



**WEST TORONTO COMMUNITY HEALTH SERVICES (WTCHS)**

**West Toronto Community Health Centre (WTCHC) - 209 Mavety St.  
HDR Architecture Associates Inc. Project No.: 10355669  
WSP Project No.: 221-11662-00**

**ISSUED FOR ELECTRICAL ADDENDUM, ADD-E01**

**October 7th, 2024**

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**INCLUDE IN YOUR BID AMOUNT FOR THE FOLLOWING ITEMS OF ADDITION, DELETION OR CLARIFICATION. INDICATE IN THE SPACE PROVIDED ON THE BID FORM THAT YOU HAVE RECEIVED AND INCLUDED FOR THE REQUIREMENTS OF THIS ADDENDUM.**

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**1. ISSUED SPECIFICATIONS**

**1.1 SECTION 26 09 00 LIGHTING CONTROL**

1.1.1 Refer to attached Spec 26 09 00 for changes.

**1.2 SECTION 26 20 00 ELECTRIC SERVICE AND DISTRIBUTION**

1.2.1 Refer to attached Spec 26 20 00 for changes.

**1.3 SECTION 26 27 26 WIRING DEVICES**

1.3.1 Refer to attached Spec 26 27 26 for changes.

**1.4 SECTION 26 50 00 LIGHTING**

1.4.1 Refer to attached Spec 26 50 00 for changes.

**2. ISSUED DRAWINGS**

Following drawings are issued with and form part of this addendum (include for additional work and/or revisions as shown/noted):

**2.1 E-001 DRAWING LITS AND LEGENDS**

2.1.1 Update legends for Fire alarm symbols, Clock symbols, Receptacle symbols and Abbreviations.

**2.2 E-101 SITE PLAN - ELECTRICAL**

2.2.1 Revised "DETAIL NEW WORK NOTES" to read "DETAIL 1 GENERAL NEW WORK NOTES".

**2.3 E-200 LEVEL B1 - LIGHTING**



- 2.3.1 Clarification on Detail New Work Notes and General New Work Notes.
- 2.4 E-201 LEVEL 01 - LIGHTING**
- 2.4.1 Note 3 added to General New Work Notes.
- 2.5 E-202 LEVEL 02 - LIGHTING**
- 2.5.1 Note 3 added to General New Work Notes.
- 2.6 E-300 LEVEL B1 - POWER**
- 2.6.1 Added total of five (5) direct connections for fire smoke dampers in Hoteling, HUB 017 and Public Corridor 018.
- 2.6.2 Deleted note 8 in Elev. Machine Room 020.
- 2.6.3 Relocated panel MRP-BA and MRP-BEA.
- 2.7 E-301 LEVEL 01 - POWER**
- 2.7.1 Added total of four (4) direct connections for fire smoke dampers in Device Parking 115c, Exit Corridor 105 and Public Corridor 110.
- 2.7.2 Detail New Work Notes for incoming service to be note 2.
- 2.7.3 Clarification on General New Work Note 1.
- 2.7.4 Added Detail New Work Notes 5 and 6
- 2.8 E-302 LEVEL 02 - POWER**
- 2.8.1 Added Detail New Work Note 3.
- 2.9 E-303 ROOF - POWER**
- 2.9.1 Provide electric heating cabling system for pipe tracing. Refer to drawing for piping locations.
- 2.9.2 Revised motor & VFD symbol for exhaust fan EF-2 to motor & disconnect switch symbol.
- 2.9.3 Revised note 1 in Detail New Work Notes.
- 2.9.4 Added note 3 in General New Work Notes.
- 2.10 E-402 LEVEL 02 - COMMUNICATIONS**
- 2.10.1 Revised Detail New Work Note 1 in Data/Server Room 201 to Note 2.
- 2.11 E-500 LEVEL B1 - SECURITY AND FIRE ALARM**
- 2.11.1 Added total of five (5) duct type smoke detectors for fire smoke dampers in Hoteling, HUB 017 and Public Corridor 018.



- 2.11.2 Revised Detail New Work Note 1.
- 2.11.3 **E-501 LEVEL 01 - SECURITY AND FIRE ALARM**
- 2.11.4 Added total of four (4) duct type smoke detectors for fire smoke dampers in Device Parking 115c, Exit Corridor 105 and Public Corridor 110.
- 2.11.5 Added Detail New Work Note 3.
- 2.11.6 Added Detail New Work Note 2 callout for maglock key switch in Enlarged Vestibule 170.
- 2.12 **E-602 STANDARD DETAILS - ELECTRICAL**
- 2.12.1 Refer to Detail 4 for revision of Direct Buried Duct Work Detail.
- 2.13 **E-605 STANDARD DETAILS - COMMUNICATIONS**
- 2.13.1 Clarification on detail drawing number.
- 2.14 **E-701 SINGLE LINE DIAGRAMS - DEMOLITION AND NEW**
- 2.14.1 Clarification on single line diagram. Refer to single line diagram detail for changes.
- 2.14.2 Load calculation tables added.
- 2.15 **E-702 ELECTRICAL RISERS - SHEET 1**
- 2.15.1 Detail 1 Partial Fire Alarm Wiring Diagram - Revised horns to Class B wiring configuration.
- 2.15.2 Detail 3 - Power Distribution Riser Diagram - Service Entrance fused disconnect switch to be 600AF-3P in lieu of 500A-3P.
- 2.16 **E-801 ENLARGED PLANS - ELECTRICAL**
- 2.16.1 Relocated panel MRP-BA and MRP-BEA.
- 2.17 **E-802 FEEDER ROUTING PLANS**
- 2.17.1 Relocated panel MRP-BA and MRP-BEA.
- 2.17.2 Revised "DETAIL 1 NEW WORK NOTES" to read "DETAIL 1 GENERAL NEW WORK NOTES".
- 2.18 **E-1101 SCHEDULES - ELECTRICAL**
- 2.18.1 Clarification on dimension of luminaires in Luminaire Schedule.
- 2.18.2 Emergency Battery Sizing chart updated with uniform sizing for each battery pack.
- 2.19 **E-1101 SCHEDULES - ELECTRICAL**
- 2.19.1 "MDP-BA" KAIC rating updated to 35kA to match revised KAIC rating of main distribution panelboard "DP-BA".



**2.20 E-1103 SCHEDULES - ELECTRICAL**

2.20.1 Updated Panel schedule "MRP-2A" for the additional electric heat tracing systems on roof.

**2.21 E-1104 SCHEDULES - ELECTRICAL**

2.21.1 Clarification on electrical load for Dryer Laundry 141 (circuit #RP-1A-47,49).

**2.22 E-1106 SCHEDULES - ELECTRICAL**

2.22.1 Updated Panel schedule "RP-BEA" and "RP-1EA" for the additional direct connection for fire smoke dampers.

**END OF ADD-E01**

**SECTION 26 09 00**  
**LIGHTING CONTROLS**

**PART 1 - GENERAL**

**1.1 SUBMITTALS**

- A. Submit shop drawings for products specified in this Section. In addition to requirements of Section 26 00 10, include for copies of documents of respective manufacturers confirming complete compatibility between lighting controls and luminaires.

**1.2 PRODUCT COMPATIBILITY**

- A. Lighting controls and luminaires when integrated together for control purposes must be 100% compatible with each other. Coordinate with ballast/driver and LED/lamp manufacturers, LV relay panel manufacturers, switches/timers manufacturers and dimmer/light sensor/occupancy sensor control manufacturers to ensure that components are compatible with each other and that interconnections do not adversely affect performance, life or any warranties.

**PART 2 - PRODUCTS**

**2.1 STANDALONE WALL BOX DIMMERS**

- A. Lutron Electronics Co. "Nova-T" Series, ULC listed and labelled, CSA certified wall box dimmers as follows:
1. of type and size to control and suit intended connected loads;
  2. air gap accessible without removing faceplate, to meet UL20 and UL1472 short circuit test requirement for snap switches;
  3. withstand voltage surges up to 600 V and current surges up to 200 A as per ANSI/IEEE C62.41;
  4. voltage regulated;
  5. power failure memory;
  6. LC filtering to minimize RFI;
  7. linear slide with smooth and continuous square law dimming curve operation;
  8. snap on faceplate (seamless multi-gang at locations with multiple devices);
  9. finish to Consultant's direction.
- B. Where noted for applications of multiple wall box dimmers located in one location, provide CSA certified, NEMA 1 type, flush wall mounting, electrical cabinet with hinged locking front door, of painted enamel painted steel construction, complete with conduit knockout entries, flush trim and sized to accommodate dimmers. Refer to applicable drawing detail.
- C. Acceptable manufacturer is Lutron.

**2.2 LOW VOLTAGE DIMMERS**

- A. Lutron Electronics Co. DCLV-2 Series, ULC listed and labelled, CSA certified low voltage dimmers as follows:
1. decorative rocker style;
  2. programmed to default to Manual-On setting;
  3. if switched to Auto-On mode, defaults to 50% Partial-On if no adjustments are made, and if connected to sensor, lights fade on to preset level and fade off, based on occupancy;
  4. type to control and suit intended connected loads;
  5. 24 VDC input and 0 to 10 V dimming control;
  6. LED indicator light;
  7. recalls last-used light level (preset);
  8. two-second fade rate;
  9. snap on decorative type faceplate;

10. compatible with and connects to power pack and emergency lighting control units;
  11. input connections for occupancy sensors;
  12. finish to Consultant's direction.
- B. Acceptable manufacturers are:
1. Legrand-Watt Stopper;
  2. Lutron;
  3. Acuity nLight / Sensor Switch;
  4. Leviton;
  5. Philips;
  6. Hubbell;
  7. Douglas.

### 2.3 DIMMING WALL SWITCH OCCUPANCY SENSOR

- A. Legrand Watt Stopper, CSA certified, ULC listed, series DW-311, dual technology dimming wall switch sensor with features and functionality as follows:
1. turn lights OFF and ON based on occupancy and allow user to increase or decrease lighting level; factory default operation is for Manual-ON mode, so that users turn light on only when needed;
  2. combines passive infrared (PIR) and ultrasonic occupancy detection technologies and works with 0-10 VDC dimming drivers and ballasts to control lighting loads including LEDs;
  3. 120/347VAC voltage operation to suit specific project design applications;
  4. variety of control options including Auto-ON operation, walk-through and test mode; additional settings allow choice of which sensing technologies hold ON or retrigger lighting;
  5. vandal resistant colour matched lens and low profile design;
  6. coverage: major motion: PIR 10 m x 9 m (35' x 30'), Ultrasonic 6 m x 6 m (20' x 20'); minor motion: PIR 6 m x 4.5 m (20' x 15'), Ultrasonic 4.5 m x 4.5 m (15' x 15');
  7. selectable walk-through mode turns lights off three minutes after room is initially occupied if no motion is detected after first 30 seconds;
  8. test mode allows quick and easy verification of coverage;
  9. selectable audible and/or visual alerts for impending shutoff;
  10. LED indicates occupancy detection;
  11. service mode allows sensor to operate as a service switch in unlikely event of failure;
  12. adjustable time delays and sensitivity;
  13. complete with required mounting accessories.
- B. Legrand Watt Stopper, CSA certified, ULC listed, series PW-311, PIR technology dimming wall switch sensor with features and functionality as follows:
1. turn lights OFF and ON based on occupancy and allow user to increase or decrease lighting level; factory default operation is for Manual-ON mode, so that users turn light on only when needed;
  2. passive infrared (PIR) detection technology and works with 0-10 VDC dimming drivers and ballasts to control lighting loads including LEDs;
  3. 120/347VAC voltage operation to suit specific project design applications;
  4. variety of control options including Auto-ON operation, walk-through and test mode; additional settings allow choice of which sensing technologies hold ON or retrigger lighting;
  5. vandal resistant colour matched lens and low profile design;
  6. coverage: major motion: 10 m x 9 m (35' x 30'); minor motion: 6 m x 4.5 m (20' x 15');
  7. selectable walk-through mode turns lights off three minutes after room is initially occupied if no motion is detected after first 30 seconds;
  8. test mode allows quick and easy verification of coverage;
  9. selectable audible and/or visual alerts for impending shutoff;
  10. LED indicates occupancy detection;
  11. service mode allows sensor to operate as a service switch in unlikely event of failure;
  12. adjustable time delays and sensitivity;
  13. complete with required mounting accessories.
- C. Acceptable manufacturers are:
1. Legrand-Watt Stopper;

2. Lutron;
3. Acuity nLight / Sensor Switch;
4. Leviton;
5. Philips;
6. Hubbell;
7. Douglas.

## **2.4 OCCUPANCY SENSORS (STANDARD)**

- A. Legrand - Watt Stopper, CSA certified devices to provide automatic control of lighting with following components:
  1. power and slave packs;
  2. dual technology occupancy sensors;
  3. controls and daylight sensors;
  4. wiring in conduit and mounting hardware.
- B. For applications in general areas: W series, ultrasonic technology type ceiling mounted occupancy sensors as follows:
  1. low voltage operation;
  2. ultrasonic technologies;
  3. when ultrasonic technology detects occupancy, lights turn ON automatically; once lights are ON, detection holds lights ON until occupancy is no longer detected and time delay elapses;
  4. 360 degrees dispersion coverage to suit space depending on model, up to 185 m<sup>2</sup> (2000 ft<sup>2</sup>);
  5. low profile ceiling mounting design;
  6. integral light sensor;
  7. adjustable digital time delay;
  8. LED indication of occupancy detection;
- C. For applications in general areas: ceiling mounted, CI-300/305 series, PIR technology type occupancy sensors as follows:
  1. low or line voltage operation to suit project design requirements;
  2. 360° lens area coverage, extending out up to 13 m (44') and area of 111 m<sup>2</sup> (1200 ft<sup>2</sup>);
  3. low profile ceiling mounting design;
  4. passive infrared technologies;
  5. integral light sensor;
  6. adjustable sensitivity and digital time delay;
  7. walk-through mode;
  8. LED indication of occupancy detection;
  9. isolated relay for interconnection to auxiliary control systems where required.
- D. For applications in general areas: ceiling mounted, DT-300 series, dual technology type sensors as follows:
  1. low voltage operation;
  2. combination passive infrared and ultrasonic technologies;
  3. when both PIR and ultrasonic technologies detect occupancy, lights turn ON automatically; once lights are ON, detection by either technology holds lights ON until occupancy is no longer detected and time delay elapses;
  4. 360° lens area coverage, extending out up to 6 m (20') and area of 92.9 m<sup>2</sup> (1000 ft<sup>2</sup>);
  5. DIP switches for setup;
  6. low profile ceiling mounting design;
  7. integral light sensor;
  8. adjustable sensitivity and digital time delay;
  9. walk-through mode;
  10. LED indication of occupancy detection;
  11. isolated relay for interconnection to auxiliary control systems where required.
- E. For applications in general areas: ceiling mounted, DT-355 series, dual technology type sensors as follows:
  1. line voltage operation;
  2. combination passive infrared and ultrasonic technologies;

3. when both PIR and ultrasonic technologies detect occupancy, lights turn ON automatically; once lights are ON, detection by either technology holds lights ON until occupancy is no longer detected and time delay elapses;
  4. 360° lens area coverage, extending out up to 6 m (20') and area of 92.9 m<sup>2</sup> (1000 ft<sup>2</sup>);
  5. Dip switches for setup;
  6. low profile ceiling mounting design;
  7. integral light sensor;
  8. adjustable sensitivity and digital time delay;
  9. walk-through mode;
  10. LED indication of occupancy detection.
- F. For sensors mounted in ceiling/wall corners: series DT-200 with features as follows:
1. low voltage operation;
  2. combination passive infrared and ultrasonic technologies;
  3. when either or both (user set option) PIR and ultrasonic technologies detect occupancy, lights turn ON automatically; once lights are ON, detection by either technology holds lights ON until occupancy is no longer detected and time delay elapses;
  4. complete with adjustable swivel mounting bracket;
  5. wide dispersion lens area coverage, extending out up to 16 m (55') and area of 185 m<sup>2</sup> (2000 ft<sup>2</sup>);
  6. low profile design;
  7. integral light sensor;
  8. adjustable sensitivity and digital time delay;
  9. walk-through mode;
  10. LED indication of occupancy detection;
  11. isolated relay for interconnection to auxiliary control systems where required.
- G. For applications in washrooms and small storage rooms: wall mounted "DSW-301" series dual technology type wall switch occupancy sensors as follows:
1. line voltage operation to suit specific project design applications and LED type loads;
  2. wall switch sensor turns lights OFF and ON based on occupancy;
  3. multi-way control from one up to four control locations;
  4. factory default operation is for Manual-ON mode, so that users turn light on only when needed;
  5. variety of control options including Auto-ON operation, walk-through and test mode; additional settings allow choice of which sensing technologies hold ON or retrigger lighting;
  6. colour matched vandal resistant lens and low-profile design;
  7. wide dispersion lens area coverage for major motion, extending out up to 6 m (20') and area of 37 m<sup>2</sup> (400 ft<sup>2</sup>) for ultrasonic; 10.5 m (35') and area of 93 m<sup>2</sup> (1000 ft<sup>2</sup>) for PIR;
  8. passive infrared and ultrasonic technologies;
  9. LED indicator of occupancy detection;
  10. adjustable time delays and sensitivity;
  11. manual pushbutton operation (override);
  12. complete with required mounting accessories.
- H. For applications of wall mounting and control of two lighting loads: DSW-302 series dual technology dual relays type wall switch occupancy sensors as follows:
1. includes two relays for control of two separate lighting loads or circuits;
  2. line voltage operation to suit specific project design applications and LED type loads;
  3. wall switch sensor turns lights OFF and ON based on occupancy;
  4. multi-way control from one up to four control locations;
  5. factory default operation is for Manual-ON mode, so that users turn light on only when needed;
  6. variety of control options including Auto-ON operation, walk-through and test mode; additional settings allow choice of which sensing technologies hold ON or retrigger lighting;
  7. colour matched vandal resistant lens and low-profile design;
  8. wide dispersion lens area coverage for major motion, extending out up to 6 m (20') and area of 37 m<sup>2</sup> (400 ft<sup>2</sup>) for ultrasonic; 10.5 m (35') and area of 93 m<sup>2</sup> (1000 ft<sup>2</sup>) for PIR;
  9. passive infrared and ultrasonic technologies;
  10. LED indicator of occupancy detection;



11. adjustable time delays and sensitivity;
  12. manual pushbutton operation (override);
  13. complete with required mounting accessories.
- I. For corridors or wide space coverage: Ceiling mounted, WT series, ultrasonic technology type sensors as follows:
1. low voltage operation;
  2. ultrasonic technologies;
  3. when ultrasonic technology detects occupancy, lights turn ON automatically; once lights are ON, detection holds lights ON until occupancy is no longer detected and time delay elapses;
  4. corridor applications to include linear lens area coverage, extending out up to 13.5 m (45') in 2 directions;
  5. wider spaces applications to include wide dispersion coverage to suit space, up to 200 m<sup>2</sup> (2200 ft<sup>2</sup>);
  6. low profile ceiling mounting design;
  7. integral light sensor;
  8. adjustable digital time delay;
  9. LED indication of occupancy detection;
  10. isolated relay for interconnection to auxiliary control systems where required.
- J. For outdoor control of lighting: Series "EW" outdoor motion sensor:
1. low voltage or line voltage operation to suit specific project design applications.
  2. weatherproof and raintight enclosure;
  3. operating temperature from minus 40°C to 54°C (-40°F to 130°F);
  4. adjustable head,
  5. with minimum 270° of coverage;
  6. adjustable light level from 5.4 lux to 2150 lux (0.5 fc to 200 fc);
  7. isolated relay with NO and NC outputs;
  8. 13 mm (1/2") threaded conduit nipple for attachment to standard weatherproof electrical box with faceplate.
- K. Where required, power packs to be self-contained, 120 VAC/24 VDC (or of voltage shown on drawings) transformer relay system. Slave packs to contain isolated relay. System to allow one sensor to control luminaires circuited to both essential power circuits and normal power circuits. Features also include:
1. switches lighting or plug loads On and Off in response to low voltage control inputs;
  2. enables Manual-On sequences of operation, as well as Hold-On, Hold-Off, load shed applications and bi-level switching;
  3. field-selectable Auto-On or Manual-On operation;
  4. LED indicates status of relay or presence of low voltage overcurrent;
  5. plenum rated.
- L. Override switches to be wall mounting in single gang recessed outlet boxes.
- M. Day light sensors to be provided where required for dimming or controlling lights in areas of windows and atriums/sky lights.
- N. Where both normal and emergency power circuited luminaires exist, provide emergency power control unit that allows sensor to control both emergency power circuited luminaires as well as normal power circuited luminaires, and when normal power is lost, forces on emergency power circuited luminaires.
- O. Relays to be provided as required to integrate sensors to BAS. Coordinate exact requirements with central lighting control system vendor and BAS vendor.
- P. Wiring in conduit, mounting hardware and ancillary devices to be provided as per manufacturer's requirements.
- Q. System to be complete with initial 1 year parts and labour warranty, with additional extended 5 years parts warranty.
- R. Include for and arrange for manufacturer's authorized representative to perform on site testing, verification and certification of installed system. Refer to Part 3 installation article for additional requirements.

- S. Where sensors are interconnected to dimming system, ensure that they are 100% compatible with respective control systems, dimmers and ballasts. Confirm with respective equipment manufacturers and obtain in writing that such integrations are acceptable to each manufacturer.
- T. Where devices are connected to central lighting control system, acceptable device manufacturers to be as recommended by manufacturers of central lighting control system.
- U. Generally, acceptable manufacturers are:
  - 1. Legrand-Watt Stopper;
  - 2. Acuity nLight / Sensor Switch;
  - 3. Leviton;
  - 4. Philips;
  - 5. Lutron;
  - 6. Douglas;
  - 7. Hubbell;
  - 8. Eaton – Fifth Light;
  - 9. Osram - Encelium.

## **2.5 INTEGRATED LIGHTING CONTROL**

- A. Partition sensor: LMIO-102 series digital partition interface:
  - 1. to automatically coordinate lighting controls in flexible spaces with up to four movable walls equipped with contact closures;
  - 2. four status LEDs indicate if walls are open or closed;
  - 3. terminal block for connection to contact closure inputs; coordinate with wall partition vendor.
  - 4. RJ45 connectors.
- B. Additional system interfaces, modules and connectors as required to integrate other components to provide a complete system.
- C. Provide wiring, jumpers, mounting hardware, connectors, jacks, and ancillary devices as per manufacturer's requirements. Include system manufacturer's recommended pre-terminated cables as required. For systems as required, include MSTP wire connections, segment network wire, and junction boxes for completing system connections. Wiring not pre-terminated to be typically minimum CAT 5e unshielded twisted pair conductors terminated with RJ45 connectors. Comply with manufacturer's installation requirements. Submit block wiring diagram of system as part of shop drawings.
- D. Where sensors are interconnected to dimming system, ensure that they are 100% compatible with respective control systems, dimmers, lamps/LEDs and drivers/ballasts. Confirm with respective equipment manufacturers and obtain in writing that such integrations are acceptable to each manufacturer.
- E. When sizing system components capacities, include for minimum 20% future spare capacity.
- F. Acceptable manufacturers are to provide systems at least meeting requirements of issued documents and having been installed and successfully operating in locations in Ontario for at least past 5 years.
- G. Acceptable manufacturers are:
  - 1. Legrand-Watt Stopper;
  - 2. Acuity nLight / Sensor Switch;
  - 3. Leviton;
  - 4. Philips;
  - 5. Lutron;
  - 6. Douglas;
  - 7. Hubbell;
  - 8. Eaton – Fifth Light;
  - 9. Osram Encelium.

## **2.6 LOW VOLTAGE LIGHTING RELAYS AND SWITCHES**

- A. Legrand Watt Stopper, CSA certified, factory tested relays and associated devices for low voltage lighting control, as follows:

1. specification grade, heavy duty, 20 ampere rated plug-in relays complete with auxiliary contacts to provide status indication;
  2. 24 V, momentary contact, switches, single, decorative styling, ivory pushbutton type with pilot and location light LEDs;
  3. 24 V, momentary contact, switches, multi ivory pushbutton type with pilot and location light LEDs, and removable lens cap for labelling each switch with laminated tape;
  4. 24 V, momentary contact, key operated switches complete with keys;
  5. 24 V, momentary contact, ivory toggle type switches;
  6. decorative style, Lexan screwless wall plates;
  7. type 302 stainless steel wall plates, number of gang as required, suitable for switches specified and complete with mounting brackets and matching screws;
  8. power supplies sized as required;
  9. wiring in conduit, in accordance with system manufacturer's requirements;
  10. NEMA 1, electrical box sized to accommodate system components and spare future 10%; identify box cover with engraved nameplate; include drip shield for surface mounted boxes.
- B. Acceptable manufacturers are:
1. Legrand Watt Stopper;
  2. Philips;
  3. Douglas;
  4. Hubbell;
  5. Lutron;
  6. Acuity nLight;
  7. Leviton.

## **2.7 DIMMING SYSTEM PROVISIONS**

- A. Supply and installation of dimming system is part of Work of Division 11. Issued separately, are documents identifying electrical requirements to be provided by Electrical Contractor. Obtain such documents from Consultant and include for respective work.
- B. Be responsibilities for, but not be limited to, providing following items to accommodate installation of dimming system:
1. system conduit;
  2. system device backboxes;
  3. system grounding requirements;
  4. system feeder requirements;
  5. coordination of conduit, box and system power requirements with Division 11 successful system tenderer;
  6. installation of control cables as specified in Division 11.
- C. For product general specifications, refer to respective sections for products, requirements of Division 11 and/or issued drawings.

## **2.8 DIMMING CONTROL STATION**

- A. Dimming system to be based on Lutron Electronics Co. "Grafik Eye QS" series system, CSA certified, ULC listed and labelled dimming control including but not limited to following:
1. dimmer of solid state construction;
  2. power booster/interfaces, where required;
  3. fire alarm interface;
  4. control stations of flush wall mounting type, with front panel control setting soft switch sliders and preset controls.
- B. For this application, all controls, dimmers, power supply are to be integrated into single wall mounted station.
- C. Dimming system incorporates a microprocessor based, fully integrated lighting control. General component requirements are shown on drawings.

- D. Control station to be flush wall mounting unit with faceplates free of visible fasteners and of finish to Consultant's approval. Stations to be provided with OFF pushbuttons and LED indicators. OFF function to be programmable preset with fade times. Station to be complete with infrared receiver compatible with wireless infrared remote control supplied with system. Station includes feature to prevent unauthorized alteration to presets and fade times. Station includes flip open front cover. Finish of cover and base to be selected from manufacturer's standard options and reviewed with Consultant prior to ordering.
- E. Control station units provide multiple preset lighting scenes (minimum 4). Control station to store additional preset lighting scenes which can be accessed via remote wall stations and/or control interfaces. Station to include minimum \_\_\_\_ zones of circuiting and control. Preset to be set via easy-to-use raise/lower switches, one raise and lower switch per zone. Intensity for each zone to be indicated via an illuminated barograph, one barograph per zone. More than one zone may be proportionately raised or lowered at same time. Programming of preset scenes to be accomplished without use of an 'enter' or 'store' button. Additionally, one or more zones may be temporarily overridden without altering scene values, which are stored in memory.
- F. Lighting levels to fade smoothly between scenes at time intervals of 0 to 59 seconds or 1 to 60 minutes. Fade time to be separately selectable for each scene and to be indicated by a digital display for current scene. Pressing a scene select button will illuminate corresponding scene LED and simultaneously begin changing barograph levels to reflect currently selected scene. In event that a preset scene with a fade time greater than 5 seconds is initially selected from an 'off' condition, programmed fade time to be temporarily overridden, unless otherwise noted, and lights to fade up to that scene over a five-second time span.
- G. Panel processor to provide following programming capability:
  - 1. electronically assign each circuit to any zone in dimming system;
  - 2. adjust High-End Trim and Low-End Trim;
  - 3. determine load type for each dimmer;
  - 4. determine Normal / Emergency function of panel and set emergency lighting levels;
  - 5. panel processor to react to changes from control in no more than 20 milliseconds (Update rate of 50 times per second);
  - 6. sequence of operation as confirmed with Consultant prior to start of Work.
- H. Upon loss of normal input power, a station operating from an emergency feed to immediately turn circuits within that station to full-on condition when emergency input power is present.
- I. Under Emergency input power feed, unless otherwise indicated dimmers to operate at 100% of dimmer output voltage. Under these conditions, dimmers will be in full-on state.
- J. Under Emergency input power feed, control stations to be inoperable. Once normal power is restored, lighting zones to revert back to their status prior to emergency condition without requiring any action on part of user.
- K. Illumination levels to be field-programmable to meet local code requirements for Emergency power conditions. Such options include, but are not limited to, providing a constant minimal light level for emergency circuits during normal operation or providing full function dimming under emergency power.
- L. Dry contact closures (momentary contacts for "ON" and "OFF") from fire alarm system to force selected dimmers to go to full. This function to be selectable on a dimmer by dimmer basis and to be processor independent.

M. Dimmer Modules:

1. Under fully-loaded operating conditions, dimmer modules to operate at a minimum 20°C (36°F) safety margin below component manufacturer's maximum component temperature rating at a 40°C (104°F) ambient room temperature. A positive air gap switch to be employed by each dimmer in panel to ensure that load circuits are open when "off" function is selected from control system. Dimmer to be capable of withstanding inrush current of 50 times operating current typically generated by a full circuit of switching electronic non-dim ballasts. Each dimmer to compensate for incoming line voltage variations such as changes in RMS voltage, frequency shifts, harmonics and line noise. Dimmer to maintain constant light level with no visible flicker under  $\pm 2\%$  change in RMS voltage/cycle or  $\pm 2$  Hz change in frequency/second.
2. Dimmer output voltage to be a minimum 95% of input voltage at maximum intensity setting under full load conditions. Each dimmer to incorporate an electronic "soft-start" default at initial turn-on that smoothly ramps lights up to appropriate levels within 0.5 seconds. Dimmer to be both designed and tested to withstand surges, without impairment to performance, of 6000V, 3000A (equivalent to a near lightning strike) as specified by ANSI/IEEE std. C62.41. One type of dimmer to be used for sources, line voltages, and frequencies.
3. Filtering to be provided for each dimmer such that current rise to be at least 350 usec as measured from 10%-90% of load current waveform and at least 525 usec as measured from 0%-100% of load current waveform at 50% rated dimmer capacity at a 90° conduction angle. Current rise to be at least 400  $\mu$ sec as measured from 10%-90% of load current waveform and at least 600 usec as measured from 0%-100% of load current waveform at 100% rated dimmer capacity at a 90° conduction angle.
4. Dimmers to operate sources/load types as required and connected, with a smooth continuous Square Law dimming curve or on a non-dim basis. Dimmers to be electronically assigned to appropriate load type/dimming curve and can be reassigned at any time.
5. Dimmers to be suitable for dimming required connected lamp types including linear florescent compact fluorescent, incandescent and LEDs, as required.

N. Power Boosters and Interfaces:

1. 2-way interfaces between system and AV systems; coordinate exact requirements with AV vendor;
2. interface between system and fire alarm system; coordinate exact requirements with fire alarm vendor;
3. interfaces to dim or switch specific types of loads;
4. power boosters as required to increase zone capacity to accommodate connected loads.

O. Submittals:

1. Provide detailed design installation drawings of systems and include with shop drawings.
2. Provide dimming load schedules and interconnection wiring diagrams.

P. Manufacturer's Services:

1. Manufacturer's authorized technician to provide following:
  - a. custom system programming;
  - b. inspection of installed system;
  - c. adjustments;
  - d. start-up procedures;
  - e. certify system equipment and operation.

Q. Acceptable Manufacturers are:

1. Lutron;
2. Electronic Theatre Control (as distributed by Omnilumen);
3. Philips;
4. Acuity nLight;
5. Crestron.

## 2.9 DIMMING SYSTEM

- A. Dimming system to be based on Lutron Electronics Co. "Grafik Eye QS" series system, CSA certified, ULC listed and labelled modular components including but not limited to following:
1. dimmer modules of solid state construction;

2. power booster/interfaces;
  3. fire alarm interface;
  4. control stations of flush wall mounting type, with soft switch sliders and preset controls.
- B. Dimming system incorporates a microprocessor based, fully integrated lighting control, utilizing digital multiplexed communications between remote stations, central processor, and load control devices (dimmers and relays) as required. General component requirements are shown on drawings.
- C. Control units provide multiple preset lighting scenes and 'off' for minimum 3 control zones. Control to be capable of storing an additional 3 preset lighting scenes which can be accessed via wall stations and/or control interfaces. Up to 3 zones may be tied together in one system by linking control units. Preset to be set via easy-to-use raise/lower switches, one raise, and lower switch per zone. Intensity for each zone to be indicated via an illuminated barograph, one barograph per zone. More than one zone may be proportionately raised or lowered at same time. Programming of preset scenes to be accomplished without use of an 'enter' or 'store' button. Additionally, one or more zones may be temporarily overridden without altering scene values, which are stored in memory.
- D. Lighting levels to fade smoothly between scenes at time intervals of 0 to 59 seconds or 1 to 60 minutes. Fade time to be separately selectable for each scene and to be indicated by a digital display for current scene. Pressing a scene select button will illuminate corresponding scene LED and simultaneously begin changing barograph levels to reflect currently selected scene. In event that a preset scene with a fade time greater than 5 seconds is initially selected from an 'off' condition, programmed fade time to be temporarily overridden, unless otherwise noted, and lights to fade up to that scene over a five-second time span.
- E. Panel processor to provide following programming capability:
1. electronically assign each circuit to any zone in dimming system;
  2. adjust High-End Trim and Low-End Trim;
  3. determine load type for each dimmer;
  4. determine Normal / Emergency function of panel and set emergency lighting levels;
  5. panel processor to react to changes from control in no more than 20 milliseconds (Update rate of 50 times per second);
  6. sequence of operation as reviewed with Consultant prior to start of Work.
- F. Upon loss of normal input power, a panel operating from an emergency feed to immediately turn circuits within that panel to full-on condition when emergency input power is present.
- G. Under Emergency input power feed, unless otherwise indicated dimmers to operate at 100% of dimmer output voltage. Under these conditions, dimmers will be in full-on state.
- H. Under Emergency input power feed, local control stations to be inoperable. Once normal power is restored, lighting zones to revert back to their status prior to emergency condition without requiring any action on part of user.
- I. Illumination levels to be field-programmable to meet local code requirements for Emergency power conditions. Such options include, but are not limited to, providing a constant minimal light level for emergency circuits during normal operation or providing full function dimming under emergency power.
- J. Dry contact closures (momentary contacts for "ON" and "OFF") from fire alarm system to force selected dimmers to go to full. This function to be selectable on a dimmer by dimmer basis and to be processor independent.
- K. Control Stations and Accessories:
1. Faceplates free of visible fasteners and of finish to Consultant's approval.
  2. Model SG4SN-WH, which include controls for multiple zones and be with touch button sliders and presets. Up to four (4) scenes of programmed presets to be provided. Stations to be provided with ON, OFF and Take Control pushbuttons and LED indicators. ON and OFF functions to be programmable presets with fade times. Master slider to be used for setting fade time. Station to be complete with infrared receiver compatible with wireless infrared remote control supplied with system.

