District of Summerland
Tender No. 5330-91
Wastewater Treatment Plant Upgrade Project
ADDENDUM NO. 3

March 31, 2017

PROJECT: 5330-91 District of Summerland Waterwater Treatment Plant Upgrade Project

The Contract Documents for this work are revised as noted herein. All such revisions become a part of the work and shall be included in your tender. No consideration will be allowed for extras due to the tenderer not being familiar with this addendum.

1. REFERENCE: **SECTION 11101 GENERAL PROVISIONS, CLAUSE 1.2**

DELETE: Mequipco as the supplier for the pre-selected John Meunier equipment

REPLACE WITH: John Meunier
Veolia Water Technologies Canada Inc.
3138 Brookridge Drive
North Vancouver, BC, V7R 3A8
Attention Chris Howorth
Phone: (604) 562.0301
Email: chris.howorth@veolia.com Tender closing date

2. REFERENCE: **SECTION 00304 TENDER FORM, CLAUSE T-5**

DELETE: PAGES 4, 5, 6

REPLACE WITH: Attached lump sum price sheet. At the request of the Engineer, bidders will provide the detailed breakdown of Schedule of Prices as per the enclosed schedule in Appendix E (3 pages)

3. REFERENCE: **SECTION 00304 TENDER FORM, CLAUSE T-6.1**

DELETE: "…entirely in 240 calendar days…"

REPLACE WITH: "…entirely in 300 calendar days…"

4. REFERENCE: **DRAWING NO. S-001**

ADD: General note 4.0 "Not all pipe penetrations are shown on the structural drawings. Refer to Process Mechanical drawings (M Series) for sizes and locations of all structural penetrations

ADD: General note 5.0 "All references in the drawings to Strongwell Safplate are deemed to mean of the appropriate construction (eg. Safplate bonded to Duradek where necessary) for the loads and spans to be supported

ADD: Design Criteria, Note 1 – Building Importance Category is "Post Disaster"

REVISE: Reinforcing Note 2 – For Classes of Exposure F-1, F-2, S-1 & S-2, the clear cover for beams, girders, columns and piles shall be revised to 65mm and the clear cover for slabs, walls, joists, shells and folded plates shall be revised to 50mm.

5. REFERENCE: **DRAWING NO. S-300, SECTION 1**

DELETE: "15M TOP & BTM EW"

REPLACE WITH: "15M @ 300 T&B EW"

6. REFERENCE: **DRAWING NO. S-300, SECTION 2**

DELETE: "T/O FOOTING EL. 335.30" (right hand side)

REPLACE WITH: "T/O FOOTING EL. 345.30"

7. REFERENCE: **DRAWING NO. S-104**

DELETE: "914x2032 OVERHEAD DOOR, REFER TO SPEC"

REPLACE WITH: "OVERHEAD, INSULATED, COILING DOOR 3048 WIDE x 3660 HIGH"

ADD: **"**Note 2 - Lintel for 3048 door opening to be 2 block courses deep reinforced with 1-15M btm. Lintels for 914 door openings to be 1 block course deep reinforced with 1-15M btm"

8. REFERENCE: **DRAWING NO. S-105, SUSPENDED SLAB ADJACENT TO INFLUENT BYPASS CHANNEL**

DELETE: "100 SUSPENDED CONCRETE SLAB R/W 15M @ 300 BOT."

REPLACE WITH: "200 THK SUSPENDED CONCRETE SLAB R/W 15M @ 300 EW TOP AND BTM."

9. REFERENCE: **DRAWING NO. S-105, SUSPENDED SLAB ADJACENT TO GRIT CHAMBER**

DELETE: "200 SUSPENDED CONCRETE SLAB R/W 15M @ 300 BOT."

REPLACE WITH: "200 THK SUSPENDED CONCRETE SLAB R/W 15M @ 300 EW TOP AND BTM."

10. REFERENCE: **DRAWING NO. S-301, SECTION 2 – WALL NOTE ON RIGHT HAND SIDE**

DELETE: "300 CONC. FDN WALLS R/W 15M @ 300 TOP & BOT."

REPLACE WITH: "300 THK CONC FDN WALLS R/W 15M @ 300 EF."

ADD: The concrete block wall to this building is to be 190 thk reinforced with 15M verts @ 400 o.c.

11. REFERENCE: **SECTION 11150 PROCESS PIPING**

DELETE: Clause 1.3

REPLACE WITH: Piping schedule below

Abbreviation	Process Commodity	Pipe Material	Comments
RS	Raw Sewage exterior	PVC Sch 80	Fittings: PVC Sch 80 or Ductile Iron cement mortar lined
RS	Raw Sewage under structure	Mild Steel, CW, ERW or Seamless Std Wt.	Epoxy lining and coating to AWWA C210
C1	Potable Water	Copper or PVC Sch 80	
C3	Recycled Water	PVC Sch 80 PVC Series 160, DR26	
SE	Secondary Effluent	PVC Sch 80 PVC C905, SDR41	Less or equal to 600mm dia. Greater than 600m dia.
GR	Grit Slurry	PVC Sch 80	
FA	Foul Air	PVC Sch 80 (exterior) FRP (interior) SS Type 316L Sch 10S	
PD	Process Drain	PVC Sch 80	
SAN	Sanitary Drainage Gravity	PVC SDR35 PVC SDR28	Greater than 150mm dia. Less than or equal to 150mm dia.
FLBW	Filter Backwash	PVC Sch 80	

12. REFERENCE: **DRAWING H-001**

ADD: Roof drain, 75mm rain water leader, 75mm overflow pipe and precast concrete splash pad.

13. REFERENCE: **SECTION 01400 QUALITY CONTROL, CLAUSE 1.2**

DELETE: "… Contractor..."

REPLACE WITH: "…Owner…" will coordinate testing but the District will pay for testing directly."

14. REFERENCE: **SECTION 11201 SLIDE GATES**

ADD: Golden Harvest as an approved slide gate manufacturer.

15. REFERENCE: **SECTION 11160 PROCESS VALVES, CLAUSE 2.1**

ADD: Henry Pratt Plug Valves as an accepted alternate for plug valves.

16. REFERENCE: **SECTION 11160 PROCESS VALVES, CLAUSE 2.3**

ADD: Henry Pratt Plug Valves as an accepted alternate for check valves.

17. REFERENCE: **SECTION 16110 CONDUITS, FASTENINGS, AND FITTINGS, CLAUSE 2.1.5.A**

ADD: Note: "Concrete encased ducts are not required unless cover is less than 900mm.".

18. REFERENCE: **SECTION 16105 DUCTS, CLAUSE 2.1.2 AND 3.1.4**

ADD: Note: "Concrete encased ducts are not required unless cover is less than 900mm.".

19. REFERENCE: **TENDER DOCUMENTS (ENTIRETY)**

REMOVE: any reference to "Owner Supplied".

REPLACE WITH: "Owner pre-selected". All equipment and materials are to be supplied and installed by the contractor.

20. REFERENCE: **SECTION 11366 SCREEN WASH PRESS, PART 2.3.2**

REMOVE: the reference to use of a "PLC".

REPLACE WITH: **"**SMART relay type of control panel".

21. REFERENCE: **SECTION 00500 AGREEMENT, ITEM 3.3**

REMOVE: "…estimated to be $500 dollars per calendar day…".

REPLACE WITH: "…estimated to be $1,000 dollars per calendar day…".

22. REFERENCE: **SECTION 11431 EFFLUENT CLOTH MEDIA DISC FILTER**

REMOVE: **Clause 2.4.12 Scum Pump Removal** as there are no pumps required as scum line is connected to gravity.

23. REFERENCE: **DRAWING NO. P-101 AND M-101**

ADD: The weir opening in the overflow channel is to be 325 L x 250 H.

24. REFERENCE: **APPENDIX A – GEOTECHNICAL REPORT**

CLARIFY: As stated in **Clause 5.5**, native material is not to be used for structural fill material but can be used for backfilling and landscaping.

REVISE: **Clause 5.1** - Underpinning is not required

25. REFERENCE: **DRAWING NO. E-100**

DELETE: Entire drawing.

REPLACE WITH: Drawing No. E-100, Revision 2

26. REFERENCE: **DRAWING NO. M-104**

ADD: To note 3: "…Standard containers are supplied by Bill Cummins, EMV, Tel: 403 686-2102, email: bcummins@emworks.ca."

