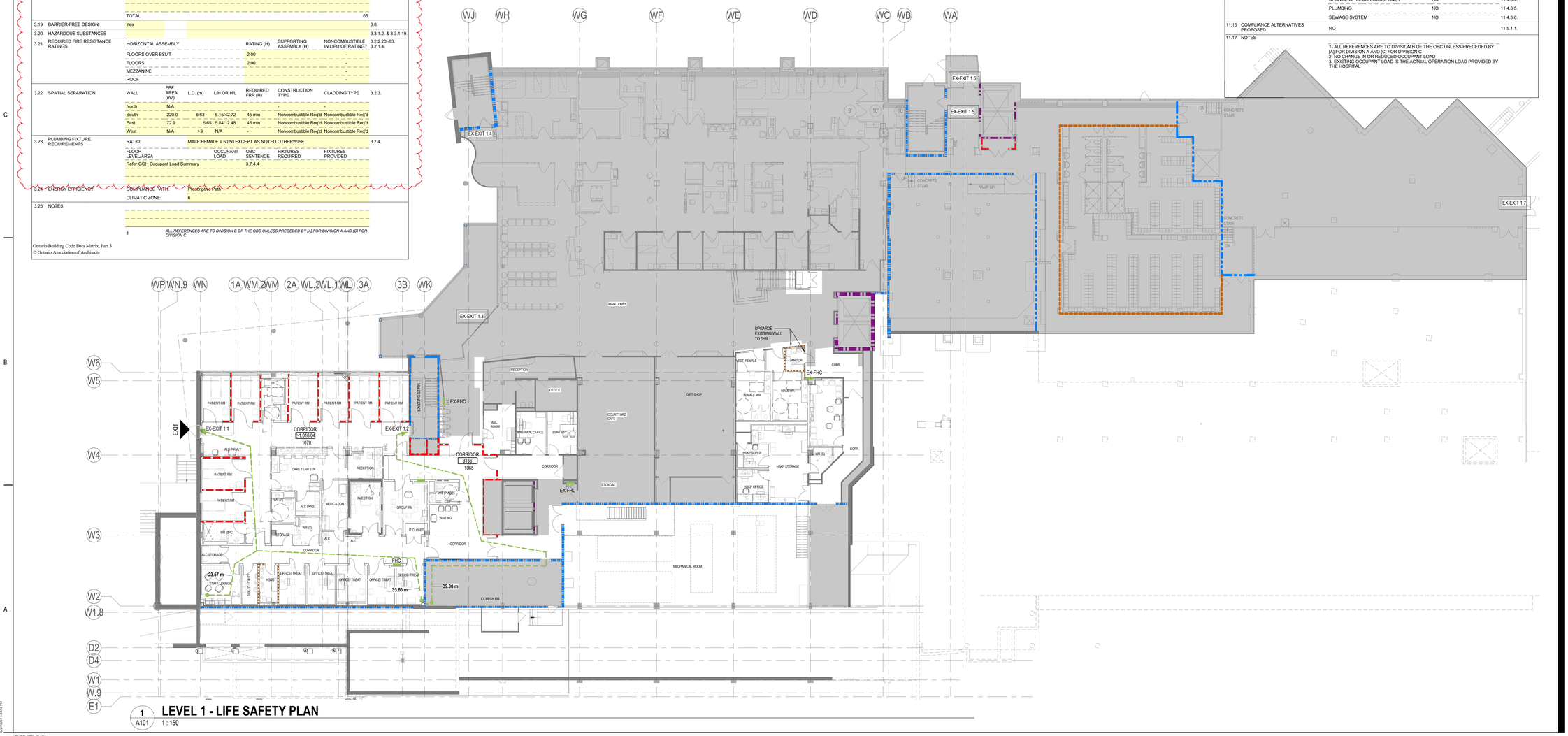
PART 11 - RENOVATION OF EXISTING BUILDING

OBC REFERENCE [1]

11.00	BUILDING CODE VERSION	O.Reg. 332/12		LAST AMENDMENT	O.Reg. 30/23	
11.01	PROJECT TYPE	Addition and Renovation Description: Interior renovation and addition. Renovation of the emergency department mental health unit and housekeeping on Level 1 Addition to the mechanical room on Level 2. Renovation and expansion of emergency department and entrance and ambulance garage on Level 3				[A] 1.1.2.
11.02	Location/Address	OCCUPANCY		USE		3.1.2.1.(1)
		B2	Care and Treatment Occupancies	Hospital		
11.03	SUPERIMPOSED MAJOR OCCUPANCIES	NO				3.2.2.7.
11.04	BUILDING AREA (m²)	DESCRIPTION	EXISTING	NEW	TOTAL	[A] 1.4.1.2.
		EXPANSION OF LEVEL3 EMERGENCY AND AMBULANCE GARAGE	6298.00	659.00	6,957.0	
11.05	GROSS AREA AREA (m²)	DESCRIPTION	EXISTING	NEW	TOTAL	[A] 1.4.1.2.
		Level 1	4130.00	0.00	4,130.0	
		Level 2	6282.00	188.00	6,470.0	
		Level 3	6298.00	659.00	6,957.0	
		Level 4	3107.00	0.00	3,107.0	
		Level 5	5379.00	0.00	5,379.0	
		Level 6	3575.00	0.00	3,575.0	
		Level 7	2880.00	0.00	2,880.0	
		Level 8	158.00	0.00	158.0	
		Level 9	81.00	0.00	81.0	
		TOTAL	31890.00	847.0	32,737.0	
11.06	BUILDING HEIGHT	7	STOREYS ABOVE GRADE	19.12	(m) ABOVE...	[A] 1.4.1.2. & 3.2.1.1.
11.07	NUMBER OF STREETS/ FIRE FIGHTER ACCESS	1	STREETS(S)			3.2.2.10. & 3.2.5.
11.08	BUILDING SIZE	LARGE				T.11.2.1.1.B.-N.
11.09	EXISTING BUILDING CLASSIFICATION	CHANGE IN MAJOR OCCUPANCY		NO		11.2.1.1.
		CONSTRUCTION INDEX		7		T.11.2.1.1.A.
		HAZARD INDEX		7		T.11.2.1.1.B.-N.
		IMPORTANCE CATEGORY		Post-Disaster		
11.10	RENOVATION TYPE	EXTENSIVE RENOVATION				11.3.3.1. & 11.3.3.2.
11.11	OCCUPANT LOAD	FLOOR LEVEL/AREA	OCCUPANCY TYPE	BASED ON	OCCUPANT LOAD (PERSONS)	3.1.17.
		Level 1 (4130 s.m.)[2]	B2	m² per person	Reduced	
		Level 2 (6282 s.m.)[2]	F3	m² per person	No cahnge	
		Level 3 (6298 s.m.)[4]	B2	m² per person	375 3	
		TOTAL				
11.12	PLUMBING FIXTURE REQUIREMENTS	RATIO:	MALE:FEMALE = 50:50 EXCEPT AS NOTED OTHERWISE			3.7.4.
		FLOOR LEVEL/AREA	OCCUPANT LOAD	OBC REFERENCE	FIXTURES REQUIRED	FIXTURES PROVIDED
		Level 1[2]		3.7.4.7.		11m+11f [2]
		Level 2[2]		3.7.4.7.		9m+9f [2]
		Level 3[2]		3.7.4.7.		18m+18 [3]
11.13	BARRIER-FREE DESIGN	Yes				11.3.3.2.(2)
11.14	REDUCTION IN PERFORMANCE LEVEL	STRUCTURAL		NO		11.4.2.1.
		INCREASE IN OCCUPANT LOAD		NO		11.4.2.2.
		CHANGE OF MAJOR OCCUPANCY		NO		11.4.2.3.
		PLUMBING		NO		11.4.2.4.
		SEWAGE SYSTEM		NO		11.4.2.5.
11.15	COMPENSATING CONSTRUCTION	STRUCTURAL		NO		11.4.3.2.
		INCREASE IN OCCUPANT LOAD		NO		11.4.3.3.
		CHANGE OF MAJOR OCCUPANCY		NO		11.4.3.4.
		PLUMBING		NO		11.4.3.5.
		SEWAGE SYSTEM		NO		11.4.3.6.
11.16	COMPLIANCE ALTERNATIVES PROPOSED	NO				11.5.1.1.
11.17	NOTES	1- ALL REFERENCES ARE TO DIVISION B OF THE OBC UNLESS PRECEDED BY [A] FOR DIVISION A AND [C] FOR DIVISION C 2- NO CHANGE IN OR REDUCED OCCUPANT LOAD 3- EXISTING OCCUPANT LOAD IS THE ACTUAL OPERATION LOAD PROVIDED BY THE HOSPITAL				



1 LEVEL 1 - LIFE SAFETY PLAN
A101 1 : 150

Stantec

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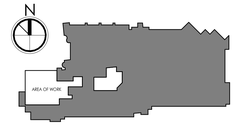
Consultant



Notes

LIFE SAFETY PLAN LEGEND

- 0 HOUR SMOKE SEPARATION
- ¾ HOUR FIRE RATED SEPARATION
- 1 HOUR FIRE RATED SEPARATION
- 1.5 HOUR FIRE RATED SEPARATION
- 2 HOUR FIRE RATED SEPARATION
- EXIT ROUTE (45M MAX.)
- ##m — DISTANCE (METER)
- EXIT
- **FHC**: FIRE HOSE CABINET
  EX - FHC: EXISTING FIRE HOSE CABINET

LEGEND:

- EXISTING AREA (OUT OF RENOVATION SCOPE)
- EXISTING WALLS TO REMAIN
- NEW CONSTRUCTION
- AREA AFFECTED BY ABOVE CEILING WORK
- DENOTES NEW MILLWORK

15	ISSUED FOR ADDENDUM No.2		2024.06.21
14	RE-ISSUED AS PER BUILDING PERMIT COMMENTS		2024.06.19
12	ISSUED FOR TENDER		2024.06.07
11	ISSUED FOR PRE-TENDER		2024.05.27
9	ISSUED FOR BUILDING PERMIT		2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION		2024.02.23
6	ISSUED FOR COSTING AND GGH REVIEW		2023.12.21
5	ISSUED FOR 40% CONSTRUCTION DOCUMENTS		2023.10.26
3	ISSUED FOR MOH STAGE 2.2 SUBMISSION		2023.06.09
2	ISSUED FOR DD COSTING AND CLIENT REVIEW		2023.03.29
Issued/Revision		By	Appd YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	02/15/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

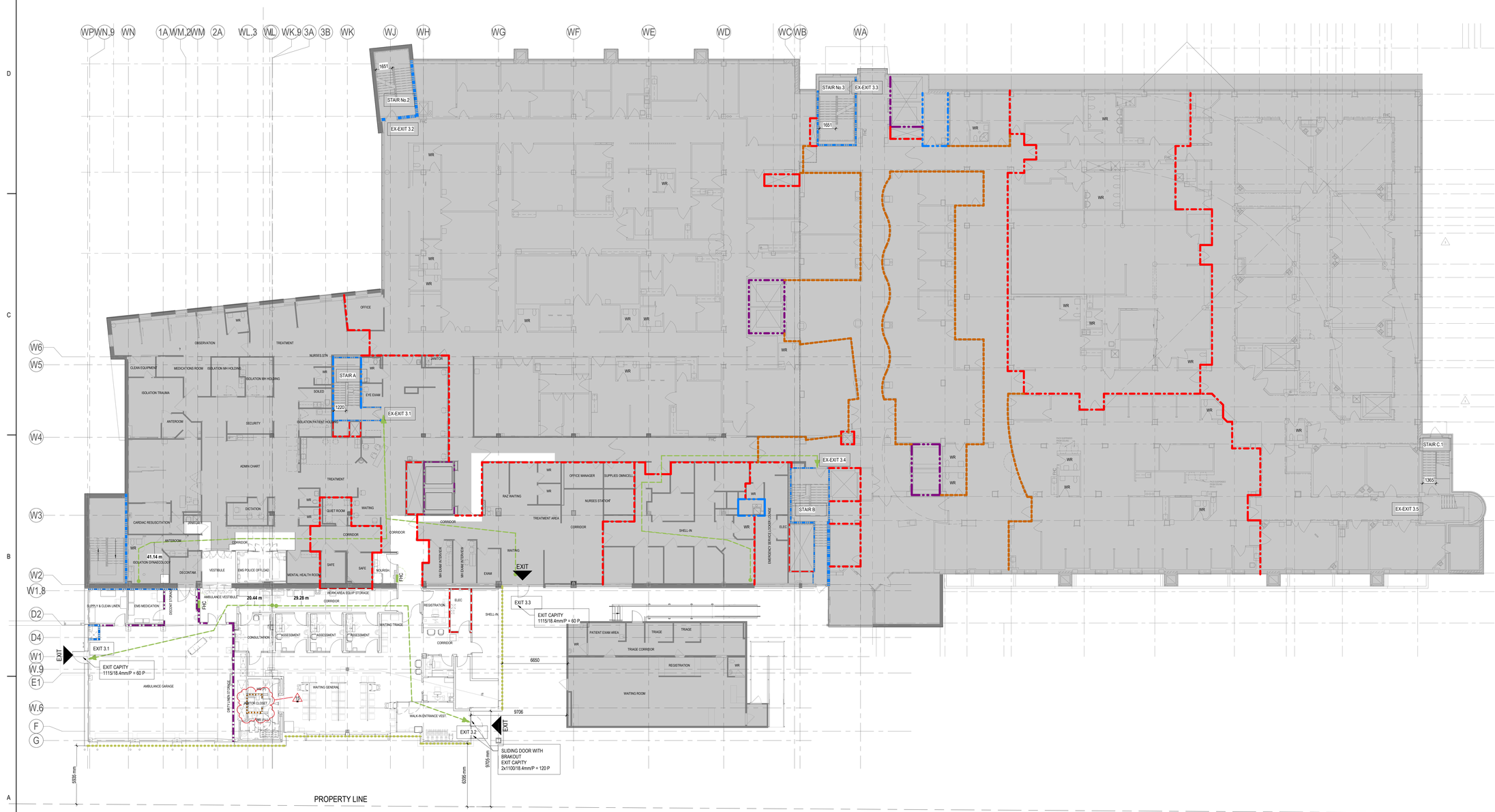
Client/Project
GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

Title
PHASE 1 - LEVEL 1 LIFE SAFETY PLAN & OBC MATRIX

Project No. 140022022		Scale As indicated
Revision 15	Drawing No.	A101



1 LEVEL 3 LIFE AND SAFETY PLAN

A103 1 : 150

Stantec

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Consultant

KEY PLAN

Notes

LIFE SAFETY PLAN LEGEND

- 0 HOUR SMOKE SEPARATION
- ½ HOUR FIRE RATED SEPARATION
- 1 HOUR FIRE RATED SEPARATION
- 1.5 HOUR FIRE RATED SEPARATION
- 2 HOUR FIRE RATED SEPARATION
- EXIT ROUTE (45M MAX.)
- ##m — DISTANCE (METER)
- EXIT
- EXIT
- **FHC**: FIRE HOSE CABINET
  EX - FHC: EXISTING FIRE HOSE CABINET

LEGEND:

- EXISTING AREA (OUT OF RENOVATION SCOPE)
- EXISTING WALLS TO REMAIN
- NEW CONSTRUCTION
- AREA AFFECTED BY ABOVE CEILING WORK
- DENOTES NEW MILLWORK

15	ISSUED FOR ADDENDUM No.2			2024.06.21
12	ISSUED FOR TENDER			2024.06.07
11	ISSUED FOR PRE-TENDER			2024.05.27
9	ISSUED FOR BUILDING PERMIT			2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
4	ISSUED FOR COSTING AND DGH REVIEW			2023.12.21
Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	02/23/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project

GUELPH GENERAL HOSPITAL

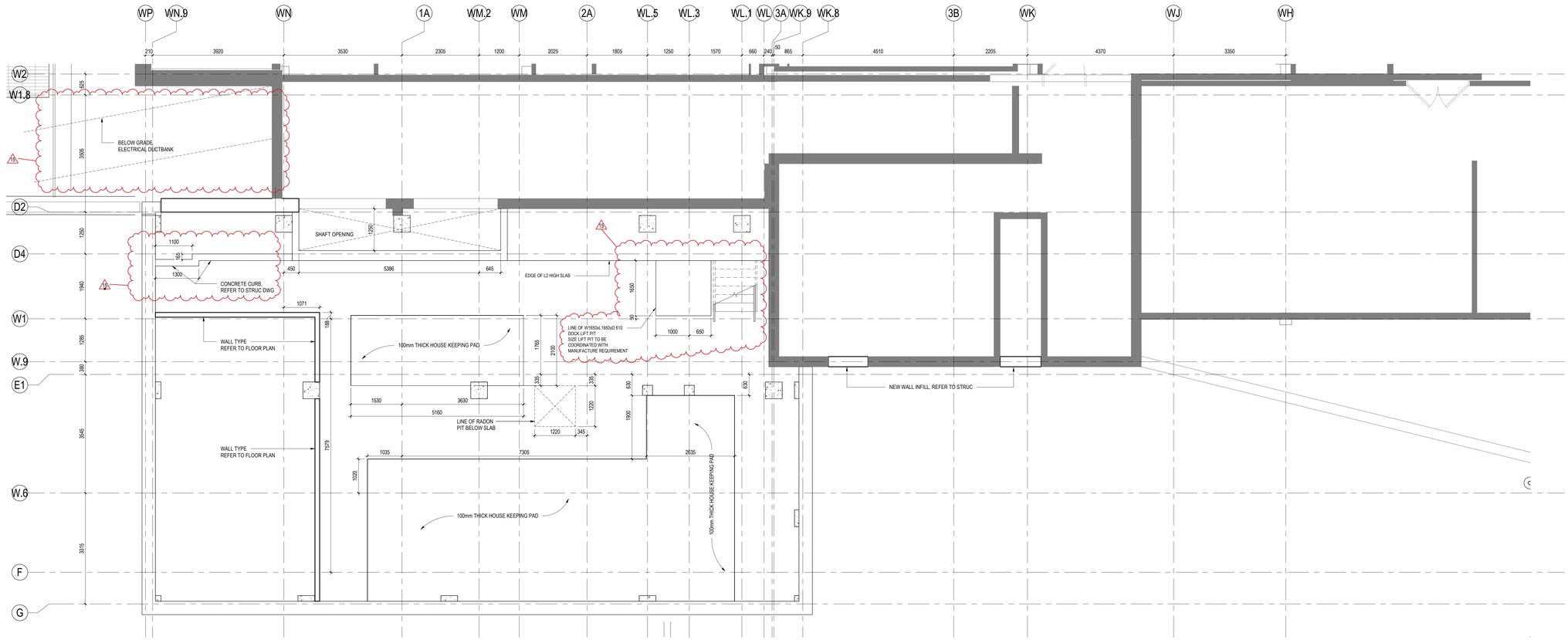
Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

Title

PHASE 1 - LEVEL 3 LIFE SAFETY PLAN

Project No.	Scale
140022022	As indicated
Revision	Drawing No.
15	A103



1 A222 **LEVEL 2 OVERALL PLAN - SLAB EDGE**

1 : 50

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KEY PLAN

Notes

15	ISSUED FOR ADDENDUM No.2		2024.06.21
12	ISSUED FOR TENDER		2024.06.07
11	ISSUED FOR PRE-TENDER		2024.05.27
9	ISSUED FOR BUILDING PERMIT		2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION		2024.02.23
Issued/Revision		By	Appd YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	02/08/24
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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Client/Project Logo

GUELPH GENERAL HOSPITAL

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GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

Title

PHASE 1 - SLAB EDGE PLAN-LEVEL 2

Project No. 140022022

Scale 1 : 50

Revision 15

Drawing No. **A222**

LEGEND:

- EXISTING AREA (OUT OF RENOVATION SCOPE)
- EXISTING WALLS TO REMAIN
- NEW CONSTRUCTION
- AREA AFFECTED BY ABOVE CEILING WORK
- DENOTES NEW MILLWORK

ABOVE CEILING WORK:

- ANY WORK DISTURBING THE HOSPITAL NORMAL OPERATION TO BE COORDINATED WITH GGH IN ADVANCE.
- USE PHOTOS AND VIDEO TO DOCUMENT EXISTING CONDITIONS BEFORE WORK STARTS.
- REPLACE ANY DAMAGED TILES AND FIXTURES TO MATCH THE EXISTING TYPE AND MODEL. IF TYPE AND MODEL ARE NOT AVAILABLE, PROVIDE AN EQUAL ALTERNATIVE FOR APPROVAL.
- PROTECT EXISTING FINISHES, EQUIPMENT AND SYSTEMS FROM DAMAGE DURING DEMOLITION AND CONSTRUCTION.

