Date: April 5, 2022

This Addendum varies the Bidding and Contract Documents dated March 15, 2022 and titled:

Project Name: UHNBC Cardiac – Phase 1 Biomed 3rd Floor
Project Number: N662030002

This Addendum shall form part of the Contract Documents and is to be read, interpreted and coordinated with all other parts. The cost of all work contained herein shall be included in the Contract sum. The following revisions supersede the information contained in the original specifications and drawings issued for the above-named project. Acknowledge receipt of this Addendum by inserting its number in the STIPULATED PRICE BID FORM.

1.0 GENERAL

1.1 Invitation to Bid

REVISE: Tender questions deadline to close Thursday April 7, 2022 at 2:00pm.

REVISE: Tender submission to close Tuesday April 12, 2022 at 2:00pm.

2.0 SPECIFICATIONS

2.1 Section 01 21 00 Cash Allowances

ADD Cash Allowance #2 Lighting Control Devices – replace section 01 21 00 in its entirety with attached revised section.

2.2 Section 22 05 00 Clause 3.3-Testing and Inspection

REVISE item 3.3.3 to be read as “No plumbing system or part thereof shall be covered until it has been inspected and approved by the Plumbing Inspector and UHNBC Facility Maintenance (FM). UHNBC FM should have an opportunity to inspect and approve the systems”.

2.2 Section 22 40 00 Clause 2.3-Janitor Sink MS-1

REVISE item 2.3.2 to “Janitor Sink MS-1”.

ADD following item to 2.3.2. “Provide a separate cold-water feed completed with back flow protection, shut off valve and funnel drain for chemical dispenser of MS-1”.

2.3 Section 22 40 00 Clause 2.7-Hand Hygiene Sink HHS-1 (Wall Hung Basin Electronic Faucet-Point of Use Thermostatic Mixing Valve)

REVISE item 2.7 Hand Hygiene Sink HHS-1 to following:

.1 Provide braided stainless-steel flexible supplies for sinks. Supplies for sinks shall incorporate 12 mm [1/2”] chrome plated quarter turn mini ball valve stop.

.2 Hand Hygiene Sink HHS-1 (wall hung basin electronic faucet - point of use thermostatic water mixing valve

.3 Basin: American Standard ICU Basin #9118.111.020, Center hole only, 509 mm x 432 mm x 663 mm (20-1/16" x 17" x 26-1/8") high, Rectangular, Vitreous china with EverClean antimicrobial surface which inhibits the growth of stain and odor causing bacteria mold and mildew, White Finish, 65 mm (2-9/16") dia. Faucet perch, back of sink 93 mm (3-11/16") higher than faucet perch, Offset grid drain included, integrated mounting brackets, P-trap with Saniguard coating provided. Provide compatible shroud.

.4 Faucet: American Standard Selectronic I.C. #605B.193.002 Electronic Faucet, Polished Chrome finish, Center hole only, Vandal resistant brass construction, 1.5 GPM (5.7 LPM) pressure compensating laminar flow device in spout base with plain spout laminar flow end, Rigid gooseneck spout, 127 mm (5") projection reach, Self-adjusting sensor, AC Powered (Hard Wired). American Standard #PK00.HAC, Hardwired Hardwired AC - Power Kit, Includes 10' long extension cable. American Standard PK00.BBU Battery Back Up Includes standard CR-P2 lithium battery for back-up power, Allows Selectronic AC faucets and flush valces to continue operating during a power failure and maintains fail-safe operation, Installs between Selectronic product and AC Power Supply (Plug-In or Hard-Wired), 4- amstd, Selectronic Battery Back- Up.

.5 Mixing valve, Symmons MaxLine, Point Of Use Thermostatic Water Mixing Valve, nickel plated bronze body, temperature adjusting spindle, 10 mm (3/8") inlets and outlet FNPT connections, Integral checks, temperature range between 35 °C (95 °F) and 46 °C (114.8 °F), housed in 356 mm x 356 mm x 152 mm (14" x 14" x 6") recessed box. Set valve temperature at 46 °C (114.8 °F). Note : Provide tee, adaptors and flex. copper tubing to suit installation.

.6 Waste and Supplies, McGuire #LFH165LKN3 Faucet Supplies, Chrome plated finish polished brass, heavy duty angle stops, 10 mm (3/8") I.P.S. Inlet x 76 mm (3") long rigid horizontal nipples, V.P. Loose keys, Escutcheon and flexible copper risers. McGuire #8872C P-Trap, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/2") size, Shallow wall flange and Seamless tubular wall bend.

.7 Carrier, Watts #CA-311 Fixture Carrier, mounted on concrete floor, steel hanger plate, heavy gauge epoxy coated steel offset uprights with welded feet supports. For one unit: 102 mm (4") for two to six units in a row: 152 mm (6") finished metal stud wall to back of pipe space.

.8 Acceptable product: American ICU Basin with features and accessories as specified above.

2.4 Section 22 40 00 Clause 3.1.6-Lavatories and Sinks

ADD the following to clause to 3.1.6.3

“Double waste fittings for lavatories and sinks shall be a double sanitary tee. Provide a clean out access above flood level rim to vertical portion of pipe, equal to the diameter of the vertical pipe. Clean out access needs to be accessible with an access door”.

2.5 Section 25 05 00 Common Work for Control Systems

REVISE enteliWEB system to RC Webview system in item 1.2.2.

REVISE enteliWEB system to RC Webview system in item 1.4.1.

2.6 Section 25 05 00 Common Work for Control Systems

ADD the following item to clause 1.12-Identification.

. "All Equipment above concealed ceiling should be tagged properly. tagged according to UHNBC FM standards. This includes appropriate tags and equipment description".

2.7 Section 25 05 00 Common Work for Control Systems

ADD the following item to clause 1.4-General

. "All trend logs need to be setup in Reliable Controls RC Archive to allow long term trending."

2.7 Section 25 99 65 Controls Equipment Manufacturers

DELETE "Siemens" from control valve actuators.

2.8 Section 25 90 10 Control Sequence of Operations

RELABLE CU-1 to CU-WW-3-1. RELABEL AC-1 to AC-WW-3-1.

RELABLE CU-2 to CU-WW-3-2. RELABEL AC-2 to AC-WW-3-2.

RELABLE CU-3 to CU-WW-3-3. RELABEL AC-3 to AC-WW-3-3.

RELABLE EF-1 to EF-WW-3-1.

RELABLE EF-2 to EF-WW-3-2. RELABEL CD-EF-2 to CD-EF-WW-3-2.

RELABLE EF-3 to EF-WW-3-3. RELABEL CD-EF-3 to CD-EF-WW-3-3.

2.9 Section 25 90 10 Control Sequence of Operations

ADD the following item to clause 2.7.

"Provide amperage readings and supply air temperature readings for all split air conditioning units at BMS. Provide alarm for these points".

ADD the following item to clause 2.8.

"Provide amperage readings for EF-WW-3-1 at BMS. Provide Alarm for these points".

ADD the following item to clause 2.9.

"Provide amperage readings for EF-WW-3-2 at BMS. Provide Alarm for these points".

ADD the following item to clause 2.10.

"Provide amperage readings for EF-WW-3-3 at BMS. Provide Alarm for these points".

2.10 Section 26 09 24 Lighting Controls

Clause 2.1.3 Standard of Acceptance
DELETE .1 to .4 and REPLACE with the following:

.1 Reliable Controls

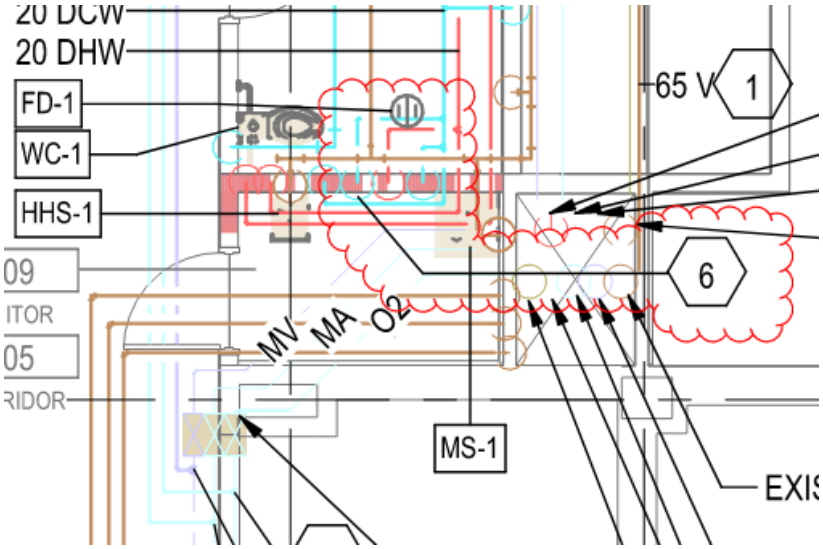
3.0 <u>DRAWINGS</u>

3.1 DRAWING E003

REPLACE with attached revised Drawing E003.

3.2 DRAWING M203:

ADD the red clouded areas to Drawing M203.



Keynote Legend

Key Value	Keynote Text
1	CONNECT NEW 65 VENT PIPE TO EXISTING 150 VENT STACK.
2	REFER TO LEVEL 2 PLUMBING DRAWING M300A FOR CONNECTION OF NEW SANITARY LINE TO EXISTING SANITARY STACK
3	CONNECT NEW 15 O2 PIPE TO EXISTING 40 MAIN O2 RISER. PROVIDE NEW SHUT OFF VALVE.
4	CONNECT NEW 15 MA PIPE TO EXISTING MA PIPE. PROVIDE NEW SHUT OFF VALVE.
5	CONNECT NEW 20 MV PIPE TO EXISTING MV PIPE. PROVIDE NEW SHUT OFF VALVE.
6	PROVIDE A SEPARATE 15 COLD WATER FEED COMPLETED WITH BACK FLOW PROTECTION, SHUT OFF VALVE AND FUNNEL DRAIN FOR THE CHEMICAL DISPENSER OF MOP SINK MS-1.

3.3 DRAWINGS M500, M104, M106 & M203:

RELABLE CU-1 to CU-WW-3-1. RELABEL AC-1 to AC-WW-3-1.
RELABLE CU-2 to CU-WW-3-2. RELABEL AC-2 to AC-WW-3-2.
RELABLE CU-3 to CU-WW-3-3. RELABEL AC-3 to AC-WW-3-3.
RELABLE EF-1 to EF-WW-3-1.
RELABLE EF-2 to EF-WW-3-2. RELABEL CD-EF-2 to CD-EF-WW-3-2.
RELABLE EF-3 to EF-WW-3-3. RELABEL CD-EF-3 to CD-EF-WW-3-3.

4.0 QUESTIONS AND ANSWERS

Question: In section 23 05 00, page 37 of 38 item 3.24, Acoustical Testing, is specified with the requirement to – Provide acoustic performance testing in accordance with SOR 5.3.7.20 -. Just to confirm, is acoustical testing required for this project? If it is, we have already asked BKL Consulting to provide pricing as per the specification and they have asked us to provide the SOR (Statement of Requirements) for this building so they can meet the specification of following SOR 5.3.7.20 specified (item 3.24.3 in the spec.). If Acoustic testing is required for this project, please provide the SOR for this building / project.
Answer: Acoustical performance testing is not required. Delete item 3.24-Acoustic Testing from specifications section 23 05 00.

Question: The existing concrete floors have changes in elevation exceeding 3 inches. It would appear based on-site conditions that many yards of material will be required to bring the floor to a consistent elevation, yet the specified material for floor leveling is a patching product available in 10-lb bags. Is it truly the intent of the consultant / owner to have the contractor apply hundreds of bags of the specified material to level the floor? If yes, are bidders expected to carry costs for a structural engineer to assess the impacts associated with adding several inches of material over the majority of the project area or will that engineering be provided by others? If no, will a drawing be issued clarifying the intended FFE for each room and where ramps / curbs / steps are acceptable?
Answer: There are some locations where a slight slope from one area to another area will be required to transition between differing floor elevations. These areas are limited to corridors and offices which are not as critical for floor flatness. For filling of larger gaps and transitions there are products available such as UZIN NC 157 and UZIN PE 260 primer. It is not intended to raise entire floor areas.

Question: Section 28 13 00 3.1.1 states “Any Lenel authorized installer can install the system. ONLY BMS can make final connections to protect the enterprise server/database and do initial programming.” In the addenda it notes to allow for one new Kantech KT-300 controller. Please confirm that this system will be Kantech. Please confirm who will be programming this system.
Answer: This system will be Kantech. Division 28 to install the system and all programming shall be done by a certified contractor.

Question: Can I possibly get photos of the existing controllers in room 2021 to ensure there is enough space in the room?
Answer: Refer to attached pictures for the wall where the existing controllers are.

Question: On drawing A101, demo note 13 mentions exterior walls, but symbol 13 is shown only on the exterior wall east of new offices and the wall south of vacant space 312. Should the north exterior wall of 316 receive same treatment? What about the undeveloped spaces west of the temp morgue – are those walls intended to have existing GWB removed and replaced?
Answer: The GWB on all exterior walls needs to be abated and remediated. See also room finish schedule.

Question: Addendum 1 A700 room finish schedule comments call for repair and finish level 3 ready for paint. Are rooms coded this way to receive a prime coat or should that read ready for prime?
Answer: Ready for PRIMER is sufficient.

Question: The Matterport scan is not sufficient to bid the fire-stopping. However, the floor is still shown to be covered with storage materials blocking potential penetrations needing to be fire-stopped. As this scope has not been quantified, we suggest once

again that this should be a Cash Allowance instead of trying to force the risk onto the Contractor.
Answer: A cash allowance is being considered and will be clarified in Addendum 3.

Question: Are we required to paint the open ceilings in room 310? It only says to stay open ceiling and does not specify a colour. The specifications call for the open ceiling to be painted, but no colour is mentioned.
Answer: The only OPEN ceiling that require painting of the existing exposed structure are rooms 310 and 323. Color to be White.

Question: If the specification calls for the open ceiling to be painted, are we supposed to paint the open ceiling of the undeveloped spaces? If so, please specify the colour.
Answer: The only OPEN ceiling that require painting of the existing exposed structure are rooms 310 and 323. Color to be White.

Question: Some electrical contractors have indicated that they are to price electrical directly to Northern Health. Should the General Contractor include Electrical in their pricing?
Answer: The General Contractor shall not price directly to Northern Health.

End of Addendum No. 2

Part 1 General

1.1 SECTION INCLUDES

.1 Cash allowances.

1.2 RELATED SECTIONS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 CASH ALLOWANCES

.1 Costs Included in Cash Allowances: Cost of Product to Contractor less applicable trade discounts; delivery to site, and applicable taxes.

