

The following Addendum forms part of the Contract Documents for the Canada Centre for Inland Waters (Project Number R.073578.001). The following changes, additions or deletions shall be made to the following documents as indicated and all other Contract Documents shall remain the same.

This Addendum Number 01 contains 5 written pages, Specifications Section 23 63 23 and 21 attached Drawings (SKA-008, SKA-009, SKA-010, SKA-011, SKA-012, SKA-013, SKS-001, ADD-02-SKM-001, ADD-02-SKM-002, ADD-02-SKM-003, ADD-02-SKM-004, ADD-02-SKM-005, ADD-02-SKM-006, ADD-02-SKM-007, ADD-02-SKM-008, ADD-02-SKM-009, ADD-02-SKM-010, ADD-02-SKM-011, ADD-02-SKM-012, ADD-02-SKM-013, ADD-02-SKM-014).

1 ARCHITECTURAL

1.1 DRAWINGS:

- .1 Drawing A0.01 - SCHEDULES
 - .1 Door ST530-1; revise door & frame to indicate aluminum material and anodized finish in accordance with Drawing SKA-008 dated 2015-09-16, attached and forms part of this Addendum.
- .2 Drawing A2.14 – A&L BUILDING O521/O532A DESIGN PLANS
 - .1 Detail 1/A2.14; to indicate location and size of induction unit enclosures and adjacent drywall furring in accordance with Drawing SKA-013 dated 2015-09-16, attached and forms part of this Addendum.
- .3 Drawing A6.02 – PLAN DETAILS & SECTION DETAILS
 - .1 Detail 2/A6.02; revise detail in accordance with Drawing SKA-010 dated 2015-09-16, attached and forms part of this Addendum.
 - .2 Detail 3/A6.02; revise detail in accordance with Drawing SKA-009 dated 2015-09-16, attached and forms part of this Addendum.
 - .3 Detail 7/A6.02; revise detail in accordance with Drawing SKA-011 dated 2015-09-16, attached and forms part of this Addendum.
 - .4 Detail 8/A6.02; revise detail in accordance with Drawing SKA-012 dated 2015-09-16, attached and forms part of this Addendum.

2 MECHANICAL

2.1 SPECIFICATIONS:

- .1 Section 22 11 16 – Domestic Water Piping
 - .1 Item 2.1.2; add new item 2.1.2 as follows:
 - .2 Reverse osmosis (RO) water piping
 - .1 Above ground: PVC Schedule 80.

- .2 Item 2.3.7; add new item 2.3.7 as follows:
 - .7 Solvent weld PVC Schedule 80 piping for RO water system
- .3 Item 2.4.2; add new item 2.4.2 as follows:
 - .2 Provide PVC isolation valves sized to suit diameter of RO water piping as indicated on drawings and to isolate piping branches
- .2 Section 22 15 00 – General Service Compressed Air System
 - .1 Delete Section 22 15 00 in its entirety.
- .3 Section 22 63 23 – Laboratory Gases System
 - .1 Add new Section 22 63 23, dated 2015-09-17, 8 pages, attached and forms part of this Addendum.
- .4 Section 23 21 23 – Hydronic Pumps
 - .1 Item 2.3; revise to read:
 - 2.3 VERTICAL IN-LINE CIRCULATORS (P-PHC1, P-HC1, P-CC1)
- .5 Section 23 73 10 – Air Handling – Built-Up
 - .1 Items 1.7.1 and 1.7.2; revise to read:
 - .1 The refurbishment shall be carried out in coordination with the operating requirements of the facility and in a workmanlike manner. A proposed plan for refurbishment of AHU-1, complete with schedule indicating AHU shut-down time and component installation time is to be submitted for review within 60 days of award. Proposed refurbishment plan to be complete with detailed shop drawings of each component to be refurbished.
 - .2 Detailed schedule and proposal drawings shall be provided to and accepted by the Departmental Representative before beginning any unit modifications. No time extensions will be provided for unacceptable submissions
 - .2 Item 1.7.9; revise to read:
 - .9 Unacceptable workmanship will be repaired and redone at no additional cost to the Departmental Representative. Time extensions will not be provided to accommodate rework due to quality issues.
 - .3 Item 3.5; add new item 3.5 as follows:
 - 3.5 TESTING
 - 1. Preheat, heating and cooling coils shall be tested to verify that the performance meets the scheduled output.

2. Prior to refurbishment, each section of AHU-1 shall be pressure tested to determine baseline performance. Pressure testing methodology shall be conducted in accordance with the SMACNA duct construction manual.
 - .1 A calibrated orifice shall be used to measure leakage airflow. "Dual duct" or "side by side" units shall have each duct tested.
 - .2 Following refurbishment, AHU-1 shall be subject to a negative pressure test in the field to ensure excessive air leakage will not affect unit performance.
 - .3 Air leakage rate of refurbished AHU-1 shall demonstrate a minimum 10% improvement against baseline measurements. The leakage rate of the casing should not exceed 1% of the unit airflow at -1.0 times the rated static pressure. A representative of the refurbishing contractor shall certify the test results.
- .6 Section 23 73 23 – Custom Indoor Central Station Air Handling Units
 - .1 Item 3.11; revise to read:
 - .11 Refer to Custom Air Handling Unit Schedule on Drawings

2.2 DRAWINGS:

- .1 Drawing M1.33 – WTC BUILDING HEATING SYSTEM PENTHOUSE MECHANICAL PLAN
 - .1 General Notes 3 and 11; revise in accordance with Drawing ADD-02-SKM-001 dated 2015-09-16, attached and forms part of this Addendum.
- .2 Drawing M2.01 – HYDRAULICS WING LAB H158 GROUND FLOOR PLUMBING PLAN
 - .1 Revisions in accordance with Drawing ADD-02-SKM-002 dated 2015-09-16, attached and forms part of this Addendum and as follows:
 - .1 Clarification; notes for plumbing fixtures.
 - .2 Add pipe size of RO water to laboratory sinks is 12mm diameter in Plumbing Fixture Connections schedule.
- .3 Drawing M2.11 – A&L BUILDING LAB L527 & L530 FIFTH FLOOR PLUMBING PLAN
 - .1 Revisions in accordance with Drawing ADD-02-SKM-003 dated 2015-09-16, attached and forms part of this Addendum and as follows:
 - .1 Clarification; notes for plumbing fixtures.
 - .2 Add pipe size of RO water to laboratory sinks is 12mm diameter in Plumbing Fixture Connections schedule.

- .4 Drawing M2.12 – A&L BUILDING LAB L527 & L530 FIFTH FLOOR HVAC PLAN
 - .1 Clarification of tags for venturi valves in accordance with Drawing ADD-02 SKM-004 dated 2015-09-16, attached and forms part of this Addendum.
- .5 Drawing M2.15 – A&L BUILDING EXHAUST UPGRADE PENTHOUSE/ROOF HVAC PLAN
 - .1 Add tag for heat recovery coil HX-8 associated with exhaust fan FH-EF1 in accordance with Drawing ADD-02-SKM-007 dated 2015-09-16, attached and forms part of this Addendum.
- .6 Drawing M2.21 – R&D BUILDING AHU-1, 3, & 5 PENTHOUSE HVAC PLAN
 - .1 Revisions in accordance with Drawings ADD-02-SKM-005 and ADD-02-SKM-006 dated 2015-09-16, attached and forms part of this Addendum and as follows:
 - .1 Clarification; pump tag as shown on Drawing ADD-02-SKM-005.
 - .2 Clarification; heat exchanger tags as shown on Drawings ADD-02-SKM-005 and ADD-02-SKM-006.
 - .3 Clarification; pipe and duct sizes as shown on Drawings ADD-02-SKM-005 and ADD-02-SKM-006.
- .7 Drawing M2.30 – WTC BUILDING HEATING SYSTEM SERVICE TUNNEL & BASEMENT MECHANICAL PLAN
 - .1 Revise gas pipe size to 50 mm Ø in accordance with Drawings ADD-02-SKM-008, ADD-02-SKM-009 and ADD-02-SKM-010 dated 2015-09-16, attached and forms part of this Addendum.
- .8 Drawing M2.33 – WTC BUILDING HEATING SYSTEM PENTHOUSE MECHANICAL PLAN
 - .1 Revise and add General Notes 2 and 4 in accordance with Drawing ADD-02 SKM-011 dated 2015-09-16, attached and forms part of this Addendum.
- .9 Drawing M5.02 – MECHANICAL DETAILS SHEET 2
 - .1 Detail 6/M5.02; add detail for profile of induction unit enclosure in accordance with Drawing ADD-02 SKM-012 dated 2015-09-16, attached and forms part of this Addendum.
- .10 Drawing M7.01 – MECHANICAL SCHEDULES SHEET 1
 - .1 Clarification; schedules for general and fume hood exhaust valves in accordance with Drawing ADD-02 SKM-013 dated 2015-09-16, attached and forms part of this Addendum.
- .11 Drawing M7.02 – MECHANICAL SCHEDULES SHEET 2
 - .1 Add information for HX-7 and HX-8 to Heat Recovery Coil Schedule in accordance with Drawing ADD-02 SKM-014 dated 2015-09-16, attached and forms part of this Addendum.

3 STRUCTURAL

3.1 DRAWINGS:

.1 Drawing S2.03 – WTC BUILDING PENTHOUSE EXTENSION FLOOR AND ROOF FRAMING PLANS

.1 Bracing and framing revisions in accordance with Drawing SKS-001 dated 2015-09-16, attached and forms part of this Addendum and as follows:

- .1 Detail 2/S2.03; revise new vertical x-bracing along gridline D^I to new vertical brace frame (chevron bracing) to suit Mechanical louvre openings.**
- .2 Detail 9/S2.03; add new detail to revise new vertical x-bracing along gridline D^I to new vertical brace frame (chevron bracing) to suit Mechanical louvre openings and add framing member sizes to mechanical louvre openings.**

END OF ADDENDUM 02



DOOR SCHEDULE:

DESCRIPTION			DOORS				FRAMES/GLAZING			OTHER		GENERAL
DOOR NO.	LOCATION	NOMINAL SIZE (HxW)	TYPE	MATERIAL	GLASS	FINISH	TYPE	MATERIAL	FINISH	FIRE RATING	HARDWARE GROUP	COMMENTS
LAB H158												
H158-1	H158	1830 x 2286	D	HM	TG	PT	1	HM	PT	45 MIN	1	
H158-2	H158	1830 x 2286	D	HM	TG	PT	1	HM	PT	-	2	
H158-3	H158	1830 x 2286	D	HM	TG	EP	1	HM	EP	-	2	
H158C-1	H158C	914 x 2286	B	FG	TG	EP	1	FG	EP	-	3	
H158D-1	H158D	1016 x 2286	B	HM	TG	EP	1	HM	EP	-	4	
H158E-1	H158E	914 x 2286	B	HM	TG	PT	1	HM	PT	-	5	
H158F-1	H158F	914 x 2286	C	HM	-	PT	1	HM	PT	-	6	
TRACE METALS STORAGE & STAGING ROOM												
D-107	TRACE METAL S&S	1830 x 2286	D	HM	TG	PT	1	HM	PT	-	7	
LAB L527												
L527-1	L527	1016 x 2440	A	AL	TG	ANO	2	AL	ANO	-	8	
LAB L530												
L530-1	L530	1016 x 2440	A	AL	TG	ANO	2	AL	ANO	-	8	
ST530-1	L530	1016 x 2286	B	AL	TG	ANO	2	AL	ANO	-	9	
L530A-1	L530	914 x 2286	A	AL	TG	ANO	2	AL	ANO	-	10	
WTC												
D-101	PENTHOUSE	914 x 2286	C	HM	-	PT	1	HM	PT	-	11	
D-102	PENTHOUSE	914 x 2286	C	HM	-	PT	1	HM	PT	-		
O526												
O526-1	O526	1016 x 2438	E	AL	TG	ANO	-	-	-	-	12	SLIDING DOOR
O528												
O528-1	O528	1016 x 2438	E	AL	TG	ANO	-	-	-	-	12	SLIDING DOOR
O532												
O532-1	O532	1016 x 2438	E	AL	TG	ANO	-	-	-	-	12	SLIDING DOOR
O532A-1	O532A	1016 x 2438	E	AL	TG	ANO	-	-	-	-	12	SLIDING DOOR
SCHEDULE ABBREVIATIONS:												
		HM	HOLLOW METAL			HCW	HOLLOW CORE WOOD		EP	EPOXY PAINT		
		HMI	HOLLOW METAL INSULATED			PT	PAINT		FRR	FIRE RESISTANCE RATING		
		AL	ALUMINUM			ANO	ANODIZED		FG	FIBRE GLASS		
		TG	TEMPERED GLASS									

