

# Addendum / Addenda

Project Description / Description de projet <b>S 77 Nanocomposites Lab 147 Renovation</b>		
Solicitation No./N° de sollicitation <b>16-22100</b>	Project No./N° de projet <b>5263</b>	W.O. No./N° d'ordre de travail <b>A1-004307-01-03</b>
Departmental Representative / représentant ministériel <b>Allan Smith</b>		Date <b>October 27, 2016</b>
<b>Notice:</b> This addendum shall form part of the tender documents and all conditions shall apply and be read in conjunction with the original plans and specifications.		<b>Nota:</b> Cet addenda fait partie intégrale des dossiers d'appel; toutes les conditions énoncées doivent être lues et appliquées en conjonction avec les plans et les devis originaux.

- A See attached Notes for Addendum S77-5263 Nanocomposites Lab147 Renovations
- B In Addition to the attached notes the Contractor is to carry all required Costs to (a) Hire a Certified Tree Removal Expert to remove the two existing large Trees that are located along the front face of the Building where the "Damp Proofing" is to take place, NRC to identify the Trees to be removed on Site (b) transport these Trees to a location that the Trees can be cared for until the "Damp Proofing" has been accepted by NRC (c) return with the Trees and re-plant them c/w all required nutrients to ensure the life of the Trees after placing back into the original loactions
- C See attached Drawings to be included in this Tender 52630A01-ADD#01 and 5263-A02-ADD#01
- D See attached Architechural Specification to be included in this Tender S77 5263 ARCH SPEC - ADD#01
- E In Addition to the attached notes the Mechanical Contractor is to remove the existing Heating Radiation Wall Units located in Rooms 147, 149 and 151 to allow the General Trades to make all required repairs to the walls that these are affixed onto (for reference see Architechural Drawing Note #12, Wall Remediation, Units located on outside wall below the Windows). This Contractor is to reinstall the same wall units complete with all required modifications (piping, Controls, ect..) for a complete and functional system.

END / FIN

S77-5263 NANOCOMPOSITES LAB 147 RENOVATIONS

Notes for the Addendum

1. General

- a. The following changes in the Bid Documents are effective immediately.
- b. This addendum shall form part of the Contract Documents.
- c. Include this addendum in the list of numbered addendums entered on the bid form.

2. ARCHITECTURAL

- a. Add the attached drawings:
  - 5263-A01, Exterior Foundation Wall Damp proofing, Site Plan and Details
  - 5263-A02, Floor Plans, Reflected Ceiling Plans and Details
  
- b. Add the attached Specification Sections:
  - 020750 - Interior Protection
  - 022100 - Site Grading
  - 024110 - Foundation Drainage
  - 071000 - Air & Vapor Barrier
  - 071352 - Modified Bituminous Sheet Waterproofing
  - 072000 - Insulation
  - 079000 - Sealants
  - 091110 - Metal Studs System
  - 091300 - Suspension System for Acoustical Ceilings
  - 092500 - Gypsum Board
  - 095110 - Acoustical Panels
  - 096723 - Resinous Chemical Resistant Epoxy Floor
  - 096730 - Resinous Vinyl Chip Flooring
  - 099000 - Painting
  - 320190.33 - Tree and Shrub Preservation
  - 329119.13 - Topsoil Placement and Grading
  - 329310 - Trees Shrubs and Ground Cover Planting

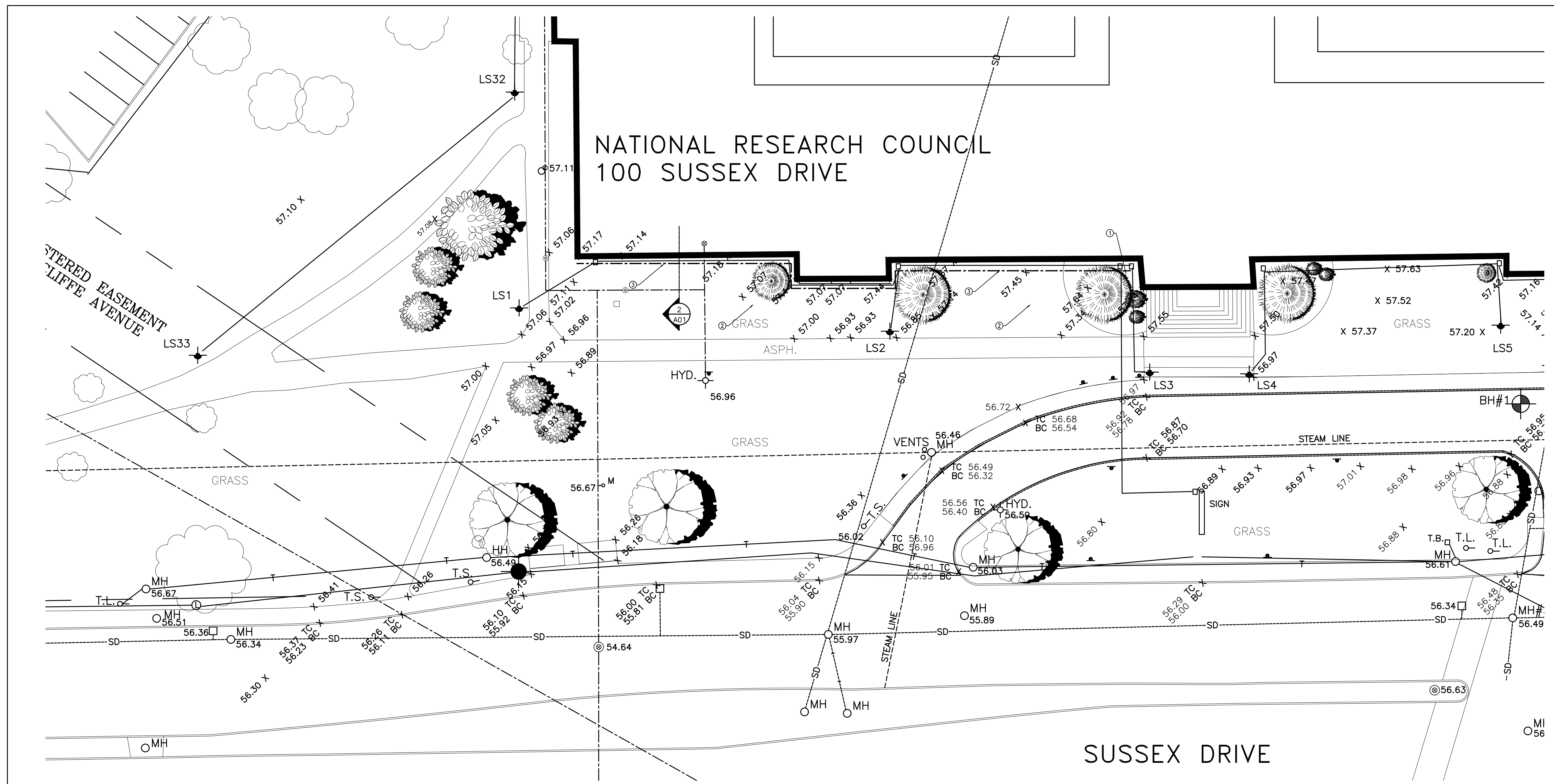
END

GENERAL NOTES

PRIOR TO COMMENCEMENT OF WORK, NOTIFY DEPARTMENTAL REPRESENTATIVE OF ANY DISCREPANCIES NOTED IN THE CONTRACT DOCUMENTS.

- A. ALL GRID TO GRID DIMENSIONS ARE PLUS/MINUS. PRIOR TO COMMENCEMENT OF WORK, REVIEW SITE CONDITIONS AND VERIFY ALL DIMENSIONS. NOTIFY DEPARTMENTAL REPRESENTATIVE OF ANY DISCREPANCIES.
- B. DO NOT SCALE DRAWINGS.
- C. ALL DIMENSIONS ARE INDICATED IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
- D. SEAL ALL OPENINGS WHERE CABLES, CONDUITS OR PIPES PASS THROUGH FIRE RATED WALLS AND FLOORS, PACK SPACE BETWEEN WITH COMPRESSED GLASS FIBRES AND SEAL WITH FIRE STOP CAULKING IN ACCORDANCE WITH CAN/CGSB-19.13-M87 AND NBC 3.1.7.
- E. WHERE CABLES, CONDUITS AND PIPES PASS THROUGH FIRE RATED WALLS AND FLOORS, PACK SPACE BETWEEN WITH COMPRESSED GLASS FIBRES AND SEAL WITH FIRE STOP CAULKING IN ACCORDANCE WITH CAN/CGSB-19.13-M87 AND NBC 3.1.7.
- F. ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE APPROVAL OF NRC DEPARTMENTAL REPRESENTATIVE.

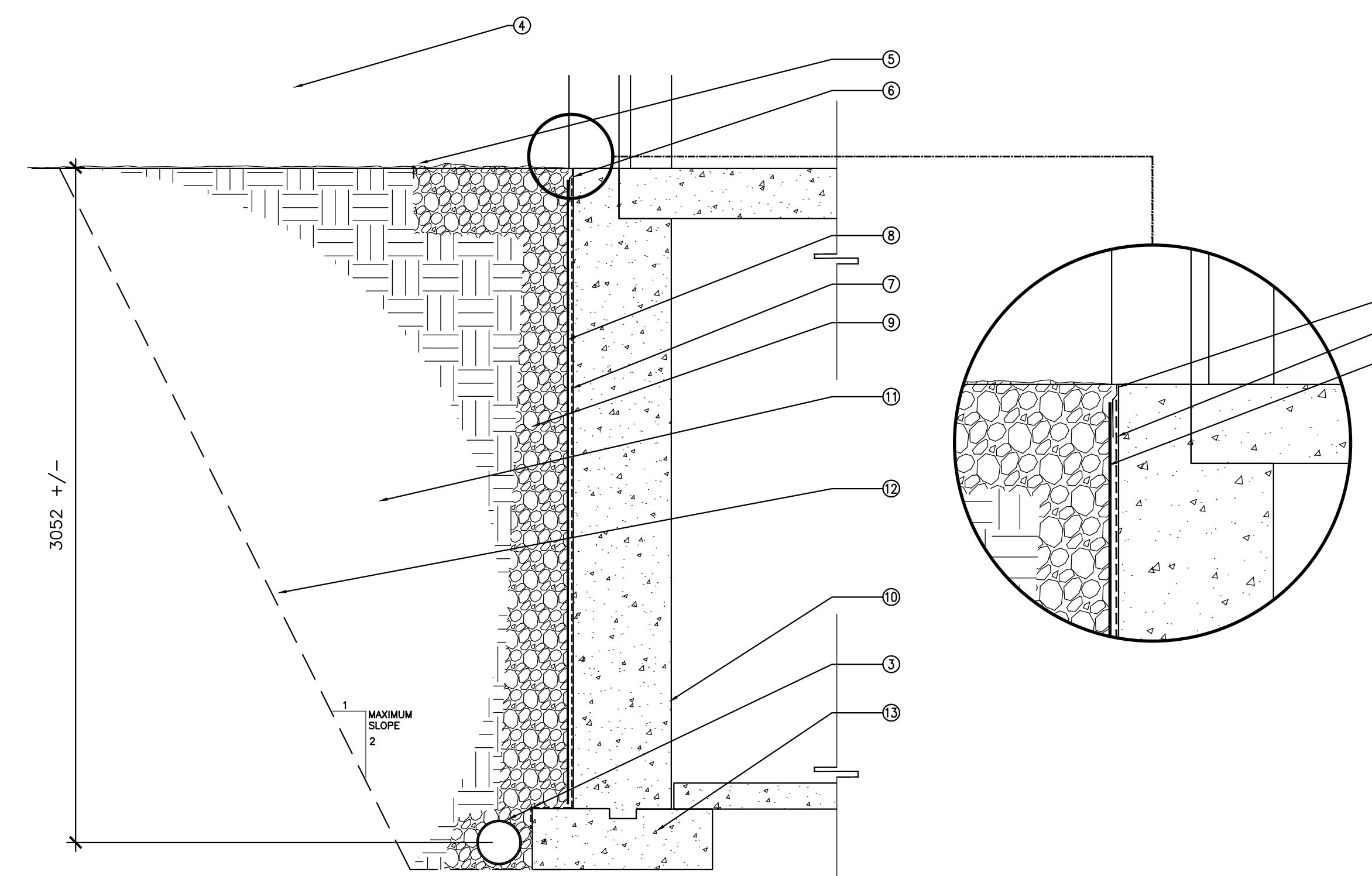
- CONTRACTORS TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO DEMOLITION OR CONSTRUCTION AND REPORT ANY ERRORS OR OMISSIONS TO NRC REPRESENTATIVE.
- CONTRACTORS MUST VISIT THE SITE & FULLY FAMILIARIZE THEMSELVES WITH THE SCOPE OF THE WORK.
- PREVENT THE SPREAD OF DUST & DEBRIS BEYOND THE WORK AREA AND CLEAN ALL SURFACES AT COMPLETION.
- MAKE GOOD ALL SURFACES AFFECTED BY THIS WORK.
- COORDINATE ALL SHUTDOWNS WITH THE NRC REPRESENTATIVE.
- PROVIDE ALL LABOUR AND MATERIAL REQUIRED TO FORM A COMPLETE, FUNCTIONAL SYSTEM AS DESCRIBED ON DRAWINGS.
- ALL PENETRATIONS THROUGH WALLS TO TEST CELLS SHALL BE SEALED AS PER SPECIFICATIONS.
- COORDINATE LOCATIONS OF ALL MECHANICAL SERVICES WITH ALL OTHER TRADES AND REPORT ANY CONFLICTS TO NRC REPRESENTATIVE.



1 PART SITE PLAN  
 A01 SCALE = 1:200

**EXISTING SERVICES LEGEND**

---	PROPERTY LINE
---+---	CHAIN LINK FENCE
---	SANITARY SEWER
---SD---	STORM SEWER
---	GASMAIN
---	WATERMAIN
---	TRAFFIC DUCT
---	STEAM LINE
---	HYDRO DUCT
---	STREET LIGHT DUCT
□	BELL DUCT
□	CATCHBASIN
○	MANHOLE
⊙	VALVE CHAMBER
⊙	CURB STOP
⊙	HYDRANT
⊙	LAWN SERVICE
⊙	TRAFFIC SIGN
⊙	TRAFFIC LIGHT
⊙	STREET LIGHT OR LIGHT STANDARD
⊙	TOP OF CURB GRADE
⊙	BOTTOM OF CURB GRADE
⊙	BOREHOLE LOCATION AND NUMBER



2 SECTION @ DAMP PROOFING  
 A01 SCALE = 1:20

- DRAWING NOTES - SHEET A01**  
 THESE NOTES APPLY TO DRAWING SHEET A01 ONLY
- CONNECT NEW DRAINAGE TUBING TO EXISTING TUBING WEERING TILE.
  - WHERE REQUIRED, REMOVE EXISTING LANDSCAPE INCLUDING SHRUBS/TREES. REINSTATE WITH SAME SPECIES AND SIZE TO MATCH EXISTING OR TO MATCH REMOVED.
  - NEW 200mm PERFORATED, CORRUGATED PLASTIC TUBING WEERING TILE.
  - EXISTING CONCRETE WALL.
  - NEW CONTINUOUS PVC DIVIDER.
  - CONTINUOUS CAP MOULDING.
  - TORCHED ON WATERPROOF MEMBRANE.
  - 6mm ASPHALT IMPREGNATED FIBREBOARD.
  - RE-USED EXISTING CRUSHED STONE FROM EXCAVATION.
  - EXISTING FOUNDATION WALL.
  - COMPACTED BACKFILL.
  - LINE OF EXCAVATION.
  - EXISTING CONCRETE FOOTING.