.2 If a Cash Allowance item described in the Allowances Schedule below indicates the inclusion of installation, include in the Cash Allowance amount, provision for Product handling at the site, including unloading, uncrating, storage, protection of Products from elements and from damage, labour for installation and finishing, insurance, labour costs, taxes, bonding if applicable, equipment rental, overhead and profit.

.3 If a Cash Allowance item described in the Allowances Schedule below indicates supply only, include in the Contract Price costs not included in Cash Allowances but included in the Contract Price: Product handling at the site including unloading, uncrating, storage, protection of Products from elements and from damage, labour for installation and finishing, insurance, labour costs, taxes, bonding if applicable, equipment rental, overhead and profit.

.4 Consultant Responsibilities:

.1 Consult with Contractor for consideration and selection of Products, suppliers, and installers.

.2 Owner and Consultant to select Products.

.3 Prepare Change Order.

.5 Contractor Responsibilities:

.1 Assist Consultant in selection of Products, suppliers and installers.

.2 Obtain proposals from suppliers and installers and offer recommendations.

.3 On notification of selection by Consultant or Owner, execute purchase agreement with designated supplier and installer.

.4 Arrange for and process shop drawings, product data, and samples. Arrange for delivery.

.5 Promptly inspect Products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

.6 Differences in costs will be adjusted by Change Order.

.7 Allowances Schedule:

.1 Cash Allowance #1: Unforeseen site conditions: $10,000.00

.2 Cash Allowance #2: Lighting Control Devices: $40,000.00

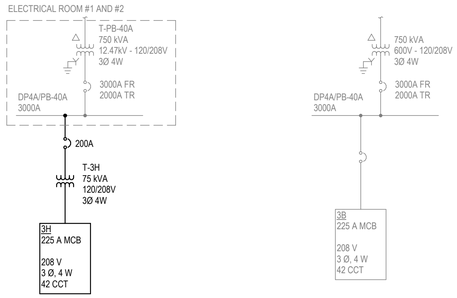
Contractor to allow for a $40,000.00 cash allowance for the scope of work listed below. Refer to electrical drawings for exact scope of work

- Provide room controllers, low voltage switches, occupancy sensors and control modules as indicated in the electrical drawings.
- Programming and commissioning for the lighting control system.

- Shop drawings for review prior to purchasing devices.

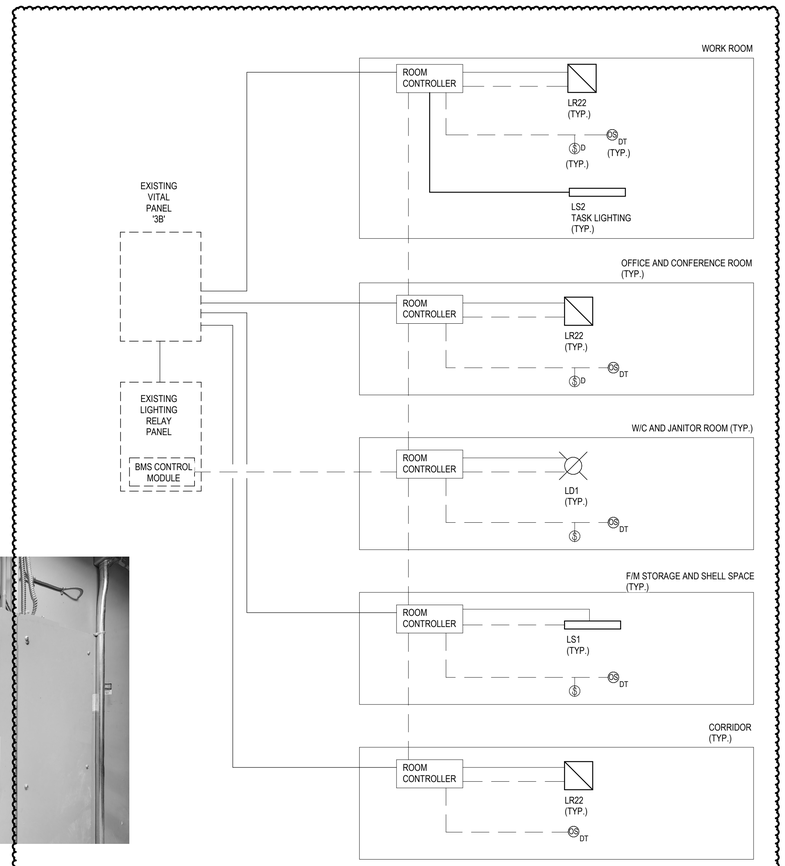
All conduit raceway infrastructure with wiring related to the above scope is to be carried in the tender package.

END OF SECTION



PARTIAL SINGLE LINE DIAGRAM

n.t.s



LINE VOLTAGE WIRING

LOW VOLTAGE WIRING

NOTES:

1. PROVIDE ROOM CONTROLLER, DIMMER SWITCH AND OCCUPANCY SENSOR TO MATCH EXISTING LIGHTING CONTROL SYSTEM (RELIABLE CONTROLS).
2. LIGHTING CONTROL BEHAVIOR:
   a. WORK ROOM: ALL LIGHTING FIXTURE TYPE 'LR22' TO BE MANUAL ON,DIMMABLE AND AUTO OFF UPON 15 MINS OF INACTIVITY, TASK LIGHTING FIXTURE TYPE 'LS2' TO BE MANUAL ON/OFF BY PULL CORD AND AUTOMATICALLY OFF UPON 15 MINS OF INACTIVITY.
   b. TYPICAL OFFICE AND CONFERENCE ROOM: LIGHTS TO BE MANUAL ON, DIMMABLE AND AUTO OFF UPON 15 MINS OF INACTIVITY.
   c. TYPICAL W/C, JANITOR ROOM, STORAGE AND SHELL SPACE: LIGHTS TO BE MANUAL ON, AND AUTO OFF UPON 15 MINS OF INACTIVITY.
   d. CORRIDOR: LIGHTING TO BE DIMMED TO 50% UPON 15 MINS OF INACTIVITY, AUTO 100% ON WHEN DETECTING MOVEMENT.

LIGHTING CONTROL WIRING DIAGRAM

n.t.s

Stantec

Name: **3B** | Volts: 208Y/120V | Mains Type: | Type: PANELBOARD
Location: Space 312 | Phases: 3 | Mains Rating: 100 A | AIC Rating:
Supply From: | Wires: 4 | Mounting: SURFACE
Serves: | Lugs: | Enclosure: NEMA 1

Notes:

CKT	Circuit Description	Trip	Poles	CB	A		B		C		CB	Poles	Trip	Circuit Description	CKT
1	LIGHTING	15 A	1		960	696						1	15 A	OTHER	2
3	LIGHTING	15 A	1				969								4
5	LIGHTING	15 A	1						295						6
7	LIGHTING	15 A	1		611										8
9	LIGHTING	15 A	1				1080								10
11	OTHER	15 A	1						98						12
13	LIGHTING	15 A	1		616										14
15	OTHER	15 A	1				98								16
17	OTHER	15 A	1						0						18
19	OTHER	15 A	1		36										20
21	OTHER	15 A	1				0								22
23	OTHER	15 A	1						36						24
25	OTHER	15 A	2		1331										26
27	--	--	--	--			1331								28
29	OTHER	15 A	1						696						30
31	OTHER	15 A	2		1331										32
33	--	--	--	--			1331								34
35	OTHER	15 A	2						1082						36
37	--	--	--	--	1082										38
39	OTHER	15 A	1				36								40
41	OTHER	15 A	1						696						42
				Total Load:	6.66 kVA		4.85 kVA		2.90 kVA						
				Total Amps:	58 A		43 A		24 A						

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	3355 VA	125.00%	4193 VA		
Motor	2662 VA	125.00%	3328 VA	Total Conn. Load:	14412 VA
Other	7218 VA	100.00%	7218 VA	Total Est. Demand:	16210 VA
Lighting (Normal)	1177 VA	125.00%	1471 VA	Total Conn.:	40 A
				Total Est. Demand:	45 A

CB Legend (blank = circuit breaker):
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

Notes:

Stantec

Name: **3H** | Volts: 208Y/120V | Mains Type: | Type: PANELBOARD
Location: F/M STORAGE 317 | Phases: 3 | Mains Rating: 200 A | AIC Rating:
Supply From: | Wires: 4 | Mounting: RECESSED
Serves: | Lugs: | Enclosure: NEMA 1

Notes:

CKT	Circuit Description	Trip	Poles	CB	A		B		C		CB	Poles	Trip	Circuit Description	CKT
1	HK RECEPT. - 310,311& 313	15 A	1		1200	0						1	15 A	LAV - W/C 307/308	2
3	HK RECEPT. - 306	15 A	1				900	0				1	15 A	MEDICAL GAS ALARM PANEL	4
5	RECEPT. - W/C 307 & 308	15 A	1						600	0		1	15 A	HSS - WORKROOM	6
7	RECEPT. - WORK ROOM 316	15 A	1		1000										8
9	RECEPT. - WORK ROOM 316	15 A	1				1000								10
11	RECEPT. - WORK ROOM 316	15 A	1						1000						12
13	RECEPT. - WORK ROOM 316	15 A	1		1000										14
15	RECEPT. - WORK ROOM 316	15 A	1				1000								16
17	RECEPT. - WORK ROOM 316	15 A	1						1000						18
19	RECEPT. - WORK ROOM 316	15 A	1		1000										20
21	RECEPT. - WORK ROOM 316 - ISLAND	15 A	1				1000								22
23	RECEPT. - WORK ROOM 316 - ISLAND	15 A	1						1000						24
25	RECEPT. - WORK ROOM 316 - ISLAND	15 A	1		1000										26
27	HK RECEPT.	15 A	1				900								28
29	RECEPTACLE GFCI	15 A	1						360						30
31															32
33															34
35	RECEPT. - OFFICE 317/318	15 A	1						720						36
37	PRINTER	15 A	1		180										38
39	HK RECEPT.	15 A	1				900								40
41	RECEPT. - OFFICE 315	15 A	1						360						42
43	RECEPT. - OFFICE 303 & 304	15 A	1		1080										44
45	HK RECEPT. - 306 & STR. 302	15 A	1				900								46
47	RECEPTACLE GFCI	15 A	1						540						48
49	RECEPTACLE GFCI	15 A	1		1000										50
51	RECEPTACLE GFCI	15 A	1				1000								52
53	RECEPTACLE GFCI	15 A	1						500						54
55															56
57															58
59															60
				Total Load:	7.46 kVA		7.60 kVA		6.08 kVA						
				Total Amps:	64 A		65 A		51 A						

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	0 VA	0.00%	0 VA		
Receptacle (C)	10360 VA	98.26%	10180 VA	Total Conn. Load:	21140 VA
Receptacle (V)	5400 VA	100.00%	5400 VA	Total Est. Demand:	20960 VA
Receptacle GFCI	5380 VA	100.00%	5380 VA	Total Conn.:	59 A
				Total Est. Demand:	58 A

CB Legend (blank = circuit breaker):
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

Notes:

Stantec

Stantec Consulting Ltd.
1100-1111 Dunsmuir Street
Vancouver, BC V6B 6A3
Tel: (604) 696-8000 • www.stantec.com

Consultant

Revision	By	Appd	YYYY.MM.DD
1 ADDENDUM 02	BS	TF	2022.04.05

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR TENDER	BS	TF	2022.02.07
ISSUED FOR CLIENT REVIEW	BS	TF	2021.12.24
ISSUED FOR DD	MG	TF	2021.05.07

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

northern health
the northern way of caring

Northern Health

University Hospital of Northern B.C. - Cardiac

1475 Edmonton St, Prince George, BC V2M 1S2

Project No.:144320012

File Name: N/A

Author	Designer	Checker	08/25/21
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

SYSTEM OVERVIEW

Scale: 1 : 1

Revision: **1**

Drawing No. **E003**

TABLE OF CONTENTS

Part 1 General

1.1 WORK INCLUDED

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.2 The Division 23 Common Work Results for HVAC shall govern the Division 22 Plumbing sections of the work (read in conjunction with Division 1). This section covers items common to Division 22 series sections and is intended only to supplement the requirements of Division 1 and 23.

.3 Refer to Section 23 99 60 Mechanical Forms and submit all documentation therein that is applicable to Division 22 Plumbing.

1.2 RELATED WORK

.1	Concrete	Division 3
.2	Electrical	Division 26

1.3 COORDINATION

.1 Systems indicated in Division 22 sections, located inside and/or on the roof of the building shall extend to a point 900 mm [36"] beyond the exterior face of the building.

.2 Plumbing drawings are diagrammatic and approximately to scale. They establish the scope of the work and the general location and orientation of the plumbing systems. The systems shall be installed generally in the locations and generally along the routings shown, close to the building structure and coordinated with other services. Piping shall be concealed within walls, ceilings or other spaces and shall be routed to maximize head room and the intended use of the space through which they pass, unless specifically noted otherwise.

1.4 CODES, BYLAWS, STANDARDS AND APPROVALS

.1 Where multiple versions of the same code are published, the most recent version shall be applied, unless noted otherwise by building codes and local by-laws.

.2 Installation, workmanship and testing shall conform to the following standards:

- .1 British Columbia Building Code
- .2 Local Building By-Laws
- .3 National Building Code of Canada
- .4 CSA Standard Z7396.1 Medical Gas Pipeline Systems

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1 and Division 23.

.2 Shop drawings are required for all materials and equipment including, but not limited, to the following:

- .1 Cleanouts and access panels.
- .2 Floor drains.
- .3 Plumbing fixtures.
- .4 Trap primers.
- .5 Valves.
- .6 Water hammer arrestors.
- .7 Pipe, fittings and couplings.
- .8 All medical gas equipment
- .9 Fire stopping.

1.6 MAINTENANCE DATA

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

1.7 RECORD DRAWINGS

.1 Provide project record drawings for all plumbing systems as specified in Section 23 05 00 Common Work Results for HVAC.

.2 Submit hard copies of all “as-built” record drawings for inclusion in the paper maintenance manual.

.3 Provide digital files in pdf for inclusion in the digital format manuals.

1.8 OCCUPANCY DOCUMENTATION REQUIREMENTS

.1 Provide occupancy documentation for all plumbing work as specified in Section 23 05 00 Common Work Results for HVAC.

.2 The contractor shall submit the following documentation to the Consultant a minimum of 5 working days prior to the project occupancy site walk-through or occupancy date, whichever is scheduled first. The dates will be established by the project architect, project manager or Certified Professional. It is the contractor’s responsibility to provide all documentation to the Consultant in a timely manner. If all documentation is not received, the Consultant may not be able to issue their associated Schedule C-B in support of the building occupancy application and any associated consequences shall become the responsibility of the contractor.

.3 Seismic restraint system letters of assurance Schedules B and C-B from the plumbing contractor’s seismic restraint engineer.