Project title: CANADA CENTRE FOR
INLAND WATERS
867 LAKESHORE ROAD BURLINGTON,
ONTARIO, L7R 4A6
LABS, AHUs, AND HEATING
UPGRADE

Drawing title:
SCHEDULE

Designed by : GG

Drawn by : GG

Approved by : GG

Tender:

Sketch No: SKA-008

Plot scale : PLSCALE

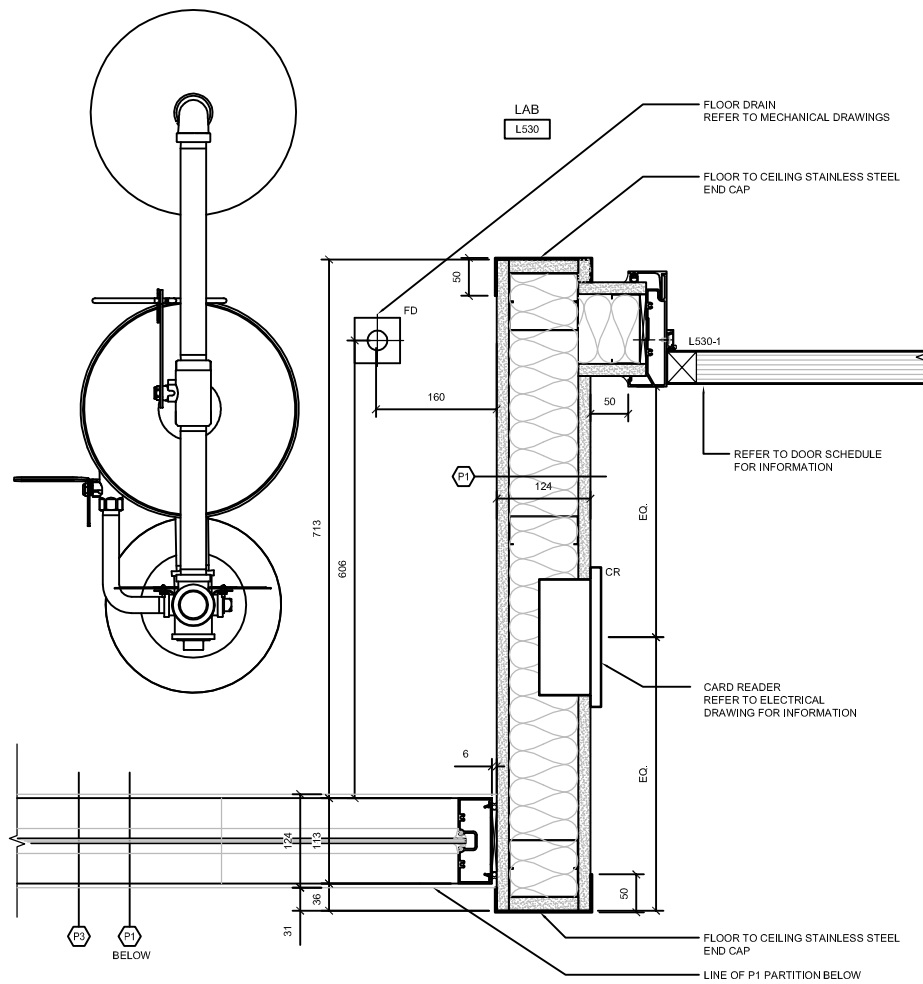
Drawing no.: A0.01

Project no.: R.073578.001

Project date : 2015-09-16

Date plotted : PLOT

Cadd file : DWG



Project title: CANADA CENTRE FOR
INLAND WATERS
867 LAKESHORE ROAD BURLINGTON,
ONTARIO, L7R 4A6
LABS, AHUs, AND HEATING
UPGRADE

Drawing title:
PLAN DETAIL – ALUMINUM DOOR AND SCREEN

Designed by : GG

Tender:

Drawn by : JC

Sketch No: SKA-009

Approved by : RN

Plot scale : 1:10

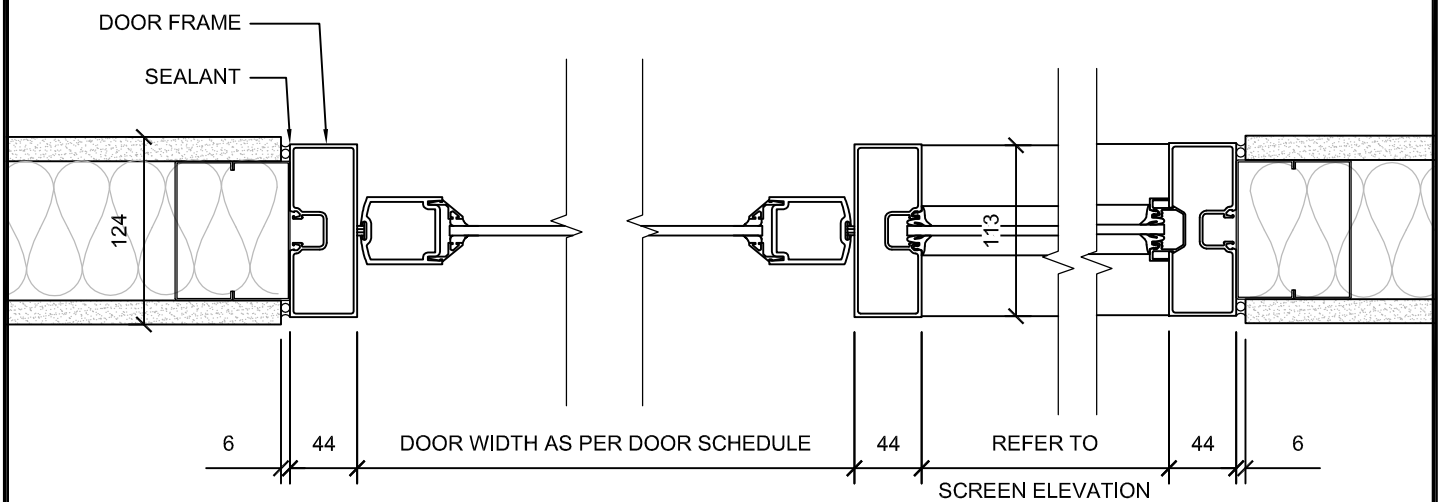
Drawing no.: 3/A6.02

Project no.: R.073578.001

Project date : 2015-09-16

Date plotted : PLOT

Cadd file : DWG



Project title: CANADA CENTRE FOR
INLAND WATERS
867 LAKESHORE ROAD BURLINGTON,
ONTARIO, L7R 4A6
LABS, AHUs, AND HEATING
UPGRADE

Drawing title:
PLAN DETAIL – ALUMINUM DOOR/ SIDELITE
JAMB

Designed by : GG

Tender:

Drawn by : JC

Sketch No: SKA-010

Approved by : RN

Plot scale : 1:5

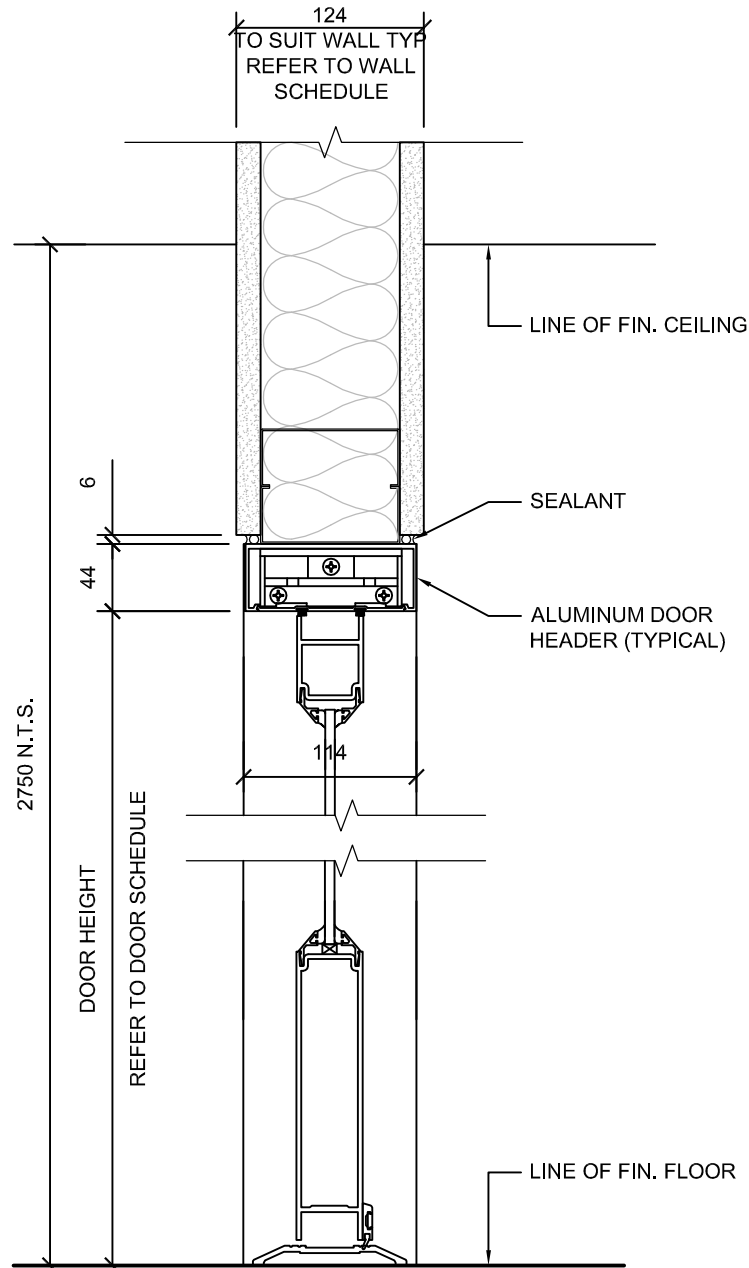
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Project no.: R.073578.001

Project date : 2015-09-16

Date plotted : PLOT

Cadd file : DWG



Project title: CANADA CENTRE FOR
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ONTARIO, L7R 4A6
LABS, AHUs, AND HEATING
UPGRADE

Drawing title:
SECTION DETAIL – ALUM. DOOR HEADER

Designed by : GG

Tender:

Drawn by : JC

Sketch No: SKA-011

Approved by : RN

Plot scale : 1:5

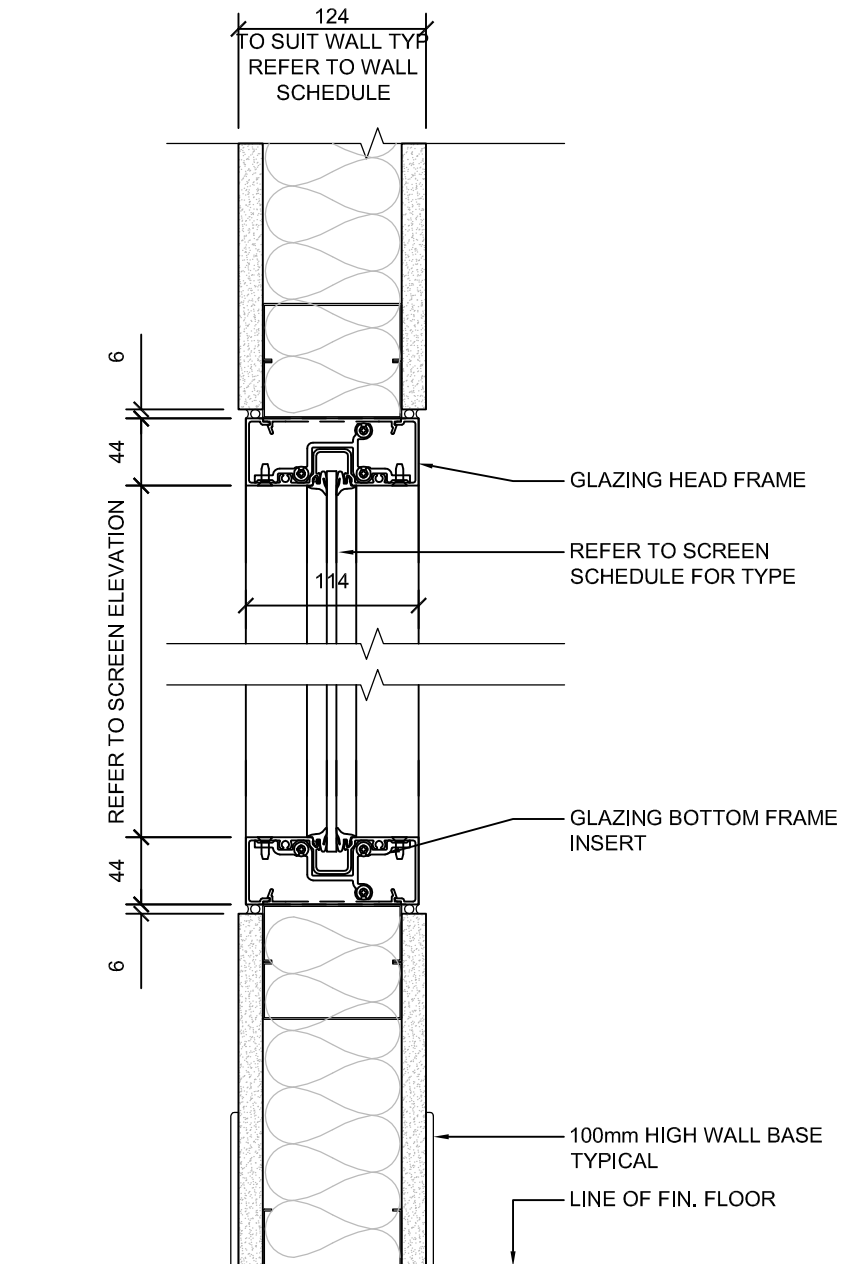
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Project no.: R.073578.001

Project date : 2015-09-16

Date plotted : PLOT

Cadd file : DWG



Project title: CANADA CENTRE FOR
INLAND WATERS
867 LAKESHORE ROAD BURLINGTON,
ONTARIO, L7R 4A6
LABS, AHUs, AND HEATING
UPGRADE

Drawing title:
SECTION DETAIL - ALUM. SIDELITE HEADER

Designed by : GG

Drawn by : JC

Approved by : RN

Tender:

Sketch No: SKA-012

Plot scale : 1:5

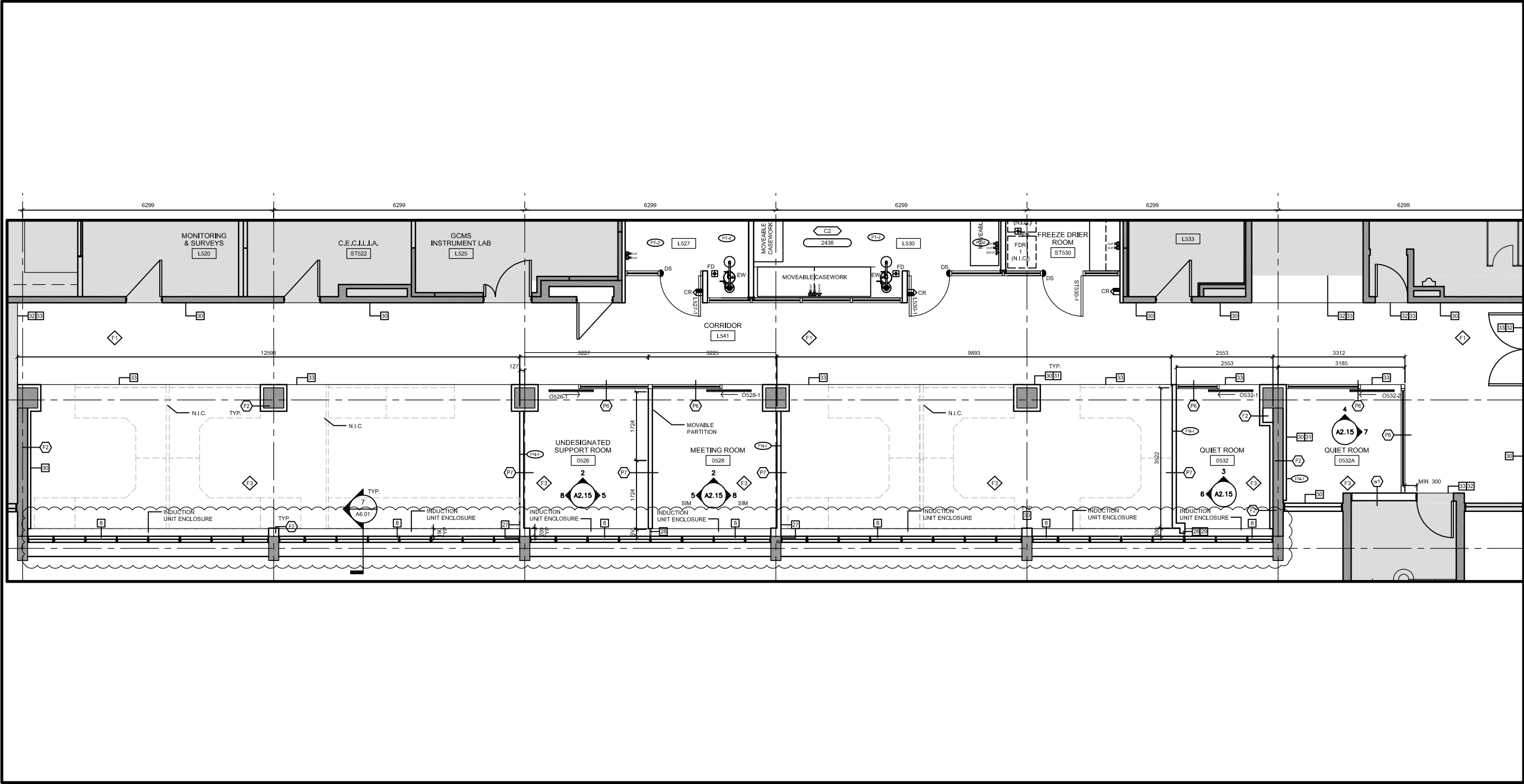
Drawing no.: 8/A6.02

Project no.: R.073578.001

Project date : 2015-09-16

Date plotted : PLOT

Cadd file : DWG



 Public Works and Government Services Canada Ontario Region	Travaux publics et Services gouvernementaux Canada Région de l'Ontario	Project title: CANADA CENTRE FOR INLAND WATERS 867 LAKESHORE ROAD BURLINGTON, ONTARIO, L7R 4A6 LABS, AHUs, AND HEATING UPGRADE	Drawing title: A&L BUILDING 0521/0532A DESIGN PLANS	Designed by : GG	Tender:	Drawing no.: 1/A2.14
				Drawn by : GG	Sketch No: SKA-013	Project no.: R.073578.001
				Approved by : GG	Plot scale : 1:100	Project date : 2015-09-16

Part 1 General

1.1 SUMMARY

- .1 This Section includes general provisions applicable to all work relating to the engineering, fabrication, erection, and commissioning of a complete laboratory gas system.
- .2 This Section includes descriptions for supply and installation of the following laboratory gas systems:
 - .1 Laboratory Oxygen System
 - .2 Laboratory Nitrogen System
 - .3 Laboratory Helium System
 - .4 Laboratory Hydrogen System
 - .5 Laboratory Vacuum System
 - .6 Laboratory Compressed Air System
 - .7 Systems descriptions include, but are not limited to, the following components:
 - .1 Pipe, fittings, valves, valve boxes, alarms and sensing devices.
 - .2 Installation of service piping and connection to owner supplied gas cylinders.

1.2 RELATED REQUIREMENTS

- .1 Section 21 05 01 – Common Work Results - Mechanical.
- .2 Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI):
 - .1 ANSI/AWS A5.8/A5.8M-2004, Specification for Filler Metals for Brazing and Braze Welding
- .2 American Society of Mechanical Engineers (ASME):
 - .1 ASME Pressure Vessels And Piping Codes And Standards, 2000
 - .2 ASME B16.18-2001(R2005), Cast Copper Alloy Solder Joint Pressure Fittings
 - .3 ASME B16.22-2001(R2005), Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- .3 American Society for Testing and Materials (ASTM):
 - .1 ASTM A167-99 (2009), Standard Specification for Stainless and Heat-Resisting Chromium - Nickel Steel Plate, Sheet, and Strip
 - .2 ASTM A269-13, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
 - .3 ASTM A403/A403M-10a, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
 - .4 ASTM B32-08, Standard Specification for Solder Metal

- .5 ASTM D1785-06, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- .6 ASTM D2466-06, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings, Schedule 40
- .7 ASTM D2564-04(2009)e1, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings

1.4 SUBMITTALS

- .1 Provide required information in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Submit shop drawings indicating general assembly of components, mounting and installation details, and general layout of control and alarm panels.
 - .2 Submit product data, manufacturers literature and illustrations indicating size, dimensions and configuration of all components forming a part of the gas system including, but not limited to, the following:
 - .1 Valves
- .3 Information Submittals: Provide the following submittals when requested by the Consultant:
 - .1 Submit certification indicating compliance to codes and standards referenced in this Section and required by the authorities having jurisdiction.

1.5 PROJECT CLOSEOUT SUBMISSIONS

- .1 Submit required information in accordance with Section 01 77 00 – Closeout Procedures.
 - .1 Equipment list identifying components used in each system including installation instructions, operating instructions, and assembly views.
 - .2 Equipment manufacturers names and addresses.
 - .3 Equipment maintenance data including maintenance and inspection data, replacement part numbers and availability, and service depot location and telephone numbers.
 - .4 Detailed drawings of equipment and components.
 - .5 Manufacturers service manuals for equipment.
 - Valve schedule listing valves in the system with location.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Conform with applicable codes for supply and installation of laboratory gas systems.
 - .2 Perform work in accordance with NFPA 45, other referenced codes and standards, and requirements of this Section; maintain one copy of each document referenced in this section on site.
-

- .3 Qualifications: Provide proof of qualifications when requested by Departmental Representative:
 - .1 Verify installer is a company specializing in performing the work of this Section having a minimum of three (3) years documented experience, and as follows:
 - .1 Installing personnel to hold current certification or license indicating that they are skilled in the installation of laboratory gas systems.
 - .2 Provide evidence of certification for the Consultant prior to any work being performed on the laboratory gas systems.
- .4 Provide materials that are complete in every respect and ready to be in operation at completion of the work and as follows:
 - .1 New materials and of the best grade and quality obtainable.
 - .2 Materials to comply with relevant standards and codes listed in this section and as required by the Authorities Having Jurisdiction.
 - .3 Equipment must be CSA Approved and bear a CSA Label indicating compliance with specified standards.
- .5 Specific reference to a phrase or component within a particular Code or Standard in this specification is made to emphasize and clarify the intent of the Section; compliance with these individual points does not constitute or relieve installer or testing agency from complying with the remaining applicable sections of the reference Codes and Standards.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 This section includes requirements for the supply, installation and testing of equipment, devices, valves and piping required for a complete oxygen, nitrogen, helium, hydrogen, and vacuum delivery system meeting applicable laboratory gas piping systems codes and standards as listed in this Section.
- .2 Components forming a part of the laboratory gas system include, but are not limited to, the following:
 - .1 Pipe and pipe fittings.
 - .2 Valves.