3. Control functions for each station to be assigned to pushbuttons, sliders and remote inputs or templates. There are to be multiple templates per control station which can be recalled via appropriate control function, Macro or automatically using astronomical time clock.
  4. Feature to prevent unauthorized alteration to presets and fade times.
  5. Flush mounted multi-button stations for control of preset levels for scenes and include off control.
  6. RS 232 interface.
- L. Dimmer Modules:
1. Under fully-loaded operating conditions, dimmer modules to operate at a minimum 20°C (36°F) safety margin below component manufacturer's maximum component temperature rating at a 40°C (104°F) ambient room temperature. A positive air gap switch to be employed by each dimmer in panel to ensure that load circuits are open when "off" function is selected from control system. Dimmer to be capable of withstanding inrush current of 50 times operating current typically generated by a full circuit of switching electronic non-dim ballasts. Each dimmer to compensate for incoming line voltage variations such as changes in RMS voltage, frequency shifts, harmonics and line noise. Dimmer to be capable of maintaining constant light level with no visible flicker under  $\pm 2\%$  change in RMS voltage/cycle or  $\pm 2$  Hz change in frequency/second.
  2. Dimmer output voltage to be a minimum 95% of input voltage at maximum intensity setting under full load conditions. Each dimmer to incorporate an electronic "soft-start" default at initial turn-on that smoothly ramps lights up to appropriate levels within 0.5 seconds. Dimmer to be both designed and tested to withstand surges, without impairment to performance, of 6000 V, 3000 A (equivalent to a near lightning strike) as specified by ANSI/IEEE std. C62.41. One type of dimmer to be used for sources, line voltages, and frequencies.
  3. Filtering to be provided for each dimmer such that current rise to be at least 350 usec as measured from 10%-90% of load current waveform and at least 525 usec as measured from 0%-100% of load current waveform at 50% rated dimmer capacity at a 90° conduction angle. Current rise to be at least 400  $\mu$ sec as measured from 10%-90% of load current waveform and at least 600usec as measured from 0%-100% of load current waveform at 100% rated dimmer capacity at a 90° conduction angle.
  4. Dimmers to operate sources/load types as required and connected, with a smooth continuous Square Law dimming curve or on a non-dim basis. Dimmers to be electronically assigned to appropriate load type/dimming curve and can be reassigned at any time.
- M. Power Boosters:
1. Power boosters to be provided to increase single zone load capacity as required for specific loads and applications.
- N. Submittals:
1. Provide detailed design installation drawings of systems and include with shop drawings.
  2. Provide dimming load schedules and interconnection wiring diagrams.
- O. Manufacturer's Services:
1. Manufacturer's authorized technician to provide following:
    - a. custom system programming;
    - b. inspection of installed system;
    - c. adjustments;
    - d. start-up procedures;
    - e. certify system equipment and operation;
    - f. instructions on system operating and maintenance.
- P. Acceptable Manufacturers are:
1. Lutron;
  2. Philips;
  3. Acuity nLight;
  4. Electronic Theatre Control (as distributed by Omnilumen;)
  5. Crestron.
  6. In cases where an area is to be divisible for separate or combined control, it is possible to combine constituent rooms either manually or with automatic partition switches. Rooms are combined using "Join" mode of operation where each room to maintain its own presets, levels and channels.

"Joining" coordinates selection of presets within combined rooms from any control station within those rooms.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION OF WALL BOX DIMMERS AND STAND ALONE DIMMERS**

- A. Provide flush wall box dimmers and stand alone dimmers in locations and connect to control lighting as indicated. Confirm exact locations prior to roughing-in. Equip each dimmer with a faceplate. Review faceplate colour with Consultant prior to ordering.
- B. Install components in accordance with manufacturer's instructions to suit specific installation requirements.
- C. Provide power packs and emergency power control units as noted for low voltage dimmers. Connect complete.
- D. Where identified, provide central enclosure cabinet for mounting dimmers within and connect complete. Clearly identify each dimmer and enclosure with engrave Lamacoid nameplates. Review exact nomenclature with Consultant prior to ordering.
- E. When installation is complete, check and test operation of each dimmer and adjust as required.
- F. Ensure that each dimmer is properly sized and of type to suit connected load.

#### **3.2 INSTALLATION OF DIMMING WALL SWITCH OCCUPANCY SENSORS**

- A. Provide flush wall box dimmer occupancy sensors in locations and connect to control lighting as indicated. Confirm exact locations prior to roughing-in. Equip each dimmer with a faceplate. Review faceplate colour with Consultant prior to ordering.
- B. Confirm device settings for automatic or manual on, and delay-off, with Owner and review with Consultant prior to installation, and make settings adjustments on each device.
- C. Install components in accordance with manufacturer's instructions to suit specific installation requirements.
- D. When installation is complete, check and test operation of each dimmer and adjust as required.
- E. Ensure that each dimmer is properly sized to suit connected load.

#### **3.3 INSTALLATION OF LIGHTING CONTROL SYSTEM**

- A. Submit as part of shop drawings, detailed design drawings, single line drawing, block drawings, equipment literature cuts, station finishes, and proposed sequence of operation of entire integrated system. Confirm sequence with Owner and review with Consultant prior to start of Work.
- B. Provide required components for stand alone and integrated control of lighting. Where required, integrate system such that dimming system and Mechanical Divisions BAS system can provide control as required. Refer to notes on drawings.
- C. Control system components and programming to perform an integrated lighting control system that provides dimming and ON/OFF control of designated luminaires. Zoning and sequence of operations to be pre-programmed and user friendly in any program changes. Confirm exact zoning and proposed sequence of operation via shop drawings submission stage.
- D. Install sensors as specified in accordance with requirements of article elsewhere in this section. Confirm device settings for automatic or manual on, and delay-off, with Owner and review with Consultant prior to installation, and make settings adjustments on each device.
- E. Provide components for both emergency power and normal power lighting loads being controlled. Provide power, control, and communication wiring in conduit as required. Confirm exact wiring type and requirements with system manufacturer.



- F. Review emergency sequence of operation with Consultant prior to start of Work and include required hardware and software and interfaces to other integrated systems. Coordinate interfaces with respective system vendors.
- G. Flush wall mount low voltage switches and mount into recessed wall boxes, complete with a mounting bracket and faceplate for each switch. Install controls for areas as identified and reviewed with Consultant. Refer to details on drawings. Circuit system as required and note that no circuits to be loaded greater than rating of dimmers.
- H. Clearly identify low voltage switching circuits.
- I. Do not overload circuits or dimmers. Comply with manufacturer's loading recommendations and local code requirements. Include spare future capacity as specified.
- J. Connect normal power feeder and emergency power feeder as required. Provide relays as required. Interconnect system to BAS and fire alarming system as applicable.
- K. Include for and arrange for manufacturer's authorized representative to perform programming work and adjustments. Final program features must be approved by Owner and reviewed with Consultant.
- L. ON/OFF pushbuttons and preset buttons to fade into operation, not instant operation. Set cleaning presets to control circuits at levels as reviewed with Consultant.
- M. Luminaire LED drivers to be dimmed are to be completely compatible with control system. Ensure compatibility in writing with respective product manufacturers. Coordinate requirements and connect complete as per manufacturer's instructions.
- N. Provide wiring in accordance with manufacturer's instructions and approved manufacturer's system wiring diagrams and run wiring in conduit. Wiring to be oversized in accordance with manufacturer's instructions to compensate for voltage drop. Do not splice wiring between control stations or between dimmer/relay panels/racks.
- O. Install components in accordance with manufacturer's instructions to suit specific installation requirements.
- P. Refer to drawing details and notes.
- Q. Review exact locations of components with Consultant prior to roughing-in.
- R. Ground and bond system as required by local governing electrical code and authority and system manufacturer.
- S. Integrate system to fire alarm system, BAS and other systems, as required. Extend wiring in conduit to required interconnection panels of systems. Typically terminate in junction box adjacent panel, leaving a loop of 3m (10') of un-terminated wiring for final termination by respective system vendors of Mechanical Divisions. Coordinate exact requirements with Mechanical Divisions. Where requested by Mechanical Divisions, provide conduit to terminate at Mechanical Divisions panel.
- T. Review device finishes with Consultant prior to ordering.
- U. Submit with shop drawings, detailed system wiring diagram and system riser diagram.
- V. Upon completion of installation, provide following:
  - 1. inspection, testing and verification of system;
  - 2. re-verification of failed or replaced components;
  - 3. signed verification report.
- W. Testing to include check of operation of each controller, dimmer and control station. Adjust and preset devices as required to meet Owner's applications.
- X. Provide engraved lamacoid identification nameplate for each station, panel and controller. Clearly label each dimmer/panel and label low voltage circuits.
- Y. Review nomenclature with Consultant prior to ordering.

- Z. Locate and identify on as-built drawings, system components installed in ceiling spaces and other remote locations.
- AA. Refer also to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

### **3.4 INSTALLATION OF OCCUPANCY SENSORS**

- A. Provide occupancy sensors and daylight sensors and associated devices to control lighting in areas as required. Provide power packs as required with suitable voltage and power ratings.
- B. Exact type of occupancy sensors and type of lenses to be verified by manufacturer/supplier to ensure proper coverage in sensed areas only, and compatibility to interconnected systems. Confirm with respective manufacturers.
- C. Confirm device settings for automatic or manual on, and delay-off, with Owner and review with Consultant prior to installation, and make settings adjustments on each device.
- D. Be responsible for providing, locating, and aiming appropriate sensors in correct location required for complete and proper volumetric coverage within range of coverage(s) of controlled areas per manufacturer's recommendations. Rooms to have 90-100% coverage to completely cover controlled area to accommodate occupancy habits of single or multiple occupants at any location within room(s). Locations and quantities of sensors shown and/or noted are illustrations only and should only be used as guidelines. Provide additional sensors if required to properly and completely cover respective room.
- E. Verify with manufacturer's factory authorized representative, exact type of sensor to be used in each area, placement of sensors and installation criteria, to best meet requirements of end user. Manufacturer's representative should be consulted for more non-typical installation types. Ensure that sensors connected to dimming system are 100% compatible with dimming system.
- F. Where luminaires in rooms/areas are fed from normal and emergency power circuits, provide suitable relays and provisions to ensure that operation of luminaires on emergency power are maintained during loss of normal power.
- G. Proper judgement must be exercised in executing installation so as to ensure that best possible installation in available space and to overcome local difficulties due to space limitations or interference of structural components. Also provide, at Owner's facility, training necessary to familiarize Owner's personnel with operation, use, adjustment, and problem solving diagnosis of occupancy sensing devices and systems.
- H. Install devices in accordance with manufacturer's instructions. Provide wiring in conduit. Provide required power connections and interconnection to luminaires and power panels. Provide manual switches to override control system in each area/room as shown.
- I. Review finishes of sensors with Consultant prior to ordering.
- J. Review mounting heights with Consultant and manufacturer prior to roughing-in and installation.
- K. Adjust sensitivity and time delays to best suit Owner's furniture layout drawings. Allow for minor adjustments of locations (1 m [3.3']) of sensors.
- L. After installation is complete, provide for manufacturer's authorized representative to inspect, test and verify system performance and installation.
- M. After completion of project and within 30 days after Owner has taken occupancy and furnishings are in place, provide for manufacturer's authorized representative to revisit site to test and make final adjustments.
- N. Refer also to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

### **3.5 INSTALLATION OF LOW VOLTAGE LIGHTING CONTROLS**

- A. Provide low voltage lighting components as required. Connect complete.
- B. Install components in accordance with manufacturer's instructions to suit specific installation requirements.

- C. Flush mount low voltage switches into wall mounted electrical boxes. Provide suitable mounting bracket and faceplate for each switch. Review finishes with Consultant prior to ordering.
- D. Install power supplies, transformers and relays in barriered electrical boxes/enclosures and locate adjacent to surface mounted panel boards to which lighting loads are connected or in accessible ceiling space above recessed mounted panel boards to which lighting loads are connected. Review exact locations with Consultant prior to start of work.
- E. Locate locations of boxes on as-builts.
- F. Clearly label each box and label low voltage switching circuits.
- G. Refer also to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

### **3.6 INSTALLATION OF DIMMING CONTROL STATION**

- A. Install dimming systems for dimming control of lighting for areas as identified and reviewed with Consultant. Refer to details on drawings. Circuit dimmers as required and note that no circuits to be loaded greater than rating of dimmers.
- B. Install dimmer control station in locations as shown and as required. Provide required power source and connections. Connect normal power feeder and emergency power feeder as required. Interconnect system to BAS and fire alarming system as applicable.
- C. Integrate system to fire alarm system, BAS and other systems, as required. Extend wiring in conduit to required interconnection panels of systems. Typically terminate in junction box adjacent panel, leaving a loop of 3m (10') of un-terminated wiring for final termination by respective system vendors of Mechanical Divisions. Coordinate exact requirements with Mechanical Divisions. Where requested by Mechanical Divisions, provide conduit to terminate at Mechanical Divisions panel.
- D. Review emergency sequence of operation with Consultant prior to start of Work and include required hardware and software and interfaces to other integrated systems. Coordinate interfaces with respective system vendors.
- E. Include for and arrange for manufacturer's authorized representative to perform programming work. Final program features must be approved by Owner prior to start of Work.
- F. Install recessed, wall mounting control stations and wall box dimmers in locations as shown.
- G. ON/OFF pushbuttons and preset buttons to be fade into operation, not instant operation. Where applicable, set cleaning presets to control circuits at levels as reviewed with Consultant.
- H. Luminaire ballasts to be dimmed are to be electronic dimmable types completely compatible with dimming system. Ensure compatibility in writing with respective product manufacturers. Coordinate requirements and connect complete as per manufacturer's instructions.
- I. Provide wiring in accordance with manufacturer's instructions and run wiring in conduit. Wiring to be oversized in accordance with manufacturer's instructions.
- J. Install components in accordance with manufacturer's instructions to suit specific installation requirements.
- K. Review exact locations of components with Consultant prior to roughing-in.
- L. Review device finishes with Consultant prior to ordering.
- M. Ground and bond system as required by local governing electrical code and authority and system manufacturer.
- N. Submit with shop drawings, detailed system wiring diagram and system riser diagram.
- O. Clearly label low voltage circuits.
- P. Upon completion of installation, provide following:
  - 1. inspection, testing and verification of system;

2. re-verification of failed or replaced components;
  3. signed verification report.
- Q. Testing to include check of operation of each dimmer and control station. Adjust and preset devices as required to meet Owner's applications.
- R. Refer also to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

**END OF SECTION**

**SECTION 26 20 00**  
**ELECTRICAL SERVICE AND DISTRIBUTION**

**PART 1 - GENERAL**

**1.1 SUBMITTALS**

- A. Submit shop drawings for products specified in this Section.

**1.2 LOCAL ELECTRICAL UTILITY REQUIREMENTS**

- A. Comply with latest conditions of supply requirements of local governing electrical utility. Confirm exact requirements with local governing electrical utility and coordinate utility requirements with respective Divisions of Work providing such work. Provisions to accommodate local governing electrical utility requirements generally include but are not limited to following:
1. preconstruction meeting;
  2. inspection: on site access for local governing electrical utility inspector to be on duty for duration of work;
  3. underground inspection: submission of approval drawings and application for inspection prior to any inspection of work;
  4. approval of work and materials by local governing electrical utility inspector prior to any backfilling work.
- B. In case of discrepancies or conflicts between Drawings and Specifications and local governing authority standards, contact Consultant and obtain direction. If direction is not available prior to close of Bids, include for most costly arrangement, but ensure that direction is obtained prior to start of Work.

**1.3 INCOMING ELECTRIC SERVICE WORK**

- A. Included in Division 01 is a cash allowance to cover costs for local governing electrical utility to extend their electrical system to service property. Local governing electrical utility work to include but not be limited to provision of following:
1. primary conductors and secondary conductors installed in concrete encased ductbank;
  2. required primary and secondary connections to main power transformer;
  3. pad mounted main power transformer;
  4. testing of primary conductors, main power transformer and connections;
  5. required off site work to incoming system;
  6. low voltage metering components.

**1.4 SERIES RATED COMBINATIONS**

- A. Series rated combinations of over-current protective devices are not permitted.

**1.5 PROTECTIVE COORDINATION AND EQUIPMENT WITHSTAND RATINGS**

- A. Obtain results of coordination study and short circuit calculations reports and Consultant comments and incorporate into shop drawings of electrical distribution equipment (high voltage and low voltage equipment as applicable). Do not order equipment until shop drawings submission process has been completed and reviewed with Consultant.
- B. Provide ratings for electrical equipment, circuit protective devices, bussing, and switches to interrupt and withstand short circuit faults greater than available fault current at its source of supply.

## **1.6 BREAKERS**

- A. Breakers to be NEMA rated types, and for switchboards and distribution panelboards, breakers when frame sized greater than 225 amperes, or where scheduled or where noted on drawings, to be provided with solid state adjustable trip units with long time, short time and instantaneous time (LSI) functions and time delays. Set trip units at ratings as per coordination study as required for proper selective coordination. Unless otherwise noted on drawings, provide ground fault alarm and trip functions at breaker trip unit rating above 600 A, and set as coordinated with results of coordination study and as reviewed with Consultant.
- B. Size breakers as per drawings and/or schedules, but in absence of direction, size breakers to suit intended application, to suit coordination study requirements and in accordance with local governing electrical code.

## **PART 2 - PRODUCTS**

### **2.1 SPLITTER TROUGH**

- A. CSA certified, splitter trough each complete with:
  - 1. formed, factory primed and painted steel box with knockouts;
  - 2. hinged front coverplate;
  - 3. suitable mounting provisions;
  - 4. a nameplate giving its rating.
- B. Terminal blocks consist of pressure type main lugs and branch lugs approved for copper wiring and mounted on porcelain bases.
- C. Enclosures for splitters mounted in climate controlled areas to be NEMA 1. For standard non-climate controlled applications, enclosures to be minimum NEMA 3R. Use NEMA 4X for corrosive environment applications.
- D. Splitter trough ratings are scheduled on drawings.
- E. Acceptable manufacturers are:
  - 1. Bel Inc.;
  - 2. Hydrel;

### **2.2 HAMMOND CONTACTORS**

- A. Eaton, CSA certified, NEMA rated, factory assembled, magnetic, full voltage contactors as follows:
  - 1. To CSA C22.2 No.14;
  - 2. "Freedom" CN15 series, non-reversing type for heating and motor loads; features long life twin break, silver cadmium oxide contacts and steel mounting plate; magnetically actuated switch to include remote operation capability;
  - 3. Series A202 electrically held, magnetically latched contactor for lighting loads; contactors designed to withstand large initial inrush currents.
- B. Each contactor to be suitable in respects for application and complete with following, as applicable:
  - 1. "Hand-Off-Auto" switch and pilot lamp;
  - 2. "START/STOP" pushbutton;
  - 3. an enclosure of NEMA size to suit application with necessary accessories;
  - 4. factory primed and painted enclosures;
  - 5. minimum NEMA 1 type enclosures for climate-controlled areas;
  - 6. minimum NEMA 3R type enclosures for non-climate-controlled areas;
  - 7. ampere rating, number of poles, etc., as noted on drawings.
- C. Acceptable manufacturers are:
  - 1. Eaton;
  - 2. Schneider Electric (Square D);
  - 3. Rockwell Automation (Allen-Bradley);
  - 4. Siemens;
  - 5. ABB.

### **2.3 DISCONNECT SWITCHES**

- A. Heavy duty, CSA certified, disconnect (safety) switches. Features include:
  - 1. front operated with handle suitable for padlocking in "OFF" position and arranged so that enclosure cover cannot be opened while handle is in "ON" position;
  - 2. operating mechanisms: quick-break, positive acting with visible blades and line terminal shield;
  - 3. 100% load break / make rated;
  - 4. non-fusible units;
  - 5. fusible units with fuse clips suitable for HRC fuses, unless otherwise noted;
  - 6. ampere rating, number of poles and fuse requirements as indicated on drawings;
  - 7. factory primed and painted switch enclosures.
- B. Disconnects for variable speed drives to be suitable for use with such drives and include auxiliary switch/contact to de-energize control power circuit, as required and as applicable.
- C. Enclosures for disconnects mounted in interior climate-controlled areas and standard non-climate controlled areas to be NEMA 3R. For corrosive environmental applications, enclosures to be minimum NEMA 4X.
- D. Acceptable manufacturers are:
  - 1. Eaton;
  - 2. Siemens Electric Ltd.;
  - 3. Schneider Electric (Square D);
  - 4. ABB.

### **2.4 DOUBLE THROW DISCONNECT SWITCHES**

- A. Heavy duty, CSA certified, double throw disconnect switches. Features include:
  - 1. front operated handle operating mechanism actuates either upper or lower switch; when handle is in centre position, both switches are OFF;
  - 2. handle and door interlocked to keep door closed when switch is ON and hold handle OFF when door is open;
  - 3. triple padlocking – 2 on door and up to 3 locks in centre OFF position;
  - 4. 100% load break / make rated;
  - 5. non-fusible units;
  - 6. fusible units with fuse clips suitable for HRC fuses, unless otherwise noted;
  - 7. ampere rating, number of poles and fuse requirements as indicated on drawings;
  - 8. factory primed and painted switch enclosures.
- B. Enclosures for disconnects mounted in interior climate-controlled areas and standard non-climate controlled areas to be NEMA 3R. For corrosive environmental applications, enclosures to be minimum NEMA 4X.
- C. Acceptable manufacturers are:
  - 1. Eaton;
  - 2. Siemens Electric Ltd.;
  - 3. Schneider Electric (Square D)
  - 4. ABB.

### **2.5 FUSES**

- A. Unless otherwise indicated, fuses to be Form I, Class "J" HRC fuses for constantly running equipment, and Form II, Class "C" HRC fuses for motorized equipment that cycle "ON" and "OFF".
- B. Unless otherwise indicated, fuses for use in motor control centres and motor starters to be equivalent to Mersen Class "J" type "AJT", dual element time delay type and in accordance with UL standards 248-8 and 198L.
- C. Fuses to be of type suitable for applications as required by local governing electrical codes and in coordination with respective equipment manufacturer's recommendations in which fuses are required. Coordinate also with Mechanical Division Contractor for requirements for Mechanical Division equipment.
- D. Fuses to be of product of one manufacturer.

- E. Acceptable manufacturers are:
  - 1. Mersen (Ferraz Shawmut);
  - 2. English Electric Ltd.;
  - 3. Noram;
  - 4. Cooper Bussmann.

## **2.6 FUSE CABINET**

- A. Fuse storage cabinet, surface wall mounted, manufactured from aluminum, approximately 750 mm (30") high, 600 mm (24") wide, 300 mm (12") deep, with provisions for supporting fuses and hinged lockable front access door. Cabinet to be finished in grey enamel paint and include identification labelling.

## **PART 3 - EXECUTION**

### **3.1 INCOMING ELECTRIC SERVICE WORK**

- A. As confirmed with local governing electrical utility, include for but not be limited to provision of following:
  - 1. provision of primary and secondary concrete encased ductbank;
  - 2. provision of manholes;
  - 3. provision of foundation padmount and grounding provisions for local electrical utility main power transformer;
  - 4. provision of protection bollards around pad mount transformer;
  - 5. provision of secondary conductors installed in concrete encased ductbank;
  - 6. coordination with local electrical utility for their secondary connections to main power transformer;
  - 7. testing of secondary conductors;
  - 8. coordination with local electrical utility for their low voltage metering components.
- B. Review incoming cables and duct/conduit runs from utility source and comply with local governing utility requirements for installation of cables and duct/conduit runs to Owner service entrance equipment. Obtain required local governing utility details, inspections and approvals.

### **3.2 INSTALLATION OF SPLITTER TROUGH**

- A. Provide splitter trough and install into locations and connect complete. Install with adequate clearance as per code requirements and as required for access for operation and maintenance.
- B. Ensure enclosure ratings are suitable for intended applications.
- C. Secure splitter trough in place independent of connecting conduit, secure into position and connect complete.

### **3.3 PROVIDE ENGRAVED LAMACOID NAMEPLATE WITH NOMENCLATURE REVIEWED WITH CONSULTANT.INSTALLATION OF CONTACTORS**

- A. Provide contactors in enclosures for electric heating, outside lighting control and other equipment. Connect complete to equipment and auxiliary control devices as required.
- B. Wall mount each enclosure independent to panelboard to which loads are connected.
- C. Ensure enclosure ratings are suitable for intended applications.
- D. Provide engraved lamacoid nameplate with nomenclature reviewed with Consultant.

### **3.4 INSTALLATION OF DISCONNECT SWITCHES**

- A. Provide disconnects switches and install into locations and connect complete. Ensure adequate clearance is provided as per local code requirements and as required for access for operation and maintenance. Install as follows:
  - 1. wherever shown on drawings and/or specified herein;
  - 2. wherever required by MCC/VFD/starter schedule drawings;
  - 3. for motorized equipment which cannot be seen from motor starter location or is more than 9 m (30') from starter location (in accordance with local governing electrical code requirements);



- 4. for "packaged" equipment fed from a motor starter panel.
- B. Where double throw switches are required, connect to provide operations as noted.
- C. Ensure enclosure ratings are suitable for intended applications.
- D. Provide engraved lamaroid nameplate with nomenclature reviewed with Consultant.

### **3.5 INSTALLATION OF FUSES**

- A. Install fuses in mounting devices immediately before energizing circuit.
- B. Ensure correct fuses fitted to physically matched mounting devices.
- C. Ensure correct fuses fitted to assigned electrical circuit.
- D. Provide a complete set of fuses for each fusible disconnect, motor starter, and similar fusible equipment provided or supplied.
- E. Supply 3 spare fuses of each size and type used on project, mount fuses in cabinet. Secure cabinet in wall location as reviewed with Consultant.

### **3.6 PROVISIONS FOR BUILDING AUTOMATION SYSTEM**

- A. Provide alarm/communications circuits as required. Include for provision of conduits, boxes and control/signal wiring for interconnection to BAS. Coordinate with Mechanical Divisions BAS Contractor on location of BAS panel to be used for monitoring points and extend wiring in conduit from electrical equipment to location. Terminate in junction box leaving 3 m (10') of slack length of wiring (exact length to be coordinated between Mechanical and Electrical trades), for extending and termination to BAS panel by Mechanical Division BAS Contractor. Properly identify wiring and junction box.

### **3.7 ELEVATOR EQUIPMENT POWER AND CONTROL CONNECTIONS**

- A. Provide splitter trough, disconnect switches, outlet boxes, etc., as required for elevators provided as part of work of Division 14. Include for additional relays and/or contacts to interconnect with auxiliary building systems and equipment. Refer to and comply with Division 14 documents.
- B. Generally, terminate power and control wiring at elevator controllers for final connection to elevator equipment as part of work of Division 14. Confirm with elevator trades their extent of work and provide work to properly interface. Generally, interconnections and provisions are required for but not limited to following:
  - 1. power for elevators;
  - 2. power for cab interior devices;
  - 3. telephone and other communications for cab;
  - 4. signalling and fire alarm interconnections for initiating sequence of operation of elevators (ie. homing); provide fire fighter's key switch control for takeover of elevators;
  - 5. telephone and miscellaneous power in elevator room;
  - 6. smoke/heat detectors in elevator room and pit.
- C. Obtain accurate roughing in information and carefully coordinate work with Division 14. Placing of elevating device apparatus is to take precedence over work of this Division and, with exception of fire alarm devices, work in hoistways, equipment rooms, and pits are to be confined to work serving elevating devices only.
- D. Failure to comply with above will render you responsible for relocation and adjustments as required.
- E. Provide required central control and interlocking feeders for elevator equipment indicated on drawings. Carefully coordinate exact requirements with successful elevator equipment supplier/installer prior to roughing-in.
- F. Identify each disconnect switch with labels and lettering to requirements of Division 14.
- G. Provide GFCI type 110 V convenience outlets in machine rooms and pits.

- H. Provide empty conduit with fish cords, as required from telephone head end equipment to elevator machine room for future wiring and connection by Division 14 to each elevator cab phone. Terminate on box outside elevator controller.
- I. Provide fire alarm system provisions as specified in fire alarm system Section and as specified in Division 14.
- J. Comply with latest requirements of CSA B44. Coordinate with Division 14 in obtaining required inspections and approval certificates from local authority having jurisdiction.

### **3.8 ELECTRICAL CONNECTIONS FOR MECHANICAL, OWNER'S, ETC., EQUIPMENT**

- A. Provide required electrical connections to apparatus provided and/or supplied by Electrical Divisions. Review shop drawings and coordinate with each equipment vendor, requirements for power feeds and control/communication interconnections and provide these requirements to complete installations work.
- B. In addition to providing electrical feeders and connections to equipment provided by Electrical Divisions, provide required electrical connections to apparatus provided and/or supplied by Mechanical Divisions, Owner and as part of other Divisions.
- C. Unless otherwise noted, provide electrical connections including power and control wiring for equipment supplied by Owner or by other Divisions, and except where specified for control wiring of Mechanical Divisions automatic control systems specification Section. Provide complete wired and empty conduit systems with fish cord, junction boxes, pull boxes, outlet boxes, faceplates, sleeves, etc. Provide disconnect switches, receptacles and other required wiring and connection accessories. Coordinate work with respective Consultants and suppliers of equipment to be provided with electrical connections.
- D. Refer to Divisions 10 and 11 and include for coordination and interconnections of Divisions 10 and 11 requirements and equipment schedules.
- E. Coordinate with trades of other Divisions to ensure provision of proper electrical requirements. Unless otherwise noted or reviewed with Consultant, be responsible for provision of interconnect wiring between remote operator devices, controllers, and equipment being controlled by operator devices, whether or not such devices/controllers are supplied by Electrical Divisions. Where equipment is of split unit design and line voltage is required to both units, be responsible for feeders to each unit as coordinated with equipment manufacturer and Division responsible for equipment. Provide disconnect switches, receptacles and other required wiring and connection accessories. Provide system/equipment power feeds with hard wired or receptacle type connections, as required. Coordinate exact requirements prior to start of work, at time of shop drawing submissions and prior to roughing-in of work. Coordinate work with suppliers of equipment to be provided with electrical connections which may include but not be limited to following:
  - 1. kitchen equipment;
  - 2. audio visual systems;
  - 3. telecommunication systems;
  - 4. mechanical systems and equipment;
  - 5. other medical equipment.
- F. Provide coordination of alarm connections of equipment with Mechanical Divisions BAS Contractor. Refer to drawings of both Electrical Divisions and Mechanical Divisions for BAS points to be connected. Include for wiring in conduit, contacts, termination/junction boxes, etc., as required for inter connection.
- G. Mechanical Divisions are responsible for supply of motor control centres (MCCs), motor starters and variable frequency drives (VFDs) (also known as variable speed drives –VSDs) and harmonic filters for motorized apparatus supplied by them and is to provide Lamacoid identification throughout. Motor starters, VFDs and/or MCCs are generally to be as scheduled. Generally, starters are supplied in following manner:
  - 1. loose starters for mounting adjacent to apparatus or on motor starter panels;
  - 2. mounted starters in factory assembled and pre-wired motor control centres;
  - 3. mounted starters on factory assembled and pre-wired packaged equipment.
- H. MCCs and VFDs (with harmonic filters where required) are to be supplied and set in position by Mechanical Divisions. Coordinate installation and connection requirements with Mechanical Divisions and respective equipment manufacturers. Obtain required wiring diagrams. Provide required connections.

