

ADDENDUM #1

Project	Holy Family Catholic Elementary School	Project No.	2325
Location	1420 Grosvenor Street, Oakville, ON	Date of Issue	2024 03 28
Owner	Halton Catholic District School Board	File	2325/7.1.3

This Addendum forms part of the Contract Documents and amends the original Drawings and Specifications, dated 2024 03 26, and all preceding Addenda, as noted below.

Ensure all parties submitting bids are aware of all items included in this Addendum. Read, interpret and coordinate the items contained herein with the Contract Documents and include all related costs as part of the Bid Price. Acknowledge receipt of this Addendum by inserting its number on the Bid Form. Failure to do so may subject the bidder to disqualification.

This Consultant Addendum consists of 2 page + noted attachments.

A1-1 ELECTRICAL SPECIFICATIONS

- .1 Refer to the attached Electrical Specifications, dated March 28, 2024 prepared by DEI Consulting Engineers.

A1-2 ELECTRICAL DRAWINGS

- .1 Refer to the attached Electrical Drawings, dated March 28, 2024 prepared by DEI Consulting Engineers.

A1-3 BIDDER QUESTIONS

- .1 Q: Locker Spec 2.6.1 calls for 4H hardness rating to ASTM D3363. Note, this additional hardness property comes at a premium cost, even much higher if replacements are required after warranty period. Please advise if the standard powder paint formulation is acceptable?

A: Finish is a requirement by school board. Please include as per spec.

- .2 Q: Locker spec 2.6.1 calls for colours as selected by consultant. Please advise if colour are selected from manufacturers standard colours? Note, custom colours come at a premium cost and is not advise as cost will be much high if replacements are required after warranty period.

A: Provide 4 colour choices from the standard colour options.

- .3 Q: It looks like there are no existing lockers to be removed and disposed. Is this correct?

A: Yes, there are no existing lockers.

- .4 Q: Locker spec 2.2.1 calls for single tier lockers. However, elevation details 2/A100 shows double tier. Please confirm which tier of locker is required

A: Provide double tier locker design as shown in drawings; 305mm wide, 1830mm high, 380mm deep; ventilated; complete with finished metal end panels, fillers and jamb trim.

.5 Q: Locker elevation detail 2/A100 calls for 4 inch rise slope tops. Note - GSS/Dasco lockers that are 15 inch deep come with a 5 inch rise slope top. Is this acceptable?

A: Yes, this is acceptable.

.6 Q: Do hooks have to be provided in the change rooms?

A: Yes, SC01 to provide and install breakaway hooks above bleachers in boys and girls change rooms.

END OF ADDENDUM #1

Division 26 Common Requirements for Electrical

26 00 11	Electrical Specification Index
	Common Contract Requirements for Electrical
26 01 13	Electrical Supplemental Tender Form
26 01 15	Electrical Allowances and Fees
26 01 16	Electrical Contract General Requirements
26 01 17	Demolition and Renovation
26 01 20	Commissioning and Integrated Testing of Life Safety and Fire Protection System
	Common Work Results for Electrical
26 05 19	Wires and Cables
26 05 20	Splitters, Junction, and Pull Boxes
26 05 21	Outlet Boxes, Conduit Boxes and Fittings
26 05 22	Wire and Box Connectors – 0 –1000 V
26 05 26	Grounding Secondary
26 05 33	Conduits, Conduit Fastenings and Conduit Fittings
26 05 75	Auxiliary Systems
	Switchboard and Panelboards
26 24 16	Panelboards
26 24 17	Moulded Case Circuit Breakers
	Low-Voltage Distribution Equipment
26 27 26	Wiring Devices
	Low-Voltage Circuit Protective Devices
26 28 16	Disconnect Switches
	Low-Voltage Controllers
26 29 13	Starters and Contactors
	Lighting
26 51 13	Lighting Equipment

Division 28 Electronic Safety and Security

	Fire Detection and Alarm
28 31 25	Fire Alarm System (Addressable)

END OF SECTION

Part 1 General

1.1 INSTRUCTIONS TO BIDDERS

- .1 The Electrical Supplemental Tender Form must be submitted to the architect and consultant (dei@deiassociates.ca) within 2 hours of tender closing. Electrical contractors shall identify all sub-contractors he/she intends to use and must complete all information requested. The requisite information shall be given at the office of the Consultant. Contractor shall sign and date this page and initial and date each page thereafter.