2.2 GAS AND COMPRESSED AIR PIPING, FITTINGS, AND JOINTS

- .1 Piping: Following applies to distribution system piping:
 - .1 Tube: ASTM B819, Type K or L:
 - .1 Use Type K for systems having an operating pressure of 1380 kPa or greater.
 - .2 Concealed Piping: Soft Temper.
 - .3 Exposed Piping: Hard Temper.
 - .2 Service Rating: Suitable for oxygen service, permanently labelled and delivered plugged, capped or otherwise sealed to prevent contamination of internal surfaces.
 - .3 Plugs, caps or other seals to remain in place until final assembly.

- .4 Copper Tubing: Type "K" seamless copper cleaned and degreased in accordance with ASTM B819.
- .5 Protective Caps: Cap open ends of piping to prevent contamination of system until fixtures or fittings are attached.
- .2 Fittings: ASME B16.22, cleaned for oxygen service:
 - .1 Deliver fixtures plugged, capped, bagged or otherwise sealed to prevent contamination of internal surfaces.
 - .2 Keep plugs, caps, bags or other seals in place until final assembly.
- .3 Joints: Brazed using an AWS A5.8 BCuP Series filler metal and flux recommended for gas piping systems for interior installations.

2.3 VACUUM PIPING, FITTINGS AND JOINTS

- .1 Tube:
 - .1 Exposed Locations: Hard Temper ASTM B88 Type L or Type M, ASTM B280 Type ACR, or ASTM B819 Type L.
 - .2 Concealed Underground Locations: Soft Temper ASTM B 88 Type L, or ASTM B280 Type ACR, soft temper for concealed locations.
- .2 Fittings: ASME B16.18, ASME B16.22.
- .3 Joints: Brazed using an AWS A5.8 BCuP Series filler metal and flux recommended for gas piping systems for interior installations.

2.4 SHUT-OFF VALVES

- .1 Provide lever handle valves, double seal type ball valves having a minimum pressure rating of 2070 kPa. Fabricate valve of forged bronze and designed in such a manner that it can be "swung out" during installation, so as to prevent damage, due to heat transfer during brazing operations.
 - .2 Level handle to require a quarter of a turn from the fully open position to a fully closed position. Valve seals must be of a BUNA-N compound and seal on a chromium plated bronze ball. Valve stem to incorporate a dual "O" ring seal for blow out proof operation.
 - .3 Type "K" washed and degreased copper tubing stubs extend from both the inlet and the outlet sides of the valve to facilitate installation.
 - .4 Each bare valve in areas accessible only to authorized personnel to state the specific gas or vacuum being controlled by that valve; and have the lever handle removed, with the valve in the open position.
 - .5 Provide washed and degreased valve for oxygen usage and stub end extensions capped at both ends.
 - .6 Contractor to exercise considerable care in storing to prevent contamination of valves prior to installation. All equipment and valves to be properly protected on site.
-

Part 3 Execution

3.1 CLEANING

.1 Material Cleaning Requirements:

- .1 Fittings, tube, valves, and piping system components cleaned for oxygen service in accordance with CGA Pamphlet G-4.1. Cleaning performed by the manufacturer or a facility equipped to clean, rinse, and purge the material in accordance with CGA Pamphlet G-4.1.
- .2 Immediately before final assembly, fittings, tube, valves, and piping system components visually examined internally for contamination. Material that has become contaminated to not be installed.
- .3 On-site cleaning of the interior surfaces of fittings, tube, valves, and piping system components limited to recleaning surfaces in the immediate vicinity of the joints that have become contaminated prior to brazing. These surfaces must be cleaned by washing in a clean, hot water/alkaline solution such as sodium carbonate or trisodium phosphate (1 lb. to 3 gal. of potable water). Scrub thoroughly the interior surfaces and rinse with clean, hot, potable water.

3.2 LABORATORY GAS INSTALLATION REQUIREMENTS

- .1 Brazers qualified in accordance with the requirements of NFPA 45.
- .2 Brazing flux will not be used in joints between copper tube and ASME B16.22 fittings.
- .3 In applications where copper tube must be joined to brass or bronze system components brazing flux will be applied sparingly to the exterior surface of the tube. Brazing flux will not be applied to the interior surfaces of the fitting.
- .4 During installation care will be taken to avoid contamination of interior "cleaned for oxygen service" surfaces of piping system components. Joints brazed within one hour of being cleaned.
- .5 While being brazed, joints continuously purged with a positive flow of oil-free dry nitrogen to prevent the formation of copper oxide on the interior surface of the joint. Maintain the flow of purge gas until the joint is cool to the touch.
- .6 During and after installation, openings in the piping system kept capped, plugged or sealed to avoid unnecessary loss of purge gas while brazing and to prevent contamination of the system. During brazing, a discharge opening provided on the opposite side of the joint from where the purge gas is being introduced. After brazing, this discharge opening capped, plugged or sealed to prevent contamination of the system.
- .7 Brazed joints allowed to cool to the touch naturally and not be shock cooled. After cooling, all joints cleaned with water and a stainless steel wire brush to remove any residue and permit clear visual inspection of the joint. Where flux has been permitted, use hot water.
- .8 Site fabricated, mechanically formed tees/outlets and couplings will not be used.

3.3 VACUUM INSTALLATION REQUIREMENTS

- .1 The outside of all joints be cleaned by washing with hot water after assembly and cooling.

- .2 After installation of the piping, but before attachment of the vacuum line to the vacuum pump(s) and receiver(s), and before installation of the vacuum alarm switches, station inlets, and gauges, blow clear the line by means of oil-free, dry nitrogen or air.
- .3 Before erection, all pipe, tubing, valves and fittings (except those supplied expressly cleaned for oxygen and nitrous oxide services by manufacturer) be thoroughly cleansed of all grease, oil, or other combustible materials by washing in a hot solution of sodium carbonate or trisodium phosphate mixed in proportions of 2.2 kg to 11.25 L of water.
- .4 Scrubbing and continuous agitation of the parts employed where necessary to remove all deposits and ensure complete cleansing. After washing, all materials be rinsed thoroughly in clean, hot water and blown clean with nitrogen.
- .5 After cleansing, great care must be exercised in the storage and handling of all materials and in condition of tools used in cutting and reaming to prevent oil or grease being introduced into the tubing. Where such contamination is known to have occurred, the materials must be rewashed and then rinsed.

3.4 PIPING FABRICATION

- .1 All joints in pipe and tubing, except those at equipment requiring screwed connections, be made with brazed-joint type wrought fittings. Suitable adapters be employed for installation of equipment provided with threaded connections, all threaded connections must be tinned.
- .2 All brazed connections be made with type of brazing alloy as specified above in "PIPE, FITTINGS, AND JOINTS". The joining processes be those recommended by the manufacturer of pipe, tubing, and fittings. Avoid leaving excess flux inside of the pipe and fittings.
- .3 Screwed Connections: Telfon Tape applied to the external threads only, leaving first thread clean if possible.
- .4 Bends: All changes in direction requiring turns at offsets of radius less than five times the pipe or tubing outside diameter be made with braze-type wrought fittings, or by pipe or tubing shaped by bending tools. All bends be free of any appreciable flattening, buckling or thinning of the tube wall at any point.
- .5 Piping systems for gases not be used as a grounding electrode.
- .6 All pipe and tubing cut accurately to measurements obtained at the site of the system and installed without springing or forcing.
- .7 Gas piping not be supported by other piping, nor laboratory gas piping be used to support other pipe or conduit. Provide support with pipe hangers suitable for the size of pipe and of proper strength and quality, at proper intervals, so that piping cannot be moved accidentally from the installed position as follows:

6.3 mm pipe or tubing	1200 mm
9.5 mm pipe or tubing	1200 mm
15 mm pipe or tubing	1800 mm
20 mm to 25 mm pipe or tubing	2400 mm
30 mm or larger (horizontal)	3000 mm
30 mm or larger (vertical)	every floor level

- .8 All copper pipe, tubing, valves, and fittings be precleaned and prepared for oxygen service in accordance with NFPA 45 except those supplied especially prepared for oxygen service by the manufacturer and received sealed on the job.
- .9 During the brazing of pipe connections, the interior of the pipe purged continuously with nitrogen. The outside of the tube and fittings cleaned by washing with hot water after assembly.
- .10 Threaded joints in piping systems be tinned or made up with polytetrafluorethylene (such as Telfon) tape or other thread sealants suitable for oxygen service. Sealants applied to the male threads only.
- .11 Buried piping adequately protected against frost, corrosion, and physical damage. Ducts or casings used wherever buried piping traverses a roadway, driveway, parking lot, or other area subject to surface loads.
- .12 Piping exposed to physical damage adequately protected. Protect pipe or tubing in corridors or other locations where exposed to damage from moving equipment.
- .13 Supply and install any additional isolation valves required to obtain certification by the Testing Agency, and to meet the requirements of the codes and standards referenced.

3.5 IDENTIFICATION OF PIPING

- .1 Label all laboratory gas piping to indicate its gas content. All laboratory gas pipelines have a permanent pipeline identifier and label applied at 6.0 m intervals, before and after barriers, and behind access doors and inlet and outlet points.

3.6 PIPING SYSTEMS TESTING

- .1 After installation of the piping and valves, but before installation of the service outlets, alarm actuating switches and gauges, blow the line clear by means of nitrogen.
 - .2 After installation of the rough-in portion of service outlets and area line pressure alarms, but before closing of the walls, each section of piping system subjected to a test pressure of one and one-half (1½) times the maximum working pressure, but not less than 1030 kPa with nitrogen. This test pressure maintained until each joint has been examined for leakage by means of soapy water or other effective means of leak detection safe for use with oxygen.
 - .3 Repair all leaks and the section retested.
 - .4 After completing the testing of each individual piping system, all of the laboratory gas systems subjected to a 24-hour standing pressure test at one and one-half (1½) times the maximum working pressure, but not less than 1030 kPa. The test gas will be nitrogen. The main line shut-off valve closed during the test.
 - .5 Leaks, if any, will be located, repaired, and the system retested.
 - .6 Provide purging valves for this purpose.
 - .7 Use temporary cylinders for this purpose.
 - .8 Perform pressure test and cross connection test as per code requirements.
-

3.7 RECORD DRAWINGS

- .1 The record drawings presented to the Owner as a set of permanent reproducible drawings marked "Record for Laboratory Gas Piping Systems Only" and be part of the permanent records of the facility of which the piping system is a part. Record drawings produced by this contractor to the same drafting standards as the contract drawings.

END OF SECTION

GENERAL NOTES

1. DEMOLISH EXISTING GAS, STEAM, VENT, AND CONDENSATE PIPING AS NOTED.
2. DEMOLISH EXISTING INDIRECT WATER HEATER, HEAT EXCHANGERS, UNIT HEATERS, HUMIDIFICATION MANIFOLD, AND PUMPS AS NOTED. DISCONNECT ALL EQUIPMENT AND REMOVE PIPING AS SHOWN.
3. CONTRACTOR TO SITE VERIFY ROUTING & SIZE OF EXISTING GAS, VENT, CONDENSATE, STEAM, GLYCOL, SUPPLY/RETURN/EXHAUST DUCTS, CHILLED WATER, AND DOMESTIC WATER PIPING
4. REMOVE ALL RUBBISH & DEBRIS ONCE JOB IS COMPLETE
5. COORDINATE ANY SHUTDOWN OF SERVICES WITH THE OWNER PRIOR TO COMMENCING WORK.
6. DEMOLISH PIPE HANGERS AND ASSOCIATED CLAMPS AND RODS THAT ARE NO LONGER IN USE.
7. COORDINATE DEMOLITION OF UNIT HEATERS, CONTROL VALVES, & PUMPS, WITH ELECTRICAL CONTRACTOR.
8. ALL ABANDONED PENETRATIONS THROUGH FLOOR AND WALLS TO BE FILLED. FILL MATERIAL TO MATCH FIRE RATING OF EXISTING WALLS.
9. REFER TO SCHEMATIC ON DRAWING M4.00 FOR ADDITIONAL INFORMATION.
10. CONTRACTOR SHALL SCAN SLAB PRIOR TO ANY CORING AND/OR CUTTING
11. ALL EXISTING DUCT AND PIPE INSULATION WITH ASBESTOS CONTAINING MATERIALS (ACM) SHALL BE REMOVED AS PART OF THE ASBESTOS ABATEMENT, AS PER SPECIFICATIONS.