27. REFERENCE: **SECTION 00303 CONTENTS OF THE CONTRACT DOCUMENTS**

ADD: **Division 3 Concrete**, including Sections 03100, 03200, 03250, 03300, 03345, 03600.

28. REFERENCE: **SECTION 00303 CONTENTS OF THE CONTRACT DOCUMENTS**

ADD: **Sections 03100, 03200, 03250, 03300, 03345, 03600** to replace specifications noted.

Enclosures:

Drawings:

00304 Tender Forms – Lump Sum Price	1 page
Section 03100	8 pages
Section 03200	3 pages
Section 03250	4 pages
Section 03300	12 pages
Section 03345	4 pages
Section 03600	2 pages
E-100 – Single Line Diagram	1 sheet
Appendix E – Schedule of Prices	3 pages

END OF ADDENDUM NO. 3

T-5 Lump Sum Contract Price

The *Contract Price*, which excludes Goods and Services Tax (GST), is:

_____/100 dollars $_____

GST (of %5) payable by the *Owner* to the *Contractor* are:

_____/100 dollars $_____

Total amount payable by the *Owner* to the *Contractor* for the construction of the *Work* is:

_____/100 dollars $_____

These amounts shall be subject to adjustments as provided in the *Contract Documents.*

All amounts are in Canadian funds.

PART 1 GENERAL

1.1 WORK INCLUDED

.1 Forms and supporting falsework design.

.2 Wood or steel forms for all cast-in-place concrete.

.3 Special forms for architectural concrete formed finished.

.4 Tubular column forms.

.5 Void forms.

.6 Shoring, bracing and anchorage.

.7 Taping of form joints for special finishes.

.8 Form openings for other trades.

.9 Coordinate installation of concrete accessories.

.10 Set anchor bolts, anchors, sleeves, frames and other items supplied by other trades.

.11 Clean erected formwork prior to concrete placement.

.12 Remove forms and supporting falsework.

.13 Reshoring.

1.2 RELATED WORK

.1 Concrete Reinforcement: Section 03201

.2 Concrete Accessories: Section 03250

.3 Cast-in-Place Concrete: Section 03300

1.3 REFERENCE STANDARDS

.1 Design, construct and erect supporting falsework in accordance with the current National Building Code of Canada, CSA CAN3-A23.1M, ACI 347 and applicable construction safety regulations.

.2 Design to be done by a Professional Structural Engineer registered in the Province of British Columbia. [1]Same Professional Structural Engineer to inspect the erected formwork and certify, in writing, that it is in accordance with the design.

1.4 SHOP DRAWINGS

.1 Submit falsework and formwork shop drawings for review in accordance with Section 01300 – Submittals.

.2 Clearly indicate sizes, methods of construction, materials, arrangement of joints, ties and shores, location and size of falsework, schedule of erection and stripping.

.3 Shop drawings and design briefs are to bear the seal of a Professional Structural Engineer registered in the Province of British Columbia.

PART 2 PRODUCTS

2.1 MATERIALS

.1 For Exposed Surfaces: square-edged, smooth surfaced panels true in plane, free of holes, surface markings or defects.

.2 For Unexposed Surfaces: square-edged T&G lumber, plywood or other material suitable to retain concrete without leakage or distortion.

.3 Architectural Finish: fabricated form adequate to achieve the architectural finished as marked on drawings and architectural specifications.

.4 Wood Materials:

.1 Plywood: Douglas Fir, conforming to CSA 0121-M, solid one side select sheathing - tight face grade. Sound, undamaged sheets with clean true edges.

.2 Lumber: conforming to CSA 0141-M.

.3 Nails, Spikes and Staples: galvanized or phosphatized; conforming to CSA B111.

.5 Prefabricated Forms:

.1 Steel Type: minimum 1.6 mm steel thickness; well matched, tight fitting and adequately stiffened to support the weight of concrete without deflection detrimental to structural tolerance and appearance of finished concrete surface.

.2 Tubular Column Type: round, spirally wound laminated fibre material, internally treated with release agent; sizes indicated on the Drawings.

1

.3 Void Forms: moisture resistant treated paper faces; bio-degradable; structurally sufficient to support weight of wet concrete mix until initial set; 150 mm thick.

.6 Accessories:

.1 Form Ties: suitable for water retaining structure construction. Removable or snap-off metal type with metal form spacers, adjustable length; minimum working strength of 13 kN. When assembled, free of defects that will leave metal closer than 40 mm from concrete surface. Cones shall be approximately 20 mm diameter and not larger than 40 mm. Use plastic cone snap type or screw type on exposed surface. Wire ties are not permitted.

.2 Form Release Agent: colourless mineral oil which will not stain concrete or impair natural bonding or colour characteristics of coating intended for use on concrete. Form release agent shall be non-toxic.

.3 Corner or Chamfer Fillets: extruded plastic or mill finish pine, 20 mm width, maximum possible lengths, mitre ends.

.4 Sealing Tape: reinforced, self-adhesive polyvinyl-chloride.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Before starting the Work examine work done by others which affects the Work.

.2 Rectify all conditions which would prejudice proper completion of the Work.

.3 Commencement of the Work implies acceptance of existing conditions.

3.2 ERECTION

.1 Verify lines, levels and centers before proceeding with formwork. Ensure dimensions agree with the Drawings.

.2 Construct formwork and falsework to meet design and regulatory requirements and to produce finished concrete conforming to surfaces, shapes, lines and dimensions indicated on the Drawings. Ensure visible lines of the curbs, walls and walks follow a smooth profile both vertically and horizontally.

.3 Arrange and assemble formwork to permit removal without damage to concrete. Set shores supporting forms for beams, slabs and other horizontal members on wedges or other approved adjustable supports.

.4 Do not weld formwork to steel superstructure.

.5 Align joints and make watertight to prevent leakage of cement paste and disfiguration of concrete. Keep form joints to a minimum. Where joints are shown on drawings,

Contractor shall ensure that joint layout matches drawings. Tape form joints as necessary.

.6 Do not use earth surfaces to form concrete without written approval of the Engineer.

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

.8 Obtain the Engineer's permission before framing openings in concrete slabs, beams and columns not shown on drawings.

.9 Provide falsework to ensure stability of formwork. Prop or strengthen all previously constructed parts liable to be overstressed by construction loads.

.10 Position form joints to suit any expressed lines required in exposed concrete. Arrange form board panels in a regular symmetrical pattern to the approval of the Engineer.

.11 Provide 25 mm chamfer on all internal and external corners and edges of exposed concrete.

.12 Form chases, slots, openings, drips and recesses as detailed on the Drawings.

.13 Set screeds with top edge level to required elevations.

.14 Check and re-adjust formwork to required lines and levels during placing of concrete.

.15 If form sheathing is to be re-used, remove nails and clean surfaces in contact with concrete before re-using.

3.3 TOLERANCES

.1 Construct formwork, falsework and all supporting or bracing members to provide concrete with dimensions, lines and levels within tolerances specified in CAN/CSA A23.1, latest edition.

.2 If tolerances are exceeded, remove, replace or modify placed concrete as directed by the Engineer at no cost to the Owner.

.3 Provide for settlement, closure of joints and elastic shortening of forms and shoring. Camber slabs and beams as shown on the Drawings. Maintain beam depth and slab thickness from cambered surface.

3.4 CONSTRUCTION JOINTS

.1 Locate joints not indicated on the Drawings so as to least impair the strength of the structure. Obtain the Consultant's approval before proceeding.

.2 Construct joints in accordance with CSA CAN3-A23.1-M. Provide waterstops for full length of joint.

.3 Roughen surface of hardened concrete and thoroughly clean roughened surface to remove any foreign matter and laitance. Wet surface with water and ensure forms are tight against face of hardened concrete. Epoxy bonding agent to be used where shown on drawings or as indicated by the Engineer.

3.5 INSERTS / EMBEDDED ITEMS / OPENINGS

.1 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.

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

.3 Coordinate work of other sections and cooperate with trades involved in forming openings, slots, recesses, chases, and setting sleeves, bolts, anchors and other inserts.

.4 Coordinate installation of concrete accessories specified in Section 03250 – Concrete Accessories.

.5 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.

.6 Close temporary ports or openings with tight fitting panels, fit flush with inside face of forms, neatly fitted so no leakage occurs and to provide uniform surface on exposed concrete.

3.6 FORM TIES

.1 Submit tie patterns form tie specifications to the Engineer for review prior to construction. Arrange ties in a uniform pattern; horizontally and vertically.

