

ATTACHMENTS

No.	Title	Issue Date
23 82 33 13	Convectors	Nov 07, 2021
11 53 13 R1	Laboratory Fume Hoods	Nov 07, 2021
22 33 00 01	Domestic Water Storage Tanks	Nov 07, 2021
SKM-5	Ground Floor – Ventilation Revisions	Nov 07, 2021
SKM-6	First Floor – Ventilation Revisions	Nov 07, 2021
SKM-7	Ground Floor – Heating Revisions	Nov 07, 2021
SKM-8	SAV Schedule Revisions	Nov 07, 2021
SKM-9	EAV Schedule Revisions	Nov 07, 2021
SKM-10	Ground Floor – Domestic Services Revisions to Hose Reel Piping	Nov 07, 2021
SKM-11	Ground and First Floor – Domestic Services Pipe Size Revisions	Nov 07, 2021
SKE-1	Electrical Controls Conduit Layout for Exterior Container	Nov 07, 2021
SKE-2	Electrical TV Outlets for Autonomy Common Development Lab	Nov 07, 2021
SKE-3	Electrical Storage FL-125 Receptacle Relocation	Nov 07, 2021
SKE-4	Electrical Fire Alarm Device Additions	Nov 07, 2021
SKE-5	Electrical Fire Alarm Device Additions	Nov 07, 2021
SKE-6	Electrical Battery Unit Addition to ATS Room	Nov 07, 2021

CHANGES TO THE PROJECT MANUAL

.1 SECTION 00 01 10

Add "Section 23 82 33 13 Convectors . . . 3 (pages)" under Division 23.

.2 SECTION 08 71 00

Delete Set 23.0 under 3.5 Door Hardware Schedule.

.3 SECTION 21 13 13

Add Paragraph 2.10 Excess Pressure Pump as follows:

- .1 Replace existing pump on sprinkler piping riser.
- .2 Pump and Motor unit:
 - .1 Approved for automatic wet pipe fire extinguishing sprinkler systems; complete with pilot light panel, differential motor control switch, high pressure switch, and low pressure switch.
 - .2 EEMAC Class B squirrel cage induction 1725 rpm, continuous duty, drip proof, ball bearing, maximum temperature rise 50 degrees C, 0.25 kW, 120/1/60.
 - .3 Capacity: 7.5 L/min
- .3 Maximum operating pressure of 1034 kPa. Maximum differential of 517 kPa.
- .4 Shut-off valve and strainer on pump inlet. Relief valve, check valve and shut-off valve on discharge connections.

.4 SECTION 23 82 33 13 (attached)

Add Section 23 82 33 13 Convectors as attached to the project specifications.

.5 SECTION 23 31 00

Add subsection 2.12.6 Duct Smoke Detector as noted below:

- .6 Intelligent photoelectric smoke detector (duct smoke detectors only):
 - .1 Integral microprocessor.
 - .2 Non-volatile memory.
 - .3 Automatic device mapping.
 - .4 Electronic addressing.
 - .5 Environmental compensation.
 - .6 Identification of dirty or defective detectors.
 - .7 Twin status LED's.
 - .8 Standard detector mounting base.
 - .9 Intelligent duct smoke detector housing
 - .1 High impact plastic housing with clear cover.
 - .2 Intelligent analog duct sensor.
 - .3 Sampling tubes.

- .6 SECTION 00 01 10
Add "Section 23 33 00 01 Domestic Water Storage Tanks (3 pages) under Division 23.
- .7 SECTION 10 44 16
Revise 2.1.1.1 Size from "2.25 kg" to "4.5 kg".
Revise 2.2.3 Door Glazing from "Glass, clear, 5 mm thick, tempered." to "Glass, clear, 6mm, double pane with adhesive center."
- .8 SECTION 11 53 13 (attached)
Replace specification section with the attached 11 53 13 Laboratory Fume Hoods Revision
- .9 SECTION 21 13 13
Revise 2.4.2 Sprinkler head types:
Type A: Upright Bronze (intermediate or High Temperature)
Type B: Chrome Pendant
Type C: Dry Pendant
Sidewall
- .10 SECTION 22 33 00 01 (attached)
Add "Section 22 33 00 01 Domestic Water Storage Tanks" attached.
- .11 SECTION 23 33 16
Delete paragraph 2.2 Combination Fire and Smoke Dampers.
- .12 SECTION 25 09 00
Add general notes as follows:
.1 The sequence is preliminary in nature to describe the intent. A meeting with the controls contractor and designer is required to finalize the sequence.
.2 Controls contractor shall submit graphics screens for review and comment prior to implementation.
.3 Controls contractor shall be responsible for programming laboratory pressurization (AHU-1 zones) based on a volumetric offset strategy. Pressure zones will include three (3) different modes:
.1 Occupied maximum airflow (per valve)
.2 Occupied minimum airflow (per valve)
.3 Unoccupied minimum airflow (per valve)