01	OCT 2016	ISSUED FOR ADDENDUM # 01	SMH
No.	Date	Revision	By:
			Print:

Date Printed: \_\_\_\_\_ Date imprimée: \_\_\_\_\_

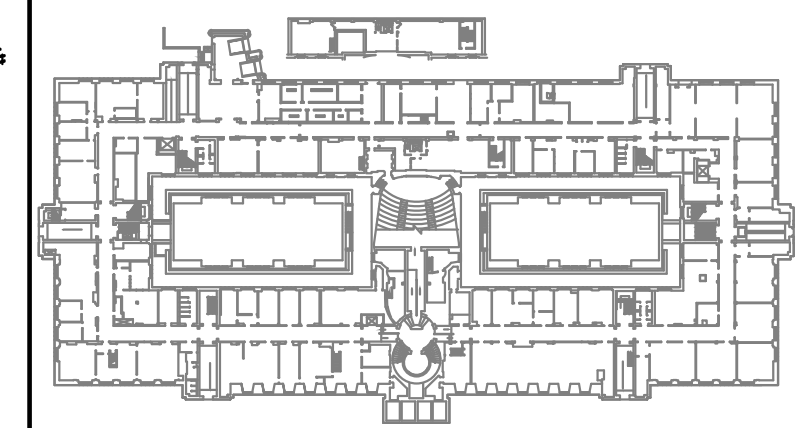
- Verify all dimensions and site conditions and be responsible for same
- Vérifier toutes les dimensions et l'état des lieux et en assumer la responsabilité

A	A Detail no. No. du détail	A
C	B Location drawing no. sur dessin no.	B
	C Drawing no. dessin no.	C

project: **BUILDING 9-77 NANOCOMPOSITES LAB 147 RENOVATIONS** projet

SUSSEX DRIVE CAMPUS  
 drawing: **EXTERIOR FOUNDATION WALL DAMP PROOFING SITE PLAN, SECTIONS AND DETAILS** dessin

designed	conçu	date	date
CE		SEPTEMBER 2016	
drawn	dessiné	scale	échelle
CE/SMH		AS NOTED	
checked	vérifié	sheet	feuille
JCW		1 of/de 2	
approved	approuvé	W.O.no.	D.T.no.
BY		A1-006436-01	
dwg.no.		dessin no.	
5263-A01-ADD#01			



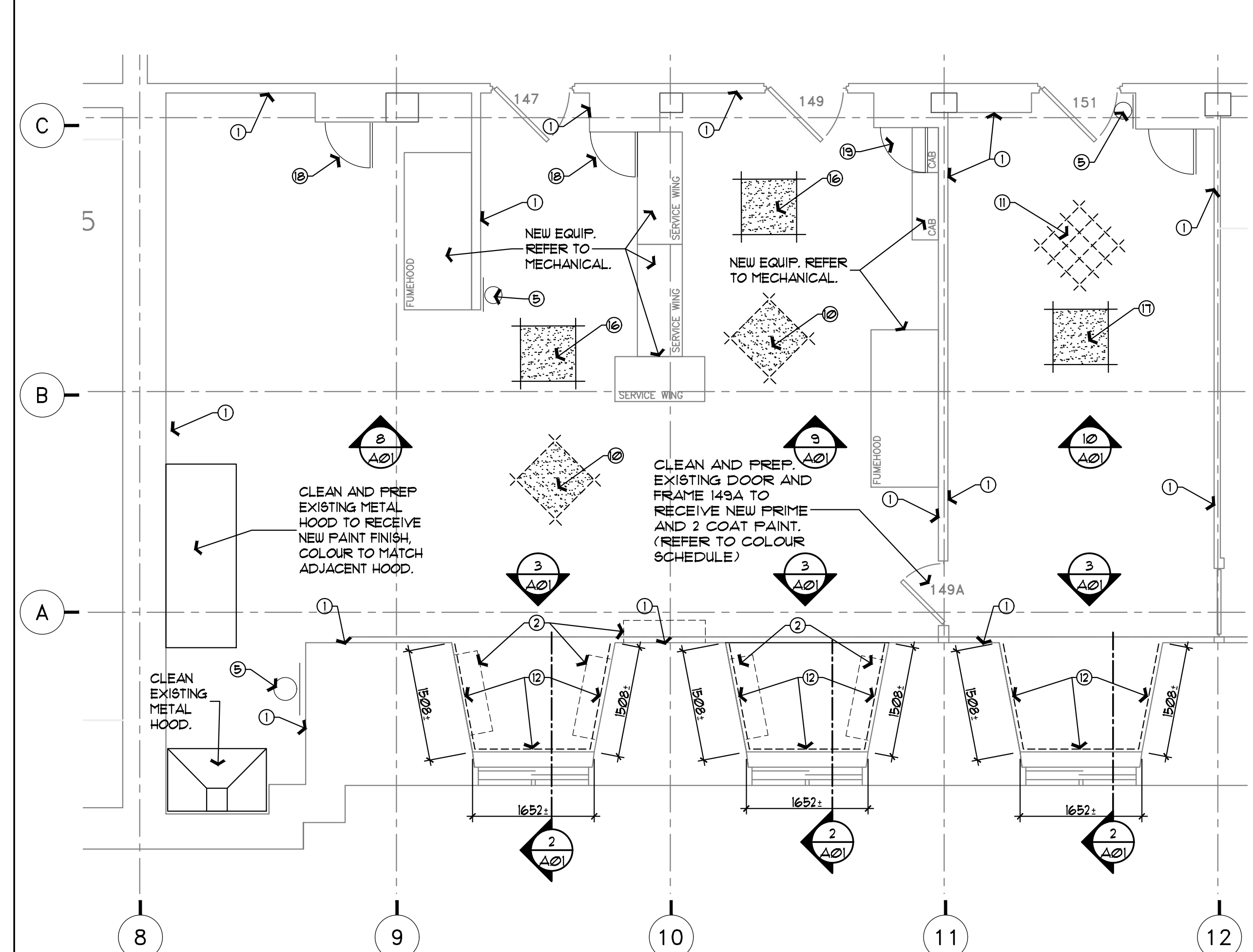
keyplan - BASEMENT  
 PROJECT NORTH  
 TRUE NORTH

**GENERAL NOTES:**  
 A. CONTRACTOR TO VERIFY ALL DIMENSIONS AND CONDITIONS ON SITE AND IMMEDIATELY NOTIFY THE NRC ENG. OF ANY DISCREPANCIES BEFORE PROCEEDING.  
 B. DO NOT SCALE DRAWINGS.  
 C. PROVIDE OPENINGS THROUGH WALLS, FLOORS AND CEILINGS THROUGH MECH. AND ELEC. INSTALLATIONS. REFER TO MECH. AND ELEC. DRAWINGS. CO-ORDINATE SIZES AND LOCATIONS WITH MECH. AND ELEC.  
 D. THESE DRAWINGS TO BE READ IN CONJUNCTION WITH MECHANICAL AND ELECTRICAL.

**ABBREVIATIONS:**

AUB	ALUMINUM WALL BASE	LIT	LAY IN TILE CEILING
ACT	ACOUSTIC CEILING TILE	NTS	NOT TO SCALE
AFF	ABOVE FINISHED FLOOR	O.C.	ON CENTER
CONC	CONCRETE	FS	FRESHED STEEL
CPT	CARPET	PT	PAINT
CMU	CONCRETE MASONRY UNIT	PCF	PAINTED CONCRETE TOPPING
CAU	COMPLETE WITH	REV	REVERSE
DMNT	DEMOUNTABLE	RWB	RESILIENT WALL BASE
DWG	DRAWING	RFS	RESILIENT SHEET FLOORING
(E)	EXISTING	SM	SIMILAR
FFL	FINISHED FLOOR LEVEL	SP	SPRINKLER HEAD
GB	GYPSPUM BOARD	US	UNDERSIDE
H1	HOLLOW METAL	TYP	TYPICAL

- CONSTRUCTION NOTES**
- TYPICAL: REMOVE ALL UNUSED UNISTRUT, NAILS, SCREWS, ETC AND WALL BASE FROM WALLS. PATCH AND REPAIR TO RECEIVE NEW PRIME AND 2 COAT PAINT FINISH.
  - REMOVE EXISTING WALL MOUNTED SHELVING UNIT.
  - REMOVE EXISTING T-BAR CEILING GRID SYSTEM C/W ALL TILES, WALL ANGLES AND TIES.
  - N/A
  - REMOVE EXISTING FIRE EXTINGUISHER AND WOOD MOUNTING PLATE AND HANDOVER TO DEPARTMENTAL REPRESENTATIVE FOR STORAGE AND REINSTALL AT COMPLETION OF PROJECT.
  - REMOVE AND CUT BACK LATH AND PLASTER BACK TO STONE. APPROX. 1'-6" AWAY FROM WINDOW AS SHOWN. SHOWN HATCHED ON SECTION AND ELEVATION.
  - REMOVE LATH AND PLASTER BELOW CONCRETE SILL BACK TO SILL. SHOWN HATCHED ON SECTION AND ELEVATION.
  - EXISTING RADIATOR PROTECT DURING RENOVATION.
  - INSTALL QTY 2 x ANGLES BACK TO BACK WITH A 1/2" GAP BETWEEN EXISTING LATH AND PLASTER AND THE NEW DENSGLASS TO CREATE A CONSTRUCTION SEPARATION. CAULK JOINT, WALLS AND CEILING.
  - ROOMS 141 & 149: REMOVE EXISTING SEAMLESS FLOORING AND PREP FLOOR TO RECEIVE NEW EPOXY COATING.
  - ROOM 151: REMOVE EXISTING CARPET AND PREP FLOOR TO RECEIVE NEW EPOXY COATING.
  - WALL REMEDIATION:  
 1. REMOVE LATH AND PLASTER BACK TO SOLID SUBSTRATE. APPROX. AREA SHOWN HATCHED ON SECTION AND ELEVATION. COORDINATE WITH MECHANICAL AND ELECTRICAL. REMOVE EXISTING RUBBER BASE.  
 2. INSTALL SELF ADHERING MEMBRANE, BLUE SKIN OVER THE ENTIRE EXPOSED STONE BRICK WALL.  
 3. INSTALL PRESSURE TREATED WOOD BLOCKING, SIZING TO SUIT AS FURRING TO MEET NEW WALL FINISH.  
 4. INSTALL 1/2" (95) SHEATHING BY GEORGIA-PACIFIC OR APPROVED EQUAL.  
 5. INSTALL QTY 2 x ANGLES BACK TO BACK WITH A 1/2" GAP BETWEEN EXISTING LATH AND PLASTER AND THE NEW DENSGLASS TO CREATE A CONSTRUCTION SEPARATION. CAULK JOINT, WALLS AND CEILING.  
 6. USE A PLASTER WELD BONDING AGENT ON ALL EXPOSED EDGES OF LATH AND PLASTER.  
 7. MUD, TAPE AND SAND FINISH. PRIME AND TWO COAT PAINT FINISH TO MATCH ADJACENT.  
 8. NEW 100mm RUBBER WALL BASE.  
 9. REMOVE EXISTING BLINDS. RE-INSTALL WHEN RENOVATIONS ARE COMPLETE.
  - REMOVE EXISTING BLINDS. RE-INSTALL WHEN RENOVATIONS ARE COMPLETE.
  - CUT BACK LOOSE PLASTER AT EXISTING WINDOW HEAD AND MAKE GOOD. (USE A PLASTER WELD BONDING AGENT ON ALL EXPOSED EDGES OF LATH AND PLASTER). FILL, SAND AND PAINT TO MATCH ADJACENT WALLS AND CEILING.
  - EXISTING DOOR: CLEAN, PATCH AND REPAIR DOOR AS REQUIRE TO RECEIVE NEW PRIME AND 2 COAT PAINT FINISH.
  - NEW FLOOR SYSTEM ROOM 141 AND 149:  
 - AREA WILL BE CLEANED AND PREPARED BY SHOTBLAST METHOD TO STONHARD'S SPECIFICATIONS.  
 - ONE COAT OF STANDARD PRIMER WILL BE APPLIED.  
 - STONHARD'S HRI BASE WILL BE APPLIED TO FORM A 100mm COVE BASE AGAINST METAL EDGE.  
 - STONHARD'S HRI BASE, TO FOLLOW PRESENT CONTOUR OF FLOOR.  
 - TWO COATS OF STONKOTE HT4 EPOXY COATING.  
 11. NEW FLOORING SYSTEM ROOM 151:  
 - AREA WILL BE CLEANED AND PREPARED BY SHOTBLAST METHOD TO STONHARD'S SPECIFICATIONS.  
 - STONHARD'S HRI BASE WILL BE APPLIED TO FORM A 100mm COVE BASE AGAINST METAL EDGE.  
 - ONE COAT OF STANDARD PRIMER.  
 - STONTEC ERF EPOXY RESIN, FLAKED FILLED FLOORING SYSTEM, NOMINAL 3mm THICKNESS.  
 12. REMOVE EXISTING ACCESS PANEL AND PROVIDE NEW 610 x 610mm ACCESS PANEL, PAINTABLE NEW FRAMING AND 15mm GYPSPUM BOARD AS REQUIRED.
  - INSTALL NEW 610 x 610mm ACCESS PANEL, PAINTABLE, IN EXISTING GYPSPUM BOARD WALL. NEW FRAMING AND 15mm GYPSPUM BOARD AS REQUIRED.