.2 For exposed concrete fit ties with cones approximately 20 mm diameter and not longer than 40 mm. Coat ties with cup grease or other approved material if ties are to be removed. Loosen ties twenty four hours after concrete has been placed. Ensure sufficient numbers of ties remain to hold form in place. Cutting ties back from the face of the wall is not permitted.

.3 For all non-exposed concrete, fill all holes left by withdrawal of rods or holes left by removal of tie ends with solid mortar as outlined in the concrete section.

.4 Remove all cones from both interior and exterior concrete surfaces. If surface is to be sandblasted, leave cones in place until after sandblasting is complete. Fill cone holes with small amount of grey sealant to cover metal rod.

.5 In water retaining structures, channels, tunnels or surfaces requiring waterproofing of removable ties; remove the rods and cones and fill the holes with Permaquik or Vandex mortar after applying a slurry coat of Permaquik on the water retention side.

.6 The holes left by withdrawal of rods or the holes left by removal of ends of ties shall be filled solid with mortar after first being thoroughly wetted. For holes passing entirely through the wall a plunger-type pressure gun or other device shall be used to force the mortar through the wall starting at the back face. A piece of burlap or canvas shall be held over the hole on the outside and when the hole is completely filled, the excess mortar shall be struck off with the cloth flush with the surface. Holes not passing entirely through the wall shall be filled with a small tool that will permit packing the hole solid with mortar. Any excess mortar at the wall shall be struck off flush with the surface.

3.7 EMBEDDED ITEMS

.1 Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through the concrete members.

.2 Accurately locate and set in place, items which are to be cast directly into concrete.

.3 Coordinate the work of other Sections and cooperate with trades involved in forming openings, slots, recesses, chases and setting sleeves, bolts, anchors and other inserts.

.4 Coordinate installation of concrete accessories specified in Section 03250 – Concrete Accessories.

.5 Set anchor bolts, sleeves and inserts accurately at the positions designated. Secure in position by means of wooden templates and ties to prevent shifting and floating during concrete placement.

.6 Do not set anchor bolts, sleeves and inserts into placed concrete.

.7 Core holes and grout anchor bolts for bearings.

3.8 QUALITY CONTROL

.1 Inspect and check complete formwork, falsework, shoring and bracing to ensure that the work is in accordance with formwork design and that supports, fastenings, wedges, ties and parts are secure.

.2 Inform Engineer when formwork is complete and has been cleaned to allow for inspection. Engineer's inspection will be for verification that forms are clean and free from debris.

.3 For all exposed concrete surfaces. Do not patch formwork.

.4 Allow the Consultant to inspect each section of formwork prior to reuse. Formwork may be re-used if approved by the Engineer.

3.9 CLEANING

.1 Clean forms as erection proceeds to remove foreign matter. Remove cuttings, shavings and debris from within the forms. Flush completely with water 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 the 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.

3.10 PREPARATION

.1 Apply form release agent in accordance with the manufacturer's recommendations prior to placing reinforcing steel, anchoring devices and embedded parts. Any embedded item to be cast in concrete, on which form release agent has been applied, shall be thoroughly cleaned prior to placing concrete.

.2 Do not apply form release agent where concrete surfaces are to receive special finishes or applied coverings which are affected by the agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces moist prior to placing the concrete.

.3 Do not apply form release agent where wood graining characteristics are required on finished concrete surfaces.

3.11 FORM REMOVAL

.1 Notify Engineer prior to removing formwork.

.2 The following table is to be used as a guide for the removal of forms and supports:

	Minimum Period of Time	Minimum Concrete Strength (based on 28 Day Strength)
Beams and slabs	14 days	80%
Columns	3 days	70%
Walls and critical vertical faces	2 days	50%
Footings	1 day	--

.3 Remove falsework progressively in accordance with regulatory requirements and ensure that no shock loads or imbalanced loads are imposed on the structure.

.4 Loosen forms carefully. Do not apply tools to exposed concrete surfaces.

.5 Leave forms loosely in place for protection until complete removal is approved by the Engineer.

.6 Store removed forms for exposed architectural concrete in a manner that surfaces to be in contact with fresh concrete will not be damaged. Marked or scored forms will be rejected.

.7 Removal of forms subject to approved on-going curing procedures.

3.12 RESHORING

.1 Prepare a schedule of reshoring and submit to the Engineer for review.

.2 Reshore structural members where required due to design requirements or construction conditions, or where subject to additional loads during construction.

.3 Install reshoring as required to permit progressive construction.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

.1 Reinforcing steel bars, welded steel wire fabric or fabricated steel bar for cast-in-place concrete, complete with tie wire and epoxy coating where shown on the drawings.

.2 Support chairs, bolsters, bar supports and spacers for reinforcing.

1.2 RELATED WORK

.1 Section 03300 – Cast-in-place Concrete

1.3 QUALITY ASSURANCE

.1 Perform concrete reinforcing work in accordance CAN / CSA-A23.1 latest edition.

.2 Submit two certified copies of mill test report of reinforcement supplied, indicating physical and chemical analysis.

.3 Submit samples and specifications of accessory materials prior to use.

1.4 SHOP DRAWINGS

.1 Concrete reinforcement will be inspected “in place”: Shop drawings for concrete reinforcement are not to be submitted to the Engineer for review.

1.5 DELIVERY AND STORAGE

.1 Deliver, handle and store reinforcement in a manner to prevent damage and contamination.

.2 Deliver bars in bundles, clearly identified in relation to bar lists.

PART 2 PRODUCTS

2.1 REINFORCING MATERIALS

.1 Reinforcing Steel: 400 MPa yield grade; deformed new billet steel bars conforming to CSA G30. 18-M.

2.2 ACCESSORY MATERIALS

.1 Tie Wire: minimum 1.6mm diameter annealed type, plastic coated for epoxy-coated reinforcement.

.2 Chairs, Bolsters, Bar Supports, Spacers: adequately sized for strength and support of reinforcing steel during construction and meeting cover requirements.

.3 Concrete Bricks: acceptable for support of bottom layer of bars in foundations on grade. Broken concrete blocks and wood supports are NOT acceptable.

.4 Mechanical Couplers: shall develop at least 125 percent of the specified yield strength of the bars, conforming to CSA A23.3M, ACI 318, ACI 349, complete with temporary cap, sizes as shown on drawings, as manufactured by Bar Grip Canada or approved equal. Couplers which require threads to be cut into the bar are not allowed.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Before starting the Work, examine work done by others which affects the Work.

.2 Review any conditions which would prejudice proper completion of the Work.

.3 Commencement of the Work implies acceptance of existing conditions.

3.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CAN / CSA-A23.1 latest edition and Drawings.

.2 Locate reinforcing splices not indicated on drawings at points of minimum stress. Lap splices are calculated in accordance with A23.3 summarized in the following table.

Bar Size	Basic Lap Length (mm)	Top Bars Lap Length (mm)[1]
10M	390	510
15M	550	720
20M	670	870
25M	1080	1400
30M	1280	1670

Note: [1] Top bars placed so that more than 300 mm of fresh concrete is cast below the splice length.

.3 Fabricate within the following tolerances:

.1 Sheared length: ±25mm.

.2 Depth of truss bars: plus 0, minus 10mm.

.3 Stirrups, ties and spirals: ±10mm.

.4 Other bends: ±25mm.

.4 Welding of reinforcing bar is not permitted. Use of mechanical couplers is permitted if required.

.5 All bending shall be done cold with a suitable machine accurately producing all lengths, depths and radii shown on the bending details.

.6 After initial fabrication, reinforcing steel shall not be rebent or straightened unless so indicated on the drawings.

.7 Heating of reinforcing steel will not be permitted.

3.3 INSTALLATION

.1 Place reinforcing steel in accordance with reviewed placing drawings and CAN / CSA-A23.1. Chair slab reinforcing not further apart than 1.2m in either direction.

.2 Adequately support reinforcing, and secure against displacement within tolerances permitted.

.3 Unless noted otherwise on the drawings, place reinforcing steel to provide concrete cover, as follows:

.1 Surfaces in cast against earth: 75 mm

.2 All other: 50 mm

.4 Maintain alignment within the tolerances noted in CAN / CSA-A23.1.

.5 Do not disturb or damage vapour barrier while placing reinforcing steel.

3.4 CLEANING

.1 Ensure concrete reinforcing is clean and free from oil and deleterious matter.

.2 Remove all loose scale, loose rust and other deleterious matter from surfaces of reinforcing.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

.1 Premoulded joint fillers.