- I. Be responsible for following work:
1. mounting loose starters and providing "line" and "load" power connections;
  2. providing motor starter panels - conduit work at motor starter panels to be horizontally and vertically plumb; plan installation to avoid crossovers;
  3. making "line" side power connections to motor control centres and "load" side connections to motors or other apparatus supplied power from motor control centres - where applicable, sub-feed refrigeration machine starter from double lugs furnished in adjacent motor control centre for refrigeration equipment;
  4. making "line" side power connections to starters on "packaged" equipment;
  5. coordinating feeder entries to starters and starter assemblies with Mechanical Divisions;
  6. providing additional disconnect switches (complete with identification) detailed on drawings, or required by Code, or for apparatus which cannot be seen from its starter or is in excess of 9 m (30') from its starter;
  7. connections to thermistors and provision of additional relays as required for connections to starters; generally, Mechanical Divisions are to supply required thermistors and relays necessary for starters; review Mechanical Divisions specifications and/or drawings defining these requirements and include necessary work, wiring, conduit and components not being supplied by Mechanical Divisions;
  8. performing required motor starter interlocking in accordance with requirements specified and as outlined on MCC/starter schedules; coordinate interlocking requirements with Mechanical Divisions;
  9. in coordination with Mechanical Division, providing 120 VAC power feeds to receptacles and luminaires integral with mechanical equipment including air handling units;
  10. in coordination with Mechanical Division, ensure that identification nameplate is provided on each motor starter or disconnect;
  11. in coordination with Mechanical Division, ensure that identification nameplate is provided on each motor control centre nameplate is to identify name, for example, MCC No. 1, and voltage, for example, 600 V;
  12. in coordination with Mechanical Division, ensure that identification nameplate is provided and attached with stainless steel screws to each separately mounted 3-phase motor starter or group of 3-phase motor starters a suitably sized black-white-black Lamacoid nameplate engraved to read:  
"MOTOR(S) IS CAPABLE OF MAKING TWO (2) STARTS IN SUCCESSION, COASTING TO REST WITH APPROXIMATELY 15 MINUTES ELAPSED TIME BETWEEN STARTS, WITH MOTOR INITIALLY AT AMBIENT TEMPERATURE, OR OF MAKING ONE (1) START WITH MOTOR INITIALLY AT A TEMPERATURE NOT EXCEEDING ITS RATED LOAD OPERATING TEMPERATURE, IF  $\Omega K^2$  OF LOAD, LOAD TORQUE DURING ACCELERATION, APPLIED VOLTAGE AND METHOD OF STARTING ARE THOSE FOR WHICH MOTOR WAS DESIGNED."
  13. Replace motors due to abuse of above prior to acceptance of work. If additional starts are required, it is recommended that none be made until conditions affecting motor operation have been thoroughly investigated and apparatus examined for evidence of excessive heating. Restrict number of motor starts to absolute minimum since life of motor is affected by number of starts.
  14. Where supplied by Mechanical Divisions and connected by Electrical Divisions, connect VFDs and harmonic filters with power, control and monitoring conductors in strict accordance with manufacturer's instructions and local governing electrical code. Provide manufacturer's recommended conductors and connectors to suit respective connected equipment (such as Nexan DriveRX type VFD cables). Provide required upstream fused disconnects or breakers and overload protection. Maintain separation of power and control conductors as per manufacturer's requirements to minimize effects of electromagnetic interference. Properly ground and bond equipment. Coordinate exact installation requirements with Mechanical Division and equipment vendors.

- J. Refer also to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

**END OF SECTION**

## SECTION 26 27 26 WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 SUBMITTALS

- A. Submit shop drawings for products specified in this Section.
- B. Submit samples of each typical wiring device, faceplates, finishes and colours. Mount to sample board, clearly labelling devices and finishes. Submit for review with Consultant. Do not order any device unless finishes have been approved by Owner and reviewed with Consultant.

### PART 2 - PRODUCTS

#### 2.1 SWITCHES

- A. Switches to be CSA certified, ULC listed and labelled devices.
- B. Hubbell Canada Inc., HBL 1221 Series, CSA certified, heavy duty, industrial grade, back, and side wired, AC quiet action toggle type, 20 ampere, 120-277 V switches. Switches to include steel-nickel plated bridge, nylon toggle, one-piece rivetless copper alloy spring contact arm and terminal plate, silver cadmium oxide contacts, brass binding head screws, one-piece integral grounding terminal and stainless-steel automatic grounding clips. Provide single way, 2-way, 3-way, and key type to suit specific application requirements.
- C. Hubbell Canada Inc., No. DS120 series "Style Line", decorator specification grade, 20 ampere, 120-277 V decorative rocker type switches, LED lighted with load off, back and side wired and complete with matching faceplates and screws.
- D. Hubbell Canada Inc., SNAP1221 series, CSA certified, specification grade, back, and side wired, AC quiet action toggle type, 20 ampere, 120-277 V switches. Switches to include steel-nickel plated bridge, nylon toggle, one-piece rivetless copper alloy spring contact arm and terminal plate, silver cadmium oxide contacts, brass binding head screws, one-piece integral grounding terminal and stainless-steel automatic grounding clips. Provide single way, 3-way, and pilot type to suit specific application requirements.
- E. Hubbell Canada Inc., SNAP2121 decorator series, CSA certified, specification grade, back and side wired, A.C. rocker type, 20 ampere, 120-277 V switches. Switches to include steel-nickel plated bridge, nylon rocker, one-piece rivetless copper alloy spring contact arm and terminal plate, silver cadmium oxide contacts, brass binding head screws, one-piece integral grounding terminal and stainless steel automatic grounding clips. Provide single way, 3-way, and pilot type to suit specific application requirements.

#### 2.2 RECEPTACLES

- A. Receptacles to be CSA certified, ULC listed, certified and labelled devices.
- B. Hubbell Canada Inc., No. HBL5262 / HBL5362 CSA certified, ULC listed, extra heavy duty, specification grade, back and side wired, flush, nylon face/body construction, duplex U-ground, 15/20 ampere, 125 V, 2-pole, 3-wire grounding receptacles complete with one piece nickel-plated brass mounting strip with integral grounding clips, ground retention clips, nickel-plated brass wiring clamps with nickel-plated brass screws, front circuit identification area and reinforced thermoplastic base.
- C. Hubbell Canada Inc., No. HBL 5361 series, extra heavy duty, specification grade, flush, nylon face, single, 20 ampere, 125 V, 3-wire grounding receptacles.
- D. Hubbell Canada Inc., No. HBL 5461 series, extra heavy duty, specification grade, flush, nylon face, single, 20 ampere, 250 V, 2-pole 3-wire grounding receptacle.
- E. Hubbell Canada Inc., No. BR15TR series, commercial specification grade, 15 ampere, 125 V, 2-pole, 3-wire grounding, tamper-resistant (safety shutter) duplex receptacles.

- F. Hubbell Canada, No. GFR 5262SG / GFR 5362SG "AUTOGUARD" Series, extra heavy-duty grade, 15/20 ampere, 125 V, duplex, ULC Class "A", Group One, tamper resistant, weather resistant ground fault circuit interrupting receptacles complete with automatic self-test diagnostics, green power ON LED, red ground fault LED and 10ka short circuit current rating.
- G. Hubbell Canada Inc., No. DR15 / DR20 "Commercial Style Line" decorator series, specification grade, CSA certified, ULC listed, back and side wired, nylon face/body construction, 15 ampere, 125 V, 2 pole, 3 wire grounding, duplex receptacles complete with wrap around galvanized steel mounting strip and oversize terminal screws.
- H. Hubbell Canada Inc., No. USB 15AC series, CSA certified, ULC listed, 2- USB ports (5A, 5V DC, type A and type C port configurations, class 2.0, 3.0 and 3.1) and 15/20 ampere, 125 V rated duplex decorative style power receptacles, tamper resistant, back and side wired. Confirm exact USB port configuration and 15A or 20A power receptacle requirements with Owner prior to ordering.
- I. Hubbell Canada Inc., No. DR15C/DR20C1 " Style Line Decorator " plug load controlled series, industrial grade, permanently marked with symbol identifying controlled receptacle, CSA certified, ULC listed, back and side wired, nylon face/body construction, 15/20 ampere, 125 V, grounding, duplex receptacles; for use with automatic outlet control systems, and with factory broken split circuit tab allowing control of half of receptacle; interconnected to control module relays of lighting control system or other building control systems.
- J. Hubbell Canada Inc., No. DR15C2/DR20C2 " Style Line Decorator " plug load controlled series, industrial grade, permanently marked with symbol identifying controlled receptacle, CSA certified, ULC listed, back and side wired, nylon face/body construction, 15/20 ampere, 125 V, grounding, duplex receptacles; for use with automatic outlet control systems allowing control of full receptacle; interconnected to control module relays of lighting control system or other building control systems.
- K. Legrand - Pass & Seymour, No. 2122, 15 ampere, 125 V, recessed, ivory clock hanger receptacles and wall plates.
- L. Hubbell Canada Inc., No. 9430, EEMAC type 14-30R, 30 ampere, 125/250 V, 3-pole, 4-wire single electric clothes dryer receptacles with steel faceplates.
- M. Hubbell Canada Inc., No. 9450, EEMAC type 14-50R, 50 ampere, 125/250 V, 3-pole, 4-wire single electric range receptacles with steel faceplates.
- N. Hubbell Canada, No. IG 5262, heavy duty, specification grade, 15 ampere, 125 V, duplex, orange colour, nylon construction, back, and side wired isolated receptacles.
- O. Hubbell Canada, No. BR15TR series, specification grade, 15 ampere, 125 V, 2-pole, 3-wire, tamper resistant, safety shutter receptacles.
- P. Hubbell Canada, No. 4710, specification grade, 15 ampere, 125 V, single, 2-pole, 3-wire grounding twist lock receptacle.
- Q. Hubbell Canada, No. 15 ampere and 50 ampere receptacles complete with neutral and ground conductors required for indicated number of phases as required.

### **2.3 FACEPLATES**

- A. Grade 18 8, type 430, 1 mm (0.032") thick stainless steel, satin, brushed or natural finish, complete with a peel off protective plastic film, and stainless steel screws.
- B. Hubbell Canada Inc., No. WP8E / WP8EH, NEMA 3R rated, CSA certified, ULC listed and labelled, single gang, vertical/horizontal mounting, weather-proof in-use, gasketed, cast aluminium faceplates for standard duplex receptacles in wet locations.
- C. Hubbell Canada Inc., No. WP26E/WP26EH, NEMA 3R rated, CSA certified, ULC listed and labelled, single gang, vertical/horizontal mounting, weather-proof in-use, gasketed, cast aluminium faceplates for GFI receptacles in wet locations.

- D. Hubbell Canada Inc., No. HBL1795, ULC listed and labelled, single gang, vertical mounting, weather proof in-use, gasketted, clear bubble plate, silicone rubber faceplates for standard AC toggle switches in wet locations.
- E. Galvanized steel stamped faceplates.
- F. Legrand - Pass & Seymour, "Sierra Thermoset" series, moulded of non-combustible mar proof material and complete with colour matching screws.
- G. Hubbell Canada Inc., forged brass "S" Series faceplates with flip open doors for receptacles.
- H. Colours and finishes of faceplates are specified in Part 3 of this Section.
- I. Acceptable manufacturers are as per switches and receptacles.

## **2.4 PUSHBUTTONS OPERATORS**

- A. Rockwell Automation (Allen-Bradley) Ltd., 800T Series operators as follows:
  - 1. emergency off pushbuttons: oversized 60 mm (2-1/2") diameter red plastic mushroom head pushbutton with shroud, thrust washer, and an aluminum faceplate with "EMERGENCY POWER OFF" identification lettering or other nomenclature as required to suit application;
  - 2. pushbuttons: standard 30 mm (1-1/4") diameter plastic pushbuttons in Red/Green colours as required for application, momentary/maintained/2 position push-pull operations as required, flush/extended/mushroom heads; non-illuminated/illuminated, with aluminum faceplate with identification lettering nomenclature as required to suit application;
  - 3. selector switches: 30 mm (1-1/4") diameter standard knob selector switches, 2/3 position maintained contact operations; non-illuminated, with aluminum faceplate with identification lettering nomenclature as required to suit application;
  - 4. key operated switches: standard 30 mm (1-1/4") diameter key cylinder lock operator, 2 or 3 position operations; non-illuminated, with aluminum faceplate with identification lettering nomenclature as required to suit application;
  - 5. pilot lamps: 30 mm (1-1/4") diameter illuminated LED pilot lights, red/green/amber/white/clear colours as required to suit application; of voltage ratings as required to suit application; with contact block; with aluminum faceplate with identification lettering nomenclature as required to suit application; push to test feature where required;
  - 6. with enamel painted steel or stainless steel faceplate for flush mounting onto recessed wall boxes or in millwork, suitable for mounting of devices;
  - 7. with NEMA 1 box for surface mounting applications in climate controlled areas, CSA certified for application and of size suitable for mounting of devices;
  - 8. with minimum NEMA 3R box for surface mounting applications in non-climate controlled areas, CSA certified for application and of size suitable for mounting of devices;
  - 9. with STI type flip open polycarbonate tamper-proof cover and audible alarm device activated when cover is open, and custom labelling.
- B. Exact type and ratings of devices are to suit specific applications.
- C. Acceptable manufacturers are:
  - 1. Rockwell Automation (Allen-Bradley);
  - 2. Eaton (Cutler-Hammer);
  - 3. Square D;
  - 4. GE.

## **2.5 LINEAR SWITCHES**

- A. Encased Linear Switches: Tapeswitch Corporation "NexGen" series with features as follows:
  - 1. ULC listed and labelled;
  - 2. momentary-contact, press-at-any-point linear switch enclosed in Lexan housing consisting of clear, impact-resistant cover for vandal resistance applications;
  - 3. custom colour, graphics and labels to match equipment or area colour schemes and provide operating instructions;
  - 4. Actuation Force: 5 lbs. (22 N) nominal;

5. Voltage and Current: 24 VAC or VDC at 1.0 amps max;
  6. Operating Temperature:-18 to 50°C (0 to 122°F);
  7. Length unless otherwise as noted on drawings: 600 mm (24").
- B. Include required ancillary devices and power supplies.
  - C. Review finishes and lengths with Consultant prior to ordering.
  - D. Install securely to surfaces as required using mechanical fasteners and following manufacturers recommendations.
  - E. Acceptable manufacturers are:
    1. Tapeswitch Corporation;
    2. Londonmat Industries.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF SWITCHES**

- A. Provide devices and install in electrical outlet boxes. Refer to drawings to determine flush or surface mounting requirements. Generally, flush mount devices in finished areas. Size electrical boxes to suit device requirements as per device manufacturer's recommendations. Properly ground device to box and ground system as per code requirements and manufacturer's instructions.
- B. For pricing only, switches to be ivory for devices connected to normal power circuits, red for devices connected to emergency power circuits.
- C. Every switch connected to essential (emergency) power circuits, to be illuminated toggle type.
- D. Illuminated operation of lighted switches to suit specific applications as confirmed with Consultant.
- E. Ensure that switches located adjacent to doors are located at strike side of door. Confirm door swing requirements on architectural drawings, not on electrical drawings.
- F. Coordinate installation of door switches with trades responsible for provision of doors and frames. Review exact locations of switches with Consultant to ensure optimum operation of switch to door position.
- G. Review final device finishes with Consultant as per sample board submission specified in Part 1. Do not order any devices unless final finishes have been approved by Owner and reviewed with Consultant.
- H. Additionally, refer to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

### **3.2 INSTALLATION OF RECEPTACLES**

- A. Provide devices and install in electrical outlet boxes. Refer to drawings to determine flush or surface mounting requirements. Generally, flush mount devices in finished areas. Size electrical boxes to suit device requirements as per device manufacturer's recommendations. Properly ground device to box and ground system as per code requirements and manufacturer's instructions.
- B. For pricing only, receptacles to be ivory for devices connected to normal power circuits, red for devices connected to emergency power circuits. Generally, install receptacles in Patient Care Areas vertically with ground pins up.
- C. Safety shutter type receptacles to be located where shown and required by code and CSA Z32.
- D. Provide separate insulated ground wire for each isolated ground receptacle. Do not install isolated ground receptacles in patient care areas.
- E. Install USB charger receptacles in extra deep boxes in accordance with manufacturer's recommendations.
- F. Install exterior receptacles in accordance with drawing details, and as coordinated and reviewed with Consultant. Comply with local governing electrical code with regards to wiring and installation requirements. Properly ground installations.



- G. Comply with requirements of CSA Standard Z32, with regards to identifying circuit number and supplying panelboard, permanently identified at outlets. Identify this information in areas on front of each receptacle. In addition, provide engraved lamacoid nameplate on wall below each device faceplate, identifying circuit number and panelboard from where each device is fed. Review exact location for identification with Consultant.
- H. Where receptacles are indicated in counters and benches, box cut-out to be provided in counter and bench. Provide a box, receptacle, plate and branch circuit wiring. Branch circuit wiring within counters and benches to be flexible armoured cable, under requirements of local governing electrical code and standards. Install and connect complete.
- I. Install plug load controlled receptacles of type compatible with and coordinated with connected control system. Confirm compatibility of receptacle with control system vendor. Circuit split controlled receptacles as per local governing electrical code requirements.
- J. Review locations and nomenclature of nameplates and labelling with Consultant prior to printing of labels and nameplates. Turn over label maker to Consultant/Owner prior to application for Certificate of Substantial Performance of the Work.
- K. Review final device finishes with Consultant as per sample board submission specified in Part 1. Do not order any devices unless final finishes have been approved by Owner and reviewed with Consultant.
- L. Additionally, refer to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.

### **3.3 INSTALLATION OF FACEPLATES**

- A. Provide each device with a faceplate with an opening or openings suitable for device it conceals and covers openings around boxes. Secure faceplates to device frames with screws to match faceplates. Provide larger than standard type faceplates for devices that require engraved nomenclature to define special purpose for that device.
- B. Provide nylon type standard size faceplates for flush mounted devices unless specified otherwise.
- C. Provide stainless steel faceplates in exam rooms, kitchens, large group rooms, gym, waste holding, chiropody rooms, housekeeping rooms, etc.
- D. Provide nylon type faceplates for switches and receptacles circuited to emergency power sources and/or isolated power centres. Colour finish to be red, but reviewed with Consultant.
- E. Provide galvanized stamped steel faceplates in service areas and equipment rooms where devices are surface mounted.
- F. Isolated ground receptacles connected to circuits fed from uninterruptible power supply units to be equipped with faceplates in orange colour.
- G. Provide faceplates for computer equipment isolated ground receptacles with label printed with "Computer Equipment Only" lettering.
- H. Provide faceplates for housekeeping receptacles with label printed with "Housekeeping Only" lettering.
- I. Provide weatherproof insulated faceplates with hinged and gasketed receptacle access flaps for weatherproof receptacles denoted "WP" on drawings.
- J. Generally, oversized faceplates to be provided where engraved lettering is required.
- K. Faceplates for flush floor mounted receptacles in standard floor boxes to be forged brass rectangular faceplates.
- L. For flush mounted devices, provide oversized faceplates as required to properly cover wall openings around recessed boxes.
- M. Provide faceplates with suitable identification labels. Review exact locations for labelling with Consultant.

- N. In addition to identification requirements specified with devices, provide faceplates with printed self-adhesive label on inside face identifying circuit number and panel feeding device. Turn over label maker to Consultant prior to application for Certificate of Substantial Performance of the Work.
- O. Review exact material, finish, and colour of faceplates for devices in any particular area with Consultant prior to ordering. Submit sample board as per requirements of Part 1.

#### **3.4 INSTALLATION OF PUSHBUTTON OPERATORS**

- A. Provide specified and suitable pushbutton operators and pilot lamps to suit various applications.
- B. Where flush mounted, provide faceplate for mounting onto recessed boxes.
- C. Where surface mounted climate controlled areas, provide suitable NEMA 1 box. In non-climate controlled areas, surface mounted devices to be mounted within minimum NEMA 3R rated boxes.
- D. Install devices in accordance with manufacturer's instructions to suit application requirements of Owner. Connect complete to respective equipment being controlled. Provide required wiring in conduit.
- E. Test and verify operation of each device. Provide engraved lamacoid nameplate to identify system being operated and any special instructions. Confirm exact nomenclature with Consultant prior to ordering.

**END OF SECTION**

**SECTION 26 50 00**  
**LIGHTING**

**PART 1 - GENERAL**

**1.1 SUBMITTALS**

- A. Submit shop drawings for products of this Section, and on Schedule of Luminaires on drawings.
- B. Submittals to include:
  - 1. luminaire dimensions, aperture dimensions, cutout dimensions;
  - 2. driver information for each luminaire, including maximum circuit loading limitations, and dimming details;
  - 3. total input watts;
  - 4. lumen rating in accordance with IESNA testing procedures;
  - 5. candlepower summary, candela distribution zonal lumen summary;
  - 6. luminaire efficiency;
  - 7. lamp life rating (based on LM-80 and TM-21);
  - 8. colour temperature;
  - 9. colour fidelity (as per TM-30 preferred);
  - 10. finishes;
  - 11. options being provided;
  - 12. other relevant information to ensure design intent.
- C. Include copy of certification that lenses, and louvers comply with local governing building code requirements for flame spread ratings.
- D. Include copies of documents of respective manufacturers confirming complete compatibility between lighting controls and luminaires.

**1.2 WARRANTY**

- A. Warranty requirements for luminaires are as follows:
  - 1. warranties to be full comprehensive product replacement direct from luminaire manufacturers;
  - 2. when LEDs and drivers, or lamps and ballasts are supplied with luminaire by luminaire manufacturer, warranty to be under responsibility of luminaire manufacturer;
  - 3. unless otherwise noted, warrant LED luminaires and LED drivers for a period of minimum 5 years from date of application for Certificate for Substantial Performance of the Work; include for personnel, equipment and labour for replacing products onsite, for duration of Contract warranty period defined in Division 00 or 01; for remainder of 5 years extended warranties beyond Contract warranty period, include typical conditions of product manufacturers' replacement warranty;

**1.3 EXIT SIGNS**

- A. Provide exit signs in compliance with local governing authority directions but ensure quality standards meet specified product. Advise Consultant where specified exit signs do not comply with local governing authority requirements.
- B. Review each respective installation location and determine required installation accessories to suit support from either wall or ceiling construction. Provide required brackets and stem assemblies. Review with Consultant.
- C. For suspended from ceiling installation of exit signs, mount signs with stem assembly from ceiling structure, and provide assembly that connects to sign frame directly (not with electrical box mounted onto frame). Provide continuous minimum 13 mm (½") threaded conduit (finished painted as reviewed with Consultant) extending from ceiling mounted junction box complete with ball align hanger to threaded connector directly mounted into the top of specified exit sign.

#### **1.4 PRODUCT COMPATIBILITY**

- A. Luminaires and lighting controls when integrated together for control purposes must be 100% compatible with each other. Coordinate with ballast/driver and LED/lamp manufacturers, LV relay panel manufacturers, switches/timers manufacturers and dimmer/light sensor/occupancy control manufacturers to ensure that components are compatible with each other and that interconnections do not adversely affect performance, life or any warranties.

#### **1.5 SUBSTITUTIONS**

- A. Provide luminaires as specified in Schedule of Luminaires and as per documented List of Manufacturers, where applicable. During construction period, no substitutions are permitted unless compelling reasons are given and accepted by Owner and reviewed with Consultant. A delay caused by Contractor's failure to order luminaires to meet construction schedule is not a valid reason.
- B. Make requests for proposed substitutions as per requirements of Section entitled Electrical Work General Instructions and Division 01. In addition, make payments for additional costs to Consultant for these reviews, based on amount of \$250 per luminaire type, and per submission.
- C. Consideration of any proposed substitutions after Bid Period to be at Consultant's sole discretion.

### **PART 2 - PRODUCTS**

#### **2.1 LUMINAIRES**

- A. Provide luminaires in accordance with Schedule of Luminaires. Luminaires including integrated LEDs and drivers are to be CSA approved or have special local electrical authority approval. Ensure luminaires and integrated LEDs and drivers are tested for full compatibility operation prior to shipping to site.
- B. Some luminaires as noted in Contract Documents or identified in other Division documents may be supplied by Owner or under another Division of Work. Include in Bid, Work and materials to accommodate such luminaires, including:
  - 1. receiving and inspecting luminaires;
  - 2. complete installation;
  - 3. providing installation hardware to complete installation, and not supplied by luminaire manufacturer;
  - 4. aiming as required and connecting;
  - 5. providing power feeders and control wiring and conduit/boxes;
  - 6. cleaning, adjusting and testing;
  - 7. providing lamps where documented or as scheduled, unless otherwise reviewed with Consultant or supplied with luminaires by luminaires manufacturer; LED type luminaires are typically supplied complete;
  - 8. provide required power connections and where luminaires are controlled via remote low voltage controller, include for installation of controller and providing required low voltage wiring in conduit and necessary connections;
  - 9. coordination of exact requirements with supplier of luminaires and reviewed with Consultant prior to installation.
- C. Provide thickness of metal as indicated in Schedule of Luminaires and details, or as required so that luminaires are rigid, stable and resists deflection, twisting, warping or bending under normal installation procedures, re-lamping etc., or no less than requirements specified herein the specifications.
- D. Unless otherwise noted, linear and continuous linear architectural LED luminaires bodies to be constructed of extruded aluminum and of rigid construction. Unless otherwise noted, provide body finishes of corrosion resistant, chemically treated and electrostatically applied post powder coat finish. Efficiency not to be less than 69%.
- E. Unless otherwise noted, vandal resistant luminaires to be constructed of heavy duty extruded aluminum rails and die cast end caps, complete with stainless steel torx with centre reject pin and Allen head set screws. Screw heads to be mounted and concealed under lens. Lens to be extruded UV stabilized polycarbonate lens with internal linear ribbed design.

- F. Provide neoprene or silicone gasketing, barriers and stops where required to prevent light leaks or water/water vapour penetration.
- G. Fabricate housings to allow for easy accessibility and replacement of parts.
- H. Fabricate fixtures with a minimum number of joints. Make unexposed joints by acceptable method such as welding, brazing, screwing or bolting. Soldered joints are unacceptable. Do not use blind metal tapping methods or rivets for fastening parts which must be removed during service, or for fastening electrical components and supports. Cast parts, including die-cast members, to be of uniform quality, close grained, rigid, true to pattern, free from blow holes, pores, discoloration, hard spots, shrinkage defects, and cracks or other imperfections that affect strength and appearance or are indicative of inferior metals or alloys.
- I. Reflectors and reflecting cones or baffles to be free of any tooling marks, spinning lines or marks by other assembly techniques. Iridescence to be low. Finishes to be equal to first quality polished, baffled, and anodized "Alzak".
- J. Lenses and louvers to comply with local governing building code and other local governing code flame spread rating requirements.
- K. Unless otherwise noted, construct acrylic lens from 100% virgin acrylic and not less than 3.22 mm (0.125") thick. K12 acrylic lenses to have recessed prismatic pattern with no fade-outs or streaks and be of strain-free and uniform production. Glass lenses to be minimum 9.5 mm (0.375") thick.
- L. Recessed luminaires with replaceable/serviceable parts such as ballasts, lamps, sockets, etc., must be accessible from lens side (i.e. room side) of fixtures to allow for proper accessibility.
- M. Luminaires to be factory assembled and tested prior to delivery on site.
- N. Exposed parts and hardware of luminaires located in non-climate controlled areas to be corrosion resistant and weather resistant. Hardware to be tamper-proof. Manufacturer exterior luminaire poles with corrosion resistant finish and construction. Pole suppliers to ensure that poles supplied are suitable for steady wind velocity and gust velocity of area of installation, and suitable for total effective projected area of lighting equipment. Submit verification of this with shop drawings.
- O. When requested, submit luminaire samples.
- P. Dimensions for coves, valances, and strips as shown on drawings are for bidding purposes only. Job measure for exact dimensions of louvers, lenses and strips.
- Q. Dimensions for linear and continuous linear LED as shown on drawings are for bidding purposes only. Job measure for exact dimensions requirements to suit installation location.
- R. Review exact colours and finishes of luminaires with Consultant after award of contract but prior to ordering. Obtain information in time to meet installation schedule.
- S. Coordinate with interconnected product manufacturers to ensure that components are compatible with each other and that interconnections do not affect performance, life or any warranties.
- T. Products of same specified type to be of same manufacturer.

## **2.2 LEDS AND DRIVERS**

- A. Typically, general features include:
  - 1. CSA approved, ULC listed and labelled;
  - 2. NEMA 410 compliant drivers;
  - 3. typical operating temperatures:
    - a. Luminaires for applications in extreme cold, non-climate-controlled area: operating temperature range through -40°C (-40°F) to 60°C (140°F);
    - b. Luminaires for applications in climate-controlled area: operating temperature range through -20°C (-4°F) to 50°C (122°F);
  - 4. with rapid and changing development of LED technology, provide most technically proven and most advanced and successfully tested LED technology at time of installation;
  - 5. specification standards to meet requirements of IES LM 79 and LM-80.

6. where connected to dimmers, be 100% compatible with connected dimmer controls to provide dimming down to 1%. Coordinate with dimming controls vendors to ensure that technical operations of dimmers (i.e. forward phase, reverse phase, etc.) match LED/ driver technology. Clearly identify this information in shop drawing submissions.
- B. Typical light emitting diodes (LEDs) features to include:
  1. LEDs to be selected from same colour bin size for consistency in chromaticity and meet ANSI C78 377A as a minimum;
  2. generally, colour temperature range to be from 2700 K to 6500 K; specific temperature requirements to be identified on Schedule of Luminaires and reviewed with Consultant prior to ordering;
  3. minimum CRI of 85;
  4. minimum rated life (based on LM-80 and TM-21) from 50,000 to 70,000 hours.
- C. Typical driver features to include:
  1. operate from 60 Hz input source of 120 VAC/347VAC (as applicable) with sustained variations of  $\pm 10\%$  (voltage and frequency) with no damage to driver;
  2. output regulated to  $\pm 5\%$  across load range;
  3. power factor greater than 0.90;
  4. total harmonic distortion less than 20%;
  5. Class A sound rating;
  6. comply with ANSI C62.41 Category A for transient protection.
- D. LEDs and drivers are to be 100% compatible with each other. Luminaire with LED and driver to be CSA approved or ULC listed, and certified and tested as a complete assembly.
- E. Above features are general requirements to ensure that any proposed luminaires that are not base specified are to have premium quality LEDs and drivers. Refer to Schedule of Luminaires.
- F. Acceptable LED manufacturers are:
  1. Cree;
  2. Nichia;
  3. Lumileds;
  4. Toshiba;
  5. Samsung.
- G. Acceptable driver manufacturers are:
  1. Philips;
  2. OSRAM Sylvania;
  3. Lutron;
  4. eldoLED;
  5. GE.
- H. For specialty luminaires used for accent or task lighting applications, acceptable manufacturers of LEDs and drivers to be as listed above. Additionally, for these specialty luminaires, acceptable manufacturer of LEDs and drivers to include those of base specified luminaires. Refer to Schedule of Luminaires for additional requirements.

### **2.3 SURGE PROTECTION FOR LED SYSTEMS**

- A. Luminaire manufacturers supplying exterior LED luminaires are to include surge protection for LED systems in accordance with IEEE and ANSI C62.41.2 transient surge requirements. Surge protection to be level of 6 kV/3 kA for low exposure conditions (low grade level landscape lighting) and, 10 kV/10 kA for high exposure conditions (pole mounted lighting).

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF LUMINAIRES

- A. Reference electrical drawings for general luminaire location, circuiting, and controls. Reference Architectural reflected ceiling plans (RCPs) for more detailed location of luminaires. Consult both sets of drawings in preparation for installation. Review final locations with Consultant prior to roughing-in.
- B. Review construction of materials where luminaires are to be located. Comply with local governing building code requirements for providing openings in walls, partitions and floor assemblies required to be a fire separation, to be protected with fire separations and closures. Where luminaires are not specified with fire rated housings, provide other means reviewed with Consultant and meeting local governing building code requirements.
- C. Installed luminaires may be energized for testing installation and be de-energized until system commissioning. Installed luminaires may not be used as construction lights.
- D. Protective material to remain on luminaires until prior to commissioning. At commissioning, clean luminaires to in new condition.
- E. Confirm with luminaire manufacturers that luminaires have been tested at factory with integrated LEDs and drivers to ensure 100% compatibility of operation between products. Document in report signed by manufacturer's authorized representative. Submit copy to Consultant.
- F. After shop drawing review process has been completed with Consultant, provide luminaires as required. Obtain required training from manufacturer's representative on any special installation procedures. Install products in accordance with manufacturer's instructions to suit specific installation requirements.
- G. Before placing luminaire orders:
  - 1. verify quantity requirements;
  - 2. thoroughly review ceiling types, finishes and construction details; verify ceiling types with latest Architectural Drawings; order luminaires to suit correct ceiling type;
  - 3. ensure that required mounting assemblies, frames, rings and similar features are included;
  - 4. review colours and finishes with Consultant.
- H. Include for assembly and mounting of luminaires and lamps, complete with:
  - 1. wiring and connections;
  - 2. fittings and hangers;
  - 3. aligners;
  - 4. box covers;
  - 5. other accessories required for a complete, safe and fully operational assembly.
- I. Where outlet boxes locations are shown on drawings, they are diagrammatic only. Position outlet boxes to coincide with suspension hangers and knockouts.
- J. Install ceiling fixtures in centre of tiles unless dimensioned otherwise on Reflected Ceiling Plans. Locate hangers on tile centres or intersections. Mount recessed downlights, troffers, and surface mounted luminaires in or on full tiles. Install fixtures in and on acoustical tile ceilings in alignment with tile joints.
- K. Cut holes for recessed luminaires to exact size so that gaps are not visible, or luminaire trims cover gaps.
- L. Mount surface ceiling luminaires perfectly level or plumb, tightly to ceiling without showing a space or light leak between frame and ceiling.
- M. Carefully align linear luminaires shown in continuous lines or rows, so that rows appear as straight lines. Variation in alignment not to exceed 6 mm (1/4") for any 5 m (16') run.
- N. Provide spacers for fixtures mounted on low density ceiling material.
- O. Provide plaster frames for recessed fixtures in plaster or gypsum board ceilings.
- P. Prepare fixtures, trim and poles and standards required to be painted.