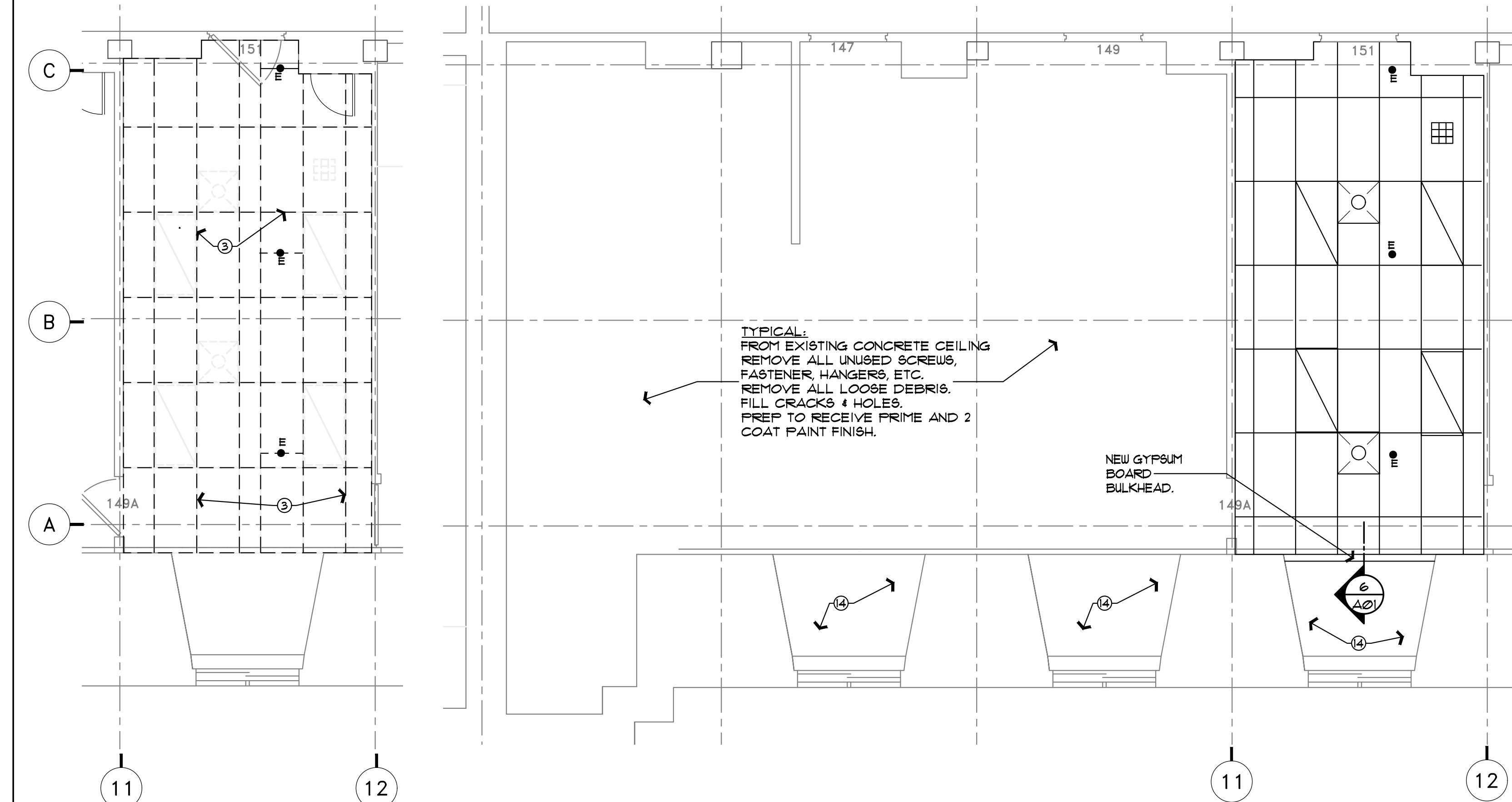


**1 FLOOR PLAN**  
 SCALE = 1:50

**2 TYPICAL: WALL SECTION REMEDIATION**  
 SCALE = 1:20

**3 TYPICAL: WALL ELEVATION REMEDIATION**  
 SCALE = 1:20

- REFLECTED CEILING PLAN LEGEND**
- REMOVE EXISTING T-BAR CEILING GRID SYSTEM C/W ALL TILES, WALL ANGLES AND TIES.
  - NEW ACOUSTIC CEILING GRID, 25mm TEES, FLAT WHITE. INCLUDE ALL TEES, TRIM, AND HANGARS FOR A COMPLETE INSTALLATION.
  - NEW LAY IN ACOUSTIC TILES SIMILAR TO: ARMSTRONG CLEAN ROOM FL #1211MYLAR TILES. NOTE: USE A COMBINATION OF FIELD AND BASE UNITS. FIELD UNITS FOR USE AS FULL SIZE PANELS ONLY. BORDER UNITS FOR USE WHERE PANELS MUST BE CUT ON THE JOB (BORDERS, SPRINKLER HEAD PENETRATIONS ETC.).
  - NEW 2' x 4' LIGHT FIXTURE, REFER TO ELECTRICAL.
  - EXISTING LIGHT FIXTURE TO BE REMOVE BY ELECTRICAL, REFER TO ELECTRICAL.
  - NEW SUPPLY AIR GRILLE, REFER TO MECHANICAL.
  - EXISTING SUPPLY AIR GRILLE TO BE REMOVE BY MECHANICAL, REFER TO MECHANICAL.
  - NEW RETURN/EXHAUST AIR GRILLE, REFER TO MECHANICAL.
  - EXISTING RETURN/EXHAUST AIR GRILLE TO BE REMOVE BY MECHANICAL, REFER TO MECHANICAL.
  - EXISTING SPRINKLER HEAD TO REMAIN.



**4 ROOM 151 - DEMOLITION RCP**  
 SCALE = 1:50

**5 CONSTRUCTION RCP**  
 SCALE = 1:50

**6 BULKHEAD DETAIL**  
 SCALE = 1:5



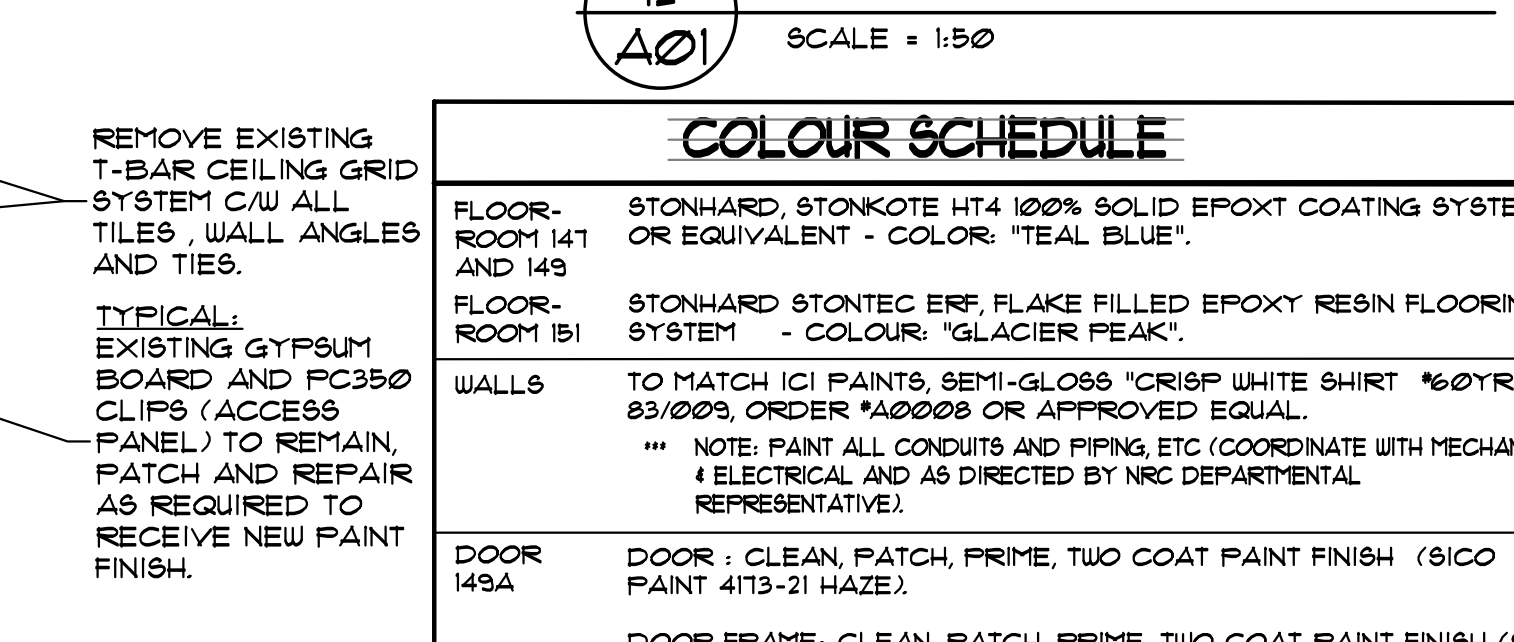
**8 LAB 147/149 PHOTO # 02**  
 SCALE = 1:50



**9 LAB 147/149 PHOTO # 03**  
 SCALE = 1:50

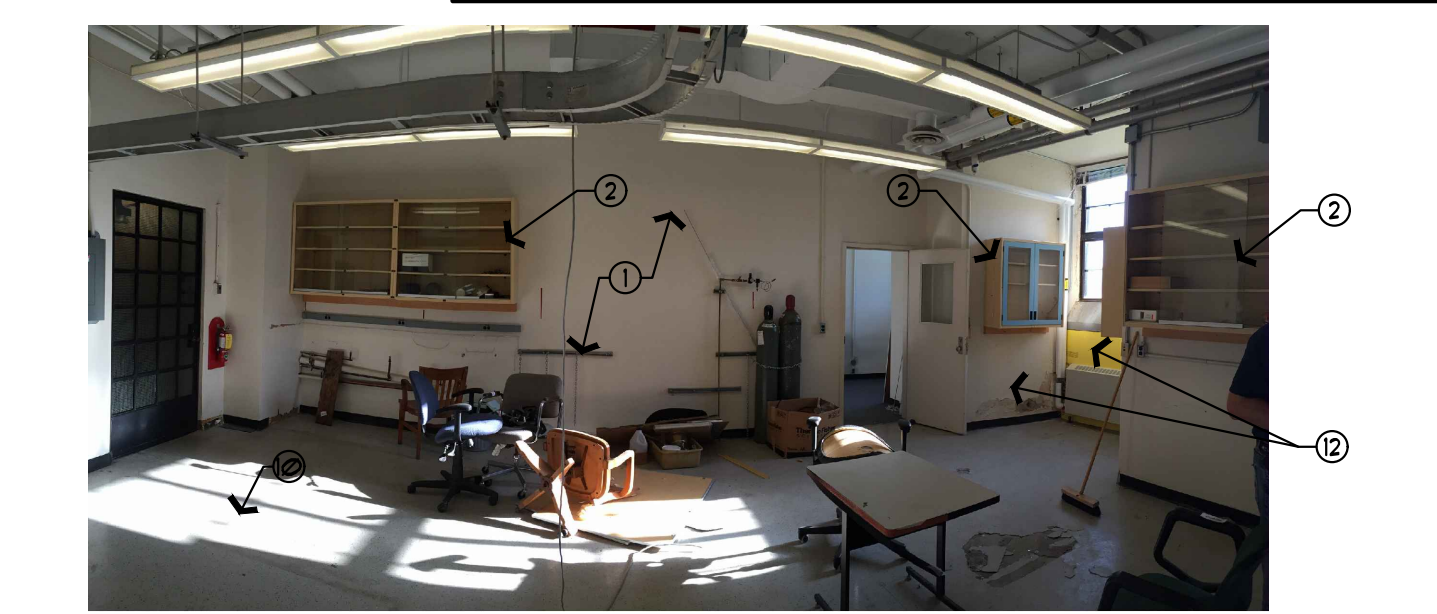


**10 LAB 150 PHOTO # 04**  
 SCALE = 1:50

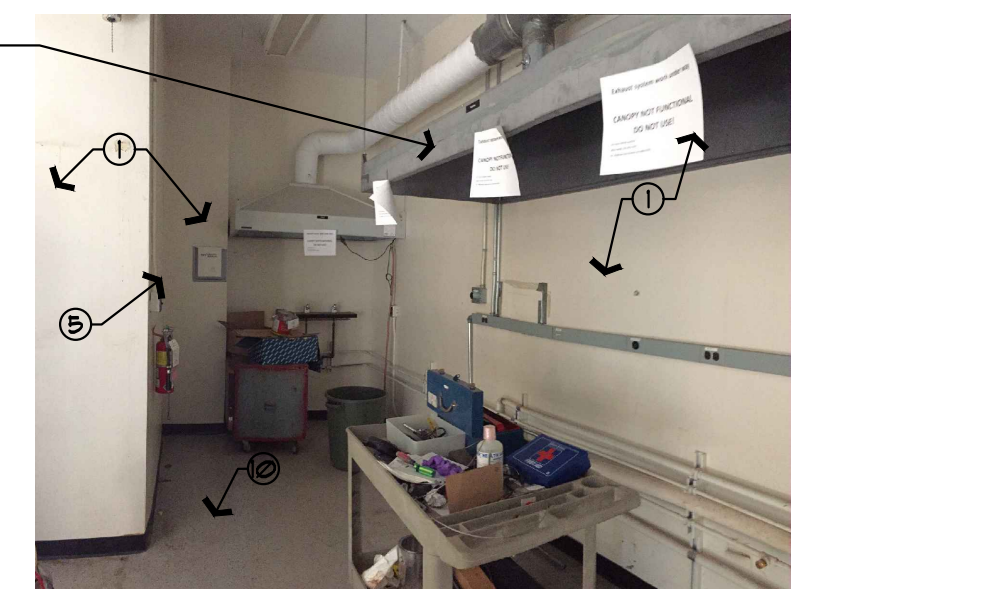


**11 LAB 147/149 PHOTO # 05**  
 SCALE = 1:50

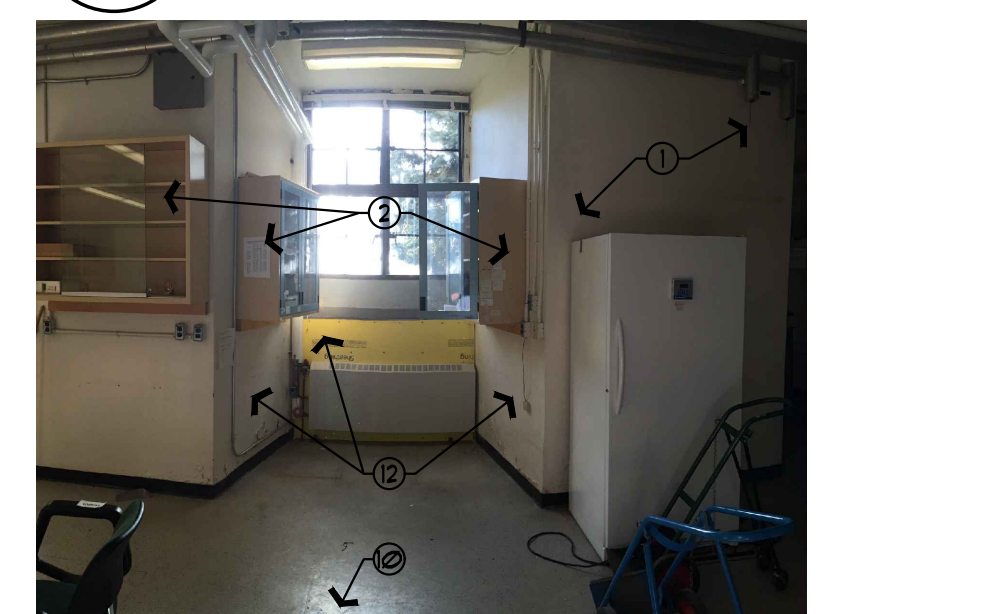
**12 LAB 147/149 PHOTO # 06**  
 SCALE = 1:50