1 PHASE 1 _ LEVEL 3 - BLOCK 1 FLOOR PLAN

A303.1 — 1 : 50

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KEY PLAN

Notes

15	ISSUED FOR ADDENDUM No.2	2024.06.21
14	RE-ISSUED AS PER BUILDING PERMIT COMMENTS	2024.06.19
13	ISSUED FOR ADDENDUM No.1	2024.06.14
12	ISSUED FOR TENDER	2024.06.07
11	ISSUED FOR PRE-TENDER	2024.05.27
9	ISSUED FOR BUILDING PERMIT	2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION	2024.02.23
6	ISSUED FOR COSTING AND GGH REVIEW	2023.12.21
5	ISSUED FOR 60% CONSTRUCTION DOCUMENTS	2023.10.26
2	ISSUED FOR DD COSTING AND CLIENT REVIEW	2023.03.29

Issued/Revision — By — Appd — YYYY.MM.DD

File Name: N/A — Author: Dwn. — Designer: Dsgn. — Checker: Chkd. — 02/13/23 — YYYY.MM.DD

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Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

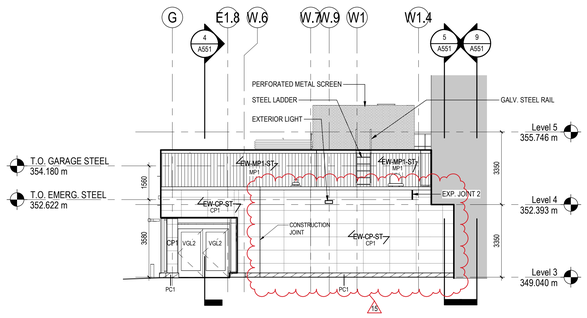
115 DELHI STREET, GUELPH ON N1E 4J4

Title

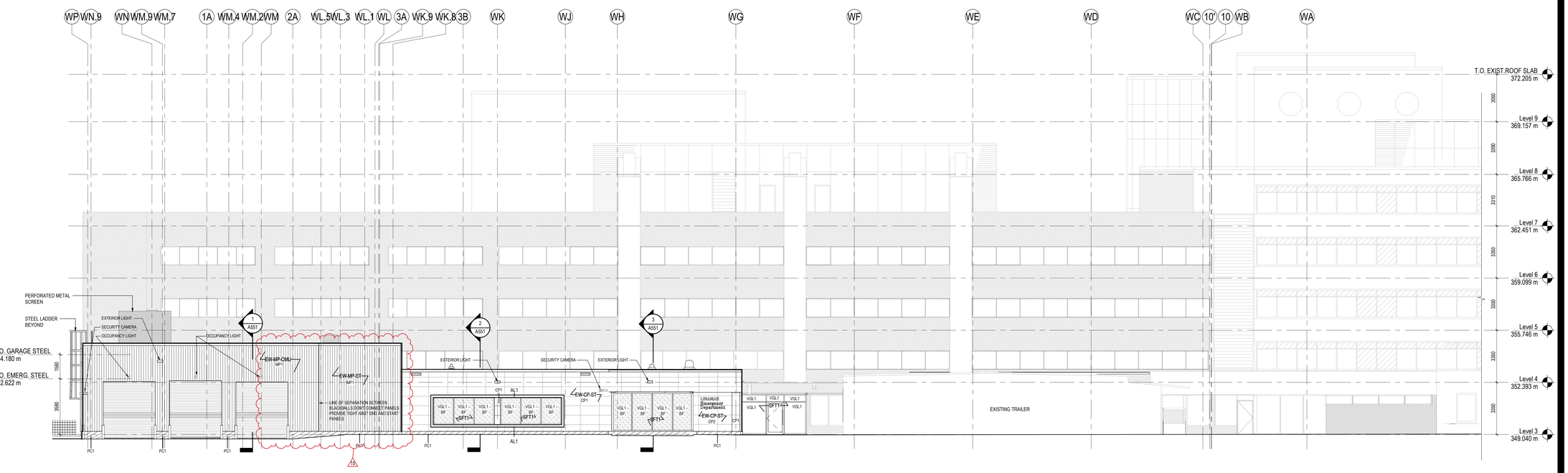
PHASE 1 - LEVEL 3 - BLOCK 1 FLOOR PLAN

Project No. 140022022 — Scale 1 : 50

Revision 15 — Drawing No. A303.1



2 A502 **PHASE 1 - EAST ELEVATION**
1 : 100



1 A502 **PHASE 1 - SOUTH ELEVATION**
1 : 100

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Notes

GLASS AND SPANDREL TYPES

GL1-BF
GLAZING TYPE / FRIT / SHADING TREATMENT

GLAZING TYPES

XVG	EXISTING VISION GLASS, CLEAR (EXTERIOR)
VGL1	VISION GLASS, CLEAR (EXTERIOR STRORE FRONT)
VGL2	VISION GLASS, CLEAR (EXTERIOR DOORS)
VGL3	COMBINED IGU (WITH 120MIN FRR)
SPL	SPANDREL PANEL (ALUMINUM)
XSPL	SPANDREL PANEL (ALUMINUM)
SPG	SPANDREL PANEL (GLASS)

CLADDING TYPES

CP1	CERAMIC PANEL CLADDING - COLOUR 1
CP2	CERAMIC PANEL CLADDING - COLOUR 2
MP1	METAL PANEL, FLAT, COLOUR 1
AL1	ALUMINUM PANELS COLOUR 1

15	ISSUED FOR ADDENDUM No.2			2024.06.21
14	RE-ISSUED AS PER BUILDING PERMIT COMMENTS			2024.06.19
12	ISSUED FOR TENDER			2024.06.07
11	ISSUED FOR PRE-TENDER			2024.05.27
9	ISSUED FOR BUILDING PERMIT			2024.03.28
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
6	ISSUED FOR COSTING AND QGH REVIEW			2023.12.21
5	ISSUED FOR AOR-CONSTRUCTION DOCUMENTS			2023.10.26
3	ISSUED FOR MOH STAGE 2.2 SUBMISSION			2023.06.09
2	ISSUED FOR DD COSTING AND CLIENT REVIEW			2023.03.29
Issued/Revision			By	Appd. YYYY.MM.DD

File Name: N/A

Author	Designer	Checker	03/09/23
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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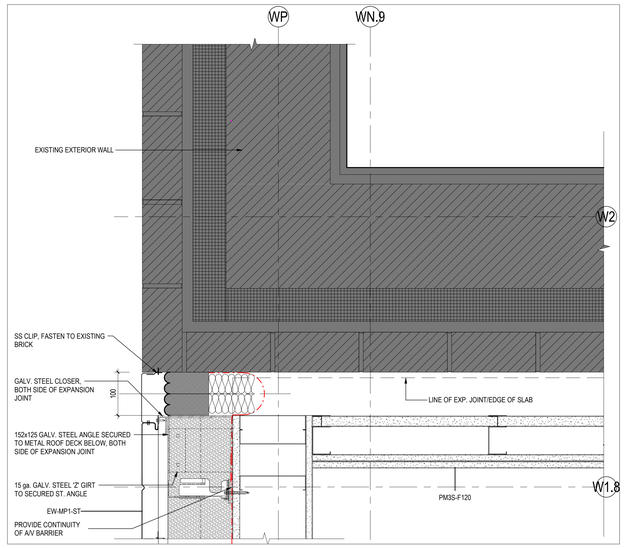
Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

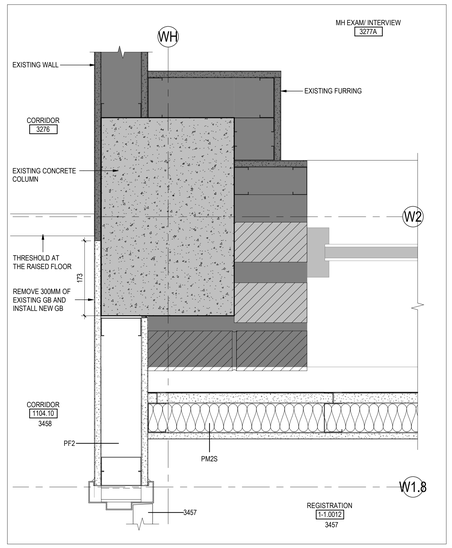
Title

PHASE 1 - BUILDING ELEVATIONS

Project No.		Scale	
140022022		As indicated	
Revision	Drawing No.		
15	A502		



10 A610 **LEVEL 3 - PLAN DETAIL @ GRIDS WP AND W2**
1 : 5, REF: 1/ A303.1/



11 A610 **LEVEL 3 - PLAN DETAIL @ GRIDS WH AND W2**
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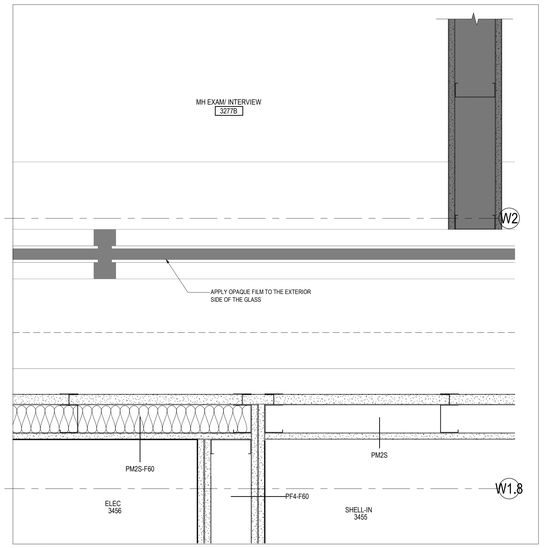
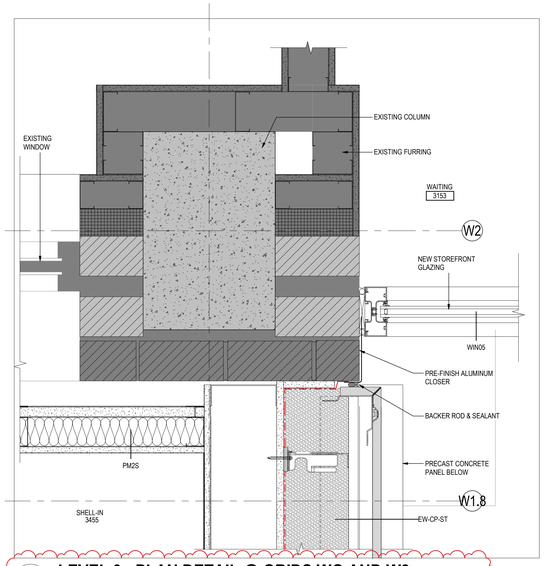
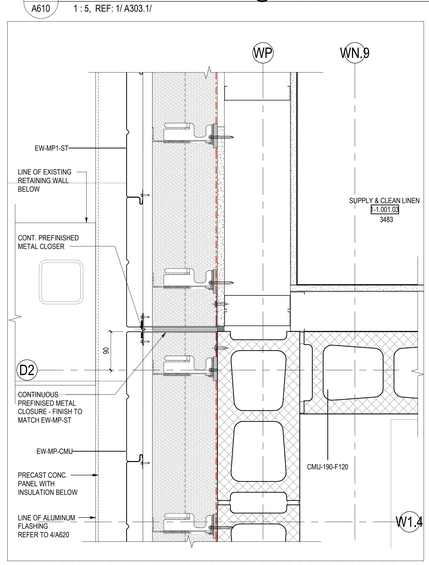


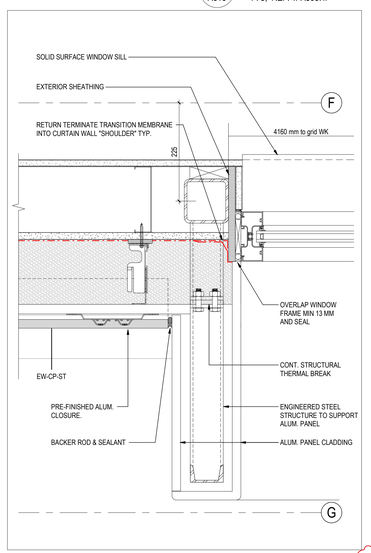
12 A610 **LEVEL 3 - PLAN DETAIL @ GRID W2**
1 : 5, REF: 1/ A303.1/



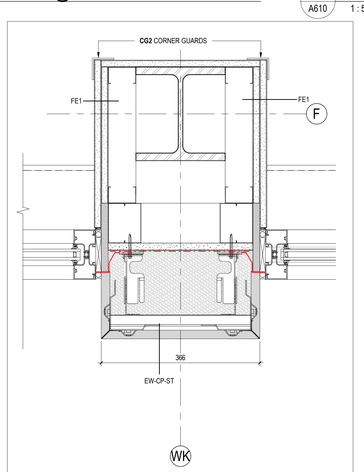
13 A610 **LEVEL 3 - PLAN DETAIL @ GRIDS WG AND W2**
1 : 5, REF: 1/ A303.1/



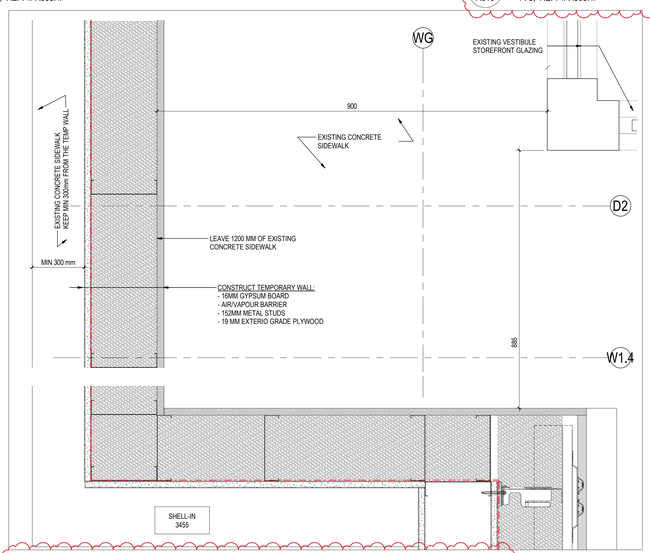
5 A610 **LEVEL 3 - PLAN DETAIL @ GRIDS WP AND D2**
1 : 5, REF: 1/ A303.1/



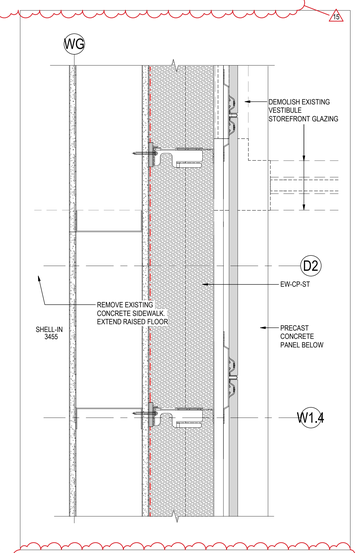
6 A610 **PLAN DETAIL @ STOREFRONT FIN**
1 : 5, REF: 1/ A303.1/



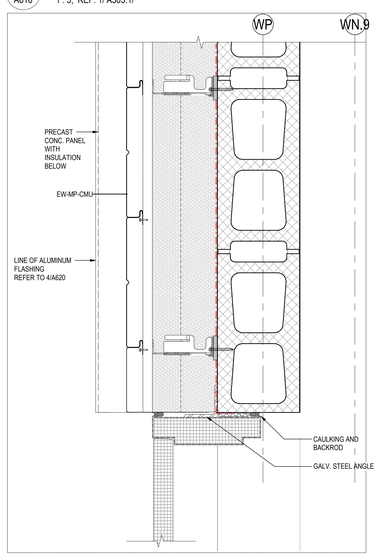
7 A610 **LEVEL 3 - PLAN DETAIL @ GRIDS WK & F**
1 : 5, REF: 1/ A303.1/



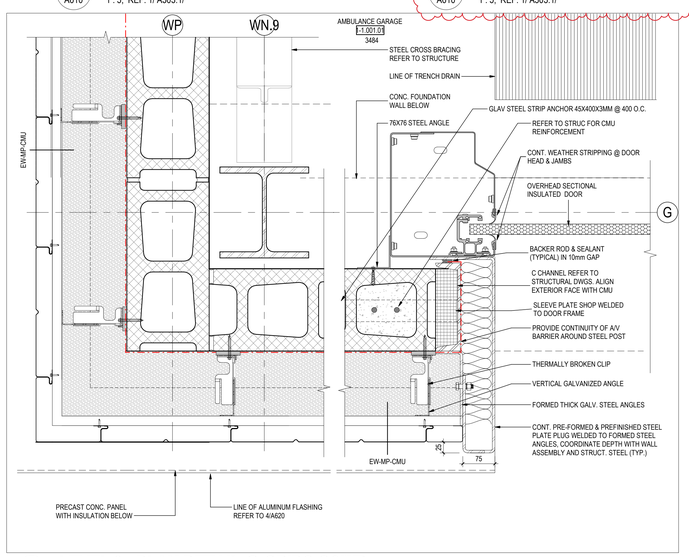
8 A610 **PLAN DETAIL @ GRIDS WG AND D1 (TEMPORARY)**
1 : 5,



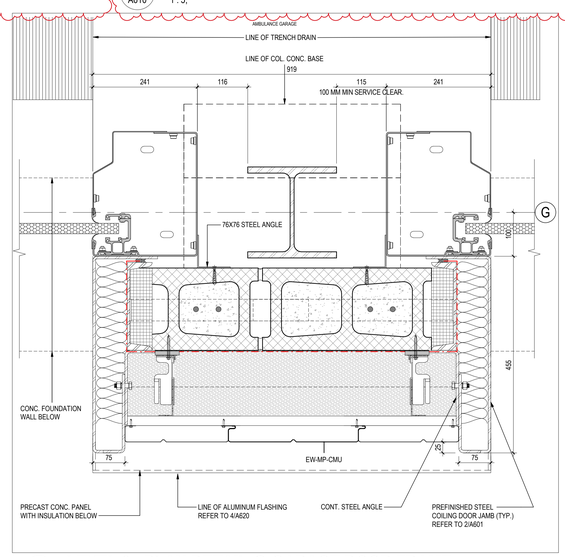
9 A610 **LEVEL 3 - PD @ GRIDS WG AND D2**
1 : 5, REF: 1/ A303.1/



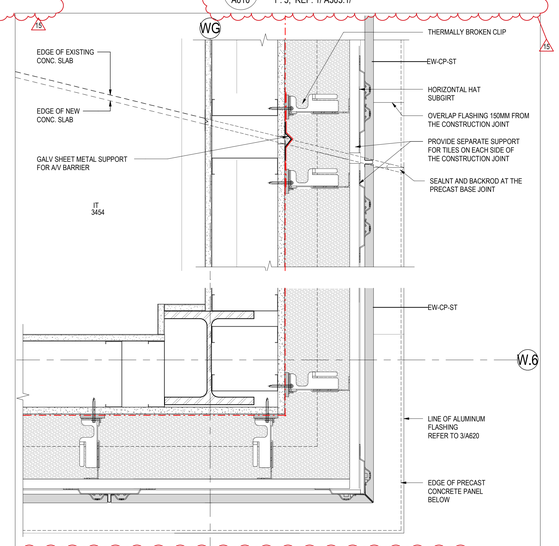
1 A610 **LEVEL 3 - PD @ EXTERIOR DOOR FRAME**
1 : 5, REF: 1/ A303.1/



2 A610 **LEVEL 3 - PLAN DETAIL @ GRIDS G&WP**
1 : 5, REF: 1/ A303.1/



3 A610 **LEVEL 3 - PLAN DETAIL @ GARAGE DOOR FRAME**
1 : 5, REF: 1/ A303.1/



4 A610 **LEVEL 3 - PLAN DETAIL @ GRID WG AND W.6**
1 : 5, REF: 1/ A303.1/

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Notes

Issued/Revision	By	Appd	YYYY.MM.DD
15 ISSUED FOR ADDENDUM No.2			2024.06.21
12 ISSUED FOR TENDER			2024.06.07
11 ISSUED FOR PRE-TENDER			2024.05.27
9 ISSUED FOR BUILDING PERMIT			2024.03.28
8 ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
6 ISSUED FOR COSTING AND QQA REVIEW			2023.12.21
5 ISSUED FOR 40% CONSTRUCTION DOCUMENTS			2023.10.26

File name: N/A	Author	Designer	Checker	08/14/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

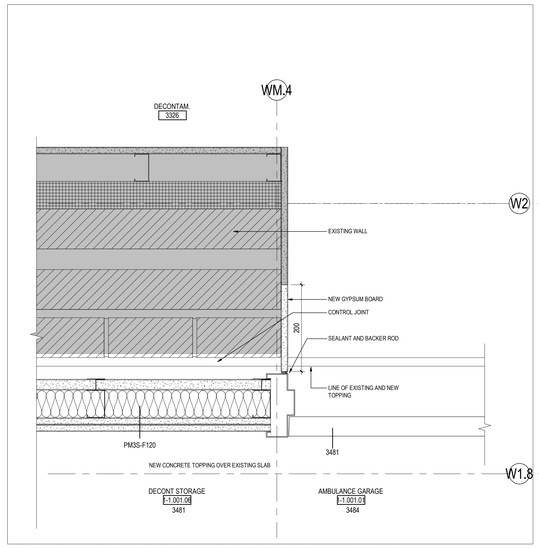
Client/Project
GUELPH GENERAL HOSPITAL

Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

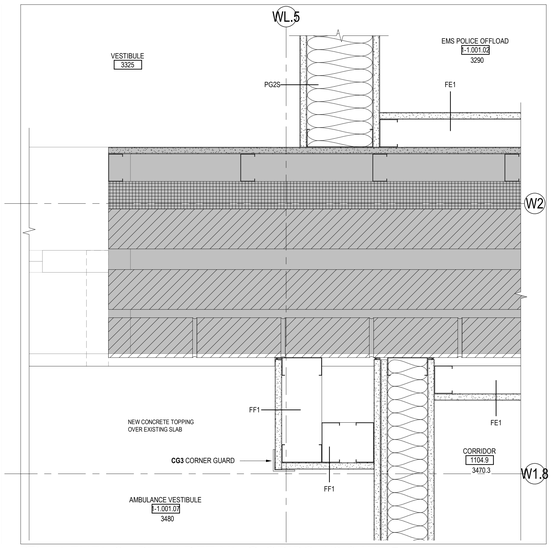
Title
PHASE 1 - PLAN DETAILS EXTERIOR

Project No.	Scale
140020022	1 : 5
Revision	Drawing No.
15	A610



9 A611 **LEVEL 3 - PLAN DETAIL @ GRIDS WM.4 & W2**

1 : 5, REF: 1/ A303.1/



10 A611 **LEVEL 3 - PLAN DETAIL @ GRIDS W2 & WL.5**

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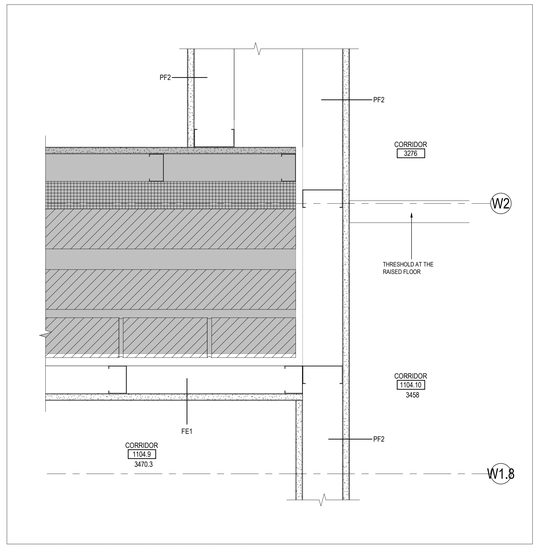
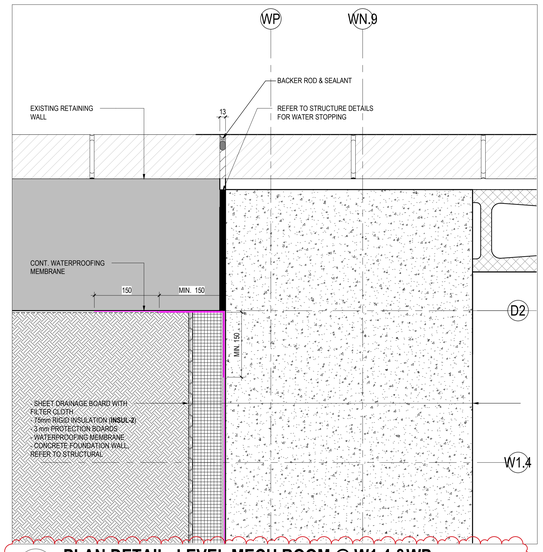


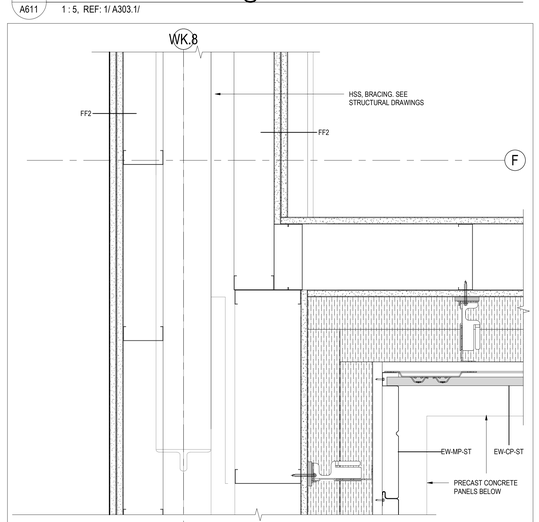
11 A611 **PLAN DETAIL @ GRID W2**

1 : 5, REF: 1/ A303.1/



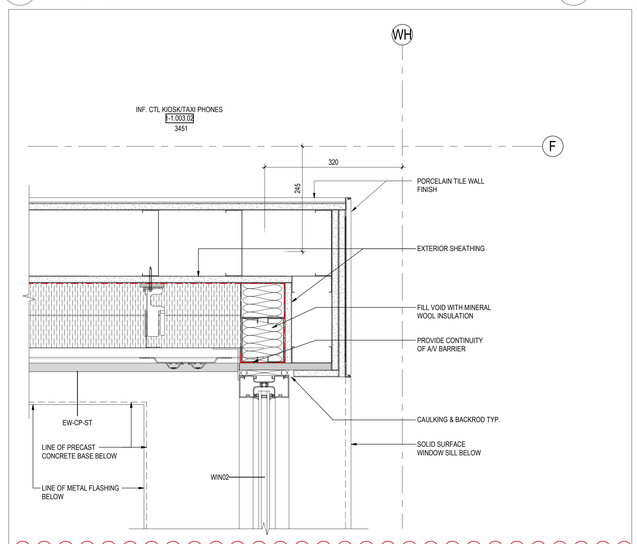
12 A611 **PLAN DETAIL- LEVEL MECH ROOM @ W1.4 &WP**