- Q. Protect wiring with tape or tubing at all points where abrasion may occur. Conceal wiring within fixture construction except where design or mounting dictates otherwise.
- R. Splices:
  - 1. Minimize number of splices.
  - 2. Make with approved mechanical insulated steel spring type connectors, suitable for temperature and voltage conditions to which splices are to be subjected.
  - 3. Splices are not to be made unless properly terminated in accessible identified junction boxes.
- S. Support luminaires directly by ceiling slab structure and not to formed steel decking, ceiling hangers, ductwork, piping, cable trays, etc. Review exact requirements with Consultant prior to start of work.
- T. Do not tighten wing nuts, bolts, or screws that allow fixture adjustment for recessed adjustable fixtures.
- U. Install spread lenses only where called out on Schedule of Luminaires and Specifications.
- V. Use cloth gloves when handling reflector cones, louvers, lamps, glass, sconces and all exposed surfaces of luminaires.
- W. Co-ordinate luminaire installation with work of other trades to ensure that necessary recessing depths and mounting spaces are provided.
- X. Install luminaires in accordance with applicable architectural drawing reflected ceiling plans and/or wall elevations and/or field instructions issued by Consultant. Review final luminaire locations with Consultant prior to roughing-in. In equipment rooms, shafts and similar secondary areas, install luminaires after mechanical and other major work is roughed in and adjust luminaire locations as required.
- Y. Align and position all adjustable luminaires and ensure that luminaires with adjustable lamp holders are properly positioned to correspond to lamps specified.
- Z. Comply with requirements of local governing electrical code regarding support of luminaires in suspended ceilings.
- AA. Independently suspend luminaires in suspended ceilings from ceiling slab. For each luminaire, provide minimum two cable supports secured to ceiling slab and to luminaire. Confirm with local governing authorities and review with Consultant if a variance to this requirement can be made for specific luminaires of low weight.
- BB. Connect luminaires to power circuits and controls as required. Refer to drawings notes and schedules. Include for both normal and emergency power circuits as required.
- CC. Locate exit signs in final locations reviewed with Consultant and approved by local building code authority. Connect to power circuits as required. Where applicable for emergency power requirements, connect to emergency battery units. Relocate exit sign and re-direct direction arrows to suit local building code authority requirements and directions, and as reviewed with Consultant.
- DD. For emergency lighting controls include required relays compliant with UL924 and applicable CSA C22.2 Standards.
- EE. Notify Consultant immediately and relocate if necessary as reviewed with Consultant, if:
  - 1. fixture placement conflicts with a structural beam, mechanical duct, plumbing pipe, etc.;
  - 2. space above ceiling is not sufficient;
  - 3. any reason that a fixture cannot be located where it is dimensioned or shown on construction documents.
- FF. Existing luminaires designated to be relocated and reused, to be:
  - 1. disconnected, removed and stored in a safe area as designated by Owner and reviewed with Consultant until ready for re-installation;
  - 2. inspected, cleaned, repaired and re-lamped;
  - 3. identified to Consultant of requirement for replacement parts for broken lenses, faulty ballasts, broken mounting hardware, etc., as necessary to return luminaires to good working condition; identify cost to Consultant for repair/replacement parts.



- GG. Provide seismic restraints to suspended luminaires, in accordance with latest local governing building code requirements to suit zone of Place of Work.
- HH. Ground and bond luminaires as per local governing electrical code requirements.
- II. If requested by Owner or Consultant, demonstrate operation of luminaires intended for special applications such as building floodlights and other decorative purposes. Adjust their locations within reasonable distance to obtain effects desired.
- JJ. Test and adjust exterior luminaires at times after sunset, in presence of Consultant and at times acceptable to Owner and reviewed with Consultant.
- KK. Properly identify circuits and components in manner reviewed with Consultant.
- LL. Prior to turn over of Work to Owner, clean luminaires in manner recommended by manufacturer and to satisfaction of Owner.
- MM. Lamps to be new and intact when project is complete and ready for acceptance.
- NN. Include a full lamp listing in Operating and Maintenance Instruction Manuals.
- OO. Additionally, refer to testing and verification requirements in Section entitled Electrical Work Analysis and Testing and include applicable requirements.
- PP. Refer to Section 26 09 00 entitled Lighting Controls for related controls work.

**END OF SECTION**



POWER SYMBOLS	
SYMBOL	DESCRIPTION
	120V, 1PH CONNECTION TO EQUIPMENT.
	208V, 1PH CONNECTION TO EQUIPMENT.
	208V, 3PH CONNECTION TO EQUIPMENT.
	600V, 1PH CONNECTION TO EQUIPMENT.
	600V, 3PH CONNECTION TO EQUIPMENT.
	SINGLE-PHASE AND THREE-PHASE MOTOR CONNECTIONS
	FUSED DISCONNECT SWITCH.
	NON-FUSED DISCONNECT SWITCH.
	MOTOR STARTER.
	VARIABLE FREQUENCY DRIVE.
	SYSTEMS FURNITURE CONNECTION (POWER & DATA)
	SURFACE & RECESSED ELECTRICAL DISTRIBUTION PANEL.
	AUTOMATIC DOOR OPERATOR PUSH BUTTON.

CLOCK SYMBOLS	
SYMBOL	DESCRIPTION
	CLOCK
	DUAL FACE CLOCK

	FIRE ALARM ISOLATION MODULE.
	FIRE ALARM END OF LINE RESISTOR

	FIRE ALARM HORN, CEILING MOUNTED.
	FIRE ALARM HORN, MOUNTED APPROXIMATELY 12" (300mm) BELOW FINISHED CEILING, UNLESS OTHERWISE NOTED.
	COMBINATION FIRE ALARM HORN AND STROBE LIGHT, CEILING MOUNTED.
	COMBINATION FIRE ALARM HORN AND STROBE LIGHT, MOUNTED APPROXIMATELY 12" (300mm) BELOW FINISHED CEILING, UNLESS OTHERWISE NOTED.
	FIRE ALARM STROBE, CEILING MOUNTED TYPE.
	FIRE ALARM STROBE, MOUNTED APPROXIMATELY 12" (300mm) BELOW FINISHED CEILING, UNLESS OTHERWISE.

	AUTOMATIC HEAT DETECTOR 15°F (8.3°C) RATE OF RISE AND FIXED TEMPERATURE TYPE 135°F (57°C) RATED AT 2500 SOFT (232sqm) COVERAGE, CEILING MOUNTED TYPE.
	AUTOMATIC HEAT DETECTOR 15°F (8.3°C) RATE OF RISE AND FIXED TEMPERATURE TYPE 135°F (57°C) RATED AT 2500 SOFT (232sqm) COVERAGE, WALL MOUNTED TYPE.
	PRODUCTS OF COMBUSTION DETECTOR IONIZATION, CEILING MOUNTED TYPE.
	PRODUCTS OF COMBUSTION DETECTOR IONIZATION, WALL MOUNTED TYPE.
	PRODUCTS OF COMBUSTION DETECTOR PHOTO ELECTRIC, CEILING MOUNTED TYPE.
	PRODUCTS OF COMBUSTION DETECTOR PHOTO ELECTRIC, WALL MOUNTED TYPE.
	PRODUCTS OF COMBUSTION DETECTOR, DUCT TYPE WITH SAMPLING TUBES.

	FIRE ALARM PULL STATION MOUNTED 3'-10" (1150mm) ABOVE FINISHED FLOOR LEVEL UNLESS OTHERWISE NOTED.
	SIMILAR TO ABOVE, EXCEPT: "CG" WHERE SHOWN, DENOTES DEVICE c/w CLEAR GUARD. "WG" WHERE SHOWN, DENOTES DEVICE c/w WIRE GUARD. "WP" WHERE SHOWN, DENOTES WEATHERPROOF DEVICE. "EX" WHERE SHOWN, DENOTES EXPLOSION PROOF. "A" WHERE SHOWN, DENOTES DEVICE c/w AUXILIARY CONTACTS FOR CONNECTION TO MAG-LOCK ELEVATOR CONTROL. "BG" WHERE SHOWN, DENOTES "BREAK GLASS" TYPE. "K" WHERE SHOWN, DENOTES DEVICE c/w KEY RESET. "ML" WHERE SHOWN, DENOTES DEVICE c/w AUXILIARY CONTACTS FOR MAG-LOCK.

FIRE ALARM SYMBOLS	
SYMBOL	DESCRIPTION
	RECESSED OR SURFACE FIRE ALARM CONTROL PANEL.
	RECESSED OR SURFACE MOUNTED FIRE ALARM ANNUNCIATOR PANEL.
	FIRE ALARM SYSTEM LOCAL GRAPHIC ANNUNCIATOR PANEL.

DEMOLITION LEGEND	
SYMBOL	DESCRIPTION
	EXISTING DEVICE TO REMAIN
	EXISTING DEVICE TO BE DEMOLISHED
	EXISTING DEVICE TO BE RELOCATED
	EXISTING DEVICE TO BE REMOVED AND REPLACED

LIGHTING CONTROLS SYMBOLS	
SYMBOL	DESCRIPTION
	LINE VOLTAGE SWITCH, MOUNTED 4'-0" (1200mm) ABOVE FINISHED FLOOR LEVEL TO CENTER LINE, UNLESS OTHERWISE NOTED.
	SIMILAR TO EXCEPT: "K" WHERE SHOWN, DENOTES KEY SWITCH. "P" WHERE SHOWN, DENOTES SWITCH AND PILOT LIGHT. "3" WHERE SHOWN, DENOTES 3-WAY SWITCH. "4" WHERE SHOWN, DENOTES 4-WAY SWITCH. "M" WHERE SHOWN, DENOTES MANUAL SWITCH. "DV" WHERE SHOWN, DENOTES DIMMER PLUS VACANCY SENSOR. "T" WHERE SHOWN, DENOTES MANUAL TIME SWITCH. "LV" WHERE SHOWN, DENOTES LOW VOLTAGE SWITCH. "V" WHERE SHOWN, DENOTES VARIABLE SPEED CONTROLLER SWITCH. "WP" WHERE SHOWN, DENOTES WET LOCATION DEVICE. "EX" WHERE SHOWN, DENOTES EXPLOSION PROOF.
	DIMMER SWITCH, MOUNTED 4'-0" (1200mm) ABOVE FINISHED FLOOR LEVEL TO CENTER LINE, UNLESS OTHERWISE NOTED.
	OCCUPANCY SWITCH, MOUNTED 4'-0" (1200mm) ABOVE FINISHED FLOOR LEVEL TO CENTER LINE, UNLESS OTHERWISE NOTED. REFER TO ELECTRICAL SPECIFICATIONS FOR DETAILS.
	VACANCY SWITCH, MOUNTED 4'-0" (1200mm) ABOVE FINISHED FLOOR LEVEL TO CENTER LINE, UNLESS OTHERWISE NOTED. REFER TO ELECTRICAL SPECIFICATIONS FOR DETAILS.
	OCCUPANCY SENSOR, REFER TO ELECTRICAL, SPECIFICATIONS FOR DETAILS.
	COMBINATION OCCUPANCY SENOR WITH BUILT IN DAYLIGHT SENSOR FUNCTIONALITY, REFER TO ELECTRICAL SPECIFICATIONS FOR DETAILS.
	VACANCY REFER TO ELECTRICAL SPECIFICATIONS FOR DETAILS.

	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, "I" THROUGH DEVICE INDICATES RECEPTACLE MOUNTED 42" (1100mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED. "WP" WHERE SHOWN, DENOTES WEATHERPROOF DEVICE. "IC" WHERE SHOWN, DENOTES ISOLATED GROUND TYPE. "C" WHERE SHOWN, DENOTES CEILING MOUNTED TYPE. "TL" WHERE SHOWN, DENOTES TWIST LOCK. "GFI" WHERE SHOWN, DENOTES GFCI CIRCUIT BREAKER IN PANEL. "HK" WHERE SHOWN, DENOTES HOUSEKEEPING RECEPTACLE.
	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED WITHIN FURNITURE.
	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED GFI TYPE RECEPTACLE, MOUNTED APPROXIMATELY 18" (450 mm) ABOVE FINISHED FLOOR.
	TWO DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED. MOUNTED IN COMMON DEVICE BOX.
	SPLIT WIRED DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	TAMPER PROOF (SAFETY SHUTTER) DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE WITH TWO USB CHARGING OUTLETS MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED WITHIN FURNITURE.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED GFI TYPE RECEPTACLE, MOUNTED APPROXIMATELY 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	TWO DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED. MOUNTED IN COMMON DEVICE BOX.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE WITH TWO USB CHARGING OUTLETS MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 5-20R, 240 VOLT, 2-POLE, 3 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 6-30R, 240 VOLT, 2-POLE, 3 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 6-50R, 240 VOLT, 2-POLE, 3 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-15R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-20R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-30R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-50R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	RECESSED FLOORBOX C/W DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE.
	RECESSED FLOORBOX C/W TWO DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTABLES.

RECEPTACLE SYMBOLS	
SYMBOL	DESCRIPTION
	DUPLEX U-5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, "I" THROUGH DEVICE INDICATES RECEPTACLE MOUNTED 42" (1100mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED. "WP" WHERE SHOWN, DENOTES WEATHERPROOF DEVICE. "IC" WHERE SHOWN, DENOTES ISOLATED GROUND TYPE. "C" WHERE SHOWN, DENOTES CEILING MOUNTED TYPE. "TL" WHERE SHOWN, DENOTES TWIST LOCK. "GFI" WHERE SHOWN, DENOTES GFCI CIRCUIT BREAKER IN PANEL. "HK" WHERE SHOWN, DENOTES HOUSEKEEPING RECEPTACLE.
	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED WITHIN FURNITURE.
	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED GFI TYPE RECEPTACLE, MOUNTED APPROXIMATELY 18" (450 mm) ABOVE FINISHED FLOOR.
	TWO DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED. MOUNTED IN COMMON DEVICE BOX.
	SPLIT WIRED DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	TAMPER PROOF (SAFETY SHUTTER) DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE WITH TWO USB CHARGING OUTLETS MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED WITHIN FURNITURE.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED GFI TYPE RECEPTACLE, MOUNTED APPROXIMATELY 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	TWO DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED. MOUNTED IN COMMON DEVICE BOX.
	DUPLEX U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE WITH TWO USB CHARGING OUTLETS MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 5-20R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE MOUNTED 18" (450 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 5-20R, 240 VOLT, 2-POLE, 3 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 6-30R, 240 VOLT, 2-POLE, 3 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 6-50R, 240 VOLT, 2-POLE, 3 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-15R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-20R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-30R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	SINGLE U-GROUND 14-50R, 120/240 VOLT, 3-POLE, 4 WIRE GROUNDED RECEPTACLE MOUNTED 12" (300 mm) ABOVE FINISHED FLOOR, UNLESS OTHERWISE NOTED.
	RECESSED FLOORBOX C/W DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTACLE.
	RECESSED FLOORBOX C/W TWO DUPLEX U-GROUND 5-15R, 120 VOLT, 3 WIRE GROUNDED RECEPTABLES.

LINETYPE / SHADING LEGEND	
SYMBOL	DESCRIPTION
	FIRE ALARM ZONE BOUNDARY (FIRE ALARM DRAWINGS)
	DAYLIGHT ZONE FOR LIGHTING CONTROL (LIGHTING DRAWINGS)
	PROPOSED SHELLED SPACE AREAS

LIGHTING FIXTURE SYMBOLS	
SYMBOL	DESCRIPTION
	LINEAR RECESSED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR SURFACE LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR SUSPENDED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR STRIP LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR WALL MOUNTED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	RECESSED WALL MOUNTED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	SURFACE WALL MOUNTED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	RECESSED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR SURFACE LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR SUSPENDED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	LINEAR WALL MOUNTED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	RECESSED WALL MOUNTED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	SURFACE WALL MOUNTED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	RECESSED LUMINAIRE, REFER TO LUMINAIRE SCHEDULE FOR FIXTURE TYPE AND DETAILS.
	EXIT SIGN - CEILING MOUNTED, COMPLETE WITH DIRECTIONAL ARROWS AS SHOWN, "WP" DENOTES WEATHERPROOF TYPE, NUMBER INDICATES BATTERY SUPPLY CIRCUITING.
	EXIT SIGN - WALL MOUNTED, COMPLETE WITH DIRECTIONAL ARROWS AS SHOWN, "WP" DENOTES WEATHERPROOF TYPE, NUMBER INDICATES BATTERY SUPPLY CIRCUITING.
	REMOTE EMERGENCY LIGHTING HEAD, NUMBER INDICATES BATTERY SUPPLY CIRCUITING.
	EMERGENCY BATTERY PACK c/w DUAL HEADS AND DUPLEX RECEPTACLE (5-15R), NUMBER INDICATES BATTERY AND REMOTE HEAD CIRCUITING.

SINGLE LINE DIAGRAM SYMBOLS	
SYMBOL	DESCRIPTION
	DISTRIBUTION TRANSFORMER
	MOLDED CASE CIRCUIT BREAKER
	FUSE
	UNFUSED VOLTAGE DISCONNECT SWITCH
	FUSE DISCONNECT SWITCH
	AUTOMATIC TRANSFER SWITCH WITHOUT MANUAL BYPASS
	CURRENT/POTENTIAL METER c/w TRANSFORMER
	CURRENT METER c/w TRANSFORMER
	BUSBAR
	SURGE PROTECTION DEVICE
	GENERATOR
	MOTOR
	PANELBOARDS "RP" DENOTES RECEPTACLE PANELBOARD (120/208V SYSTEM) "PP" DENOTES POWER PANELBOARD (120/208V SYSTEM) "DP" DENOTES DISTRIBUTION PANELBOARDS

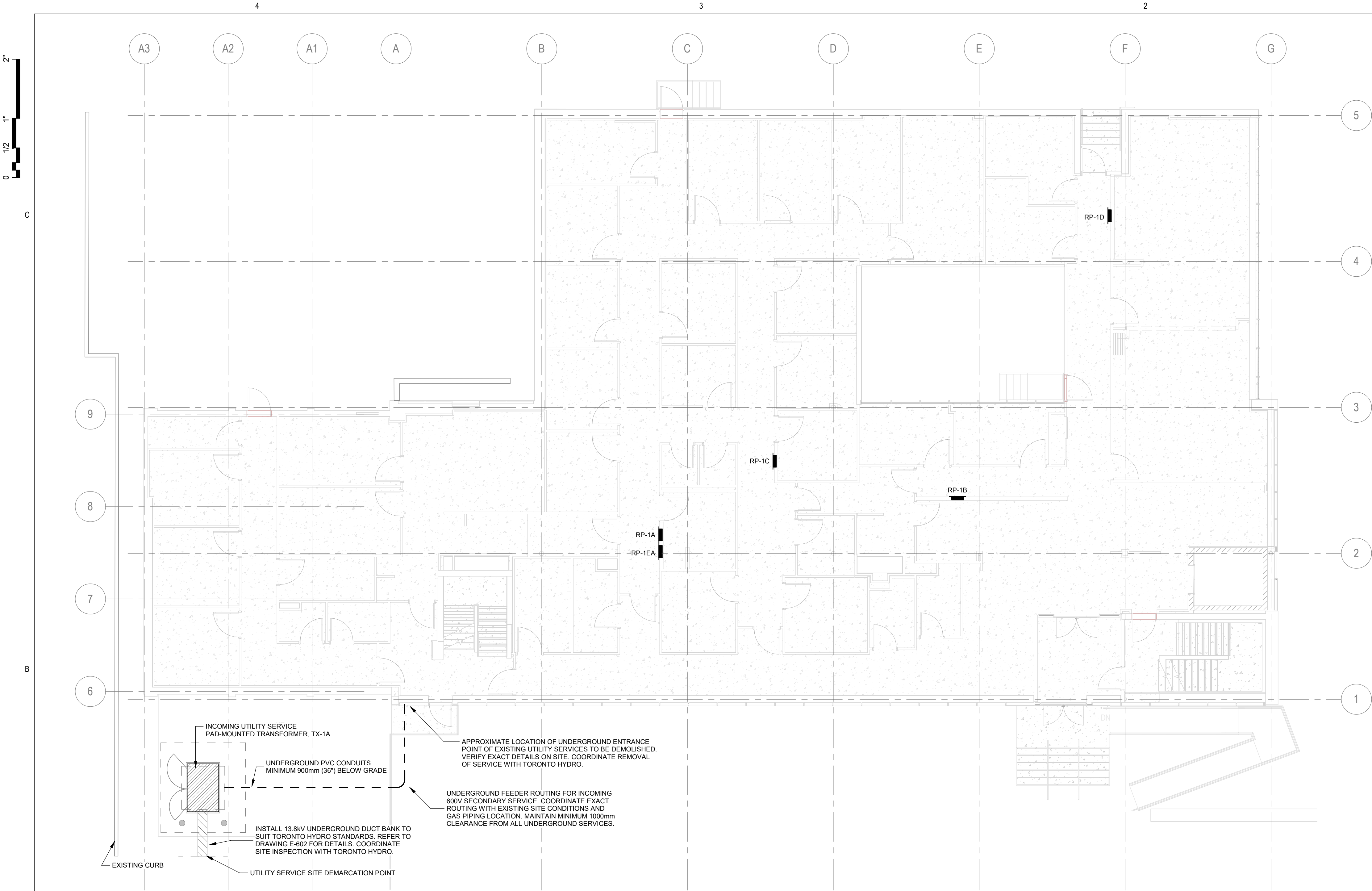
SECURITY SYMBOLS	
SYMBOL	DESCRIPTION
	ACCESS CONTROL PANEL.
	INTRUSION ALARM CONTROL PANEL.
	ACCESS CONTROL CARD READER.
	ACCESS CONTROL COMBINATION CARD READER KEYPAD.
	ACCESS CONTROL BIOMETRIC READER.
	ACCESS CONTROL KEYPAD.
	ACCESS CONTROL KEYED SWITCH.
	BUZZER MOUNTED MAXIMUM 8'-0" (2400mm) ABOVE FINISHED FLOOR.
	SECURITY SYSTEM DOOR ALARM CONTACTS, RECESSED IN DOOR AND FRAME.
	ACCESS CONTROL ELECTRIC STRIKE.
	LOCK STATUS SENSOR.
	LOCKABLE DEVICE - TO BE DETERMINED BY DOOR HARDWARE CONSULTANT.
	POWER CONNECTION TO MAGNETIC DOOR LOCK.
	EXIT SENSOR.
	REQUEST TO EXIT PUSHBUTTON.
	REMOTE READER ELECTRONICS CONTROL BOX.
	REQUEST TO EXIT MOTION DETECTOR.
	REQUEST TO EXIT HANDLE.
	INTRUSION ALARM GLASSBREAK DETECTOR.
	INTRUSION ALARM MOTION DETECTOR.
	INTRUSION ALARM KEYPAD.
	CEILING MOUNTED INTRUSION ALARM STROBE INDICATOR.
	WALL MOUNTED INTRUSION ALARM STROBE INDICATOR.
	CEILING MOUNTED INTRUSION ALARM HORN INDICATOR.
	WALL MOUNTED INTRUSION ALARM HORN INDICATOR.
	CEILING MOUNTED INTRUSION ALARM HORN STROBE INDICATOR.
	WALL MOUNTED INTRUSION ALARM HORN STROBE INDICATOR.
	DURESS ALARM INTERCOM STATION.
	MASTER INTERCOM STATION.
	SLAVE INTERCOM STATION.
	DURESS ALARM PANIC BUTTON.
	DURESS ALARM PANIC BUTTON WIRELESS.
	POWER TRANSFORMER FOR SECURITY DEVICES.
	CEILING OR WALL MOUNTED CLOSED CIRCUIT TELEVISION CAMERA FOR SECURITY SYSTEM. "WP" WHERE SHOWN, DENOTES WET LOCATION HOUSING.
	CEILING OR WALL MOUNTED CLOSED CIRCUIT TELEVISION CAMERA FOR SECURITY SYSTEM REQUIRING 120V POWER CONNECTION. "WP" WHERE SHOWN, DENOTES WET LOCATION HOUSING.
	CEILING OR WALL MOUNTED CLOSED CIRCUIT TELEVISION PAN/TILT/ZOOM CAMERA FOR SECURITY SYSTEM. "WP" WHERE SHOWN, DENOTES WET LOCATION HOUSING.
	CEILING OR WALL MOUNTED CLOSED CIRCUIT TELEVISION PAN/TILT/ZOOM CAMERA FOR SECURITY SYSTEM REQUIRING 120V POWER CONNECTION. "WP" WHERE SHOWN, DENOTES WET LOCATION HOUSING.
	CEILING OR WALL MOUNTED CLOSED CIRCUIT TELEVISION CAMERA. "TH" WHERE SHOWN, DENOTES THERMAL CAMERA.

ELECTRICAL DRAWING LIST	
SHEET No.	SHEET NAME
E-001	DRAWING LIST AND LEGENDS
E-101	SITE PLAN - ELECTRICAL
E-200	LEVEL B1 - LIGHTING
E-201	LEVEL 01 - LIGHTING
E-202	LEVEL 02 - LIGHTING
E-300	LEVEL B1 - POWER
E-301	LEVEL 01 - POWER
E-302	LEVEL 02 - POWER
E-303	ROOF - POWER
E-400	LEVEL B1 - COMMUNICATIONS
E-401	LEVEL 01 - COMMUNICATIONS
E-402	LEVEL 02 - COMMUNICATIONS
E-500	LEVEL B1 - SECURITY AND FIRE ALARM
E-501	LEVEL 01 - SECURITY AND FIRE ALARM
E-502	LEVEL 02 - SECURITY AND FIRE ALARM
E-601	STANDARD DETAILS - ELECTRICAL
E-602	STANDARD DETAILS - ELECTRICAL
E-603	STANDARD DETAILS - ELECTRICAL DOOR DETAILS
E-604	STANDARD DETAILS - COMMUNICATIONS
E-605	STANDARD DETAILS - COMMUNICATIONS
E-606	STANDARD DETAILS - MAGLOCK WIRING SCHEMATIC
E-701	SINGLE LINE DIAGRAMS - DEMOLITION AND NEW
E-702	ELECTRICAL RISERS - SHEET 1
E-801	ENLARGED PLANS - ELECTRICAL
E-802	FEEDER ROUTING PLANS
E-900	LEVEL B1 - DEMOLITION WORK
E-901	LEVEL 01 - DEMOLITION WORK
E-902	LEVEL 02 - DEMOLITION WORK
E-1101	SCHEDULES - ELECTRICAL
E-1102	SCHEDULES - ELECTRICAL
E-1103	SCHEDULES - ELECTRICAL
E-1104	SCHEDULES - ELECTRICAL
E-1105	SCHEDULES - ELECTRICAL
E-1106	SCHEDULES - ELECTRICAL
E-1107	SCHEDULES - ELECTRICAL

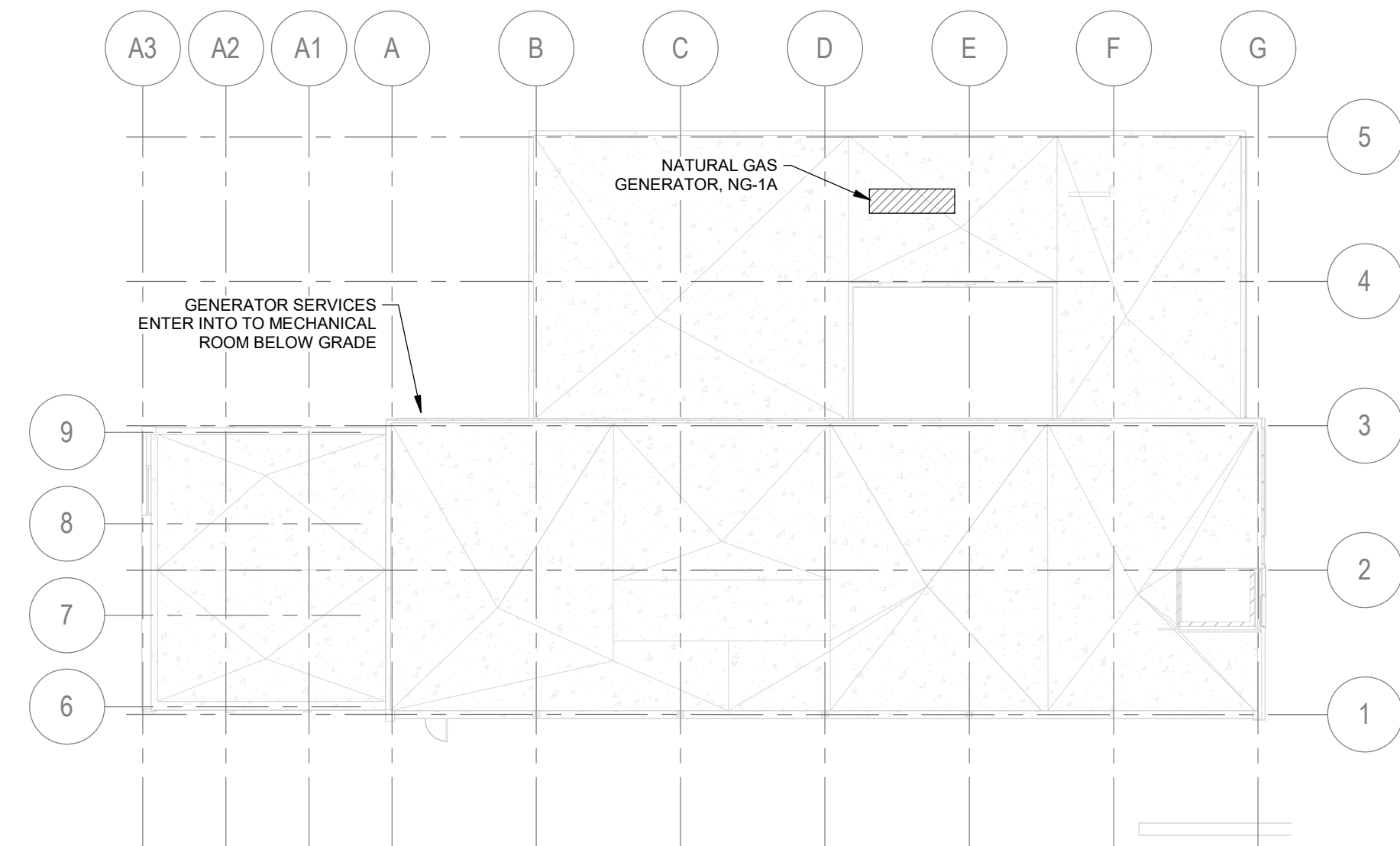
ABBREVIATIONS	
SYMBOL	DESCRIPTION
WP	"WP" WHERE SHOWN, DENOTES DEVICE MOUNTED IN WEATHERPROOF BACK BOX WITH WEATHERPROOF COVER.
C	"C" WHERE SHOWN, DENOTES DEVICE IS CEILING MOUNTED.
UIC	"UIC" WHERE SHOWN, DENOTES MOUNTED UNDERCOUNTER.
UIF	"UIF" WHERE SHOWN, DENOTES UNFUSED DISCONNECT SWITCH.
AF	"AF" WHERE SHOWN, DENOTES BREAKER AMPERAGE FRAME SIZE.
AT	"AT" WHERE SHOWN, DENOTES BREAKER AMPERAGE TRIP SETTING.
MLO	"MLO" WHERE SHOWN, DENOTES MAIN LUG ONLY.
ADO	AUTOMATIC DOOR OPERATOR
A.F.F.	ABOVE FINISHED FLOOR.
CW	COMPLETE WITH.
SP	SPARE.



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1 LEVEL 01 - ELECTRICAL SITE PLAN  
E-101 1:100



2 ROOF - SITE PLAN  
E-101 1:250

GENERAL NEW WORK NOTES:

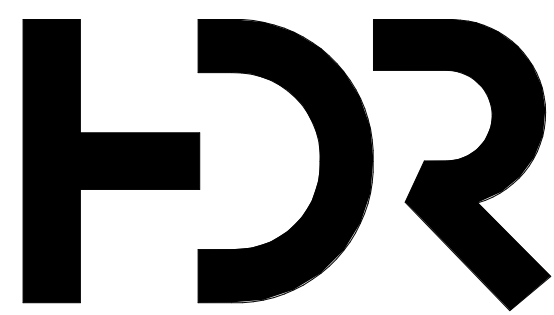
- THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH CIVIL, STRUCTURAL, ARCHITECTURAL & MECHANICAL DRAWINGS AS PER SPEC. SECTION 26 00 10.
- ALL CEILING DEVICES SHALL AVOID STRUCTURAL BEAMS AND MECHANICAL DUCTWORK. CONTRACTOR TO COORDINATE ON SITE PRIOR TO INSTALLATION.
- REFER TO ARCHITECTURAL AND INTERIOR DESIGNER DRAWINGS FOR ELEVATION OF POWER AND DATA OUTLETS. COORDINATE ELEVATION OF OUTLETS WITH MILLWORK.
- ALL DATA & VOICE SYSTEM CONDUITS, TRAYS, SUPPORT INFRASTRUCTURE, AND CABLEING TO BE SUPPLIED AND INSTALLED BY CONTRACTOR UNLESS OTHERWISE NOTED.
- SIZES OF BRANCH CIRCUIT CONDUCTORS INDICATED ARE MINIMUM SIZES AND MUST BE INCREASED AS REQUIRED TO SUIT LENGTH OF RUN AND VOLTAGE DROP IN ACCORDANCE WITH VOLTAGE DROP SCHEDULE OBTAINED FROM CONSULTANT. WHERE CONDUCTOR SIZES ARE INCREASED TO SUIT VOLTAGE DROP REQUIREMENTS, INCREASE SCHEDULED OR SPECIFIED CONDUIT SIZE TO SUIT.

GENERAL DEMOLITION WORK NOTES:

- COORDINATE ALL DEMOLITION WORK WITH GENERAL CONTRACTOR.
- VISIT THE SITE DURING THE TENDERING PERIOD TO DETERMINE THE EXACT SCOPE OF DEMOLITION WORK AND TO BECOME THOROUGHLY FAMILIAR WITH ALL CONDITIONS TO MEET IN CARRYING OUT SAME. REQUEST FOR EXTRAS WILL NOT BE CONSIDERED FOR FAILURE TO PROPERLY EVALUATE CONDITIONS WHICH AFFECT THE SCOPE OF DEMOLITION WORK.
- REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL DEMOLITION WORK.
- UNLESS OTHERWISE NOTED, OBSOLETE MATERIALS WHICH ARE REMOVED AND ARE NOT TO BE RELOCATED OR REUSED ARE TO BECOME YOUR PROPERTY. REMOVE FROM SITE AND PROPERLY DISPOSE.
- ALL LIFE SAFETY SYSTEMS MUST REMAIN IN OPERATION DURING CONSTRUCTION. PROVIDE TEMPORARY POWER FOR DEMOLITION AND CONSTRUCTION PHASES. COORDINATE THE NEW INCOMING UTILITY SERVICE CONNECTION AND DEMOLITION OF THE EXISTING CONNECTION TO MINIMIZE THE IMPACT ON CONSTRUCTION WORK.
- CONTRACTOR TO ALLOW FOR SURVEYING OF EXISTING AREA AND CONFIRMING EXISTING POWER DISTRIBUTION SYSTEM TO BE REMOVED. ALL WORK RELATED TO TRACING, INVESTIGATING, AND CONFIRMING EXISTING ELECTRICAL SYSTEMS SHALL BE INCLUDED IN THE SCOPE OF WORK.