TO BE READ IN CONJUNCTION WITH DRAWING: M1.33

DIALOGTM

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

DRAWING #: ADD-02-SKM-001

PROJECT #: 09946T0200

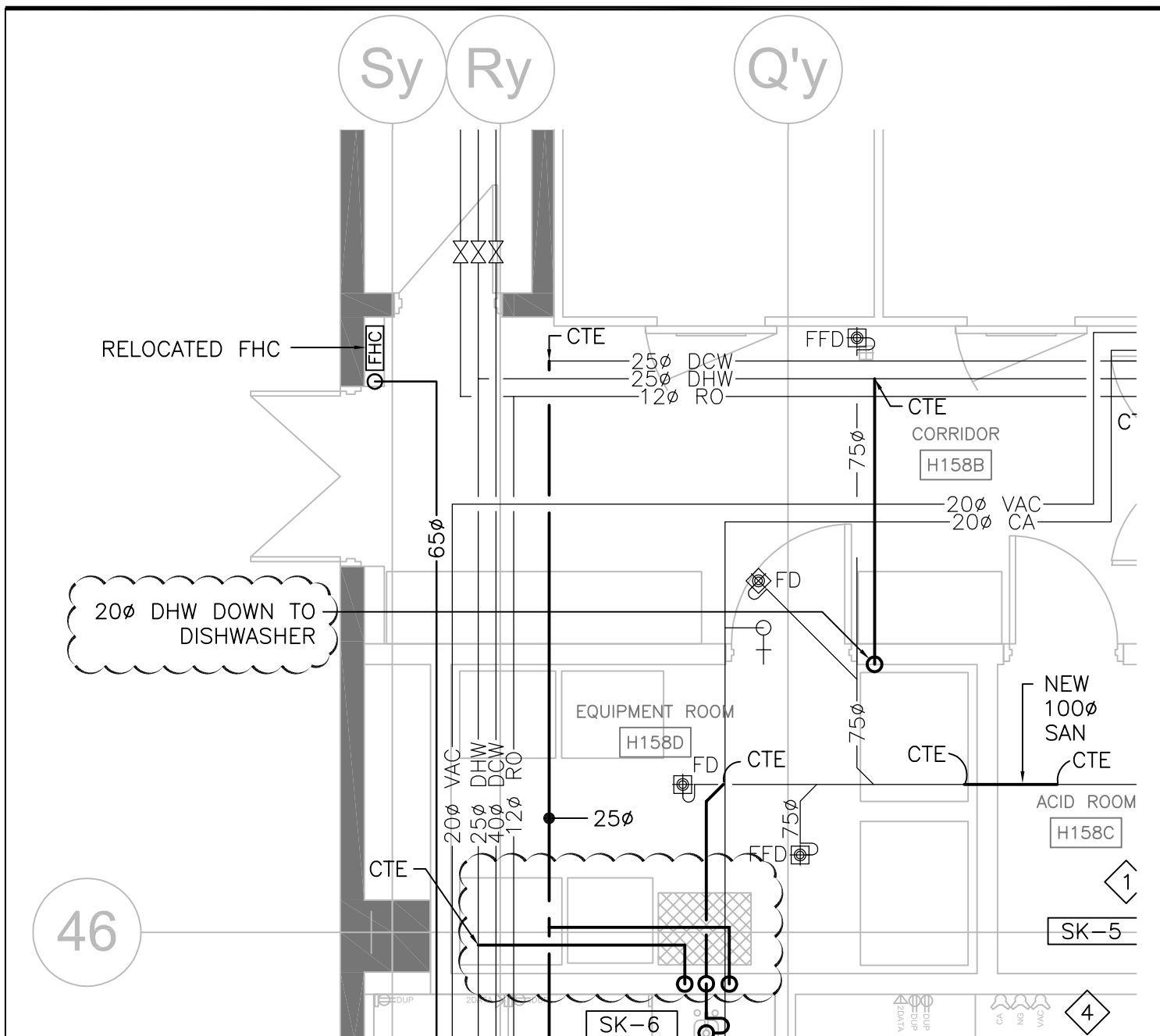
DRAWN BY: JPK

DRAWING TITLE: WTC BUILDING HEATING SYSTEM SERVICE

CHECKED BY: JPK

PENTHOUSE MECHANICAL PLAN — DEMOLITION

DATE: 2015-09-16



PLUMBING FIXTURE CONNECTIONS

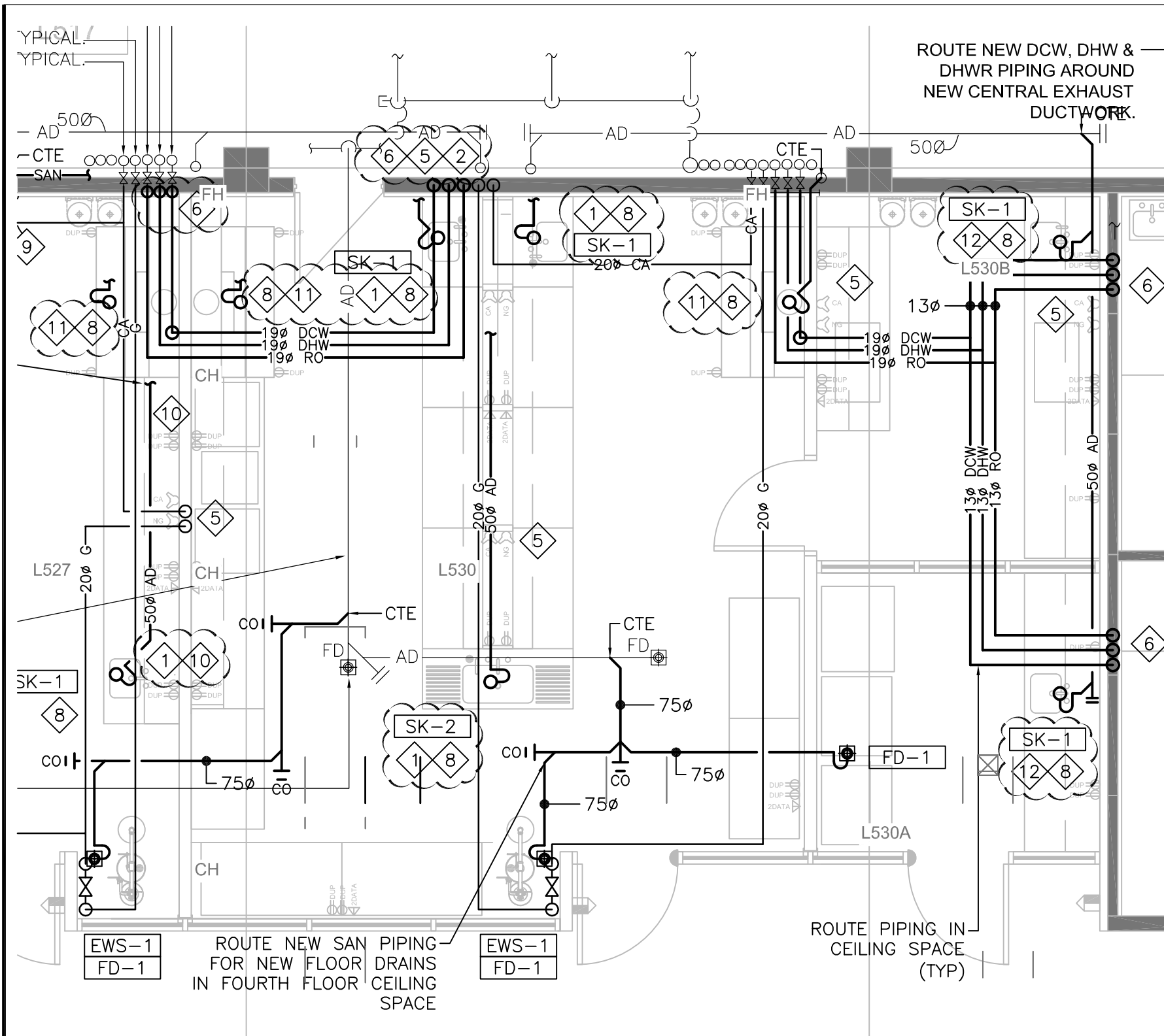
FIXTURE	DRAIN		VENT	COLD WATER	HOT WATER	RO WATER
	CAST IRON	DWV COPPER				
LAB SINK	40ø	40ø	32ø	12ø	12ø	12ø
EYEWASH	----	----	----	32ø	32ø	----

TO BE READ IN CONJUNCTION WITH DRAWING: M2.01

DIALOGTM

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS
 PROJECT #: 09946T0200
 DRAWING TITLE: HYDRAULICS WING LAB H158
 GROUND FLOOR PLUMBING PLAN