1 : 5, REF: 1/ A302.1/



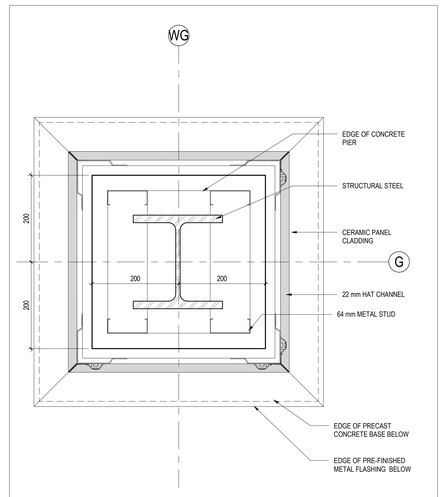
5 A611 **LEVEL 3 - PLAN DETAIL @ GRIDS WK.8 & F**

1 : 5, REF: 1/ A303.1/



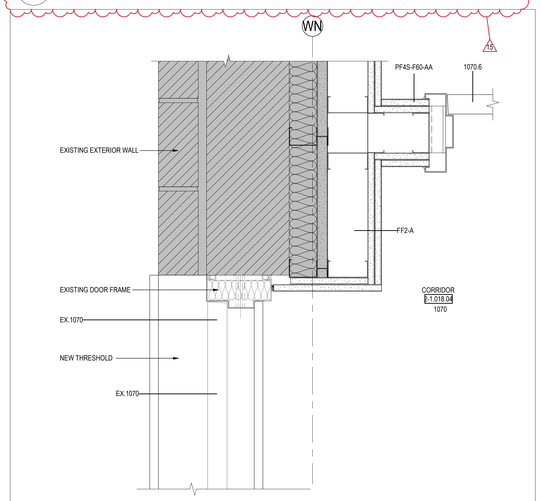
6 A611 **LEVEL 3 - PLAN DETAIL - STRORE FRONT JAMB / GRIDS WH & F**

1 : 5, REF: 1/ A303.1/



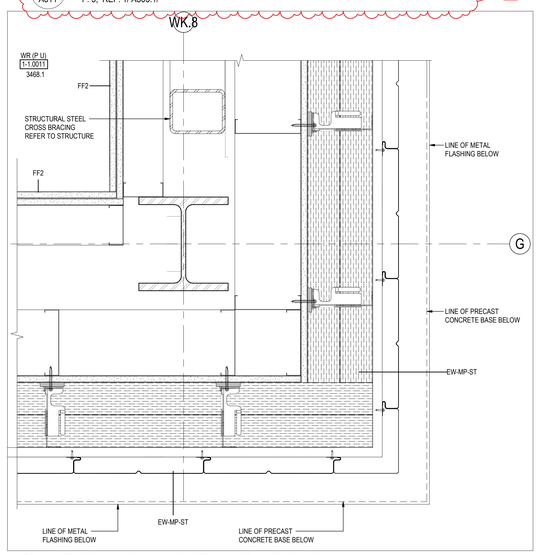
7 A611 **PLAN DETAIL @ GRIDS WG AND G**

1 : 5,



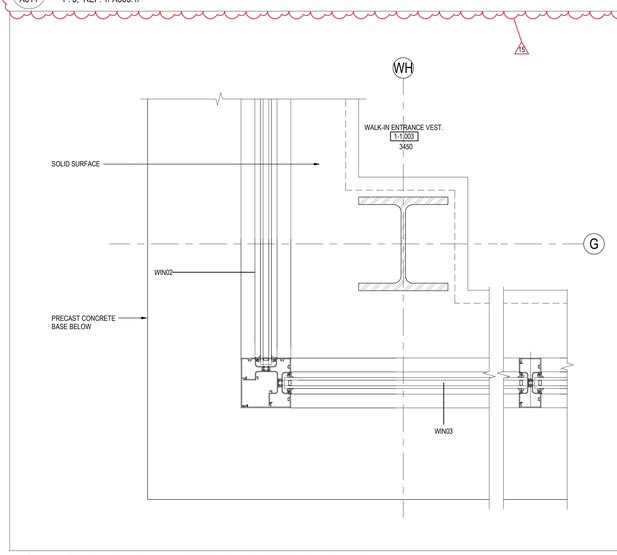
8 A611 **LEVEL 1 - PLAN DETAIL @ EXST. DOOR 1070**

1 : 5, REF: 1/ A301.1/



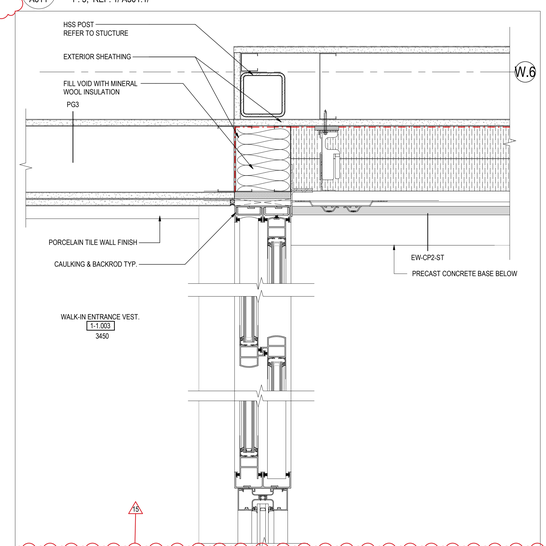
1 A611 **LEVEL 3 - PLAN DETAIL @ GRIDS WK.8 & G**

1 : 5, REF: 1/ A303.1/



2 A611 **LEVEL 3 - PLAN DETAIL @ GRIDS WH & G**

1 : 5, REF: 1/ A303.1/



4 A611 **LEVEL 3 - PLAN DETAIL @ AUTOMATIC SLIDING DOOR**

1 : 5, REF: 1/ A303.1/

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Notes

15	ISSUED FOR ADDENDUM No.2	2024.06.21
12	ISSUED FOR TENDER	2024.06.07
11	ISSUED FOR PRE-TENDER	2024.05.27
9	ISSUED FOR BUILDING PERMIT	2024.03.26
8	ISSUED FOR STAGE 2.3 MOH SUBMISSION	2024.02.23
6	ISSUED FOR COSTING AND QCH REVIEW	2023.12.21
5	ISSUED FOR 60% CONSTRUCTION DOCUMENTS	2023.10.24

Issued/Revision | By | Appd | YYYY.MM.DD

File Name: N/A | Author Dwn. | Designer Dsgn. | Checker Chkd. | 07/18/23 YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project
GUELPH GENERAL HOSPITAL

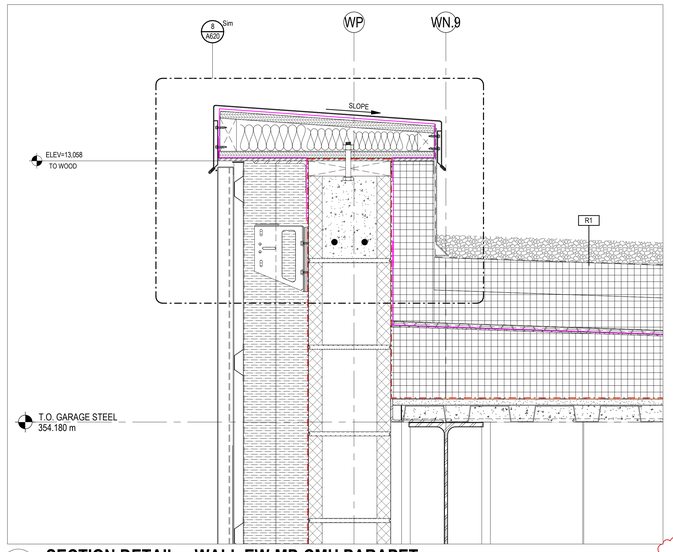
Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

Title
PHASE 1 - PLAN DETAILS EXTERIOR

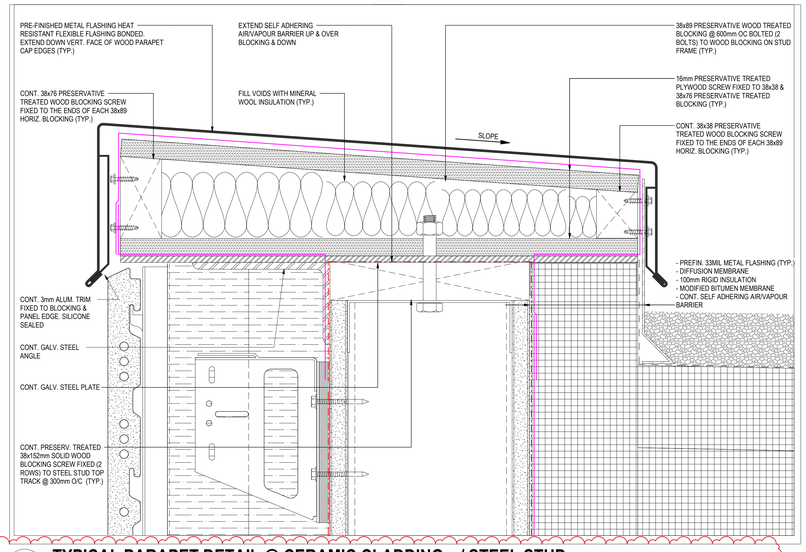
Project No. 140022022 | Scale 1 : 5

Revision 15 | Drawing No. A611



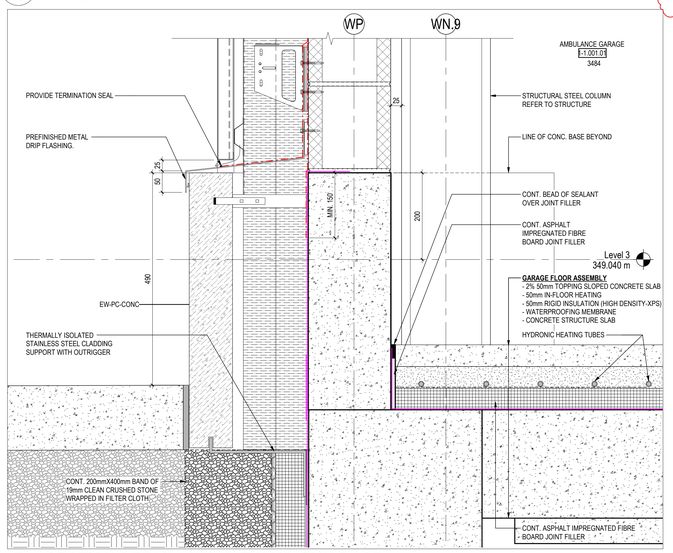
7 A620 SECTION DETAIL - WALL EW-MP-CMU PARAPET

1 : 5, REF: 1/ A561/



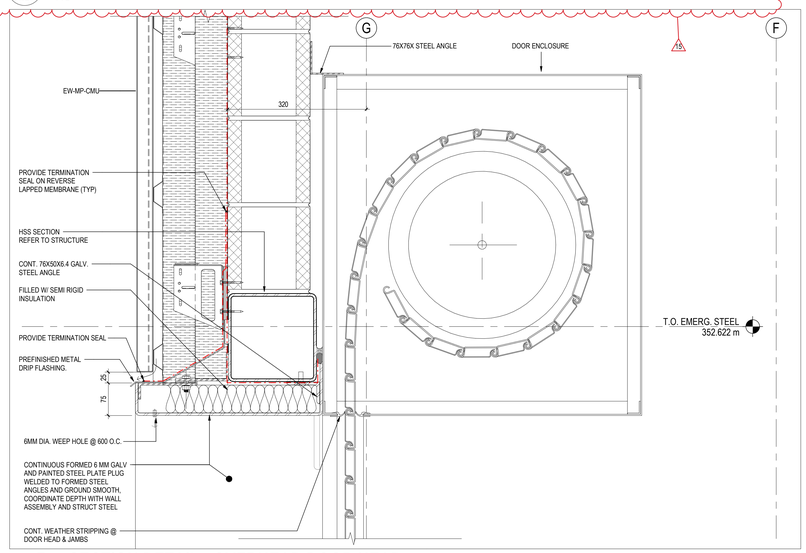
8 A620 TYPICAL PARAPET DETAIL @ CERAMIC CLADDING w/ STEEL STUD

1 : 2



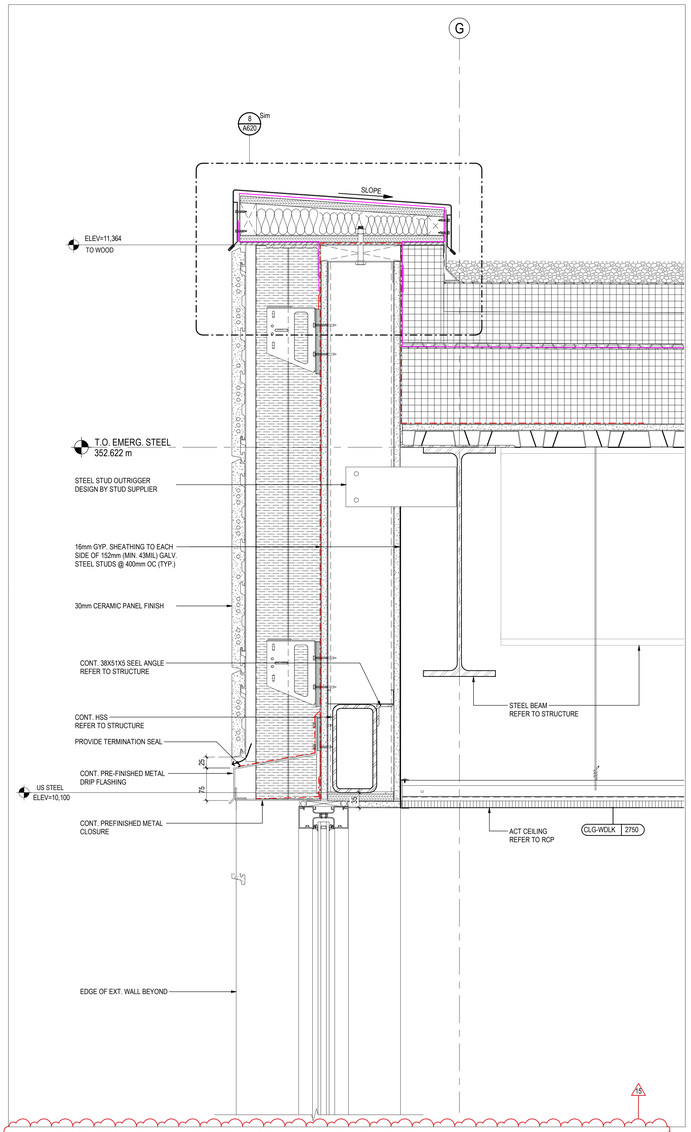
4 A620 SECTION DETAIL - WALL EW-MP-CMU BASE

1 : 5, REF: 1/ A561/



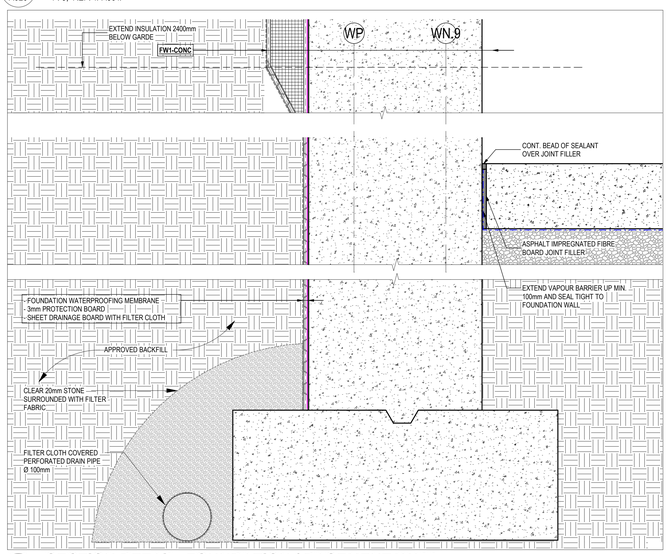
5 A620 SECTION DETAIL - OVERHEAD DOOR HEAD

1 : 5, REF: 2/ A561/



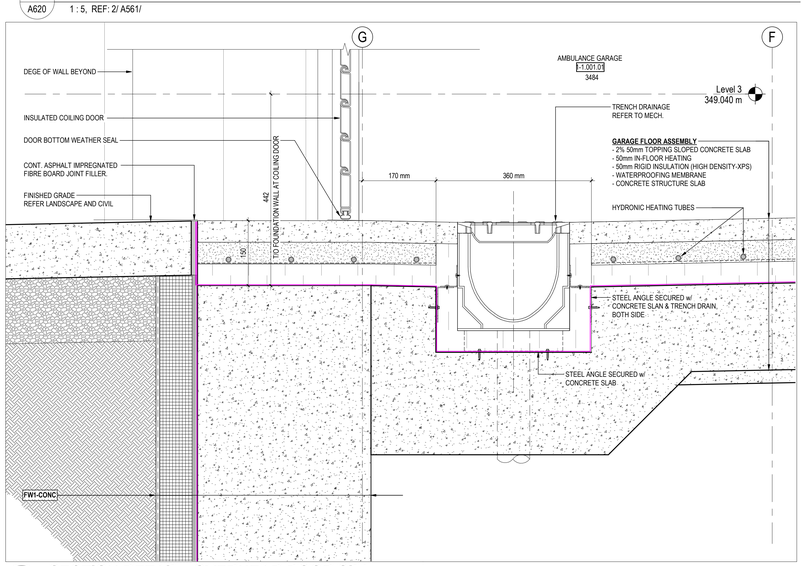
6 A620 SECTION DETAIL STOREFRONT HEAD / PARAPET

1 : 5, REF: 6/ A561/



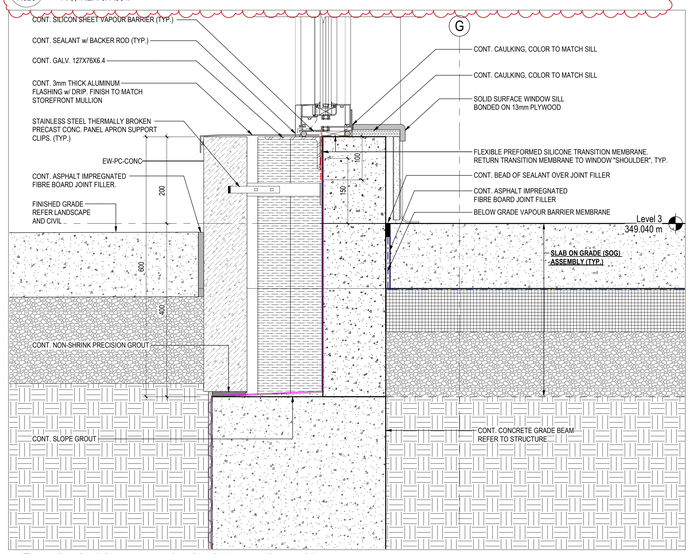
1 A620 SECTION DETAIL- FOUNDATION / BASEMENT WALL

1 : 5, REF: 1/ A561/



2 A620 SECTION DETAIL - OVERHEAD DOOR SILL

1 : 5, REF: 2/ A561/



3 A620 SECTION DETAIL STOREFRONT SILL

1 : 5, REF: 6/ A561/

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Notes

15	ISSUED FOR ADDENDUM No.2		2024.04.21
12	ISSUED FOR TENDER		2024.06.07
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9	ISSUED FOR BUILDING PERMIT		2024.03.28
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5	ISSUED FOR 60% CONSTRUCTION DOCUMENTS		2023.10.26
No.	Issued/Revision	By	Appd. YYYY.MM.DD

File Name: N/A | Author: Dwn. | Designer: Dsgn. | Checker: Chkd. | 07/18/23 YYYY.MM.DD

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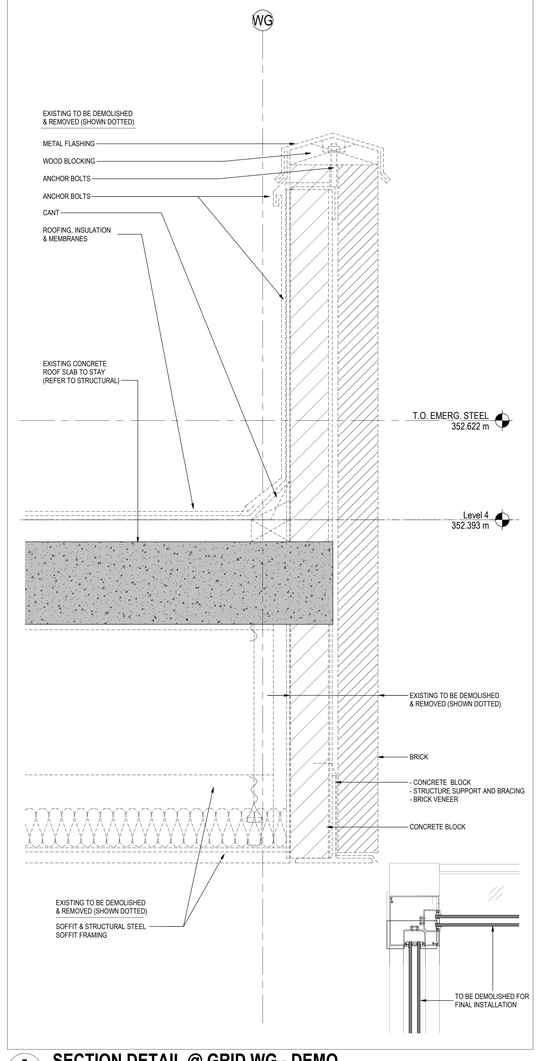
Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

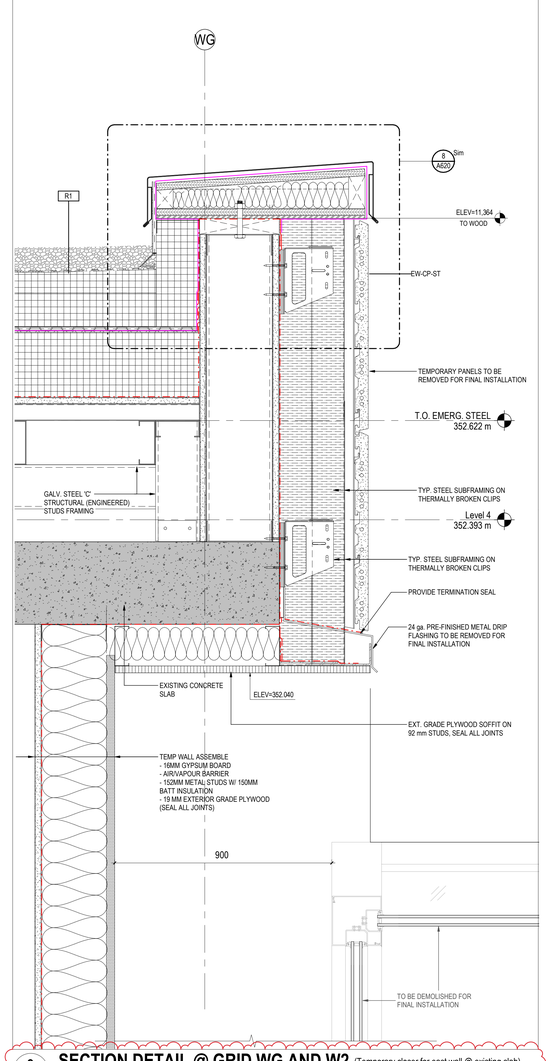
Title
PHASE 1 - ENVELOPE SECTION DETAILS