DETAIL 1 GENERAL NOTES:

- DUCT BANK INSTALLATION SHALL MEET TORONTO HYDRO DETAILS. REFER TO ELECTRICAL DETAILS FOR TYPICAL DETAILS.
- COORDINATE EXACT PAD MOUNTED TRANSFORMER LOCATION WITH SITE CONDITIONS TO MEET ALL CLEARANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS.



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Landscape Architect  
Civil Engineer  
Structural Engineer  
Mechanical Engineer  
Electrical Engineer  
Plumbing Engineer  
Interior Designer  
Equipment Planner  
Wayfinding

DG  
JL  
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WSP  
WSP  
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HDR  
HDR

Sheet Reviewer NM

MARK	DATE	DESCRIPTION
1	2022-12-16	ISSUED FOR MOH STAGE 3.1
2	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
3	2023-07-05	ISSUED FOR MOH STAGE 3.2
4	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
5	2024-02-12	ISSUED FOR MOH STAGE 3.3
6	2024-03-22	ISSUED FOR PERMIT
7	2024-09-17	ISSUED FOR ESA
8	2024-09-13	ISSUED FOR TENDER
9	2024-10-07	ISSUED FOR ADD-E01

Project Number 10355669  
Original Issue 07/08/22

Sheet Name

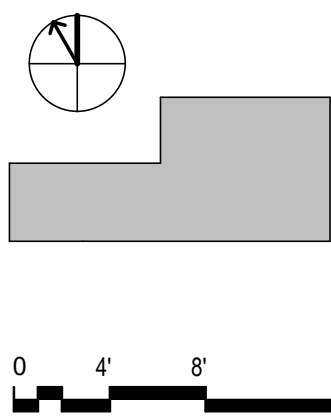
SITE PLAN -  
ELECTRICAL

Sheet Number

E-101

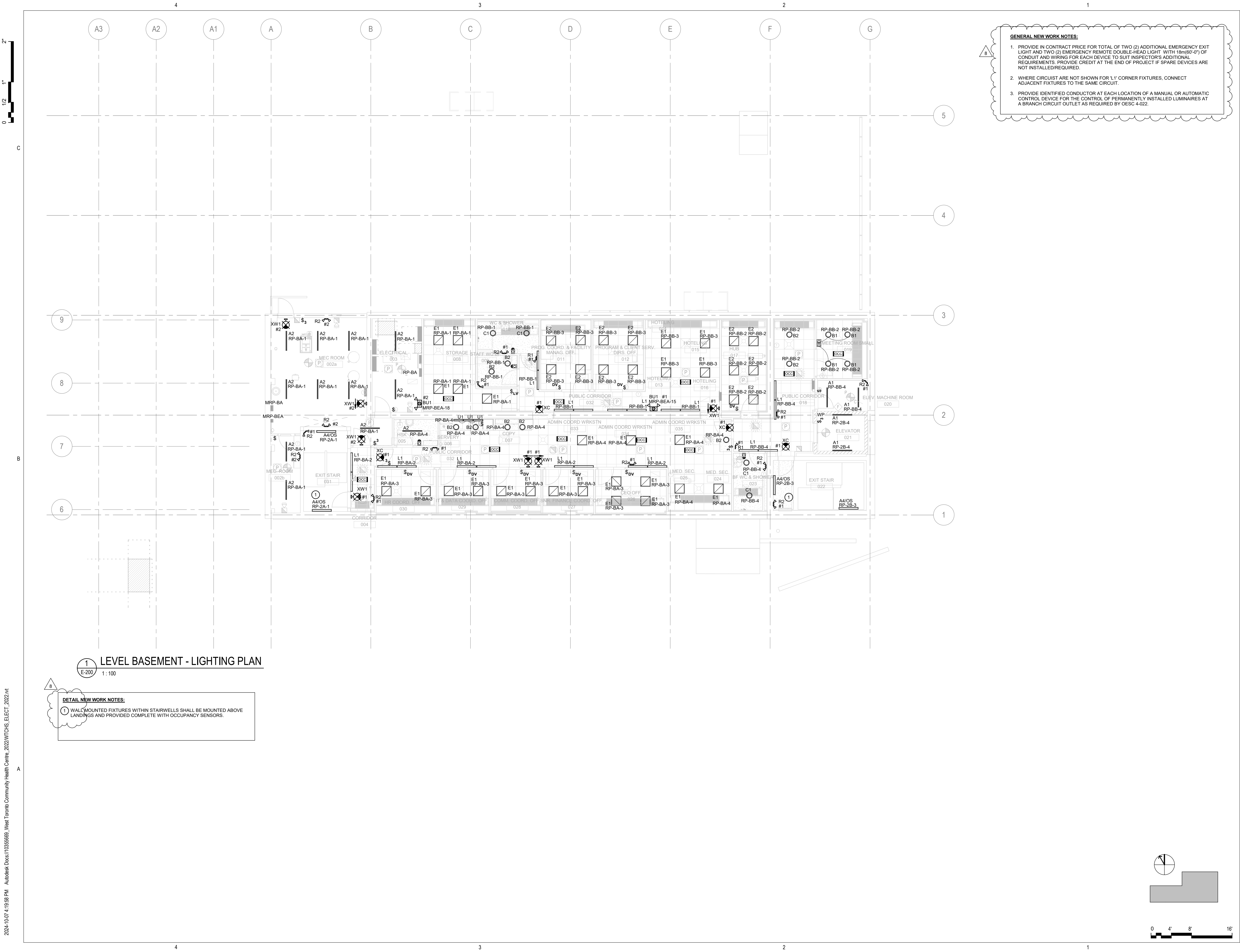
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Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

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Original Issue	07/08/22

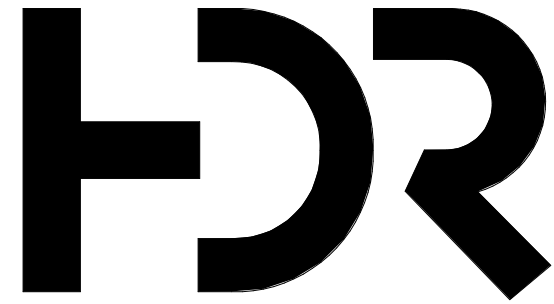
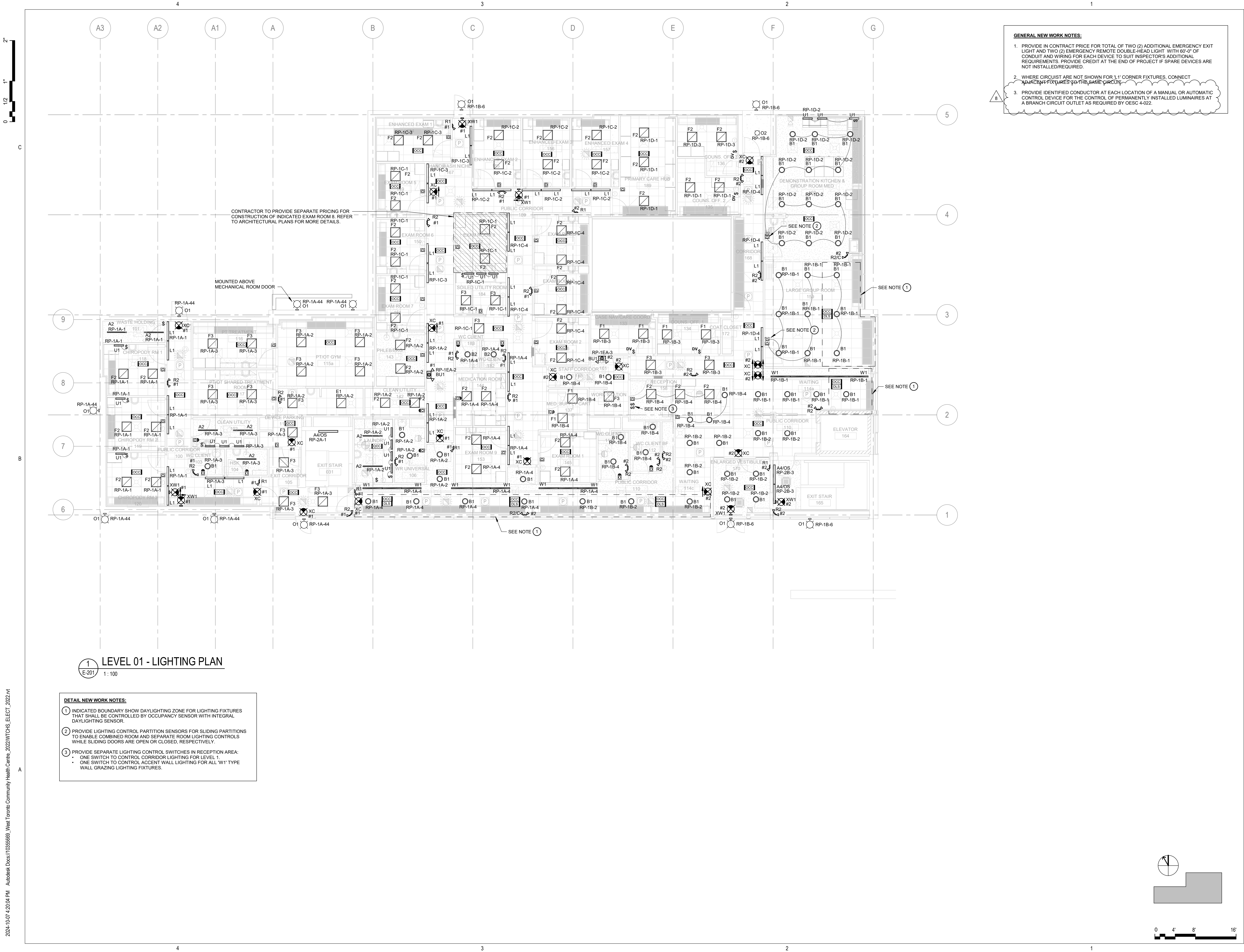
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**LEVEL B1 - LIGHTING**

Sheet Number  
**E-200**

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Structural Engineer	WSP
Mechanical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	
Wayfinding	

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

LEVEL 01 - LIGHTING

Sheet Number

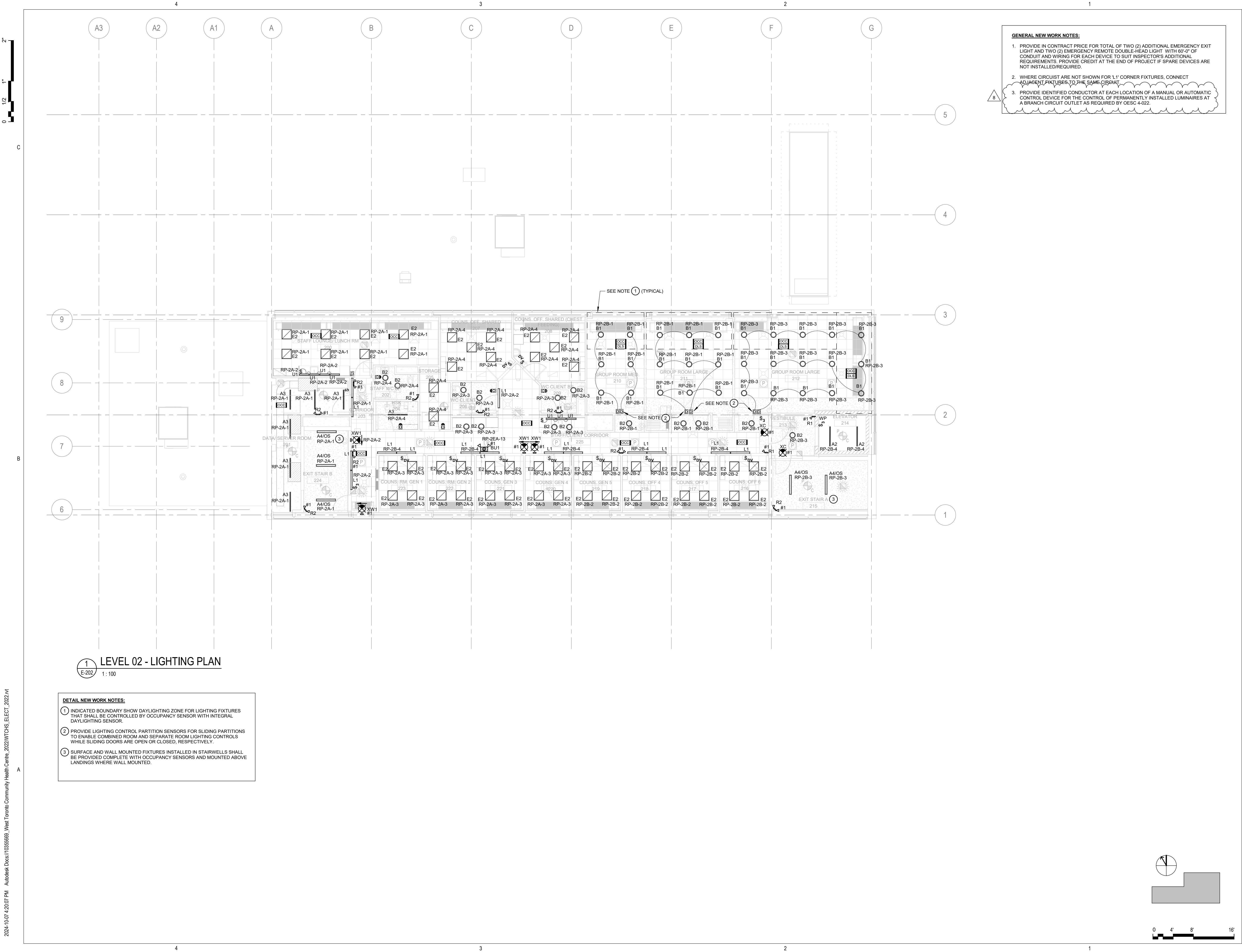
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Project Status

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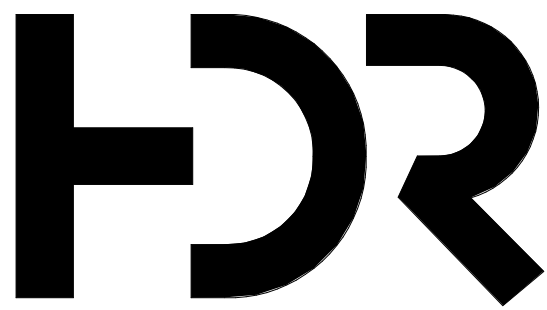


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GENERAL NEW WORK NOTES:

1. PROVIDE IN CONTRACT PRICE FOR TOTAL OF TWO (2) ADDITIONAL EMERGENCY EXIT LIGHT AND TWO (2) EMERGENCY REMOTE DOUBLE-HEAD LIGHT WITH 60'-0" OF CONDUIT AND WIRING FOR EACH DEVICE TO SUIT INSPECTOR'S ADDITIONAL REQUIREMENTS. PROVIDE CREDIT AT THE END OF PROJECT IF SPARE DEVICES ARE NOT INSTALLED/REQUIRED.
2. WHERE CIRCUITS ARE NOT SHOWN FOR 'L1' CORNER FIXTURES, CONNECT ADJACENT FIXTURES TO THE SAME CIRCUIT.
3. PROVIDE IDENTIFIED CONDUCTOR AT EACH LOCATION OF A MANUAL OR AUTOMATIC CONTROL DEVICE FOR THE CONTROL OF PERMANENTLY INSTALLED LUMINAIRES AT A BRANCH CIRCUIT OUTLET AS REQUIRED BY OESC 4-022.



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Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

LEVEL 02 - LIGHTING

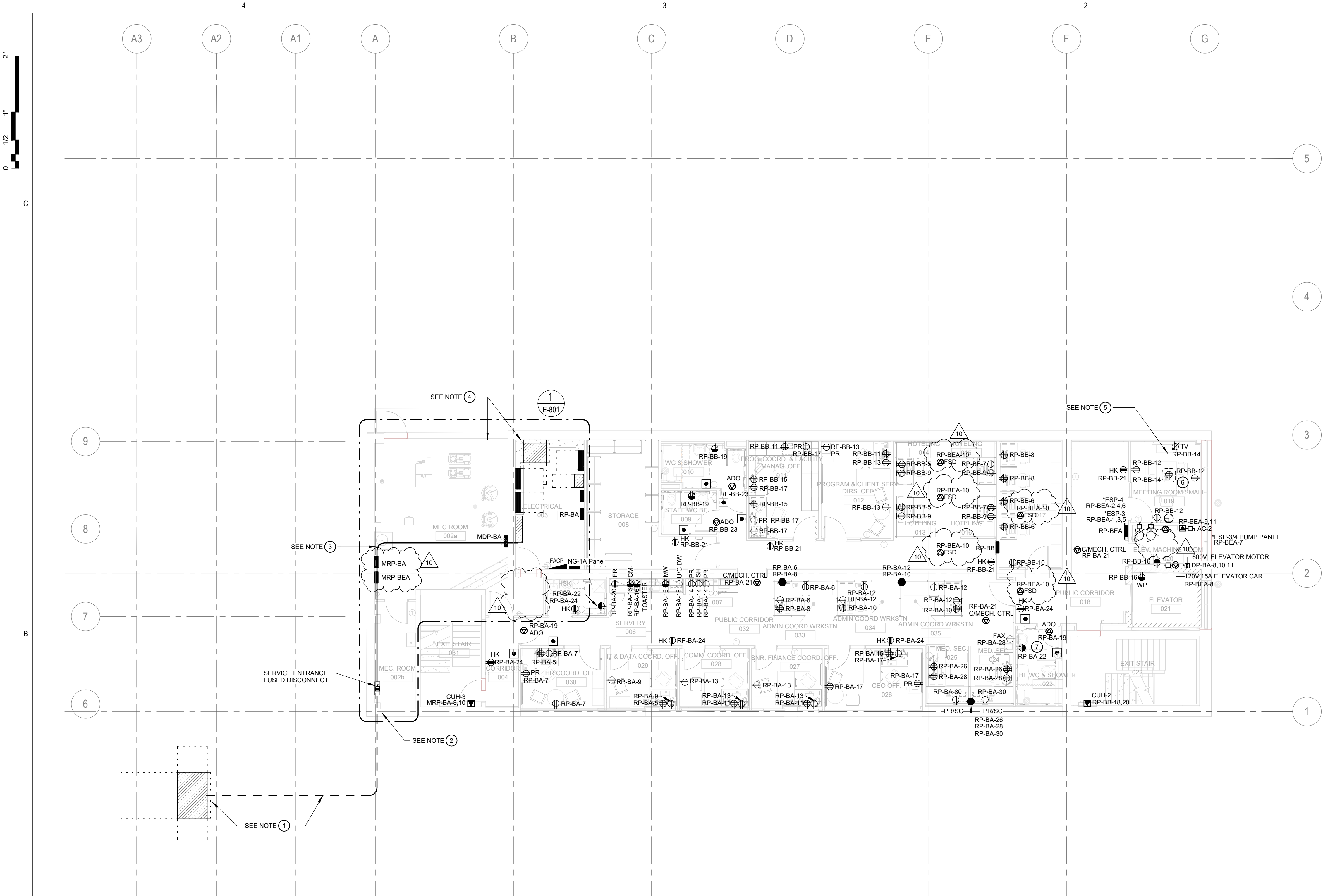
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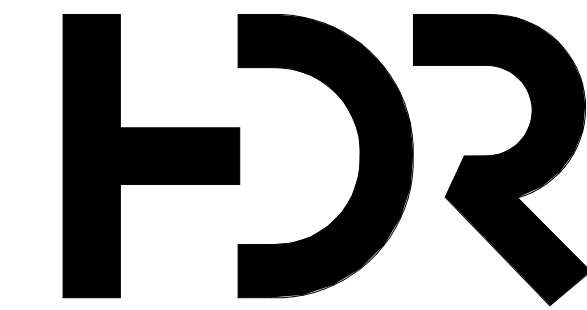
Project Status

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- GENERAL NEW WORK NOTES:**
1. ELECTRICAL CONTRACTOR ENSURE ALL DEVICES, LIGHTING FIXTURES AND CONDUITS IN PATIENT CARE AREA ARE WIRED IN ACCORDANCE WITH O.E.S.C. SECTION 24.
  2. COORDINATE WITH ARCHITECTURAL FOR LOCATION OF GROMMETS TO BE PROVIDED IN WORKSTATION COUNTERS.
  3. REFER TO OTHER SYSTEM DRAWINGS FOR MORE POWER / CIRCUITING INFORMATION.



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Wayfinding

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HDR  
WSP  
WSP  
WSP  
WSP  
HDR  
HDR

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MARK	DATE	DESCRIPTION
1	2022-12-16	ISSUED FOR MOH STAGE 3.1
2	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
3	2023-05-26	ISSUED FOR STAGE 3.2 COSTING-R1
4	2023-07-05	ISSUED FOR MOH STAGE 3.2
5	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
6	2024-02-12	ISSUED FOR MOH STAGE 3.3
7	2024-03-22	ISSUED FOR PERMIT
8	2024-09-17	ISSUED FOR ESA
9	2024-09-13	ISSUED FOR TENDER
10	2024-10-07	ISSUED FOR ADD-E01

Project Number 10355669  
Original Issue 07/08/22

Sheet Name

LEVEL B1 - POWER

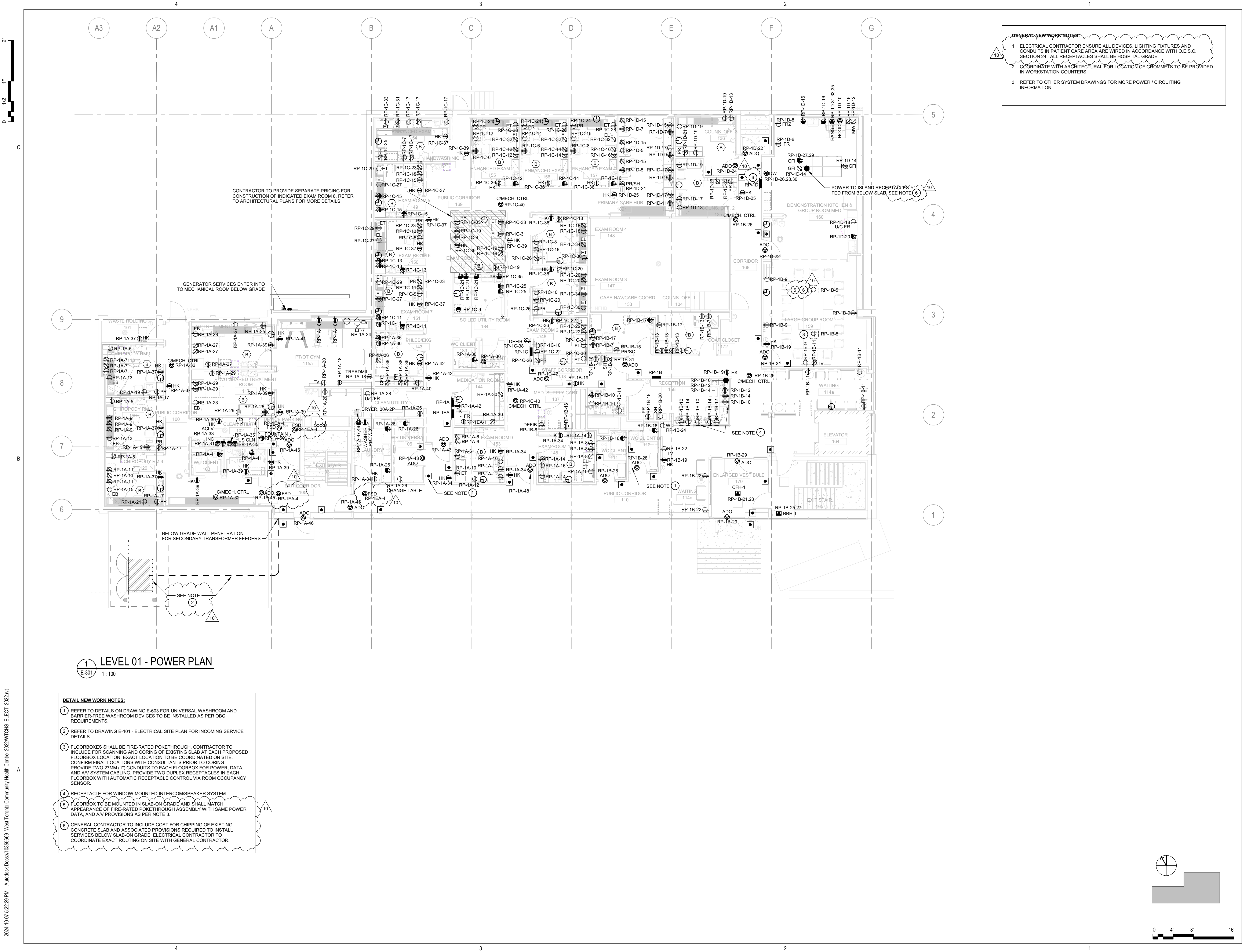
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Project Status

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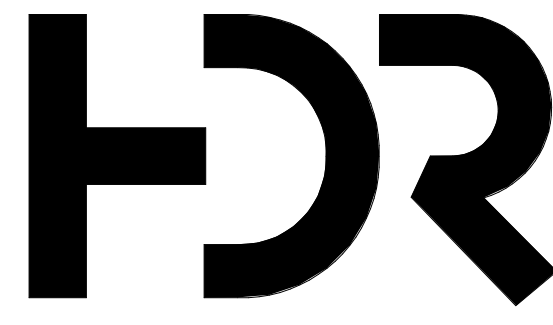
**GENERAL NEW WORK NOTES:**

1. ELECTRICAL CONTRACTOR ENSURE ALL DEVICES, LIGHTING FIXTURES AND CONDUITS IN PATIENT CARE AREA ARE WIRED IN ACCORDANCE WITH O.E.S.C. SECTION 24. ALL RECEPTACLES SHALL BE HOSPITAL GRADE.
2. COORDINATE WITH ARCHITECTURAL FOR LOCATION OF GROMMETS TO BE PROVIDED IN WORKSTATION COUNTERS.
3. REFER TO OTHER SYSTEM DRAWINGS FOR MORE POWER / CIRCUITING INFORMATION.

**LEVEL 01 - POWER PLAN**  
E-301 1:100

**DETAIL NEW WORK NOTES:**

- 1 REFER TO DETAILS ON DRAWING E-603 FOR UNIVERSAL WASHROOM AND BARRIER-FREE WASHROOM DEVICES TO BE INSTALLED AS PER OBC REQUIREMENTS.
- 2 REFER TO DRAWING E-101 - ELECTRICAL SITE PLAN FOR INCOMING SERVICE DETAILS.
- 3 FLOORBOXES SHALL BE FIRE-RATED POKETHROUGH. CONTRACTOR TO INCLUDE FOR SCANNING AND CORING OF EXISTING SLAB AT EACH PROPOSED FLOORBOX LOCATION. EXACT LOCATION TO BE COORDINATED ON SITE. CONFIRM FINAL LOCATIONS WITH CONSULTANTS PRIOR TO CORING. PROVIDE TWO 27MM (1") CONDUITS TO EACH FLOORBOX FOR POWER, DATA, AND A/V SYSTEM CABLING. PROVIDE TWO DUPLEX RECEPTACLES IN EACH FLOORBOX WITH AUTOMATIC RECEPTACLE CONTROL VIA ROOM OCCUPANCY SENSOR.
- 4 RECEPTACLE FOR WINDOW MOUNTED INTERCOM/SPEAKER SYSTEM.
- 5 FLOORBOX TO BE MOUNTED IN SLAB ON GRADE AND SHALL MATCH APPEARANCE OF FIRE-RATED POKETHROUGH ASSEMBLY WITH SAME POWER, DATA, AND A/V PROVISIONS AS PER NOTE 3.
- 6 GENERAL CONTRACTOR TO INCLUDE COST FOR CHIPPING OF EXISTING CONCRETE SLAB AND ASSOCIATED PROVISIONS REQUIRED TO INSTALL SERVICES BELOW SLAB ON GRADE. ELECTRICAL CONTRACTOR TO COORDINATE EXACT ROUTING ON SITE WITH GENERAL CONTRACTOR.



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WSP Project No. 221-11662-00

## WTCHS West Toronto Community HC

209 Mavety St,  
Toronto, ON M6P 2M1  
Canada

Project Manager	DG
Project Designer	JL
Project Architect	HDR
Landscape Architect	
Civil Engineer	WSP
Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2022-12-16	ISSUED FOR MOH STAGE 3.1
2	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
3	2023-05-26	ISSUED FOR STAGE 3.2 COSTING-R1
4	2023-07-05	ISSUED FOR MOH STAGE 3.2
5	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
6	2024-02-12	ISSUED FOR MOH STAGE 3.3
7	2024-03-22	ISSUED FOR PERMIT
8	2024-09-17	ISSUED FOR ESA
9	2024-09-13	ISSUED FOR TENDER
10	2024-10-07	ISSUED FOR ADD-E01

Project Number  
Original Issue

10355669  
07/08/22

Sheet Name

LEVEL 01 - POWER

Sheet Number

E-301

Project Status

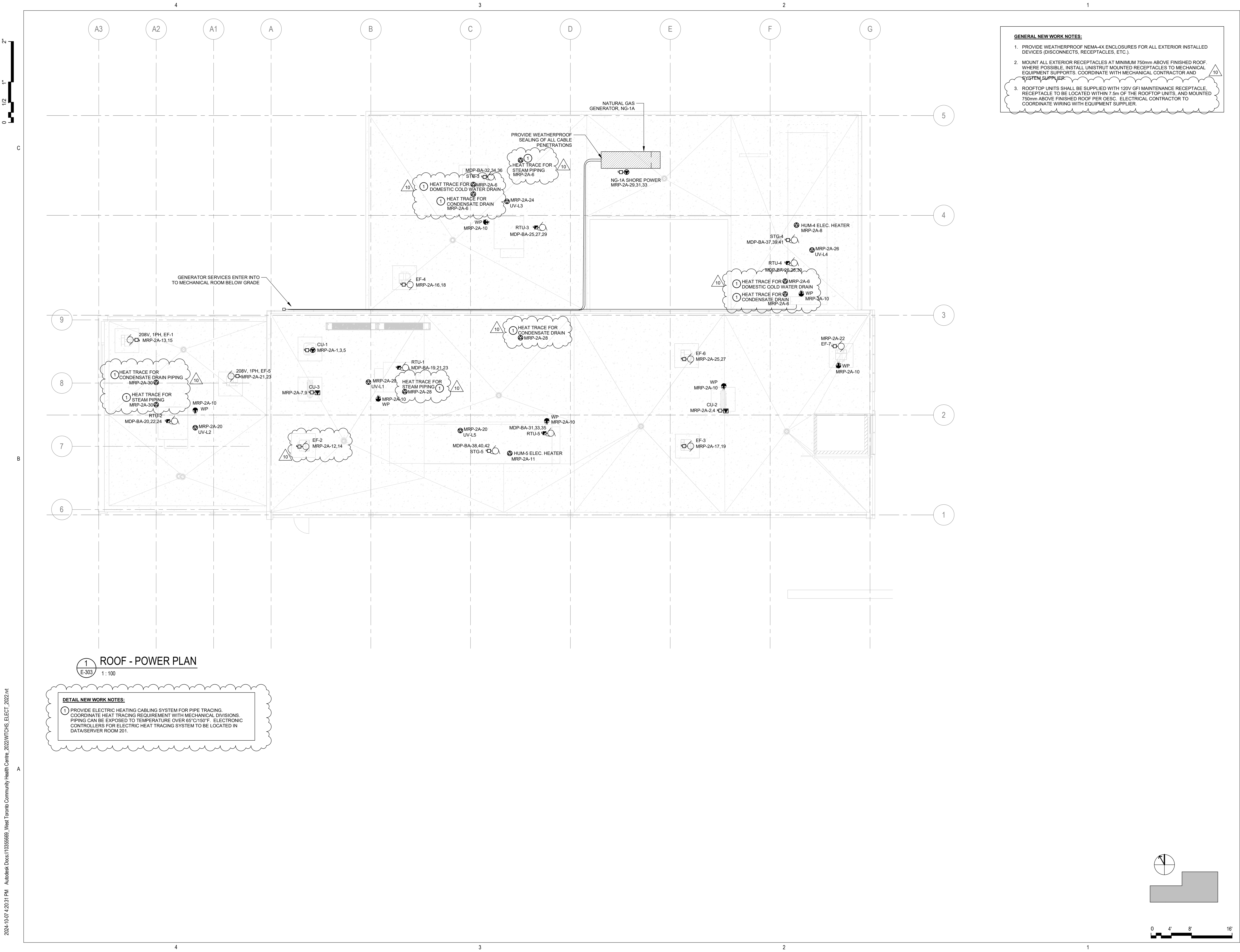
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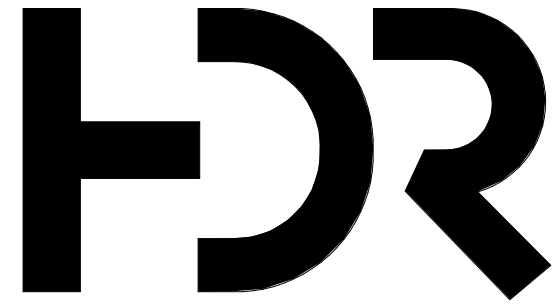




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- GENERAL NEW WORK NOTES:**
1. PROVIDE WEATHERPROOF NEMA-4X ENCLOSURES FOR ALL EXTERIOR INSTALLED DEVICES (DISCONNECTS, RECEPTACLES, ETC.).
  2. MOUNT ALL EXTERIOR RECEPTACLES AT MINIMUM 750mm ABOVE FINISHED ROOF. WHERE POSSIBLE, INSTALL UNISTRUT MOUNTED RECEPTACLES TO MECHANICAL EQUIPMENT SUPPORTS. COORDINATE WITH MECHANICAL CONTRACTOR AND SYSTEM SUPPLIER.
  3. ROOFTOP UNITS SHALL BE SUPPLIED WITH 120V GFI MAINTENANCE RECEPTACLE. RECEPTACLE TO BE LOCATED WITHIN 7.5m OF THE ROOFTOP UNITS, AND MOUNTED 750mm ABOVE FINISHED ROOF PER OESC. ELECTRICAL CONTRACTOR TO COORDINATE WIRING WITH EQUIPMENT SUPPLIER.