**7 LAB 147/149 PHOTO # 01**  
 SCALE = 1:50



**11 LAB 147/149 PHOTO # 05**  
 SCALE = 1:50



**12 LAB 147/149 PHOTO # 06**  
 SCALE = 1:50

**COLOUR SCHEDULE**

FLOOR - ROOM 141 AND 149	STONHARD, STONKOTE HT4 100% SOLID EPOXY COATING SYSTEM OR EQUIVALENT - COLOR: 'TEAL BLUE'.
FLOOR - ROOM 151	STONHARD STONTEC ERF, FLAKE FILLED EPOXY RESIN FLOORING SYSTEM - COLOR: 'GLACIER PEAK'.
WALLS	TO MATCH ICI PAINTS, SEMI-GLOSS 'CRISP WHITE SHIRT' #60YR 83/009, ORDER #A0000 OR APPROVED EQUAL. *** NOTE: PAINT ALL CONDUITS AND PIPING ETC (COORDINATE WITH MECHANICAL & ELECTRICAL AND AS DIRECTED BY NRC DEPARTMENTAL REPRESENTATIVE).
DOOR 149A	DOOR: CLEAN, PATCH, PRIME, TWO COAT PAINT FINISH (61CO PAINT 4113-21 HAZE).
DOOR FRAME 149A	DOOR FRAME: CLEAN, PATCH, PRIME, TWO COAT PAINT FINISH (61CO PAINT 4113-32 BAYOU).
CEILING - ROOM 141 & 149	PRIME AND TWO COAT PAINT FINISH. ICI PAINTS: FAITHFUL, 09 BB, 11/09, A044 *** NOTE: PAINT ALL CONDUITS, REMAINING DUCT WORK, ETC (COORDINATE WITH MECHANICAL & ELECTRICAL AND AS DIRECTED BY NRC DEPARTMENTAL REPRESENTATIVE).

No.	Date	Revision	By	For

Date Printed: \_\_\_\_\_ Date imprimée: \_\_\_\_\_  
 • Verify all dimensions and site conditions and be responsible for same.  
 • Vérifier toutes les dimensions et l'état des lieux et en assumer la responsabilité.

A	A Detail no. No. du détail	A
B	B Location drawing no. sur dessin no.	B
C	C Drawing no. dessin no.	C

project: **BUILDING 8-77 Nanocomposites Lab 147 Renovations** projet

location: **SUSSEX DRIVE CAMPUS** dessiné

drawing: **FLOOR PLANS, REFLECTED CEILING PLANS AND DETAILS** date

designed: **SWH** conçu: **September 2016** date

drawn: **SWH** dessiné: **AS NOTED** échelle

checked: **JCW** vérifié: **1** sheet: **1** of: **1** feuille

approved: **B VALLIERES** approuvé: **W.O.no.** D.T.no.

dwg.no.: **5263-A02-ADD#01** dessin no.

---

**Part 1            GENERAL**

**1.1                Scope of Work**

- .1     Provide interior protection prior to demolition work.
- .2     Protection to be constructed in such a fashion so as to afford security, dust and weather resistance.
- .3     Barriers to be constructed continuously on the interior/exterior perimeter as directed by NRC Departmental Representative.

**Part 2            PRODUCTS**

**2.1                Materials**

- .1     1/2" x 4'-0" x 8'-0" wood sheathing.
- .2     3-5/8" metal studding.
- .3     3-1/2" spruce wood, construction grade studding.
- .4     6 mil. polyethylene.
- .5     Vinyl reinforced tarps.

**2.2                Erection**

- .1     Construct a solid barrier in all locations where window, A/C, or roof modifications are to occur.
- .2     Construct barriers full height and line with polyethylene to ensure dust and watertightness.
- .3     Have a mock-up assembly approved by the Departmental Representative prior to proceeding with the erection.

**Part 3            SECONDARY PROTECTION**

**3.1                Dust Walls**

- .1     As the work progresses and after all structural work and wall framing have been completed, remove the temporary interior protection walls and construct a 6 mill polyethylene dust wall in its place, to allow finish work to proceed.

- 
- .2 Install wood sheathing in the new window openings temporarily until the new glazing units have been received.
  - .3 Inspect walls on a regular basis to ensure integrity of the assembly and to avoid dust and water infiltration to the interior of the building.
  - .4 Remove interior protections only when approved by the Departmental Representative.

**Part 4 REINSTATEMENTS**

**4.1 Finishes**

- .1 Reinststate the interior finishes affected by this work to the satisfaction of the Departmental Representative.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 SITE CONDITIONS**

- .1 Subsurface investigation report is available for inspection at job showing.

### **1.2 PROTECTION**

- .1 Prevent damage to, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, surface or underground utility lines which are to remain. Pay particular attention to the underground tunnel systems and avoid heavy equipment above tunnels. Make good any damage.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Fill material: Type 2 Gran A conforming to Ontario Ministry of Transport and Communications form No. 314.
- .2 Excavated or graded material to be approved before re-use as fill for grading work.

## **PART 3 EXECUTION**

### **3.1 REMOVAL OF TOPSOIL**

- .1 Remove all topsoil from areas to be excavated or paved. Strip topsoil when dry enough to prevent contamination with subgrade material.
- .2 Do not handle topsoil in wet or frozen condition.
- .3 Stockpile topsoil in area approved by NRC Departmental Representative.

### **3.2 GRADING**

- .1 Rough grade to levels, profiles, and contours allowing for surface treatment as indicated.
- .2 Rough grade to the following depths below finish grades:
  - .1 100 mm (4") for grassed areas.
  - .2 500 mm (1' -8") for shrub beds.
- .3 Slope rough grade away from building 1:50 minimum.
- .4 Prior to placing fill over existing ground, scarify surface to depth of 150 mm (6") Moisture content of fill and existing surface to be approximately the same to facilitate bonding.

- .5 Compact filled and disturbed areas to Standard Proctor density to ASTM D698-91 as follows:
  - .1 98% under paved and walk areas.
  - .2 85% under landscaped areas.
  
- .6 Do not disturb soil within branch spread of trees or shrubs to remain.

### **3.3 TESTING PROCEDURES**

- .1 Inspection and testing of soil compaction will be carried out by designated testing laboratory.

### **3.4 DISPOSAL**

- .1 Dispose of material excavated and deemed unsuitable for backfill under around foundations or surplus to that required for grading or landscaping. Haul to suitable dump site off property.

**END OF SECTION**



## **Part 1 – GENERAL**

### **1.1 SITE CONDITIONS**

- .1 Subsurface investigation report is available for inspection at job showing.

### **1.2 SHOP DRAWINGS**

- .1 Submit shop drawings of shoring and bracing required in connection with excavation, in accordance with Section 00 10 00. Drawings to show clearly procedural sequence to be followed.
- .2 Drawings shall bear signature and stamp of a professional Engineer with a demonstrated competence in this type of work.

### **1.3 SHORING & BRACING**

- .1 Prevent movement or settlement. Safeguard and maintain integrity of adjacent structures, earth, bench marks, services, walks, paving trees, curbs, landscaping, adjacent grades. Provide bracing, shoring required.
- .2 Shore and brace excavations to prevent failure in accordance with Canadian Construction Safety Code 1977 and applicable local regulations.
- .3 Make good and pay for any damage and be liable for any injury resulting from inadequate shoring, bracing or underpinning.

### **1.4 UTILITIES & SERVICES**

- .1 Size, depth and location of existing utilities shown on drawings are for guidance: completeness and accuracy are not guaranteed.
- .2 Obtain the exact location of any existing underground service lines from supply utility company, municipal authority and/or other authorities having jurisdiction.
- .3 Immediately notify the NRC Departmental Representative should uncharted services be encountered, and await instruction in writing regarding remedial action.
- .4 Support, shore up and maintain pipes and conduits encountered.
- .5 Arrange for disconnection of services by others where required or indicated.
- .6 Have telephone and similar services diverted or disconnected, removed or relocated as required by the utility companies.
- .7 Assume full responsibility for any damage to existing utilities and services resulting from this work, including third party claims for disruption of services.
- .8 Immediately notify the NRC Departmental Representative and Utility Company concerned in case of damage to or cutting off of an essential service.

## 1.5 PROTECTION

- .1 Protect bottoms of excavations from softening. Should softening occur, remove softened soil and replace with footing concrete.
- .2 Protect bottoms of excavations from freezing.
- .3 Construct banks in accordance with local bylaws.
- .4 Provide protection around bench markers, layout markers, survey markers, and geodetic monuments.
- .5 Provide protection to ensure no damage to existing facilities and equipment situated on site.
- .6 Protect and or transplant existing trees, landscaping, natural features, buildings, pavement, surface or underground utility lines which are to remain. If damaged, restore to original or better condition unless directed otherwise.
- .7 Maintain access roads to prevent accumulation of construction related debris on roads.

## Part 2 - PRODUCTS

### 2.1 MATERIALS

- .1 Type 2 fill: clean, natural sand and gravel material, free from silt, clay, loam, friable or soluble materials and vegetable matter and graded to conform to MTC forms 314 and 1010 for Granular A.

### 2.2 STOCKPILING

- .1 Stockpile fill materials in areas designated by NRC Departmental Representative. Stockpile granular materials in manner to prevent segregation. Protect stockpiled fill material from freezing.
- .2 Protect fill materials from contamination.

## Part 3 - EXECUTION

### 3.1 EXCAVATING

- .1 Excavate to elevations and dimensions indicated for installation, construction and inspection of work specified.
- .2 Excavate to well defined lines to minimize quantity of fill material required.
- .3 Earth bottoms of excavations to be dry undisturbed soil, level, free from loose or organic matter.
- .4 Excavation shall not interfere with normal 45o splay of bearing from bottom of any footing.
- .5 When complete, have NRC Departmental Representative inspect excavations to verify soil bearing capacity, depths and dimensions.

- .6 Excavation, exceeding that indicated in contract documents, if authorized in writing by NRC Departmental Representative, will be paid as extra to Contract price in accordance with General Conditions.
- .7 Correct unauthorized excavation at no extra cost as follows:
  - .1 Fill under bearing surfaces and footings with concrete specified for footings.
  - .2 Fill under other areas with Type 2 fill compacted to 95% of maximum density as determined by ASTM D698-78 standard Proctor density.
- .8 Do not disturb soil within branch spread of trees or shrubs that are to remain. If excavating through roots, excavate by hand and cut roots with sharp axe or saw. Seal cuts with approved tree wound dressing.
- .9 Remove concrete, masonry, paving, walks, demolished foundations and rubble, and other obstructions encountered in course of excavation.

### **3.2 BACKFILING**

- .1 Do not commence backfilling until areas of work to be backfilled have been inspected and pipe joints tested and approved by NRC Departmental Representative.
- .2 Areas to be backfilled shall be free from debris, snow, ice, water or frozen ground. Backfill material shall not be frozen or contain ice, snow or debris.
- .3 Where temporary unbalanced earth pressures are liable to develop on walls or other structures, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by NRC Departmental Representative.
- .4 Place and compact fill materials in continuous horizontal layers not exceeding 150 mm (6") loose depth. Use methods to prevent disturbing or damaging buried services, foundation drainage system, waterproofing, damp proofing. Make good damage.
- .5 Do not use frozen material for backfilling or filling.

### **3.3 FILL TYPES & COMPACTION**

- .1 Dimensions specified in following paragraphs are dimensions of fill after compaction.
- .2 Provide 150 mm (6") base course of Gran. A, Type 2 fill. Compact base course to 95% density.

### **3.4 INSPECTION & TESTING**

- .1 Testing of materials and compaction shall be carried out by CSA approved testing laboratory designated by NRC Departmental Representative.
- .2 NRC Departmental Representative will pay costs for inspection and testing.
- .3 Sieve analysis: proposed fill materials will be tested to confirm suitability for intended use and conformity with specifications.
- .4 Provide extra testing as determined by NRC Departmental Representative and carried out by an independent, CSA approved testing agency to show compliance with specifications of supplier's materials. Provide certificates of compliance.

- .5 Frequency of Tests
  - .1 Excavated surfaces: when undisturbed excavated surface is being prepared, make a series of 3 tests of surface for each 500 m<sup>2</sup> (5382 ft<sup>2</sup>) area.

**END OF SECTION**

## **Part 1 - GENERAL**

### **1.1 SITE CONDITIONS**

- .1 Subsurface investigation report is available for inspection at job showing.

## **Part 2 - PRODUCTS**

### **2.1 Materials**

- .1 Coarse filter aggregate: to CAN/CSA-A23.1-M90, Table 3, Group 1, 20 to 4.75 mm (3/4" to 3/16").
- .2 Fine filter aggregate: to CAN/CSA-A23.1-M90, Table 1.
- .3 Plastic pipe and fittings: to CGSB 41-GP-29Ma-83, Type 3, nominal inside diameter 200 mm (8").
- .4 Filter cloth: three dimensional labyrinthine needled polyester fibres.

## **Part 3 – EXECUTION**

### **3.1 INSPECTION**

- .1 Ensure graded subgrade conforms with required drainage pattern before placing filter bed material.
- .2 Report to NRC Departmental Representative improper slopes, unstable areas, areas requiring additional compaction or other unsatisfactory conditions.
- .3 Begin installation of foundation drainage after deficiencies have been corrected.
- .4 Ensure foundation wall and waterproofing have been inspected and accepted.

### **3.2 INSTALLATION**

- .1 Pipe bedding: cut trenches in compacted subbase and place 100 mm (4") thickness minimum of coarse filter aggregate and tamp to grade.
- .2 Pipe laying:
  - .1 Ensure pipe interior and coupling surfaces are clean before laying.
  - .2 Lay perforated pipe to slope of 1:100. Face perforations and coupling slots downward.
  - .3 Do not use shims to establish pipe slope.
  - .4 Use fittings recommended by manufacturer.
  - .5 Install end plugs at ends of collector drains.

- .6 Protect pipe ends from damage and ingress of foreign material.
- .7 Connect pipe to existing system by appropriate adapters manufactured for this purpose.
  