Project No. 140022022 | Scale As indicated

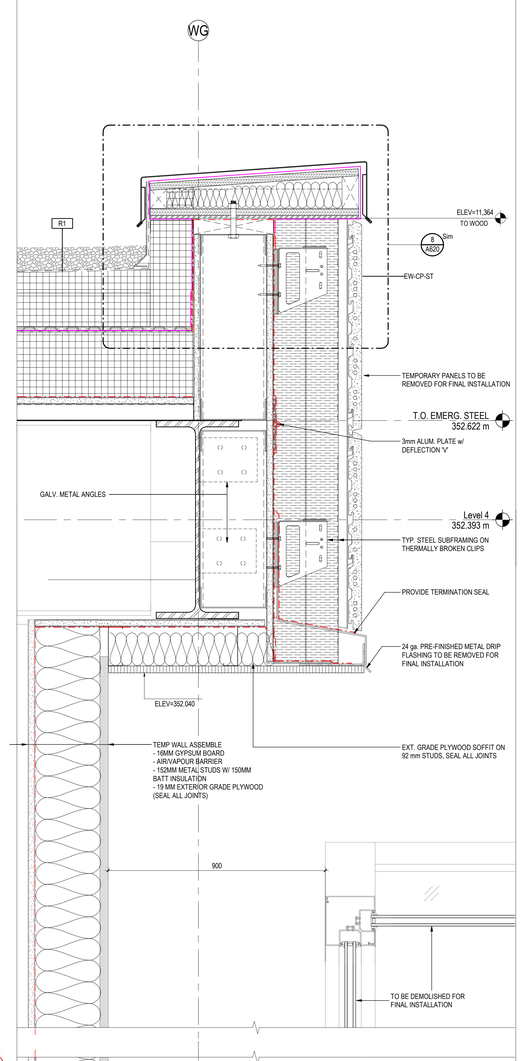
Revision 15 | Drawing No. A620



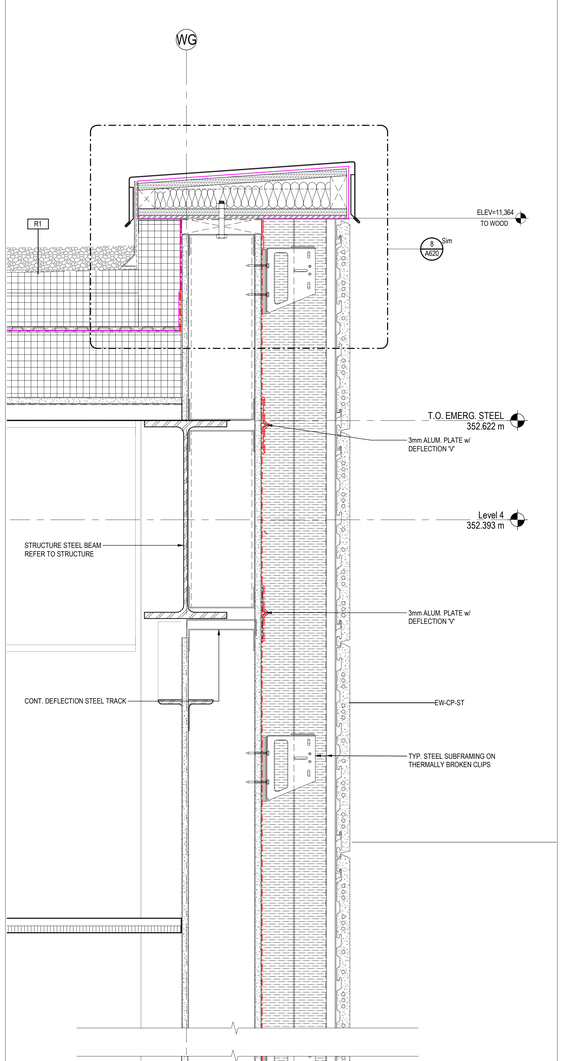
5 A623 **SECTION DETAIL @ GRID WG - DEMO**
1 : 5



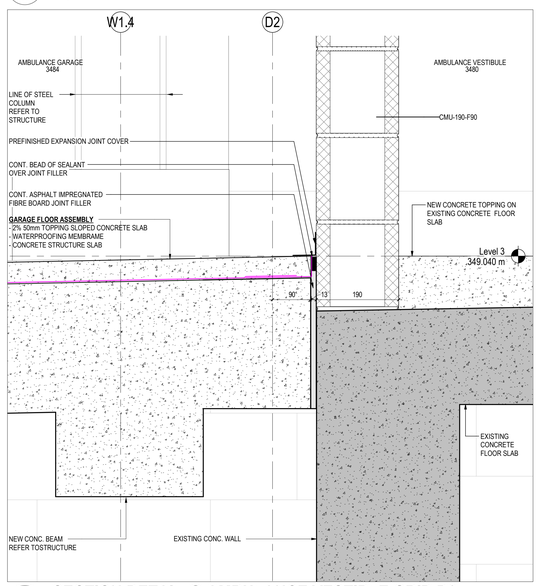
6 A623 **SECTION DETAIL @ GRID WG AND W2** (Temporary closer for east wall @ existing slab)
1 : 5



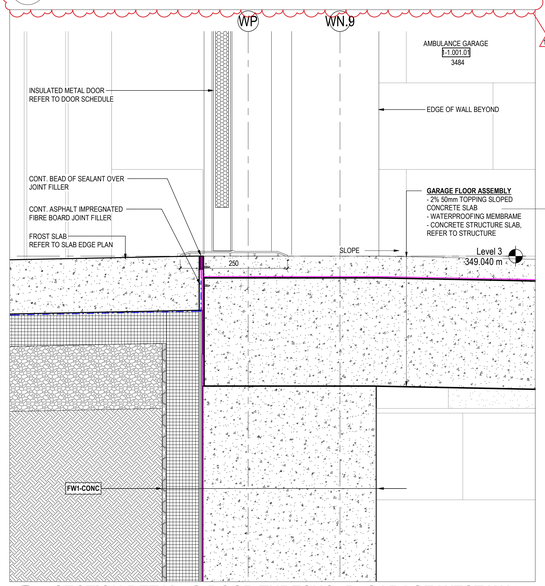
3 A623 **SECTION DETAIL @ GRID WG AND D4** (Temporary closer for east wall at new steel structure)
1 : 5



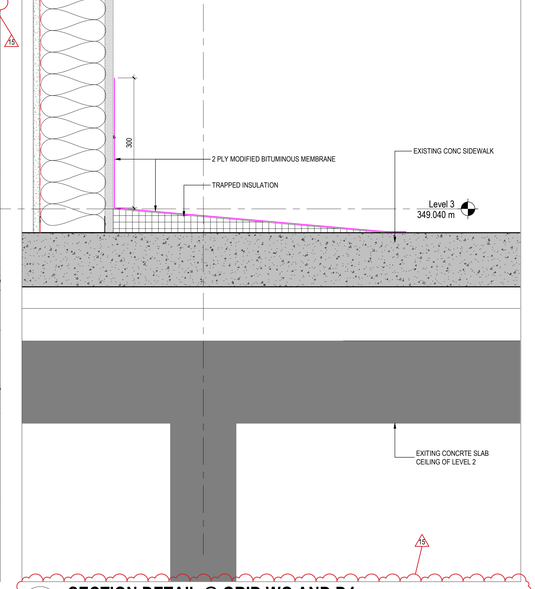
4 A623 **SECTION DETAIL @ EAST WALL**
1 : 5



1 A623 **SECTION DETAIL @ AMBULANCE VESTIBLE GRID D2**
1 : 5



2 A623 **SECTION DETAIL @ DOOR THRESHOLD, GARAGE WEST WALL**
1 : 5



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Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	12/21/23
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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Emergency Mental Health and Addictions Services Relocation and Emergency Department Expansion

115 DELHI STREET, GUELPH ON N1E 4J4

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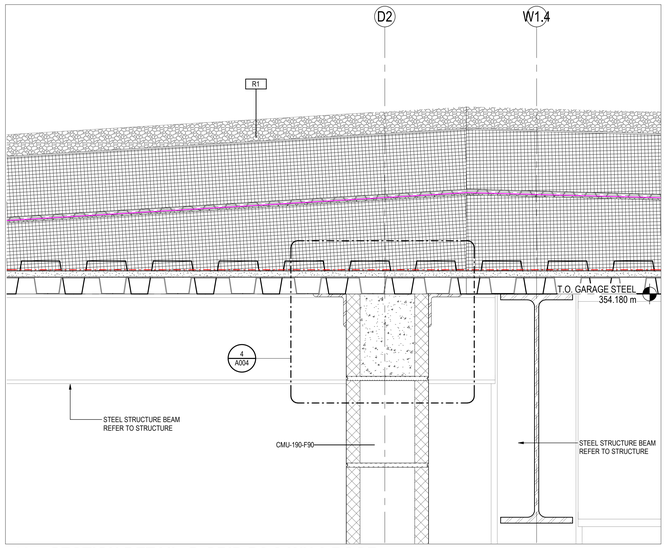
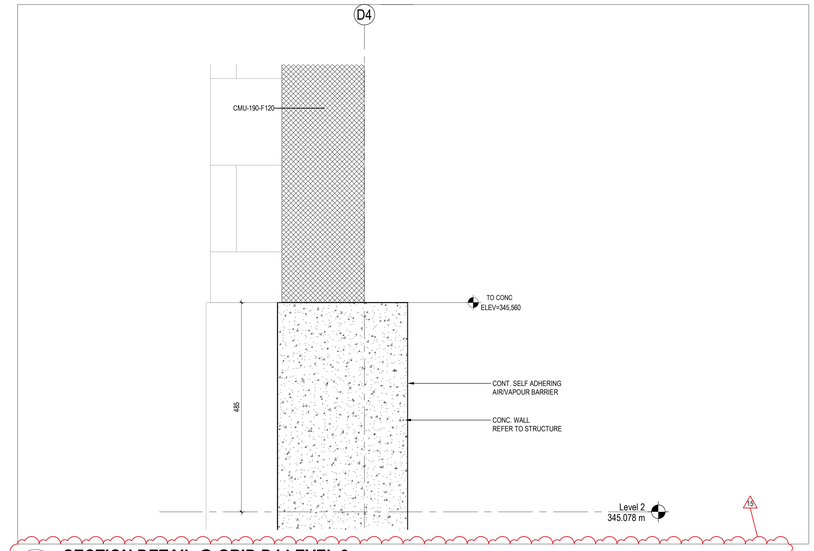
PHASE 1 - ENVELOPE SECTION DETAILS

Project No. 140022022	Scale 1 : 5
Revision 15	Drawing No. A623



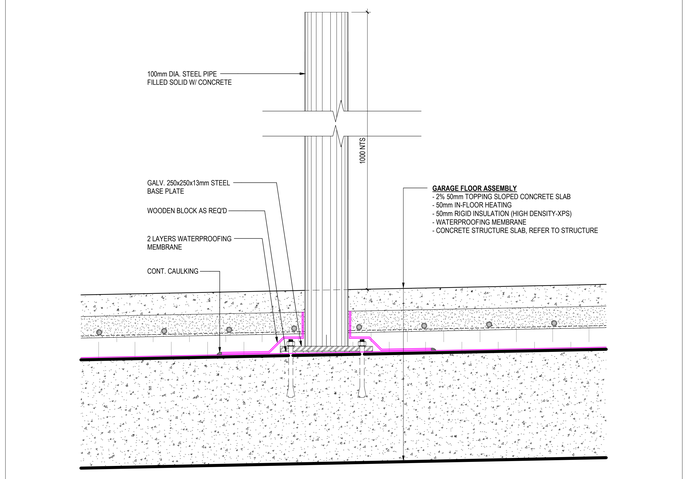
6 A625 **SECTION DETAIL @ GRID D2 & WN.9 ROOF**

1 : 5, REF: 4/ A563/



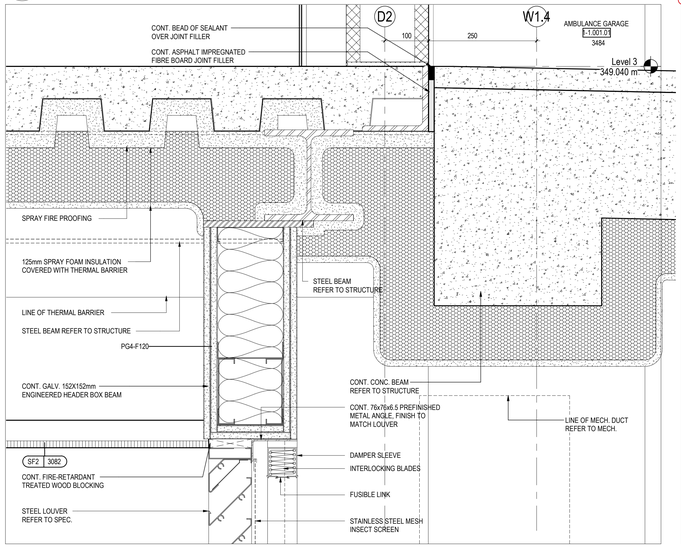
7 A625 **SECTION DETAIL @ GRID D4 LEVEL 2**

1 : 5, REF: 1/ A302.1/



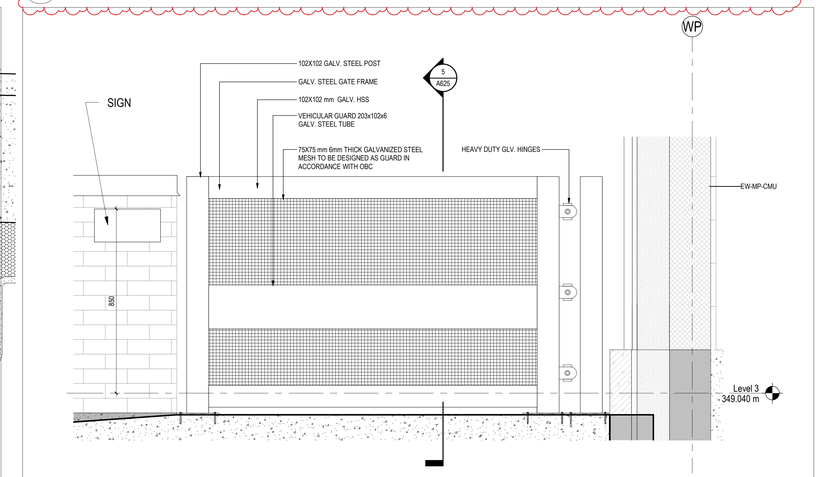
8 A625 **BOLLARD DETAIL AT GARAGE**

1 : 5,



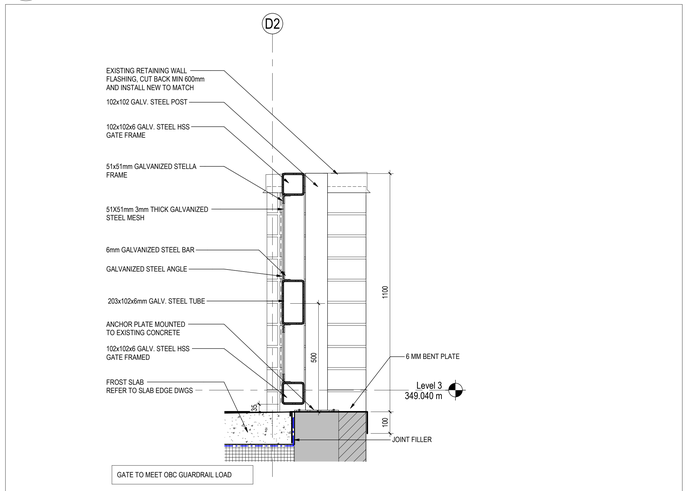
3 A625 **SECTION DETAIL @ GRID D2 & WN.9 LEVEL 3**

1 : 5, REF: 4/ A563/



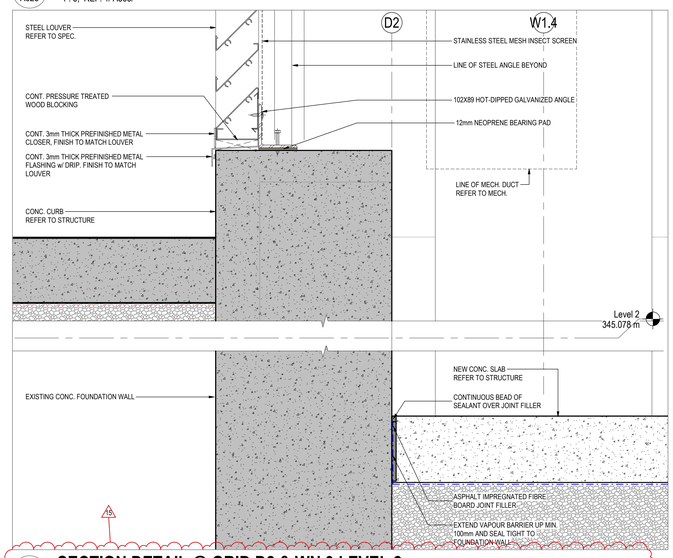
4 A625 **ELEVATION - STEEL GATE**

1 : 10, REF: 1/ A303.1/



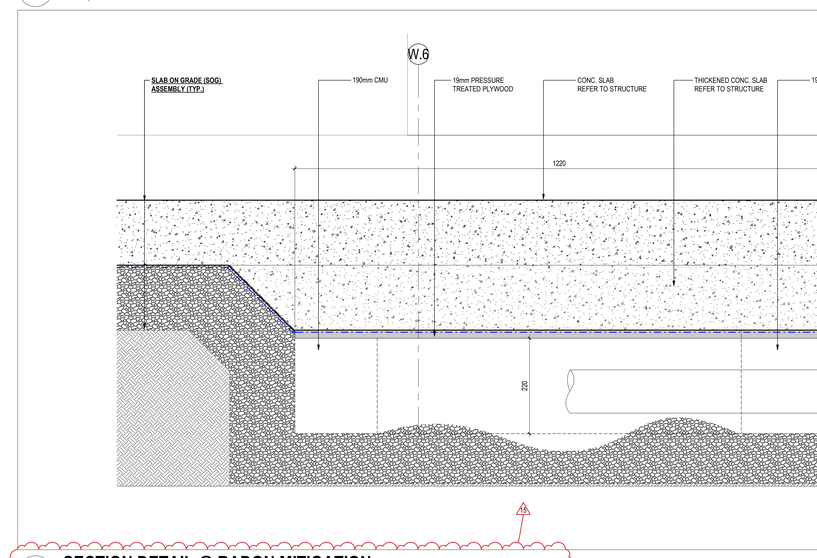
5 A625 **SECTION DETAIL - STEEL GATE**

1 : 10, REF: 2/ A612/



1 A625 **SECTION DETAIL @ GRID D2 & WN.9 LEVEL 2**

1 : 5, REF: 4/ A563/



2 A625 **SECTION DETAIL @ RADON MITIGATION**

1 : 5,

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Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	01/30/24
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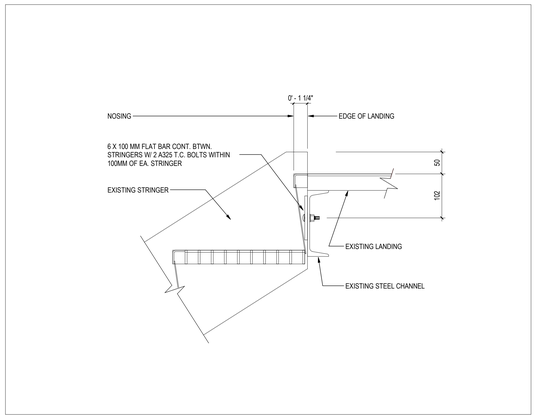
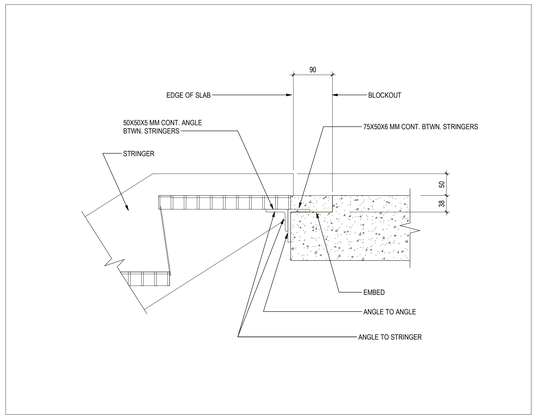
Title

PHASE 1 - ENVELOPE SECTION DETAILS

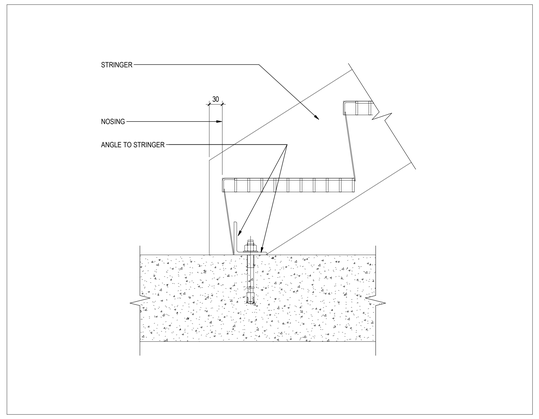
Project No. 140022022	Scale As indicated
Revision 15	Drawing No. A625



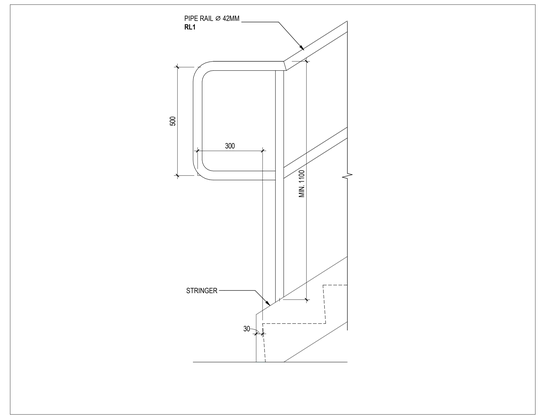
11 A700 **EXISTING STAIR TOP CONNECTION**
1 : 5



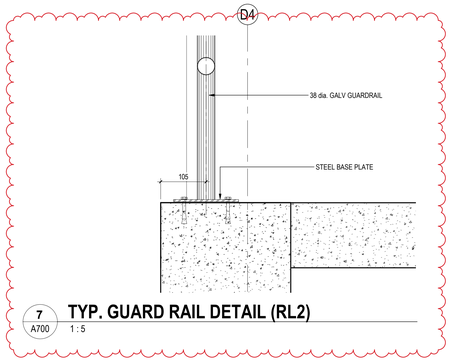
12 A700 **EXTENDED TOP CONNECTION TO EMBED**
1 : 5



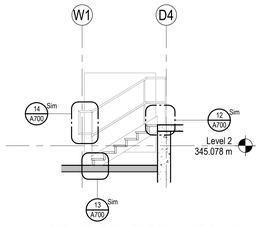
13 A700 **CONNECTION TO CONCRETE SLAB**
1 : 5



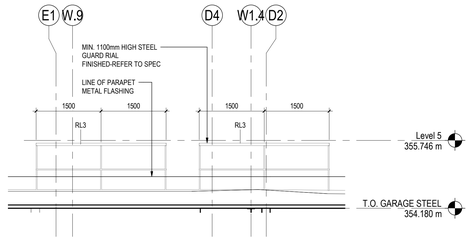
14 A700 **PIPE RAILING DETAIL**
1 : 10



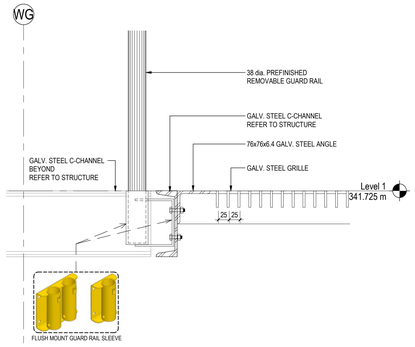
7 A700 **TYP. GUARD RAIL DETAIL (RL2)**
1 : 5



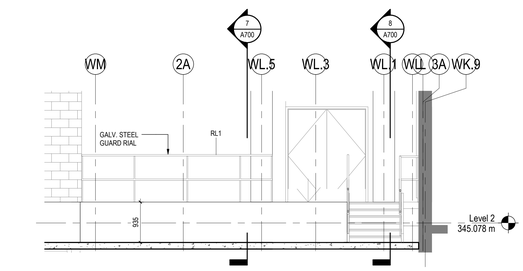
8 A700 **STAIR SECTION - MECH ROOM 2241**
1 : 50