DRAWING #: ADD-02-SKM-002
 DRAWN BY: AO
 CHECKED BY: DM
 DATE: 2015-09-16

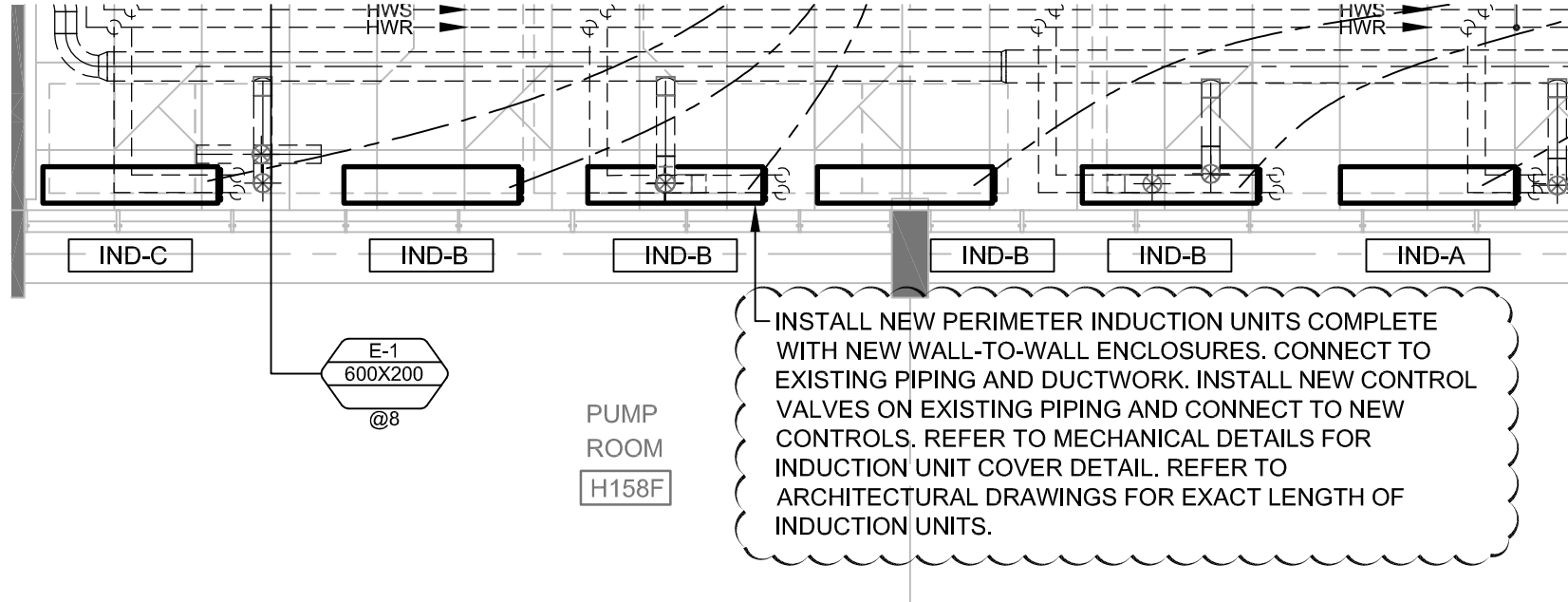
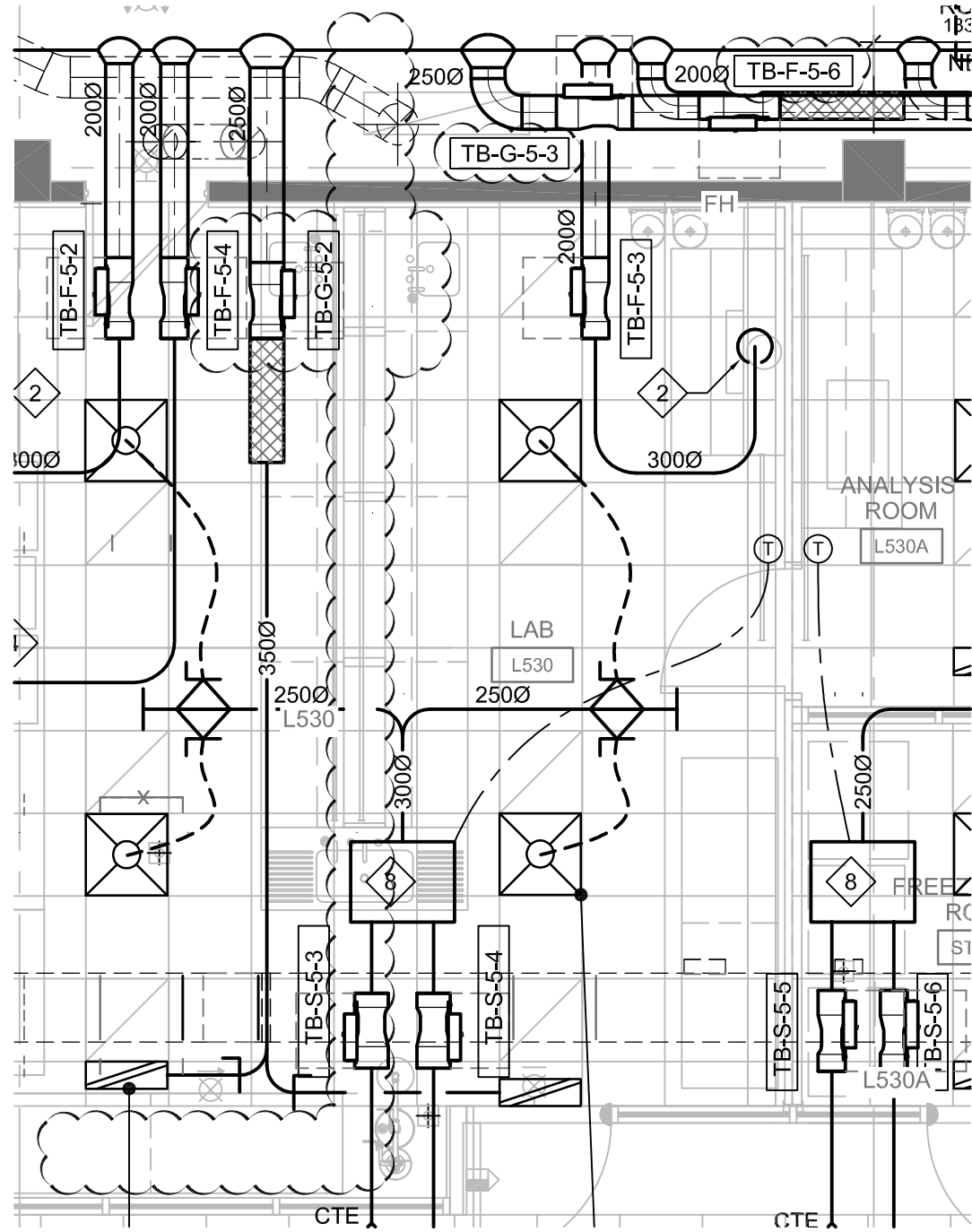


KEYNOTES

- 1 CONNECT NEW SINK TO NEW RO, DCW, DHW & SAN SERVICES RUN WITHIN MILLWORK.
- 2 DROP LAB GAS SERVICE IN WALL. ROUTE DISTRIBUTION PIPING TO OUTLETS WITHIN MILLWORK.
- 3 WALL MOUNTED GAS SHUTOFF VALVE. COORDINATE WITH ARCHITECTURAL ELEVATIONS.
- 4 CONNECT DCW & DHW TO TMV-1. TEMPERED WATER TO SERVE EMERGENCY EYE WASH & EMERGENCY SHOWER. TMV-1 SHALL BE MOUNTED IN CEILING SPACE.
- 5 NEW COMPRESSED AIR & GAS OUTLETS. CONNECT COMPLETE TO SERVICE DISTRIBUTION PIPING WITHIN MILLWORK. COORDINATE FINAL INSTALLATION LOCATION WITH ARCHITECTURAL.
- 6 DROP 19 inch DCW, 19 inch DHW & 19 inch RO WITHIN WALL. ROUTE PIPING WITHIN MILLWORK TO SERVE FIXTURES AS INDICATED.
- 7 RELOCATED 20 inch DCW, 20 inch DHW, 20 inch RO, 32 inch GAS, 32 inch CA RISERS, COMPLETE WITH NEW BRANCH ISOLATION VALVES CONNECTED TO EXISTING BRANCH PIPING.
- 8 ROUTE NEW 50 inch AD FROM NEW SINK WITHIN MILLWORK TO EXISTING AD RISER IN CORNER.
- 9 PROVIDE NEW LAB GAS DISTRIBUTION MANIFOLD. REFER TO MECHANICAL SCHEMATIC.
- 10 PROVIDE NEW 12 inch OXYGEN, NITROGEN, HYDROGEN, AND HELIUM CAPPED OUTLET.
- 11 CONNECT 12mm RO SERVICE TO NEW FUME HOOD CUP SINK. ROUTE SERVICE WITHIN MILLWORK.
- 12 CONNECT NEW SINK TO NEW DCW, DHW & SAN SERVICES RUN WITHIN MILLWORK.

PLUMBING FIXTURE CONNECTIONS

FIXTURE	DRAIN		VENT	COLD WATER	HOT WATER	RO WATER
	CAST IRON	DWV COPPER				
LAB SINK	40 inch	40 inch	32 inch	12 inch	12 inch	12 inch
EYEWASH	----	----	----	32 inch	32 inch	----