- .3 Filter bed backfill:
  - .1 Place filter bed backfill after pipe installation is approved.
  - .2 Place minimum of 150 mm (6") thickness coarse filter aggregate under and on each side of perforated pipe.
  - .3 Extend coarse filter aggregate to and along foundation wall minimum 300 mm (1'-0") above top of pipe.
  - .4 Place filter bed by hand, in 150 mm (6") lifts. Consolidate by hand tamping lightly. Prevent displacement of pipe.
  - .5 Place filter cloth over coarse filter aggregate extending full width of trench and up foundation wall minimum of 150 mm (6"). Lap joints in filter cloth minimum 300 mm (1'-0") to prevent surface infiltration of fine materials into coarse filter material, thereby blocking groundwater infiltration.
  - .6 Place 150 mm (6") thickness of fine filter aggregate over filter cloth and leave trench ready for backfilling.

**END OF SECTION**

## **Part 1            GENERAL**

### **1.1                Reference Standards**

- .1 Do work in accordance with elastomeric membrane manufacturer's printed application instructions, except where specified otherwise.

### **1.2                Quality Assurance**

- .1 Membrane: applied by applicator trained and approved by manufacturer for application of its products.
- .2 Applicators: minimum 5 years proven experience.
- .3 Manufacturers representative:
  - .1 Inspect substrate prior to commencement of work, during application of membrane and upon completion of work.
  - .2 Provide technical assistance to applicator and assist where required in correct installation of membrane.

### **1.3                Mock-Up**

- .1 Construct mock-ups in accordance with Section 001000.
- .2 Construct mock-up 10 m<sup>2</sup> (108 ft<sup>2</sup>) minimum, of elastomeric membrane waterproofing including one lap joint, one inside corner, one outside corner and complete window. Mock-up may be part of finished work.
- .3 Allow 24 hrs. for inspection of mock-up by Departmental Representative before proceeding with waterproofing work.

### **1.4                Samples**

- .1 Submit samples in accordance with Section 001000.
- .2 Submit duplicate 300 x 300 mm (1' -0" x 1' -0") samples of sheet membrane material

## **Part 2            PRODUCTS**

### **2.1                Materials**

- .1 Modified bitumen cold applied self-adherent sheet membrane such as Colphene 1000 GSA from Soprema, Blue Skin SSA from Bakor, Perm-A-Barrier System 4000 from Grace or equal approved by the Departmental Representative.
- .2 Primer or surface conditioner as recommended by air-barrier membrane manufacturer.
- .3 Mastic, adhesive tape and sealant as recommended by air-barrier membrane manufacturer.

## **2.2 Compatibility**

- .1 Use same membrane throughout whole project.
- .2 All products to be from same manufacturer or to be approved by him.

## **Part 3 EXECUTION**

### **3.1 Preparation**

- .1 Carefully inspect surfaces to be covered with air barrier membrane. Remove dirt, dust, peeling paint, or other substances that might impair adherence to air barrier.
- .2 Remove sharp protuberances and round sharp angles.
- .3 Secure unsound substrate, fill holes and cracks and even surface repaired.

### **3.2 Primer**

- .1 Follow manufacturer's printed instructions.
- .2 Prime a surface area no bigger than what can be covered with air barrier within recommended setting time limits for primer used on the job.
- .3 Re-prime surface areas where primer has set before being covered with membrane.

### **3.3 Application of Membrane**

- .1 Apply membrane over the entire exterior face of existing building, from two (2) feet below grade up to roof parapets.
- .2 Provide air/watertight junction with existing roof waterproofing system.
- .3 Coordinate work with other trades to ensure air-tightness at junction with windows, doors, louvers and other openings thru exterior walls.
- .4 Detailed application of air barrier membrane should be similar to standard roof membrane details: reinforced corners, expansion joints, etc.; add bituminous flashings around wall penetrations, protrusions, etc.
- .5 Install air barrier membrane plumb and on straight lines. Stagger end joints. Overlap as recommended.
- .6 Provide positive seal at overlaps.
- .7 Repair damages to air barrier as soon as they are discovered.



- .8 Redo areas that prove to be unacceptable due to inadequate substrate preparation, deficient priming, defective materials, lack of bonding and/or improper installation.

**3.4 Inspection**

- .1 Allow enough time to Departmental Representative for review of membrane installed before covering it with new insulation.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 REFERENCES**

- .1 ASTM International Inc.
  - .1 ASTM D6164/D6164M-11, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Provide two copies of most recent technical waterproofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Provide two copies of WHMIS MSDS in accordance with Section 00 10 00 – General Instructions.
- .3 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .4 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens and membrane with specification requirements.
- .5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

### **1.3 FIRE PROTECTION**

- .1 In accordance with Section 00 15 45 -General and Fire Safety Requirements.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt and membrane in upright position.
  - .1 Store membrane rolls with salvage edge up.
- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over completed Work to enable movement of material and other traffic.
- .5 Store sealants at +5 degrees C minimum.
- .6 Handle waterproofing materials in accordance with manufacturer's written directives, to prevent

damage or loss of performance.

- .7 Store and manage hazardous materials in accordance with Section 00 10 00 – General Instructions.
- .8 Packaging Waste Management: remove for reuse packaging materials.

## 1.5 SITE CONDITIONS

- .1 Ambient Conditions
  - .1 Do not install waterproofing when temperature remains below -18 degrees C for torch application.
- .2 Install waterproofing on dry surface, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into waterproofing system.

## 1.6 WARRANTY

- .1 For Work of this Section 07 13 52 - Modified Bituminous Sheet Waterproofing, 12 months warranty period is extended to 60 months.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE CRITERIA

- .1 Waterproofing System: capable of resisting moisture/water, and preventing moisture migration to interior.
- .2 Compatibility between components of waterproofing system is essential. Provide written declaration to NRC Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

### 2.2 MEMBRANE

- .1 Base sheet: to CGSB 37-GP-56M.
  - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, non-woven polyester reinforcement, having nominal weight of 38kg.
  - .2 Type 2, fully adhered.
  - .3 Class C - plain surfaced.
  - .4 Grade heavy duty service.
  - .5 Top and bottom surfaces:
    - .1 sanded/polyethylene .
  - .6 Base sheet membrane properties: to CGSB 37-GP-56M.
    - .1 Strain energy (longitudinal/transversal): 8.1/8.8 kN/m.
    - .2 Breaking strength (longitudinal/transversal): 17.0/18.0 N/5 cm.
    - .3 Ultimate elongation (longitudinal/transversal): 60/65 %.

- .4 Tear resistance: 75 N.
- .5 Cold bending at -30 degrees C : no cracking.
- .6 Softening point:  $\geq$  110 degrees C.
- .7 Static puncture resistance: > 400 N.
- .8 Dimensional Stability: -0.3 / 0.3%.

### 2.3 OVERLAY BOARD

- .1 Overlay Board: 6 mm thick asphalt impregnated fiberboard.

## PART 3 - EXECUTION

### 3.1 QUALITY OF WORK

- .1 Do examination, preparation and waterproofing Work in accordance with Roofing Manufacturer's Specification Manual and Provincial Roofing Association Manual, particularly for fire safety precautions.

### 3.2 PROTECTION OF IN-PLACE CONDITIONS

- .1 Cover walls, walks and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .4 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

### 3.3 PROTECTED MEMBRANE APPLICATION

- .1 Base sheet application:
  - .1 Starting at low point of application perpendicular to slope, unroll base sheet, align and reroll from both ends.
  - .2 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.
  - .3 Lap sheets 75 mm for side and 150 mm for end laps.
  - .4 Application to be free of blisters, wrinkles and fishmouths.

### 3.4 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of

surfaces for cleaning advice and complying with their documented instructions.

- .3 Repair or replace defaced or disfigured finishes caused by work of this section.
- .4 Waste Management: separate waste materials for reuse and recycling.
  - .1 Place materials defined as hazardous or toxic in designated containers.
  - .2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.
  - .3 Ensure emptied containers are sealed and stored safely.

**END OF SECTION**

**Part 1            GENERAL        N/A**

**Part 2            PRODUCTS**

**2.1               Insulation**

- .1 Bulk insulation: fabricated from friction fit batts or rolls [glass fibre][mineral fibre], RSI 0.6 (R3.33) for each 25 mm (1") thickness. Extruded polystyrene: below grade: to CAN/CGSB-51.20-M87, type 4 having RSI 0.87 for each 25 mm (1") thickness to thickness indicated and having a compressive strength of 210 Kpa, square edges. Only polystyrene insulations listed on CGSB Qualified Products List (GP-41) are acceptable for use on this project. For roofing application, use polystyrene board with pre-grooved channels on the underface to facilitate drainage.
- .2 Extruded polystyrene: Only polystyrene insulations listed on CGSB Qualified Products List (GP-41) are acceptable for use on this project. For roofing application, use polystyrene board with pre-grooved channels on the underface to facilitate drainage.
- .3 Bulk insulation: fabricated from friction fit batts or rolls mineral fibre, RSI 0.6 (R3.33) for each 25 mm (1") thickness.

**2.2               Accessories**

- .1 Insulation clips: impale type, perforated 50 x 50 mm (2" x 2") cold rolled carbon steel 0.8 mm (20 ga.) thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm (1") diameter washers of self locking type.
- .2 Sealant: to CAN/CGSB-19.21-M87.
- .3 Tape for sealing as recommended by manufacturer.

**Part 3            EXECUTION**

**3.1               Workmanship**

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation closely around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.
- .5 Offset both vertical and horizontal joints in multiple layer applications.
- .6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

### **3.2 Semi-Rigid Insulation Installation**

- .1 Install glass fibre bulk insulation with insulation clips and disc, cut off fastener spindle 3 mm (1/8") beyond disc where installed to substrate. Install with adhesive to concrete substrate.
- .2 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm (6") wide 0.15 mm (6 mil) polyethylene strip over joint using compatible adhesive before application of insulation.

**END OF SECTION**

**Part 1           GENERAL**

**1.1            General**

- .1    One manufacturer's product only to be used throughout.
- .2    Sealant must be approved by Departmental Representative as acceptable product.
- .3    Colours of all sealants to be selected by the Departmental Representative prior to proceeding.

**Part 2           PRODUCTS**

**2.1            Materials**

- .1    Multi-purpose sealant: Silicone, "Dow Corning #732" or equivalent approved by Departmental Representative.
- .2    Filler of backing material: white non-absorbent, closed cell foam polyethylene. Material 30-50% wider than joint width to receive same.
- .3    Primers: sealant manufacturer's type.
- .4    Cleaners: as recommended by sealant manufacturers.

**Part 3           EXECUTION**

**3.1            Preparation**

- .1    Ensure all materials which will bear sealant on their surfaces are clean and free from foreign material which would affect bonding.
- .2    Permit concrete and mortar to cure fully before sealing.
- .3    Use bond breaking backing: to prevent sealant bonding to joint bottom.
- .4    Prime joint sides in accordance with manufacturer's directions.
- .5    Mask adjacent surfaces to prevent contamination by sealant. Remove mask immediately after joints completed.

**3.2            Application**

- .1    Employ a professional applicator to run continuous non varying width and depth beads of sealant on joints.
- .2    Apply sealant as per manufacturer's recommendations.



- .3 Do not apply sealant when surrounding air temperature air is below 5°C.
- .4 Immediately clean surplus compound from adjacent surfaces.

**END OF SECTION**

---

**Part 1            GENERAL**

**Part 2            PRODUCTS**

**2.1                Materials**

- .1 Non-loadbearing channel stud framing: to ASTM C645-83; [38mm (1-5/8")][64mm (2-1/2")][92mm (3-5/8")][152mm (6")] stud sizes as indicated on drawings; roll formed from [0.53 mm (26 gauge)] [1.0mm (20 gauge)] electrogalvanized steel sheet; for screw attachment of gypsum board. Knock-out service holes at 460 mm (1'-6") centres.
- .2 Use double track slip joint to maintain clearance under existing beams and structural slab decks to avoid transmission of structural loads to studs.
- .3 Floor and ceiling tracks: to ASTM C645-92b; in widths to suit stud sizes, 32 mm (1-1/4") flange height.
- .4 Metal channel stiffener: 38 x 20mm (1-1/2" x 3/4") size, 1.52 mm (16 gauge) thick cold rolled steel, coated with rust inhibitive coating.
- .5 Metal channel Furring (Hat Channel type): 22 x 32/64mm (7/8" x 1 1/4"- 2 1/2 ") size, 1.52 mm (16 gauge) thick cold rolled steel, coated with rust inhibitive coating.
- .6 Acoustical sealant: to CAN/CGSB-19.21-M87.
- .7 Insulating strip: rubberized, moisture resistant 3 mm (1/8") thick cork strip, 12 mm (1/2") wide, with self sticking adhesive on one face, lengths as required.

**Part 3            EXECUTION**

**3.1                Erection**

- .1 Align partition tracks at floor and ceiling and secure at 400 mm (16") oc maximum.
- .2 Place studs vertically at 400mm (16") oc and not more than 50 mm (2") from abutting walls and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .3 Erect metal studding to tolerance of 1:1000.
- .4 Attach studs to bottom using screws.
- .5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .6 Co-ordinate erection of studs with installation of door frames and special supports or anchorage for work specified in other Sections.
- .7 Provide wood blocking secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, and base and upper cabinets, attached to steel stud partitions.

- .8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, using column clips or other approved means of fastening placed alongside frame anchor clips.
- .9 Erect track at head of door openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .10 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .11 Install hat channels to concrete or CMU block wall for furring purposes and to apply gypsum board finish..
- .12 Extend partitions to ceiling height except where noted otherwise on drawings.
- .11 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use double track slip joints.
- .12 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .13 Install two continuous beads of acoustical sealant behind studs and tracks around perimeter of sound control partitions.

**END OF SECTION**

---

**Part 1            GENERAL**

**1.1                Reference Standards**

- .1        Installation: to ASTM C636-92 except where specified otherwise.

**1.2                Design Criteria**

- .1        Maximum deflection: 1/360th of span to ASTM C635-83 deflection test.

**1.3                Samples**

- .1        Submit one representative sample of ceiling suspension system in accordance with Section 001000.
- .2        Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

**Part 2            PRODUCTS**

**2.1                Materials**

- .1        Light duty system to ASTM C635-91.
- .2        Basic materials for suspension system: commercial quality cold rolled steel, conforming to ASTM A525-91b and ASTM A526/A526M-90, zinc coated to Z275.
- .3        Suspension system: non fire rated, made up as follows:
  - .1            two directional exposed tee bar grid
  - .2            Exposed tee bar grid components: shop painted satin sheen white. Components die cut. Main tee with double web, rectangular bulb and 25 mm (1") rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs: lower flange extended and offset to provide flush intersection.
- .4        Hanger wire: galvanized soft annealed steel 3.0 mm (1/8") dia. (12 gauge).
- .5        Hangers: self-drilling type anchors similar to Phillips "Red Head" T-32.
- .6        Carrying channels: 38 x 25 mm (1-1/2" x 1") channel, of 1.2 mm thick galvanized steel.
- .7        Accessories: splices, clips, wire ties, retainers and wall moulding, flush, to complement suspension system components, as recommended by system manufacturer.