.2 Waterstops.

.3 Inserts.

.4 Joint sealants.

.5 Vapour barrier under floor slabs on fill.

.6 Sealing compounds.

1.2 RELATED WORK

.1 Section 03100 – Concrete Formwork

.2 Section 03300 – Cast-in-place Concrete

PART 2 PRODUCTS

2.1 PREMOULDED JOINT FILLERS

.1 Asphalt-impregnated vegetable or cane fibreboard, conforming to ASTM D1751, sizes indicated on drawings, W. R. Meadows Sealtight Fibre Expansion Joint, Sternson Flexcell.

2.2 BACKER ROD FOR JOINT SEALANT

.1 Backer Rod: closed cell vinyl foam.

2.3 WATERSTOPS

.1 PVC Waterstops: conform to CSGB 41-6P-35M polyvinylchloride hollow tube at mid-width, sizes indicated on drawings. Waterstop intersections, such as tees, crosses and L's shall be factory made fabrications. Product and manufacturer identification to be printed at minimum 3m intervals.

.2 PVC Waerstop Physical Properties:

PVC Waterstop Physical Properties		
Property	**TEST *ASTM**	**NOMINAL VALUE**
Water absorption	*D570	0.043
Tear resistance	*D624	395 lb./in.
Ultimate elongation	*D638	365%
Min tensile strength	*D638	16 MPa
Low temperature brittleness	*D746	Passed @ -37°C
Stiffness in flexure	*D747	5 MPa
Specific gravity	*D792	1.35
Ozone resistance	*D1149	No failure
Volatile loss	*D1203	0.60%
Hardness Shore A15	*D2240	79±3
Accelerated extraction * Tensile strength * Elongation Effect of Alkali * Weight change * Hardness change	CRD-C572	 15.7MPA 370% +.13% -1 point

.3 Approved products: 150 mm width Greenstreak 705 waterstop or approved equal.

2.4 INSERTS

.1 Dovetail Anchor Slots: minimum 0.8 mm thick galvanized steel, conforming to CSA A37OM; foam filled; release tape sealed slots; stiffening lips minimum 3mm wide, neck 13mm, depth 25mm; securable to formwork, manufactured by Superior Concrete Accessories Ltd.; Drew Brown Ltd.; Burke Industries.

.2 Flashing Reglets: 0.032mm extruded aluminum, longest possible lengths; complete with alignment splines for joints; securable to formwork; Superior or Fry Reglet.

.3 Structural Inserts: stainless steel inserts for bolts, sizes and locations as indicated on the drawings. All inserts to be Hilti products unless otherwise noted.

2.5 SEALANTS

.1 Polyurethane Sealant (Vertical Joint): withstand a maximum of 25% joint movement, Sikaflex lA, PRC 270, Vulkem 116.

.2 Interior Saw Cut Joint or Control Joint Sealant: Sternson Loadflex, Sealtight Bondflex, Concrete Chemicals 903B Flexible Sealant, Allied Coatings AC-1210 Flexible Epoxy Sealant, Sikaflex 1A.

.3 Exterior Saw Cut Joint or Control Joint Sealant: self levelling polyurethane, Sternson Uraflex 2, PRC 270, Sikaflex 1A.

.4 Water retaining structure exterior and interior faces: Sikaflex 2C/NS for vertical joints and Sikaflex 2C/SL for horizontal joints.

.5 Primers: as supplied by sealant manufacturers.

2.6 VAPOUR BARRIER

.1 Vapour Barrier: 0.15mm clear polyethylene film, unreinforced, with self-adhesive polyethylene tape for joints, suitable for use below grade.

2.7 SEALING COMPOUNDS

.1 Colourless silane sealer and chloride ion protective coating; Sikagard 71 or equal.

2.8 EPOXY BONDING AGENT

.1 Sikadur 32 Hi-Mod.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Before starting the Work, examine work done by others which affects the Work.

.2 Review any conditions which would prejudice proper completion of the Work.

.3 Commencement of the Work implies acceptance of existing conditions.

3.2 INSTALLATION

.1 Coordinate the Work of this Section with other construction.

.2 Install all concrete accessories in accordance with drawings and manufacturer's recommendations; straight, level, and plumb.

.3 Install vapour barrier under interior floor slabs on grade. Lap joints 150mm (minimum) and tape full length of joints.

.4 Construction joints shall be placed in accordance with drawings.

.5 Ensure embedded items are not disturbed during concrete placement.

.6 Install waterstops continuous without displacing reinforcement. All PVC waterstop mitred tees, crosses, and L's shall be shop welded by manufacturer. Butt splices can be welded on site but should be strictly in accordance with manufacturer's recommendations. Secure in place to prevent dislodgement during placing of concrete. Splices in Volclay or Ultraseal waterstops shall be installed as per manufacturers' recommendations.

.7 When installing sealants, clean contact surfaces free from dirt, water, oil, rust, frost, and any other loose foreign matter. When recommended by manufacturer, prime contact surfaces of concrete.

.8 Install protective boards over joint covers when potentially damaging construction activities are not complete. Protect wall joint sealants from bituminous dampproofing with a fibreboard protection board, minimum 300 mm wide.

3.3 SEALING SAW CUT JOINTS AND EXPANSION JOINTS

.1 Saw cutting of control and construction joints in slabs on grade as per Section 03300 – Cast-in-Place Concrete.

.2 Not less than 7 days after concrete placement, blow out joints with compressed air.

.3 Remove all loose particles, dust, laitance and curing compounds from joints.

.4 Install PVC, polyurethane or polyethylene foam rope joint filler, same distance below concrete surface as joint width.

.5 If joint surfaces are damp, dry and apply primer as recommended by manufacturer.

.6 Install sealant in joints in accordance with manufacturer's directions.

3.4 SEALING COMPOUNDS

.1 After concrete has been allowed to dry, apply sealer to specified locations. Concrete shall be at least 28 days old.

.2 Apply at least two (2) coats of the sealer. Apply sealer until a residual film of epoxy resin starts to form on the surface (approximately $4m^2$ per litre). Confirm proper amounts of sealer required by testing over a 2m by 2m area.

.3 Apply all coats within 1½ hours of preceding application.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

.1 All plain and reinforced cast-in-place concrete shown on drawings.

.2 Setting anchors, inserts, frames, sleeves and other items supplied by other Sections.

.3 Repairing concrete imperfections.

.4 Finishing formed concrete surfaces.

1.2 RELATED WORK

.1 Section 03100 – Concrete Formwork and Falsework

.2 Section 03200 – Concrete Reinforcement

.3 Section 03250 – Concrete Accessories

1.3 QUALITY ASSURANCE

.1 Cast-in-place concrete to conform to CAN / CSA-A23.1 latest Edition and ACI 350 M-01.

.2 Testing shall conform to CAN/CSA-A23.2.

1.4 INSPECTION AND TESTING

.1 Inspect complete formwork and concrete reinforcement prior to closing of forms or pouring concrete. Record inspections on Concrete Pour Release Form.

.2 Allow ample time for inspection and corrective work, if required, before scheduling concrete placement.

.3 Provide free access to all portions of the Work.

.4 Submit proposed mix design of each class of concrete for review at least 2 weeks prior to commencement of concrete work.

.5 Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

.6 Concrete sampling, inspection and testing is to be performed by an independent inspection and testing firm appointed and paid by the Contractor upon approval of the Engineer.

.7 Three concrete test cylinders will be taken for every $50m^3$ or less of each class of concrete placed.

.8 At least three test cylinders will be taken daily for each class of concrete placed. Atmospheric and concrete temperatures shall be recorded.

.9 One additional test cylinder will be taken during cold weather placement of concrete, and be cured on job site under same conditions as concrete it represents.

.10 One slump test and one air content test will be taken for each set of test cylinders taken. These tests shall be performed before the concrete from which the sample was taken is allowed to be incorporated into the concrete work.

.11 Verify quality of concrete with additional slump tests as required.

.12 Test concrete in accordance with CAN / CSA-A23.2 latest edition. Test results will be issued to the Contractor, the Supplier, the Engineer and the Owner.

.13 Pay costs for required retesting due to results indicating defective materials or workmanship regardless of the results of the restarting.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

.1 Cement: Type GU, General Use Hydraulic Cement to CAN/CSA A3001, latest Edition.

.2 Supplementary cementing materials: Pozzolan to CAN/CSA – A3001, Type F flyash.