TO BE READ IN CONJUNCTION WITH DRAWING: M2.12

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

PROJECT #: 09946T0200

DRAWING TITLE: A & L BUILDING LAB L527
& L530 FIFTH FLOOR HVAC PLAN

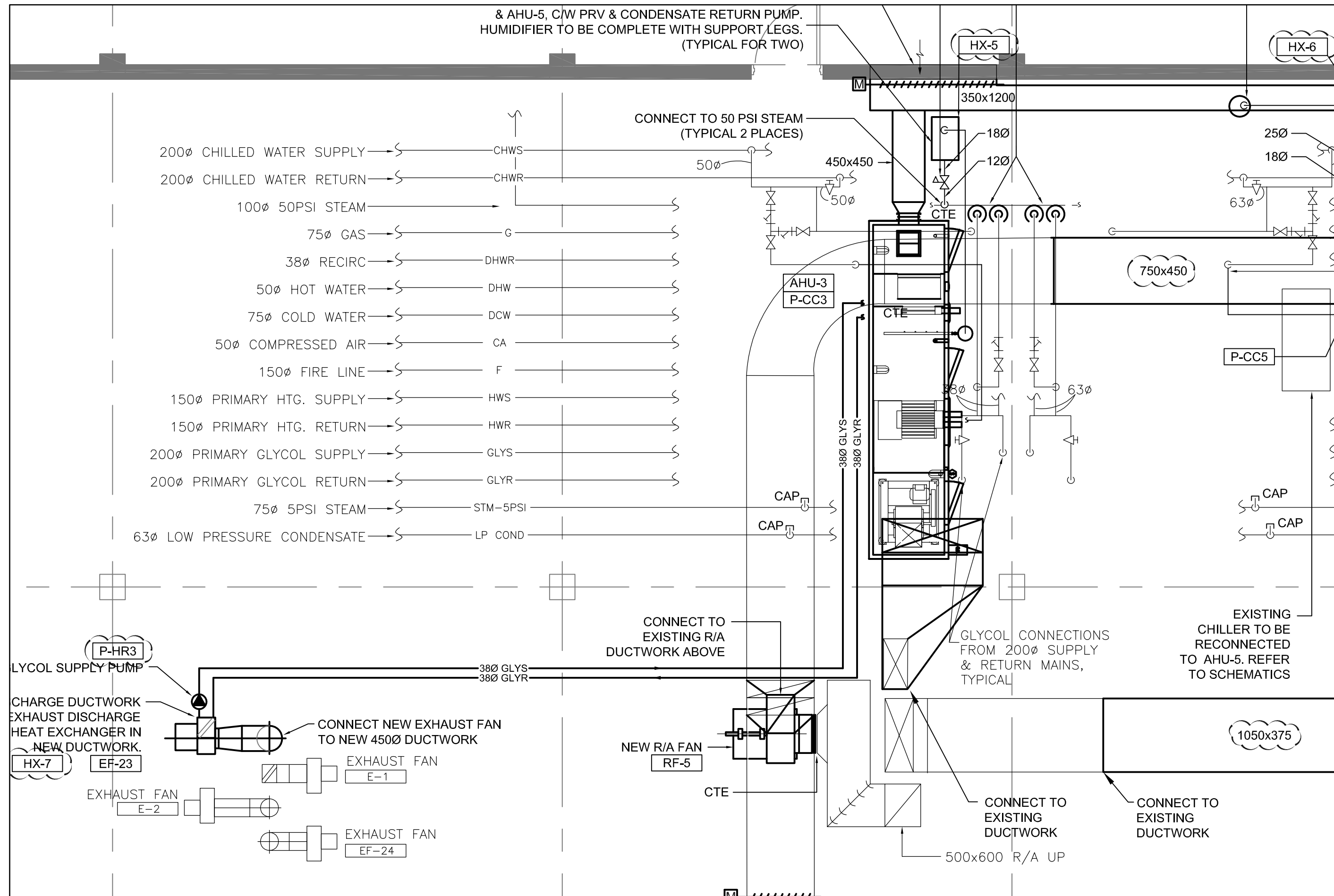
DRAWING #: ADD-02-SKM-004

DRAWN BY: AO

CHECKED BY: DM

DATE: 2015-09-16

DIALOG



DIALOG™

TO BE READ IN CONJUNCTION WITH DRAWING: M2.21

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

PROJECT #: 09946T0200

DRAWING TITLE: R & D BUILDING AHU-1,3 & 5

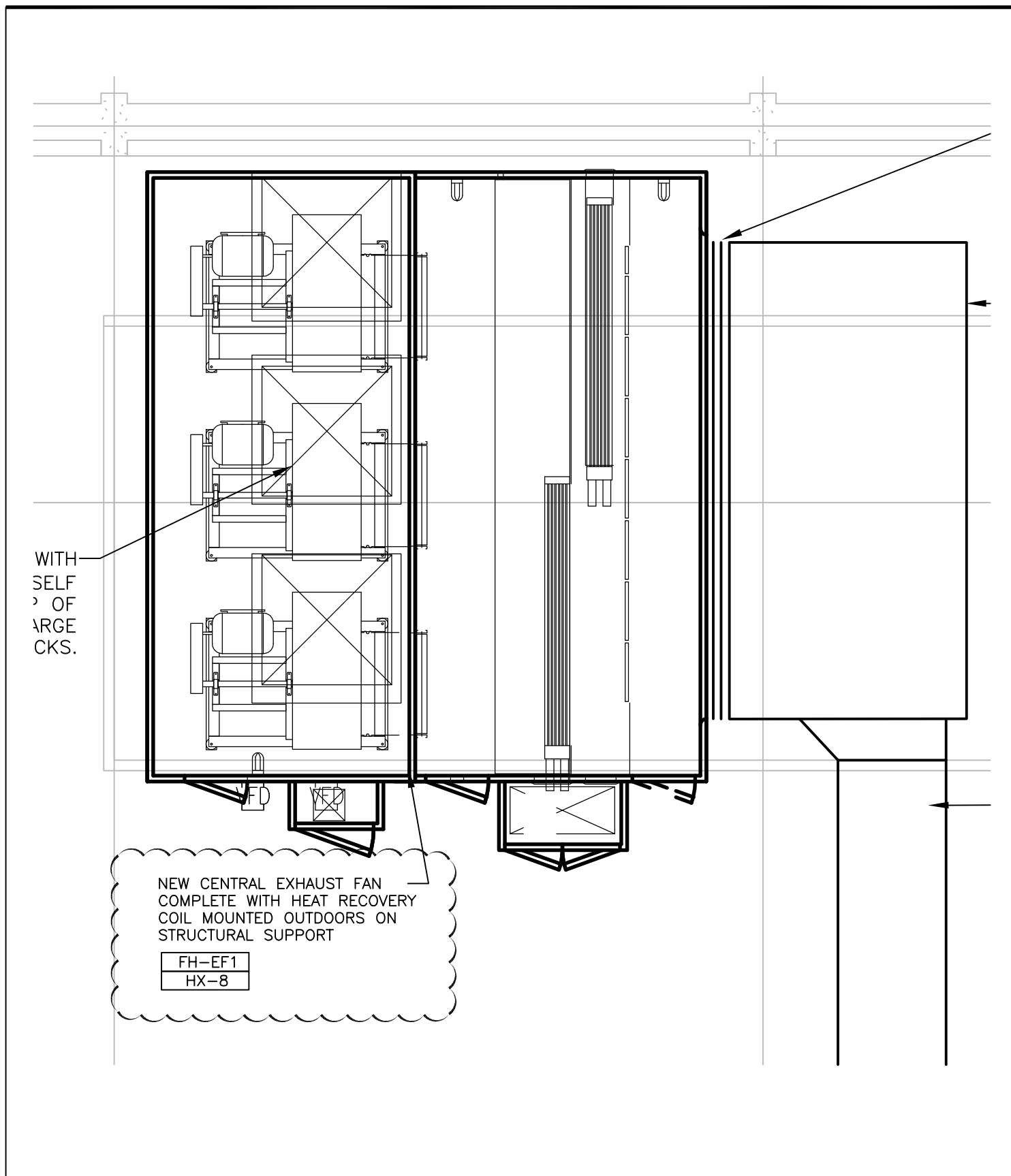
FIFTH FLOOR HVAC PLAN

DRAWING #: ADD-02-SKM-005

DRAWN BY: AO

CHECKED BY: DM

DATE: 2015-09-16

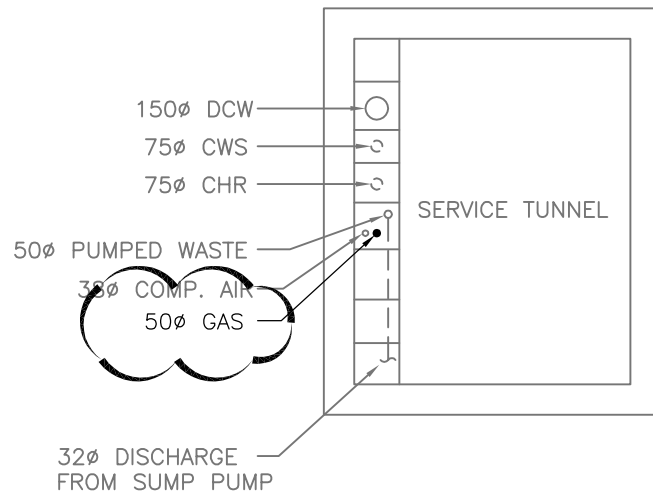


TO BE READ IN CONJUNCTION WITH DRAWING: M2.15

DIALOG[™]

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS
PROJECT #: 09946T0200
DRAWING TITLE: A & L BUILDING EXHAUST UPGRADE
PENTHOUSE/ROOF HVAC PLAN

DRAWING #: ADD-02-SKM-007
DRAWN BY: AO
CHECKED BY: DM
DATE: 2015-09-16



2
M2.30

SECTION THROUGH TUNNEL

SCALE: 1:50

TO BE READ IN CONJUNCTION WITH DRAWING: M2.30

DIALOGTM

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

DRAWING #: ADD-02-SKM-008

PROJECT #: 09946T0200

DRAWN BY: JPK

DRAWING TITLE: WTC BUILDING HEATING SYSTEM SERVICE
TUNNEL & BASEMENT MECHANICAL PLAN

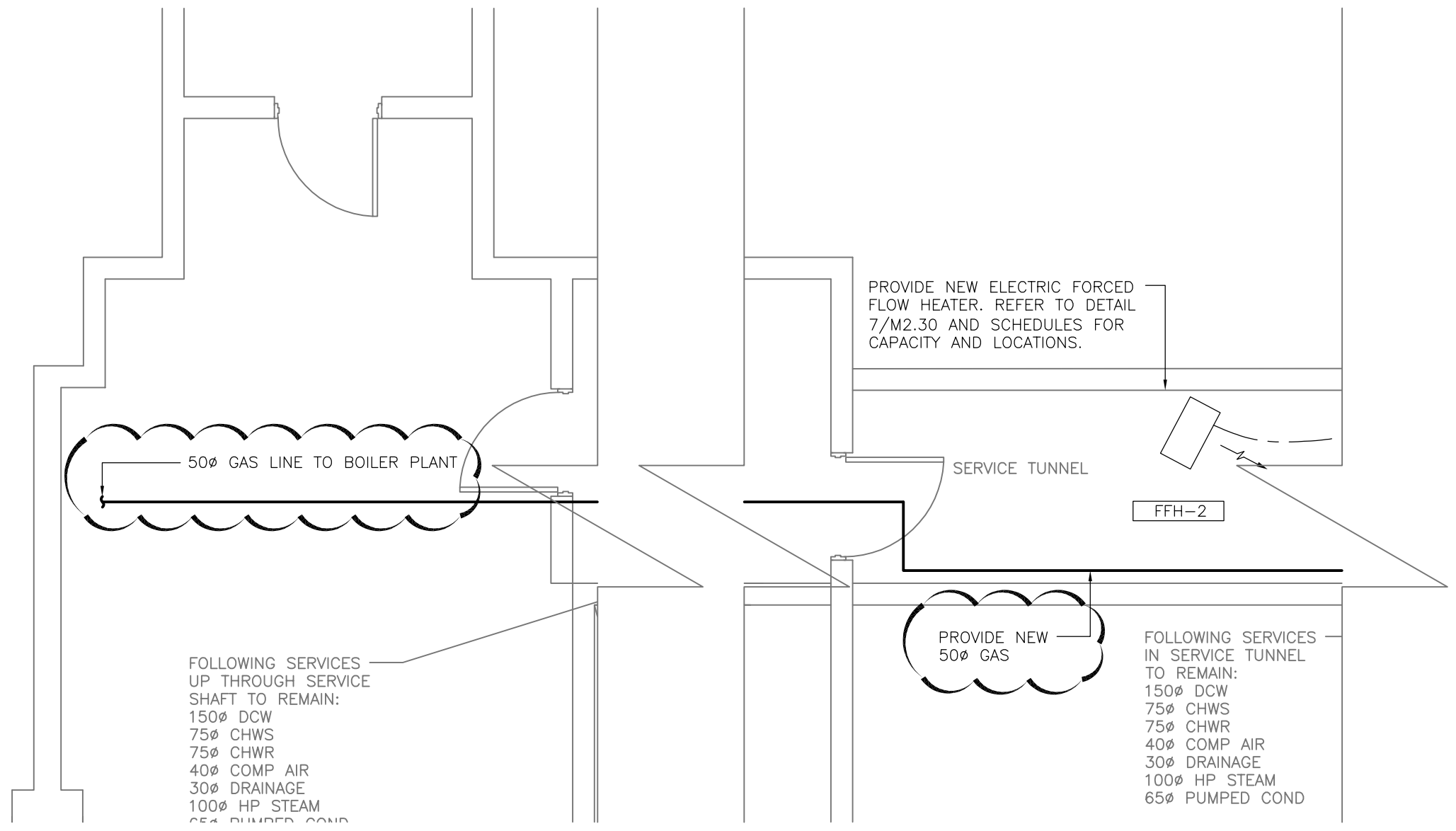
CHECKED BY: JPK

DATE: 2015-09-16

1
M2.30

SERVICE TUNNEL AND BASEMENT MECHANICAL PLAN

SCALE: 1:50



TO BE READ IN CONJUNCTION WITH DRAWING: M2.30

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

PROJECT #: 09946T0200

DRAWING TITLE: WTC BUILDING HEATING SYSTEM SERVICE TUNNEL & BASEMENT MECHANICAL PLAN

DIALOG™

DRAWING #: ADD-02-SKM-009

DRAWN BY: JPK

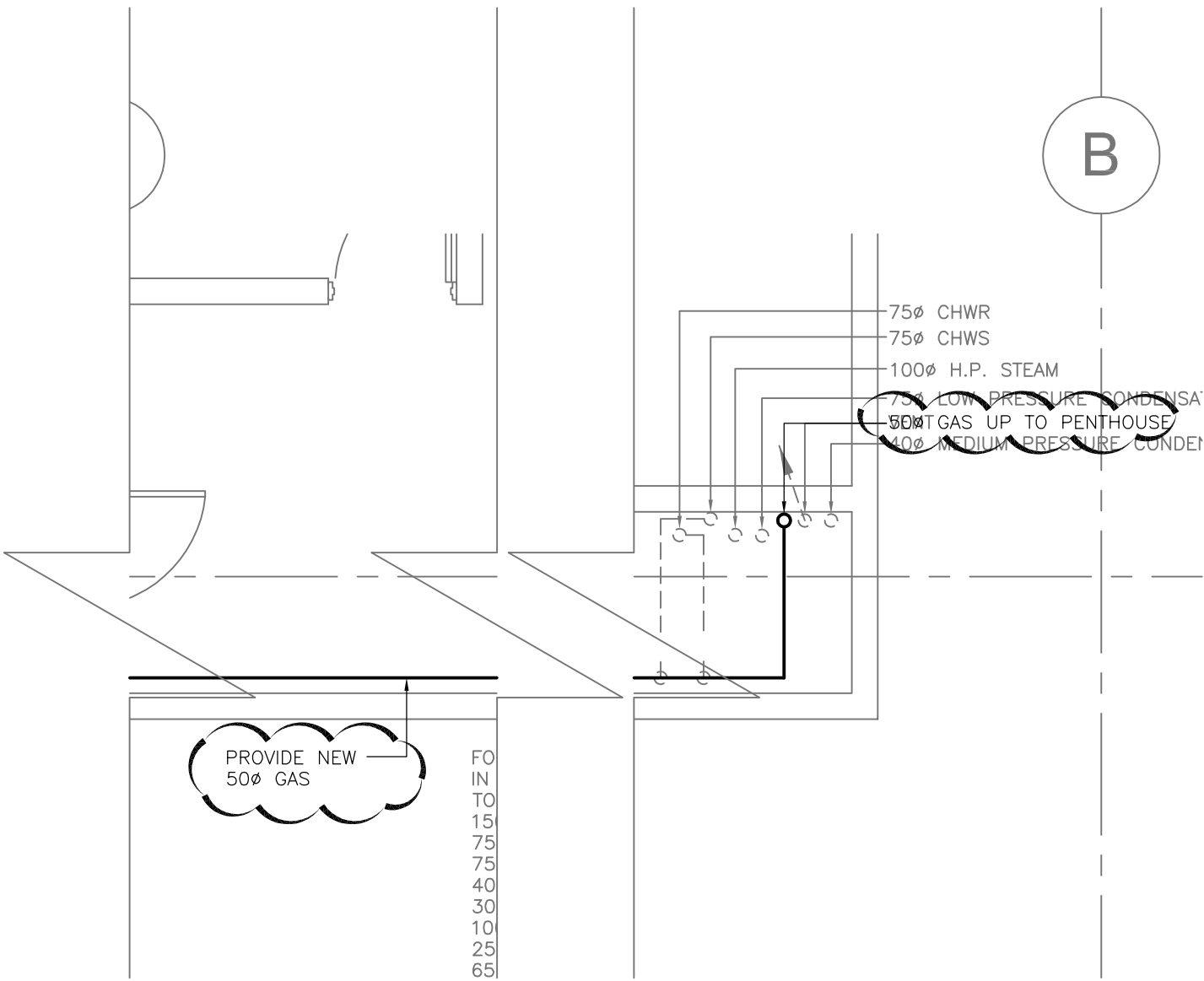
CHECKED BY: JPK

DATE: 2015-09-16

1
M2.30

SERVICE TUNNEL AND BASEMENT
MECHANICAL PLAN

SCALE: 1:50



GENERAL NOTES

1. PROVIDE NEW BOILERS, PUMPS, PIPING, CONTROLS, AND SUPPORTS AS INDICATED.

2. CONTRACTOR TO SITE VERIFY ROUTING & SIZE OF EXISTING GAS, STEAM, HOT WATER, GLYCOL, CHILLED WATER, SUPPLY/RETURN/EXHAUST DUCTS AND DOMESTIC WATER PIPING.