---

**Part 3 EXECUTION**

**3.1 Installation**

- .1 Install suspension system to manufacturer's instruction.
- .2 Secure hangers to overhead structure using attachment methods acceptable to engineer. Install hangers spaced at maximum 1200 mm (4'-0") centres and within 150 mm (6") from ends of main tees.
- .3 Do not erect ceiling suspension system until work above ceiling has been inspected by Engineer.
- .4 Lay out system according to reflected ceiling plan.
- .5 Ensure suspension system is co-ordinated with location of related components.
- .6 Install wall mould to provide correct ceiling height. Finished ceiling system to be level within 1:1000.
- .7 Completed suspension system to support superimposed loads, such as lighting fixtures, diffusers and grilles, etc.
- .8 Support light fixtures, diffusers, with additional ceiling suspension hangers within 150 mm (6") of each corner and at 600 mm (2'-0") around perimeter of fixture, also install at splices.
- .9 Interlock cross member to main runner to provide rigid assembly.
- .10 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

**3.2 Cleaning**

- .1 Touch up scratches, abrasions, voids and other defects in painted surfaces to the satisfaction of the NRC Departmental Representative.

**END OF SECTION**

---

**Part 1 GENERAL**

**1.1 Reference Standards**

- .1 Do work in accordance with CAN/CSA-A82.31-M91 except where specified otherwise.

**Part 2 PRODUCTS**

**2.1 Gypsum Board**

- .1 Regular board: to CAN/CSA A82.27-M91 12.7mm (1/2") x 1200 mm (4'-0") wide x maximum practical length, edges tapered with round edge.

**2.2 Metal Furring**

- .1 Metal furring, runners, hangers, tie wires & suspension to CSA A82.30-M1980, galvanized systems.
- .2 Hangers: self-drilling type anchors similar to Phillips "Red Head" T-32.
- .3 Drywall furring channels: 0.5 mm (0.02") core thickness galvanized steel channels for screw attachment of gypsum board.

**2.3 Fastenings and Adhesives**

- .1 Nails, screws and staples: CAN/CSA- A82.31-M91.
- .2 Laminating compound: to CAN/CSA-A82.31-M91, asbestos-free.
- .3 Stud adhesive: to CAN/CGSB-71.25.

**2.4 Accessories**

- .1 Casing beads, corner beads: 0.5 mm (0.02") base thickness commercial grade sheet steel with Z275 zinc finish to ASTM A525-91b, perforated flanges; one piece length per location.
- .2 Acoustic sealant: to CAN/CGSB-19.21-M87.
- .3 Sealants acceptable for use on this project must be listed on CGSB Qualified Products List issued by CGSB Qualification Panel for joint sealants.
- .4 Insulating strip: rubberized, moisture resistant, 3 mm (1/8") thick closed cell neoprene strip, 12 mm (1/2") wide, with self sticking permanent adhesive on one face; lengths as required.
- .5 Joint compound: to CAN/CSA-A82.31-M91, asbestos-free.

---

**Part 3 EXECUTION**

**3.1 Wall Furring**

- .1 Install wall furring for gypsum board wall finishes in accordance with CAN/CSA-A82.31-M91, except where specified otherwise.
- .2 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .3 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

**3.2 Gypsum Board Application**

- .1 Do not apply gypsum board until bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Apply single layer gypsum board as indicated to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm (1'-0") oc.

**3.3 Sound Attenuation Blanket**

- .1 N/a.

**3.4 Control Joints**

- .1 N/a.

**3.5 Access Doors**

- .1 Install access doors to electrical and mechanical fixtures specified in respective Sections.
- .2 Rigidly secure frames to furring or framing systems.

**3.6 Taping and Filling**

- .1 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- .2 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
- .3 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after painting is completed.
- .4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

- .5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

**END OF SECTION**



PART 1 - GENERAL

- 1.1 Samples .1 Submit duplicate full size samples acoustical units in accordance with Section 001000 if requested by Departmental Representative.
- 1.2 Environmental Conditions .1 Permit wet work to dry before commencement of installation.  
.2 Maintain uniform minimum temperature of 15°C (41°F) and humidity of 20 - 40% before and during installation.  
.3 Store materials in work area 48 h prior to installation.
- 1.3 Maintenance Materials .1 Deliver six (6) acoustical units for maintenance use for each pattern and type required for project. Store where directed and identify contents.

PART 2 - PRODUCTS

- 2.1 Materials .1 Acoustic units for suspended ceiling system to CAN/CGSB-92.1-M89.  
.1 Type: polyester film wrapped mineral fibre panels.  
.2 Manufacturer: Armstrong Cleanroom FL #1721.  
.3 Fire Resist. / Flame spread: UL Class A.  
.4 Ceiling Attenuation Class: 40 minimum.  
.5 Edge type: Square.  
.6 Colour: White.  
.7 Size: 24" x 48" x 5/8".  
.8 Shape: Lay-In.

PART 3 - EXECUTION

- 3.1 Installation .1 Do not install acoustical panels until work above

ceiling has been inspected by Departmental Representative.

- .2 Torn, cracked or dirty tiles will not be accepted.
- .3 Wrap facing film around field cut edges and secure with concealed aluminum tape.

3.2 Suspension  
ceiling System

- .1 Install acoustical panels and tiles in suspension system.

End of Section

## 1 GENERAL

### 1.01 SECTION INCLUDES

- .1 Seamless, resinous, chemically resistant, 100% solids, epoxy floor coating.

### 1.02 SUMMARY

- .1 Definitions: Resinous epoxy floor coating system includes a 100% solids, 0 VOC, two component, moisture-tolerant, pigmented, chemical resistant, bisphenol F epoxy primer and a 100% solids, 0 VOC, two component, moisture tolerant, pigmented, chemical resistant, bisphenol F epoxy topcoat.

### 1.03 SUBMITTALS

- .1 Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required. Include certification indicating compliance of materials with project requirements.
- .2 Samples: Submit, for verification purposes, 4-inch square samples of each type of resinous flooring material required, applied to a rigid backing, in color and finish indicated.
  1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.
  2. For initial selection of texture, submit manufacturer's texture samples showing full range of slip resistant textures available.

### 1.04 QUALITY ASSURANCE

- .1 Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, aggregates, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five projects of similar size and complexity; Stonhard or approved equal.
- .2 Pre-Installation Conference
  1. General contractor shall arrange a meeting not less than thirty days prior to starting work.
  2. Attendance
    - a. General Contractor
    - b. NRC Departmental Representative
    - c. Manufacturer/Installer's Representative
- .3 ISO 9001: All materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

## 1.05 DELIVERY, STORAGE AND HANDLING

- .1 Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
- .2 All materials used shall be factory blended and packaged in single, easy to manage batches to eliminate on site blending errors. Only the on-site weighing of catalyst will be allowed.
- .3 Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.

## 1.06 PROJECT CONDITIONS

- .1 Concrete or masonry substrates shall be properly cured for a minimum of 30 days and shall be tested to ensure relative humidity or water vapour emission rates are in accordance with Manufacturer's recommendations. A vapor barrier or exterior applied waterproofing membrane must be present for concrete slabs below grade.
- .2 Utilities, including electric, water, heat (air temperature between 32 and 85°F/0 and 30°C) and finished lighting to be supplied by General Contractor.
- .3 Job area to be free of other trades during, and for a period of 24 hours, after flooring system installation.
- .4 Protection of finished flooring system from damage by subsequent trades shall be the responsibility of the General Contractor.

## 1.07 WARRANTY

- .1 Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) full year from date of installation.

## 2 PRODUCTS

### 2.01 COLORS

- .1 Colors: As selected by NRC Departmental Representative from manufacturer's standard colors or as indicated on drawings.

### 2.02 RESINOUS FLOORING SYSTEM

- .1 Stonkote HT4 as distributed by Stonhard division, RPM Canada, (800) 263-3112, is a nominal 12-16 mil, 100% solids, 0 VOC, two-component, moisture tolerant, chemical resistant, bisphenol F epoxy floor coating. Stonkote HT4 is comprised of a 100% solids, 0 VOC, moisture tolerant, chemical resistant, bisphenol F epoxy primer and a 100% solids, 0 VOC, moisture tolerant, chemical resistant, bisphenol F epoxy topcoat.

- .1 Physical Properties: Provide flooring system in which minimum physical properties of the complete system, including primers, fillers, aggregates, and sealers, and when tested in accordance with standards or procedures referenced below, are as follows:

Hardness .....	85-90
(ASTM D-2240, Shore D)	
Abrasion Resistance .....	0.06 gm max. weight loss
(ASTM D-4060, CS-17, 1 kg Load, 1,000 cycles)	
Bond Strength .....	>400 psi
(ASTM D-7234)	(100% concrete failure)
Heat Resistance Limitation.....	200°F/93°C
	(for continuous exposure)
	..... 250°F/121°C
	(for intermittent spills)
Cure Rate allow .....	4-5 hours for tack-free surface
(at 77°F/25°C)	24 hours minimum for normal operations
Fire Resistance of Dry Film.....	Class A
(CAN/ULC S102.2)	Flame Spread - 7
	Smoke Developed - 45

## 2.03 JOINT SEALANT MATERIALS

- .1 Type produced by manufacturer of resinous flooring system for type of service and joint condition indicated.

## 3 EXECUTION

### 3.01 PREPARATION

- .1 Concrete Substrate: Concrete preparation shall be by mechanical means and may include use of diamond grinder, sander, shotblast method and / or other mechanical means for removal of bond inhibiting materials such as curing compounds, dust, form release agents or laitance. General contractor shall approve concrete preparation to ICRI Concrete Surface Profile 3 minimum prior to coating application.

### 3.02 APPLICATION

- .1 General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic surface of thickness indicated, uninterrupted except at expansion joints or other types of joints (if any), indicated or required.
- .2 Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Primer shall be applied in one coat at 6-8 mils thickness immediately after mixing using high quality medium nap rollers. Coordinate timing of primer application with

application of flooring system to ensure optimum inter-coat adhesion.

- .4 Topcoat: Mix material according to manufacturer's recommended procedures. Topcoat material shall be applied in two coats at 6-8 mils per coat immediately after mixing using high quality medium nap rollers. Strict adherence to manufacturer's coverage rates shall be maintained.

### 3.03 FIELD QUALITY CONTROL

- .1 The right is reserved to invoke the following material testing procedure(s) at any time, and any number of times during period of flooring application.
- .2 The NRC will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.
- .3 Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
- .4 The General Contractor shall engage service of an independent coating inspector to perform core tests to verify installation thickness meets the requirements of the specification. Installer shall repair to the NRC Departmental Representative's satisfaction any damage in the flooring system.
- .5 If test results show materials being used do not comply with specified requirements, flooring contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

### 3.04 CURING, PROTECTION AND CLEANING

- .1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 4 hours after application.
- .2 Protect flooring system from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor shall be responsible for protection and cleaning of surfaces after final coats.
- .3 Cleaning: Remove temporary covering and clean resinous flooring system prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring system manufacturer. General Contractor shall be responsible for cleaning of the surfaces prior to inspection.

END OF SECTION

## 1 GENERAL

### 1.01 SECTION INCLUDES

- .1 Seamless, resinous, decorative, broadcast vinyl chip, 100% solids, epoxy flooring system.

### 1.02 SUMMARY

- .1 Definitions: Resinous epoxy flooring system includes a 100% solids, 0 VOC, two component, pigmented, general service, epoxy primer, a decorative, colour stable, vinyl chip broadcast, and two coats of a 100% solids, two component, high performance, UV resistant, clear epoxy sealer.
- .2 Related Work
  1. 2. Section 07 03 75 - Joint Sealers

### 1.03 SUBMITTALS

- .1 Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for each resinous flooring material required. Include certification indicating compliance of materials with project requirements.
- .2 Samples: Submit, for verification purposes, 4-inch square samples of each type of resinous flooring material required, applied to a rigid backing, in color and finish indicated.
  1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.

### 1.04 QUALITY ASSURANCE

- .1 Single Source Responsibility: Obtain primary resinous flooring materials including primers, resins, hardening agents, aggregates, finish or sealing coats from a single manufacturer with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Contractor shall have completed at least five projects of similar size and complexity; Stonhard or approved equal.
- .2 Pre-Installation Conference
  1. General contractor shall arrange a meeting not less than thirty days prior to starting work.
  2. Attendance
    - a. General Contractor
    - b. NRC Departmental Representative/Owner's Representative
    - c. Manufacturer/Installer's Representative
- .3 ISO 9001: All materials, including primers, resins, curing agents, finish coats,

aggregates and sealants are manufactured and tested under an ISO 9001 registered quality system.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- .1 Material shall be delivered to job site and checked by flooring contractor for completeness and shipping damage prior to job start.
- .2 All materials used shall be factory blended and packaged in single, easy to manage batches to eliminate on site blending errors. Only the on-site weighing of catalyst shall be acceptable.
- .3 Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60 and 85°F/16 and 30°C.

#### 1.06 PROJECT CONDITIONS

- .1 Concrete or masonry substrates shall be properly cured for a minimum of 30 days and shall be tested to ensure relative humidity or water vapour emission rates are in accordance with Manufacturer's recommendations. A vapor barrier or exterior applied waterproofing membrane must be present for concrete slabs below grade.
- .2 Utilities, including electric, water, heat (air temperature between 32 and 85°F/0 and 30°C) and finished lighting to be supplied by General Contractor.
- .3 Job area to be free of other trades during, and for a period of 4 hours, after flooring system installation.
- .4 Protection of finished flooring system from damage by subsequent trades shall be the responsibility of the General Contractor.

#### 1.07 WARRANTY

- .1 Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) full year from date of installation.

## 2 PRODUCTS

#### 2.01 COLORS

- .1 Colors: As selected by NRC Departmental Representative from manufacturer's standard colors.

#### 2.02 RESINOUS FLOORING SYSTEM

- .1 Stontec EFC as distributed by Stonhard division, RPM Canada, (800) 263-3112, is a nominal 1 mm, 100% solids, epoxy, decorative, vinyl chip broadcast flooring system. Stontec EFC is comprised of a 100% solids, 0 VOC, two component, general service, pigmented primer, a colour stable, decorative vinyl chip



broadcast layer, and two coats of a 100% solids, high performance, UV resistant, clear epoxy sealer.