.13 SECTION 25 09 00

Add section 1.2.16 BAS Misc. Integration as follows:

1.2.16 BAS Misc. Integration

- .1 Various items are to be integrated into the BAS for information purposes and alarming. A summary of the integration items and associated controls action is listed below:

ITEM	ACTION	MONITORING
Water Meters	Wire to the BAS and sum the pulses.	Show the total water consumed for each meter. Reset each month and log the month totals for a period of 3 years prior to removing the data
Elevator Sump	Wire to the BAS	Generate an alarm
Sanitary Sump	Wire to the BAS	Generate an alarm
Glycol Tanks	Wire to the BAS	Generate an alarm
Main Electrical Meter	Provide BACnet integration	Show the instantaneous kWh and kW values as well as the monthly total and monthly peak demand. Reset each month and log the month totals for a period of 3 years prior to removing the data
Lighting Control System	Provide BACnet integration	Show a floor plan with the occupancy of each space from the lighting control system.
Fire Alarm	Provide BACnet integration	Show a graphic with the current ATS status
Automatic Transfer Switch (ATS)	Provide BACnet integration	Show a graphic with the current ATS status
Security System	Provide BACnet integration	Show a floor plan with the access to each space that contains a card reader. Show the ID of the swipe card when occupied
Building Power Monitor	Provide BACnet integration	Show the instantaneous kWh and kW values for each as well as the monthly total and monthly peak demand. Reset each month and log the month totals for a period of 3 years prior to removing the data. Show on a dedicated graphic page
Photocell and Exterior Lights	Provide a BI from the photocell and a BO to the exterior lighting contractor	When the photocell is engaged, enable the exterior lights. If the photocell is engaged during the day (8 am – 5 pm) generate an alarm

Add Section 1.3 Energy Dashboard as follows:

- .1 Two energy dashboards shall be installed per drawings. Dashboard shall be a 1525mm 4k monitor. Controls contractor to install all mounting hardware and electronics for dashboard display and DDC integration.
- .2 The dashboard shall display 4 independent screens that shall cycle at a fixed time interval (to be determined with user review once developed). One display shall be the energy use details in bar graph format and total consumption format. Comparison values shall be provided for the bar graph display.
- .3 Pie charts for each energy source and further breakdown per load as per item 7 below.
- .4 Savings summary screen for the energy units, outlined per hour, per day, per year with text. Savings shall be compared to "real world" values. Real world values to include, cars, houses, etc. Values to be determined with successful vendor.
- .5 Technology screens outlining the building's features, with a text based description and a picture of the technology. Text and photo to be provided by owner/engineer.
- .6 Final displays shall be agreed upon by owner, engineer and controls contractor. This section is a general outline with one meeting required for graphic outline, one for the first review session post preliminary graphic and one for final review.
 - .1 Energy units to be displayed are:
 - .1 Total electricity (from electrical entrance)
 - .2 Fan power energy (from VFD's)
 - .3 Pumping energy (from VFD's)
 - .4 Plug load and lighting energy (from sub-metered panels)
 - .5 Total low grade heating energy (from BTU meter)
 - .6 AHU heating energy (from energy valve)
 - .7 Domestic heating energy (from energy valve)
 - .8 Perimeter heating energy (total-AHU-domestic)
 - .9 Total cooling energy (from BTU meter)
 - .10 AHU Cooling energy (from energy valve)
 - .11 Fan coil energy
 - .12 Total water use

.14 SECTION 28 23 00

Revise section 1.6.2 to read as follows:

""Enter and edit password protected CCTV programs and save them to NVR for future use."