- .2 Should the Electrical Supplemental Form not be submitted then the contractor shall use Basis of Design manufacturers as listed.

- .3 CONTRACTOR
I/We certify that I/We have the authority to bind the company.

COMPANY NAME

AUTHORIZED SIGNATURE

ADDRESS

PRINTED SIGNATURE

CITY

TITLE

TELEPHONE NUMBER

DATE

FAX

CONTRACTOR'S NAME: _____ DATE: _____

.4 SUB-CONTRACTORS

The Contractor shall state below the name of the Public Address, Security, Co-ordination Study, Computer Network, Life Safety Systems Commissioning Agent Sub-contractor he intends to use, which shall not be changed without the consent of the Consultant.

Co-ordination Study _____

Life Safety Systems Commissioning Agent _____

- .5 The Stipulated Bid Sum shall be for the basis of design manufacturer or supplier equipment only, unless otherwise indicated. Where a choice of this equipment is given, this Contractor shall indicate the supplier or manufacturer he intends to use. Where no choice is indicated, the basis of design supplier or equipment shall be used.
- .6 Equipment or materials manufactured by firms named in the following listing only shall be deemed equal to the equipment or material specified, provided the equipment or material will have capacity, performance, rating, construction, physical dimensions, accessories and features which, in the opinion of the Consultant, are equal to those of the specified equipment or material. The Electrical Contractor shall not indicate equipment, materials or suppliers which are not listed.
- .7 Where modifications to the work of other trades are required as a result or part of the alternative offered, include the cost of said modifications in the work.
- .8 Submit the following list of basis of design and alternative suppliers in accordance with the bid requirements:

Spec. Reference Section	Equipment	Basis of Design	Acceptable Alternate Manufacturer	Indicate Manufacturer Or Supplier
26 29 13.13	Starters and Contactors	Schneider Electric	Allen Bradley Siemens Eaton Klockner-Moeller	
26 24 17	Molded Case Circuit Breakers	Schneider Electric	Siemens Eaton	
26 28 16	Disconnect Switches	Schneider Electric	Siemens Eaton	
26 24 16	Panelboards	Schneider Electric	Siemens Eaton	
26 28 13	Fuses – Low Voltage	Mersen	GEC Littlefuse	
26 51 13	LED Interior	Cooper	Lithonia	

CONTRACTOR'S NAME: _____ DATE: _____

			Visioneering Signify	
26 51 13	Emergency Battery Units	Aimlite	Lumacell Stanpro	
28 31 25	Fire Alarm System (Addressable)	Autocall 4007ES (Existing)		

.9 LABOUR RATES

.1 The following labour rates shall apply for calculating the cost of credit or extras on Change Notices. The rates shall include any employee benefits. The labour rates do not include overhead and profit.

Apprentice Electrician \$_____/hr
 Journeymen Electrician \$_____/hr

1.2 ELECTRICAL TENDER PRICE (EXCLUDING HST)

.1 Having carefully examined all Drawings and Specifications and the Addenda to the Drawings and Specifications, and having carefully examined the sites and all conditions affecting the work, we, the undersigned thereby offer to provide all plant, labour, materials and incidentals required to complete the work of all trades for: All the work specified for herein for

the Total Stipulated Price of: \$_____

 (in writing)

in lawful money of Canada; included in which are all applicable excise taxes, custom duties, freight, exchange, and all other charges. HST is not included.