- .1 Physical Properties: Provide flooring system in which minimum physical properties of the complete system, including primers, fillers, aggregates, and sealers, and when tested in accordance with standards or procedures referenced below, are as follows:

Tensile Strength.....	5,200 psi
(ASTM D-638)	
Hardness .....	85-90
(ASTM D-2240, Shore D)	
Impact Resistance .....	>160 in·lbs
(ASTM D-2794)	
Abrasion Resistance .....	0.06 gm max. weight loss
(ASTM D-4060, CS-17, 1 kg Load, 1,000 cycles)	
Bond Strength.....	>400 psi
(ASTM D-7234)	(100% concrete failure)
Heat Resistance Limitation.....	140°F/60°C
	(for continuous exposure)
	..... 200°F/93°C
	(for intermittent spills)
Cure Rate allow .....	1-2 hours for tack-free surface
(at 77°F/25°C)	4 hours minimum for normal operations
Slip Resistance Index.....	0.65
(ASTM F-1679, when tested wet)	

### 2.03 JOINT SEALANT MATERIALS

- .1 Type produced by manufacturer of resinous flooring system for type of service and joint condition indicated.

## 3 EXECUTION

### 3.01 PREPARATION

- .1 Concrete Substrate: Concrete preparation shall be by mechanical means and may include use of diamond grinder, sander, shotblast method and / or other mechanical means for removal of bond inhibiting materials such as curing compounds, dust, form release agents or laitance. General contractor shall approve concrete preparation to ICRI Concrete Surface Profile 3 minimum prior to coating application.

### 3.02 APPLICATION

- .1 General: Apply each component of resinous flooring system in compliance with manufacturer's directions to produce a uniform monolithic surface of thickness indicated, uninterrupted except at expansion joints or other types of joints (if any),

indicated or required.

- .2 Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of flooring system to ensure optimum inter-coat adhesion.
- .3 Broadcast: Apply decorative, vinyl chip broadcast into the wet primer until refusal. Strict adherence to manufacturer's coverage rates shall be maintained.
- .4 Topcoat: Mix material according to manufacturer's recommended procedures. Topcoat material shall be applied in two coats at 6-8 mils per coat immediately after mixing using high quality medium nap rollers. Strict adherence to manufacturer's coverage rates shall be maintained.

### 3.03 FIELD QUALITY CONTROL

- .1 The right is reserved to invoke the following material testing procedure(s) at any time, and any number of times during period of flooring application.
- .2 The Owner will engage service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in presence of Contractor.
- .3 Testing laboratory will perform tests for any of characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
- .4 The General Contractor shall engage service of an independent coating inspector to perform core tests to verify installation thickness meets the requirements of the specification. Installer shall repair to the NRC Departmental Representative's satisfaction any damage in the flooring system.
- .5 If test results show materials being used do not comply with specified requirements, flooring contractor may be directed by Owner to stop work; remove non-complying materials; pay for testing; reapply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials.

### 3.04 CURING, PROTECTION AND CLEANING

- .1 Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 4 hours after application.
- .2 Protect flooring system from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of

application. General Contractor shall be responsible for protection and cleaning of surfaces after final coats.

- .3 Cleaning: Remove temporary covering and clean resinous flooring system prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring system manufacturer. General Contractor shall be responsible for cleaning of the surfaces prior to inspection.

END OF SECTION

**Part 1 GENERAL**

**1.1 Samples**

- .1 Deliver on the Departmental Representative's request for approval, samples of materials proposed for use in the work. Make up samples 100mm wide by 300mm long (4" x 1'-0"). Finished work shall be equal to approved samples.

**1.2 Qualifications**

- .1 Work shall be carried out by skilled labour under the supervision of a responsible and experienced foreman.
- .2 Equipment shall be clean and in optimum working condition.

**1.3 Protection**

- .1 Provide protective barriers and signs to protect the work and the public from contact with paint not yet dry.
- .2 Protect surfaces likely to attract dust and insects thus liable to mar the finished surface.
- .3 Have hardware, electrical and mechanical fittings removed and replaced by appropriate trades, else protect the above and other adjacent work.

**1.4 Reference Standards**

- .1 Do painting and finishing to CGSB 85-GP series standards and to material manufacturer's instructions, except where specified otherwise.
- .2 Stucco and Brick: Comply with CGSB 85-GP-31M.
- .3 Ferrous Metal: Comply with CGSB 81-GP-10M, 11a, 12, 13 or 15 as applicable.
- .4 Galvanized Steel: 85-GP-16M.
- .5 Copper & Copper Alloys: 85-GP-20M.
- .6 Interior Plaster and Wallboard: 85-GP-33M.
- .7 Exterior Unpainted Wood: 85-GP-1M.
- .8 Exterior Wood Previously Painted: 85-GP-2M.

**1.5 WARNING**

- .1 DO NOT USE SPRAY EQUIPMENT:** Only paint brush and roller will be accepted on this project.

**Part 2 PRODUCTS**

**2.1 Materials**

- .1 Paint Materials: to CGSB Standards listed in Finishing Formula.  
.2 Paint materials for each coating formula to be product of a single manufacturer.

**2.2 Finishing Formula**

Apply number of coats of specified materials to designated surfaces as follows:

- .1 Interior Finishes:
- .1 Plaster and Gypsum Board Ceiling Apply:
    - .1 one coat primer-sealer CAN/CGSB-1.119-M89.
    - .2 two coats flat latex paint CAN/CGSB-100M.
  - .2 Plaster and Gypsum Board Walls Apply:
    - .1 one coat primer-sealer CAN/CGSB-1.119-M89.
    - .2 [two coats semi-gloss enamel CAN/CGSB-1.195.]
  - .3 Plaster and Gypsum Board Walls Apply:
    - .1 one coat primer-sealer CAN/CGSB-1.119-M89.
    - .2 two coats semi-gloss enamel CAN/CGSB-1.57-M90.
  - .4 Wood Doors, Trim, etc., apply:
    - .1 one coat enamel undercoat CAN/CGSB-1.38-M91.
    - .2 two coats semi-gloss enamel CAN/CGSB-1.57-M90.
  - .5 Cupboard and Drawer Interiors apply:
    - .1 two coats varnish gloss CAN/CGSB-1.36-M90, Type II; cut 1st coat 25% with thinner CAN/CGSB-1.4-92.
  - .6 Asbestos-cement board apply:
    - .1 one coat primer-sealer CAN/CGSB-1.119-M89.
    - .2 two coats semi-gloss enamel CAN/CGSB-1.57-M90.
  - .7 Primed Ferrous Metal Surfaces apply:
    - .1 one coat spot priming CAN/CGSB-1.40-M89.
    - .2 one coat enamel undercoat CAN/CGSB-1.38-M91.
    - .3 two coats semi-gloss enamel CAN/CGSB-1.57-M90.
  - .8 Galvanized and Zinc Coated Metal apply:

- .1 one coat vinyl wash primer CAN/CGSB-1.121-93.
- .2 one coat enamel undercoat CAN/CGSB-1.38-M91.
- .3 two coats semi-gloss enamel CAN/CGSB-1.57-M90.
- .9 Copper Piping and Fittings apply:
  - .1 one coat vinyl wash primer CAN/CGSB-1.121-93.
  - .2 one coat tinted enamel undercoat CAN/CGSB-1.38-M91.
  - .3 one coat semi-gloss enamel CAN/CGSB-1.57-M90.
- .2 Exterior Finishes:
  - .1 Primed Ferrous Metal Surfaces apply:
    - .1 one coat spot priming CAN/CGSB-1.40-M89.
    - .2 one coat lead primer CAN/CGSB-1.40-M89.
    - .3 two coats exterior enamel CAN/CGSB-1.59-M89.
  - .2 Galvanized and Zinc Coated Metal apply:
    - .1 one coat vinyl wash primer CAN/CGSB-1.121-93.
    - .2 one coat steel primer CAN/CGSB-1.40-M89.
    - .3 two coats exterior enamel CAN/CGSB-1.59-M89.
  - .3 Masonry, Concrete and Cement Plaster Surfaces apply:
    - .1 two coats exterior masonry coating.
  - .4 Mechanical and Electrical Equipment:
    - .1 Un-insulated: Brush on one prime coat CAN/CGSB-1.40-M89 and as required to match adjacent wall or ceiling surfaces.
    - .2 Insulated: Apply one coat glue size and paint using CAN/CGSB-1.38-M91 as a primer. Finish to match adjacent surfaces.
    - .3 High Temperature: Apply two coats CAN/CGSB-1.143-M90.

### **Part 3 EXECUTION**

#### **3.1 Examination of Surfaces**

- .1 Examine the work to be finished to determine whether the surfaces are in proper condition to receive paint work.

#### **3.2 Preparation of Surfaces**

- .1 General:
  - .1 Patch defective shop prime coats. Ensure that surfaces to be painted are smooth, level, dry, free from dust and any matter liable to interfere with adhesion of paint, cause bleeding or staining.
  - .2 Set all nails and screws below surface and putty flush.

- .2 Substrates: Whenever substrates required repairs not covered by this specification, suspend work on the affected portion and advise the Departmental Representative. Paint repairs at completion as part of the original work.
- .3 Glazing: Remove perished putty and defective stops and reset the glass, prime rabbets, replace broken glass, and reputty.
- .4 Wood (Paint finish):
  - .1 Seal all knots and pitch streaks with CAN/CGSB-1.126-M91 if not previously painted. Comply with CAN/CGSB-85-GP-1M for exterior work, CAN/CGSB-85-GP-2M for repair work. Resecure loose items. Restore surfaces to their original shape by filling, before and after priming.
  - .2 .2 Sand all woodwork lightly between all coats, clean and dust.
- .5 .5 Wood (varnish, lacquer, natural finishes):
  - .1 New Surfaces: Bleach out dark staining and restrain to the general tint with non-grain-raising stains.
  - .2 Previously Coated Surfaces: Remove waxes, oils and other previous coatings with steel wool steeped in appropriate solvent then proceed as for new surfaces.
- .6 Plaster: To be bone-dry, all patching and replacing complete before first coat of paint or sizing is applied. Sand smooth all roughness before any application of paint.
- .7 Ferrous Metal: Remove dirt and grease with Benzene. Remove rust and defective paint down to bare metal and touch up with red lead. Paint ferrous metals immediately upon delivery on site.
- .8 Sheet Metal: Treat galvanized sheet metal with a wash of phosphate conditioner prior to priming or a special coat of primer for that purpose. CGSB 31-GP-107MA.
- .9 Metal:
  - .1 Unpainted: Clean down to good metal. Use appropriate metal filler to restore the original surface. Coat with CAN/CGSB-1.121-93.
  - .2 Painted: Clean paint by washing. Treat bare spots as above.

### 3.3 Application

- .1 Varnish: Apply by brush only.
- .2 Remove all paint liable to show or bleed through new finish. Prime uncoated surfaces only.
- .3 Apply two finish coats to all previously finished or primed work.
- .4 Give the Departmental Representative due notice and ample opportunity to inspect each coat and do not proceed with any coat until the last preceding coat is approved. Each coat shall be a different tint, under white a light blue.
- .5 Apply no finish nor paint to wet, frozen or rusty surfaces.
- .6 Clean castings with wire brushes.

- .7 Do not paint at temperatures under 10°C (50°F) or over 35°C (95°F) (lacquer not lower than 15°C (59°F)) nor on surfaces where condensation is likely to form.
- .8 Give additional coats to work which is unsatisfactory to the Departmental Representative after the application of the specified number of coats without extra compensation. Touch up dead or dull spots.
- .9 Brush paint wood and metal surfaces. Other surfaces may be roller painted. Do not use rollers on uneven surfaces.
- .10 Mix materials thoroughly, apply evenly, in full coats and free from sags, runs, crawls and other defects. Cut in neatly where required.
- .11 Let each coat dry perfectly and hard before a following coat is applied.
- .12 Finish ledges and surfaces above sight lines; tops, bottoms and edges of doors to match faces.
- .13 Even up stained woodwork in colour as required by the nature of the wood.
- .14 Apply all ready-mixed paint, lacquer, varnish or other finishes without cutting or admixture of any kind.
- .15 Colour filler, if required. Work well into grain of wood, and before it sets, wipe clean.
- .16 Do not apply exterior painting during rainy, foggy or humid weather.
- .17 Apply material in accordance with the directions and instruction of their manufacturers.
- .18 Doors, windows: and other shop made items, shop prime. Seal and paint the bottoms and edges of all doors before hanging.
- .19 Allow a minimum of 24 hours between coats for oil based paints and 8 hours between coats of water based paints.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 REFERENCES**

- .1 Definitions:
  - .1 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.
- .2 Reference Standards:
  - .1 ASTM International
    - .1 ASTM A 1064/A 1064M-13, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
  - .2 Department of Justice Canada (Jus)
    - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
    - .2 Fertilizers Act (R.S. 1985, c. F-10).
    - .3 Fertilizers Regulations (C.R.C., c. 666).
    - .4 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
  - .3 Health Canada - Pest Management Regulatory Agency (PMRA)
    - .1 National Standard for Pesticide Education, Training and Certification in Canada (1995).
  - .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).

### **1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for tree and shrub preservation materials and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 00 10 00 – General Instructions.

### **1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions and 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, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect tree and shrub preservation materials from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- .1 Fill:
  - .1 Type (A): clean, natural river sand and gravel material, free from silt, clay, loam, friable or soluble materials and organic matter.
  - .2 Type (B): excavated pervious soil, free from roots, rocks larger than 75 mm, building debris, and toxic ingredients (salt, oil, etc).
- .2 Coarse washed stones: 35-75mm diameter, clean round hard stone.
- .3 Peatmoss:
  - .1 Derived from partially decomposed species of Sphagnum Mosses.
  - .2 Elastic and homogeneous.
  - .3 Free of wood and deleterious material which could prohibit growth.
  - .4 Shredded minimum particle size: 5mm.
- .4 Fertilizer:
  - .1 To Canada Fertilizer Act and Fertilizers Regulations.
  - .2 Complete, commercial, slow release with 35% of nitrogen content in water-insoluble form.
- .5 Anti-desiccant: commercial, wax-like emulsion.
- .6 Filter Cloth:
  - .1 Type 1: 100 % non-woven needle punched polyester, 2.75 mm thick, 240 g/m<sup>2</sup> mass.
  - .2 Type 2: biodegradable burlap.
- .7 Wood posts: 38 x 89 x 2400 mm length, untreated wood.
- .8 Welded wire fabric (WWF): to ASTM A 1064/A 1064 M.

## **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 tree and shrub preservation installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform NRC Departmental Representative 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 NRC Departmental Representative.

### **3.2 IDENTIFICATION AND PROTECTION**

- .1 Identify plants and limits of root systems to be preserved.

- .2 Protect plant and root systems from damage, compaction and contamination resulting from construction to the approval of NRC Departmental Representative.
- .3 Ensure no pruning is done inside drip line. If pruning inside drip line is required consult an arborist or Canadian Certified Horticultural Technician (CCHT).