Revise section 2.2 as follows:

2.2 WEATHERPROOF DAY/NIGHT OUTDOOR PTZ CAMERA

- .1 8.0 Megapixel IP based camera with POE capability.

- .2 Automatic removable IR cut filter for IR sensitivity at night.
- .3 IR PTZ (minimum 350m).
- .4 Tracks targets with 360° endless rotation.
- .5 Wide dynamic range progressive scan CMOS image sensor.
- .6 Active pixels: 1920(H) x 1080(V).
- .7 30 x zoom.
- .8 .8 Mounted on appropriate bracket, suitable for rooftop or parapet mounting in high winds.
- .9 IKIO IP66 rated enclosure.
- .10 Lens wiper.
- .11 Video analytics embedded in camera (not software overlay) which must detect the following:
 - .1 Appearance – search for faces and vehicles of interest.
 - .2 Loitering.
 - .3 Cross beam.
 - .4 Objects appear in area.
 - .5 Objects stop in area.
 - .6 Camera tampering.
- .12 Up to 64 privacy zones, coordinate with Departmental representative to witness testing and demonstrations as well as indicate areas to be masked.

Revise 2.4.1.1 as follows:

“Desktop/Tower form factor complete with mouse, keyboard and supports, one high resolution 24” desk monitor and 4k 65” monitors as indicated on the plans and in the specifications. See 11 52 33 for exact wall monitor requirements.”

Add sections 2.4.1.10 and 2.4.1.11 as follows:

- .10 8TB Hard drive.
- .11 Joystick controller for camera control.

Clarification: Camera to be supplied and installed by electrical contractor described in section 2.1 that is to be tied into the existing system must be compatible with the existing Avigilon system (conduit and cable tray by the contractor, wiring and terminations by SSC).

.15 SECTION 28 31 00.01

Delete paragraph 2.3 from this specification.

CHANGES TO THE DRAWINGS

.1 DRAWING A-00.2

Revise D018 Door Type from "3" to "2"

Add to D018 NOTES "PROVIDE 350x1085 AIR TRANSFER GRILLE PARALLEL TO AND ALIGNED WITH GLAZED LITE OF SAME HEIGHT. MAINTAIN 150mm FROM DOOR EDGE."

.2 DRAWING A-02.2

Revise Construction Note 16 as follows:

16. PROVIDE 16mm GYPSUM BOARD PATCH AND FIRESTOP EXISTING AND NEW PENETRATIONS THROUGH 1 HOUR FIRE SEPARATION FOR FULL EXTENT OF WALL ABUTTING ADJACENT BUILDING AND LINK. SEAL PENETRATIONS THROUGH FIRE SEPARATION AT LINK PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES WITHIN BUILDING. REFER TO DIGITAL BUILDING SCAN FOR QUANTITY AND TYPES OF OPENINGS AND PENETRATIONS.

.3 DRAWING A-02.3

Revise Construction Note 13 as follows:

13. FIRESTOP EXISTING AND NEW PENETRATIONS THROUGH 1 HOUR FIRE SEPARATION FOR FULL EXTENT OF WALL ABUTTING ADJACENT BUILDING AND LINK. SEAL PENETRATIONS THROUGH FIRE SEPARATION AT LINK PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES WITHIN BUILDING. REFER TO DIGITAL BUILDING SCAN FOR QUANTITY AND TYPES OF OPENINGS AND PENETRATIONS.

Add partition type P6 to east interior wall surrounding door D114.

.4 DRAWING A-02.5

Revise ACT ceiling height at east end of Corridor FL-023 and within Corridor FL-025 to from "3000" to "**2440**".

Revise ACT ceiling height at west end of Corridor FL-023 from "3000" to "**2540**".

Add GB ceiling/bulkhead with height of 2390mm approximately 1200mm east of gridline 7 within in Corridor FL-023 at lower landing of ramp to allow for transition between ACT heights. Detail similar to 4/A09.3.

Revise GB ceiling/bulkhead height tag at transition from Corridor FL-023 to Corridor FL-034 from "2950" to "**2390**".