END OF SECTION

CONTRACTOR'S NAME: _____ DATE: _____

Part 1 General

1.1 GENERAL INSTRUCTIONS

- .1 Comply with the General Conditions, Supplementary Conditions, and all of General Requirements, Mechanical and Electrical Divisions.

1.2 CASH ALLOWANCES (HST EXCLUDED)

- .1 Refer to CCDC 2 – 2020, GC 4.1 - CASH ALLOWANCES.
- .2 The Contract Price includes the allowances stated below, which allowances shall be expended as the Owner directs through the Consultant. The Consultant may direct the Contractor to bid work for which payment is made from an allowance.
- .3 The Contract Price, and not the cash allowances, includes the Contractor's overhead and profit in connection with such cash allowances.
- .4 Where the actual cost of the *Work* under any cash allowance is less than the amount of the allowance, the *Owner* shall be credited for the unexpended portion of the cash allowance, but not for the *Contractor's* overhead and profit on such amount.
- .5 The value of the work performed under a cash allowance is eligible to be included in progress payments.
- .6 Lighting Controls Cash Allowances (HST Excluded)
 - .1 The contractor shall include the following allowance for the supply of the lighting controls system, the installation including all labour and rough-in material (such as conduit, backboxes, cables, etc.) shall be included in the contract price:
*Allowance:
\$50,000.00

*This allowance includes initial distributor mark-up and purchase only for these fixtures. The installation of these fixtures must be included in the tender price.
- .7 Local Utility Cash Allowances (HST Excluded)
 - .1 This contractor shall be responsible to co-ordinate a servicing agreement and all associated work with the local utility.
 - .2 Provide a cash allowance of \$90,000 in the tender price for the work being performed by the local utility as noted on design drawings.
- .8 Replacement of main fused disconnect switch with breaker and branch breaker (HST Excluded)
 - .1 Provide a cash allowance of \$48,000 in the tender price for the work being performed by Schneider Services as noted on design drawings.

1.3 FEES

- .1 The contractor shall determine general inspection fees with Electrical Safety Authority and include as part of tender.
- .2 A submission has been made (if required by this scope of project) by the consultant to the Electrical Safety Authority for review of this project. The payment of the required review costs will be coordinated by the consultant. A copy of the Electrical Safety Authority review report will be forwarded to the successful contractor for information and action. Contractor will not be responsible for these review costs.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This Section covers items common to Electrical Divisions.**
- .2 This section supplements requirements of Division 1.
- .3 Furnish labour, materials, and equipment necessary for completion of work as described in contract documents.

1.2 INTENT

- .1 Mention herein or indication on Drawings of articles, materials, operations, or methods requires: supply of each item mentioned or indicated, of quality, or subject to qualifications noted; installation according to conditions stated: and, performance of each operation prescribed with furnishing of necessary labour, equipment, and incidentals for electrical work.
- .2 Where used, words "Section" and "Division" shall also include other Subcontractors engaged on site to perform work to make building and site complete in all respects.
- .3 Where used, word "supply" shall mean furnishing to site in location required or directed complete with accessory parts.
- .4 Where used, word "install" shall mean secured in place and connected up for operation as noted or directed.
- .5 Where used, word "provide" shall mean supply and install as each is described above.

1.3 LIABILITY INSURANCE

- .1 This contractor must maintain and produce at the request of the consultant proof of proper insurance to fully protect the Owner, the Consultant and the Contractor from any and all claims due to accidents, misfortunes, acts of God, etc.

1.4 DRAWINGS

- .1 Electrical Drawings do not show structural and related details. Take information involving accurate measurement of building from building drawings, or at building. Make, without additional charge, any necessary changes or additions to runs of conduits and ducts to accommodate structural conditions. Location of conduits and other equipment may be altered by Consultant without extra charge provided change is made before installation and does not necessitate major additional material.
- .2 As work progresses and before installing fixtures and other fittings and equipment which may interfere with interior treatment and use of building, provide detail drawings or obtain directions for exact location of such equipment and fitments.