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## WTCHS West Toronto Community HC

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Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	HDR
Interior Designer	HDR
Equipment Planner	
Wayfinding	

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MARK	DATE	DESCRIPTION
1	2022-12-16	ISSUED FOR MOH STAGE 3.1
2	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
3	2023-05-26	ISSUED FOR STAGE 3.2 COSTING-R1
4	2023-07-05	ISSUED FOR MOH STAGE 3.2
5	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
6	2024-02-12	ISSUED FOR MOH STAGE 3.3
7	2024-03-22	ISSUED FOR PERMIT
8	2024-09-17	ISSUED FOR ESA
9	2024-09-13	ISSUED FOR TENDER
10	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

ROOF - POWER

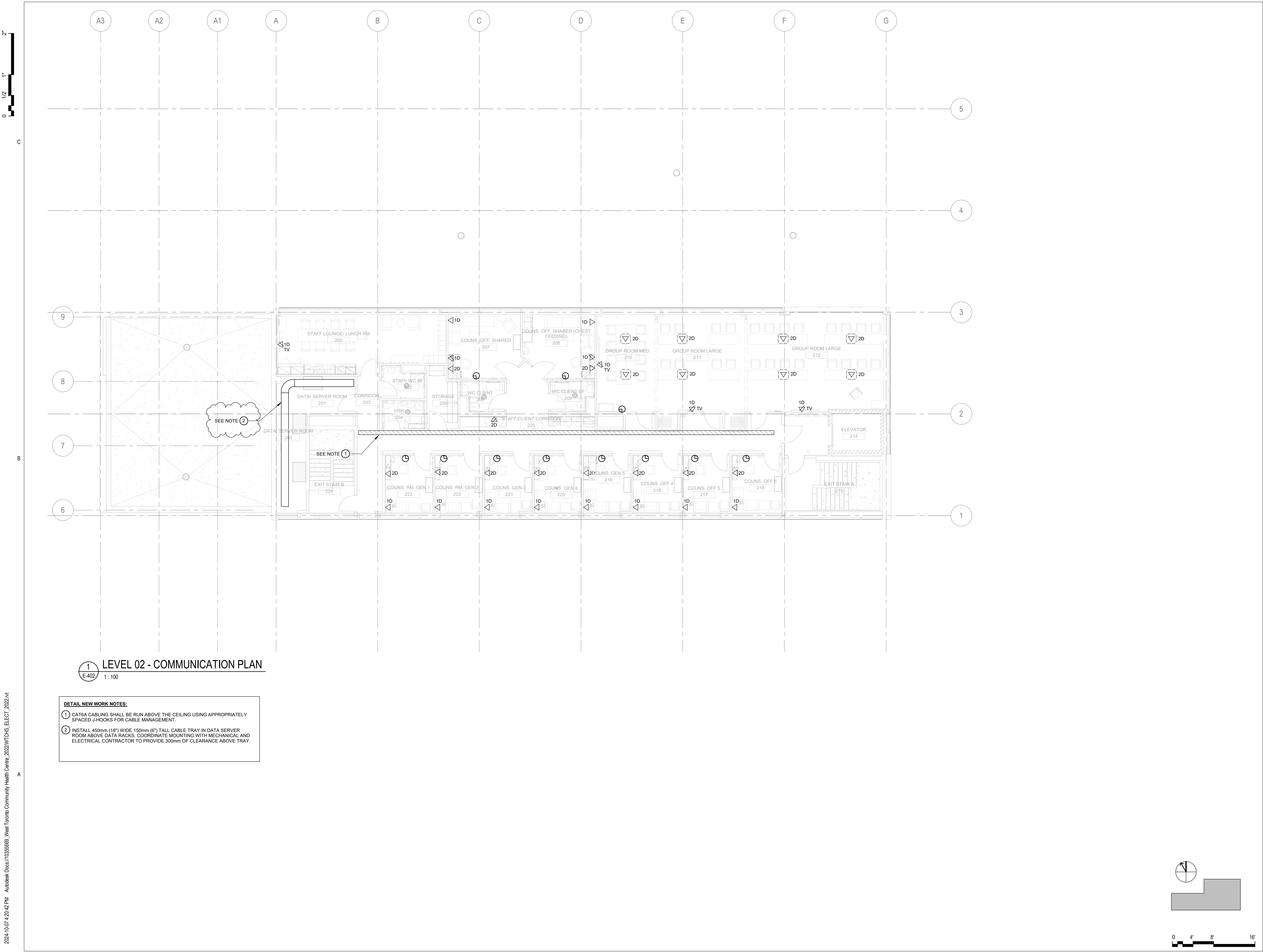
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E-303

Project Status

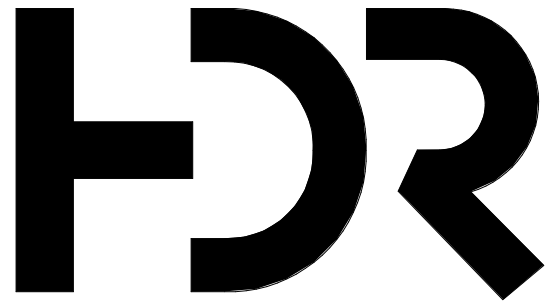
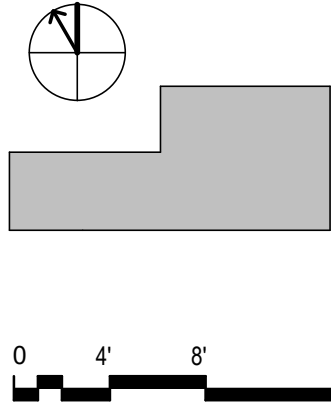
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1  
E-402  
LEVEL 02 - COMMUNICATION PLAN  
1:100

- DETAIL NEW WORK NOTES:**
- 1 CAT6A CABLING SHALL BE RUN ABOVE THE CEILING USING APPROPRIATELY SPACED J-HOOKS FOR CABLE MANAGEMENT.
  - 2 INSTALL 450mm (18") WIDE 150mm (6") TALL CABLE TRAY IN DATA SERVER ROOM ABOVE DATA RACKS. COORDINATE MOUNTING WITH MECHANICAL AND ELECTRICAL CONTRACTOR TO PROVIDE 300mm OF CLEARANCE ABOVE TRAY.



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Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

LEVEL 02 -  
COMMUNICATIONS

Sheet Number

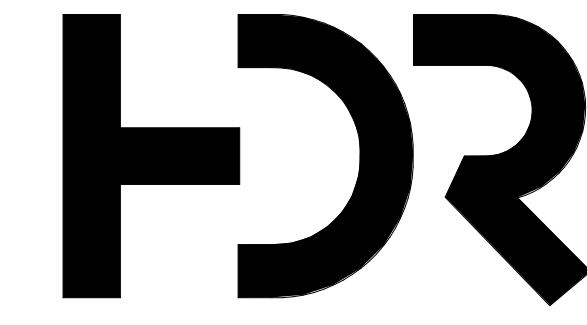
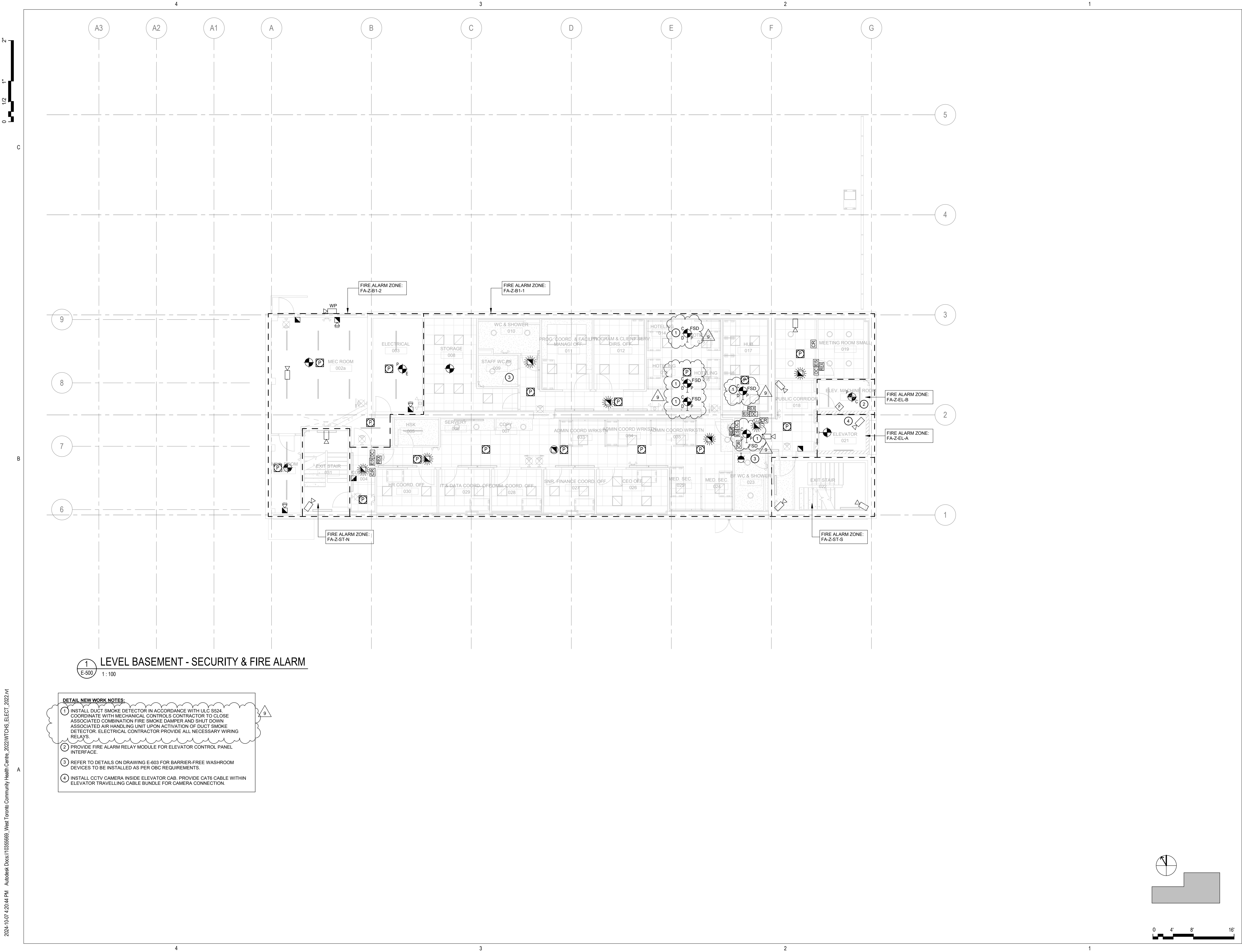
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Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Wayfinding	HDR

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-04	RE-ISSUED FOR PERMIT
7	2024-09-17	ISSUED FOR ESA
8	2024-09-13	ISSUED FOR TENDER
9	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

## LEVEL B1 - SECURITY AND FIRE ALARM

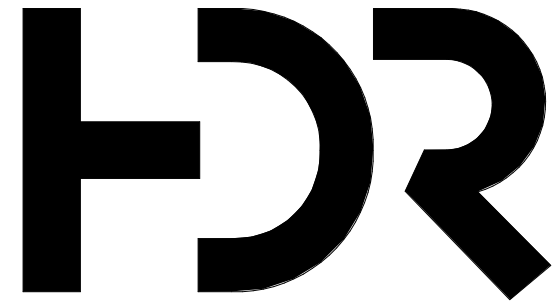
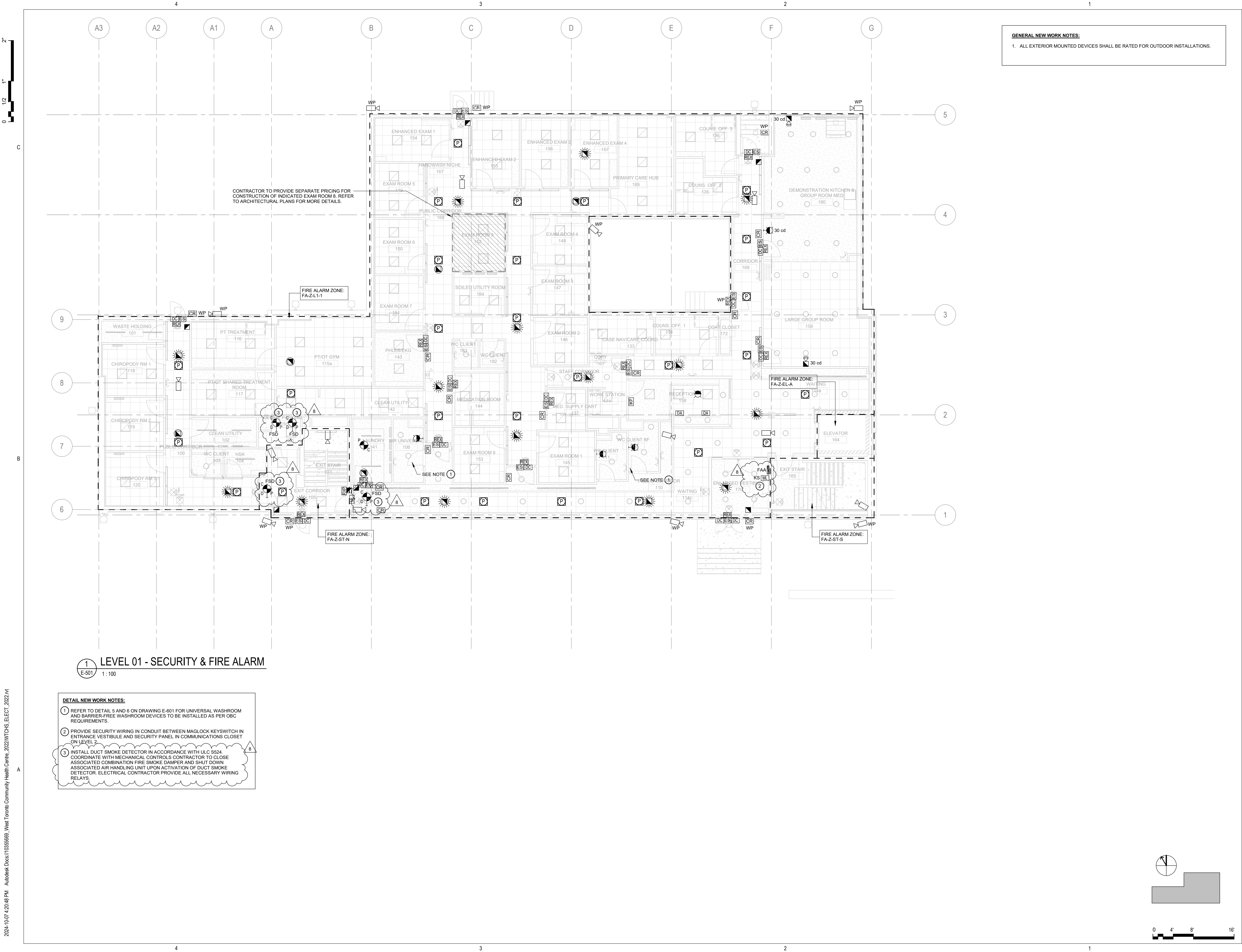
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Project Status

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## WTCHS West Toronto Community HC

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Project Manager	DG
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Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

## LEVEL 01 - SECURITY AND FIRE ALARM

Sheet Number

# E-501

Project Status

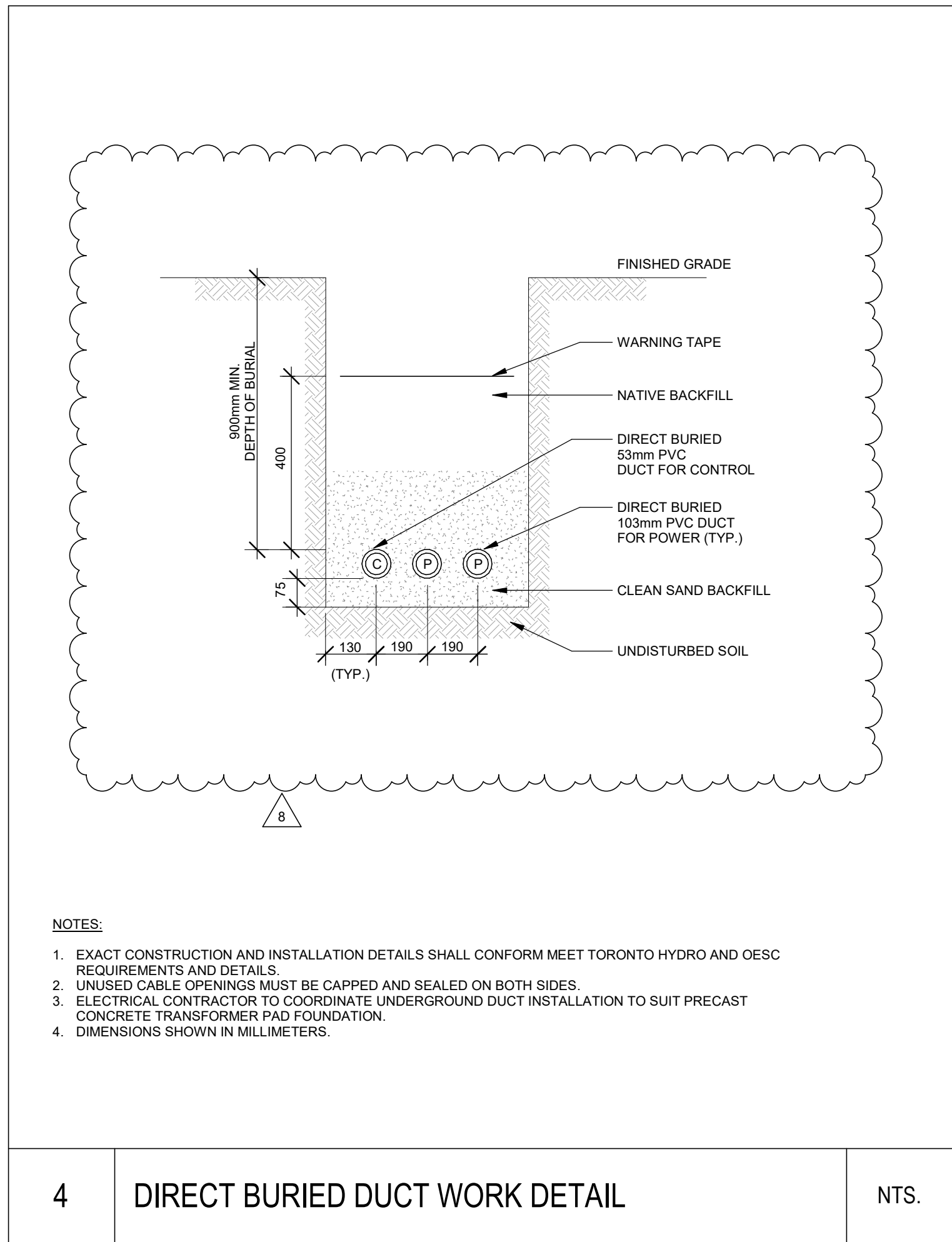
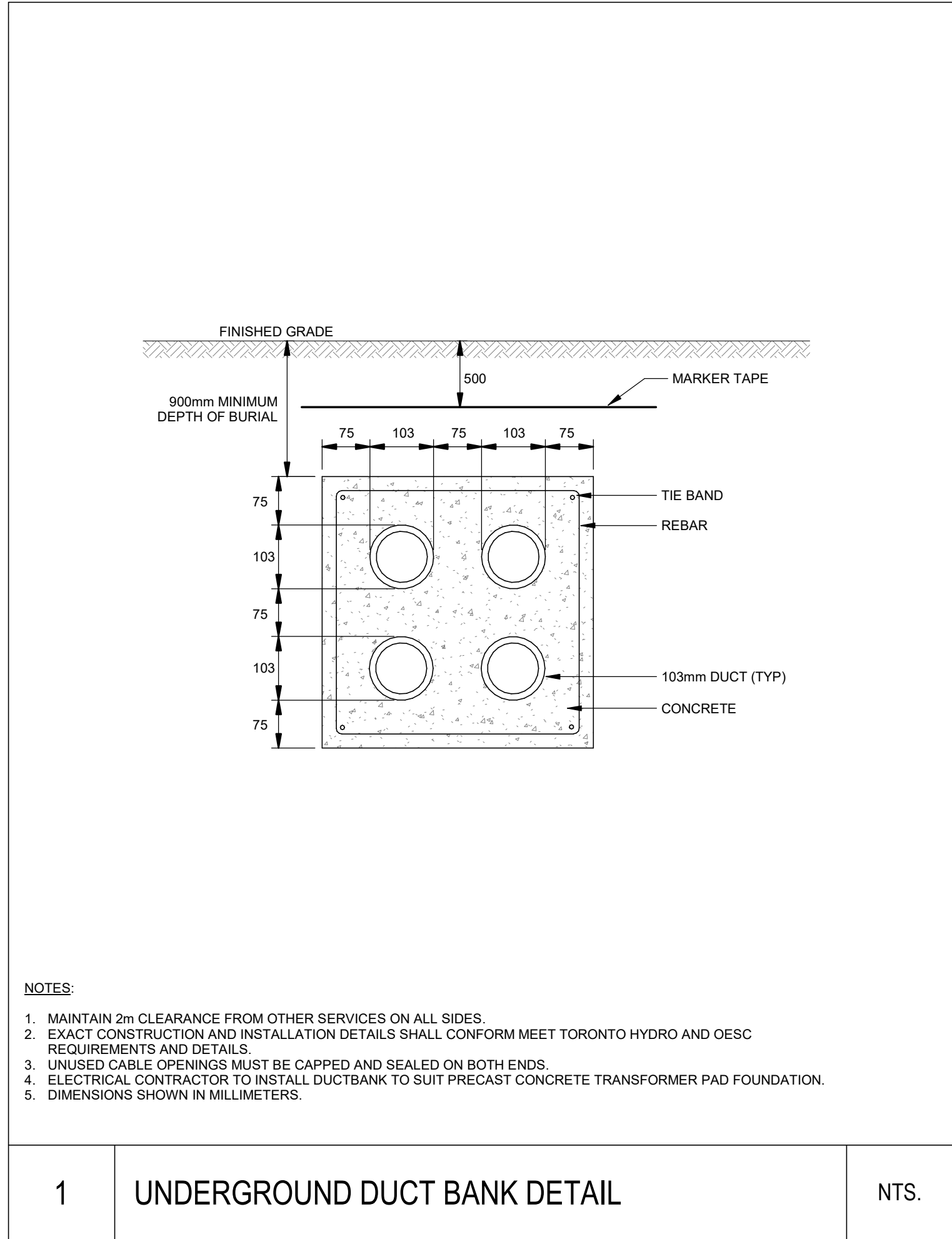
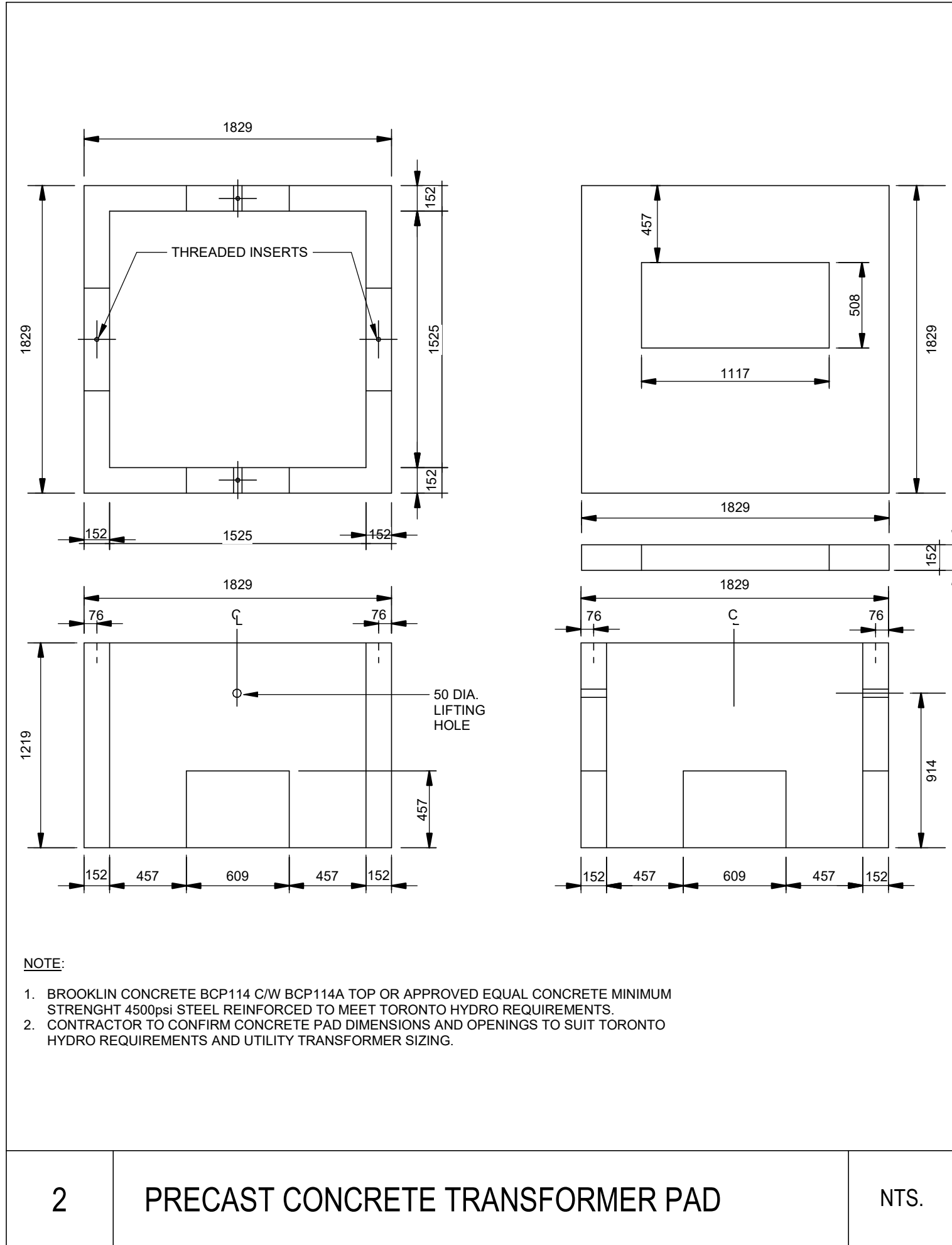
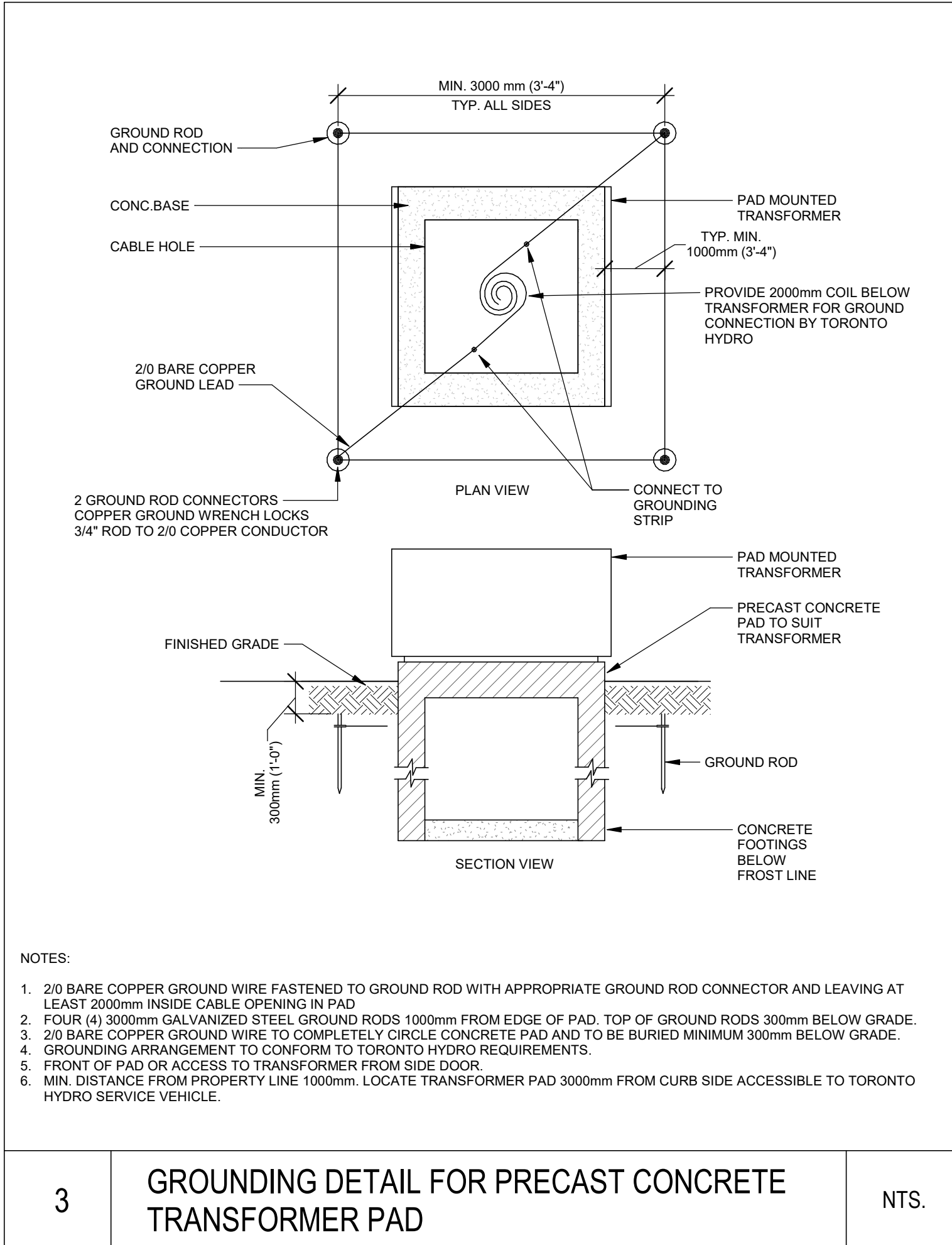
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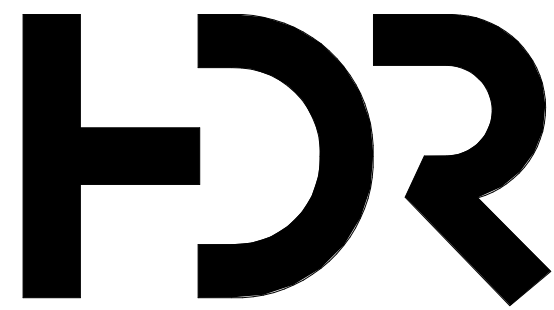
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B	Project Manager	DG
	Project Designer	JL
	Project Architect	HDR
	Landscape Architect	
	Civil Engineer	WSP
	Structural Engineer	WSP
	Mechanical Engineer	WSP
	Electrical Engineer	WSP
	Plumbing Engineer	WSP
	Interior Designer	HDR
Equipment Planner	HDR	
Wayfinding		
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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
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8	2024-10-07	ISSUED FOR ADD-E01
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Sheet Name	STANDARD DETAILS - ELECTRICAL
Sheet Number	E-602
Project Status	ISSUED FOR TENDER



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WSP Project No. 221-11662-00