3. CONTRACTOR SHALL SCAN SLAB PRIOR TO ANY CORING AND/OR CUTTING.

4. PROVIDE INSULATION ON ALL EXISTING AND NEW DUCTWORK AND PIPING WITHIN THE MECHANICAL PENTHOUSE. DUCT AND PIPE SYSTEMS REQUIRING INSULATION INCLUDES BUT ARE NOT LIMITED TO: DCW, DHW, DHWR, HWS/R, GLYS/R, CHWS/R. COORDINATE EXTENT OF RE-INSULATION OF EXISTING DUCT AND PIPE SYSTEMS WITH ASBESTOS ABATEMENT.

TO BE READ IN CONJUNCTION WITH DRAWING: M2.33

DIALOGTM

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

DRAWING #: ADD-02-SKM-011

PROJECT #: 09946T0200

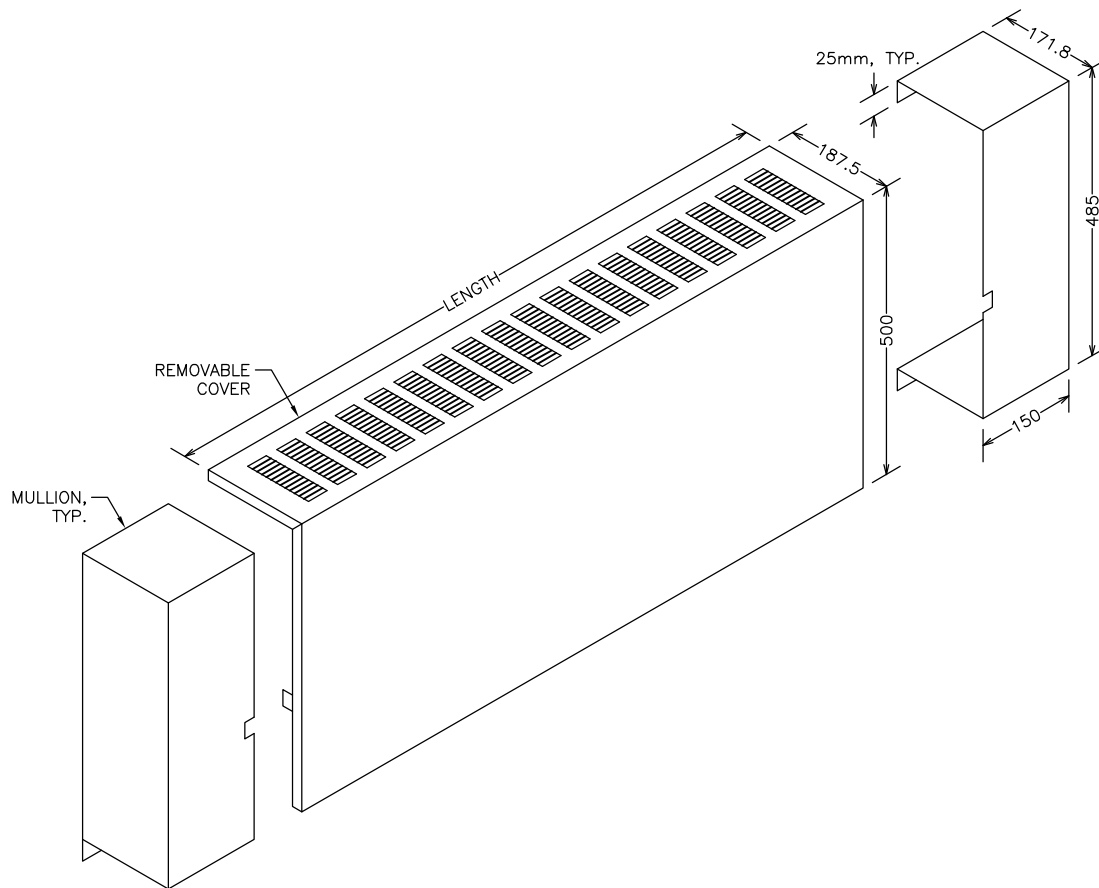
DRAWN BY: JPK

DRAWING TITLE: WTC BUILDING HEATING SYSTEM

CHECKED BY: JPK

PENTHOUSE MECHANICAL PLAN

DATE: 2015-09-16



NOTES:

1. INDUCTION UNIT ENCLOSURE TO BE CONSTRUCTED OF 16 GA. STEEL.
2. REFER TO ARCHITECTURAL DRAWINGS FOR LENGTH AND LOCATION OF ENCLOSURES.

6

TYPICAL INDUCTION UNIT COVER DETAIL

M5.02

SCALE: N.T.S.

TO BE READ IN CONJUNCTION WITH DRAWING: M5.02

DIALOGTM

PROJECT TITLE: CANADA CENTRE FOR INLAND WATERS

PROJECT #: 09946T0200

DRAWING TITLE: MECHANICAL DETAILS

SHEET 2

DRAWING #: ADD-02-SKM-012

DRAWN BY: AO

CHECKED BY: DM

DATE: 2015-09-16

AIR TERMINAL UNITS SCHEDULE (FUMEHOOD EXHAUST)

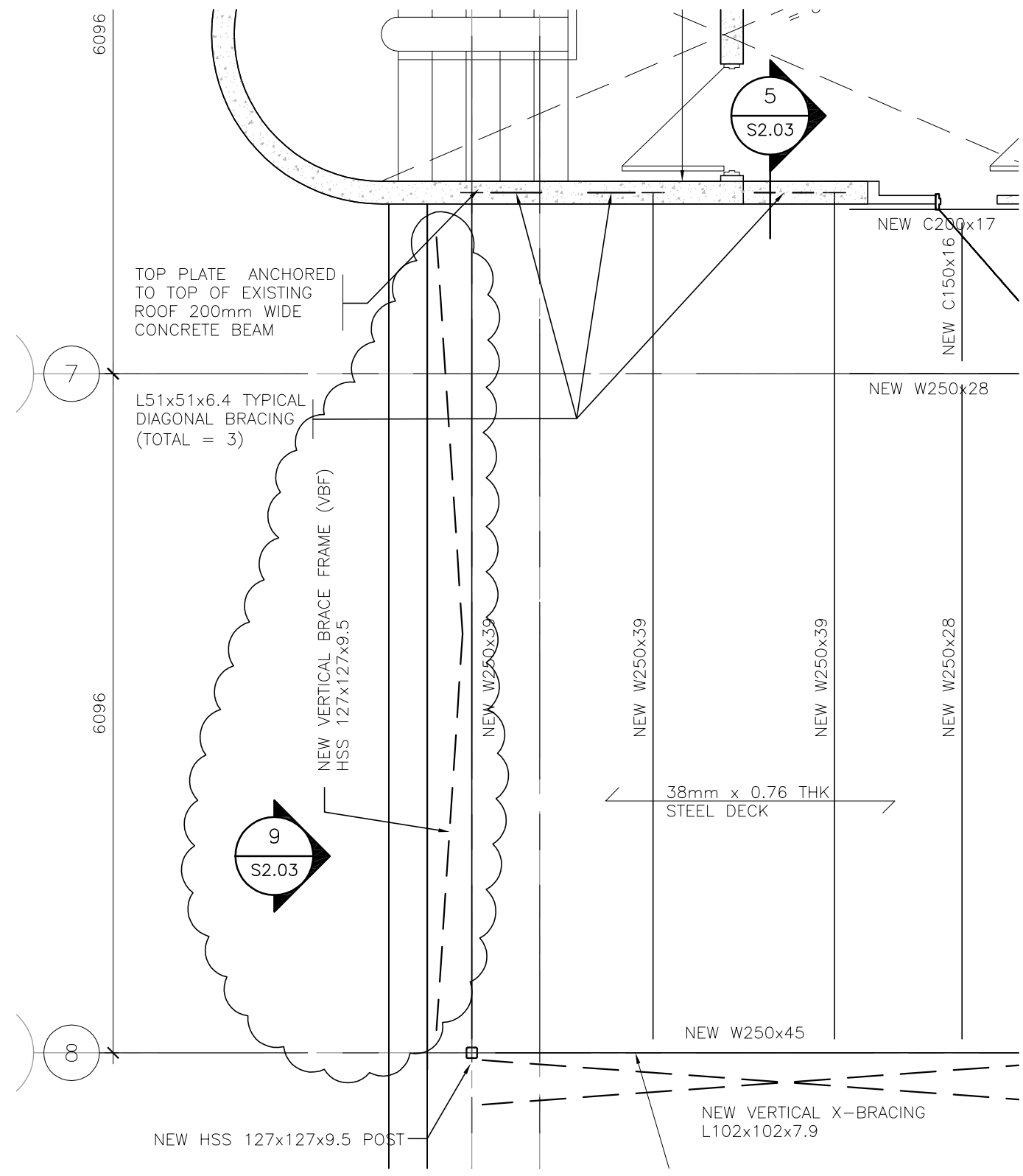
TAG	SERVICE	SIZE	AIR FLOW (L/S)		ORIENTATION	NC	NOTES
			MINIMUM	MAXIMUM			
TB-F-1-1	LAB H158	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-4-1	LAB L404	250 SINGLE	71	235	HORIZONTAL		1, 2
TB-F-4-2	LAB L404	250 SINGLE	71	235	HORIZONTAL		1, 2
TB-F-4-3	LAB L435	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-1	LAB L527	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-2	LAB L530	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-3	LAB L530	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-4	LAB L533	250 SINGLE	30	100	HORIZONTAL	-	1, 2
TB-F-5-5	LAB L533	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-6	LAB L504	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-7	LAB L508	250 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-5-8	LAB L530	200 SINGLE	71	235	HORIZONTAL	-	1, 2
TB-F-6-1	LAB L632	250 SINGLE	71	235	HORIZONTAL		1, 2

HEAT RECOVERY COIL SCHEDULE													
TAG	HEATING COIL												NOTES
	COIL				FLUID (40% PROPYLENE)				AIR				
	CAPACITY (KW)	SIZE (MM)	ROW	FIN /INCH	FLOW (L/S)	P.D. (KPA)	EFT (°C)	LFT (°C)	FLOW (L/S)	P.D. (PA)	EAT DB (°C)	LAT DB (°C)	
HX-7	28.8	610x838	6	12	1.9	34.7	-1	3	1292	250	22	4	SERVING EF-23
HX-8	381	914x2540 (QTY: 4)	6	12	7.8	40.9	-1	12	23500	250	22	9	SERVING FH-EF-1

2
S2.03

PENTHOUSE ROOF FRAMING PLAN

SCALE: 1:50
CCIW-S2.03.DWG



9
S2.03

ELEVATION

SCALE: 1:50
CCIW-S2.03.DWG