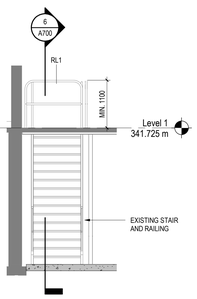
9 A700 **ELEVATION - RAILING AT LEVEL 4**
1 : 50



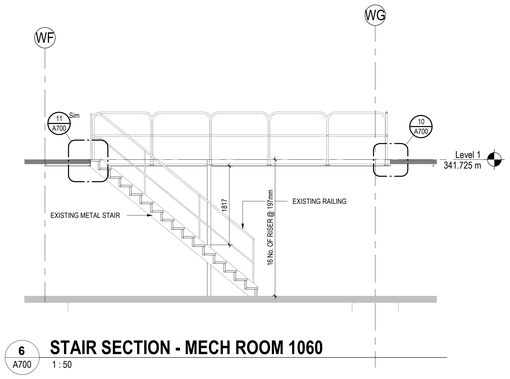
10 A700 **REMOVABLE GUARD RAIL DETAIL (RL1)**
1 : 5



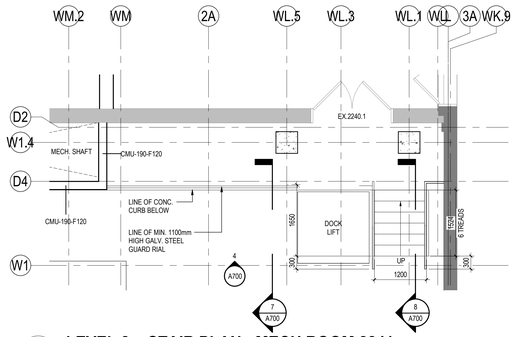
4 A700 **STAIR & RAILING ELEVATION - MECH ROOM 2241**
1 : 50



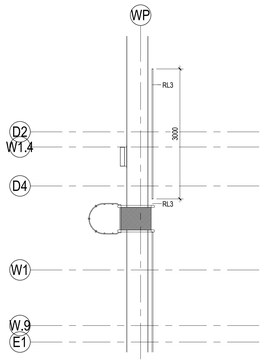
5 A700 **STAIR ELEVATION - MECH ROOM 1060**
1 : 50



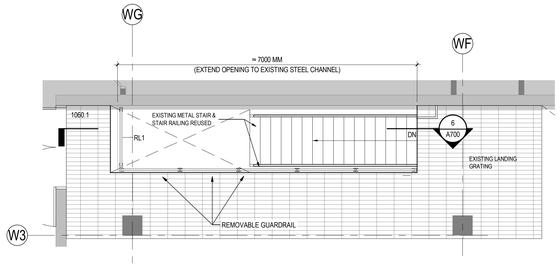
6 A700 **STAIR SECTION - MECH ROOM 1060**
1 : 50



1 A700 **LEVEL 2 - STAIR PLAN - MECH ROOM 2241**
1 : 50



2 A700 **LEVEL 4 - ENLARGED FLOOR PLAN - RAILING**
1 : 50



3 A700 **LEVEL 1 - STAIR PLAN - MECH ROOM 1060**
1 : 50

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RAILING TYPES

RL1 - ALUMINUM PIPE HANDRAIL/ GUARDRAIL

RL2 - REMOVABLE SAFETY RAILING

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8	ISSUED FOR STAGE 2.3 HCH SUBMISSION			2024.02.23
Issued/Revision		By	Appd	YYYY.MM.DD

File Name: N/A	Author	Designer	Checker	01/29/24
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PHASE 1 - STAIR & GUARDRAIL DETAILS

Project No. 140022022

Scale As indicated

Revision 15

Drawing No. **A700**

June 21, 2024 Stantec Consulting Ltd., Structural

ADDENDUM NO. 2

This Addendum forms part of the Contract Documents and amends the original Drawings, Specifications, Schedules and Details dated June 07, 2024.

1 Drawings

1.1 REFER TO STRUCTURAL DRAWING: S-201

1.1.1 Adjustment to the location of dock leveler pit.

1.1.2 Revised concrete wall and curb height.

1.2 REFER TO STRUCTURAL DRAWING: S-300

1.2.1 Revised concrete wall and curb height.

1.3 REFER TO STRUCTURAL DRAWING: S-302

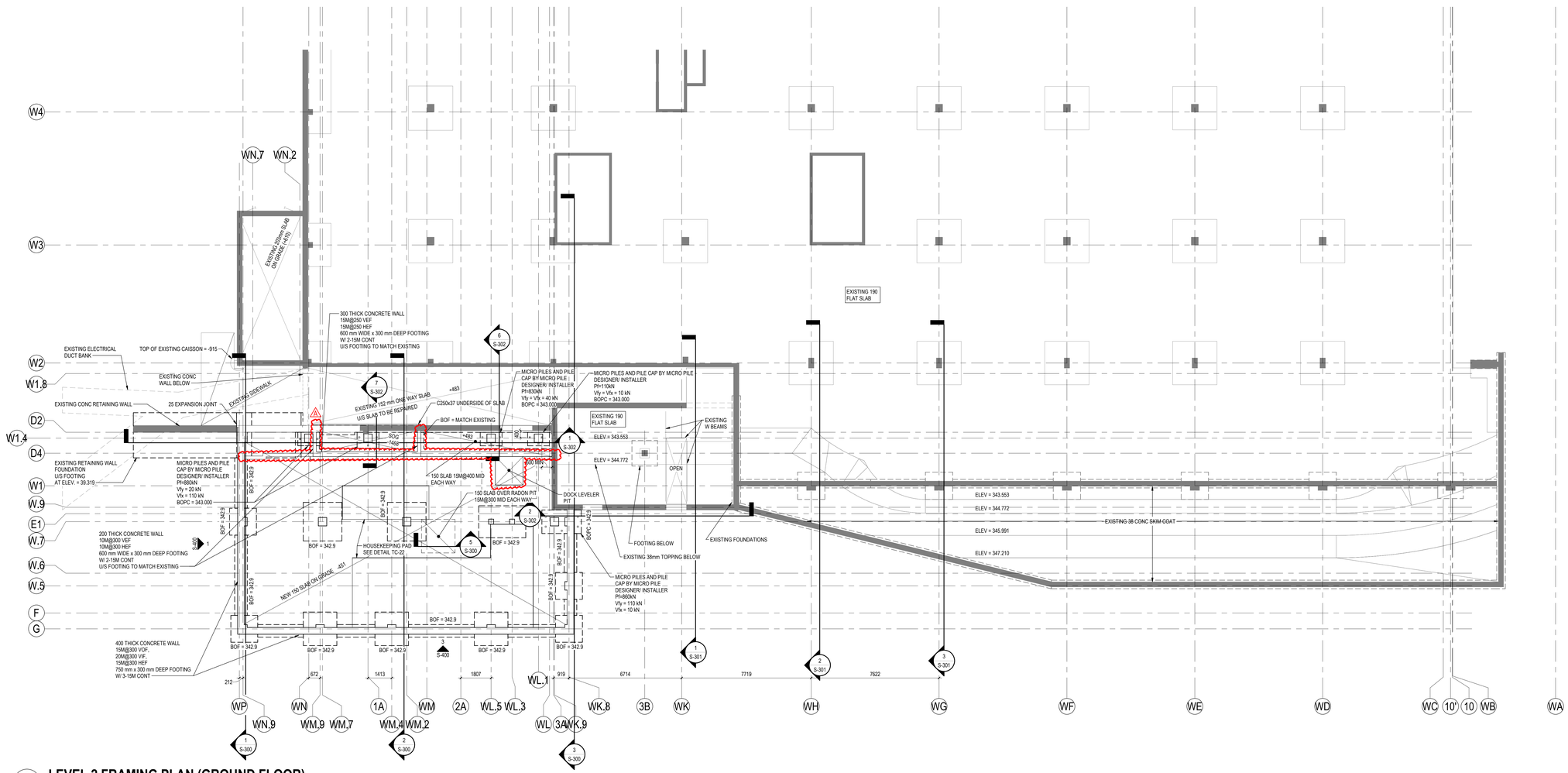
1.3.1 Revised concrete wall and curb height.

2 ATTACHMENTS

2.1 RE-ISSUED DRAWINGS

2.1.1 S-201, S-300, S-302

END OF ADDENDUM



1 S-201 LEVEL 2 FRAMING PLAN (GROUND FLOOR)

1 : 100

NOTE:

1. FINISHED LEVEL 2 FLOOR AT ELEVATION 345.078, EXCEPT AS CROSSED AND NOTED.
2. FOOTINGS BEARING ON NATURAL UNDISTURBED SOIL HAVE A SERVICEABILITY LIMIT STATE (SLS) BEARING CAPACITY OF 200 kPa AND AN ULTIMATE LIMIT STATE BEARING CAPACITY OF 300 kPa.
3. BEFORE PLACING SLAB-ON-GRADE, VERIFY THAT BEARING CAPACITY OF SUBGRADE AND COMPACTION OF SUB-BASE ARE ADEQUATE TO SUPPORT 25 kPa UNIFORMLY DISTRIBUTED LOAD ON SLAB-ON-GRADE WITHOUT SIGNIFICANT DIFFERENTIAL SETTLEMENT BETWEEN SLAB AND BUILDING FOUNDATIONS.
4. FOOTING ELEVATIONS AND BEARING VALUE OF SOIL UNDER FOOTINGS AND SLAB ON GRADE ARE BASED ON INFORMATION AVAILABLE AT THE TIME DRAWINGS ARE ISSUED. REPORT ANY ADJUSTMENTS NECESSARY DUE TO ACTUAL SITE CONDITIONS TO CONSULTANT BEFORE PROCEEDING WITH THE WORK.
5. CONCRETE: SEE SPECIFICATIONS AND CONCRETE MIX TABLE ON TYPICAL DETAIL DRAWINGS. PROVIDE 50 mm SKIM SLAB OVER THE BEARING SURFACES BASE IF STRUCTURAL CONCRETE CANNOT BE PROVIDED WITHIN 24 HOURS OF APPROVAL OF THE FOUNDATION BASE AND IMMEDIATELY UPON COMPLETION OF BEARING SURFACE PREPARATION AND VERIFICATION BY GEOTECHNICAL CONSULTANT.
6. SEE ARCHITECTURAL AND MECHANICAL DRAWINGS FOR DEPRESSIONS IN SLAB ON GRADE.
7. SEE GENERAL NOTES AND TYPICAL DETAILS ON DRAWINGS S-100 TO S-104.
8. SEE COLUMN AND FOOTING SCHEDULE ON DRAWINGS S-500.
9. LEFT - RIGHT CORRESPONDS TO X DIRECTON AND UP - DOWN IS Y DIRECTION.

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	ISSUED FOR COSTING AND DGH REVIEW			2023.12.21
	PROGRESS SET			2023.11.23
	ISSUED FOR 60% CONSTRUCTION DOCUMENTS			2023.10.26
	ISSUED FOR MOH STAGE 2.2 SUBMISSION			2023.06.09
	ISSUED FOR DD COSTING AND CLIENT REVIEW			2023.29.03

File Name: N/A — PC Dwn. — RG Dsgn. — JL Chkd. — 2023.03.28 YYYY.MM.DD

Permit/Seal

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project

EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION.

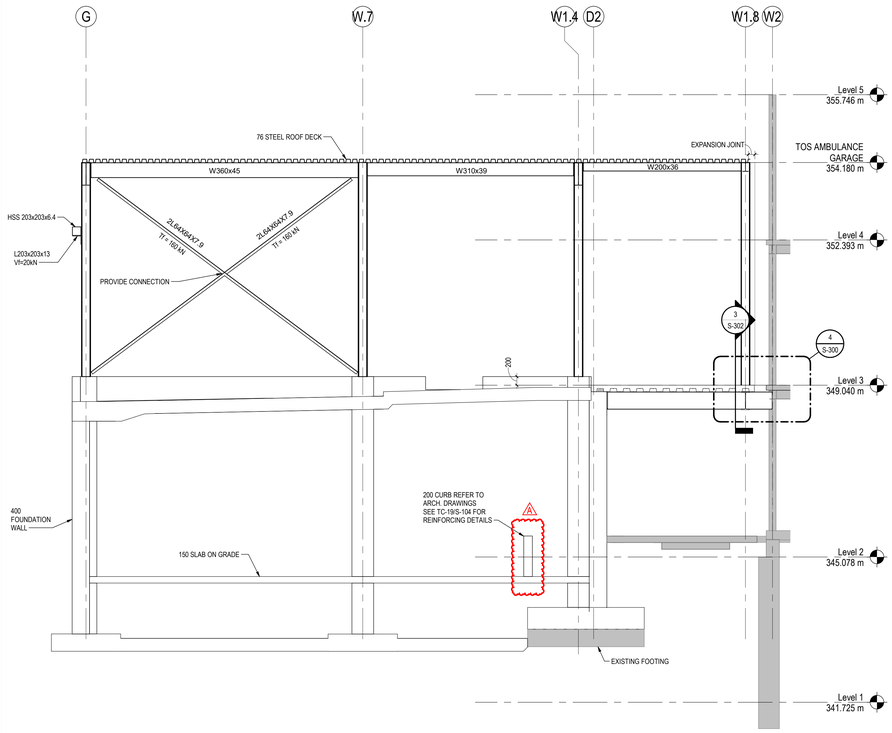
Title

LEVEL 2 FRAMING PLAN

TRUE NORTH

Project No. 140022022 — Scale 1 : 100

Revision A — Drawing No. S-201



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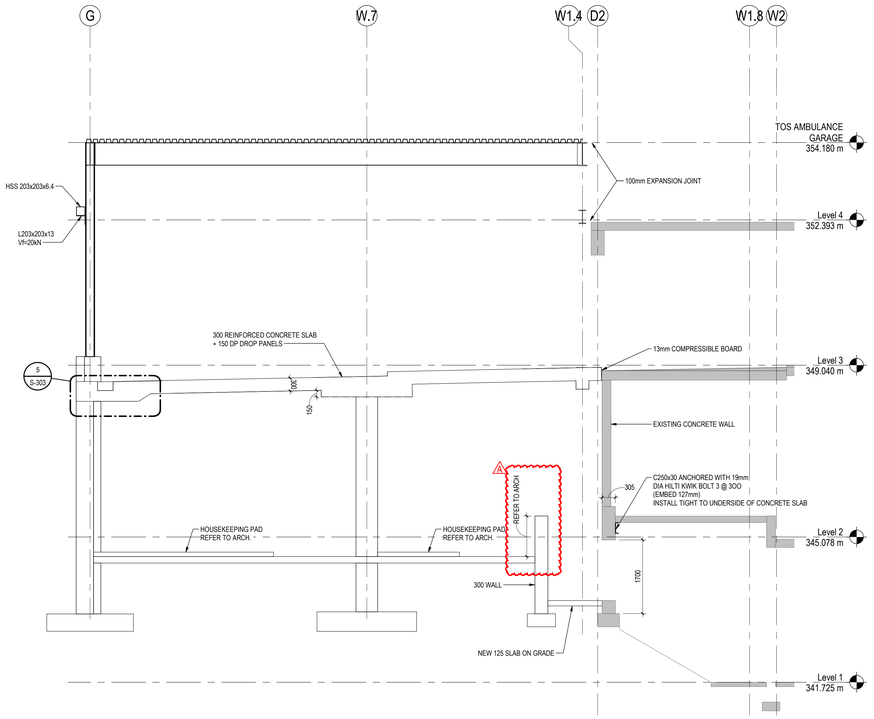
S-300 1 : 50



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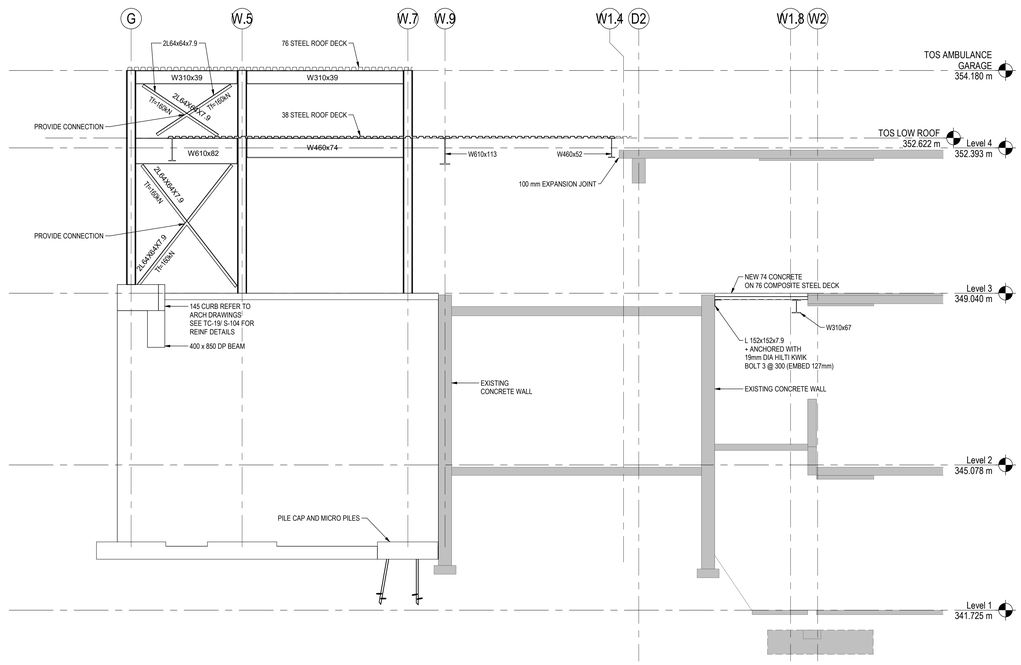
S-300 1 : 50



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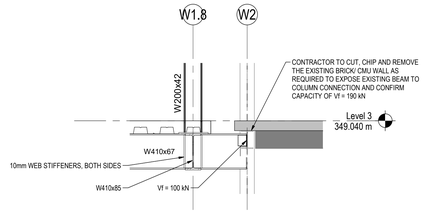
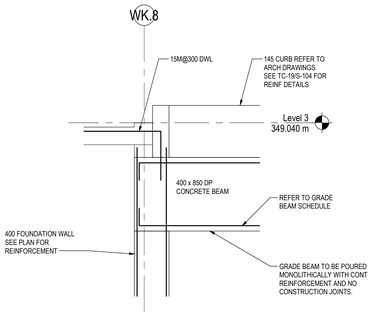


4 DETAIL
S-300 1 : 25



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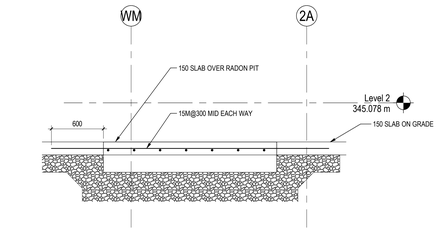

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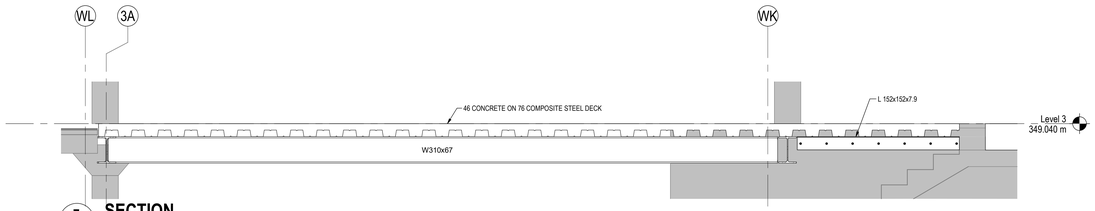
S-300 1 : 25



7 SECTION
S-300 1 : 25

Stantec

Stantec Consulting Ltd.
400-2100 Derry Road West
Mississauga, ON L5N 0B3
Tel: (905) 858-4424

Consultant

Notes

A	ISSUED FOR ADDENDUM NO. 2		2024.06.21
	ISSUED FOR TENER		2024.06.07
	ISSUED FOR PRE-TENDER		2024.05.27
	ISSUED FOR BUILDING PERMIT		2024.03.28
	ISSUED FOR STAGE 2.3 MOH SUBMISSION		2024.02.23
	ISSUED FOR COSTING AND QGH REVIEW		2023.12.21
	PROGRESS SET		2023.11.23
	ISSUED FOR 60% CONSTRUCTION DOCUMENTS		2023.10.26
	ISSUED FOR MOH STAGE 2.2 SUBMISSION		2023.06.09
	ISSUED FOR DD COSTING AND CLIENT REVIEW		2023.09.03
Issued/Revision		By	Appd YYYY.MM.DD
File Name: N/A		PC Dwn.	RG Dsgn.	JL Chkd.	2023.03.28 YYYY.MM.DD

Permit/Seal

Client/Project Logo

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Client/Project

EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION.