- .3 Electrical drawings are diagrammatic. Where required work is not shown or only shown diagrammatically, install same at maximum height in space to conserve head room (minimum 2200 mm (88") clear) and interfere as little as possible with free use of space through which they can pass. Conceal wiring, conduits and ducts in furred spaces, ceilings and walls unless specifically shown otherwise. Install work close to structure so furring will be small as practical.
- .4 Before commencing work, check and verify all sizes, locations, grades, elevations, levels and dimensions to ensure proper and correct installation. Verify existing/municipal services.
- .5 Locate all electrical equipment in such a manner as to facilitate easy and safe access to and maintenance and replacement of any part.
- .6 In every place where there is indicated space reserved for future or other equipment, leave such space clear, and install services so that necessary installation and connections can be made for any such apparatus. Obtain instructions whenever necessary for this purpose.
- .7 Relocate equipment and/or material installed but not co-ordinated with work of other Sections as directed, without extra charge.
- .8 Where drawings are done in metric and product not available in metric, the corresponding imperial trade size shall be utilized.

1.5 INTERFERENCE AND CO-ORDINATION DRAWINGS

- .1 Prepare interference and equipment placing drawings to ensure that all components will be properly accommodated within the constructed spaces provided.
- .2 Prepare drawings to indicate co-ordination and methods of installation of a system with other systems where their relationship is critical. Ensure that all details of equipment apparatus, and connections are co-ordinated.
- .3 Ensure that clearances required by jurisdictional authorities and clearances for proper maintenance are indicated on drawings.
- .4 Upon consultant's request submit copies of interference drawings to consultant.

1.6 QUALITY ASSURANCE

- .1 The installations of the division must conform to the latest edition of the Electrical Safety Code as well as its supplemental bulletins and instructions. Provide materials and labour necessary to comply with rules, regulations, and ordinances.
- .2 Complete underground systems in accordance with CSA C22.3 No. 7-94 except where specified otherwise.
- .3 Abbreviations for electrical terms: to CSA Z85-1983.
- .4 In case of differences between building codes, provincial laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Consultant in writing of such differences.

1.7 ALTERNATES AND SUBSTITUTIONS

- .1 Throughout these sections are lists of "Alternate Equipment" manufacturers acceptable to Consultant if their product meets characteristics of specified described equipment.
- .2 Each bidder may elect to use "Alternate Equipment" from lists of Alternates where listed. Include for any additional costs to suit Alternated used. Prices are not required in Tender for Alternates listed except where specifically noted as "Separate Price". Complete the Supplementary Tender Form.
- .3 It is responsibility of this Division to ensure "Alternate Equipment" fits space allocated and gives performance specified. If an "Alternate Equipment" unit is proposed and does not fit space allotted nor equal specified product in Consultant's opinion, supply of specified described equipment will be required without change in Contract amount. Only manufacturers listed will be accepted for their product listing. All other manufacturers shall be quoted as substitution stating conditions and credit amount.
- .4 If item of material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after Contract has been awarded.

1.8 EXAMINATION

- .1 Site Inspection
 - .1 Examine premises to understand conditions, which may affect performance of work of this Division before submitting proposals for this work.
 - .2 No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
- .2 Drawings:
 - .1 Electrical Drawings show general arrangement of fixtures, power devices, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
 - .2 Consider Architectural, Mechanical, and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Electrical Drawings.
 - .3 Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories, which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- .3 Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.