.3 Fine Aggregate: conforming to Normal Density Fine Aggregate, CAN / CSA-A23.1.

.4 Coarse Aggregate: conforming to Normal Density Coarse Aggregate, CAN/CSA-A23.1, Group I, maximum size 20mm, minimum size 5mm. (Group II coarse aggregate may be used for concrete to be placed by pumping).

.5 Ensure that no aggregates are used which may undergo volume change due to alkali reactivity, moisture retention or other causes. Suitability of aggregate may be confirmed with a petrographic analysis if deemed necessary.

.6 Water: All water to be used in the production of concrete shall be potable, clean and free from injurious amounts of oil, alkali, organic matter or other deleterious matter.

.7 Calcium chloride or admixtures containing calcium chloride shall **not** be used in concrete.

.8 Materials are to be obtained from the same source of supply or manufacturer for the duration of the project. All exposed concrete is to be consistent in colour.

2.2 ADMIXTURES

.1 Air Entrainment: conforming to CSA A23.1

.1 Mid-range and super-plasticized concrete – use Micro-Air by Master Builders, where Master Builders water reducers are used or Darex AEA EH by Grace Canada Inc. where Grace water reducers are used.

.2 Concrete not super-placticized:

.1 MB-VR by Master Builders,

.2 Sternson NVR Sternson Ltd.,

.3 Darex AEA by Grace Construction Products,

.4 Or approved equal.

.2 Pozzolanic Material: conforming to CAN/CSA-A23.1, Type F.

.3 The use of Flyash to reduce cement contents is not permitted. Flyash can be used as a retarder or filler. Supplemental flyash to a maximum of 10% total cementitious material may be permitted at the discretion of the Engineer.

.4 Chemical: conforming to ASTM C494 or C1017; water-reducing, strength increasing type, Super-plasticizing. Admixtures containing calcium chloride shall not be used.

.5 Ensure admixtures are compatible with each other and with construction materials.

.6 Silica fume shall meet all the requirements for Type “U” material as specified in CAN/CSA-A3001.

2.3 ACCESSORIES

.1 Epoxy Bonding Agent: two component epoxy resin. Approved product: Sika Sikadur Hi-Mod or approved equal.

.2 Curing Compound: for exterior slabs, and walls only, conforming to ASTM C309 Type 1 - clear or translucent. All concrete in contact with soil or water shall be moist-cured in conformance with CAN / CSA-A23.1.

.3 Moisture Retention Film: Master Builders Confilm or approved equal, for curing of slabs-on-grade only.

.4 Epoxy adhesive: Hilti HIT RE 500, UCAN Poly-All epoxy, or Sika Sikadur Injection Gel.

2.4 CONCRETE MIXES

.1 Pay all costs for mix design. The Contractor is responsible for the mix design. Submit design to the Engineer to review a minimum of two weeks prior to concrete pour.

.2 Provide concrete mixed in accordance with requirements of CAN/CSA A23.1.

.3 All Concrete: minimum 28 day comprehensive strength, cement type, Class of exposure, water cement ratio, nominal coarse aggregate size, maximum slump and minimum slump and air content to be shown as detailed in Table A.

TABLE A
PROPOSED CONCRETE MIXES

Item	Purpose	Strength (MPa) 28 days	Cement Type	Max W/C Ratio	Nominal Size Coarse Agg. (mm)	Allowable Slump (max/min)	Air Entrainment (%)	Comments	Exposure Class	Silica Fume % of mass of cementitiuos material
1	All structures except in Item (2)	32	GU	0.40	20	60 - 100	5 to 8%	Super P	A2	10%
2	Pipe encasement, lean mix, skim coat, low strength concrete fill	20	GU	0.50	20	100 ± 20	7±1%		-	

Notes:

1. Grout mix for the start of wall pours will be the wall mix as in Item 1 (above) but without the coarse aggregate.
2. Concrete placed in walls deeper than 3m may have an increased slump of 100±20mm by the addition of superplasticizer.
3. Supplemental flyash to a maximum of 10% of the total cementitious material may be permitted at the discretion of the Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Before starting the Work, examine work done by others which affects the Work.

.2 Review any conditions which would prejudice proper completion of the Work.

.3 Commencement of the Work implies acceptance of existing conditions.

3.2 PLACING CONCRETE

.1 Place concrete in accordance with requirements of CAN / CSA-A23.1 and as indicated on drawings.

.2 Immediately before concrete is placed, all forms shall be carefully inspected to ensure that they are properly placed, sufficiently rigid and right, and that all reinforcing steel is in the correct position and secured against movement during the placing operation. All forms shall be thoroughly cleaned and all debris, snow, ice or other foreign material removed. Chemicals shall not be used to remove ice or hardened concrete from the forms. All forms shall be thoroughly soaked with water except in freezing weather.

.3 Handling equipment shall be kept free from hardened concrete or foreign material, and cleaned at frequent intervals.

.4 Ensure all anchors, seats, plates and other items to be cast into concrete are securely placed, and will not interfere with concrete placement.

.5 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent the separation or loss of the ingredients. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling or flowing. Vibrators shall not be used to move concrete. Under no circumstances shall the concrete which has partially hardened by deposited in the forms.

.6 When concrete placement is started, it shall be carried on as a continuous operation until the placing of the section is completed. When shown on the Drawings, concrete shall be placed in the sections indicated and according to the sequence given.

.7 Maintain accurate records of cast-in-place concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

.8 Ensure reinforcement, inserts, embedded parts, formed expansion and control joints are not disturbed during concrete placement.

.9 Prepare set concrete by removing all laitance and loose materials and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.

.10 Vibrate concrete using the appropriate size equipment as placing proceeds in strict accordance with CAN / CSA-A23.1. Check frequency and amplitude of vibrations prior to use. Provide additional standby vibrators in the event of equipment failure.

.11 Where placing operations would involve dropping the concrete more than 1.5 metres, it shall be placed through “canvas elephant trunks” or galvanized iron chutes. Concrete levels shall not be raised at a rate greater than that for which proper vibration may be affected.

.12 The concrete surfaces shall be protected from rain until the final set occurs.

.13 A minimum of 72 hours shall elapse between adjacent pours separated by construction joints or expansion joints.

.14 Do not place concrete in the interior of a building if carbon dioxide producing equipment has been in operation inside the building during the 12 hours preceding the pour. Such equipment shall not be used during placing or for 24 hours after placing. During placing and curing concrete, surfaces shall be protected by formwork or an impermeable membrane from direct exposure to carbon dioxide, combustion gases or drying from heaters.

.15 Honeycomb or embedded debris in concrete is not acceptable; correct defects.

.16 Remove and replace defective concrete in accordance with Clause 3.16 – Defective Concrete of this Section.

3.3 CONSTRUCTION JOINTS

.1 Joints not indicated on the Drawings shall be located so as to least impair the strength of the structure. The location of these joints shall be subject to the prior approval of the Engineer. Joints shall be in accordance with CAN/CSA-A23.1, or as indicated on Drawings or directed by the Engineer.

.2 Where the Contractor elects to employ construction joints other than shown and the Engineer so approves, waterstops shall be provided for the full length of the joint if required by the Engineer and without additional compensation to the Contractor.

.3 The surface of hardened concrete shall be roughened and thoroughly cleaned of foreign matter and laitance, and shall be thoroughly wetted with water but not saturated and the forms re-tightened against the face of the hardened concrete before depositing additional concrete. Epoxy bonding agents may be required as directed by the Engineer.

3.4 COLD AND HOT WEATHER CONCRETING

.1 Conform to requirements of CAN / CSA-A23.1.

.2 Protect slabs being finished during drying conditions above 25°C and / or during high winds with moisture retention film.

3.5 CONCRETE PROTECTION FOR REINFORCEMENT

.1 Ensure reinforcement is placed to provide minimum concrete cover in accordance with CAN / CSA-A23.1 and with Section 03200 of this Specification.

3.6 SCREEDING

.1 Screed concrete for slabs in accordance with CAN / CSA-A23.1 and ACI 117. Screed to maintain a Class A surface flatness, measured by the straightedge method. Slope to drain as shown on drawings.

3.7 CONDUITS AND PIPES

.1 Conduit and pipe shall not be embedded in water retaining concrete structures unless it is indicated on the Drawings or approved by the Engineer.

.2 Conduit and pipe embedded in concrete shall not be of a material harmful to the concrete and shall:

.1 Not displace more than 4% of the area of the cross section of a column on which stress is calculated, including the area of concrete displaced by the bending of the conduit or exit path of the conduit out of the column.