Title

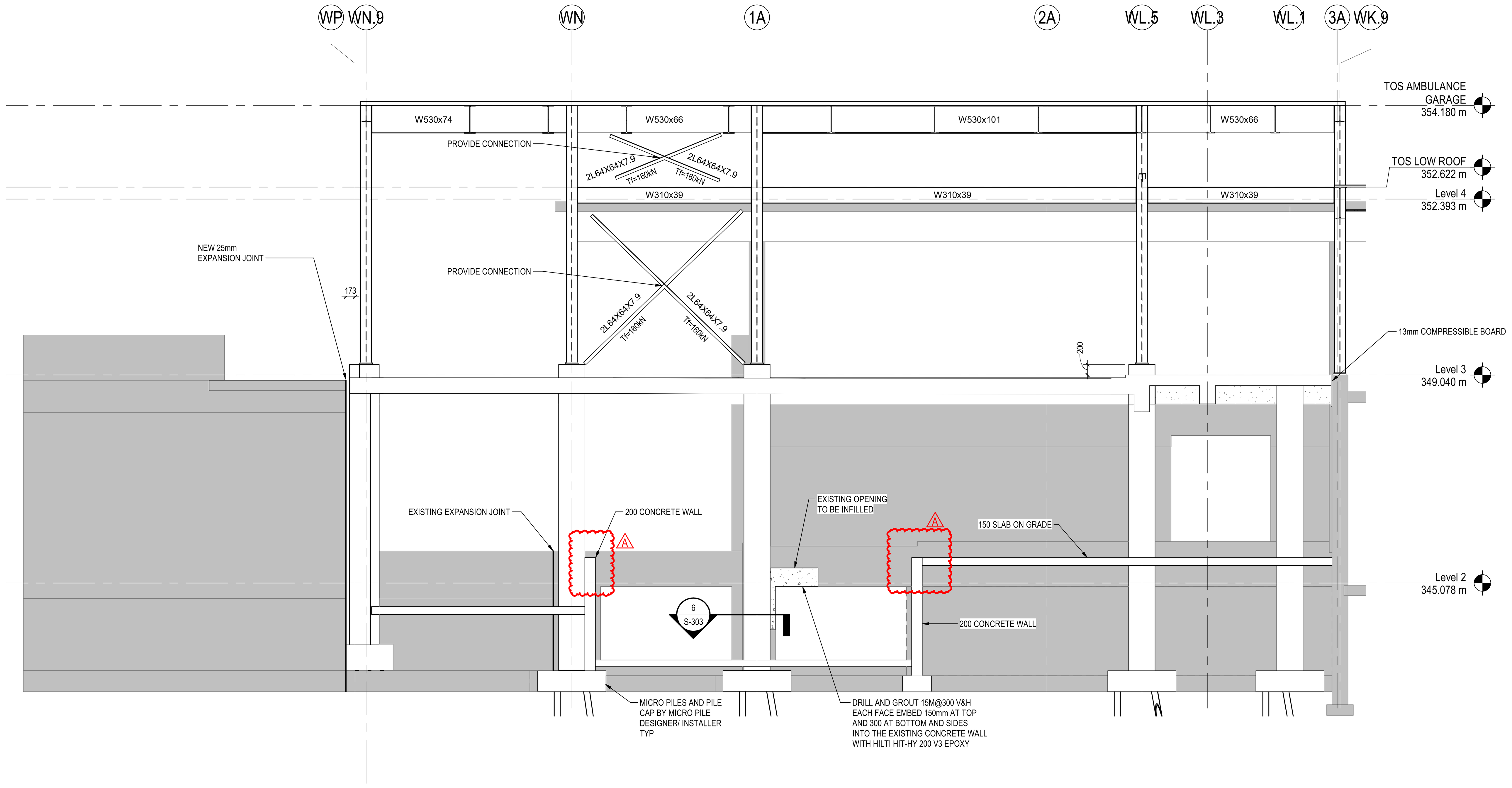
SECTIONS

Project No. 140022022

Scale As indicated

Revision A

Drawing No. **S-300**



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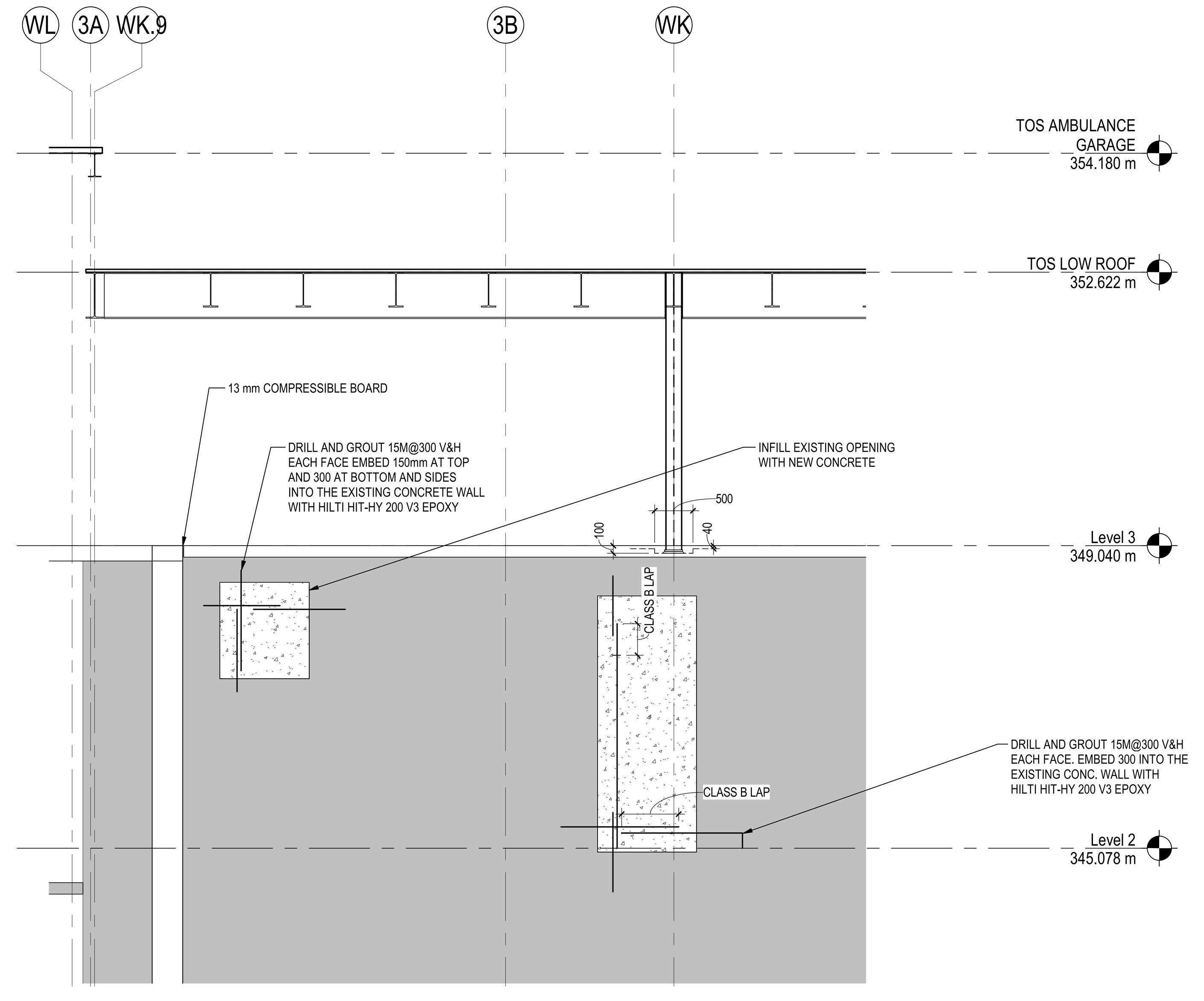

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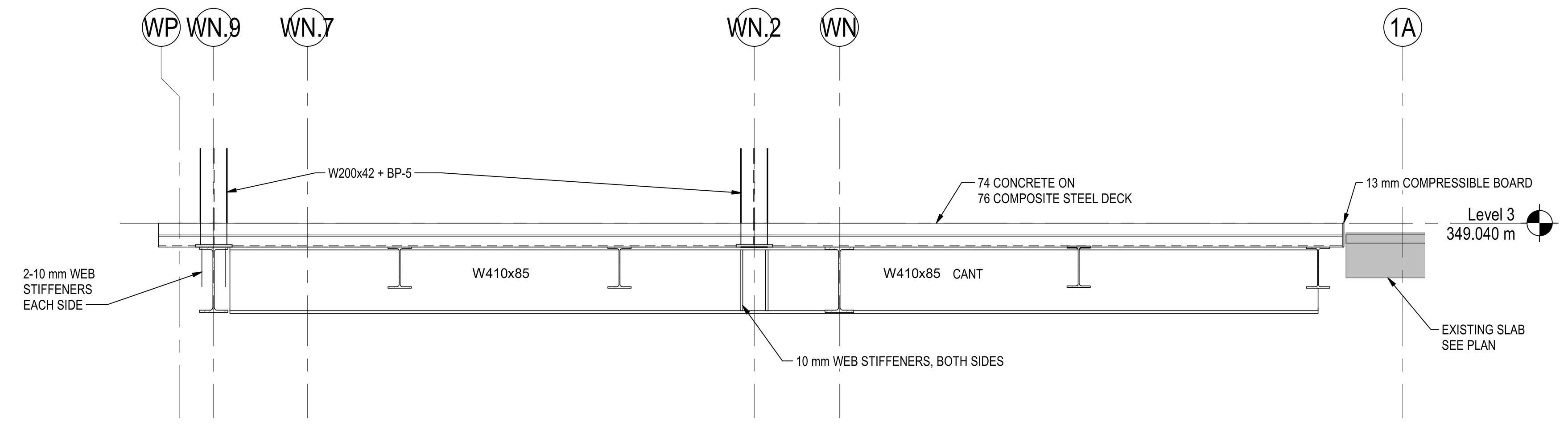

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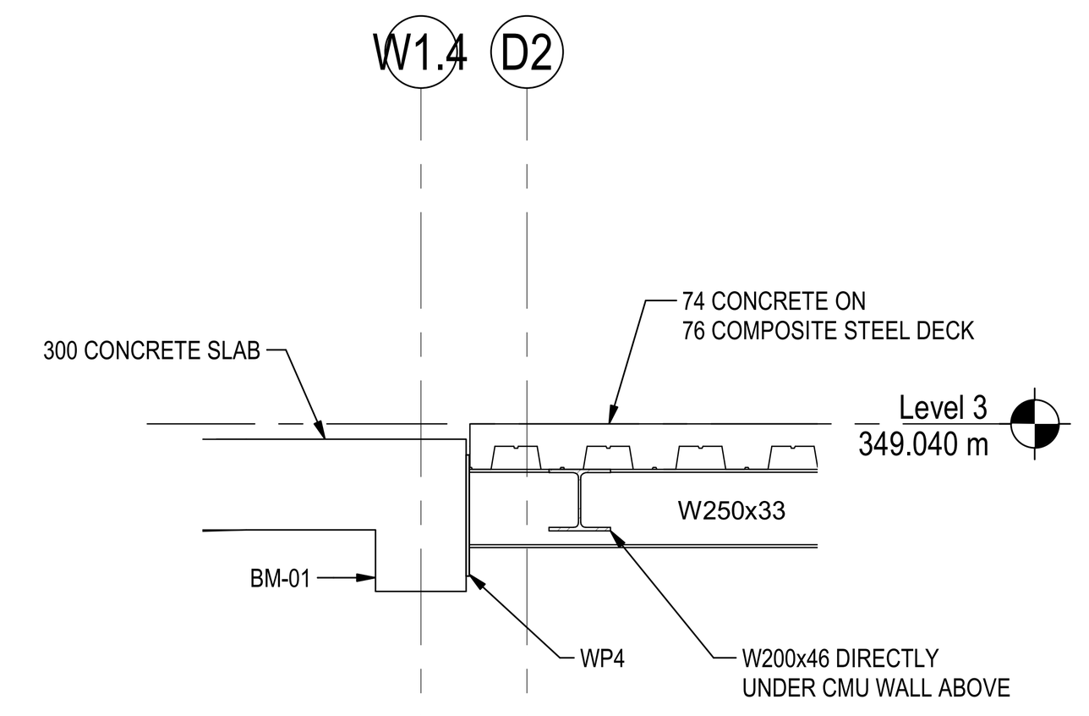

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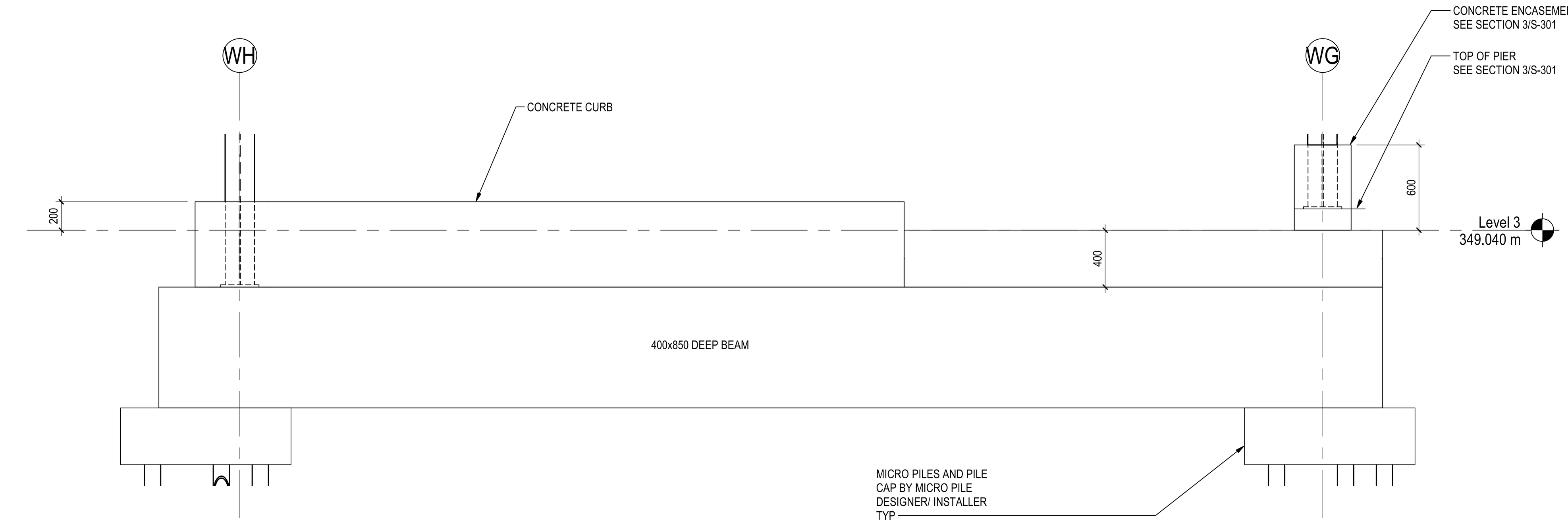

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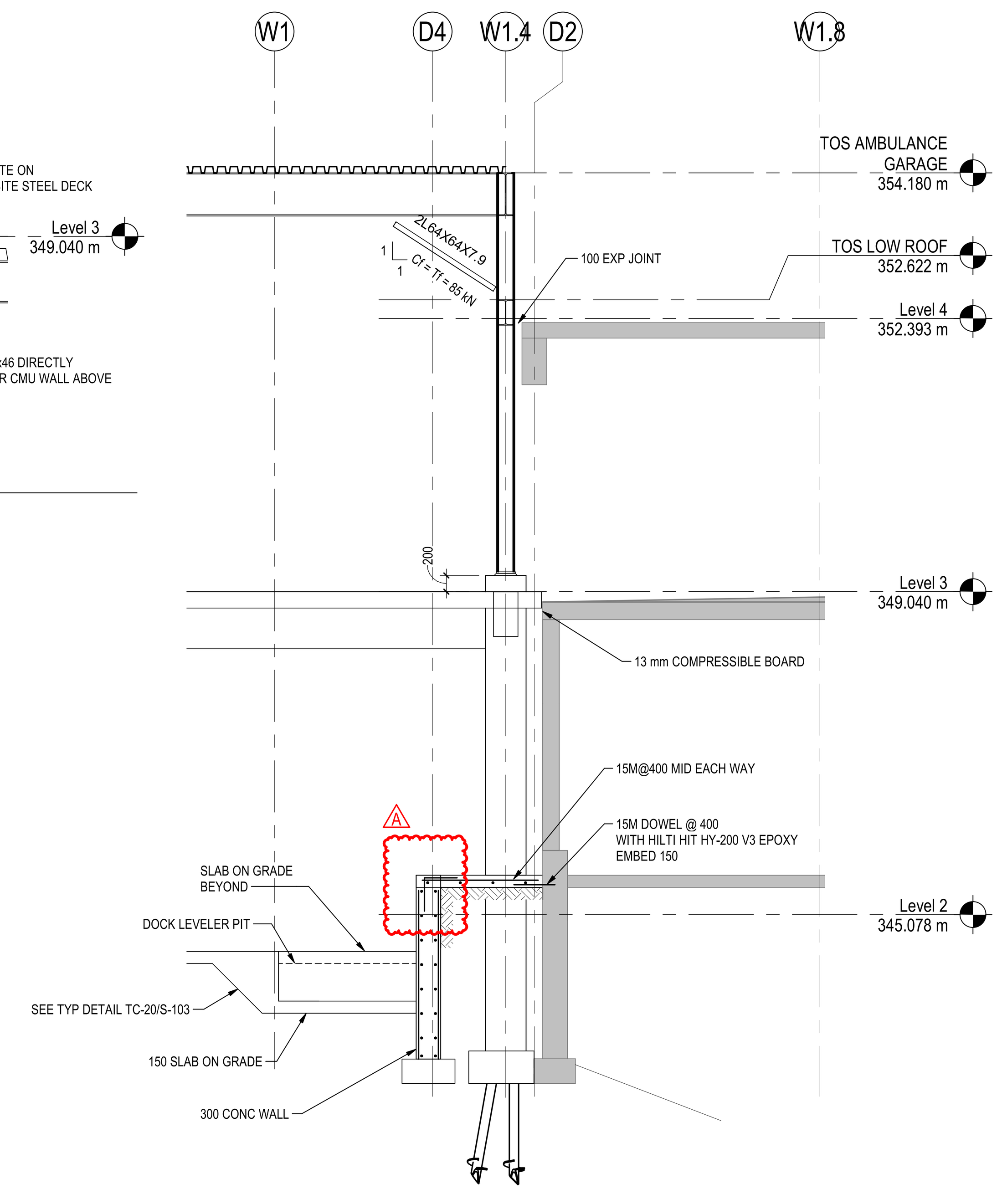

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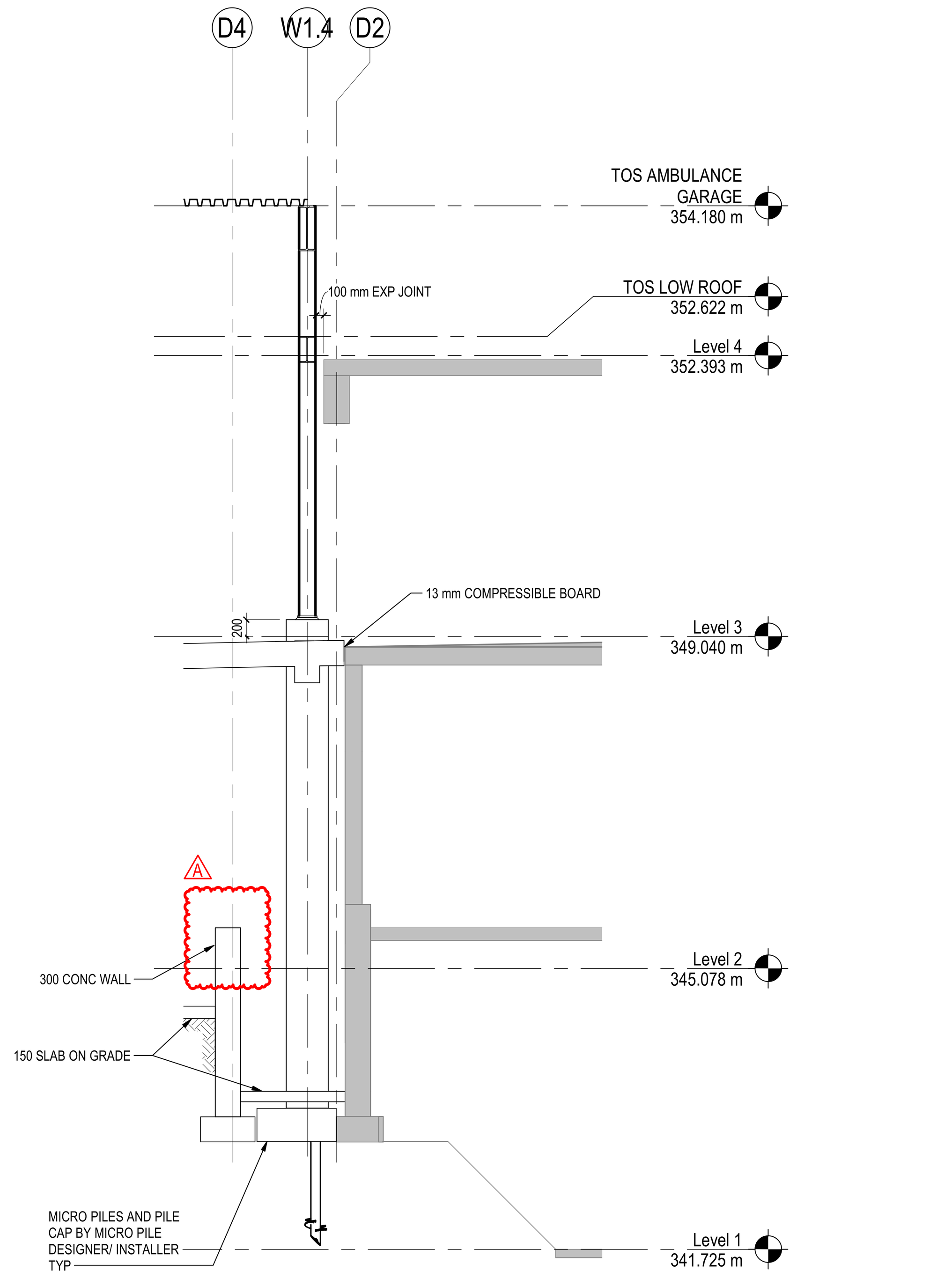

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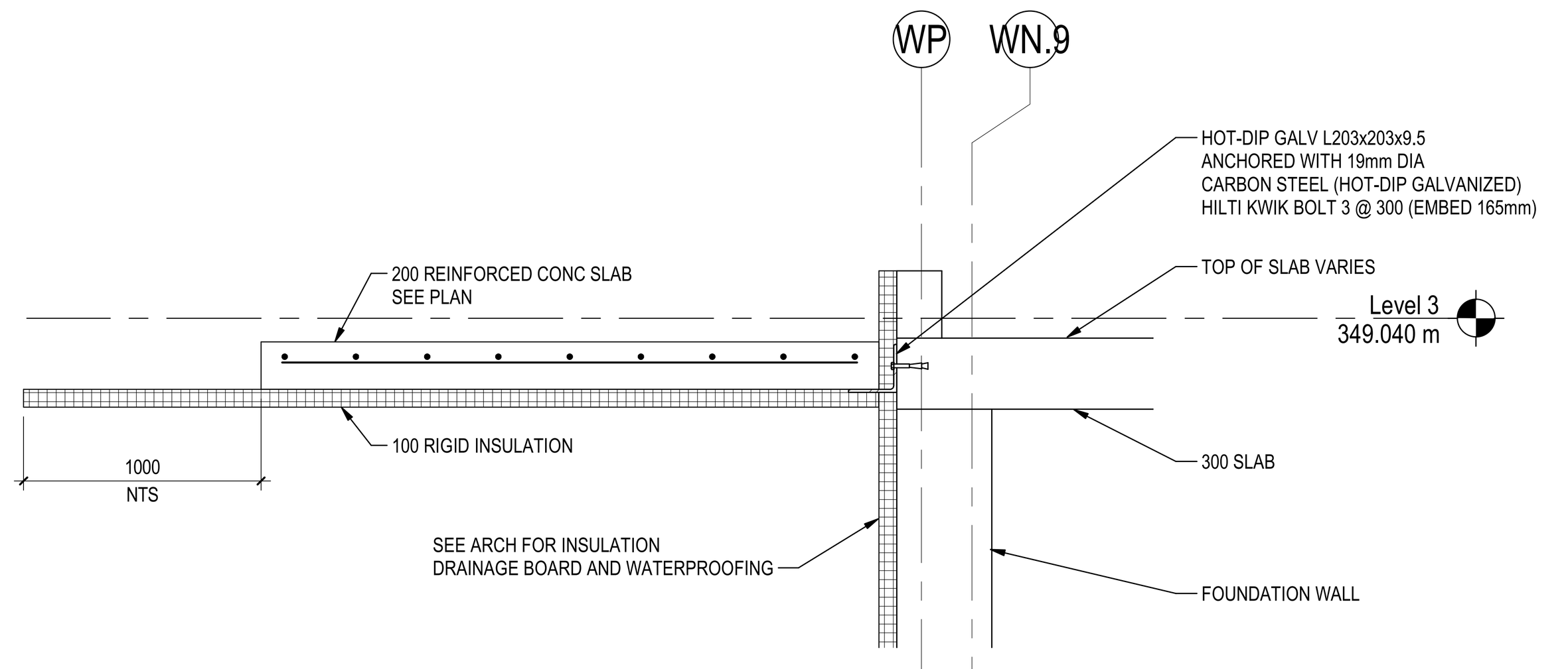