1.9 SEQUENCING AND SCHEDULING

- .1 It is understood that while Drawings are to be followed as closely as circumstances permit, this Division will be held responsible for installation of systems according to the true intent and meaning of Contract Documents. Anything not clear or in conflict will be explained by making application to Consultant. Should conditions arise where certain changes would be advisable, secure Consultant's approval of these changes before proceeding with work.
- .2 Coordinate work of various trades in installing interrelated work. Before installation of electrical items, make proper provision to avoid interferences in a manner approved by Consultant. Changes required in work specified in these sections caused by neglect to do so shall be made at no cost to Owner.
- .3 Arrange fixtures, conduit, ducts, and equipment to permit ready access to junction boxes, starters, motors, control components, and to clear openings of doors and access panels.
- .4 Furnish and install inserts and supports required by these sections unless otherwise noted. Furnish sleeves, inserts, supports, and equipment that are an integral part of other Divisions of the Work to Sections involved in sufficient time to be built into construction as the Work proceeds. Locate these items and see that they are properly installed. Expense resulting from improper location or installation of items above shall be borne by the electrical trade.
- .5 Adjust locations of ducts, conduits, equipment, fixtures, etc, to accommodate work from interferences anticipated and encountered. Determine exact route and location of each conduit and duct prior to installation.
 - .1 Make offsets, transitions, and changes in direction of ducts, and electrical raceways as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
 - .2 Supply and install pull boxes, etc, as required to effect these offsets, transitions, and changes in direction.

1.10 DRAW BREAKDOWN

- .1 This Contractor MUST submit a breakdown of the tender price into classifications to the satisfaction of the Consultant, with the aggregate of the breakdown totaling the total contract amount. **Each item must be broken out into material and labour costs.** Progress claims, when submitted are to be itemized against each item of the draw breakdown. This shall be done in table form showing contract amount, amount this draw, total to date, % complete and balance.
- .2 Breakdown shall be as follows:
 - .1 Permits and fees
 - .2 Mobilization (maximum 1%)
 - .3 Demolition
 - .4 Panelboards and miscellaneous distribution equipment
 - .5 Ductbank secondary
 - .6 Secondary cables
 - .7 Branch conduits

- .8 Branch wiring
- .9 Lighting fixtures (interior)
- .10 Wiring for mechanical equipment
- .11 Cash allowances (itemized)
- .12 Commissioning and Integrated System Testing
- .13 Electrical contractor closeout requirements (minimum of 3%)
- .3 The breakdown must be approved by the Consultant prior to submission of the first draw.
- .4 Breakdowns not complying to the above will not be approved.
- .5 Breakdown must indicate total contract amount.
- .6 **Mobilization amount may only be drawn when all required shop drawings have been reviewed by the consultant.**

1.11 SHOP DRAWINGS AND PRODUCT DATA

- .1 General
 - .1 Furnish complete catalog data for manufactured items of equipment to be used in the Work to Consultant for review within 30 days after award of Contract.
 - .2 Provide a complete list of shop drawings to be submitted prior to first submission.
 - .3 Before submitting to the Consultant, review all shop drawings to verify that the products illustrated therein conform to the Contract Documents. By this review, the Contractor agrees that it has determined and verified all field dimensions, field construction criteria, materials, catalogue numbers, and similar data and that it has checked and coordinated each shop drawing with the requirements of the work and of the Contract Documents. The Contractor's review of each shop drawings shall be indicated by stamp, date and signature of a qualified and responsible person possessing by the appropriate authorization.
 - .4 If material or equipment is not as specified or submittal is not complete, it will be rejected by Consultant.
 - .5 Additional shop drawings required by the contractor for maintenance manuals, site copies etc., shall be photocopies of the "reviewed" shop drawings. All costs to provide additional copies of shop drawings shall be borne by the contractor.
 - .6 **Submit all shop drawings for the project as a package. Partial submittals will not be accepted.**
 - .7 Catalog data or shop drawings for equipment, which are noted as being reviewed by Consultant or his Engineer shall not supersede Contract Documents.