.5 DRAWING A-02.7

Revise 2 Hour fire separation linetype along Gridline 20 to 1 Hour.

.6 DRAWING A-02.8

Revise 2 Hour fire separation linetype along Gridline 20 to 1 Hour.

.7 DRAWING A-09.3

Revise detail 1/A09.3 as follows:

Revise note "ACT@ 3000 AFF" to "**ACT@ 2440 AFF**".

Revise note "OUTLINE OF WALK-IN COOLER/FREEZER. OVERALL HEIGHT +/- 3000" to "**OUTLINE OF WALK-IN COOLER/FREEZER. OVERALL HEIGHT 2600 +/-**"

Revise detail 4/A09.3 as follows:

Revise note "ACT@ 3000 AFF" to "**ACT HEIGHT AS INDICATED ON RCP**".

Revise note "GB BULKHEAD @ 2950 AFF, PAINTED GB FINISH ON ALL EXPOSED FACES" to "**GB BULKHEAD HEIGHT AS INDICATED ON RCP, PAINTED GB FINISH ON ALL EXPOSED FACES**".

.8 DRAWING M-01.1

Add note: Provide sediment interceptor for each Dunk Tank in FL033.

.9 DRAWING M-01.3 & SKM-10 (attached).

Revise DCW piping to Hose Reels in FL050 to 20 mm, add 20 mm DHW and thermostatic mixing valve to hose reels as per sketch SKM-10.

.10 DRAWING M-01.3, M-01.4 & SKM-11 (attached).

Revise DCW and DHW lines to Exterior Hydrant outside of FL-050 to 20 mm as per sketch SKM-11.

.11 DRAWING M-02.1 & SKM-5 (attached).

Revise ventilation on ground floor as per sketch SKM-5 as follows:

- Provide new SAV-22 and SAV-23 in corridor
- Revise SA Duct to FL-027 and FL-035 to 400 mm.
- Revise EA duct to FL-027 and FL-035 to 400x350.
- Revise Ventilation in FL-035 as per sketch.

.12 DRAWING M-2.2, SKM-6 (attached).

Revise Ventilation on First Floor as per sketch SKM- 6 as follows:

- .7 Provide 400 x350 SA duct to Ground Floor from 1200 x 600 main.

.13 DRAWING M-03.1 & SKM-7 (attached).

Provide heating piping to RHCs in Corridor FL-023 per sketch SKM-7.

.14 DRAWING M-04.1.

Add size to CSW piping to Ballast Tank – 50mm.

.15 DRAWING ME-01.2, SKM-8 & SKM-9 (attached).

Revise SAV Schedule and EAV Schedule per sketches SKM-8 and SKM-9.

.16 DRAWING E-03.1 & SKE-1 (attached).

Contractor to supply and install empty 41mm conduit complete with pull cord from the ceiling space of room FL-047 to the exterior wall above gridline Y and on gridline 21 for future controls for the modular unit. Cap conduit in ceiling space and on exterior wall and label "Spare conduit for future exterior container controls". Refer to SKE-1 for further details.

.17 DRAWING M00.0

Sprinkler Legend Update:

'New Upright Sprinkler Head' to 'New Type A Upright Sprinkler Head'

'New Pendant Sprinkler Head' to 'New Type B Pendant Sprinkler Head'

'New Dry Sprinkler Head' to 'New Type C Dry Pendant Head'

'New Sidewall Sprinkler Head' to 'New Type D Sidewall Sprinkler Head'

.Fire Protection Legend Update:

FE-1 symbol to represent 4.5kg multi-purpose fire extinguisher complete with semi-recessed fire extinguisher cabinet.

.18 DRAWING M02.4

Detail 6 Diffuser/Grille Schedule: Supply air diffusers S-9 & S-10 shall be laminar flow type. Sizes shall be per manufacturer's instructions for flow rates indicated.

.19 DRAWING M02.6

Detail 4 AHU-1 Dimension Detail:

Update External Static Pressure to 500 Pa and Total Static Pressure to 1134Pa.

.20 DRAWING M03.3

Detail 6 Buffer Tank Schedule: update note 1 to read as follows:

- .1 Tanks to be supplied with four (4) flanged or grooved NPS 6 connections with 19mm tapped for temperature sensors.