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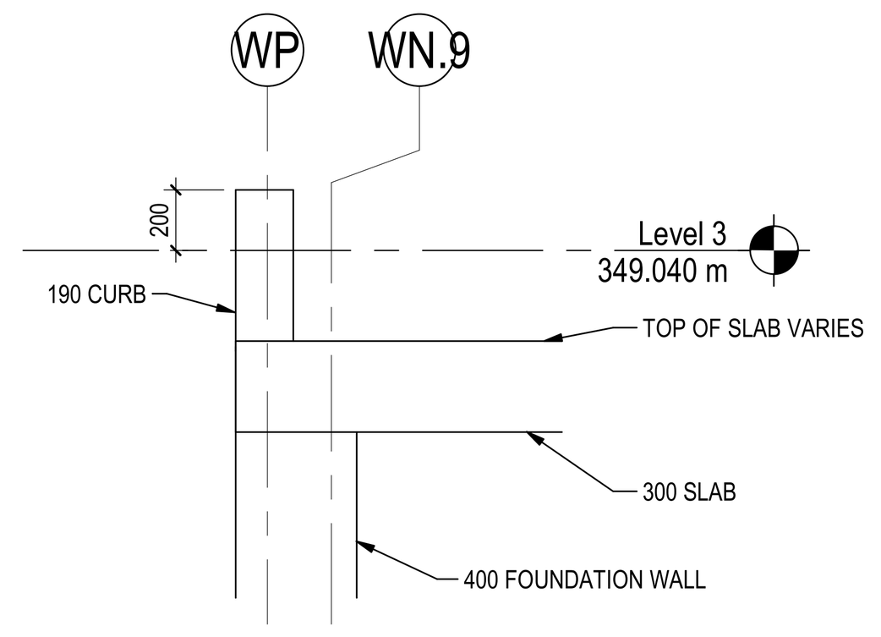

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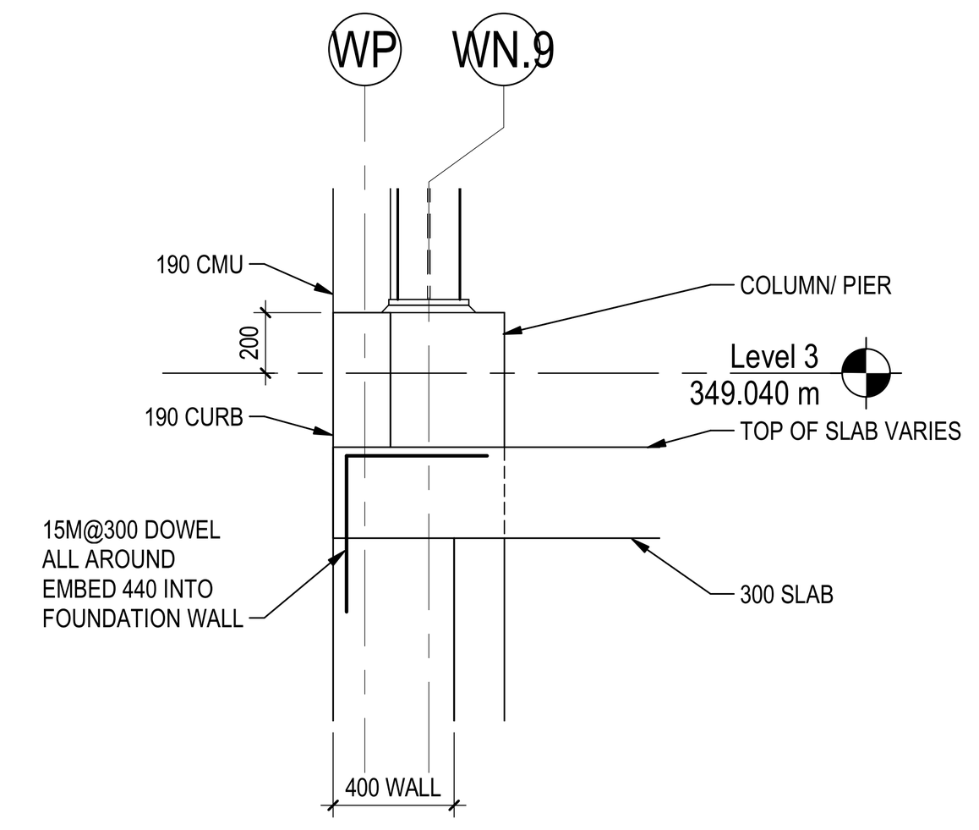

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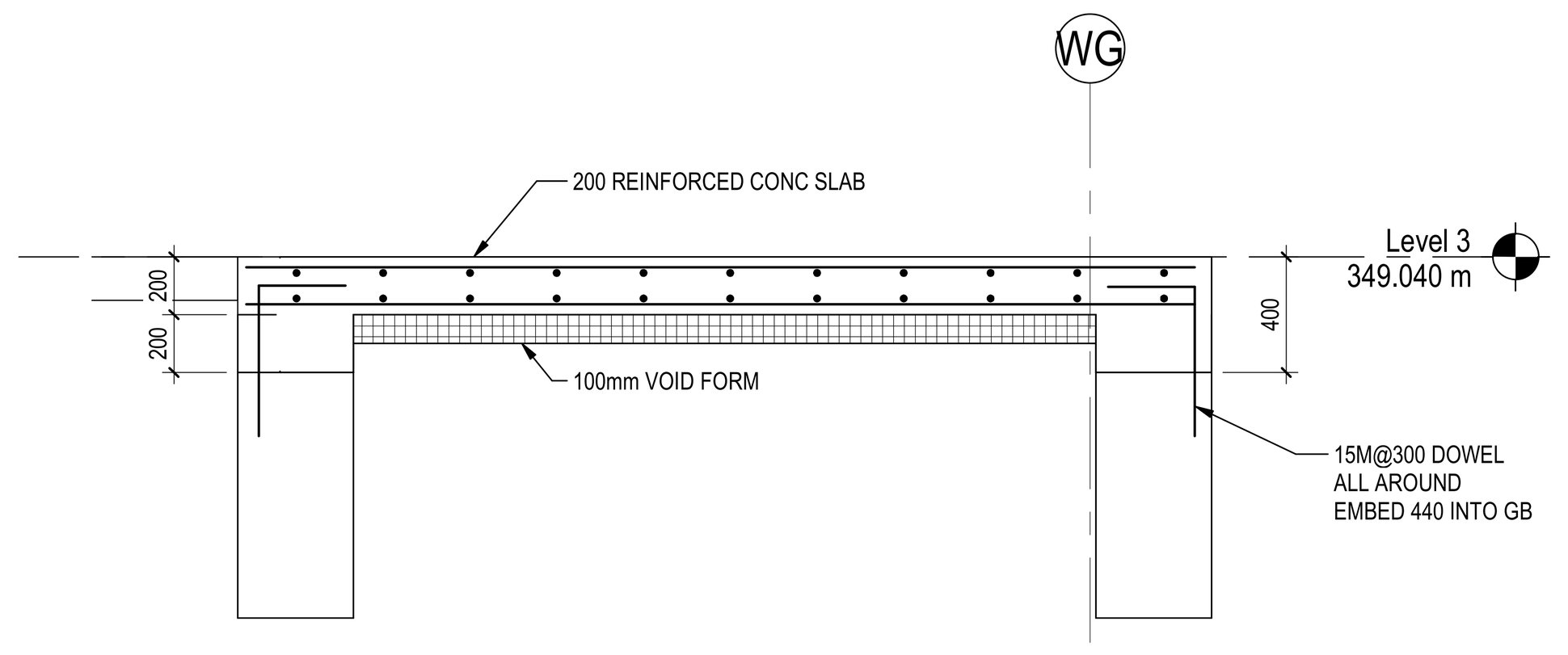

11 S-302 **SECTION** 1 : 25

Stantec

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Tel: (905) 858-4424

Consultant

Notes

A	ISSUED FOR ADDENDUM NO. 2			2024.06.21
	ISSUED FOR TENDER			2024.04.07
	ISSUED FOR PRE-TENDER			2024.03.27
	ISSUED FOR BUILDING PERMIT			2024.03.28
	ISSUED FOR STAGE 3.3 MOH SUBMISSION			2024.02.23
	ISSUED FOR COSTING AND GGH REVIEW			2023.12.21
	PROGRESS SET			2023.11.23
	ISSUED FOR MOH STAGE 3.2 SUBMISSION			2023.06.09
Issued/Revision		By	Appd	YYYY.MM.DD
File Name: N/A	PC	RG	JL	2023.03.28
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project
EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION.

Title
SECTIONS

Project No. 140022022
Scale As indicated
Revision A
Drawing No. **S-302**

Plus: Re-issued Drawings E104, E201, E202, E304, E601

ADDENDUM NO. 2

Make the following amendments and additions to the Drawings and Specifications, and include this cost in the Contract Price.

1. **ELECTRICAL DRAWINGS**

    1. **Drawing E104 – Phase 1 – Part Site Plan – Electrical**

        1. Refer to reissued drawing, attached.

    2. **Drawing E201 – Phase 1 – Part Level 1 Floor Plan – Lighting and Fire Alarm**

        1. Refer to reissued drawing, attached.

    3. **Drawing E202 – Phase 1 – Part Level 3 Floor Plan – Lighting and Fire Alarm**

        1. Refer to reissued drawing, attached.

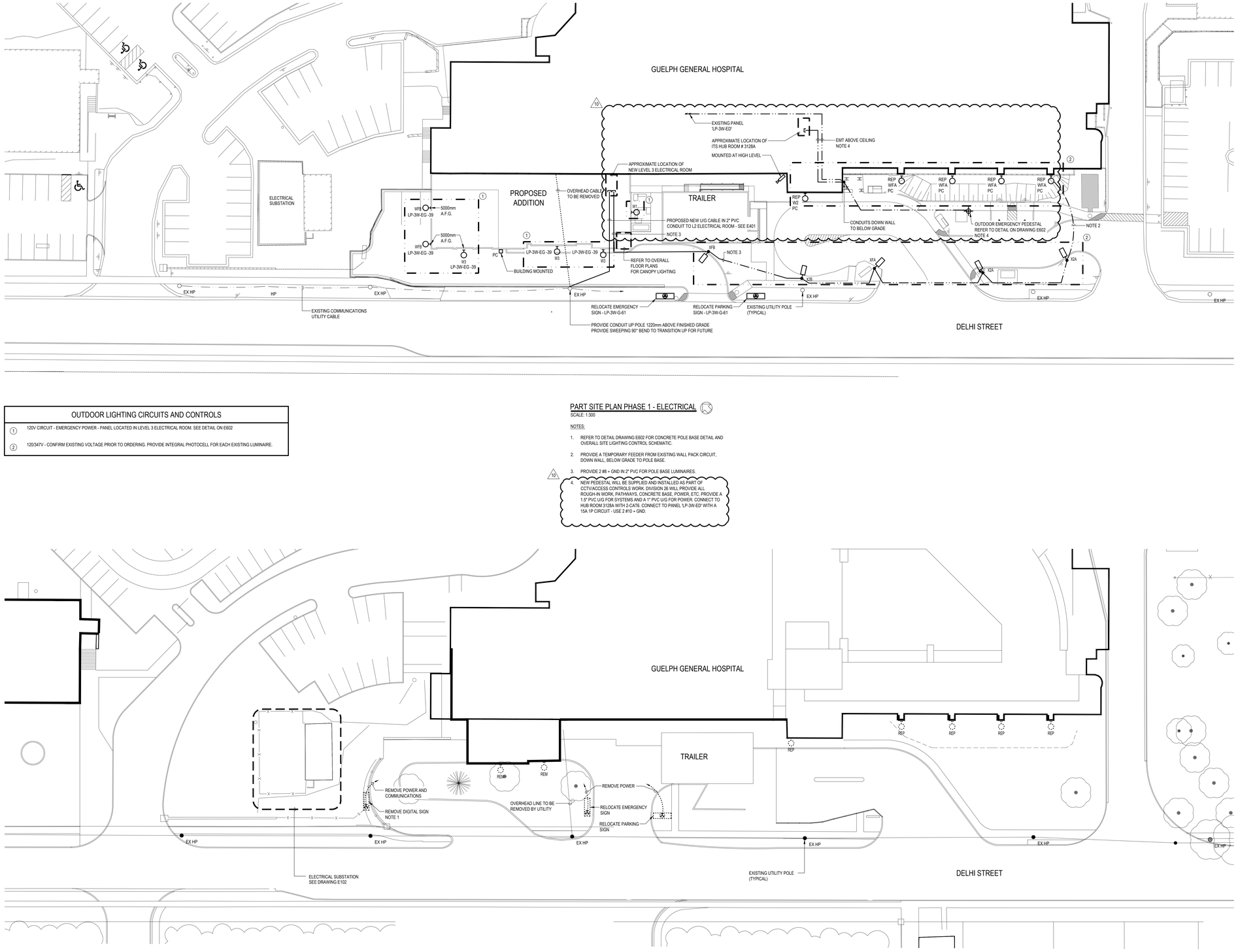
    4. **Drawing E304 – Phase 1 – Part Level 3 Floor Plan – Systems**

        1. Refer to reissued drawing, attached.

    5. **Drawing E601 – Electrical Risers**

        1. Refer to reissued drawing, attached.

END OF ADDENDUM NO. 2



OUTDOOR LIGHTING CIRCUITS AND CONTROLS

1	120V CIRCUIT - EMERGENCY POWER - PANEL LOCATED IN LEVEL 3 ELECTRICAL ROOM. SEE DETAIL ON E602
2	120/347V - CONFIRM EXISTING VOLTAGE PRIOR TO ORDERING. PROVIDE INTEGRAL PHOTOCELL FOR EACH EXISTING LUMINAIRE.

PART SITE PLAN PHASE 1 - ELECTRICAL

SCALE: 1:300

NOTES:

1. REFER TO DETAIL DRAWING E602 FOR CONCRETE POLE BASE DETAIL AND OVERALL SITE LIGHTING CONTROL SCHEMATIC.
2. PROVIDE A TEMPORARY FEEDER FROM EXISTING WALL PACK CIRCUIT, DOWN WALL, BELOW GRADE TO POLE BASE.
3. PROVIDE 2 #8 + GND IN 2" PVC FOR POLE BASE LUMINAIRES.

10 4. NEW PEDESTAL WILL BE SUPPLIED AND INSTALLED AS PART OF CCTV/ACCESS CONTROLS WORK. DIVISION 26 WILL PROVIDE ALL ROUGH-IN WORK, PATHWAYS, CONCRETE BASE, POWER, ETC. PROVIDE A 1.5" PVC U/G FOR SYSTEMS AND A 1" PVC U/G FOR POWER. CONNECT TO HUB ROOM 3128A WITH 2-CAT6. CONNECT TO PANEL 'LP-3W-ED' WITH A 15A 1P CIRCUIT - USE 2 #10 + GND.

PART SITE PLAN PHASE 1- ELECTRICAL DEMOLITION

SCALE: 1:300

NOTES:

1. REMOVE EQUIPMENT AND TURN OVER TO OWNER.

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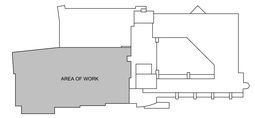
CONSULTING ENGINEERS
201 QUEENS AVE., UNIT 800
LONDON ON, N6A 1J1
250 CITY CENTRE AVE., SUITE 403
OTTAWA ON, K1R 6K7

Key Plan



KEY PLAN
NTS

10	ISSUED FOR ADDENDUM #2			2024.06.21
9	ISSUED FOR TENDER			2024.06.07
8	ISSUED FOR PRE-TENDER			2024.05.27
7	ISSUED FOR BUILDING PERMIT			2024.03.28
6	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
5	ISSUED FOR COSTING AND GGH REVIEW			2023.12.21
4	ISSUED FOR 60% CONSTRUCTION DOCUMENTS			2023.10.26
3	ISSUED FOR MOH STAGE 2.2 SUBMISSION	C.&B.	C.&B.	2023.06.09
2	ISSUED FOR DD COSTING AND CLIENT REVIEW	C.&B.	C.&B.	2023.03.29
1	ISSUED FOR 100% SCHEMATIC DESIGN	C.&B.	C.&B.	2022.11.02
Issued/Revision		By	Appd	YYYY.MM.DD
File Name:		Dwn.	Dsgn.	Chkd. 2024.06.07 YYYY.MM.DD

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LICENCED PROFESSIONAL ENGINEER
M. P. MYATT
100097120
JUNE 07
2024
PROVINCE OF ONTARIO

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GUELPH GENERAL HOSPITAL

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GUELPH GENERAL HOSPITAL

EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION

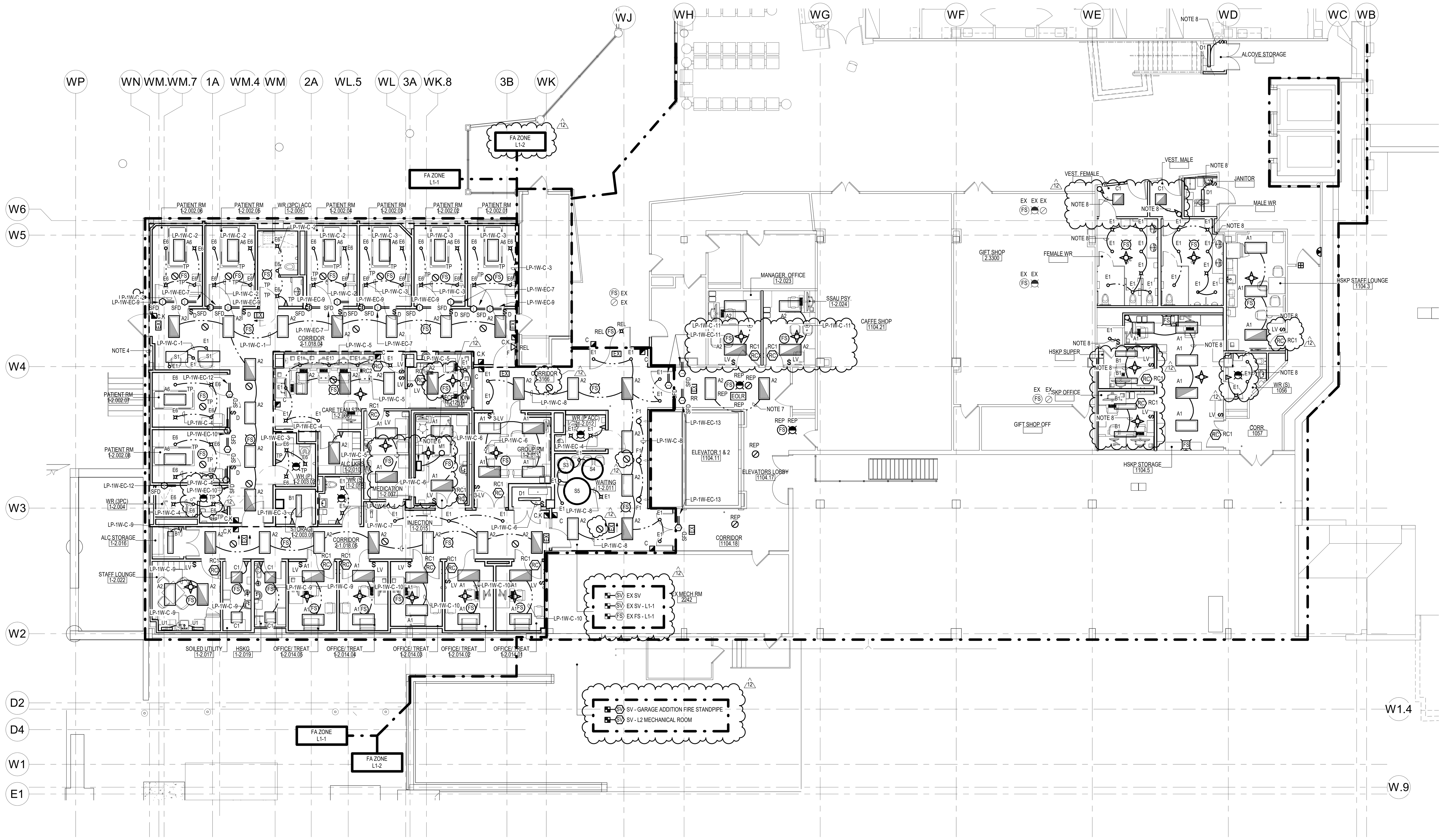
115 DELHI ST, GUELPH, ON, N1E 4J4

Title

PHASE 1 - PART SITE PLAN - ELECTRICAL

Project No.	Scale
9609	AS NOTED
Revision	Drawing No.
	E103

ORIGINAL SHEET - ISO A0



PHASE 1 - PART LEVEL 1 FLOOR PLAN - LIGHTING AND FIRE ALARM

SCALE 1 : 100

NOTES:

1. CONNECT NEW FIRE ALARM DEVICES TO THE EXISTING SIGNALING AND INITIATING ZONES SERVING THE AREA.
2. EXIT SIGNS TO BE CONNECTED TO EXIT SIGN CIRCUIT LP-1W-EC - 8.
3. PROVIDE UL-924 SHUNT RELAY FOR ALL EMERGENCY LIGHTING. REFER TO DETAIL.
4. ALL DEVICES WITHIN THE OUTLINED AREA TO BE TAMPER PROOF AND/OR PROVIDED WITH TAMPER PROOF COVERS AND HARDWARE.
5. EXISTING FIRE ALARM SYSTEM HAS ACTIVE GRAPHIC. PROVIDE UPDATED ACTIVE GRAPHIC.
6. PROVIDE EXAM LIGHT CONTROLLER ON WALL.
7. REWORK/EXTEND EXISTING NORMAL POWER AND EMERGENCY LIGHTING CIRCUITS SERVING THE CORRIDOR TO SUIT.
8. REWORK/EXTEND EXISTING NORMAL POWER AND EMERGENCY LIGHTING CIRCUITS SERVING THE AREA TO SUIT.
9. CONNECT EMERGENCY LIGHTING IN EACH SPACE TO CIRCUITS AS NOTED BELOW:
   - LP-1W-EC - 1: CORRIDOR 18.04
   - LP-1W-EC - 2: ROOMS 2.01, 2.02, 2.03, 2.04, 2.005, 2.05, 2.06
   - LP-1W-EC - 3: ROOMS 2.004, 2.07, 2.08, 3.01, 3.02
   - LP-1W-EC - 4: ROOMS 2.001, 2.006, 2.007, 2.010, 2.012, 2.013, 2.015, 2.018
   - LP-1W-EC - 5: CORRIDOR 18.05, 3166, WAITING 2.011
   - LP-1W-EC - 6: ROOMS 2.016, 2.017, 2.019, 2.022, 14.01, 14.02, 14.03, 14.04, 14.05

Chorley + Bisset
CONSULTING ENGINEERS
201 QUEENS AVE., UNIT 800
LONDON ON, N6A 1J1
250 CITY CENTRE AVE., SUITE 403
OTTAWA ON, K1R 6K7

Key Plan

KEY PLAN
NTS

	Issued/Revision	By	Appd	YYYY.MM.DD
12	ISSUED FOR ADDENDUM #2			2024.06.21
10	ISSUED FOR TENDER			2024.06.07
9	ISSUED FOR PRE-TENDER			2024.05.27
7	ISSUED FOR BUILDING PERMIT			2024.03.28
6	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
5	ISSUED FOR COSTING AND GGH REVIEW			2023.12.21
4	ISSUED FOR 60% CONSTRUCTION DOCUMENTS			2023.10.26
3	ISSUED FOR MOH STAGE 2.2 SUBMISSION	C&B	C&B	2023.06.09
2	ISSUED FOR DD COSTING AND CLIENT REVIEW	C&B	C&B	2023.03.29
1	ISSUED FOR 100% SCHEMATIC DESIGN	C&B	C&B	2022.11.02

File Name: N/A	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD
	AIS	AIS	MFM	2024.06.07

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LICENSED PROFESSIONAL ENGINEER
M. F. MYATT
100097735
PROVINCE OF ONTARIO