- .8 Review comments of Consultant shall not relieve this Division from responsibility for deviations from Contract Documents unless Consultant's attention has been called to such deviations in writing at time of submission, nor shall they relieve this Division from responsibility for errors in items submitted.
- .9 Check work described by catalog data with Contract Documents for deviations and errors.
- .10 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. e.g. access door swing spaces.
- .11 Shop drawings and product data shall be accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Manufacturer test data where requested.
 - .3 Manufacturer to certify as to current model production.
 - .4 Certification of compliance to applicable codes.
- .12 State sizes, capacities, brand names, motor HP, accessories, materials, gauges, dimensions, and other pertinent information. List on catalog covers page numbers of submitted items. Underline applicable data.
- .13 Once these shop drawings are returned "reviewed" or "reviewed as noted" fabrication, production, and installation may commence. **NOTE: If a shop drawing is returned "reviewed as noted" this Contractor must provide written indication that the comments have been complied with.**

A partial list of shop drawings includes:

 - .1 Luminaires
 - .2 Panelboards
 - .3 Lighting Control devices
 - .4 Emergency battery units
 - .5 Starters, contactors and control devices
 - .6 Wiring devices
 - .7 Firestopping materials
 - .8 Roof cone
 - .9 Hand dryers
 - .10 Co-ordination study
 - .11 Integrated Life Safety System Testing Plan (ITP)
- .2 Submissions shall be submitted electronically as per the following directions:
 - .1 Electronic Submissions:
 - .1 Electronically submitted shop drawings shall be prepared as follows:
 - .1 Use latest software to generate PDF files of submission sheets.
 - .2 Scanned legible PDF sheets are acceptable. Image files are not acceptable.
 - .3 PDF format shall be of sufficient resolution to clearly show the finest detail.

- .4 PDF page size shall be standardized for printing to letter size (8.5"x11"), portrait with no additional formatting required by the consultant. Submissions requiring larger detail sheets shall not exceed 11"x17".
- .5 Submissions shall contain multiple files according to section names as they appear in Specification.
- .6 File names shall include consultant project number and description of shop drawing section submitted.
- .7 Each submission shall contain an index sheet listing the products submitted, indexed in the same order as they appear in the Specification. Include associated PDF file name for each section.
- .8 On the shop drawing use an "electronic mark" to indicate what is being provided.
- .9 **Each file shall bear an electronic representation of the "company stamp" of the contractor. If not stamped the file submission will not be reviewed.**
- .2 Email submissions shall include subject line to clearly identify the consultants' project number and the description of the shop drawings submitted.
- .3 Electronic attachments via email shall not exceed 10MB. For submissions larger than 10MB, multiple email messages shall be used. Denote related email messages by indicating "1 of 2" and "2 of 2" in email subject line for the case of two messages.
- .4 Electronic attachments via web links (URL) shall directly reference PDF files. Provide necessary access credentials within link or as username/password clearly identified within body of email message.
- .5 On site provide one copy of the "reviewed" shop drawings in a binder as noted above.
- .6 Contractor to print copies of "reviewed" shop drawings and compile into maintenance manuals in accordance with requirements detailed in this section.

1.12 CARE, OPERATION AND START-UP

- .1 Instruct Consultant and operating personnel in the operation, care and maintenance of equipment.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

1.13 VOLTAGE RATINGS

- .1 Operating voltages: to CAN3-C235-83.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.14 PERMITS, FEES, AND INSPECTION

- .1 A submission has been made (if required by this scope of project) by the consultant to the Electrical Safety Authority for review of this project. The payment of the required review costs will be co-ordinated by the consultant. A copy of the Electrical Safety Authority review report will be forwarded to the successful contractor for information and action.
- .2 The contractor is required to include in his tender all required inspection costs by the Electrical Safety Authority. Permit application is the responsibility of the contractor.
- .3 Reproduce drawings and specifications required by Electrical Safety Authority at no cost.
- .4 Notify Consultant of changes required by Electrical Safety Authority prior to making changes.
- .5 Furnish Certificates of Acceptance to Engineer from Electrical Safety Authority and other authorities having jurisdiction upon completion of work.
- .6 This contractor must furnish any certificates required to indicate that the work completed conforms with laws and regulations of authorities having jurisdiction.