.4 Letter confirming that all penetrations of rated assemblies have been firestopped in conformance with CAN4-S115, on the firestopping installing agencies letterhead.

.5 Copies of pressure test reports for all piping systems on contractor’s letterhead.

.6 Chlorination certificates for potable water systems.

.7 Balancing reports for domestic hot water recirculation systems.

.8 Plumbing inspector’s final certificate.

.9 Medical gas piping system test certificate.

.10 Medical gas system compliance certification.

.11 Maintenance manuals for plumbing systems.

1.9 TEMPORARY USAGE OF PLUMBING EQUIPMENT

.1 Plumbing equipment and systems shall not be used without the written permission of the Design Authority and in no circumstances shall be used prior to testing and inspection.

1.10 CHROMIUM PLATED PIPING

.1 Use strap wrenches only on chromium plated pipe or fittings. Surfaces damaged by wrench marks shall be replaced. Joints shall be threaded or slip joints.

1.11 EXISTING PIPING AND EQUIPMENT TO BE REMOVED

.1 All existing plumbing piping systems that become obsolete as a result of the work or depicted on the drawings for abandonment shall be removed, and/ or disposed of if the Owner declines to retain, in the following situations:

.1 Where specifically noted on the drawings for removal.

.2 Where plumbing piping systems are exposed.

.3 Where ceilings are opened-up for any reason that would permit such removal to be implemented. In such a case only those portions of the plumbing system that can be removed without taking down more ceiling shall be removed.

.2 All existing plumbing equipment that become obsolete as a result of the work or depicted on the drawings for removal shall be removed, and/ or disposed of if the Owner declines to retain.

.1 If the Owner is to keep the equipment, move to a location as identified by the Owner.

.3 Provide fire-stopping for all existing piping at fire separations.

1.12 ACOUSTICAL TREATMENT

.1 The insulation for wall, ceilings and pipe chases as outlined herein is to be provided and installed under another division of work. This section is responsible for ensuring that all special requirement for plumbing systems have been met before the wall or ceilings have been closed in.

.2 General Scope of Work

.1 All plumbing systems located in any walls or within 2 metres [6½'] in any direction of the enclosing walls of the following areas (or of similar areas not specifically named) shall be especially protected against noise transmission as defined herein:

.1 Conference rooms.

.2 Private offices.

.3 Quiet Rooms.

.3 Summary of Requirements

.1 Drain, Waste and Vent Stacks and Rainwater Leaders:

.1 Cast iron pipe and mechanical or neoprene compression gasket hub fittings shall be used. Plastic and copper piping are unacceptable. Waste piping over sound sensitive areas shall be insulated with pre-formed glass fiber insulation.

.2 Stubs from appliances in the kitchens or lounge areas may be copper, but a minimum length should be used.

.3 Waste connections from appliances and fixtures may be copper to the waste stack.

.4 All copper dry vent pipes in walls, chases and ceiling plenums shall be lagged with 25 mm [1"] preformed glass fiber pipe insulation, canvas wrapped and sealed airtight and with one or more coats of heavy enamel paint.

.5 Rainwater leader chases shall be airtight and contain non-compressed RSI 2.11 [R-12] glass fibre insulation in the stud cavities.

.2 Domestic Water Operating Parameters:

.1 The maximum pressure at any faucet or outlet shall be 275 kPa [40 psi] with at least 10% of maximum rated flow through any pressure reducing valve in the system.

.3 Pipe Sizes:

.1 The minimum pipe size to faucets or mixing valves of each fixture shall be 12 mm [½"]. The use of 9 mm [⅜"] pipes is strictly prohibited.

.4 Plumbing Fixtures and Trim:

.1 Mixing Valves and Faucets: Quiet cartridge shall be used at mixing faucets and shower valves. Any which subsequently become noisy during the warranty period shall be replaced at no extra charge to the owner.

.2 Back-to-back Fixtures: Drain line and water supply lines shall be divided at the riser. Tee takeoffs serving back-to-back fixtures are not permitted.

.3 Quick Acting Valves: All solenoid operated, or other quick acting valves shall be equipped with water hammer arresters located as close to the valves as possible.

.5 Fastening to the structure:

.1 Piping shall not contact any framing stud or wall surface; or any other conduit, electrical or ventilation fixture that is connected to any wall or ceiling surface.

.2 Piping shall not be fastened to a partition which forms part of an adjacent room not served by the pipe in question. Do not secure piping to gypsum wallboard or its supporting frame.

.3 Riser clamps shall be isolated from the structure using an approved resilient material between the support collar and the floor structure (Vibro-Acoustics type SN, 30 durometer, 57.15 mm [2¼"] x 57.15 mm [2¼"] in size, or an approved equal). An alternate method is to wrap the pipe with neoprene prior to clamping.

.4 Pipe hangers shall be oversized to suit the insulation and shall have a protection shield between the insulation and the hanger.

.5 Pipe hangers shall contain 50 durometer, 3.2 mm [1/8"] thick neoprene pads inserted between the hanger saddle and pipe.

.6 Clearance Around Pipes:

.1 All pipe (bare or insulated) shall be clear of contact with studs or gypsum wallboard.

.2 Pipes in acoustically critical walls shall be wrapped with a minimum thickness of 6 mm [¼"] of Armaflex or Rubatex sleeving and secured by use of oversized clamps. This is not necessary where the piping is insulated if pipe clamps are mounted around the exterior of the insulation. Hard plastic pipe sleeves shall not be used.

.7 Wall and Slab Penetration by Pipes:

.1 Slab penetrating pipes shall be glass fiber wrapped prior to grouting. The grout shall not contact pipes.

.2 Gypsum wallboard or plaster wall pipe penetrations shall be 3 mm [⅛"] to 6 mm [¼"] oversized with the pipe centred in the hole and the gap caulked with silicone or other non-hardening sealant.

.3 Pipe expansion joints shall be for noise free operation.

.8 Ceiling, Wall and Other Plumbing Pipe Chases:

.1 The interior spaces shall be insulated with non-compressed RSI 2.11 [R-12] batt insulation in the following proportions:

.1 Ceiling plenum - 80% of area.

.2 Chases - 100% of all four vertical surfaces.

.3 Walls - 50% of space containing pipe, and 100% of adjacent stud space.

1.13 COLD WEATHER PROTECTION

.1 Roof Penetrations:

.1 All vent penetrations of roof structure shall be 100 mm [4"] minimum size.

1.14 SEISMIC PROTECTION

.1 Refer to Section 22 05 49 Seismic Restraint Systems for Plumbing Piping and Equipment.

1.15 BUILDING OPERATION DURING CONSTRUCTION

.1 In order to minimize operational difficulties for the building's staff, the Contractor must cooperate with the Owner throughout the entire construction period and particularly ensure that noise is minimized.

.2 Convenient access for the staff and public to the building must always be maintained . Minor inconvenience and interruption of services will be tolerated, provided advance notice is given, but the Contractor will be expected to coordinate his work, in consultation with the owner, so the operation of the facility can be maintained as nearly normal as possible.

1.16 OTHER CONTRACTS ON THIS SITE

.1 Cooperation with respect to on-site coordination of all piping connections is an integral part of the responsibility of this section of the work all within the basic tender price. No extra cost will be allowed based on a failure to allow for scheduling of piping connections to produce a complete workable system whether shown on the drawings or not.

.2 Special coordination will need to be carried out with respect to capped off plumbing systems that are to be extended above slab within concealed architectural walls under a future contract. Dimensioned architectural drawings will be available to coordinate under slab piping installation with respect to future wall placement as an integral responsibility of this section of the work. These dimensioned architectural drawings shall be used for all wall dimension requirements where roughed-in plumbing is to be concealed in walls as shown on the drawings.

1.17 DIRECT DIGITAL CONTROL (DDC)

.1 The following equipment and systems shall include contacts and/or electronic relays as required as an integral part of the equipment supplied and installed in the Plumbing Section of the work to allow connection from such equipment to a DDC computer terminal in a location remote from each plumbing system location.

.2 The plumbing systems and each condition to be monitored and/or controlled within each plumbing system for remote readout on the DDC system is as follows:

.1 Domestic hot water recirc temperature

.2 Domestic hot water temperature

.3 Refer to Division 25 for further detail. Connection from plumbing systems equipment to DDC by Division 25.

1.18 EXISTING SERVICES

.1 Protect all existing services encountered. Every effort has been made to show the known existing services. However, the removal of concealing surfaces may reveal other existing services. Work with the Owner's staff to trace the originating source and points served. Obtain instructions from the Consultant when existing services require relocation or modifications, other than those already indicated in the Contract Documents.

.2 Arrange work to avoid shutdowns of existing services. Where shutdowns are unavoidable, obtain the Owner's approval of the timing, and work to minimize any interruptions.

.3 In order to maintain existing services in operation, temporary relocations and/or bypasses of piping may be required.

.4 Be responsible for any damages to existing system by this work.

.5 The Owner reserves the right to withhold permission for a reasonable period with respect to any shutdown, if shutting off a service will interfere with important operations.

Part 2 Products

2.1 PRODUCT CONSISTENCY

.1 All products utilized on the project shall be as per the shop drawing submissions.

.2 All products of a similar nature used in a similar system or application shall be of the same manufacturer throughout the project.

2.2 ACCESS DOORS

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

2.3 CLEANOUTS

.1 Cleanouts shall be full size for pipe sizes up to 100 mm [4"] and not less than 100 mm [4"] on larger sizes. Cleanouts in inside finished areas shall all be of the same shape either round or square.

.2 Cleanouts passing through a waterproofed floor or a slab on grade subject to hydrostatic pressure shall possess a clamping collar which shall be clamped to the floor membrane or lead flashing.

.3 Pipe manufacturers' cleanouts are acceptable for vertical installation at the base of soil and waste stacks or rainwater leaders only.

.4 Make cleanouts with Barrett type fitting that has a bolted cover plate and gasket, fitting that has a threaded plug, or a cleanout ferrule that is installed in a wye or extended wye.

.5 Unfinished concrete area cleanouts shall be of heavy-duty construction and have a fully exposed scoriated cover. Standard of Acceptance: Zurn Z1400, Jay R. Smith 4229, Watts, Mifab

.6 Lino or lino tiled area cleanouts shall have the centre portion of cover recessed to receive a piece of tile that matches the adjoining tile. Standard of Acceptance: Zurn ZN 1400-X or ZN 1400-TX, Jay R. Smith 4140, Ancon, Mifab

.7 Terrazzo tile floor area cleanouts have the centre portion of cover recessed to receive terrazzo that matches the adjoining terrazzo finish. Standard of Acceptance: Zurn ZN 1400-Z, Jay R. Smith 4180, Ancon, Mifab

.8 Latex deck area cleanouts. Standard of Acceptance: Zurn ZN 1400-DX, Jay R. Smith DX4343/2646Y, Mifab

.9 Carpet area cleanouts shall be fully concealed with a small raised marker. Standard of Acceptance: Zurn ZN 1400-CM, Jay R. Smith 4020-Y, Ancon, Mifab

2.4 SERVICE PENETRATIONS IN RATED FIRE SEPARATIONS

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

2.5 SERVICE PENETRATIONS IN NON-RATED FIRE SEPARATIONS

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

2.6 FIRE STOPPING AND SMOKE SEAL MATERIALS

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

2.7 MISCELLANEOUS METAL RELATED TO PLUMBING SYSTEMS

.1 Frames shall be of welded construction consisting of angle iron sections with 7.9 mm [5/16"] locating strips and anchoring lugs at a minimum of 900 mm [36"] centres.

.2 Cover plates shall be constructed of minimum 7.9 mm [5/16"] checker plate in sections not exceeding 0.93 square metres [10 ft^2] in size with lifting holes at each end of each section. Cover plates shall be provided complete with at least two lifting keys.

.3 Gasketing between frames and cover plates on sanitary systems shall be of rubber construction.

.4 Backing Plates shall be adequate to support the use intended and shall be a minimum 4.76 mm [3/16"] in thickness.

Part 3 Execution

3.1 PIPING INSTALLATION

.1 General:

.1 Install piping straight, parallel and close to walls and ceilings, with a fall of not less than 1:100 for gravity piping and with a slope to drain cocks, fixtures or equipment for all pressure piping unless otherwise indicated on drawings. Use standard fittings for direction changes. Provide drain cocks as required.

.2 Install groups of piping parallel to each other; spaced to permit application of insulation, identification, and service access, on trapeze hangers.

.3 Where pipe size differs from connection size to equipment, install reducing fitting close to equipment. Reducing bushings are not permitted.

.4 Brass and copper pipe and tubing shall be free from surface damage. Replace damaged pipe or tubing.

.5 Ream ends of pipe and tubes before installation.

.6 Lay copper pipe so that it is not in contact with dissimilar metal and will not be crimped or collapsed. All joints on cast or ductile iron pressure service piping shall be made electrically conductive.

.7 Install flanges or unions to permit removal of equipment without disturbing piping systems.

.8 Clean ends of pipes or tubing and recesses of fittings to be jointed. Assemble joints without binding.

.9 Install piping to connections at fixtures, equipment, outlets and all other appurtenances requiring service. Trap and vent waste connections to fixtures. Grade all vents to drain back to waste piping.

.10 Plug or cap pipe and fittings to keep out debris during construction.

.11 Jointing of pipe shall be compatible with type of pipe used.

.12 Non-corrosive lubricant or Teflon tape shall be applied to the male thread of threaded joints.

.13 Flush and clean out piping systems after testing.

.2 Equipment Drainage:

.1 Install drain valves at low points.

.2 Extend equipment drain piping to discharge into floor or hub drain.

.3 Expansion and Contraction and Building Seismic Joints:

.1 Support piping to prevent any stress or strain.

.4 Install pressure piping with loops and offsets which will permit expansion and contraction to occur without damaging the pressure piping system.

3.2 ACCESS DOORS

.1 Install access doors at all concealed cleanouts, traps, unions, expansion joints, valves, control valves, air vents, water hammer arrestors, special equipment, trap primers,

vacuum breakers and any other equipment for which subsequent periodic access will be required during the life of said equipment.

.2 Locate access doors so that all concealed items are readily accessible for adjustment, operation, maintenance and replacement.

.3 Do not locate access doors in feature walls or ceilings without the prior approval of the Consultant. Locate in service areas and storage rooms wherever possible.

3.3 CLEANOUTS

.1 Install cleanouts at the following locations:

.1 Building drain leaving building on the upstream side of exterior wall.

.2 Changes of direction of more than 45 degrees in drainage piping.

.3 Nominally horizontal branch or building drain at intervals of not more than 7.5 metres [25'] for pipe sizes 65 mm [2½"] and less, 15 metres [50'] for 75 mm [3"] and 100 mm [4"] pipe sizes, and 26 metres [85'] for pipe sizes larger than 100 mm [4"].