.21 DRAWING M04.1

Room FL-037: Revise Pump Tag from RALP-1 to BLAP-1.

.22 DRAWING M04.3

Room FL-037: Revise Pump Tag from RLAP-1 to BLAP-1.

Revise Note: 'See Specification Section 22 67 00, Paragraph 2.3'
(added in Addendum No 1)

.23 DRAWING M06.1

Fire Protection Legend Update: Room FL-037: Revise Pump Tag from RLAP-1 to BLAP-1.

Room FL-053 – Add note: Existing SSW pumps are 10 HP, 575/3/60.FE-1 symbol to represent 5kg multi-

purpose fire extinguisher complete with semi-recessed
fire extinguisher cabinet.

.24 DRAWING ME1.1

Reference Return and Exhaust Fan Schedule:

For Laboratory Exhaust Fans EF-1a, EF-1b, EF-1c add the
following specific notes:

- .1 Interlock fan with integral isolation damper
- .2 Provide NEMA 3R disconnect at roof mounted fan
- .3 Provide dedicated 120V/15A feed for damper actuator motor
power. Feed from panel ELA. Wire to be 2#12RW90 +
#12BOND in 21mmC.

.25 DRAWING ME1.4

Update EQ-68 Large Wall Monitor as follows:

EQ-68 Large Wall Monitor

Comply with all items listed in 11 52 33 Monitors.

CONTRACTOR supplied and installed

.26 DRAWING E00.1

Modify legend to denote that all fire alarm horns are to be horn/strobe
combination type.

.27 DRAWING E02.1

Supply and install additional battery unit in pump room FL-053, circuit to
existing circuit in the room.

Supply and install exit sign in FL-008 above the door between FL-008 and FL-
007, circuit to ELB-2

Supply and install two (2) exit signs in FL-007, one above the double doors and
another above the single door, circuit to ELB-2

.28 DRAWING E02.2 & SKE-6

Supply and install one (1) battery unit in ATS room just below gridline V and to
the right of gridline 10, circuit to ELA-4. Reference SKE-6 attached.

.29 DRAWING E03.1 & SKE-3

Relocate receptacles in room FL-125 as indicated on attached sketch SKE-3.

.30 DRAWING E04.1 & SKE-2, SKE-4, SKE-5

Change all fire alarm horns to be horn/strobe combinations.

Supply and install one (1) fire alarm horn/strobe in generator room FL-007 as
shown on attached sketch SKE-4.

Supply and install one (1) manual pull station on the latch side of the single door in FL-007

Supply and install one (1) fire alarm horn/strobe in service corridor FL-048 as shown on attached sketch SKE-5

Supply and install one (1) fire alarm horn/strobe on the exterior wall of the autonomy common development lab FL-047 as shown on attached sketch SKE-5.

Supply and install one (1) fire alarm horn/strobe in the pump room FL-053.

Supply and install HDMI cable back to CCTV workstation as shown on the attached sketch SKE-2

.31 DRAWING E04.2 & SKE-4

Change all fire alarm horns to be horn/strobe combinations.

Supply and install one (1) fire alarm horn/strobe in corridor FL-131 on the wall opposite the kitchenette as shown on attached sketch SKE-4.

.32 DRAWING E06.2

All sub-meters are to be tied into the building automation system.

QUESTIONS AND ANSWERS

- .1 In regards to the domestic hot water and buffer tanks on this project:

Q. Are DHWT-1 and DHWT-2 new or existing equipment?

A. DHWT-1 & DHWT-2 are new equipment.

Q. If new, what is the size and performance of the “electric domestic hot water final (DHWT-1)” on drawing M01.6?

A. Reference Water Heater Schedule on ME-1.3.

Q. Please confirm the number and size of the connections on the buffer tanks. Information in the schedule (M03.3), schematic (M03.6) and specification (23 21 16, part 2.4.3) is conflicting.

A. Buffer tanks to be supplied with four (4) NPS 6 connections. This will be clarified in addendum.

- .2 **Q. For Access control please confirm if it is acceptable to satisfy the functional requirement of adding the total number of access control doors (that is to say quantities, types and locations of reader controllers and Network Controllers are at the discretion of the security integrator).**

A. Per Security Access System Riser, 1/E05.3, door controllers should be located in accessible areas within service rooms, not above doors. Quantities of network and reader controllers are at the discretion of the security integrator.