.2 Not exceed one-third the solid portion of the slab thickness.

.3 Not be spaced closer than three diameters on centre.

.4 Have a concrete covering of not less than 40mm.

.3 Be so installed that it will not require cutting, bending or displacement of the reinforcement or impair the structural strength of the system.

3.8 INSTALL ITEMS SPECIFIED UNDER OTHER SECTIONS

.1 Install hangers, sleeves, anchors, etc. specified under other Sections.

.2 Pour concrete after other trades have satisfactorily installed their materials.

.3 Do not eliminate or displace reinforcement to accommodate hardware. Consult Engineer prior to relocation of hardware.

3.9 SLABS ON GRADE

.1 Seal punctures and damaged areas of vapour barrier before placing concrete. Use vapour barrier material, lapped over punctures and damaged areas minimum 150mm in all directions. Seal continuously with tape.

.2 Place adjustable screeds at suitable locations. Do not pierce vapour barrier.

.3 Carefully place concrete to required elevations indicated on drawings.

.4 Where shown on drawings, separate slabs-on-grade from vertical surfaces with 12mm thick joint filler. Extend joint filler from bottom of slab to within 6mm of finished surface. Refer to Section 03250 – Concrete Accessories for joint filler requirements.

.5 Saw cut control joints in straight lines, within 24 hours after finishing. Cut in pattern shown on drawings. Use 5mm thick blade, cut 1/3 depth of slab. Saw cut construction joints to straight lines with true, square edges.

3.10 EQUIPMENT PADS

.1 Provide concrete pads for equipment where and as indicated on drawings. Adjust dimensions of pads to reviewed shop drawings. Unless shown otherwise on drawings, height of pads to be minimum 100mm and extend 100mm beyond equipment base.

.2 Insert bolts and sleeves and pack solidly with non-shrink grout, in accordance with setting details and templates.

.3 Steel trowel surface smooth: as per Section 03100 – Concrete Formwork and Falsework.

3.11 CURING AND PROTECTION

.1 Cure and protect freshly placed concrete in accordance with CAN / CSA-A23.1 and as specified.

.2 Surfaces of concrete which are protected by formwork which is left in place for 7 days shall not require any additional curing except as specified for hot weather. If the formwork is removed or loosened (so as to allow moisture to escape from the concrete surface) in less than 7 days, the concrete shall receive moist curing as above i.e. in conformance with CAN / CSA-A23.1 until 7 days have elapsed since the concrete was placed.

.3 No concreting will be allowed until all materials required for curing are on-site and ready for use.

3.12 FORMED CONCRETE

.1 Inspect concrete surfaces immediately upon removal of forms.

.2 Treat imperfections in formed surfaces in accordance with CAN / CSA-A23.1.

.3 Modify or replace concrete not conforming to qualities, lines, details and elevations specified herein or indicated on drawings.

3.13 FINISHING FORMED SURFACES

.1 Finish all exposed formed concrete surfaces, including interior wall surface submerged in water, with a smooth-form finish conforming to CAN / CSA-A23.1.

.2 All surfaces 500 mm below soil can be finished with rough-form finish conforming to CAN/CSA A23.1.

3.14 FINISHING WALKS, CURBS, RAMPS, STEPS

.1 Finish edges to smooth radius.

.2 On walks, platforms and ramps, tool control joints across at 1.8m on centre, unless otherwise noted in the Specifications or on the drawings.

.3 Broom finish surface of platforms, steps, walks, curbs and ramps.

.4 Apply curing compound to manufacturer's directions.

3.15 GROUTING

.1 Install non-shrink grout under equipment bases as shown on drawings and in accordance with the manufacturer's recommendations.

3.16 DEFECTIVE CONCRETE

.1 Concrete not meeting the requirements of the Specifications and Drawings shall be considered defective concrete.

.2 Concrete not conforming to the lines, details or grades specified herein or as shown on the drawings shall be modified or replaced. Finished lines, dimensions and surfaces shall be correct and true within tolerances specified herein and in Section 03100 – Concrete Formwork and Falsework.

.3 Concrete placed which results in excessive honeycombing or other defect in critical areas of stress shall be repaired or replaced.

.4 To conform to the strength requirements, the average of all tests shall exceed the specified strength. When five or more tests of the same class of concrete are available, the average of any five consecutive tests shall be equal to, or greater than the specified strength, and no strength test shall fall more than 3.5 MPa below the specified strength. Implement corrective measures if tests are below specified strength:

.1 Changes in mix proportions for the remainder of the Work, for which mix designs shall be submitted in accordance with the Specifications.

.2 Cores drilled and tested from the areas in question in accordance with CAN / CSA-A23.2. The test results shall be indicative of the strength of the in-place concrete.

.3 Load testing of the structural elements. The changes in the mix proportions and the testing shall be at the Contractor's expense.

.4 Concrete failing to meet the specified strength requirements shall be repaired or replaced.

3.17 PATCHING

.1 Inspect concrete surfaces immediately upon removal of all formwork.

.2 Patch imperfections when concrete is green.

.3 Remove all exposed metal form ties, nails and wires, break off fins and remove all loose concrete.

.4 Thoroughly wet all form tie pockets and patch with patching mortar followed by proper curing.

.5 Chip away honeycombed and other defective surfaces to depth of not less than 25mm with the edges perpendicular to the surface. Thoroughly wet and patch with patching mortar followed by proper curing.

3.18 WATER-TIGHTNESS TEST

.1 Test in compliance with ACI 350.1 and as specified below.

.2 On completion of construction of water retaining structures, conduct leakage tests. Test structures prior to backfilling. Test each cell and chamber independently.

.3 Fill the structure to the maximum liquid level shown on the Drawings and keep it filled for an absorption period of 3 days, by the addition of water as required. Use only potable water for testing.

.4 Repair visible leaks.

.5 If repairs require the water level to be lowered, carry out a further 3-day absorption period after the water level has been raised again to the maximum level.

.6 At the expiration of the absorption period, record the level of the water surface and record further measurements 24 hours, 48 hours, 72 hours and 96 hours thereafter. For open structures, place an evaporation tray in the open in a protected location during this period. The structures will be deemed watertight and acceptable if, after due allowance for evaporation and rainfall, the total leakage does not exceed 0.1% of the water volume per 24-hour period.

3.19 CLEAN-UP

.1 As work on placing concrete progresses, remove from site all debris and excess materials. Work area shall be kept continuously clean, so as not to interfere with proper inspection or the work of other Trades.

.2 At completion of the Work, remove from site all debris, excess materials and equipment.

END OF SECTION

PART 1 GENERAL

1.1 WORK INCLUDED

.1 Finish concrete floors.

.2 Non-metallic concrete hardener.

.3 Liquid concrete hardener.

.4 Curing compound and sealer on finished floors.

1.2 RELATED WORK

.1 Section 03250 – Concrete Accessories

.2 Section 03300 – Cast-in-Place Concrete

1.3 QUALITY ASSURANCE

.1 Perform work to requirements of CAN/CSA-A23.1 and ACI 117 - Proposed Floor Flatness and Levelness Specification.

.2 Tests for surface flatness and levelness to be performed in accordance with ASTM Committee E6.21.10 to ensure conformance with specified tolerances. Cost of testing to be borne by Owner.

.3 A qualified representative of the floor hardener manufacturer shall be present prior to and during initial installation of the hardener to advise on the correct use of the product under prevailing job conditions.

1.4 QUALIFICATION

.1 Concrete finishing is to be done by an established firm having at least 5 years of proven, satisfactory experience in this trade and employing skilled personnel.

.2 Submit proof of qualifications in writing to the Engineer.

PART 2 PRODUCTS

2.1 LIQUID HARDENER

.1 Liquid Hardener: fluosilicate compound, Master Builders Saniseal, Sternson Sealhard 400, coverage to manufacturer's specifications.

2.2 CURING COMPOUND

.1 Curing Compound: moisture retention requirements to conform to ASTM C309, clear [Sternson Florseal] [Master Builders Masterseal].

2.3 CONCRETE SURFACE TREATMENT SOLUTIONS

.1 Trisodium Phosphate (TSP) Solution, or Pool-Washing Compound (Olympic #910 or equivalent).

.2 Muriatic Acid Solution (for acid-etching): 30% hydrochloric acid. Mix one part muriatic acid with two parts clear water, to produce a 10% acid solution. Ensure that solution is no less than 10% acid. Always pour acid into the water when mixing. NEVER pour water into acid

PART 3 EXECUTION

3.1 EXAMINATION

.1 Before starting the Work, examine work done by others which affects the Work.