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Canada

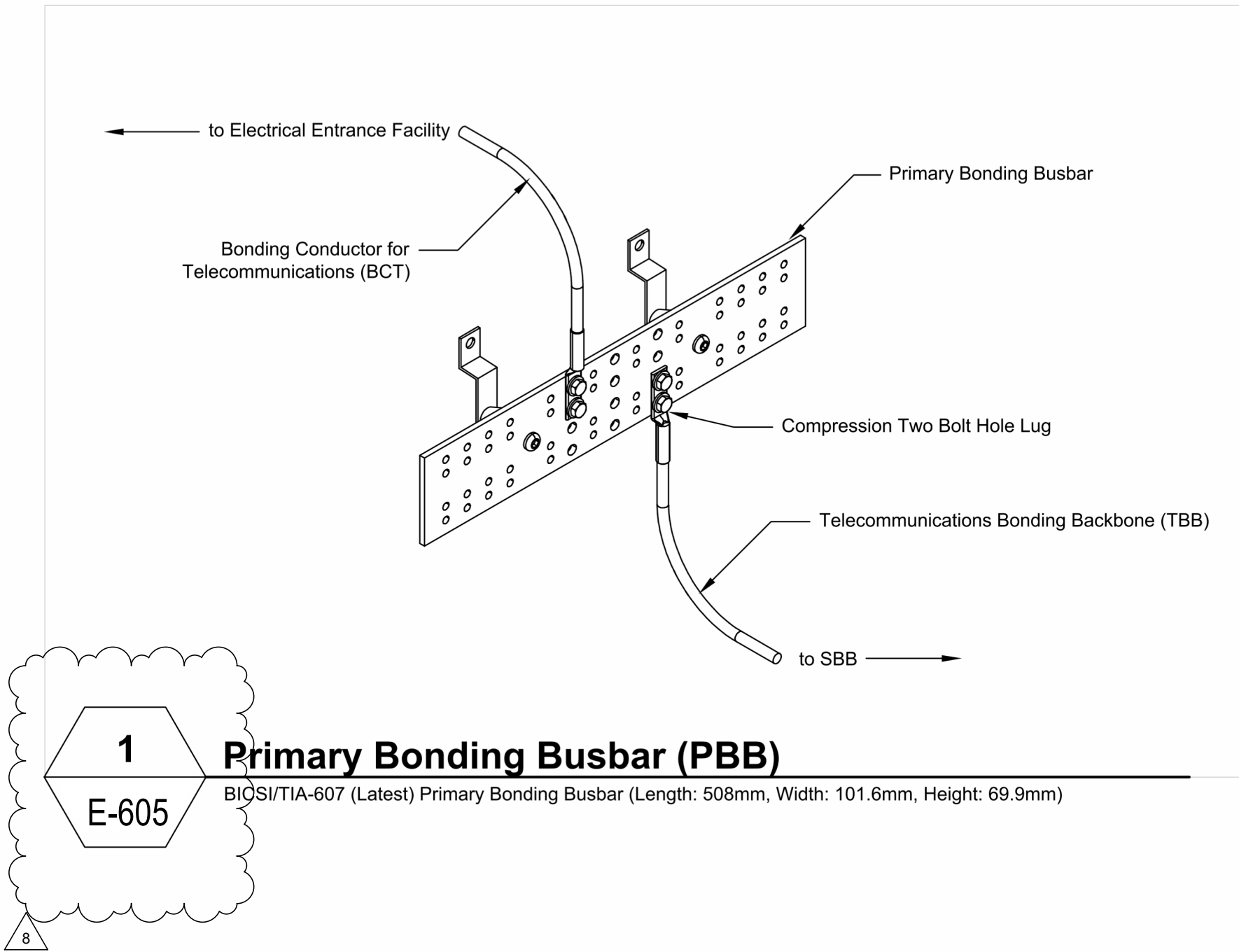
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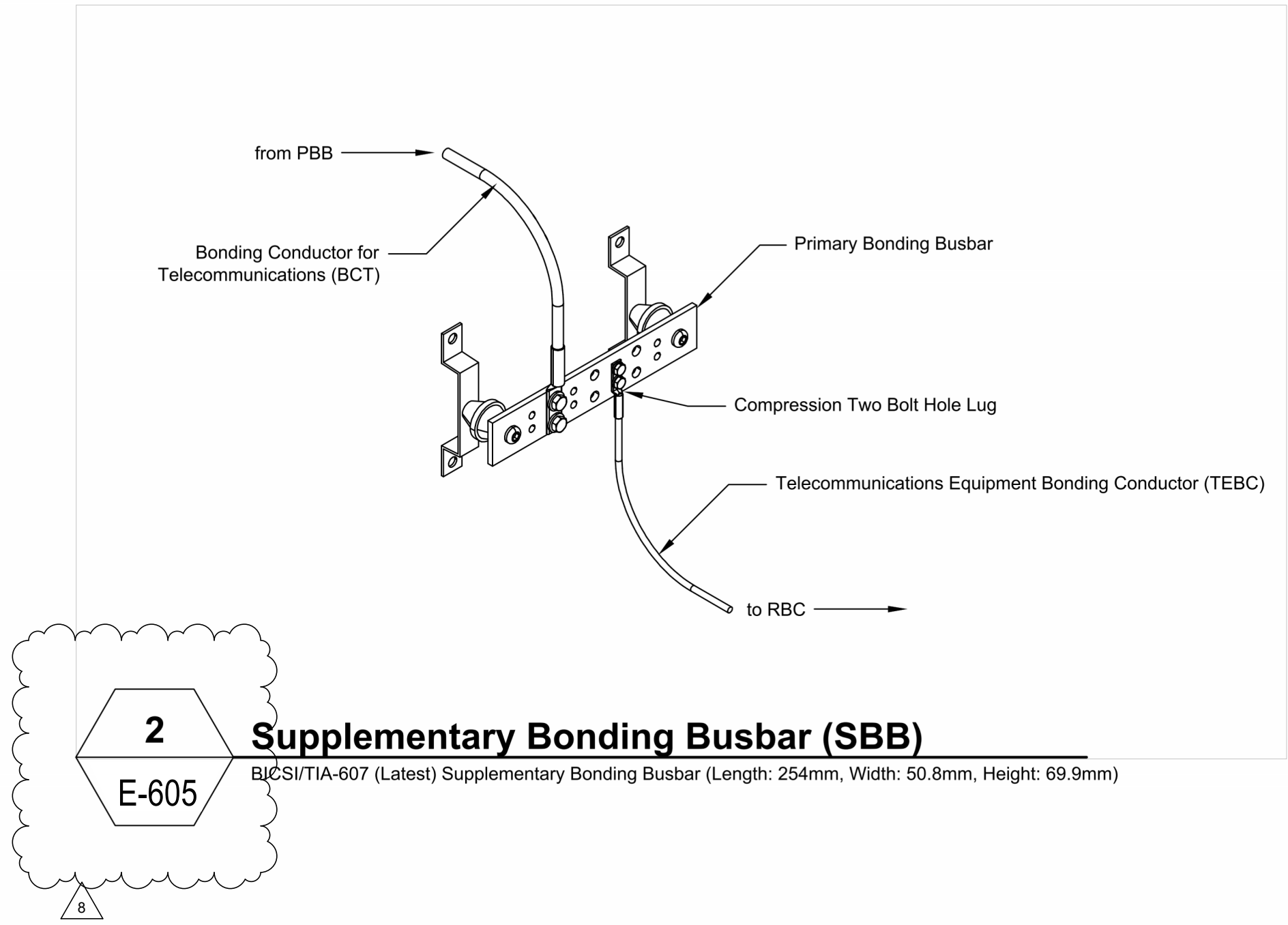
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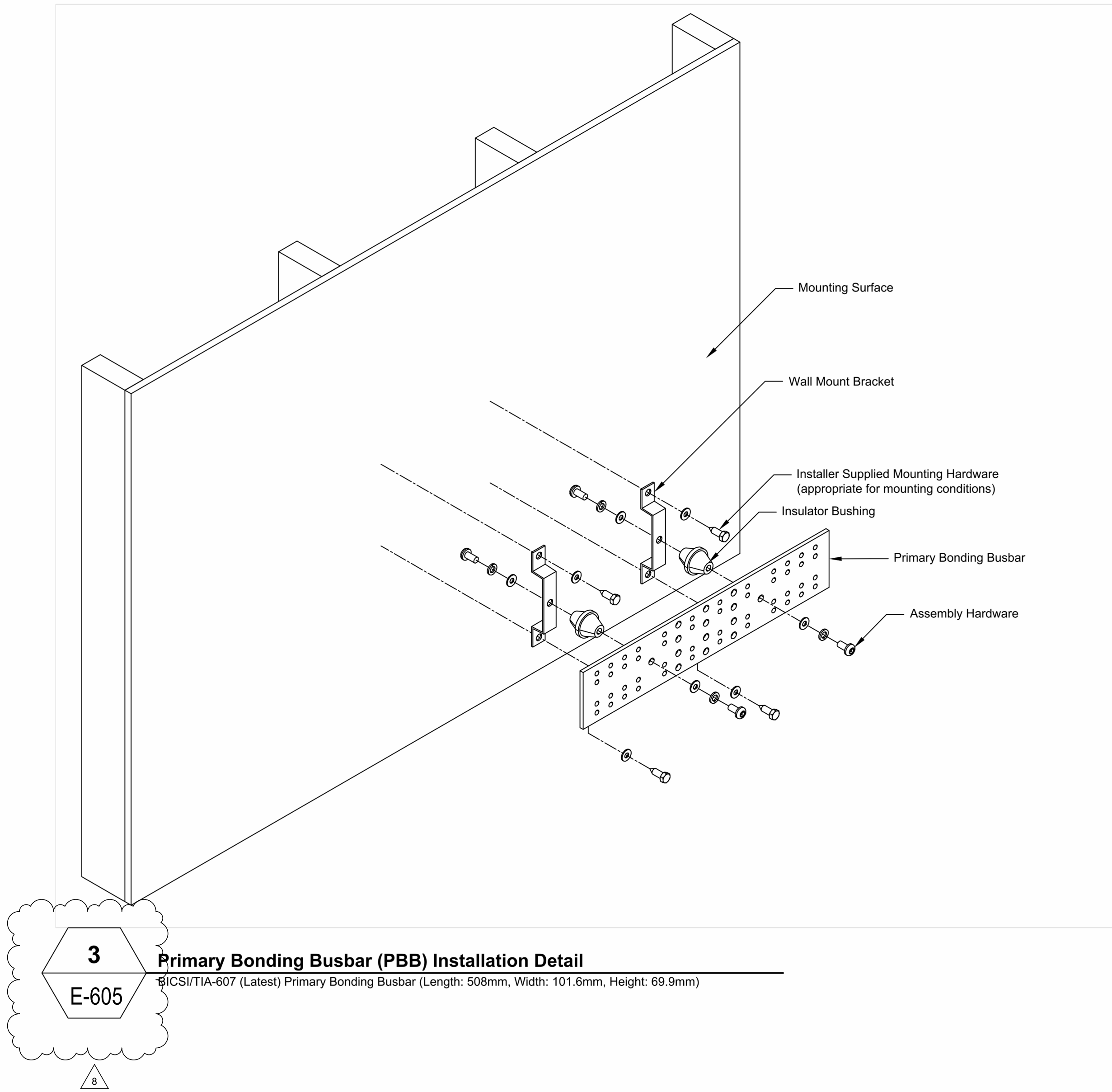
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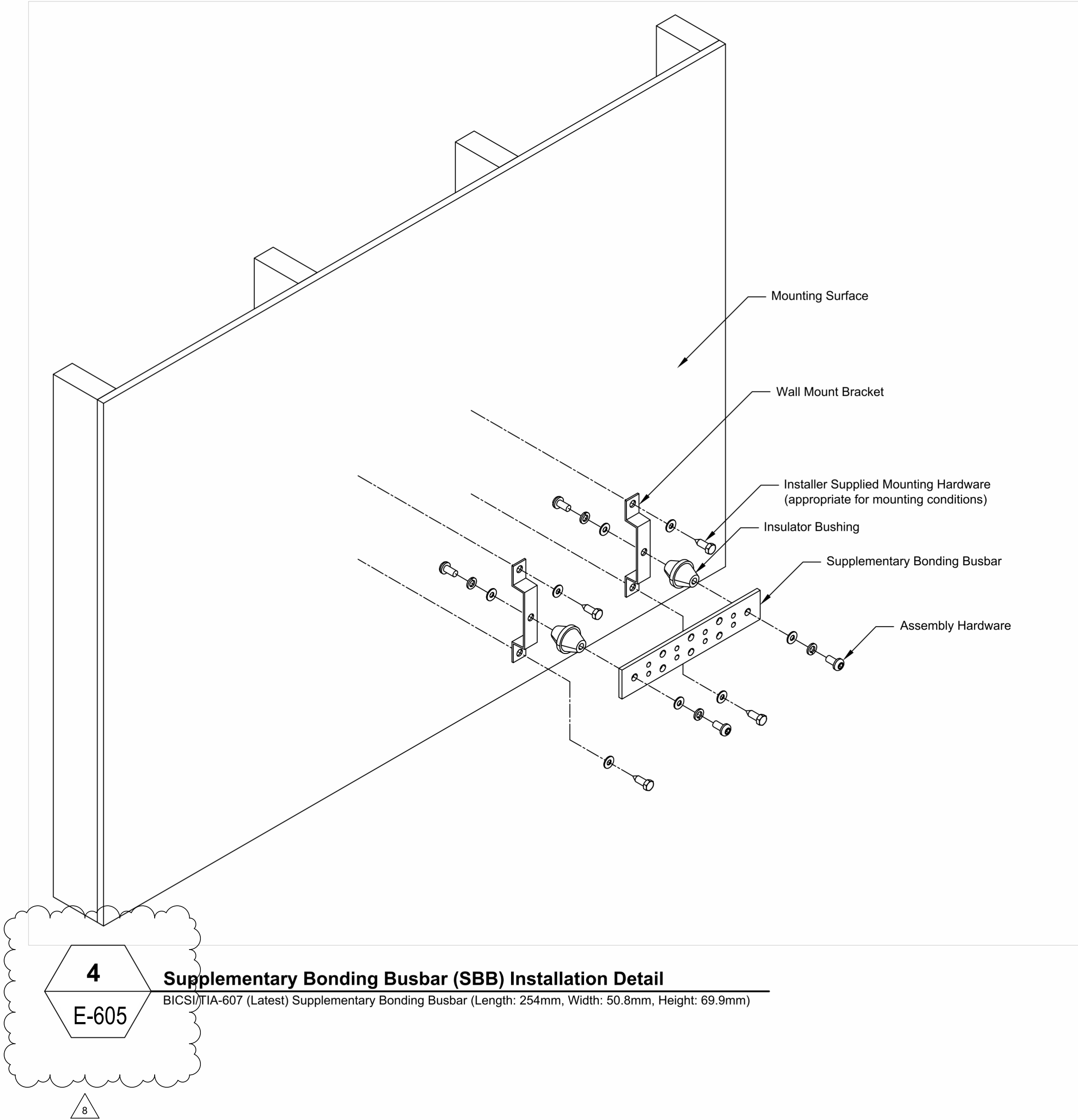
**1 Primary Bonding Busbar (PBB)**  
BICSI/TIA-607 (Latest) Primary Bonding Busbar (Length: 508mm, Width: 101.6mm, Height: 69.9mm)



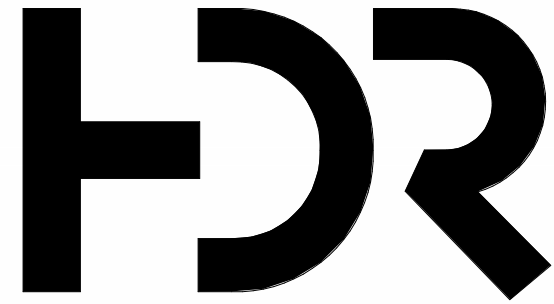
**2 Supplementary Bonding Busbar (SBB)**  
BICSI/TIA-607 (Latest) Supplementary Bonding Busbar (Length: 254mm, Width: 50.8mm, Height: 69.9mm)



**3 Primary Bonding Busbar (PBB) Installation Detail**  
BICSI/TIA-607 (Latest) Primary Bonding Busbar (Length: 508mm, Width: 101.6mm, Height: 69.9mm)



**4 Supplementary Bonding Busbar (SBB) Installation Detail**  
BICSI/TIA-607 (Latest) Supplementary Bonding Busbar (Length: 254mm, Width: 50.8mm, Height: 69.9mm)



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Landscape Architect	
Civil Engineer	WSP
Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name  
**STANDARD DETAILS -  
COMMUNICATIONS**

Sheet Number  
**E-605**

Project Status  
ISSUED FOR TENDER





Autodesk Docs//10355669 West Toronto Community Health Centre 2022/WTCHS ELECT 2022.m



<b>Connected Building Load</b>		
Floor	38,090	W
Connected Equipment	405,000	W
Total Connected Load (W)	443,090	W
	232.65	W/m <sup>2</sup>
<b>Demand load</b>		
<900m <sup>2</sup> (80%)	167,510	W
>900m <sup>2</sup> (65%)	151,907	W
Demand (kW)	319.42	kW
Power Factor	0.90	
Demand (kVA)	354.91	kVA
Spare Capacity	120%	
<b>Total Demand (kVA)</b>	<b>425.89</b>	<b>kVA</b>
Current	409.82	A
Transformer Size	500	kVA



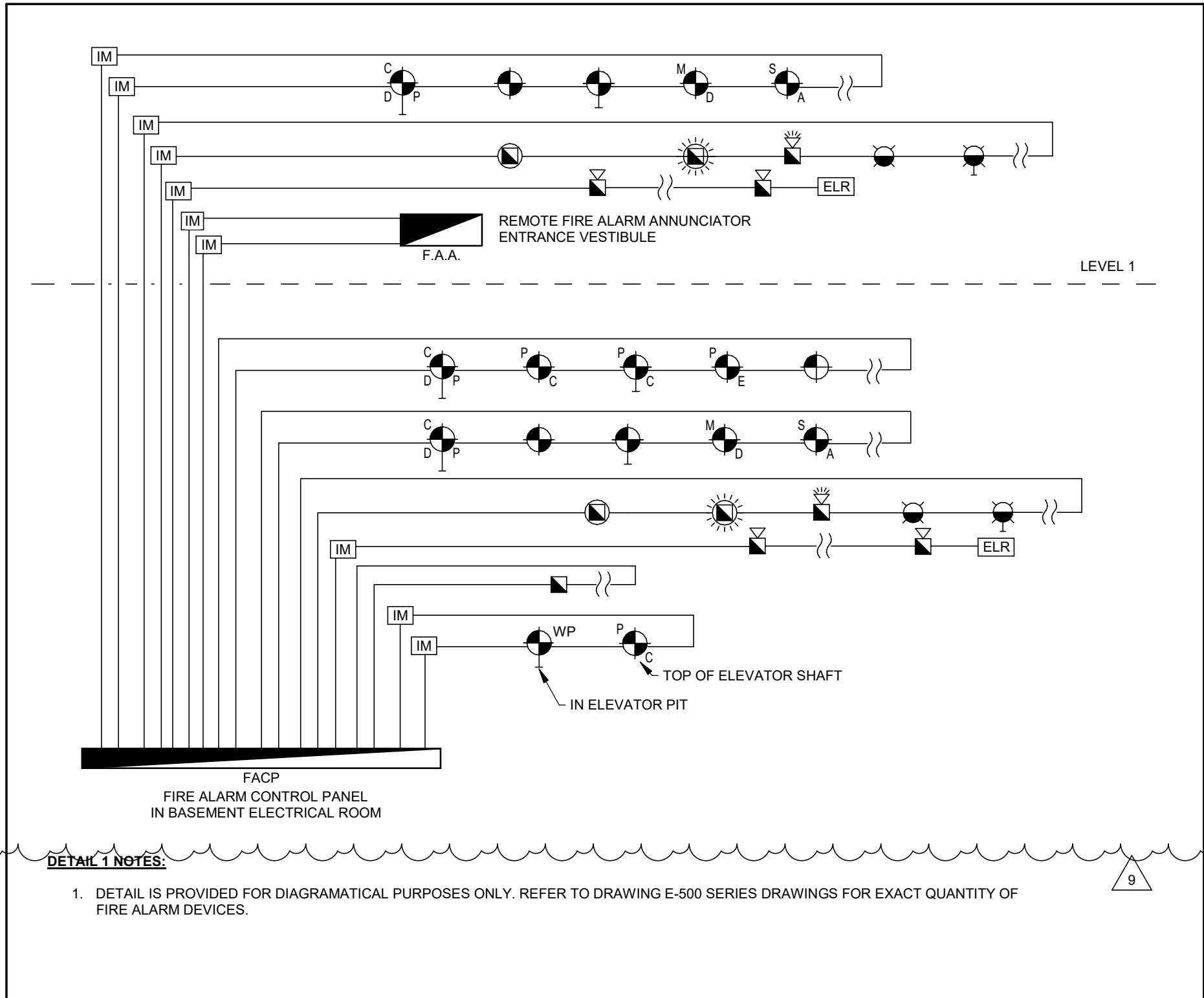
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1/2"  
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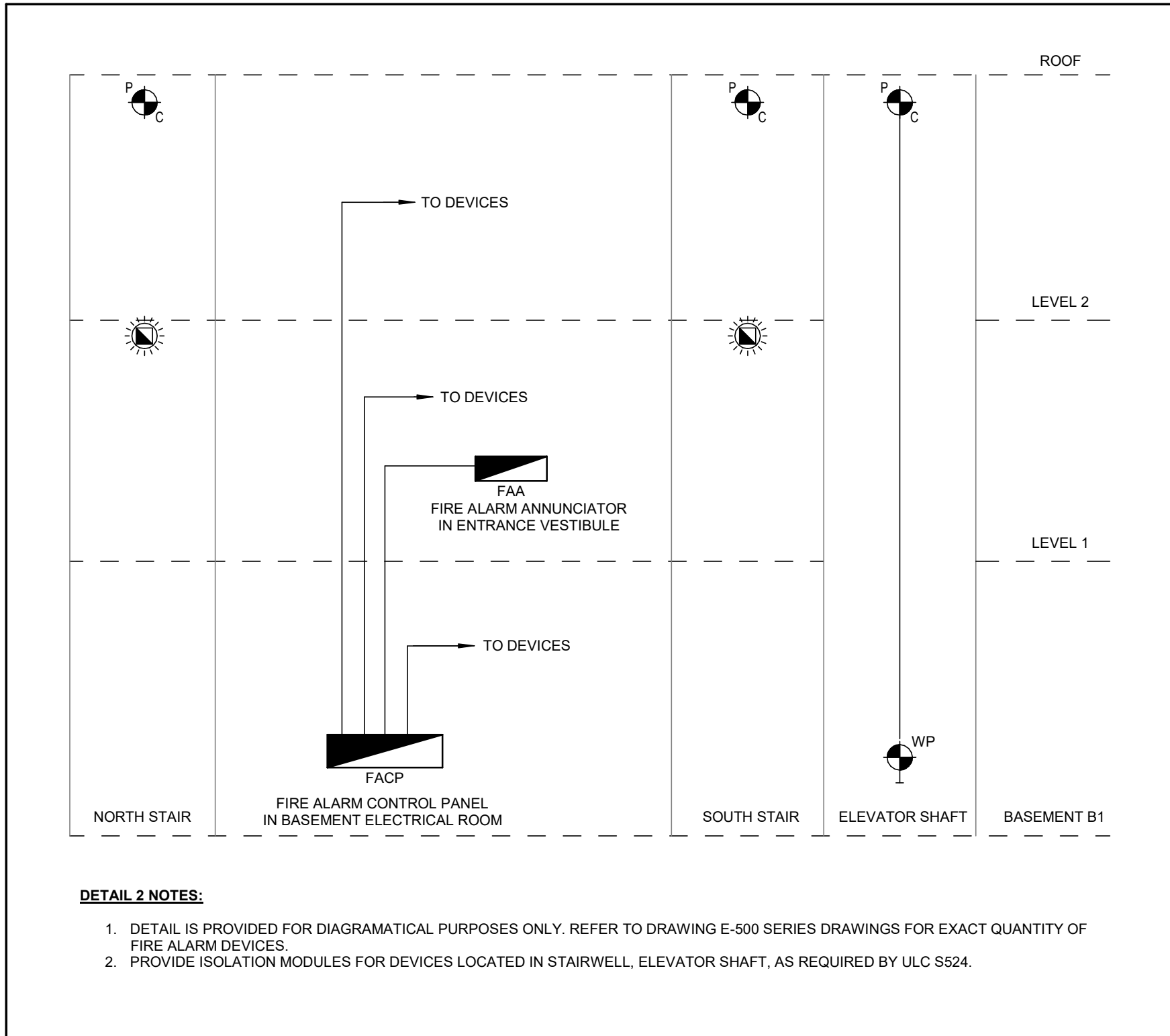
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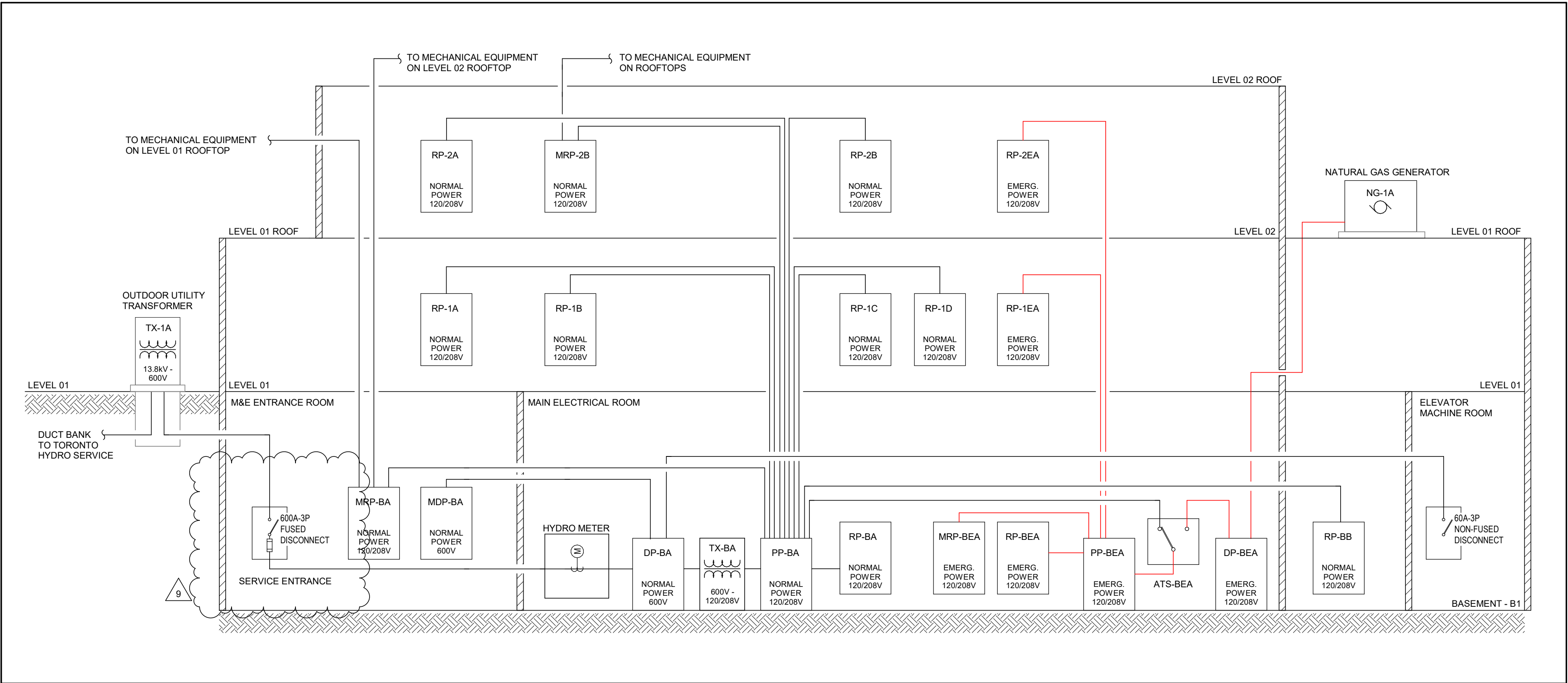
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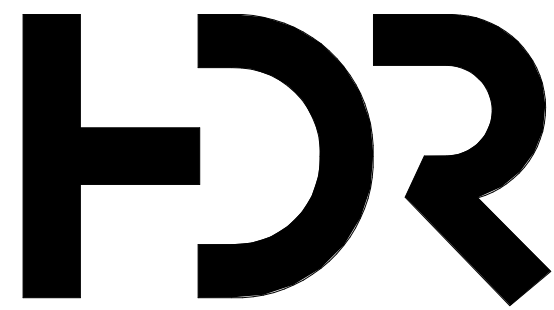
1 PARTIAL FIRE ALARM WIRING DIAGRAM  
E-702 1:1



2 FIRE ALARM RISER DIAGRAM  
E-702 1:1



3 POWER DISTRIBUTION RISER DIAGRAMS - NORMAL AND EMERGENCY POWER  
E-702 1:1



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WSP Project No. 221-11662-00

WTCHS  
West Toronto  
Community HC

209 Mavety St,  
Toronto, ON M6P 2M1  
Canada

Project Manager	DG
Project Designer	JL
Project Architect	HDR
Landscape Architect	
Civil Engineer	WSP
Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	HDR
Interior Designer	HDR
Equipment Planner	
Wayfinding	

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2022-12-16	ISSUED FOR MOH STAGE 3.1
2	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
3	2023-07-05	ISSUED FOR MOH STAGE 3.2
4	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
5	2024-02-12	ISSUED FOR MOH STAGE 3.3
6	2024-03-22	ISSUED FOR PERMIT
7	2024-09-17	ISSUED FOR ESA
8	2024-09-13	ISSUED FOR TENDER
9	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

ELECTRICAL RISERS -  
SHEET 1

Sheet Number

E-702

Project Status

ISSUED FOR TENDER

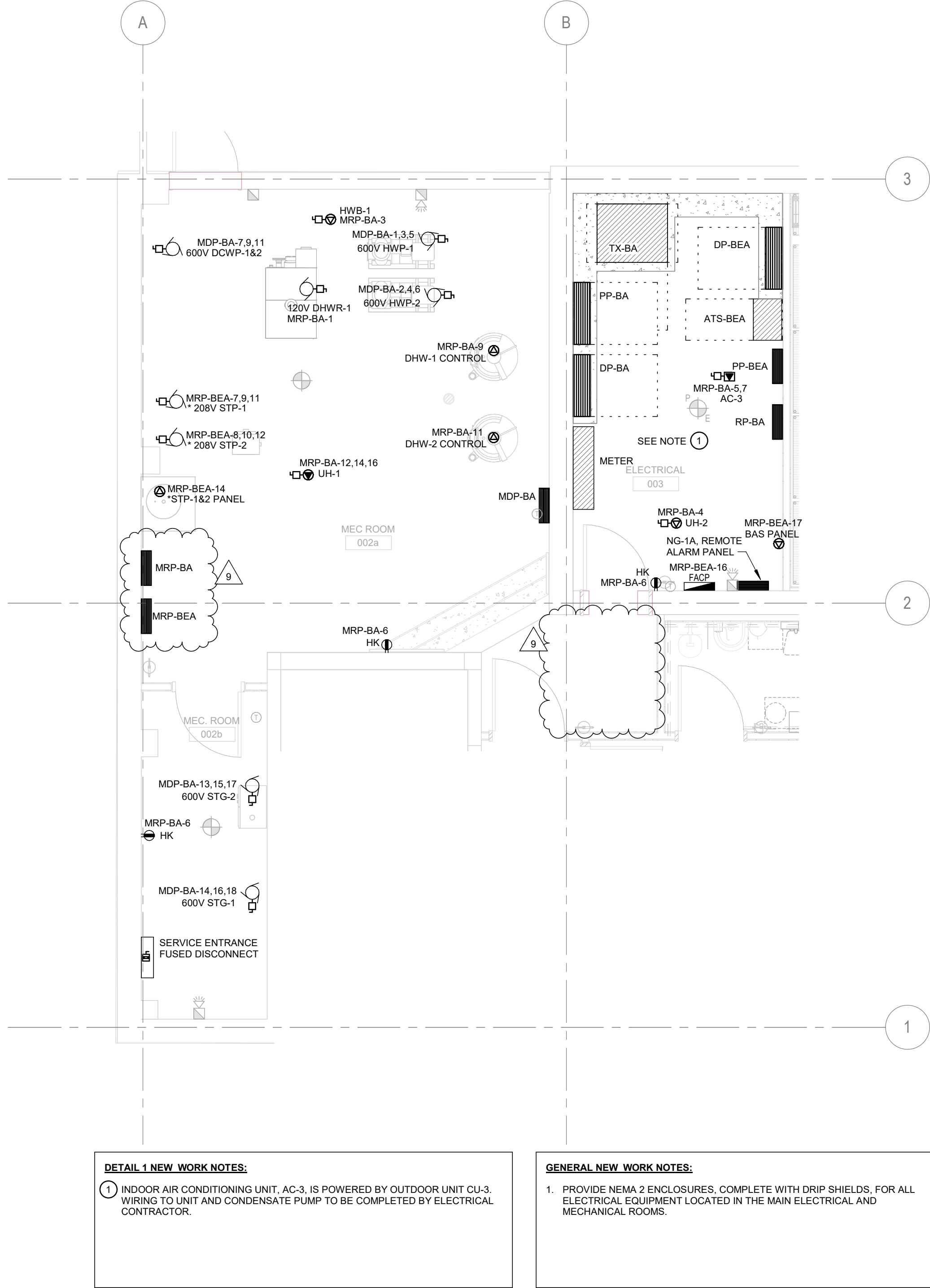
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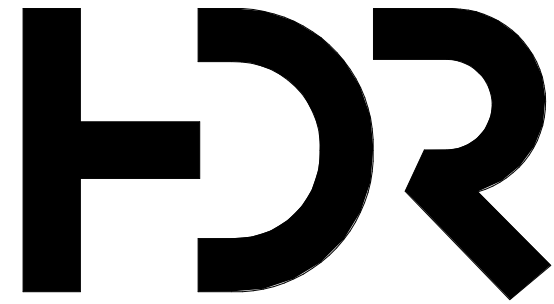
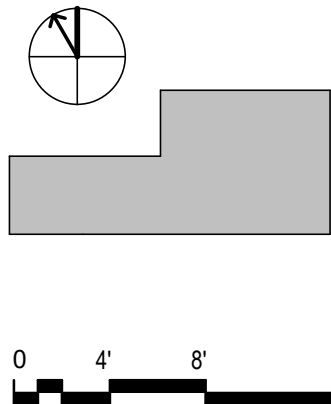
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**DETAIL 1 NEW WORK NOTES:**  
① INDOOR AIR CONDITIONING UNIT, AC-3, IS POWERED BY OUTDOOR UNIT CU-3. WIRING TO UNIT AND CONDENSATE PUMP TO BE COMPLETED BY ELECTRICAL CONTRACTOR.

**GENERAL NEW WORK NOTES:**  
1. PROVIDE NEMA 2 ENCLOSURES, COMPLETE WITH DRIP SHIELDS, FOR ALL ELECTRICAL EQUIPMENT LOCATED IN THE MAIN ELECTRICAL AND MECHANICAL ROOMS.