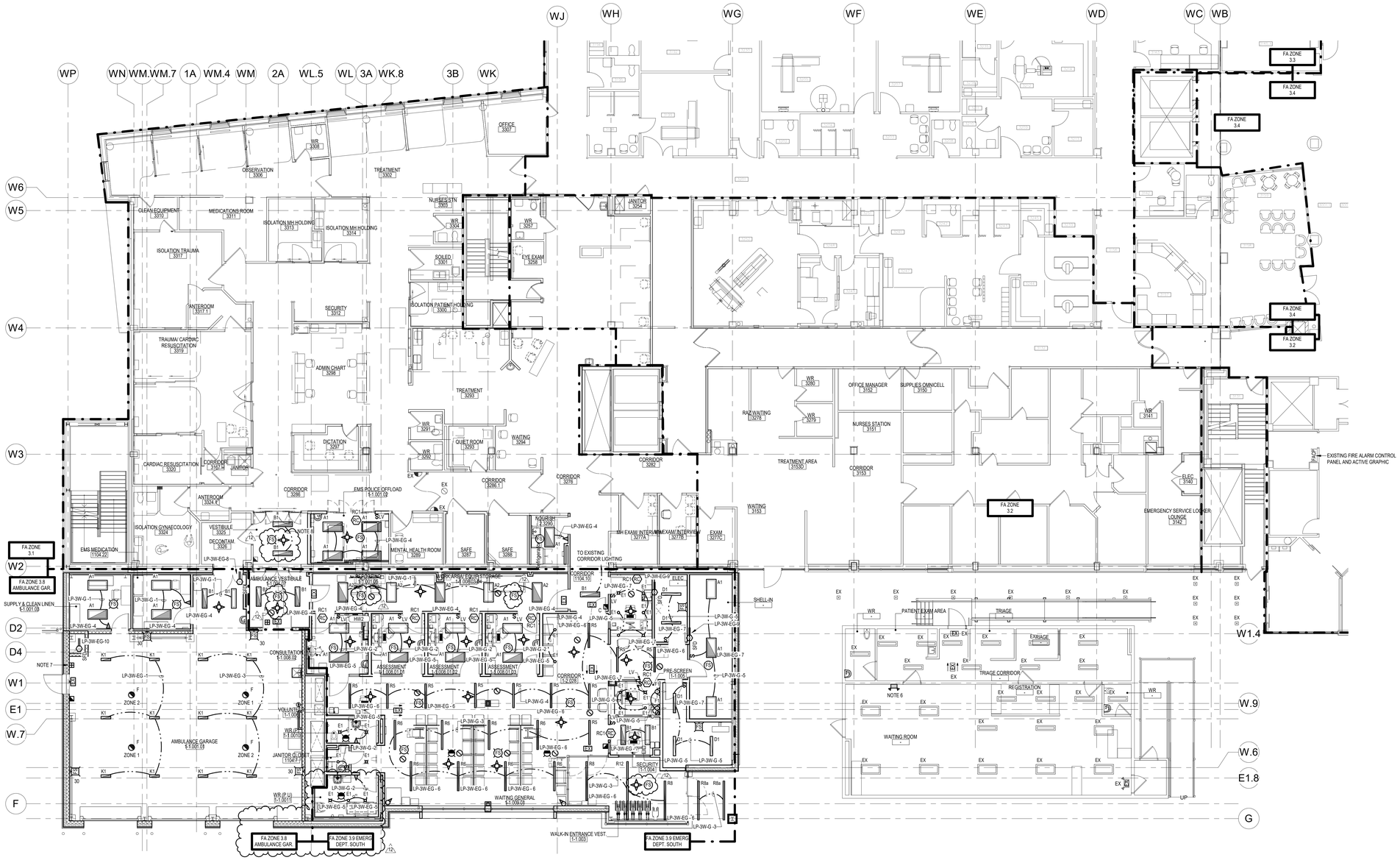
Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project
GUELPH GENERAL HOSPITAL
EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION
115 DELHI ST, GUELPH, ON, N1E 4J4

Title
PHASE 1 - PART LEVEL 1 FLOOR PLAN - LIGHTING AND FIRE ALARM

Project No.	Scale
9609	1 : 100
Revision	Drawing No.
12	E201



PHASE 1 - PART LEVEL 3 FLOOR PLAN - LIGHTING AND FIRE ALARM

SCALE 1 : 100

NOTES:

1. CONNECT NEW FIRE ALARM DEVICES TO THE EXISTING SIGNALING AND INITIATING ZONES SERVING THE AREA.
2. EXIT SIGNS TO BE CONNECTED TO EXIT SIGN CIRCUIT LP-3W-EG - 2.
3. PROVIDE UL-924 SHUNT RELAY FOR ALL EMERGENCY LIGHTING. REFER TO DETAIL.
4. EXISTING FIRE ALARM SYSTEM HAS ACTIVE GRAPHIC. PROVIDE UPDATED ACTIVE GRAPHIC.
5. PROVIDE WIRE GUARDS FOR DEVICES IN THE FOLLOWING ROOMS:
   - ELECTRICAL ROOM
   - IT ROOM
6. PROVIDE A NEW STAND-ALONE BATTERY C/W 2 @ 4W LED HEADS. SEE 26 50 00 - 2.5 FOR DETAILS. CONNECT TO EXISTING UNSWITCHED LIGHTING CIRCUIT.
7. PROVIDE SMOKE EVAC CONTROLS FOR EF-33 VFD. SEE DETAIL ON E601.
8. EXTEND/REWORK EXISTING EMERGENCY LIGHTING CIRCUIT SERVING THE AREA TO SUIT.

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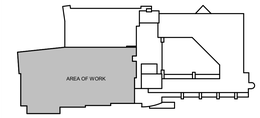
201 QUEENS AVE., UNIT 800
LONDON ON, N6A 1J1
250 CITY CENTRE AVE., SUITE 403
OTTAWA ON, K1R 6K7

Key Plan



KEY PLAN
NTS

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10	ISSUED FOR TENDER			2024.06.07
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File Name: N/A		AS	AS	2024.06.07
		Dwn.	Dsgn.	Chkd.	M/M	YYYY.MM.DD

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EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION

115 DELHI ST, GUELPH, ON, N1E 4J4

Title

PHASE 1 - PART LEVEL 3 FLOOR PLAN - LIGHTING AND FIRE ALARM

Project No.	Scale
9609	1 : 100
Revision: 12	Drawing No.: E202

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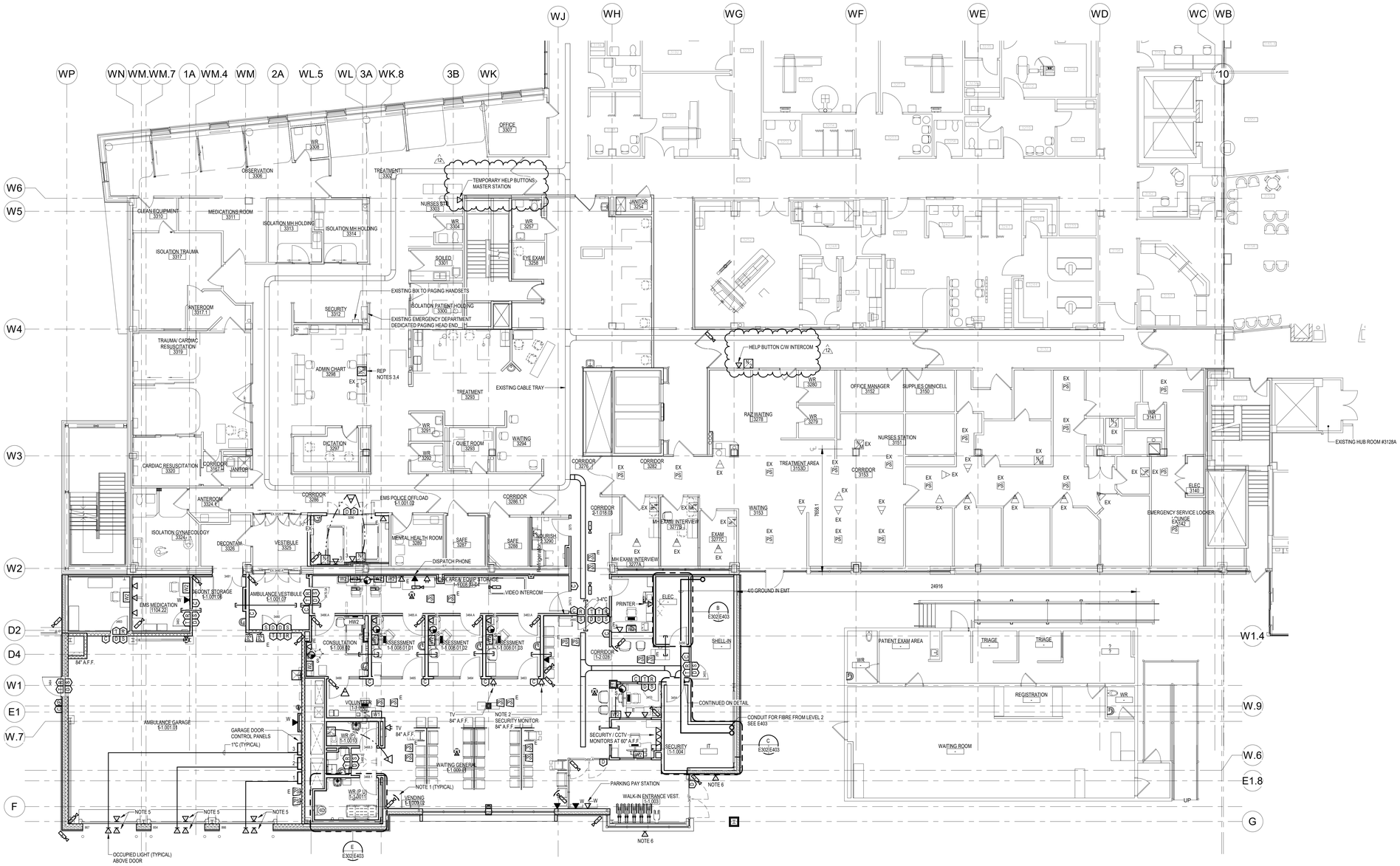
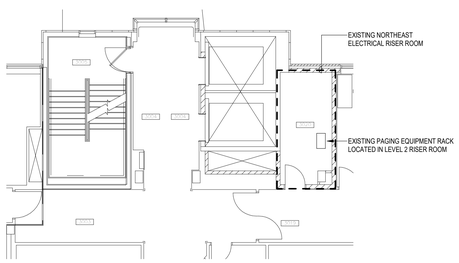


PHASE 1 - PART LEVEL 3 FLOOR PLAN - SYSTEMS

SCALE 1 : 100

NOTES:

1. PROVIDE 15' OF CAT 6 CABLING ABOVE CEILING AT EACH CCTV CAMERA.
2. FLATSCREEN TO DISPLAY "YOU ARE ON CAMERA" AND SHOW CCTV IMAGES OF WAITING ROOM.
3. ALL NURSE CALL DEVICES ARE TO RING BACK TO EXISTING MAIN EMERGENCY DEPARTMENT NURSE STATION.
4. EXISTING NURSE CALL MASTER STATION TO BE REPLACED.
5. PROVIDE 2 CAMERA ROUGH-INS FOR EACH OVERHEAD DOOR. CONNECT WITH 1"C AND A 1"C BACK TO CORRESPONDING DOOR CONTROLLER.
6. ROUGH-IN FOR FUTURE SIGNAGE. PROVIDE CONDUIT TO ACCESSIBLE CEILING SPACE.



PHASE 1 - PART LEVEL 3 ELECTRICAL RISER ROOM - SYSTEMS

SCALE 1 : 100

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201 QUEENS AVE., UNIT 800
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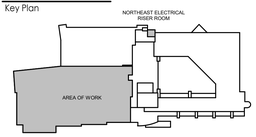
OTTAWA ON, K1R 6K7

Key Plan



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NTS

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6	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
5	ISSUED FOR COSTING AND QCH REVIEW			2023.12.21
4	ISSUED FOR 60% CONSTRUCTION DOCUMENTS			2023.10.26
File Name: N/A		AS Dwn.	AS Dsgn.	M.P.A. Chkd. YYYY.MM.DD

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
M. P. MANT
100097726
PROVINCE OF ONTARIO

Client/Project Logo

GUELPH GENERAL HOSPITAL

Client/Project

GUELPH GENERAL HOSPITAL

EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION

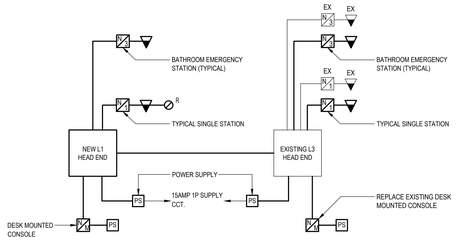
115 DELHI ST, GUELPH, ON, N1E 4J4

Title

PHASE 1 - PART LEVEL 3 FLOOR PLAN - SYSTEMS

Project No.	Scale
9609	1 : 100
Revision 12	Drawing No. E304

ORIGINAL SHEET - ISO A1

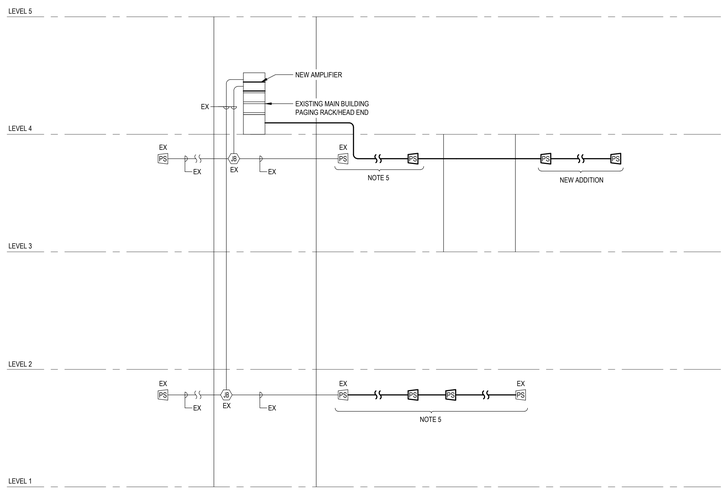


PART NURSE CALL SYSTEM RISER

N.T.S.

NOTES:

1. RUN WIRING IN EMT CONDUIT TO DIRECTIONS OF EQUIPMENT MANUFACTURER.
2. THE PROJECT WILL BE PHASED. PROVIDE ALL WORK AND MATERIALS TO SUIT.
3. DIVISION 26 TO PROVIDE BACK BOXES AND ROUGH-IN TO SUIT - SEE 27 52 23.

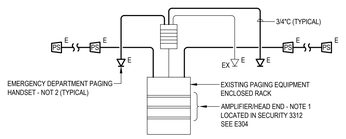


PART EXISTING MAIN BUILDING PAGING RISER

N.T.S.

NOTES:

1. EXISTING PAGING SYSTEM IS A TOA IP EXCHANGE 8000EX TYPE.
2. PROVIDE NEW SQUARE RECESSED 6"x6" SPEAKERS TO MATCH EXISTING.
3. NEW AMPLIFIER WILL SERVE THE NEW ADDITION.
4. SEE SPECIFICATION SECTION 27 51 13.
5. ALLOW FOR REMOVING EXISTING IN AREAS OF RENOVATION. REWORK EXISTING CIRCUIT TO ENSURE CONTINUITY OF SERVICE.
6. CONTACT KR COMMUNICATIONS FOR ALL PA SYSTEM WORK. SEE CASH ALLOWANCES.



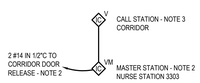
PART EMERGENCY DEPARTMENT PAGING RISER

N.T.S.

NOTES:

1. EXISTING PAGING SYSTEM IS BY TOA. EXTEND AND EXPAND EXISTING SYSTEM TO SUIT. ALLOW FOR ADDITIONAL SPEAKERS AND EMERGENCY DEPARTMENT PAGING HANDSETS.
2. PROVIDE NEW TOA PACKET INTERCOM SYSTEM HANDSETS TO MATCH EXISTING. TO BE WIRED TO EXISTING BIX AND INTO HEAD END USING CAT 6 CABLING.
3. SPEAKERS TO BE 6" SQUARE TO MATCH EXISTING 25/70V TYPE.
4. SEE SPECIFICATION SECTION 27 51 13.
5. CONTACT KR COMMUNICATIONS FOR ALL PA SYSTEM WORK. SEE CASH ALLOWANCES.

10

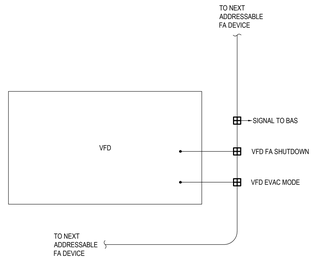


AI PHONE SYSTEM RISER

N.T.S.

NOTES:

1. TO BE AIPHONE OR EQUIVALENT BY AXIS OR BOSCH.
2. PROVIDE AIPHONE #JK-2MED MASTER INTERCOM STATION. PROVIDE WALL BOX, POWER SUPPLY, AND ALL ACCESSORIES, WIRING, WORK, AND MATERIALS FOR A COMPLETE SYSTEM. PROVIDE WIRING FOR DOOR RELEASE. COORDINATE WITH ACCESS CONTROLS INSTALLER.
3. PROVIDE AIPHONE #JK-DVF FLUSH DOOR STATION. VANDAL RESISTANT STAINLESS STEEL.
4. PROVIDE AIPHONE #JK-1HD SECONDARY MASTER STATION.



TYPICAL SMOKE EVAC FAN CONTROL AND SUPERVISION INTERCONNECTION SCHEMATIC

N.T.S.

NOTES:

1. PROVIDE FOR ALL FANS AS SHOWN FOR AHU-103 AND RF-201 AND AHU-124.
2. PROVIDE FOR EF-33 IN AMBULANCE GARAGE.

SEQUENCE FOR SMOKE EVACUATION MODE

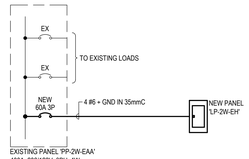
1. SMOKE EVAC MODE IS MANUALLY ACTIVATED BY SWITCH AT C.A.C.F.
2. SET VFDs FOR SUPPLY FANS TO 50% AND EXHAUST FANS TO 75% DURING MANUAL SMOKE EVAC MODE. THESE SETTINGS WILL BE CONFIRMED DURING SYSTEM TESTING AND COMMISSIONING.
3. FIRE ALARM SENDS SIGNAL TO BUILDING AUTOMATION SYSTEM FOR CONTROL OF DAMPERS.
4. ONCE CONFIRMATION IS RECEIVED FROM END SWITCHES THAT EXHAUST AIR DAMPER (EAD) IS OPEN, RETURN AIR DAMPER (RAD) IS CLOSED AND OUTSIDE AIR DAMPER (OAD) IS CLOSED THEN FIRE ALARM SEND SIGNAL TO START FANS AT PRESET SPEEDS.
5. PROVIDE A 120 SECOND DELAY BETWEEN THE TIME A MANUAL SMOKE PUAC REQUEST IS RECEIVED AND WHEN THE VFDs RECEIVE THE START SIGNAL. THIS TIME DELAY WILL BE CONFIRMED DURING SYSTEM TESTING AND COMMISSIONING.

FIRE ALARM RISER

N.T.S.

NOTES:

1. SCHEMATIC IS FOR REFERENCE PURPOSES ONLY. REFER TO FLOOR PLANS FOR DEVICE LOCATIONS, REVISIONS AND QUANTITIES.
2. ALL WIRING TO BE INSTALLED IN CONDUIT TO MANUFACTURERS REQUIREMENTS.
3. PROVIDE ZONE ISOLATION MODULES AS REQUIRED ON EACH SIDE OF ALL ZONE BOUNDARIES.
4. PROVIDE ELECTROMAGNETIC LOCK RELEASE AND SIGNAL TO POWER SUPPLY UPON 2ND STAGE ALARM.
5. PROVIDE MAG. HOLD OPEN RELEASE WHERE SHOWN.
6. PROVIDE NEW STROBE ZONES TO SUIT QUANTITY.
7. REFER TO TYPICAL SMOKE EVAC FAN CONTROL AND SUPERVISION INTERCONNECTION SCHEMATIC. SEE FLOOR PLANS FOR LOCATIONS.
8. PROVIDE SMOKE EVAC SYSTEM FOR AHU-103A/B AND AHU-124A/B AND EF-33.

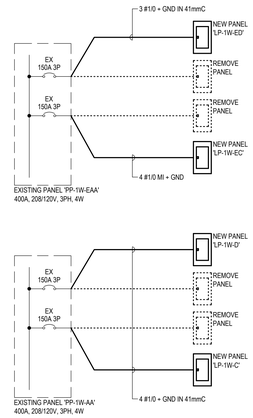


PART DISTRIBUTION RISER - LEVEL 2

N.T.S

NOTES:

1. PROVIDE NEW BREAKERS TO SUIT EX PANEL.

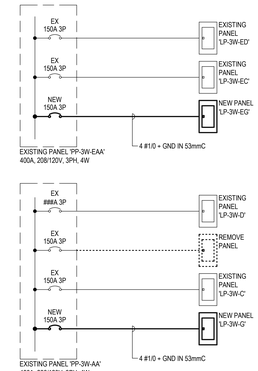


PART DISTRIBUTION RISER - LEVEL 1

N.T.S.

NOTES:

1. NEW FEEDER TO BE 2HR FIRE RATED MINERAL INSULATED TYPE EQUIVALENT TO PYROTENAX SYSTEM 1850.

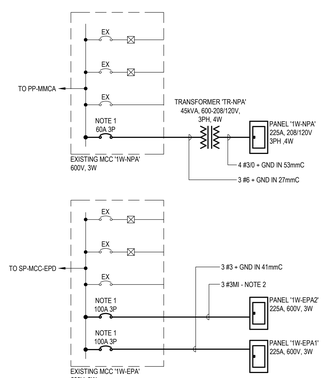


PART DISTRIBUTION RISER - LEVEL 3

N.T.S

NOTES:

1. PROVIDE NEW BREAKERS TO SUIT EX PANEL.



PART MCC DISTRIBUTION RISER

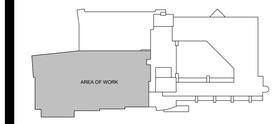
N.T.S.

NOTES:

1. PROVIDE NEW BREAKERS IN EXISTING KLOCKNER MOELLER MCCs. PROVIDE ALL WORKS, MATERIALS, AND ACCESSORIES.
2. NEW FEEDER TO BE 2HR FIRE RATED MINERAL INSULATED TYPE EQUIVALENT TO PYROTENAX SYSTEM 1850.

Chorley+Bisset
CONSULTING ENGINEERS
201 QUEENS AVE., UNIT 800
LONDON ON, N6A 1J1
250 CITY CENTRE AVE., SUITE 403
OTTAWA ON, K1R 6K7

Key Plan



KEY PLAN
NTS

10	ISSUED FOR ADDENDUM #2			2024.06.21
9	ISSUED FOR TENDER			2024.06.07
8	ISSUED FOR PRE-TENDER			2024.05.27
7	ISSUED FOR BUILDING PERMIT			2024.03.28
6	ISSUED FOR STAGE 2.3 MOH SUBMISSION			2024.02.23
5	ISSUED FOR COSTING AND GGH REVIEW			2023.12.21
4	ISSUED FOR 60% CONSTRUCTION DOCUMENTS			2023.10.26
3	ISSUED FOR MOH STAGE 2.2 SUBMISSION	C&B	C&B	2023.06.09
2	ISSUED FOR DD COSTING AND CLIENT REVIEW	C&B	C&B	2023.03.29
1	ISSUED FOR 100% SCHEMATIC DESIGN	C&B	C&B	2022.11.02
Issued/Revision		By	Appd	YYYY.MM.DD
File Name:		Dwn.	Dsgn.	2024.06.07
			Chkd.	YYYY.MM.DD

Permit/Seal

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GUELPH GENERAL HOSPITAL

Client/Project
GUELPH GENERAL HOSPITAL

EMERGENCY MENTAL HEALTH AND ADDICTIONS SERVICES RELOCATION AND EMERGENCY DEPARTMENT EXPANSION

115 DELHI ST, GUELPH, ON, N1E 4J4

Title
ELECTRICAL RISERS

Project No. 9609
Scale AS NOTED
Revision
Drawing No. **E601**

ORIGINAL SHEET - ISO A0