.2 Notify the Engineer of any conditions which would prejudice proper completion of the Work.

.3 Commencement of work implies acceptance of existing conditions.

3.2 BULL FLOATING

.1 Immediately after screeding, bull float floor surfaces to remove ridges and fill voids.

.2 Complete bull floating before any excess moisture or bleed water is visible on surface.

3.3 MECHANICAL FLOATING

.1 Mechanical float floor surfaces when bleed water has disappeared and surfaces are sufficiently hard to prevent working excess mortar to surface.

.2 Continue floating as necessary to produce surfaces of uniform texture, free from hollows, bumps and screed marks.

.3 For surfaces to be trowelled, continue floating as necessary to embed coarse aggregate particles firmly below surface mortar.

.4 Hand float in restricted areas, corners, etc.

3.4 TROWELLING

.1 Trowel floor surfaces with mechanical trowelling machines fitted with steel blades.

.2 Commence trowelling when surfaces are sufficiently hard to prevent working excess fine material to surface.

.3 Perform additional trowelling at intervals so final trowelling is done just before concrete becomes so hard that further trowelling is ineffective.

.4 Finished trowelled surfaces to be hard, dense and free from blemishes and other imperfections.

.5 Hand trowel in restricted areas, corners, etc.

.6 Cure concrete as specified under Section 03300 – Cast-in-Place Concrete.

.7 Protect, all hardened floors from damage during construction.

3.5 NON-METALLIC HARDENED FLOORS

.1 Amount of hardener aggregate (excluding cement weight) to be applied is 4.0 kg/m^2 of surface area.

.2 Dry mix two parts aggregate to one part normal Portland cement by weight.

.3 Apply mixture in two shakes; first shake - 2/3 of total mixture, second shake - 1/3 of mixture.

.4 Immediately after first mechanical floating, apply first shake uniformly by broadcast method.

.5 Use measured areas to ensure accurate quantity is being applied.

.6 Float first shake when sufficient moisture has been absorbed from concrete beneath to mix shake with mortar from concrete.

.7 Immediately apply second shake uniformly at right angles to direction of first shake application.

.8 Float second shake when moisture has been absorbed from concrete beneath.

.9 Apply sealer evenly by spray method.

3.6 LIQUID HARDENED FLOORS

.1 Ensure concrete is at least 28 days old before applying liquid hardener.

.2 Remove all laitance, dirt, dust, debris, grease and other substances from concrete surfaces.

.3 Prepare hardener in accordance with manufacturer's directions.

.4 Apply hardener in two consecutive applications, using quantities and coverage to manufacturer's directions.

3.7 CURING COMPOUND

.1 Apply curing compound on all concrete floors shown to receive resilient flooring and carpet.

.2 Coverage to be 0.1 L/m^2 using short nap rollers, brushes or low pressure spray equipment.

.3 Apply after final trowelling when concrete surfaces are sufficiently hardened to prevent marring, and before surfaces start to dry.

3.8 FLOOR FINISH TOLERANCES

.1 Surfaces of finished suspended floor slabs shall conform to design grade as follows:

Final elevation to fall between:

Elevation	D	-	d + 10mm
and elevation	D	-	d - 10mm
where	D	=	the design elevation of the finished floor surface
	d	=	deflection of the base at the point of measurement occurring as a consequence of the slab's (or topping's) dead weight.

The alternative Straight Edge Method in A23.1 provides that the gap at any point under a 3m straight edge shall not exceed:

Conventional	12 mm
Moderately Flat	8 mm
Flat	5 mm
Very Flat	3 mm

.2 Finished floor slabs on grade to conform to 3 mm in 3 m and be within + 10 mm of design grade.

.3 Finished floors not meeting the specified requirements will be rejected and must be repaired.

END OF SECTION

PART 1 GENERAL

1.1 DESCRIPTION

.1 This section specifies Portland cement based grout for general applications such as equipment bases, and which are not specified in other Sections.

1.2 REFERENCE STANDARDS

.1 Conform to the following reference standards:

.1 CAN/CSA A23.1, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CSA A3001, Cementitious Materials for use in Concrete.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS

.1 For equipment bases: Masterflow 713 or 928 by Masterbuilders; M-Bed grout by Sternsons; Horngrout by Tamms; Sikagrout 212 HP by Sika Products.

.2 For general use: Set grout by Masterbuilders M-Bed Standard by Sternsons.

2.2 MATERIALS

.1 Cement: to CAN/CSA A23.1, Type GU.

.2 Supplementary cementing materials to CAN/CSA A3001.

.3 Water to CAN/CSA A23.1.

.4 Chemical admixtures to ASTM C494 or C1017.

.5 Shrinkage compensating grout. Premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents. Compressive strength to be minimum 50 MPa at 7 days.

PART 3 EXECUTION

3.1 PREPARATION

.1 Maintain surfaces and ambient air temperature of minimum 10°C for a minimum period of 24 hours prior to, during, and 72 hours after application.

.2 If grouting in exposed conditions, provide and maintain temporary weatherproof enclosures from inclement weather during preparation, grouting and curing.

3.2 MIXING

.1 Mix grout dry and add water to bring mix to the correct consistency in a mechanical rotary mixer.

.2 Mix premix grout in accordance with manufacturer's instructions.

3.3 INSPECTION

.1 Notify Engineer 24 hours before commencing grouting operations.

3.4 PLACING

.1 Roughen and clean contact surfaces and thoroughly wet with water prior to grouting.

.2 Prepare grout no earlier than 10 minutes before use and place in final position within 30 minutes.

.3 Ram dry pack against suitable back-up blocker.

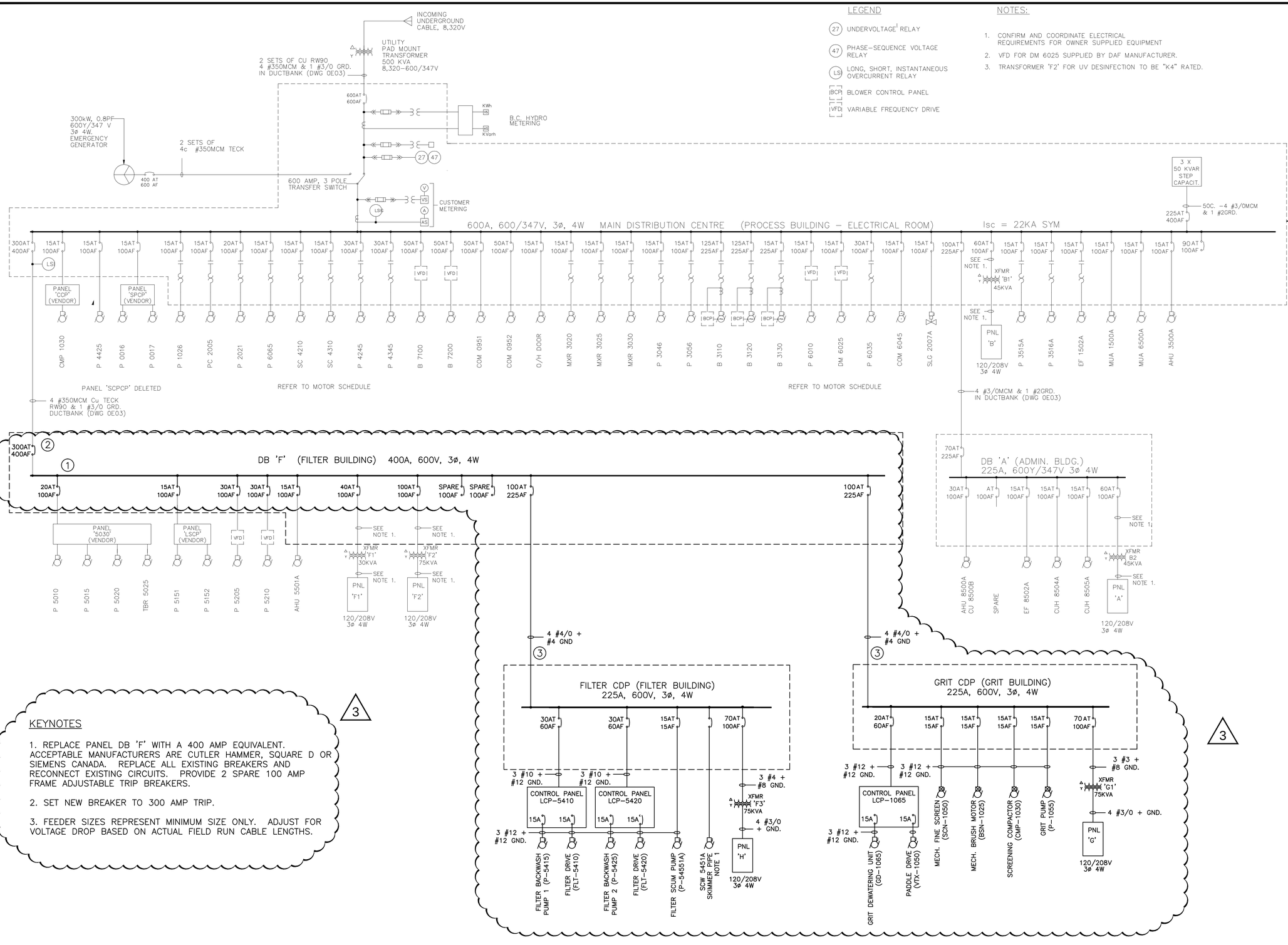
.4 Grout using procedures in accordance with manufacturer's recommendations which results in 100% contact over grouted area.