.4 Fixture drain of a sink, kitchen piping or grease waste piping at intervals not exceeding 7.5 metres [25'] for pipe all sizes.

.5 Base of soil or waste stacks and rainwater leaders.

.6 As called for by the applicable codes.

.2 Cleanouts which are located low on walls shall be located 75 mm [3"] minimum above the top of the baseboard or minimum 200 mm [8"] above finished floor level where there is no baseboard.

.3 Cleanouts shall be coordinated with all millwork and with all other obstructions, shall be placed in readily accessible locations and shall have enough clearance for rodding and cleaning.

.4 Extend cleanouts to the finished floor or wall unless exposed in a basement room, pipe tunnel or accessible crawlspace.

.5 Cleanouts in wet floor areas shall extend above the floor in walls or be provided with gasketed waterproofed tops.

.6 Cleanouts on outside drains shall be brought to grade and anchored in a concrete collar.

.7 Cleanouts serving hand hygiene sinks (HHS-1) shall be located a minimum of 150mm [6”] above the flood level trim of the fixture.

3.4 HANGERS AND SUPPORTS

.1 Refer to section 22 05 29 for Hangers and Supports for Plumbing Systems.

3.5 PIPE SLEEVES AND ESCUTCHEONS

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

3.6 CUTTING, PATCHING, DIGGING, CANNING, AND CORING

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

3.1 MISCELLANEOUS METALS

.1 Refer to Section 23 05 00 Common Work Results for HVAC.

3.2 PIPING EXPANSION

.1 All piping systems, including all take-offs shall be so installed within the building that the piping and connected equipment will not be distorted by expansion, contraction or settling.

.2 If circumstances on the job require additional changes in direction from those shown on the drawings, the configuration shall be adjusted to suit at no extra cost.

.3 Anchors shall be installed where necessary to control expansion. Expansion joints or loops shall be installed on hot water piping where required.

3.3 TESTING AND INSPECTION

.1 Furnish all labour, materials, instruments, etc. necessary for all required tests. All work shall be subject to inspection by local plumbing inspector and review by the Consultant. At least forty-eight (48) business hours [2 business days] notice shall be given in advance of making the required tests for projects within 40 km of Stantec's Vancouver office.

.2 All leaks shall be corrected by remaking the joints. The systems shall be retested until no leaks are observed.

.3 No plumbing system or part thereof shall be covered until it has been inspected and approved by the Plumbing Inspector and UHNBC Facility Maintenance (FM). UHNBC FM should have an opportunity to inspect and approve the systems.

.4 If any plumbing system or part thereof is covered before being inspected or approved, it shall be uncovered upon the direction of the Plumbing Inspector or Consultant.

3.4 PROJECT PHOTOGRAPHS

.1 Contractor shall provide digital progress photographs in "jpeg" format to the Consultant. Submit the photographs via email and/or disc as requested by the Consultant.

.2 Provide additional digital photographs of the work as requested by the Consultant to assist in the resolution of RFIs, prior to covering the work.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

1.2 CODES AND STANDARDS

.1 All fixtures shall display CSA (Canadian Standards Association) approval where a CSA standard is available and in effect.

.2 Plumbing fittings shall be to CAN/CSA B125, Plumbing Fittings.

.3 Plumbing fixtures shall be to CAN/CSA B45, 'General Requirements for Plumbing Fixtures',

.4 Vitreous china plumbing fixtures shall be to CAN/CSA B45.1, 'Ceramic Plumbing Fixtures',

.5 Stainless steel plumbing fixtures shall be to CAN/CSA B45.4, 'Stainless Steel Plumbing Fixtures'.

.6 Plastic plumbing fixtures shall be to CAN/CSA B45.5, 'Plastic Plumbing Fixtures'.

1.3 COLOUR

.1 Vitreous china fixtures shall be white unless otherwise noted.

.2 Stainless steel fixtures shall be satin and/or mirror finish or a combination thereof.

.3 Exposed plumbing brass and metal work shall be heavy triple chromium plated.

1.4 QUALITY

.1 Plumbing fixture supply brass shall be of one manufacturer unless otherwise specified.

.2 Fixtures shall be free from flaws or blemishes. Surfaces shall be clear, smooth and bright and have dimensional stability.

.3 Plumbing fixtures and trim shall be brand new unless otherwise noted.

.4 All visible or exposed parts, trim, supplies, traps, tubing, nipples escutcheons, check valves on diverter supply lines and valves to sanitary and/or kitchen fixtures shall be chrome plated finish unless otherwise noted.

.5 All fittings shall have heavy duty stems.

Part 2 Products

2.1 WATER CLOSETS

.1 Provide braided stainless-steel flexible supplies for tank type water closets. Supply shall incorporate 12 mm [½"] chrome plated quarter turn mini ball valve stop.

.2 Water Closet WC-1:

.1 Floor mounted Toilet – Vitreous china – for flush meter – Exposed no touch – hardwired

.2 American Standard Madera Flowise Right Height Elongated #3461.001.020 HET Toilet, 419 mm high, vitreous china with EverClean antimicrobial surface which inhibits the growth of stain and odor causing bacteria mold and mildew, white finish, Floor Mounted, siphon jet flush action, operates in the range of 3.8 L to 6 L (1.0 US Gal to 1.6 US Gal) per flush, condensate channel, 305 mm x 254 mm (12" x 10") water surface, siphon jet flush action, condensate channel, elongated bowl, 54 mm (2-1/8") fully glazed internal trapway, floor outlet, bolt caps, 38 mm (1-1/2") dia. Top spud.

.3 Seat Bemis 1950SS Toilet Seat with seat cover, extra heavy duty, for elongated bowl, open front, solid plastic, with cover, stainless steel check hinges, metal flat washers stainless steel posts and nuts.

.4 Valve Moen Commercial 8310ACDF16, Dual Flush Exposed Flushometer for Top Spud Toilet, chrome plated, polished chrome finish, 4.8 L (1.28 US Gal) factory set flow, quiet action diaphragm type with dual filter by-pass, infrared sensor located flush valve, solenoid operated flush controller circuitry, Courtesy Flush electronic over-ride button, extended seat bumper on, V.P. Smooth design stop cap on bak-check angle stop (screwdriver operated), flush tube for 292 mm (11-1/2") rough-in, high pressure vacuum breaker, sensor located above the toilet, 5 VA Power Required per unit. Sensor to clear toilet seat cover. Provide 4" (102 mm) square electrical box for mounting sensor plate.

.5 Transformer Moen Commercial #104630, Box Mount Multi Unit Hard Wired Transformer, 120 VAC/ 12 VDC.

2.2 LAVATORIES

.1 Provide braided stainless-steel flexible supplies for lavatories. Supplies for lavatories shall incorporate 9 mm [3/8”] chrome plated quarter turn mini ball valve stop.

.2 Lavatory LAV-1:

.3 Lavatory Plumbing Fixture Schedule

.1 Wall hung basin electronic faucet - below deck mechanical water mixing valve.

.2 American Standard Murro with EverClean #0954.904EC.020 Basin Sealed overflow, 3 holes, 4" (102 mm) center, 540 mm x 520 mm x 165 mm (21-1/4" x 20-1/2" x 6-1/2") high, Vitreous china, White Finish, for carrier with concealed arms, recessed self-draining faucet ledge.

.3 **Sloan SF-2000 Series #SF-2300 Electronic Faucet,** Chrome plated finish, Brass, 1.9 LPM (0.5 GPM) aerator spray outlet, 162 mm (6-3/8") projection reach, infrared sensor with screw adjustable range, under counter filtered solenoid valve with serviceable strainer filter, Module control assembly housed in splash proof junction box, 6 VDC plug-in adaptor with battery back-up. **Sloan #SFP-6, Plug-in Transformer,** 110 VAC/ 6 VDC, A. **Provide electrical duplex box with ground fault interrupter.**

.4 **Lawler #TMM-1070, Below Deck Mechanical Water Mixing Valve,** Bronze body, temperature adjusting dial, 10 mm (3/8") inlets and outlet compression fittings, high temperature thermostatic limit stop, shut-off with automatic reset when temperature exceeds 120 ºF (48.8 ºC), Integral checks, offer temperature range from full cold through 46 °C (114.8 °F).

.5 **Provide tee, adaptors and flex. copper tubing to suit installation. McGuire #PRODRAIN Open Grid Drain,** cast brass one piece top, 17 GA. (1.5 mm) mm tubular 32 mm (1-1/4") tailpiece, Less overflow holes.

.6 **McGuire #LFH170BV Faucet Supplies,** Chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, convertible 1/4 turn/loose key handles, Escutcheon and flexible copper risers.

.7 **McGuire #8872C P-Trap,** heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, Shallow wall flange and Seamless tubular wall bend.

.8 **Watts #WCA-411 Basin Carrier,** concealed arms, wall flanges to attach to backing plate secured in wall with locking device and levelling screws, heavy gauge steel uprights with integral welded feet. For one unit: 102 mm (4") for two to six units in a row: 152 mm (6") finished metal stud wall to back of pipe space.

2.3 JANITORS SINKS

.1 Janitor Sink MS-1:

.2 Janitor Sink MS-1:

.1 Refer to Drawing Schedules

.2 Service / mop sink - two handles faucet

.3 Franke Commercial #FSS222210/316-1 Corner Service / Mop Sink, 610 mm (24") wide x 610 mm (24") long x 559 mm (22") high deep, floor mounted, grade 18-10 16 GA. (1.5 mm) type 316 stainless steel, polished satin finish, 2 side 305 mm (12") high integral splashguard, undercoated to reduce condensation and resonance, one piece wall hangers, 51 mm (2") grid strainer included.

.4 Chicago Faucets #897-RCF Wall Mounted two handles Faucet, Rough Chrome Finish, 8" (203 mm) centerset, solid brass exposed body, ceramic 1/4 turn operating cartridge, unrestricted hose end outlet, 203 mm (8") projection spout with atmospheric vacuum breaker and bucket hook, 60 mm (2-3/8") metal vandal proof lever handles with blue and red index buttons, wall brace support. Provide P-Trap, same material as the connecting pipe drain.

.5 Hose and Wall Hook: 36” (914 mm) long hose with 3/4” (19 mm) chrome coupling, stainless steel wall bracket.

.6 Mop Hanger: Stainless steel #4 finish, 24” (610 mm) long with 3 rubber spring loaded clips.

.7 Provide a separate cold-water feed completed with back flow protection, shut off valve and funnel drain for chemical dispenser of MS-1.

2.4 SINKS – GENERAL

.1 Per CSA Z317.1 Overflows shall not be used for sinks as overflows “are difficult to clean and become contaminated very quickly, serving as reservoirs of bacteria.”

.2 All sinks shall be provided with offset drains to reduce the potential for aerosolization from the trap.

.3 All water supply outlets (faucets) shall be, per CSA 317.1, “equipped with non-aerated, splash free, laminar flow devices in all areas of the HCF. Devices with aerators or fine mesh screens shall not be used.”

2.5 MIXING VALVES

2.6 THERMOSTATIC MIXING VALVES - GENERAL

.1 For all Fixtures: Per CSA Z317.1 set thermostatic mixing valve temperature so that hot water is supplied at a minimum temperature of 55°C within 1 min at outlets (i.e., the time needed to flush out the volume of water in the pipe run-out and heat-up the piping).

2.7 Hand Hygien Sink HHS-1 (Wall Hung Basin Electronic Faucet-Point of Use Thermostatic Water Mixing Valve)

.1 Provide braided stainless-steel flexible supplies for sinks. Supplies for sinks shall incorporate 12 mm [1/2”] chrome plated quarter turn mini ball valve stop.

.2 Hand Hygiene Sink HHS-1 (wall hung basin electronic faucet - point of use thermostatic water mixing valve

.3 **Basin:** American Standard ICU Basin #9118.111.020, Center hole only, 509 mm x 432 mm x 663 mm (20-1/16" x 17" x 26-1/8") high, Rectangular, Vitreous china with EverClean antimicrobial surface which inhibits the growth of stain and odor causing bacteria mold and mildew, White Finish, 65 mm (2-9/16") dia. Faucet perch, back of sink

93 mm (3-11/16") higher than faucet perch, Offset grid drain included, integrated mounting brackets, P-trap with Saniguard coating provided. Provide compatible shroud.

.4 **Faucet:** American Standard Selectronic I.C. #605B.193.002 Electronic Faucet, Polished Chrome finish, Center hole only, Vandal resistant brass construction, 1.5 GPM (5.7 LPM) pressure compensating laminar flow device in spout base with plain spout laminar flow end, Rigid gooseneck spout, 127 mm (5") projection reach, Self-adjusting sensor, AC Powered (Hard Wired). American Standard #PK00.HAC, Hardwired Hardwired AC - Power Kit, Includes 10' long extension cable. American Standard PK00.BBU Battery Back Up Includes standard CR-P2 lithium battery for back-up power, Allows Selectronic AC faucets and flush valces to continue operating during a power failure and maintains fail-safe operation, Installs between Selectronic product and AC Power Supply (Plug-In or Hard-Wired), 4- amstd, Selectronic Battery Back- Up.

.5 **Mixing valve**, Symmons MaxLine, Point Of Use Thermostatic Water Mixing Valve, nickel plated bronze body, temperature adjusting spindle, 10 mm (3/8") inlets and outlet FNPT connections, Integral checks, temperature range between 35 °C (95 °F) and 46 °C (114.8 °F), housed in 356 mm x 356 mm x 152 mm (14" x 14" x 6") recessed box. Set valve temperature at 46 °C (114.8 °F). Note : Provide tee, adaptors and flex. copper tubing to suit installation.

.6 **Waste and Supplies**, McGuire #LFH165LKN3 Faucet Supplies, Chrome plated finish polished brass, heavy duty angle stops, 10 mm (3/8") I.P.S. Inlet x 76 mm (3") long rigid horizontal nipples, V.P. Loose keys, Escutcheon and flexible copper risers. McGuire #8872C P-Trap, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/2") size, Shallow wall flange and Seamless tubular wall bend.

.7 **Carrier**, Watts #CA-311 Fixture Carrier, mounted on concrete floor, steel hanger plate, heavy gauge epoxy coated steel offset uprights with welded feet supports. For one unit: 102 mm (4") for two to six units in a row: 152 mm (6") finished metal stud wall to back of pipe space.

.8 **Acceptable product:** American ICU Basin with features and accessories as specified above.

2.8 MIXING VALVES

.1 Mixing valves shall be thermostatic in operation, not mechanical mixing valves. This includes individual mixing valves at single fixtures or groups of fixtures including lavatories, sinks, showers, emergency fixtures etc.

.2 On both the up-stream hot and cold supplies, in an accessible location, provide isolation valves, positive swing check valves and strainers.