**1 BASEMENT - MAIN MECHANICAL & ELECTRICAL ROOMS**  
E-801 1:50



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Markham, Ontario, L3T 7Z3 Canada

WSP Project No. 221-11662-00

## WTCHS West Toronto Community HC

209 Mavety St,  
Toronto, ON M6P 2M1  
Canada

Project Manager	DG
Project Designer	JL
Project Architect	HDR
Landscape Architect	
Civil Engineer	WSP
Structural Engineer	WSP
Mechanical Engineer	WSP
Electrical Engineer	WSP
Plumbing Engineer	WSP
Interior Designer	HDR
Equipment Planner	HDR
Wayfinding	

Sheet Reviewer	NM
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MARK	DATE	DESCRIPTION
1	2023-05-05	ISSUED FOR STAGE 3.2 COSTING
2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-04	RE-ISSUED FOR PERMIT
7	2024-09-17	ISSUED FOR ESA
8	2024-09-13	ISSUED FOR TENDER
9	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

ENLARGED PLANS -  
ELECTRICAL

Sheet Number

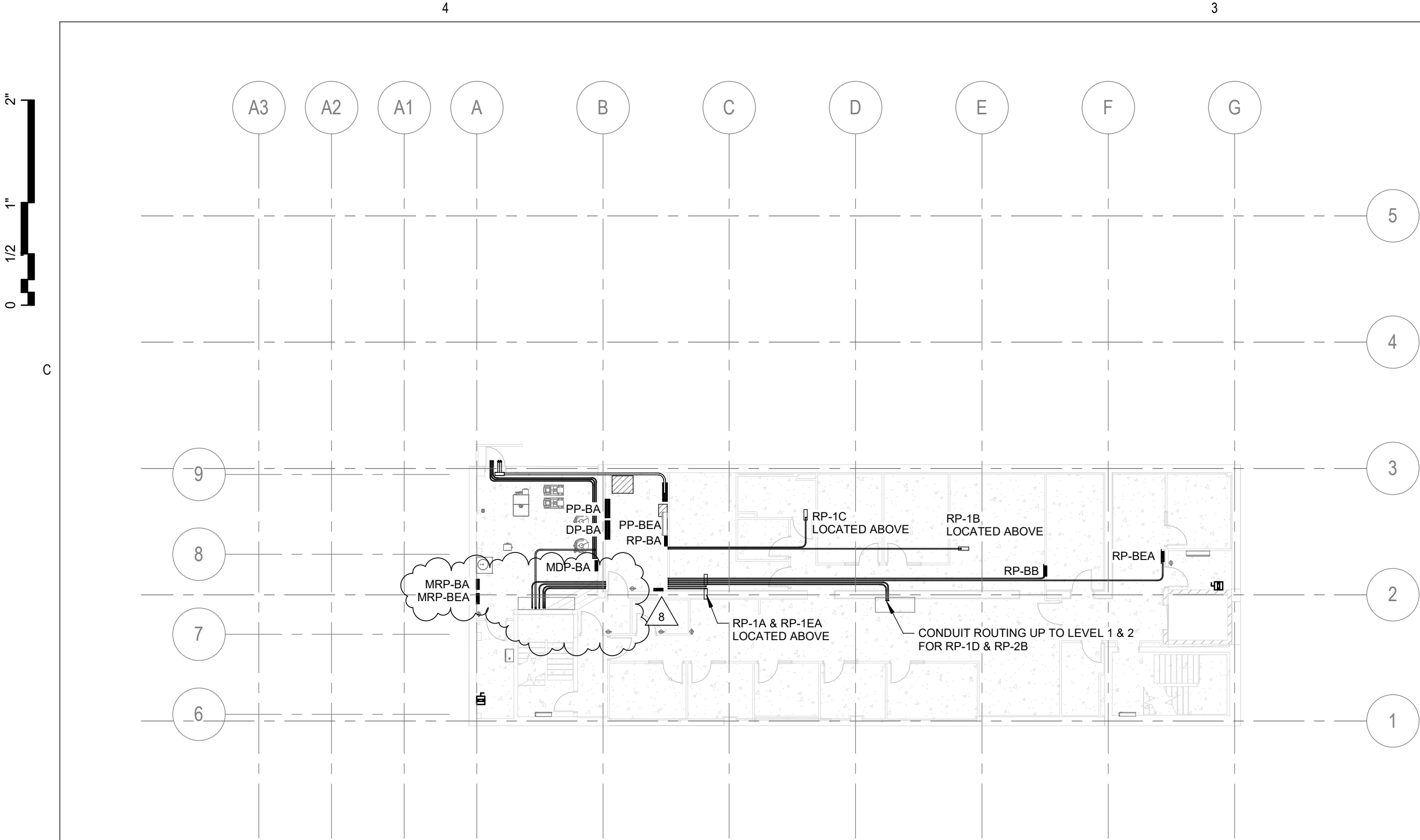
E-801

Project Status

ISSUED FOR TENDER

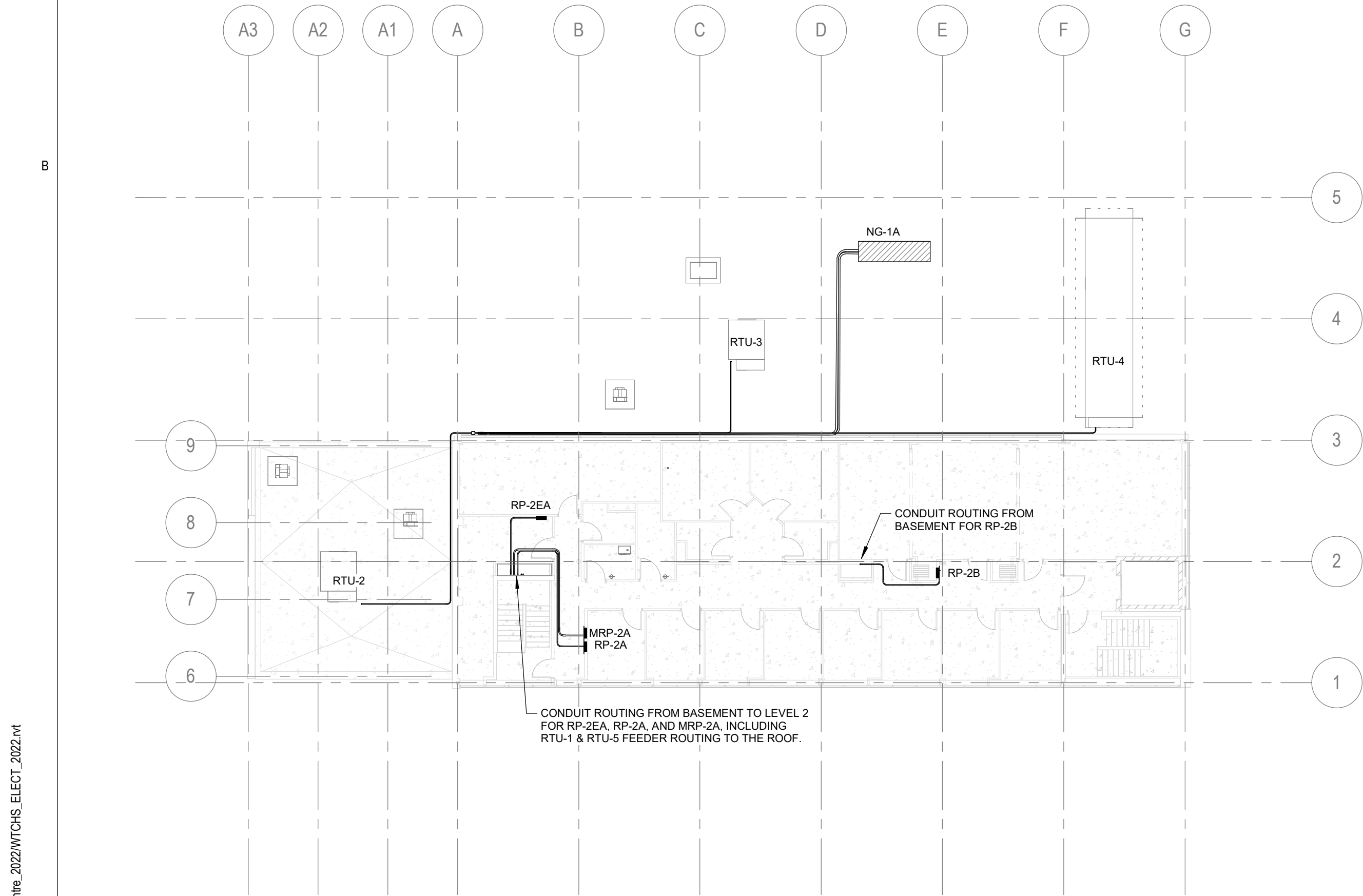


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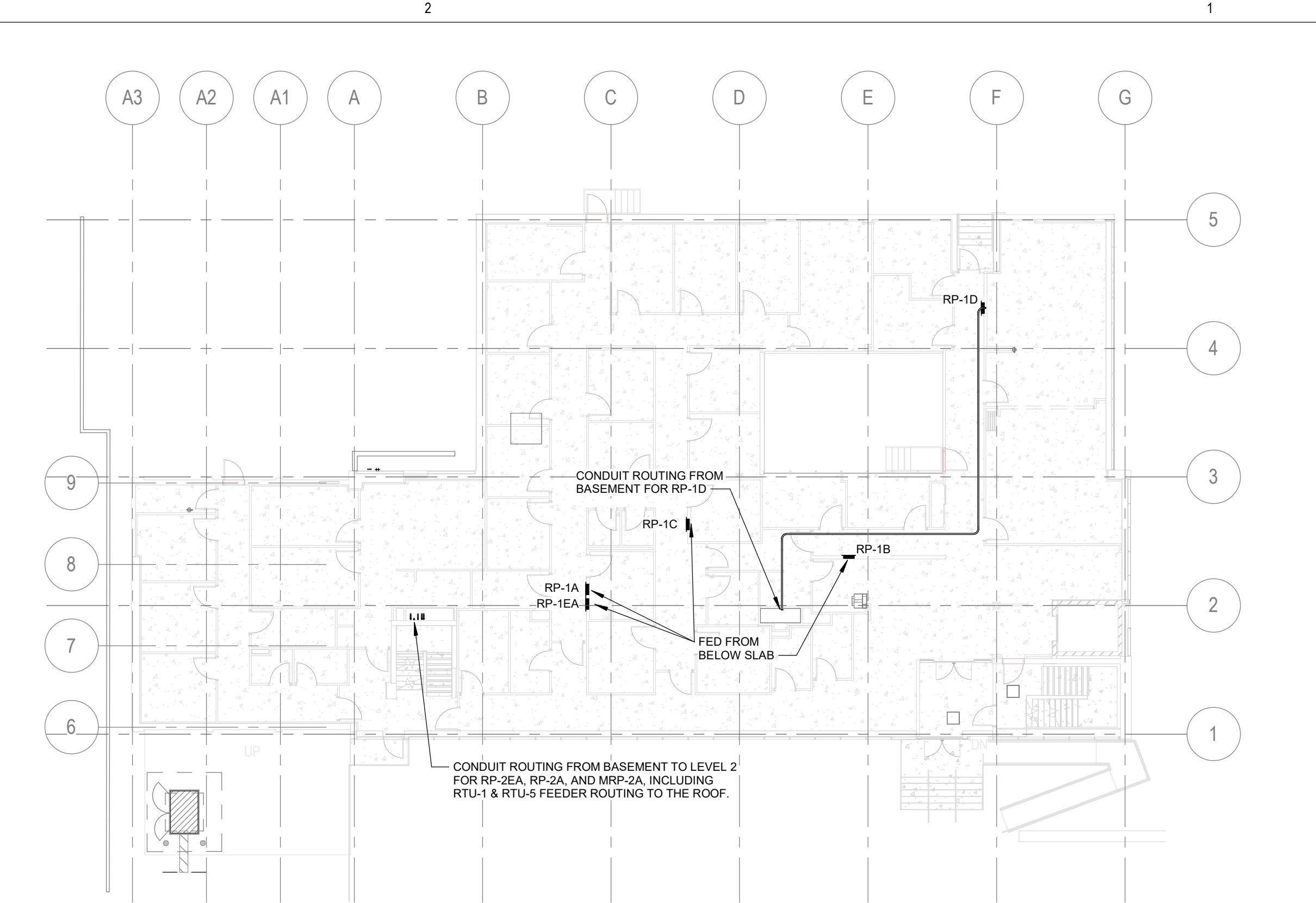
1 LEVEL BASEMENT - FEEDER ROUTING

E-802 1:200



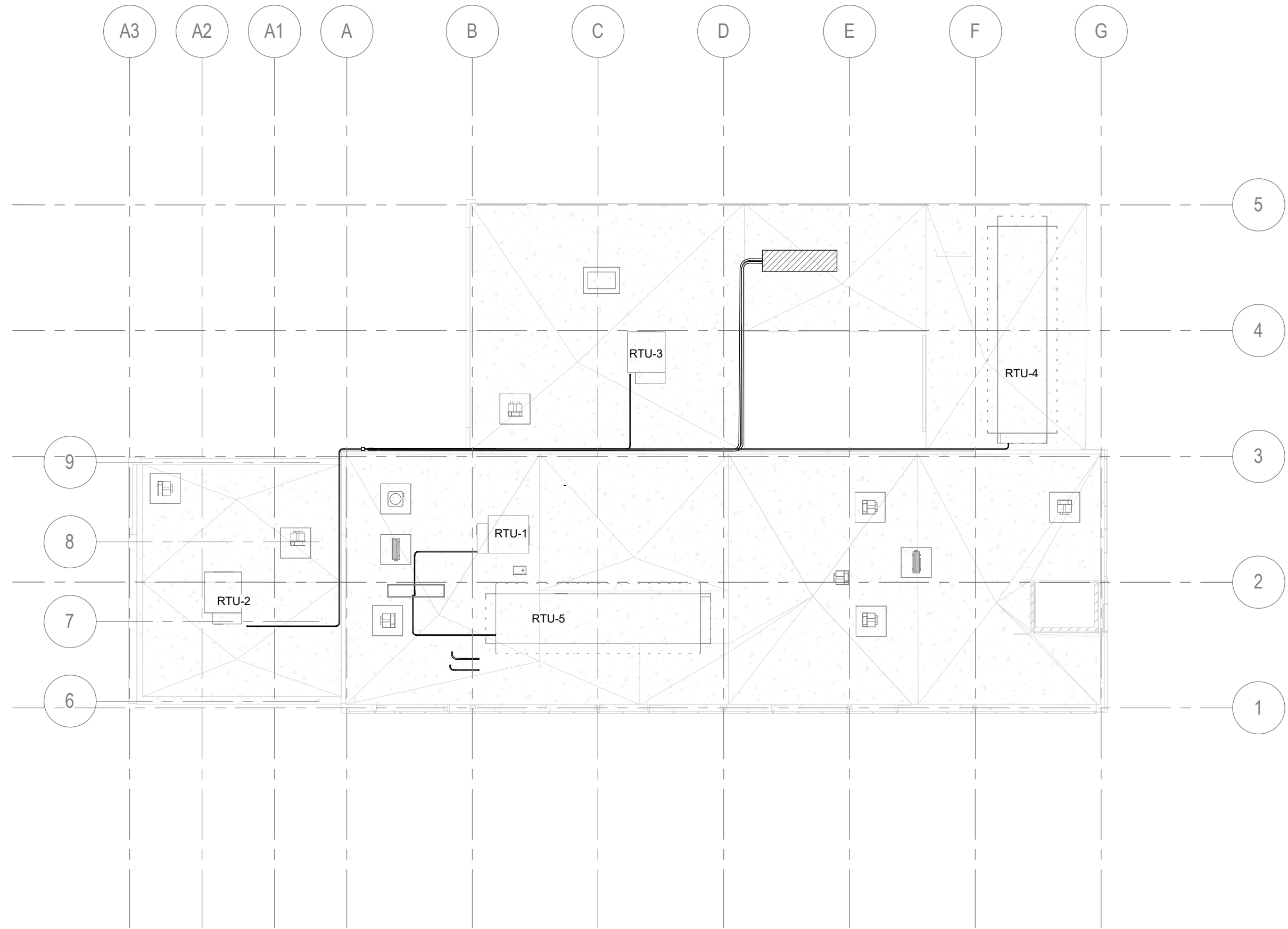
3 LEVEL 02 - FEEDER ROUTING

E-802 1:200



2 LEVEL 01 - FEEDER ROUTING

E-802 1:200

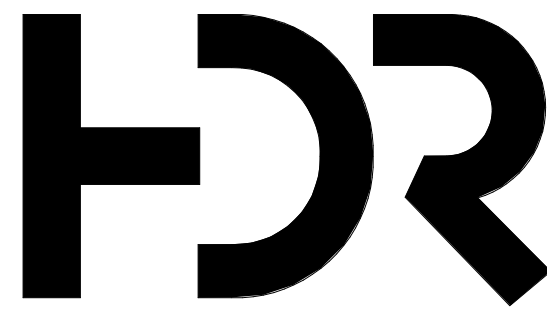
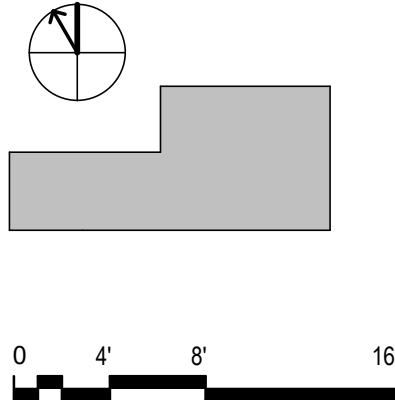


4 ROOF - FEEDER ROUTING

E-802 1:200

**DETAIL 1 GENERAL NEW WORK NOTES:**  
1. SCAN EXISTING SLAB AND CONFIRM LOCATION OF PROPOSED CORE PENETRATION WITH STRUCTURAL ENGINEER PRIOR TO CORING.

**GENERAL NEW WORK NOTES:**  
1. PROPOSED ROUTING IS FOR DIAGRAMMATICAL PURPOSES ONLY. ALL CONDUITS AND ROUTING TO BE COORDINATED WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.  
2. MAIN CONDUITS TO BE INSTALLED PRIOR TO MECHANICAL DUCTWORK AND SERVICES ARE INSTALLED. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR TO ENSURE ACCESS TO JUNCTION BOXES IS MAINTAINED UPON COMPLETION OF MECHANICAL INSTALLATION.



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2	2023-07-05	ISSUED FOR MOH STAGE 3.2
3	2023-11-24	ISSUED FOR STAGE 3.3 COSTING
4	2024-02-12	ISSUED FOR MOH STAGE 3.3
5	2024-03-22	ISSUED FOR PERMIT
6	2024-09-17	ISSUED FOR ESA
7	2024-09-13	ISSUED FOR TENDER
8	2024-10-07	ISSUED FOR ADD-E01

Project Number	10355669
Original Issue	07/08/22

Sheet Name

FEEDER ROUTING  
PLANS

Sheet Number

E-802

Project Status

ISSUED FOR TENDER



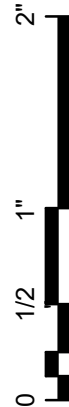


PANEL 'PP-BEA'													
NORMAL POWER													
LOCATION: ELECTRICAL 003				VOLTAGE: 208V/3Ø/4W		BUS MATERIAL: COPPER				ISOLATED GROUND: <input type="checkbox"/>			
FED FROM: ATS-BEA				PHASE: 3Ø		MAINS TYPE: MAIN BREAKER				100% RATED: <input type="checkbox"/>			
FEEDERS: REFER TO SLD				WIRES: 4W		MAIN BREAKER: 200 A							
MOUNTING: SURFACE				MAINS RATING: 225 A		SUB-FEED LUGS: <input type="checkbox"/>							
ENCLOSURE: NEMA 2				KAIC RATING: 25 kA		FEED-THROUGH LUGS: <input type="checkbox"/>							
CCT No.	LOAD DESCRIPTION			NOTE	POLES	RATING	LOAD (VA)	LOAD (VA)	RATING	POLES	NOTE	LOAD DESCRIPTION	CCT No.
1	RP-BEA				3	60 A	6314	3062	60 A	3		MRP-BEA	2
3													
5													
7	RP-1EA				3	60 A	1340	11480	100 A	3		RP-2EA	8
9													
11													
13													12
15													14
17													16
19													18
21													20
23													22
25													24
27													26
29													28
													30
LOAD CLASSIFICATION		CONNECTED LOAD (VA)		DEMAND FACTOR (%)		ESTIMATED DEMAND (VA)		PANEL TOTALS					
LIGHTING		1250 VA		90.00%		1125 VA		LOAD		ESTIMATED DEMAND (VA)		CURRENT (A)	
MISC.		2750 VA		70.00%		1925 VA		TOTAL		12662 VA		35 A	
MOTOR		5436 VA		60.00%		3262 VA		AVAILABLE		44981 VA		125 A	
OTHER		540 VA		100.00%		540 VA							
RECEPTACLE		11100 VA		50.00%		5550 VA							
POWER		100 VA		50.00%		50 VA							
MECH EQUIP.		300 VA		70.00%		210 VA							
** AVAILABLE CURRENT IS CALCULATED ASSUMING 80% RATED EQUIPMENT**													
NOTES:													

PANEL 'PP-BA'													
NORMAL POWER													
LOCATION: ELECTRICAL 003				VOLTAGE: 208V/3Ø/4W		BUS MATERIAL: COPPER				ISOLATED GROUND: <input type="checkbox"/>			
FED FROM: TX-BA				PHASE: 3Ø		MAINS TYPE: MAIN BREAKER				100% RATED: <input type="checkbox"/>			
FEEDERS: REFER TO SLD				WIRES: 4W		MAIN BREAKER: 600 A							
MOUNTING: SURFACE				MAINS RATING: 600 A		SUB-FEED LUGS: <input type="checkbox"/>							
ENCLOSURE: NEMA 2				KAIC RATING: 25 kA		FEED-THROUGH LUGS: <input type="checkbox"/>							
CCT No.	LOAD DESCRIPTION	NOTE	POLES	RATING	LOAD (VA)	LOAD (VA)	RATING	POLES	NOTE	LOAD DESCRIPTION	CCT No.		
1											2		
3	RP-BA		3	60 A	14537	19250	60 A	3		MRP-BA	4		
5											6		
7											8		
9	RP-BB		3	60 A	18345	32586	100 A	3		RP-1A	10		
11											12		
13											14		
15	RP-1C		3	60 A	22577	19952	60 A	3		RP-1B	16		
17											18		
19											20		
21	RP-1D		3	100 A	48789	16024	60 A	3		RP-2A	22		
23											24		
25											26		
27	RP-2B		3	60 A	11898	36757	100 A	3		MRP-2A	28		
29											30		
31											32		
33	ATS-BEA		3	200 A	22196						34		
35											36		
37											38		
39	SPACE	--	3	--	--	--	--	3	--	SPACE	40		
41											42		
LOAD CLASSIFICATION						CONNECTED LOAD (VA)		DEMAND FACTOR (%)		ESTIMATED DEMAND (VA)		PANEL TOTALS	
LIGHTING						14031 VA		90.00%		12628 VA		LOAD	
MISC.						24444 VA		70.00%		17111 VA		ESTIMATED DEMAND (VA)	
MOTOR						25715 VA		60.00%		15429 VA		CURRENT (A)	
OTHER						3590 VA		100.00%		3590 VA		TOTAL	
RECEPTACLE						129270 VA		50.00%		64635 VA		148733 VA	
POWER						6600 VA		50.00%		3300 VA		413 A	
MECH EQUIP.						1800 VA		70.00%		1260 VA		AVAILABLE	
KITCHEN						32641 VA		50.00%		16320 VA		24194 VA	

PANEL 'MDP-BA'													
NORMAL POWER													
LOCATION: MEC ROOM 002a				VOLTAGE: 600V/3Ø/4W		BUS MATERIAL: COPPER				ISOLATED GROUND: <input type="checkbox"/>			
FED FROM: DP-BA				PHASE: 3Ø		MAINS TYPE: MAIN LUGS ONLY				100% RATED: <input type="checkbox"/>			
FEEDERS: REFER TO SLD				WIRES: 4W		MAIN BREAKER:...							
MOUNTING: SURFACE				MAINS RATING: 400 A		SUB-FEED LUGS: <input type="checkbox"/>							
ENCLOSURE: NEMA 2				KAIC RATING: 35 kA		FEED-THROUGH LUGS: <input type="checkbox"/>							
CCT No.	LOAD DESCRIPTION	NOTE	POLES	RATING	LOAD (VA)	LOAD (VA)	RATING	POLES	NOTE	LOAD DESCRIPTION	CCT No.		
1											2		
3	HWP-1 (1-1/2 HP) - MEC. ROOM 002A		3	15 A	904	904	15 A	3		HWP-2 (1-1/2 HP) - MEC. ROOM 002A	4		
5							--	--	1	SPACE	6		
7							--	--	1	SPACE	8		
9	DCWP-1 (5 HP) - MEC. ROOM 002A		3	15 A	3731		--	--	1	SPACE	10		
11							--	--	1	SPACE	12		
13											14		
15	STG-1 (12 KW) - MEC. ROOM 002B		3	25 A	12003	12003	30 A	3		STG-2 (12 KW) - MEC. ROOM 002B	16		
17											18		
19											20		
21	RTU-1 - L2 ROOF		3	30 A	22312	22312	30 A	3		RTU-2 - L1 ROOF	22		
23											24		
25											26		
27	RTU-3 - L1 ROOF		3	30 A	22312	62073	70 A	3		RTU-4 - L1 ROOF	28		
29											30		
31											32		
33	RTU-5 - L2 ROOF		3	70 A	64952	12000	25 A	3		STG-/HUM-3 (12 KW) - L1 ROOF (AHU-3)	34		
35											36		
37											38		
39	STGHUM-4 (21 KW) - L1 ROOF (AHU-4)		3	30 A	21003	21003	30 A	3		STGHUM-5 (21 KW) - L2 ROOF (AHU-5)	40		
41											42		
43											44		
45											46		
47											48		
49											50		
51											52		
53											54		
55											56		
57											58		
59											60		
61											62		
63	SPACE	--	3	--	--	--	--	3	--	SPACE	64		
65											66		
LOAD CLASSIFICATION						PANEL TOTALS							
CONNECTED LOAD (VA)		DEMAND FACTOR (%)		ESTIMATED DEMAND (VA)		LOAD		ESTIMATED DEMAND (VA)		CURRENT (A)			
MOTOR		277513 VA		60.00%		166508 VA		TOTAL		166508 VA			
								AVAILABLE		82907 VA			
										160 A			





PANEL 'MRP-BA'																	
NORMAL POWER																	
LOCATION: MEC ROOM 002a					VOLTAGE: 208V/3Ø/4W		BUS MATERIAL: COPPER			ISOLATED GROUND: <input type="checkbox"/>							
FED FROM: PP-BA					PHASE: 3Ø		MAINS TYPE: MAIN BREAKER			100% RATED: <input type="checkbox"/>							
FEEDERS: REFER TO SLD					WIRES: 4W		MAIN BREAKER: 60 A										
MOUNTING: SURFACE					MAINS RATING: 100 A		SUB-FEED LUGS: <input type="checkbox"/>										
ENCLOSURE: NEMA 2					KAIC RATING: 25 kA		FEED-THROUGH LUGS: <input type="checkbox"/>										
CCT No.	LOAD DESCRIPTION				NOTE	POLES	RATING	LOAD (VA)		LOAD (VA)	RATING	POLES	NOTE	LOAD DESCRIPTION	CCT No.		
1	DHWR-1 - MEC. ROOM - 002a					1	15 A	600							2		
3	HWB-1 - MEC. ROOM - 002a					1	20 A	750		800	15 A	1		UH-2 - MEC. ROOM - 002a	4		
5	AC-3 - ELEC. ROOM - 003					2	15 A	600		900	15 A	1		HK RECEPTACLES (3)	6		
7															8		
9	DWH-1 CONTROL - MEC. ROOM - 002a					1	15 A	150		8000	50 A	2		CUH-3 - EXIT STAIR - 031	10		
11	DWH-2 CONTROL - MEC. ROOM - 002a					1	15 A	150							12		
13										7500	45 A	3		UH-1 - MEC ROOM 002A	14		
15															16		
17															18		
19															20		
21															22		
23															24		
25															26		
27															28		
29															30		
31															32		
33															34		
35															36		
37	SPACE				--	1	--	--		--	--	1	--	SPACE	38		
39	SPACE				--	1	--	--		--	--	1	--	SPACE	40		
41	SPACE				--	1	--	--		--	--	1	--	SPACE	42		
LOAD CLASSIFICATION									PANEL TOTALS								
CONNECTED LOAD (VA)					DEMAND FACTOR (%)		ESTIMATED DEMAND (VA)		LOAD		ESTIMATED DEMAND (VA)		CURRENT (A)				
MISC.					1350 VA		70.00%		945 VA		TOTAL		11625 VA		32 A		
MOTOR					600 VA		60.00%		360 VA		AVAILABLE		5668 VA		16 A		
RECEPTACLE					900 VA		50.00%		450 VA								
MECH EQUIP.					300 VA		70.00%		210 VA								



C

PANEL 'RP-BA'														
NORMAL POWER														
LOCATION: ELECTRICAL 003			VOLTAGE: 208V/3Ø/4W			BUS MATERIAL: COPPER			ISOLATED GROUND: <input type="checkbox"/>					
FED FROM: PP-BA			PHASE: 3Ø			MAINS TYPE: MAIN BREAKER			100% RATED: <input type="checkbox"/>					
FEEDERS: REFER TO SLD			WIRES: 4W			MAIN BREAKER: 60 A								
MOUNTING: SURFACE			MAINS RATING: 100 A			SUB-FEED LUGS: <input type="checkbox"/>								
ENCLOSURE: NEMA 2			KAIC RATING: 25 kA			FEED-THROUGH LUGS: <input type="checkbox"/>								
CCT No.	LOAD DESCRIPTION	NOTE	POLES	RATING	LOAD (VA)	LOAD (VA)	RATING	POLES	NOTE	LOAD DESCRIPTION	CCT No.			
1	LIGHTING		1	20 A	573	420	20 A	1		LIGHTING	2			
3	LIGHTING		1	20 A	419	325	15 A	1		LIGHTING HSK 005	4			
5	Rm 029, 030 - Offices - Workstation Quad (2)		1	15 A	600	400	15 A	1		Rm 033 - Offices - Misc. Recept (2)	6			
7	Rm 030 - Offices - Misc. Recept (3)		1	15 A	500	300	15 A	1		Rm 033 - Offices - Workstation Quad (1)	8			
9	Rm 029 - Offices - Misc. Recept (2)		1	15 A	300	600	15 A	1		Rm 034 - Offices - Workstation Quad (2)	10			
11	Rm 027, 028 - Offices - Workstation Quad (2)		1	15 A	600	800	15 A	1		Rm 034 - Offices - Misc. Recept (4)	12			
13	Rm 027, 028 - Offices - Misc. Recept (4)		1	15 A	600	600	15 A	1		Rm 07 - Copy - Recept (3)	14			
15	Rm 026 - Offices - Workstation Quad (2)		1	15 A	300	900	15 A	1		Rm 06 - Survey (3)	16			
17	Rm 026 - Offices - Misc. Recept (2)		1	15 A	400	1000	15 A	1		Rm 06 - Dishwater (1)	18			
19	Rm 023.004 - ADO (2)		1	15 A	500	600	15 A	1		Rm 06 - Fridge (1)	20			
21	Corridor - Mech. Controls		1	15 A	300	300	15 A	1		Rm 005, 023 - GFI Recept. (2)	22			
23						1500	15 A	1		Corridor - HSKP (4)	24			
25						600	15 A	1		Rm 024, 025 - Offices - Workstation Quad (2)	26			
27						700	15 A	1		Rm 024,025 - Offices - Misc. Recept (5)	28			
29						400	15 A	1		Rm 024, 025 - Offices - Printer/Scanners (2)	30			
31											32			
33	SPARE	--	1	15 A	--	--	15 A	1	--	SPARE	34			
35	SPARE	--	1	15 A	--	--	15 A	1	--	SPARE	36			
37	SPACE	--	1	--	--	--	--	1	--	SPACE	38			
39	SPACE	--	1	--	--	--	--	1	--	SPACE	40			
41	SPACE	--	1	--	--	--	--	1	--	SPACE	42			
LOAD CLASSIFICATION					CONNECTED LOAD (VA)	DEMAND FACTOR (%)	ESTIMATED DEMAND (VA)		PANEL TOTALS					
LIGHTING					1737 VA	90.00%	1563 VA		LOAD	ESTIMATED DEMAND (VA)		CURRENT (A)		
MISC.					0 VA	0.00%	0 VA		TOTAL	8023 VA		22 A		
RECEPTACLE					12000 VA	50.00%	6000 VA		AVAILABLE	9269 VA		26 A		
POWER					500 VA	50.00%	250 VA							
MECH EQUIP.					300 VA	70.00%	210 VA							
									** AVAILABLE CURRENT IS CALCULATED ASSUMING 80% RATED EQUIPMENT**					
NOTES:														



PANEL 'RP-BEA'													
NORMAL POWER													
LOCATION: PUBLIC CORRIDOR 018				VOLTAGE: 208V/3Ø/4W				BUS MATERIAL: COPPER				ISOLATED GROUND: <input type="checkbox"/>	
FED FROM: PP-BEA				PHASE: 3Ø				MAINS TYPE: MAIN BREAKER				100% RATED: <input type="checkbox"/>	
FEEDERS: REFER TO SLD				WIRES: 4W				MAIN BREAKER: 60 A					
MOUNTING: RECESSED				MAINS RATING: 100 A				SUB-FEED LUGS: <input type="checkbox"/>					
ENCLOSURE: NEMA 2				KAIC RATING: 22 kA				FEED-THROUGH LUGS: <input type="checkbox"/>					
CCT No.	LOAD DESCRIPTION	NOTE	POLES	RATING	LOAD (VA)	LOAD (VA)	RATING	POLES	NOTE	LOAD DESCRIPTION	CCT No.		
1											2		
3	Rm. 020 - ELEVATOR SUMP PUMP, ESP-3		3	15 A	1657	1657	15 A	3		Rm. 020 - ELEVATOR SUMP PUMP, ESP-4	4		
5											6		
7	Rm. 020 - ELEVATOR SUMP PUMP PANEL, ESP-3/4		1	15 A	150	150	15 A	1			8		
9	Rm. 020 - ELEVATOR AC-2		2	15 A	2400	300	15 A	1		RM 016, 017, 018 - FSD(5)	10		
11											12		
13											14		
15											16		
17											18		
19											20		
21											22		
23											24		
25											26		
27											28		
29											30		
LOAD CLASSIFICATION						CONNECTED LOAD (VA)		DEMAND FACTOR (%)		ESTIMATED DEMAND (VA)		PANEL TOTALS	
MISC.						2550 VA		70.00%		1785 VA		LOAD	
MOTOR						3314 VA		60.00%		1989 VA		ESTIMATED DEMAND (VA)	
OTHER						300 VA		100.00%		300 VA		CURRENT (A)	
MECH EQUIP.						150 VA		70.00%		105 VA		TOTAL	
												4179 VA	
												AVAILABLE	
												13114 VA	