.5 Grout under base plates to be installed to provide for full bearing. Remove all air pockets.

.6 Finish and tool grout exposed to view in a workmanlike manner consistent with the finish of adjacent materials.

.7 Continuously moist cure at temperature above 5°C for seven days and in accordance with manufacturer's recommendations.

END OF SECTION



LEGEND

- (27) UNDERVOLTAGE RELAY
- (47) PHASE–SEQUENCE VOLTAGE RELAY
- (LS) LONG, SHORT, INSTANTANEOUS OVERCURRENT RELAY
- [BCP] BLOWER CONTROL PANEL
- [VFD] VARIABLE FREQUENCY DRIVE

NOTES:

1. CONFIRM AND COORDINATE ELECTRICAL REQUIREMENTS FOR OWNER SUPPLIED EQUIPMENT
2. VFD FOR DM 6025 SUPPLIED BY DAF MANUFACTURER.
3. TRANSFORMER 'F2' FOR UV DESINFECTION TO BE "K4" RATED.

KEYNOTES

1. REPLACE PANEL DB 'F' WITH A 400 AMP EQUIVALENT. ACCEPTABLE MANUFACTURERS ARE CUTLER HAMMER, SQUARE D OR SIEMENS CANADA. REPLACE ALL EXISTING BREAKERS AND RECONNECT EXISTING CIRCUITS. PROVIDE 2 SPARE 100 AMP FRAME ADJUSTABLE TRIP BREAKERS.
2. SET NEW BREAKER TO 300 AMP TRIP.
3. FEEDER SIZES REPRESENT MINIMUM SIZE ONLY. ADJUST FOR VOLTAGE DROP BASED ON ACTUAL FIELD RUN CABLE LENGTHS.

1 / E100 SINGLE LINE DIAGRAM
SCALE NTS

DATE 2012.01.24
PROJECT NO 111710033
FILENAME E-100.DWG
SHEET No.
DRAWING NO E-100

DISTRICT OF SUMMERLAND
WASTEWATER TREATMENT PLANT UPGRADE

SINGLE LINE DIAGRAM

PREPARED FOR DISTRICT OF SUMMERLAND

PREPARED BY Stantec
Stantec Consulting Ltd.
400-1620 Dickson Avenue
Kelowna, British Columbia
www.stantec.com

NO	REVISIONS	DRN	CK	DATE	CHK
2	ISSUED FOR ADDENDUM 3	JB	JTK/GS	2017.03.28	
1	ISSUED FOR TENDER		JTK/GS	2017.03.08	

	DRN	CLS	2012.07.27
DES	MY		2012.01.24
CHK	MY		
APP	MY		

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ORIGINAL SHEET – ANSI D (22" x 34")

Schedule A – General Conditions (All Schedules)

Item No.	Specification and/or Description	Unit Price	Amount
A.1	General Requirements – Division 1		
	a) Mobilization & Demobilization	Lump Sum	$
	b) Start-up and Commissioning	Lump Sum	$
	c) Bonding & Insurance	Lump Sum	$
	Total Schedule A – General Conditions		**$**

Schedule B – Grit Removal Equipment

Item No.	Specification and/or Description	Unit Price	Amount
B.1	Site Work – Division 2		
	a) Underground Piping	Lump Sum	$
	b) Demolition and Removal	Lump Sum	$
	c) Dewatering	Lump Sum	$
	d) Excavation and Backfill	Lump Sum	$
	e) Paving	Lump Sum	$
	f) Temporary Works	Lump Sum	$
	g) Flow Meter Chamber	Lump Sum	$
B.2	Concrete – Division 3	Lump Sum	$
B.3	Miscellaneous Metals – Division 5	Lump Sum	$
B.4	Thermal & Moisture Protection – Division 7	Lump Sum	$
B.5	Doors & Windows – Division 8	Lump Sum	$
B.6	Finishes – Division 9	Lump Sum	$
B.7	Process Mechanical – Division 11		
B.7.1	Process Mechanical Equipment and Piping		
	a) Supply of Pre-Selected Grit Removal Equipment	Lump Sum	$
	b) Install Grit Removal Equipment	Lump Sum	$
	c) Supply & Install All Mechanical Equipment	Lump Sum	$
	d) Process Piping, Valves and Fittings	Lump Sum	$
	e) Gates	Lump Sum	$
B.8	Building Mechanical – Division 15	Lump Sum	$
B.9	Electrical – Division 16		
	a) Supply & Install All Other Electrical Equipment and Wiring	Lump Sum	$
	b) Distribution, MCCs and Control Panels	Lump Sum	$
	c) Lighting	Lump Sum	$
	d) Site Electrical	Lump Sum	$

Item No.	Specification and/or Description	Unit Price	Amount
B.10	Controls and Instrumentation – Division 13 & 17		
	a) Supply and Install Control Panels and Instrumentation	Lump Sum	$
	b) Interconnecting Cabling	Lump Sum	$
	c) Software Supply	Lump Sum	$
	Total Schedule B – Grit Removal Equipment		**$**

Schedule C – Effluent Filters

Item No.	Specification and/or Description	Unit Price	Amount
C.1	Site Work – Division 2		
	a) Underground Piping	Lump Sum	$
	b) Demolition and Removal	Lump Sum	$
	c) Dewatering	Lump Sum	$
	d) Excavation and Backfill	Lump Sum	$
	e) Paving	Lump Sum	$
	f) Temporary Works	Lump Sum	$
	g) Flow Meter Chamber on Outfall	Lump Sum	$
C.2	Concrete – Division 3	Lump Sum	$
C.3	Miscellaneous Metals – Division 5	Lump Sum	$
C.4	Thermal & Moisture Protection – Division 7	Lump Sum	$
C.5	Doors & Windows – Division 8	Lump Sum	$
C.6	Finishes – Division 9	Lump Sum	$
C.7	Process Mechanical – Division 11		
C.7.1	Process Mechanical Equipment and Piping		
	a) Supply of Pre-Selected Filter Equipment	Lump Sum	$
	b) Install Filter Equipment	Lump Sum	$
	c) Supply & Install All Other Mechanical Equipment	Lump Sum	$
	d) Process Piping, Valves and Fittings	Lump Sum	$
	e) Gates	Lump Sum	$
C.8	Building Mechanical – Division 15	Lump Sum	$
C.9	Electrical – Division 16		
	a) Supply and Install AllElectrical Equipment	Lump Sum	$
	b) Distribution, MCCs and Control Panels	Lump Sum	$
	c) Lighting	Lump Sum	$

Item No.	Specification and/or Description	Unit Price	Amount
	d) Site Electrical	Lump Sum	$
C.10	Controls and Instrumentation – Division 13&17		
	a) Supply and Install Control Panels and Instrumentation	Lump Sum	$
	b) Interconnecting Cabling	Lump Sum	$
	c) Software Supply	Lump Sum	$
	Total Schedule C – Effluent Filters		**$**

SUMMARY OF TENDER

Schedule A – General Conditions Total		$
Schedule B – Grit Removal Equipment		$
Schedule C – Effluent Filter(s) Equipment		$
	Sub-total	$
Federal Goods & Services Tax at 5.0%		$
TOTAL CONTRACT PRICE (including GST)		$