Part 3 Execution

3.1 FIXTURE INSTALLATION

.1 Connect fixtures complete with specified trim, supplies, drains accessory piping, vented traps, stops or valves, reducers, escutcheons and fittings for the proper installation of all fixtures and their respective supply fittings.

.2 Provide necessary hangers, supports, brackets, reinforcement, steel back-up plates and floor flanges to set fixtures level and square. Mount fixtures so that 90 kilogram [200 pound] mass will not loosen or distort mounting.

.3 Provide chrome plated quarter turn mini ball valves for all lavatories, sinks and tank type water closets.

.4 ABS p-traps and waste arms are not permitted.

.5 Waterclosets

.1 Water closets shall be connected to waste utilizing brass or cast iron floor flanges with lead stub or mechanical joint connections and wax seals.

.2 Provide braided stainless-steel flexible supplies for tank type water closets. Supply shall incorporate 12 mm [½"] chrome plated quarter turn mini ball valve stop.

.3 PEX or other plastic supplies are not acceptable.

.6 Lavatories and Sinks

.1 Provide braided stainless-steel flexible supplies for sinks and lavatories.

.1 Supplies for lavatories shall incorporate 9 mm [3/8”] chrome plated quarter turn mini ball valve stop.

.2 Supplies for sinks shall incorporate 12 mm [1/2”] chrome plated quarter turn mini ball valve stop.

.2 PEX or other plastic supplies are not acceptable.

.3 Double waste fittings for lavatories and sinks shall be a double sanitary tee. Provide a clean out access above flood level rim to vertical portion of pipe, equal to the diameter of the vertical pipe. Clean out access needs to be accessible with an access door.

.4 Control handles for all two handle mixing faucets shall be positioned with the cold control on the right and the hot control on the left. Activation shall be accomplished by rotating the cold control handle clockwise and the hot control handle counterclockwise.

.5 Faucets shall be complete with nuts and tailpieces.

.6 Provide appropriate gaskets and/or sealing washers that will prevent the entry of water into fixture trim or faucet holes or punchings in millwork.

.7 Gooseneck spouts shall have a clearance of 200 mm [8"] from nozzle tip to countertop, unless otherwise specified.

.8 Plastic control handles and spouts are unacceptable.

.9 Lavatory and sink P-traps shall be cast brass or tubular brass complete with either a cleanout or possess slip joint connections. Assembly shall be chrome plated where not concealed in millwork. Plastic drain and trap assemblies are **not** acceptable.

.10 Lavatory and sink P-traps shall be complete with either a cleanout or possess slip joint connections.

.11 Cleanouts serving fixtures in this Healthcare Facility shall be located at 1,830 mm above the finished floor level. At no point, shall a cleanout be less that a minimum of 150mm above the flood level rim of the fixture.

3.2 FIXTURE TRIM HOLES OR PUNCHINGS

.1 Fixture punchings for faucets or other trim shall not contain more punchings than necessary for the specified trim.

.2 Provide fixture and templates to the applicable trades for holes and cut outs required in all countertops.

3.3 WALLS AND FLOORS

.1 Fixtures mounted on glazed tile surfaces shall have ground faces to finished surface.

.2 Where plumbing fixtures come in contact with walls and floors, joints shall be sealed with Dow Corning anti-mildew 786 building sealant, made watertight and beaded smooth in a neat and workmanlike manner.

3.4 WATER HAMMER ARRESTORS

.1 Provide water hammer arrestors or shock absorbers on fixtures with flush valves and/or quick closing valves.

3.5 HANDICAP FIXTURES

.1 Water Closets

.1 Install all wall hung water closets designated for handicap use such that the top of the seat is 400 mm [15¾”] to 460 mm [18"] above the finished floor level.

.2 Install offset on handicap water closet flush valve connection to eliminate any interference with grab bar mounting.

.3 For sensor operated flush valves install the sensor above the level of the seat cover when it is in the fully raised position to ensure activation.

.4 For manual flush valve water closets install the flush valve such that the handle is facing the transfer or non-grab bar side of the water closet.

.2 Lavatories and Sinks

.1 Install offset P-traps with the run of the P-trap parallel to and close to wall.

.2 Supplies on handicap lavatories shall be offset to accommodate the offset P-trap.

.3 Insulate P-traps and waste arms at all handicap accessible lavatories and sinks with a manufactured insulation kit or 12 mm [½"] of fiberglass insulation and finished with a polyvinyl chloride jacket in a neat and workmanlike manner.

.4 Acceptable Manufactured Products: Truebro 'Handi Lav-Guard', Brocar Products Inc. 'Trap Wrap', Sexauer 'Handi Lav-Guard' Plumberex 'Handy Shield'.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.2 Refer to Division 1 – Commissioning General Requirements and 23 08 00 – Commissioning of Mechanical for additional responsibilities of the BAS contractor

1.2 SCOPE OF WORK

.1 The new control system while being a completely stand-alone system, shall be an expansion of the existing system supplied by Reliable Controls (Houle Controls) Building Automation System.

.2 The new system shall be fully integrated with the existing system (Reliable Controls) and operator interface shall be through the existing operator's workstation located in [workstations (main plant room). In addition, the new system will provide access to Facility & Energy Management Software Use through the Reliable Controls (Houle Controls) RC Webview system. The intent is to centralize the facilities building management operation and collect real-time data about energy use for the facility.

.3 Refer to Section 23 99 60 Mechanical Forms and submit all documentation therein that is applicable to Division 25 Controls and Instrumentation.

.4 The control will be coordinated and provided by the existing Reliable facility controls including the generation of new graphics for all control components.

.5 Acceptable Supplier: Reliable Controls (Houle Controls)

.6 The two louver actuators in existing level 3 Electrical Room to be connected and controlled by BMS system to control the electrical room temperature during free-cooling mode.

1.3 CODES, BYLAWS, STANDARDS AND APPROVALS

.1 Where multiple versions of the same code are published, the most recent version shall be applied, unless noted otherwise by building codes and local by-laws.

1.4 GENERAL

.1 The control system is to be fully microprocessor based [as well as Web Based RC Webview facility and energy management system.]

.2 The controls system is to be complete with all necessary control components and connections to achieve the specified functions and to permit the H.V.A.C. systems to perform properly in the manner described and as hereinafter specified.

.3 The controls contractor shall furnish all materials, including all central computer hardware and software, operator input/output peripherals, standalone DDC panels, automation sensors and controls and wiring. The controls contractor shall be responsible for the design, installation, supervision and labour services, calibration, all software programming, and checkout necessary for a complete and fully operational Building Automation System.

.4 The control system and all controllers and hardware including third party devices shall be BACnet Testing Laboratories (BTL) certified.

.5 The control system is to be set up and adjusted to achieve optimum operation of the H.V.A.C. system. This includes sequencing, timing and readjustment, as required. Modifications to the sequence of operation using points indicated will not be considered as extra to the Contract. These modifications to continue through the construction period, commissioning period and warranty period as required to achieve optimum operation of the mechanical system.

.6 All new outputs shall each have an integral HOA toggle switch.

.7 New controllers shall have a minimum 10% spare points at each location.

.8 Program a trend log and, where appropriate, totalization for each point.

.9 This Section is a performance specification clarified in certain sections to establish minimum standard of equipment, installation or level of control. The specification describes the basic functions required but not all of the installation details or components. This Trade is expected to have sufficient experience to be able to design and estimate the cost of an appropriate control system. Materials and work necessary to achieve a satisfactory result will not be considered extra to the contract.

.10 The contractor shall review all contract documents and visit the site if possible, prior to the closing date of the tender and site confirm the requirements regarding the routing of interconnecting transmission network, etc..

.11 When preparing shop drawings, review the proposed sequences, suggest improvements and review these with the Consultant.

.12 Work with the other parties involved in commissioning, assess how the programming can be modified to improve function, review this with the Consultant and modify the programming as instructed by the Consultant.

.13 The control system shall be a modular, flexible and fully commissioned Direct Digital Control (DDC) System except that controls not scheduled on the points list may be electric. Items identified in the sequence of operation as being under DDC control but which are not included in the points list shall be included in the DDC system.

.14 Control Contractor to connect the new smoke-fire combination dampers to the fire alarm control panel. All wires to run in conduits.

.15 All trend logs need to be setup in Reliable Controls RC Archive to allow long term trending.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1 and Division 23.

.2 Shop drawings shall include:

- .1 Control centre layouts.
- .2 Manufacturer's descriptive technical literature for all equipment and devices.
- .3 Interconnection schematics.
- .4 Wiring and piping diagrams.
- .5 One-line diagram from sensor and control points to Field Interface device and/or standalone DDC panel including all components and cables.
- .6 Terminal cabinets, including termination listing.
- .7 Written description indicating sequence of operation. Shop drawings will be rejected if the written description is not included with the submission. Sequences should reference English descriptors and labels for each point described.
- .8 All input/output points which shall include the following information associated with each point.
  - .1 Sensing element type and location.
  - .2 Details of associated field wiring schematics and schedules.
  - .3 Software and programming details.
- .9 Detailed block diagrams of transmission trunk routing and configuration.
- .10 Valve and damper schedules indicating size, configuration, capacity and locations. If size varies greater than 10%, obtain approval of Consultant.
- .11 Copies of all system graphics complete with system specific point labels.

1.6 OPERATING & MAINTENANCE MANUALS

.1 The maintenance manual data is intended to cover the operation and maintenance of all control systems and equipment installed. Forward three (3) copies of the Controls and Instrumentation section of the operating and maintenance manuals to the Balancing Agency to ensure the binding and format of material are compatible. Ensure sufficient time has been given to the Balancing Agency for the compiling of the complete operating and maintenance manuals by the commissioning deadline. One complete manual shall be furnished prior to the time that system or equipment tests are performed.

.2 The manuals shall include the name, address and telephone number of the control subcontractor installing the systems and a list of emergency numbers for service personnel. The manuals shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject.

.3 Manuals shall be furnished which provide full and complete coverage of the following subjects:

.1 Operational Requirements: This document shall describe, in concise English terms, all the functional and operational requirements for the system and its functions that have been established. It shall not require knowledge of digital processor programming or electronic techniques or control system theory.

.2 System Operation: Complete guidance and procedures for operation of the system, including required actions at each operator station; operation of computer peripherals; input and output formats and procedures; and emergency, alarm, and failure recovery procedures. Provide step-by-step instructions for system startup, back-up equipment operation, and execution of all system functions and operating modes.

.3 Functional Description: Detailed documentation, in language readily understandable to engineering personnel, of the theory of operation and specific functions of the system. Provide full details of data communications, including data types and formats, data processing and disposition data link components and interfaces and operator test or self-test of data link integrity for all system components and computer peripherals during each system function and operating mode. Hardware and software functions, interfaces, and requirements shall be explicitly detailed for all system components in all system functions and operating modes. Any operating procedures currently implemented or planned for implementation in an automatic mode shall be stated and described.

.4 Software: Documentation of the theory, design, interface requirements, and functions of all software modules and systems for all digital processors. Include test and verification procedures and detailed descriptions of program requirements and capabilities. Provide all data necessary to permit modification, relocation, or other reprogramming and to permit combination of new and existing software modules to respond to changing system functional requirements without disrupting normal control system operation. Include, as a minimum, for all software modules, fully annotated source code listings, error-free object code files ready for loading via a peripheral device, and complete program cross reference, plus any calling requirements, data exchange requirements, necessary subroutine lists, data file requirements, and other information necessary to ensure proper loading, integration, interfacing, and program execution. All DDC panel software shall be provided individually for each DDC panel while a single section shall reference all DDC panel common parameters and functions.

.5 Maintenance: Documentation of all maintenance on all system components including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective units. Include calibration, maintenance, and repair of

all sensors and controls, plus diagnosis and repair or replacement of all system hardware.

.6 Test Procedures and Reports: The test implementation shall be recorded with a description of the test exercise script of events and documented as Test Procedures. A provision for the measurement or observation results, based on the previously published Test Specification, forms the Test Reports. The procedures record and the results of these exercises shall be conveniently bound and documented together.

.4 Refer to Section 23 05 00 for additional requirements.

1.7 WARRANTY

.1 Refer to General Conditions for additional information..

.2 The system including all hardware and software components shall be warranted for a period of one year following the date of final acceptance per department. Any manufacturing defects arising during this warranty period shall be corrected without cost to the Owner.

.3 All applicable software as detailed in this specification shall be updated by the Controls Contractor free of charge during the warranty period. This will ensure that all system software will be the most up-to-date software available from the Controls Contractor. All future patches to the software shall be made available to the Owner.

.4 Repairs required by a total system failure, or the malfunction of any priority portion of the system shall be considered an emergency repair, and shall be performed within eight (8) hours of the report of the failure.

.5 Repairs of a non-emergency nature shall be promptly repaired on the next normal business day.

.6 Provide written assurance that a local service centre will be maintained with a complete stock of replacement parts, and capable of servicing all troubles in the system.

.7 Use of installed equipment during construction shall not shorten or alter the warranty period as specified in the General Conditions.

.8 Take note of and provide any extended warranties specified.

1.8 ELECTRICAL COMPONENTS, WIRING AND CONDUIT

.1 By Division 25 Control Systems Contractor:

.1 All control system components to make a complete and operable system, except those supplied as part of packaged equipment controls, but including all auto-sequencing devices and electrical interlocks required to accomplish the sequences specified hereafter. Refer to the electrical equipment schedule, the electrical drawings and the electrical specification, which describes the limits of the extent to the work in Division 26 serving mechanical systems. Materials, equipment, connections and power not provided by Division 26 but required for the Control System shall be provided under this section.

.2 All control circuit transformers (120/1/60 or 24/1/60 and as designated).

.3 All control wiring and metallic conduit for mechanical system controls.

.4 Supply, installation and connection of all electric control items including: damper motors, relays, outside sensors, sub-master control circuits, safety devices, electric thermostats, aquastats, flow switches, wiring to terminal strips, proportional controllers, controllers, etc..

.5 All wiring and conduit from power distribution system to any control devices needing power (including B.M.S components)

.6 Be responsible for coordinating with Division 26.

.7 Electrical work installed under Division 25 shall be to the standards specified under Division 26.

.2 By Division 26 Electrical:

.1 All power wiring and conduit from power distribution system up to and including connection to all motors and starters.

.2 All disconnect switches required (unless specified in schedules as being integral with equipment).

.3 All motor protection switches, stop-start switches, magnetic starters, contactors and hand-off-automatic selector switches except those supplied as part of packaged equipment.

.4 Terminal strips within the motor control centres (MCC) for control connections.

.5 Fire alarm signals.

.3 Note:

.1 All magnetic starters for equipment shall have the following features supplied under this Division:

.1 Hand-off-automatic selector or on-off selector or start-stop buttons in cover with hand-automatic bridge if applicable.