### 3.3 ROOT CURTAIN SYSTEM

- .1 Identify limits for required construction excavation as approved by NRC Departmental Representative.
- .2 Prior to construction excavation, hand dig trench minimum 500 mm wide x 1500 mm deep, along perimeter of excavation limits.
- .3 Prune exposed roots cleanly at side of trench nearest plants to be preserved. Pruned ends to point obliquely downwards.
- .4 Install wooden posts and welded wire fabric against construction edge of trench.
- .5 Securely attach Type 2 filter fabric on plant side of wire mesh.
- .6 Prepare homogeneous mixture of fertilizer, parent material and organic matter.
  - .1 Add organic matter to mixture to achieve 7-9% organic matter content by weight.
  - .2 Incorporate with mixture grade 2:12:8 ratio fertilizer (dry) at rate of 1.5kg/m<sup>2</sup>.
- .7 Backfill with homogeneous mixture between curtain wall and plants to be preserved in layers not exceeding 150mm in depth. Compact each layer to 85% Standard Proctor Density.
- .8 Protect root curtain from damage during construction operations.
- .9 Water plants and root curtain sufficiently during construction to maintain optimum soil moisture condition until backfill operations are complete.
- .10 Protect root curtain during backfill operations.

### 3.4 PRUNING

- .1 Prune crown to compensate for root loss while maintaining general form and character of plant. Dispose of debris through alternative disposal/composting/mulching.

### 3.5 ANTI-DESICCANT

- .1 Apply anti-desiccant to foliage where applicable.

### 3.6 CLEANING

- .1 Progress Cleaning:
  - .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 00 10 00 – General Instructions.
  
- .3 Waste Management: separate waste materials for reuse and recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**

## **PART 1- GENERAL**

### **1.1 REFERENCES**

- .1 Agriculture and Agri-Food Canada
  - .1 The Canadian System of Soil Classification, Third Edition, 1998.
- .2 Canadian Council of Ministers of the Environment
  - .1 PN1340-2005, Guidelines for Compost Quality.

### **1.2 DEFINITIONS**

- .1 Compost:
  - .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
  - .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
  - .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminants.
  - .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 00 10 00 – General Instructions.
- .2 Quality control submittals :
  - .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
  - .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for reuse and recycling.
- .2 Divert unused soil amendments from landfill to official hazardous material collections site.
- .3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

## **PART 2 - PRODUCTS**

### **2.1 TOPSOIL**

- .1 Topsoil for planting beds: mixture of particulates, micro organisms and organic matter which

provides suitable medium for supporting intended plant growth.

- .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Finished surface free from:
  - .1 Debris and stones over 50 mm diameter.
  - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
- .4 Consistence: friable when moist.

## 2.2 SOIL AMENDMENTS

- .1 Peatmoss:
  - .1 Derived from partially decomposed species of Sphagnum Mosses.
  - .2 Elastic and homogeneous, brown in colour.
  - .3 Free of wood and deleterious material which could prohibit growth.
  - .4 Shredded particle minimum size: 5mm.
- .2 Sand: washed coarse silica sand, medium to course textured.
- .3 Organic matter: compost in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.
- .4 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

## 2.3 SOURCE QUALITY CONTROL

- .1 Contractor is responsible for amendments to supply topsoil as specified.

## PART 3 - EXECUTION

### 3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.2 STRIPPING OF TOPSOIL

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses

and removed from site.

- .2 Strip topsoil to depths as indicated.
  - .1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .3 Stockpile in locations as directed by NRC Departmental Representative.
  - .1 Stockpile height not to exceed 2m.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill.
- .5 Protect stockpiles from contamination and compaction.

### **3.3 PREPARATION OF EXISTING GRADE**

- .1 Verify that grades are correct.
  - .1 If discrepancies occur, notify NRC Departmental Representative and do not commence work until instructed by NRC Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
  - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
  - .2 Remove debris which protrudes more than 75 mm above surface.
  - .3 Dispose of removed material off site.

### **3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL**

- .1 Place topsoil after NRC Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15mm below finished grade.
- .4 Spread topsoil to following minimum depths after settlement.
  - .1 135mm for sodded areas.
  - .2 300mm for flower beds.
  - .3 500mm for shrub beds.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

### **3.5 SOIL AMENDMENTS**

- .1 For planting beds: apply and thoroughly mix soil amendments into full specified depth of topsoil.

### **3.6 FINISH GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  - .1 Prepare loose friable bed by means of cultivation and subsequent raking.

- .2 Consolidate topsoil to required bulk density.
  - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

### **3.7 ACCEPTANCE**

- .1 NRC Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

### **3.8 SURPLUS MATERIAL**

- .1 Dispose of materials except topsoil not required off site.

### **3.9 CLEANING**

- .1 Proceed in accordance with Section 00 10 00 – General Instructions.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**



## **PART 1- GENERAL**

### **1.1 REFERENCES**

- .1 Definitions:
  - .1 Mycorrhiza: association between fungus and roots of plants. This symbiosis enhances plant establishment in newly landscaped and imported soils.
- .2 Reference Standards:
  - .1 Agriculture and Agri-Food Canada (AAFC).
    - .1 Plant Hardiness Zones in Canada-2000.
  - .2 Canadian Nursery Landscape Association (CNLA)
    - .1 Canadian Standards for Nursery Stock-2006.
  - .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    - .1 Material Safety Data Sheets (MSDS).

### **1.2 ADMINISTRATIVE REQUIREMENTS**

- .1 Scheduling: obtain approval from NRC Departmental Representative of schedule 7 days in advance of shipment of plant material.
- .2 Schedule to include:
  - .1 Quantity and type of plant material.
  - .2 Shipping dates.
  - .3 Arrival dates on site.
  - .4 Planting Dates.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 00 10 00 – General Instructions.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for trees, shrubs, ground cover, fertilizer, mycorrhiza, anti-desiccant, anchoring equipment, and mulch and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 00 10 00 – General Instructions.

### **1.4 QUALITY ASSURANCE**

- .1 Qualifications:
  - .1 Landscape Contractor: to be a Member in Good Standing of Horticultural Trade Association.
  - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.
  - .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Ornamental Maintenance designation.

## 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 00 10 00 – General Instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .1 Protect plant material from frost, excessive heat, wind and sun during delivery.
  - .2 Protect plant material from damage during transportation:
    - .1 Delivery distance is less than 30 km and vehicle travels at speeds under 80 km/h, tie tarpaulins around plants or over vehicle box.
    - .2 Delivery distance exceeds 30 km or vehicle travels at speeds over 80 km/h, use enclosed vehicle where practical.
    - .3 Protect foliage and root balls using anti-desiccants and tarpaulins, where use of enclosed vehicle is impractical due to size and weight of plant material.
- .3 Storage and Handling Requirements:
  - .1 Immediately store and protect plant material which will not be installed within 1 hour in accordance with supplier's written recommendations and after arrival at site in storage location approved by NRC Departmental Representative.
  - .2 Protect stored plant material from frost, wind and sun and as follows:
    - .1 For bare root plant material, preserve moisture around roots by heeling-in or burying roots in sand or topsoil and watering to full depth of root zone.
    - .2 For balled and burlapped and wire basket root balls, place to protect branches from damage. Maintain moisture level in root zones.
  - .3 Store and manage hazardous materials in accordance with manufacturer's written instructions.
- .4 Packaging Waste Management: remove for reuse packaging materials.

## 1.6 WARRANTY

- .1 For plant material over 75 mm caliper, the 12 months warranty period is extended to 24 months.
- .2 End-of-warranty inspection will be conducted by NRC Departmental Representative.
- .3 NRC Departmental Representative reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

## PART 2 - PRODUCTS

### 2.1 PLANT MATERIAL

- .1 Type of root preparation, sizing, grading and quality: comply with Canadian Standards for Nursery Stock.
  - .1 Source of plant material: grown in local Zone.
  - .2

- .3 Plant material must be planted in zone specified as appropriate for its species.
- .4 Plant material in location appropriate for its species.
- .2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
- .3 Trees: with straight trunks, well and characteristically branched for species.
  - .1 Trees to be transplanted from excavation or replaced with new to match growth, height caliper and species.
- .4 Trees larger than 200 mm in caliper: half root pruned during each of two successive growing seasons, the latter at least one growing season before arrival on site.
- .5 Bare root stock: nursery grown, in dormant stage, not balled and burlapped or container grown.

## **2.2 WATER**

- .1 Free of impurities that would inhibit plant growth.

## **2.3 STAKES**

- .1 Wood, pointed one end, 38 x 38 x 2300 mm.

## **2.4 WIRE TIGHTENER**

- .1 Type 1: galvanized steel.

## **2.5 GUYING WIRE**

- .1 Type 1: steel, 3mm wire.

## **2.6 CLAMPS**

- .1 U-bolt: galvanized, 13mm diameter, c/w curved retaining bar and hex nuts.

## **2.7 ANCHORS**

- .1 Wood:
  - .1 Type 1: 38 x 38 x 460mm.

## **2.8 GUYING COLLAR**

- .1 Tube: plastic, 13mm diameter, nylon reinforced.

## **2.9 TRUNK PROTECTION**

- .1 Plastic: perforated spiralled strip.
- .2 Burlap: clean 2.5 kg/m<sup>2</sup> minimum mass and 150 mm minimum wide, and twine fastener.

## **2.10 MULCH**

- .1 Shredded wood: varying in size from 25 to 125 mm in length, from coniferous trees.

## **2.11 FERTILIZER**

- .1 Synthetic commercial type as recommended by manufacturer.
  - .1 Ensure new root growth is in contact with mycorrhiza.
  - .2 Use mycorrhiza as recommended by manufacturer's written recommendations.

## **2.12 ANTI-DESICCANT**

- .1 Wax-like emulsion.

## **2.13 FLAGGING TAPE**

- .1 Fluorescent, orange colour.

## **2.14 SOURCE QUALITY CONTROL**

- .1 Obtain approval from NRC Departmental Representative of plant material prior to planting.
- .2 Imported plant material must be accompanied with necessary permits and import licenses. Conform to Federal, Provincial or Territorial regulations.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for planting installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform NRC Departmental Representative 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 NRC Departmental Representative.

### 3.2 PRE-PLANTING PREPARATION

- .1 Proceed only after receipt of written acceptability of plant material from NRC Departmental Representative.
- .2 Remove damaged roots and branches from plant material.
- .3 Apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.
- .4 Locate and protect utility lines.
- .5 Notify and acquire written acknowledgment from utility authorities before beginning excavation of planting pits for trees and shrubs.
- .6 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction, that complies with EPA 832/R-92-005.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 EXCAVATION AND PREPARATION OF PLANTING BEDS

- .1 Establishment of sub-grade for planting beds in accordance with Section 02 23 00 – Excavation and Backfilling.
- .2 Preparation of planting beds in accordance with Section 32 91 19.13 - Topsoil Placement and Grading.
- .3 For individual planting holes:
  - .1 Stake out location and obtain approval from NRC Departmental Representative prior to excavating.
  - .2 Excavate to depth and width as indicated.
  - .3 Remove subsoil, rocks, roots, debris and toxic material from excavated material that will be used as planting soil for trees and individual shrubs. Dispose of excess material.
  - .4 Scarify sides of planting hole.
  - .5 Remove water which enters excavations prior to planting. Notify NRC Departmental Representative if water source is ground water.

### 3.4 PLANTING

- .1 For bare root stock, place [50] mm backfill soil in bottom of hole.
  - .1 Plant trees and shrubs with roots placed straight out in hole.
- .2 For jute burlapped root balls, cut away top one third of wrapping and wire basket without damaging root ball.

- .1 Do not pull burlap or rope from under root ball.
- .3 For container stock or root balls in non-degradable wrapping, remove entire container or wrapping without damaging root ball.
- .4 Plant vertically in locations as indicated.
  - .1 Orient plant material to give best appearance in relation to structure, roads and walks.
- .5 For trees and shrubs:
  - .1 Backfill soil in 150 mm lifts.
    - .1 Tamp each lift to eliminate air pockets.
    - .2 When two thirds of depth of planting pit has been backfilled, fill remaining space with water.
    - .3 After water has penetrated into soil, backfill to finish grade.
  - .2 Form watering saucer as indicated.
- .6 For ground covers, backfill soil evenly to finish grade and tamp to eliminate air pockets.
- .7 Water plant material thoroughly.
- .8 After soil settlement has occurred, fill with soil to finish grade.

### 3.5 TRUNK PROTECTION

- .1 Install trunk protection on deciduous trees as indicated.
- .2 Install trunk protection before installation of tree supports.

### 3.6 TREE SUPPORTS

- .1 Use single stake tree support for deciduous trees less than 3 m in height and evergreens less than 2 m in height.
  - .1 Place stake on prevailing wind side and 150 mm minimum from trunk.
  - .2 Drive stake 150 mm minimum into undisturbed soil beneath roots.
    - .1 Ensure stake is secure, vertical and unsplit.
  - .3 Install 150 mm long guying collar 1500 mm above grade.
  - .4 Thread Type 1 guying wire through guying collar tube.
    - .1 Twist wire to form collar and secure firmly to stake. Cut off excess wire.
- .2 Use 3 guy wires and anchors for deciduous trees greater than 3 m in height and evergreens greater than 2 m in height.
  - .1 Use anchors for trees.
  - .2 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens and 1/2 height for deciduous trees. Collar mounting height not to exceed 2.5 m above grade.
  - .3 Guying collars to be of sufficient length to encircle tree plus 50 mm space for trunk clearance. Thread guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi-wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.
  - .4 Install anchors at equal intervals about tree and away from trunk so guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.

- .5 Attach guy wire to anchors. Tension wire and secure by multi-wraps.
  - .6 Install wire tightener ensuring that guys are secure and leave room for slight movement of tree.
  - .7 Saw tops off wooden anchors which extend in excess of 100 mm above grade.
  - .8 Install flagging tape to guys as indicated.
- .3 After tree supports have been installed, remove broken branches with clean, sharp tools.

### **3.7 MULCHING**

- .1 Ensure soil settlement has been corrected prior to mulching.
- .2 Spread mulch as indicated.

### **3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following maintenance operations from time of planting to acceptance by NRC Departmental Representative.
  - .1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
    - .1 For evergreen plant material, water thoroughly in late fall prior to freeze-up to saturate soil around root system.
    - .2 Replace or re-spread damaged, missing or disturbed mulch.
    - .3 For non-mulched areas, cultivate as required to keep top layer of soil friable.
    - .4 Remove dead or broken branches from plant material.
    - .5 Keep trunk protection and guy wires in proper repair and adjustment.
    - .6 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

### **3.9 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for reuse and recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
  - .2 Divert discarded burlap, wire and plastic plant containers materials from landfill to plastic recycling facility.
  - .3 Dispose of unused fertilizer at official hazardous material collection site.
  - .4 Dispose of unused anti-desiccant at official hazardous material collections site.
  - .5 Divert unused wood and mulch materials from landfill to composting facility.

**END OF SECTION**