- .3 **Q. For Access control please confirm 4 door controllers may be installed instead of 2 door controllers?**

A. We do not understand the question. Is this referring to network controllers, reader controllers or automatic door operators? Please reference pertinent drawing as well.

- .4 **Q. For Access control please confirm if access control door cabling can be pulled back to central location(s). Installing multiple door controllers, particularly above door locations, is less secure, more expensive and will present operational problems for the end user when servicing is needed.**

A. Per Security Access System Riser, 1/E05.3, door controllers should be located in accessible areas within service rooms, not above doors.

- .5 **Q. For Access control, Kantech Network controllers can control up to 128 door controllers. Please confirm if one KT-NCC Network Controller is acceptable.**

A. Network controllers are permitted to be sized and installed per manufacturer's recommendations and instructions. Network speed and traffic integrity is the sole responsibility of the manufacturer. Through shop drawing review, these details will be investigated further.

- .6 **Q. For CCTV what manufacturer and model is currently in use for the head end?**

A. The existing system is Avigilon.

.7 **Q. For CCTV please confirm cameras will connect to network switches by others.**

A. *"ST-002-2 CCTV Camera to be integrated into existing CCTV network by SSC.*

FL-047 CCTV Camera is for use by the research group and will be POE tied into research equipment by this contractor. This contractor also to provide CAT6 wiring from roof to FL-047.

Existing CCTV Camera's mounted to building exterior and indicated as to remain shall be maintained in place throughout construction."

.8 **Q. Can you tell me the dimensions of room FL-016 and what the walls are made of? I need this to determine the vibration detection required.**

A. *Refer to A02.2 for dimensions and partition tags. Refer to A00.1 for partition types.*

.9 **Q. What is the freezer and cooler room's exterior height?**

A. *Refer to 1/A09.3 and revisions in Addendum.*

.10 **Q. Do we require floor panels for both the freezer and cooler rooms?**

A. *Yes.*

.11 **Q. Is the insulated floor recessed?**

A. *Yes. Refer to 1/A02.1 Note 12.*

.12 **Q. There are a few pre-manufactured floor drain concrete trenches with FRP grating covers and embedment angles per the mechanical dwg M01.1, but they are mentioned on plumbing section Specs 22 05 15, page 12 / 67.**

The question is: Are the FRP grating and embedment angles for the pre-manufactured floor drain suppliers or concrete trades people? Maybe that pricing should be carried by them? Perhaps we should supply pricing as a separate item for this? Please advise

Also for reference: I have attached some info for the engineer in case the trenches will see forklift traffic, I have also attached our ez angle pdf.

A. The General Contractor is responsible for coordinating trades and providing a complete system as specified.

.13 **Q. Detail 4 supply fan external static pressure vs total static pressure on AHU-1,**

I am questioning the stated ESP. in the schedule the Supply fan is listed at 4720 l/s with 1394pa ESP and fan power of 9.1KW. If I use that ESP then my TSP is 2068 pa which at best would require 12.7 KW. I am wondering if that 1394pa in the schedule is actually the TSP & if so, I will need to know what ESP to use. The Supply fan schedule indicates a larger motor as well?

A. 1394Pa is the total static pressure. ESP is approximately 500 Pa.

.14 **Q. Confirm digital electric meters.**

A. *All digital sub-meters are to be tied into the BAS.*

.15 **Q. About refrigeration scope: what is the room's exterior height. Do we quote**

floor panels for both freezer and cooler rooms. Is the insulated floor recessed? See note 2.2.2 Section 11 41 21.

A. Refer to 1/A09.3 and revisions in Addendum. Floor panels are required for freezer and cooler. Both the freezer and cooler floors are recessed. Also refer to 1/A02.1 Note 12.

- .16 Q. I am told the First floor wall on Gridline U between Gridline 10 & 11 is missing on North Elevation detail 1/A04.1 – see below.
A. This façade/elevation is beyond and not shown, but is included in the contract as per the plan drawings. Reveals, panels, and cap are similar to adjacent.

END OF ADDENDUM NUMBER NO. 02