.2 Pilot light,

.3 120-volt coils,

.4 120-volt control transformer and,

.5 Four auxiliary dry contacts for interlocks; two normally open and two normally closed.

.2 The Controls Contractor is responsible for reading Division 26 plans and specifications to determine scope of responsibility and standards.

.4 Wiring:

.1 General:

.1 Run carrier system parallel to building lines.

.2 Support conduit carrier system one meter on centre independent of piping, ductwork and equipment.

.3 Seal all penetrations through fire separations or walls as per code requirements.

.4 Identify all junction box covers with control company label.

.5 Identify with colour bands, all conduits at all junction and pullboxes, at both sides of wall and floors and at not more than 7.5 m [25 ft] intervals along the length. Identification bands to be sprayed on and not less than 100mm [4"] wide. Bands to be [pink] [purple] in colour unless in conflict with Division 26 colours.

.6 Use colour coded conductors.

.7 Adhere to all applicable electrical codes and regulations.

.8 Obtain electrical permit.

.9 For non-CSA equipment where required by electrical code, submit to Inspection Authorities and obtain approval prior to installation of equipment on site.

.10 Refer to Division 26 Electrical for overall wiring requirements.

.11 Wiring shall match electrical wiring requirements to ensure consistent wiring is provided throughout the project.

.12 All wiring shall be run in conduit.

.2 Carrier System – In stud walls, and all open, exposed areas including mechanical, electrical and equipment rooms:

.1 All wiring for 24 volts or less shall be run in EMT conduit except wiring to all operators and to all sensors subject to vibration shall be run in flexible metallic conduit for the final 900mm (3 feet).

.2 All wiring for over 24 volts shall be run in EMT conduit.

.3 All wiring between the fire alarm panel and the DDC panels. shall be run in EMT conduit.

.4 Provide steel fittings with nylon throats for all conduit connections.

.5 All conduit containing control wiring shall loaded to a maximum of 75% full upon project completion

.6 Wires not in conduit shall be organized using Panduit or similar.

.7 All wiring shall be run in conduit.

.3 Carrier System – Concealed, accessible areas.

.1 Wires not in conduit shall be organized using Panduit or similar.

.2 Class II low voltage BMS open cable, neatly bundled, shall be routed parallel to building lines.

.3 Cable may follow ductwork routing and may be tied to the side or top of the ducting at duct supports, using suitable cable ties. If cabling does not follow ducting, it shall be fixed to the structure, supported at a minimum of every 5m.

.4 Open cable must be rated plenum cable.

.5 All wiring shall be run in conduit.

.4 Wire:

.1 Line voltage power or switched power wiring - #12 gauge copper wire minimum.

.2 Line voltage control wiring - #14 gauge copper wire, length not to exceed 50 meters; #12 gauge copper wire, lengths exceeding 50 meters.

.3 Low voltage – wire as directed by applicable electrical codes and requirements but minimum #20 gauge.

.4 All DDC wiring ran in celling spaces must be strapped every 3 feet, and not run through sharp edges or corners, cables should not be ran crisscross but in a straight organized fashion.

.5 All DDC wiring to have wire tags at both ends.

.6 All wiring shall be run in conduit.

.5 Cable:

.1 Data transmission cable shall be minimum 18-gauge twisted pairs (shielding as per manufacturers recommendations).

.2 All new cabling used for network installation shall be a minimum of CAT6 or as recommended by the equipment manufacturer.

.5 Wiring for B.M.S Life Safety Systems:

.1 Conductors for communications between the front-end CPU and standalone DDC panels and between DDC panels shall be high temperature, 200°C, Teflon FEP insulated and jacketed, shielded twisted cable pairs of minimum 18 gauge provided by the controls contractor for the distances involved. Wiring shall be fully redundant for separate channels of communication to the CPU via a

different route (so as to protect the communication links in the event of a fire in a particular area).

1.9 EQUIPMENT SUPPLIED FOR INSTALLATION UNDER OTHER SECTIONS

.1 The following equipment shall be supplied under this section but installed under the appropriate trade sections of Division :

.1 Automatic control valves.

.2 Temperature sensor wells.

.3 Automatic control dampers.

.4 Pressure tappings.

.5 Static pressure sensors.

.6 Flow switches.

.2 The Controls Subcontractor shall be responsible for arranging, coordinating and supervising the installation of the above devices in a suitable manner and readily accessible location.

1.10 FREEZE PROTECTION

.1 All air supply handling units containing coils shall have a non-recycling, manual reset, electric line voltage freeze protection controller that will stop the system upon sensing 4°C.

.2 The freeze protection controllers shall contain an additional set of dry contacts that will close on freeze detection for remote alarm indication at the [B.M.S.].

.3 The freeze protection contacts shall be connected on the common line after the H.O.A. selector switch.

1.11 ALARMS - GENERAL

.1 No alarm shall be triggered for a device until the device has been started and is in stable operation. Use software time delays to achieve this effect.

.2 Generate an alarm on the B.M.S. if any equipment is not in the intended operating condition or if any analog input is not within the intended operating range.

1.12 IDENTIFICATION

.1 Identify all panels and points with a numbering system consistent throughout the DDC network.

.2 Identify all controls with symbols relating directly to the control diagram. Use plasticized tags, engraved brass, aluminum, metal-photo, or laminated plastic labels and secure them to, or adjacent to the control devices with key chains.

.3 Identify all junction box covers with control company label. Paint junction box covers to match conduit colour coding [pink] [purple].

.4 Identify with colour bands, all conduits at all junction and pull-boxes, at both sides of wall and floors and at not more than 7.5m (25 ft.) intervals along the length. Identification bands to be sprayed on and not less than 100mm (4”) wide.

.5 Use colour coded conductors, white for neutral.

.6 All manual switches, unless they come with standard nameplates, shall be labelled with engraved plastic laminate nameplates to clearly indicate the service. Wording on nameplates shall be subject to approval by the Consultant.

.7 Identify all DDC panels and associated devices with symbols relating directly to the control diagram. Provide plastic labels for each input and output point with the following information:

.1 Point descriptor.

.2 Point type and channel number.

.3 Corresponding DDC panel number.

.8 Mount an input-output legend sheet within each DDC panel. This sheet shall include the name of the points connected to each controller, the end device manufacture, part number, model number and shall describe the I/O range. If an I/O module is remotely located, a separate legend sheet for that module shall be included at both locations.

.9 All Relays shall be labeled and have wire tags.

.10 Motor control centre and motor starters shall be provided with labels identifying that motors are under remote control.

.11 All Equipment above concealed ceiling should be tagged properly. tagged according to UHNBC FM standards. This includes appropriate tags and equipment description.

1.13 SYSTEM COMMISSIONING AND CALIBRATION

.1 Program each standalone DDC panel immediately following installation.

.2 Set up and calibrate all control loops and sensors during the initial start-up of the systems and check, recalibrate and readjust as necessary during the Owner's Demonstration and Instruction period.

.3 Upon completion of the installation, perform all necessary testing and debugging operations satisfactorily.

.4 Perform all modifications and alterations as required to correct any deficiencies noted during these tests.

.5 Check sensor calibration and control system operation during the first heating season and prior to the first cooling season.

.6 Following each visit submit printed graphs of trend logs one week in duration with hourly samples for all analog inputs connected to each DDC panel.

1.14 VERIFICATION OF SYSTEM COMMISSIONING

.1 Preliminary Tests

.1 After installation of each part of the system and completion of mechanical and electrical hook-up, perform tests to confirm correct installation and functioning of equipment.

.2 Notify the Consultant in writing at least seven days before testing is to take place stating the following:

.1 Location and part of system to be tested.

.2 Describe testing procedure and anticipated results.

.3 Provide all necessary testing equipment and personnel.

.4 Provide portable 2-way radios for communications during demonstrations. Provide three units on the same frequency and of sufficient power and quality as to be useful throughout the building.

.5 Perform tests in presence of the Consultant.

.6 Demonstrate the proper operation of each component.

.7 Correct any deficiencies and re-test in the presence of the Consultant, until designated part of the system performs satisfactorily.

.2 Final Operational Acceptance Test

.1 A final operational test of not less than thirty (30) consecutive days, twenty-four (24) hours per day, shall be conducted on the complete and total installed and operational Control System to demonstrate that it is functioning properly in accordance with all requirements of this specification.

.2 The correct operation of all monitored and controlled points shall be demonstrated as well as the operation and capabilities of all sequences, reports, specialized control algorithms, diagnostics, and all other software. If the

equipment operates at an average effectiveness level (AEL) of at least 95% during the performance test period of thirty (30) consecutive calendar days, it will be deemed to have met the Acceptable Standard of Performance, and final acceptance of the system shall be made, provided the contractor has satisfied all other requirements of this specification.

.3 The average effectiveness level (AEL) is defined as the ratio between the total thirty-day test period less any system downtime accumulated within that period, and the thirty-day test period.

.4 In the event the required AEL is not reached during the initial thirty (30) consecutive calendar day period, the final operational acceptance test period shall be extended on a day-to-day basis until the required AEL is reached for thirty (30) consecutive calendar days.

.5 Downtime shall result whenever the control system is unable to fulfill all required functions detailed within this specification due to any malfunction of either BMS hardware or software. Any defect of hardware or software shall be corrected when it occurs before the test may be resumed. Downtime created by non-BMS equipment or activities will not be considered as downtime for the AEL calculation.

1.15 MAINTENANCE SERVICE DURING THE WARRANTY PERIOD

.1 The Contractor shall provide all services, materials and equipment necessary for the maintenance of the entire Control System, for a period concurrent with the warranty period. Any necessary material required for the maintenance work shall be provided by the Contractor.

.2 The Controls Contractor shall provide one minor and major inspection per quarter or as required by the manufacturer and two major inspections per year, and all service for the required maintenance.

.3 Major Inspections: these inspections shall include but not be limited to the following:

.1 Work as detailed hereinafter for minor inspections.

.2 Clean all peripheral equipment, CPU, interface panels, multiplexing panels and microprocessor interior and exterior surfaces.

.3 Provide signal, voltage and system isolation checks of all CPU, interface panels, multiplexing panels and peripherals.

.4 Provide mechanical adjustments, new ribbons and necessary maintenance on printers.

.5 Check and/or calibrate each field input/output device.

.6 Run system software diagnostics as required.

.4 Minor Inspections: These inspections shall include but not be limited to the following:

.1 Provide visual and operational checks to all CPU, peripheral equipment, interface panels, multiplexing panels, and field devices.

.2 Change filter and check fan for all CPU's peripheral equipment as required.

.3 Provide complete back up of BMS system.

.4 Regular service calls: these calls shall be performed during regular working hours, 8:00 a.m. to 4:30 p.m. Monday through Friday excluding legal holidays.

.5 Emergency Service:

.1 The Owner will initiate service calls when there is indication that the control system is not functioning properly.

.2 The Contractor shall have qualified control personnel available during the warranty period to provide service to the "critical" control system components whenever required at no additional cost to the Owner.

.3 The Contractor shall furnish the Owner with a telephone number where the service mechanic can be reached at all times. The service mechanic shall be on the job ready to service the control system within the next eight (8) hours, after receiving a request for service and the work shall be performed continuously until the control system is back in reliable operating condition.

.4 Repairs of a non-emergency nature shall be promptly repaired on the next normal business day.

.6 Records and Logs: records and logs shall be kept of each maintenance task.

.7 System Modifications: recommendations for system modification shall be provided in writing to the Consultant. No system modification, including operating parameters and control settings, shall be made without prior approval.

.8 Software: provide implementation of all software maintenance updates. These shall be accomplished as required and full coordination with control system supervisory personnel shall be maintained.

END OF SECTION

TABLE OF CONTENTS

Part 1 General

Part 2 Execution

2.1 DESCRIPTION OF THE PROJECT:

.1 Note: this project involves integration of new controls into the existing BMS system. Unless otherwise noted, the sequence of operation for all the exiting systems that will remain, or removed and reinstalled, shall be reinstated. Test and verify the operation of all the existing equipment (i.e. rooftop exhaust fans) that will be impacted by this project.

.2 BMS contractor shall ensure the existing Building BMS system and associated wiring and devices essential for operation of the mechanical systems of the building remain protected and operational during construction.

2.2 HVAC CONTROL OBJECTIVES:

.1 Program the system to meet the following objectives:

.1 Temperature Requirements:

.1 Control the temperature in each occupied space as required by CSA Z317.2-15 - Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities.

.2 Control the temperature in other spaces that are not normally occupied or not governed by CSA Z317.2 requirements.

.2 Humidity Requirements:

.1 Monitor humidity in each occupied space as required by CSA Z317.2-15 - Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities.

.2 Control the humidification level at the supply air from the air handling units (via humidification or de-humidification) based on feedback from the humidity sensors distributed in the zones they serve.

.3 Ventilation Requirements:

.1 Control the ventilation rate in each occupied space as required by CSA Z317.2-15 - Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities.

.2 Monitor and control each zone from the existing air handling unit minimum outdoor air intake to ensure that each zone meets CSA 317.2-15 ventilation requirements under all operating conditions.

.3 Monitor the Air Change Rate (Air Changes per Hour (ACH)) for each occupied space.

.4 Monitor CO_2 levels in the spaces indicated on the drawings, minimize ventilation rates during light occupancy periods, and automatically increase to maximums noted when required.

.1 Control the system's minimum outdoor air intake and the supply to each zone to meet code ventilation requirements under all operating conditions.

.1 Energy:

.1 Provide no more heating than is essential (no reheat).

.2 Provide no more cooling than is essential (no reheat).

.3 Shut off the supply air in the large conference rooms and classrooms when they are unoccupied.

.4 Shut systems down if all the spaces are scheduled to be unoccupied and allowed by CSA Z317.2 – 2015 (relative pressurization shall be maintained as required by CSA 317.2 Standard during unoccupied mode).

.2 General:

.1 Set-points shall be adjustable on the BAS OWS. All default set-points shall be tested, set and recorded during testing and balancing. Work with testing and balancing Agency to assist with TAB and verify default set-points.

.2 Final sequence of control shall be optimized by Consultant, Commissioning Agent and Controls Contractor.

.3 Commissioning and optimization shall also include other systems such as existing fire and smoke control system.

2.3 MONITORING

.1 The BMS monitors the following conditions and parameters as a minimum:

.1 Fire Devices

.1 All fire / smoke damper positions;

.2 Smoke detection (from fire alarm panel);

.2 Ventilation System:

.1 All motorized mechanical damper positions.

.2 Supply air temperature and humidity.

.3 Duct main static pressure.

.4 Exhaust air temperatures, humidity and CO_2 level.

.3 Room Level Controls

.1 Air Supply (l/s).

.2 Air Change Rate - Air Changes per Hour (ACH).

.3 Temperature (^oC).

.4 Humidity (where applicable).

.5 CO2 (where applicable).

.6 Occupancy mode (where applicable).

2.4 ALARMS AND SAFETIES

.1 All temperature, humidity, CO2, flow and pressure sensors alarm their high or low alarm condition, as defined in the system database, at the operators work station (OWS).

.2 A fan alarm is generated at the OWS when any motor status as sensed by a current

sensing relay does not match the commanded value for the supply fan VFD.

2.5 TREND LOGGING AND HISTORIAN

1. Set up trend logs with archiving as required for sustainability documentation, for troubleshooting, energy management and preventive maintenance.

2.6 RADIANT CEILING PANEL CONTROL:

.1 General Description

.1 Ceiling mounted radiant heating panels (heating water) are specified in some exterior rooms in the new Work Room 316 and Offices 303, 304, 305 and Store 302 as indicated on the drawings.

.2 The radiant panels will operate in sequence with the air valves where applicable.

.2 Components

.1 Radiant heating panels with control valves

.3 Related Points

.1 Outside air temperature

.2 BMS Space temperature sensors

.4 Related Systems

.1 Heating water system

.5 Normal Operation

.1 Space temperature sensor shall modulate radiant ceiling panel control valve to maintain space temperature at set point of 22˚C.

.2 Radiant ceiling panels control valve opens to provide heating only when the outdoor temperature is below 18˚C.

.3 Where there are space temperature sensors or duct temperature sensors which control supply air temperature, they shall also control the radiant panel control valve. The radiant panel control valve shall be sequenced on first, followed by the reheat when required.

.4 Where radiant panels are grouped, all applicable panels turn on/off together when in heating mode.

.6 Alarms

.1 If any temperature sensor is reading above or below its intended operating range a BMS alarm shall be initiated.

2.7 SPLIT SYSTEM AIR CONDITIONING UNITS SERVING ELECTRICAL ROOM

.1 Two ductless split system cooling only units (AC-WW-3-1 and AC-WW-3-2) with two roof mounted condensing units (CU-WW-3-1 and CU-WW-3-2) operate to provide cooling for Electrical room during non-free cooling time (when outdoor temperature is above 24ºC or below 9ºC).

.2 During non-free cooling time the two existing louvers shall be closed, and the two new split system units operate to cool the electrical room to its set point temperature.

.3 The two existing louvers actuators to be open during free cooling when outdoor temperature is between 10ºC and 23ºC.

.4 One ductless split system cooling only unit AC-3 with one roof mounted condensing unit CU-WW-3-3 operate to provide cooling for the new transformer in F/M Storage room.

.5 Scope: Outdoor units CU-WW-3-1, CU-WW-3-2, CU-WW-3-3 and Indoor units AC-WW-3-1, AC-WW-3-2 and AC-WW-3-3.

.6 The refrigeration contractor shall install and terminate interlock wiring between the air conditioning units and the associated remote condensing units on the roof.

.7 The BMS shall monitor dry contact alarm outputs at the Air Conditioning units control panel for recording and annunciation at the OWS(s).

.8 Wiring between the dry contacts and the BMS panels shall be by this contractor.

.9 Flow switch supplied with CU-WW-3-1, CU-WW-3-2 and CU-WW-3-3 to be field wired.

.10 Provide high space temperature alarm at BMS.

.11 BMS space temperature sensors.

.12 Provide amperage readings and supply air temperature readings for all split air conditioning units at BMS. Provide alarm for these points

2.8 WASHROOM EXHAUST FANS: EF-WW-3-1

.1 Components:

.1 Washroom exhaust inlet gravity backdraft damper.

.2 EF-WW-3-1 to be controlled and monitored by BMS system.

.3 Provide amperage readings for EF-WW-3-1 at BMS. Provide Alarm for these points.

.4 Fire Mode Operation:

.1 Exhaust fan shall stop.

2.9 EXHAUST FANS: EF-WW-3-2

.1 Components:

.1 EF-WW-3-2 to be controlled and monitored by BMS system.

.2 Exhaust fan EF-WW-3-2 control damper (CD-EF-WW-3-2).

.3 Interlock CD-EF-WW-3-2 with existing AHU-804 zone 20 control dampers.

.4 Provide amperage readings for EF-WW-3-2 at BMS. Provide Alarm for these points.

.1 When AHU-804 Zone 20 control dampers close, CD-EF-WW-3-2 closes.

.5 Fire Mode Operation:

.1 Interlock exhaust fan EF-WW-3-2 with existing AHU-804 for shut down during fire mode.

.2 Fan shall stop

2.10 EXHAUST FANS: EF-WW-3-3

.1 Components:

.1 EF-WW-3-3 to be controlled and monitored by BMS system.

.2 Exhaust fan EF-WW-3-3 control damper (CD-EF-WW-3-3).

.3 Interlock CD-EF-WW-3-3 with existing AHU-804 zone 3 & 4 control dampers.

.4 Provide amperage readings for EF-WW-3-3 at BMS. Provide Alarm for these points.

.1 When AHU-804 Zone 3 & 4 control dampers close, CD-EF-WW-3-2 closes.

.5 Fire Mode Operation:

.1 Interlock exhaust fan EF-WW-3-3 with existing AHU-804 for shut down during fire mode.

.2 Fan shall stop

2.11 TECHNOLOGY INTERFACE:

.1 Include for interface with the following: Lighting, Fire Alarm, occupancy sensors, Electric metering, etc. as outlined in the electrical specification.

2.12 DIVISION 26 ALARMS

.1 The BMS shall monitor Division 26 dry contact alarm outputs provided by Division 26 for recording and annunciation at the OWS(s). Systems to be monitored include Fire Alarm, Transformers etc. Final points list to be clarified with Div. 26.

.2 Various pieces of electrical equipment are specified complete with BACNet capabilities. Provide connection to the items and provide interface with the building's DDC system.

.3 Wiring between the dry contacts and the BMS panels shall be by Division 23 contractor.

2.13 MEDICAL GAS SYSTEMS

.1 General Description

.1 The BMS shall monitor medical gas alarm outputs for recording and annunciation at the OWS(s).

.2 Dry contacts are located at the "ZONE" and "MASTER" medical alarm panels, and the medical gas plant equipment.

.2 Related Points

.1 Master alarm panel

.2 Combination zone valve/alarm panel

.3 Stand-alone zone alarm panels

.3 Scope of Work:

.1 Wiring between the dry contacts and the BMS panels shall be by this contractor.

.2 Refer to Medical Gas equipment specifications and drawings for details.

.4 Alarms

.1 Provide alarm for any input point that is reading above or below the normal operating range.

.2 Alarm panel in the corridor outside the Biomed offices.

2.14 PLUMBING SYSTEMS

.1 General Description

.1 Floor drain traps equipped with trap primers are specified to be fed from BMS controlled solenoid valves

.2 Solenoid valves shall cycle on/OFF as per a programmed schedule.

.3 Refer to drawings for locations of solenoid valves.

2.15 FIRE ALARM SYSTEMS

.1 Refer to Spec Section 25 09 95.

END OF SECTION

ITEM	ACCEPTABLE PRODUCTS / SUPPLIERS / MANUFACTURERS	SHOP DWG.
CONTROL SYSTEMS	Reliable Controls, Houle Controls	X
CONTROL DAMPERS		
Low Leakage Type	Arrow-Foil PBDAF & OBDAF, Honeywell Moduflow D642 & D643, Johnson Proportion/Aire D-1200 & D-1300, Ruskin CD36, Tamco 1000, Nailor 1010,	X
Not Low Leakage Type	Honeywell, Johnson, Ruskin CD35, Nailor 1012	X
CONTROL DAMPER ACTUATORS	Belimo	X
CONTROL VALVES		X
CONTROL VALVE ACTUATORS	Belimo	X
		X

NOTE:

.1 The design is based upon the equipment listed in the equipment schedules and/or underlined in the Equipment Supplier Schedules.

.2 **X** Denotes required submission.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 This Section of the Specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts.

.2 Section 26 05 00 Common Work Results

.3 Section 26 27 26 Wiring Devices

.4 Section 26 24 16 Panelboards – Breaker Type

1.2 SYSTEM DESCRIPTION

.1 The facility shall have a stand-alone lighting control system interfaced to the central Building Management Control System (BMCS). Refer to system overview drawing for wiring diagram.

.2 Lighting control system shall the following components:

.1 Room controllers
.2 Low Voltage Wall Switches
.3 Photocell Sensors
.4 Daylight Sensors
.5 Occupancy Sensors
.6 Interfaces with BMCS

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings & product data in accordance with Section 26 05 .00.

.2 Retain the equipment supplier's representative to assist with the review of the equipment application at the shop drawing stage.

.3 Provide custom schematic shop drawings of the complete systems and devices specified in this section.

Part 2 Products

2.1 LOW VOLTAGE CONTROL - GENERAL

.1 Provide low voltage control for lighting and other systems as shown on plans and specified herein.

.2 Do not connect the secondaries of the control transformers in parallel or connect one side of the secondaries in common. All control transformers to be connected to the same phase.

.3 Standard of Acceptance:

.1 Reliable Controls

2.2 LOW VOLTAGE WALL SWITCHES

.1 Wall switches shall be flush mounted with associated hardware to fit into standard wall boxes. Switches shall be single push operation, with internal solid state circuit that continuously monitors the condition of the associated lighting control load relay and connecting wires. Key operated or secure switches as noted on drawings. Key shall be removable in either the 'enabled' or 'disabled' state.

.2 Each switch shall be clearly identified with a printed switch label. The label shall indicate the switch function, or area served, as indicated in Lighting Control Schedule. Labels shall be held in place with removable clear plastic cap and shall be field replaceable. Submit label schedule as part of the shop drawing submittal.

.3 Individual switches shall each contain a green "off" LED and a red "on" LED, thus continuously indicating the status of the associated lighting control load relay.

.4 Switches shall have color coded captive screw terminals.

.5 Provide wiring as recommended by the system manufacturer. Typically wiring will be stranded multi-conductor and jacketed.

.6 Switch plates shall be stainless steel or as otherwise indicated.

.7 Provide interfaces as required to group relays to common switches.

.8 Provide master switches in gang arrangements as required.

.9 Standard of Acceptance:

.1 Douglas Power: WR-86XX series (WRK for key, WNS-23XX for data)

.2 Watt Stopper: RS series (HDLS/L1,2,3,4 for data)

.3 General Electric

.4 Pre approved product

2.3 PHOTO CELL SENSORS (LOW VOLTAGE)

.1 Photo cells to be adjustable for switching at different light levels. Adjustments to be made at photo controller located at the respective relay panel or network controller.

.2 Provide interface at the respective low voltage relay panels to operate lighting individual relays or contactors or provide input to the network controller as required.

.3 The ambient light level shall be continuously displayed in either foot candles or lux on the photo controller's LCD. Set point adjustments shall be easy to set using the base controller's integral keypad.

.4 Interior photo cells to be flush mounted unless otherwise indicated and to suit location.

.5 Exterior photo cells to be weather proof type.

.6 Exterior photo cell sensor capable of sensing from 1-60,000 lux and a minimum of 4 independent channels of light level control

.7 Each photo cell sensor shall permit different relays to switch at different light levels. Lights shall be controlled by 'sensor only' or by a combination of time clock & light level.

.8 Standard of Acceptance:

.1 Douglas Power WPC series

.2 Watt Stopper HPC series

.3 Pre approved product

2.4 DAYLIGHT SENSORS

.1 Sensors shall be ceiling flush mounted and shall measure light reflected upward from the surface below. The sensor shall be easy to adjust with a range setting and a set-point slider located under the front faceplate.

.2 Sensors to automatically dim lighting by regulating dimmable ballasts to maintain constant light level. The sensing technology shall take into account daylight harvesting, aging of lamps and fixture deterioration.

.3 The sensor shall be compatible with ballast that uses the 0-10V dimming control method. Follow manufacturer's recommendation on maximum number of ballasts that can be connected in parallel with one sensor.

2.5 OCCUPANCY SENSORS WALL SWITCHES

.1 Occupancy sensors shall be capable of detecting presence in the floor area to be controlled using dual technology: passive infrared (PIR) and microphonics. Upon sensing motion using PIR technology, the sensor signals ON, activates the sound detector and starts an internal timer. Timer will be continually reset whenever motion is seen or sound is detected.

.2 Sensors shall be complete with the following:

.1 LED status indicator.

.2 Low profile recessed design to suit faceplate.

.3 Time delay range from 30 seconds to 20 minutes.

.4 Auto On or Manual ON selectability.

.5 Manual override capability.

2.6 OCCUPANCY SENSORS – CEILING MOUNTED

.1 Occupancy sensors shall be capable of detecting presence in the floor area to be controlled using dual technology: passive infrared (PIR) and microphonics. Upon sensing motion using PIR technology, the sensor signals ON, activates the sound detector and starts an internal timer. Timer will be continually reset whenever motion is seen or sound is detected.

.2 Provide a bypass switch (or pin) to defeat automatic function that shall be visible from the floor when installed. Function selection: on/off switching or off-only switching.

.3 Sensors shall have the ability to directly control up to four low voltage relays directly and have the ability to connect low voltage wall switches in parallel to each relay for occupant override.

.4 LED status indicator.

.5 Low profile recessed design not protrude more than 25mm down from the ceiling.

.6 Multi-directional 360 degree detection.

.7 Time delay range from 30 seconds to 20 minutes.

.8 PIR lens capable of being rotated or swivelled.

.9 Unit assembly shall have one set of normally open and one set of normally closed auxiliary contacts.

2.7 POWER PACKS:

.1 Power Packs shall be self contained transformer relay module complete with snap-in nipple for installation in a typical electrical box knockout.

.2 Unit shall have dry contacts capable of switching line voltage (120V or 347V) relays controlling up to 20 Amp ballast load or 13 Amp incandescent or 13 Amp fluorescent ballast load.

.3 Unit shall provide 24 volt DC @ 150 mA output capable for controlling a minimum of three (3) occupancy sensors plus remote slave packs as required.

.4 Unit shall be capable of parallel wiring without regard to primary AC phasing.

.5 Unit shall be CSA approved.

.6 Provide addressable Power Pack as required to suit system.

.7 Standard of Acceptance:

.1 Watt Stopper B120E-P (or B347D-P – 347V) (Addressable type equal to LC 100)

.2 Pre approved product

2.8 SLAVE PACK:

.1 Slave pack shall have similar features as the Power Packs but without transformer.

.2 Standard of Acceptance:

.1 Watt Stopper S120/347EP

.2 Pre approved product

2.9 WIRING

.1 Provide all control wiring as required and recommended by the manufacturer.

.2 The removal of any addressable device shall have no effect on the communication between other devices and the relay panels in the rest of the lighting control network.

Part 3 Execution

3.1 INSTALLATION

.1 Provide and install all equipment including all components needed to make the system work in the intended manner.

.2 Confirm control wiring individual conductor sizes with equipment manufacturer prior to installation.

.3 Retain the equipment supplier's representative to assist with the proper device placement at the rough-in stage.

.4 Confirm control wiring individual conductor sizes with equipment manufacturer prior to installation.

3.2 INSPECTION

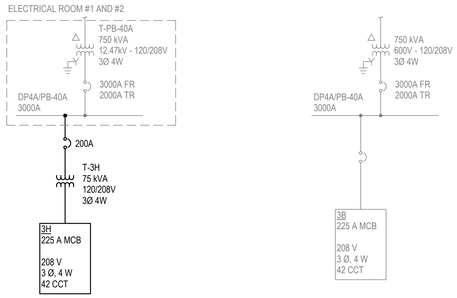
.1 Coordinate controls and interfaces to other Divisions including the BMCS.

3.3 COMMISSIONING

.1 Check and confirm that all control devices and sensors work in the intended manner.

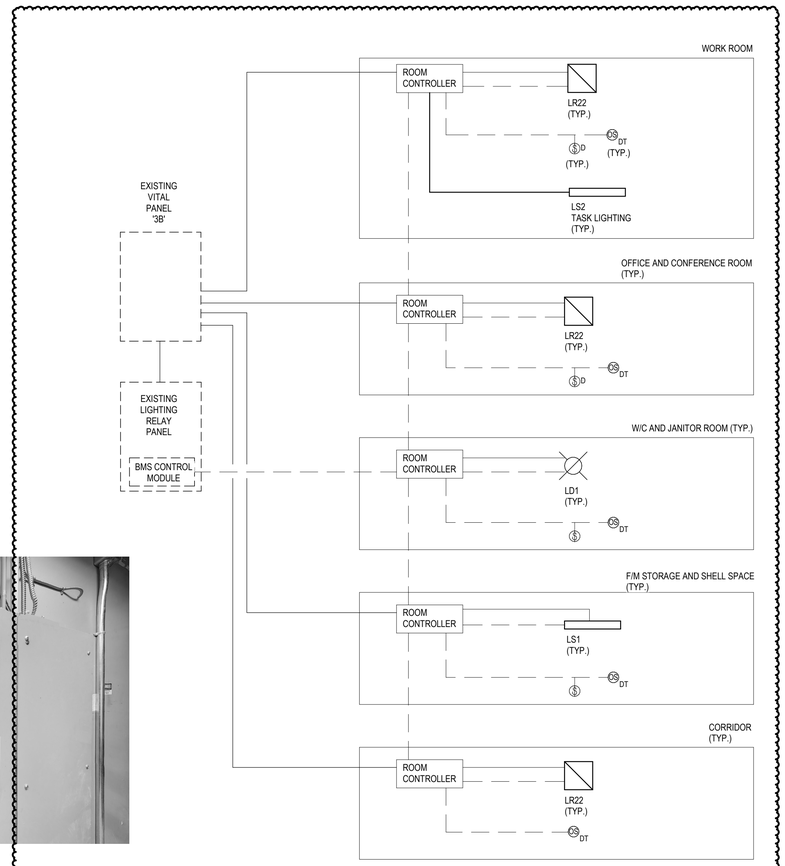
.2 Retain the equipment supplier's representative to review the coverage patterns and finally adjust sensor settings after the move in and furniture installation. Provide a Suppliers sign off letter and a schedule indicating the set points of all devices.

END OF SECTION



PARTIAL SINGLE LINE DIAGRAM

n.t.s



LINE VOLTAGE WIRING

LOW VOLTAGE WIRING

NOTES:

1. PROVIDE ROOM CONTROLLER, DIMMER SWITCH AND OCCUPANCY SENSOR TO MATCH EXISTING LIGHTING CONTROL SYSTEM (RELIABLE CONTROLS).
2. LIGHTING CONTROL BEHAVIOR:
   a. WORK ROOM: ALL LIGHTING FIXTURE TYPE 'LR22' TO BE MANUAL ON,DIMMABLE AND AUTO OFF UPON 15 MINS OF INACTIVITY, TASK LIGHTING FIXTURE TYPE 'LS2' TO BE MANUAL ON/OFF BY PULL CORD AND AUTOMATICALLY OFF UPON 15 MINS OF INACTIVITY.
   b. TYPICAL OFFICE AND CONFERENCE ROOM: LIGHTS TO BE MANUAL ON, DIMMABLE AND AUTO OFF UPON 15 MINS OF INACTIVITY.
   c. TYPICAL W/C, JANITOR ROOM, STORAGE AND SHELL SPACE: LIGHTS TO BE MANUAL ON, AND AUTO OFF UPON 15 MINS OF INACTIVITY.
   d. CORRIDOR: LIGHTING TO BE DIMMED TO 50% UPON 15 MINS OF INACTIVITY, AUTO 100% ON WHEN DETECTING MOVEMENT.

LIGHTING CONTROL WIRING DIAGRAM

n.t.s

Stantec

Name: **3B** | Volts: 208Y/120V | Mains Type: | Type: PANELBOARD
Location: Space 312 | Phases: 3 | Mains Rating: 100 A | AIC Rating:
Supply From: | Wires: 4 | Mounting: SURFACE
Serves: | Lugs: | Enclosure: NEMA 1

Notes:

CKT	Circuit Description	Trip	Poles	CB	A		B		C		CB	Poles	Trip	Circuit Description	CKT
1	LIGHTING	15 A	1		960	696						1	15 A	OTHER	2
3	LIGHTING	15 A	1				969								4
5	LIGHTING	15 A	1						295						6
7	LIGHTING	15 A	1		611										8
9	LIGHTING	15 A	1				1080								10
11	OTHER	15 A	1						98						12
13	LIGHTING	15 A	1		616										14
15	OTHER	15 A	1				98								16
17	OTHER	15 A	1						0						18
19	OTHER	15 A	1		36										20
21	OTHER	15 A	1				0								22
23	OTHER	15 A	1						36						24
25	OTHER	15 A	2		1331										26
27	--	--	--	--			1331								28
29	OTHER	15 A	1						696						30
31	OTHER	15 A	2		1331										32
33	--	--	--	--			1331								34
35	OTHER	15 A	2						1082						36
37	--	--	--	--	1082										38
39	OTHER	15 A	1				36								40
41	OTHER	15 A	1						696						42
				Total Load:	6.66 kVA		4.85 kVA		2.90 kVA						
				Total Amps:	58 A		43 A		24 A						

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	3355 VA	125.00%	4193 VA		
Motor	2662 VA	125.00%	3328 VA	Total Conn. Load:	14412 VA
Other	7218 VA	100.00%	7218 VA	Total Est. Demand:	16210 VA
Lighting (Normal)	1177 VA	125.00%	1471 VA	Total Conn.:	40 A
				Total Est. Demand:	45 A

CB Legend (blank = circuit breaker):
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

Notes:

Stantec

Name: **3H** | Volts: 208Y/120V | Mains Type: | Type: PANELBOARD
Location: F/M STORAGE 317 | Phases: 3 | Mains Rating: 200 A | AIC Rating:
Supply From: | Wires: 4 | Mounting: RECESSED
Serves: | Lugs: | Enclosure: NEMA 1

Notes:

CKT	Circuit Description	Trip	Poles	CB	A		B		C		CB	Poles	Trip	Circuit Description	CKT
1	HK RECEPT. - 310,311& 313	15 A	1		1200	0						1	15 A	LAV - W/C 307/308	2
3	HK RECEPT. - 306	15 A	1				900	0				1	15 A	MEDICAL GAS ALARM PANEL	4
5	RECEPT. - W/C 307 & 308	15 A	1						600	0		1	15 A	HSS - WORKROOM	6
7	RECEPT. - WORK ROOM 316	15 A	1		1000										8
9	RECEPT. - WORK ROOM 316	15 A	1				1000								10
11	RECEPT. - WORK ROOM 316	15 A	1						1000						12
13	RECEPT. - WORK ROOM 316	15 A	1		1000										14
15	RECEPT. - WORK ROOM 316	15 A	1				1000								16
17	RECEPT. - WORK ROOM 316	15 A	1						1000						18
19	RECEPT. - WORK ROOM 316	15 A	1		1000										20
21	RECEPT. - WORK ROOM 316 - ISLAND	15 A	1				1000								22
23	RECEPT. - WORK ROOM 316 - ISLAND	15 A	1						1000						24
25	RECEPT. - WORK ROOM 316 - ISLAND	15 A	1		1000										26
27	HK RECEPT.	15 A	1				900								28
29	RECEPTACLE GFCI	15 A	1						360						30
31															32
33															34
35	RECEPT. - OFFICE 317/318	15 A	1						720						36
37	PRINTER	15 A	1		180										38
39	HK RECEPT.	15 A	1				900								40
41	RECEPT. - OFFICE 315	15 A	1						360						42
43	RECEPT. - OFFICE 303 & 304	15 A	1		1080										44
45	HK RECEPT. - 306 & STR. 302	15 A	1				900								46
47	RECEPTACLE GFCI	15 A	1						540						48
49	RECEPTACLE GFCI	15 A	1		1000										50
51	RECEPTACLE GFCI	15 A	1				1000								52
53	RECEPTACLE GFCI	15 A	1						500						54
55															56
57															58
59															60
				Total Load:	7.46 kVA		7.60 kVA		6.08 kVA						
				Total Amps:	64 A		65 A		51 A						

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	0 VA	0.00%	0 VA		
Receptacle (C)	10360 VA	98.26%	10180 VA	Total Conn. Load:	21140 VA
Receptacle (V)	5400 VA	100.00%	5400 VA	Total Est. Demand:	20960 VA
Receptacle GFCI	5380 VA	100.00%	5380 VA	Total Conn.:	59 A
				Total Est. Demand:	58 A

CB Legend (blank = circuit breaker):
G = GFCI S = Shunt Trip D = Switching Duty A = AFCI H = HID Rated C = HACR Rated † = Existing Circuit ‡ = Revised Circuit

Notes:

Stantec

Stantec Consulting Ltd.
1100-1111 Dunsmuir Street
Vancouver, BC V6B 6A3
Tel: (604) 696-8000 • www.stantec.com

Consultant

Revision	By	Appd	YYYY.MM.DD
1 ADDENDUM 02	BS	TF	2022.04.05

Issued	By	Appd	YYYY.MM.DD
ISSUED FOR TENDER	BS	TF	2022.02.07
ISSUED FOR CLIENT REVIEW	BS	TF	2021.12.24
ISSUED FOR DD	MG	TF	2021.05.07

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

northern health
the northern way of caring

Northern Health

University Hospital of Northern B.C. - Cardiac

1475 Edmonton St, Prince George, BC V2M 1S2

Project No.:144320012

File Name: N/A

Author	Designer	Checker	08/25/21
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

SYSTEM OVERVIEW

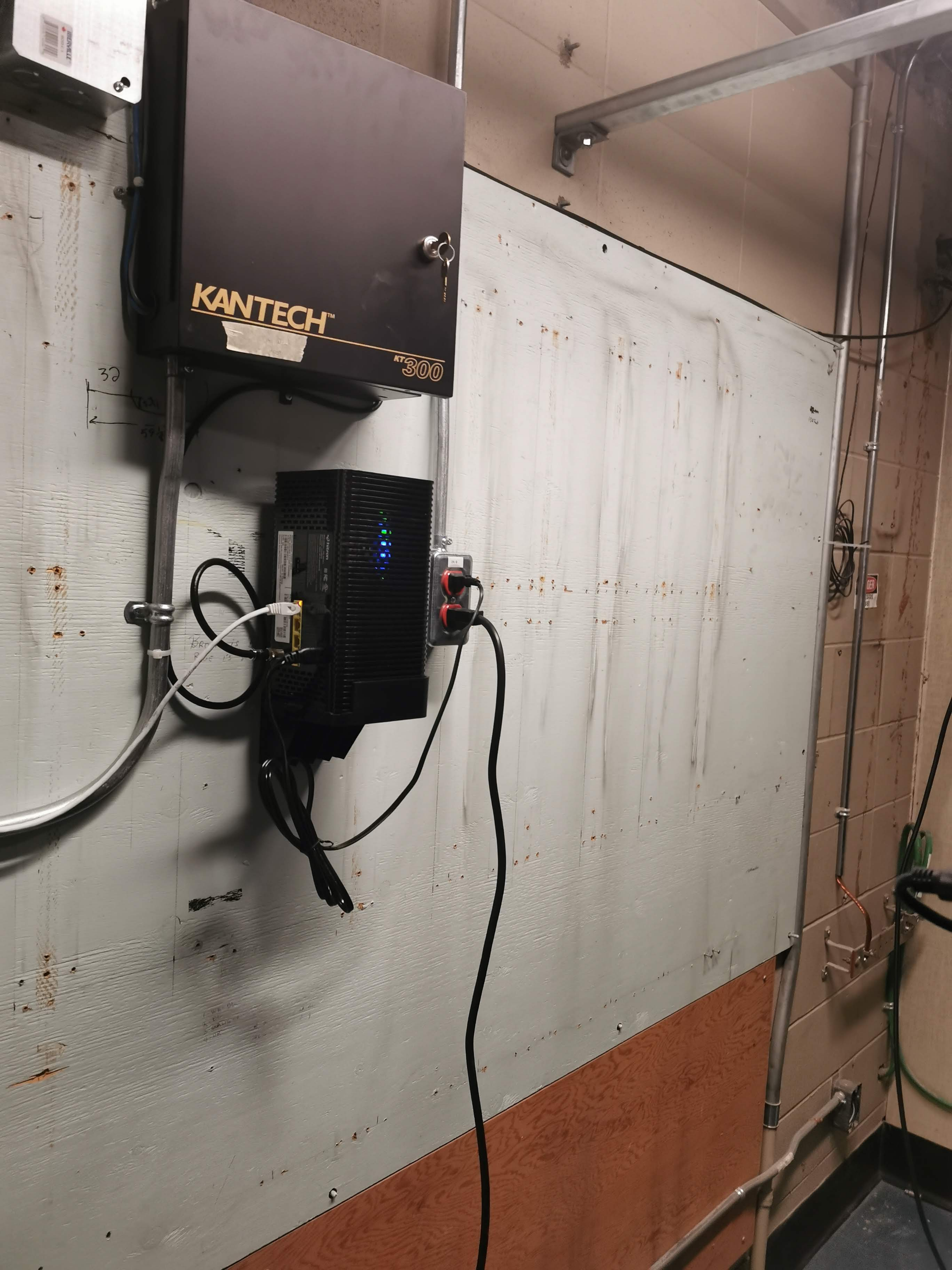
Scale: 1 : 1

Revision: **1**

Drawing No. **E003**


2021
2CC3


DOOR
HOLDERS
KANTECH™
KT300
Master Power Supply
Made in USA
PELCO


KANTECH™
KT300