1.15 MATERIALS AND EQUIPMENT

- .1 Equipment and material to be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Electrical Safety Authority.
- .2 Factory assemble control panels and component assemblies.

1.16 ELECTRIC MOTORS, EQUIPMENT, AND CONTROLS

- .1 Supplier and installer responsibility is indicated in the Equipment Wiring Schedule on electrical drawings.
- .2 Control wiring and conduit is specified in the Electrical specifications except for conduit, wiring and connections below 50 V, which are related to control systems specified in the Mechanical specifications.

1.17 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint outdoor electrical equipment "equipment green" finish.
 - .2 Paint indoor switchgear and distribution enclosures light grey.

- .2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .3 Clean and prime exposed non-galvanized hangers, racks, fastenings, and conduits etc. to prevent rusting.

1.18 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates as follows:
 - .2 Nameplates:
 - .1 Lamicaid 3 mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self tapping screws.

NAMEPLATE SIZES

Size 1	9 mm x 50 mm (3/8" x 2")	1 line	3 mm (1/8") high letters
Size 2	12 mm x 70 mm (1/2" x 2 1/2")	1 line	5 mm (3/16") high letters
Size 3	12 mm x 70 mm (1/2" x 2 1/2")	2 lines	3 mm (1/8") high letters
Size 4	20 mm x 90 mm (3/4" x 3 1/2")	1 line	9 mm (3/8") high letters
Size 5	20 mm x 90 mm (3/4" x 3 1/2")	2 lines	5 mm (3/16") high letters
Size 6	25 mm x 100 mm (1" x 4")	1 line	12 mm (1/2") high letters
Size 7	25 mm x 100 mm (1" x 4")	2 lines	6 mm (1/4") high letters

- .3 Wording on nameplates labels to be approved by Consultant prior to manufacture.
- .4 Allow for average of twenty-five (25) letters per nameplate.
- .5 Identification to be English.
- .6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .7 Nameplates for disconnects, starters and contactors must indicate equipment being controlled and voltage.
- .8 Nameplates for transformers must indicate transformer label as indicated and capacity, primary, and secondary voltages.

1.19 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

1.20 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m (45') intervals.

- .3 Colour bands must be 25 mm (1") wide.

	<u>Prime</u>
up to 208 V	yellow
209 to 600 V	white
Emergency lighting (DC)	pink
Fire alarm	red
Data System	orange

- .4 This contractor must paint all system junction boxes and covers in conformance with the above schedule.

1.21 PROTECTION OF OPENINGS

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.22 WIRING TERMINATIONS

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.23 MANUFACTURERS AND CSA LABELS

- .1 All labels must be visible and legible after equipment is installed.

1.24 WARNING SIGNS

- .1 To meet requirements of Electrical Safety Authority and Consultant.
.2 Provide porcelain enamel signs, with a minimum size of 175 mm x 250 mm (7" x 10").

1.25 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm (6") horizontal clearance between boxes.
.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m (10'), and information is given before installation.
.3 Locate light switches on latch side of doors. Locate disconnect devices in mechanical and elevator machine rooms on latch side of door.

1.26 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).
.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
.3 Install electrical equipment at following heights unless indicated otherwise.
.1 Local switches: 1100 mm (43.3").

- .2 Wall receptacles:
 - .1 General: 400 mm (16").
 - .2 Above top of continuous baseboard heater: 200 mm (8").
 - .3 Above top of counters or counter splash backs: 100 mm (4").
 - .4 In mechanical rooms: 1200 mm (48").
- .3 Voice/Data outlets: At height of adjacent outlet or at 400 mm (16").

1.27 LOAD BALANCE

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

1.28 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete shall be schedule 40 steel pipe, sized for free passage of conduit, and protruding 50 mm (2") beyond either side.
- .2 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.29 FIELD QUALITY CONTROL

- .1 Conduct and pay for following tests:
 - .1 Power distribution system including phasing, voltage, grounding, and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm system, communications, security.
- .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
- .3 Insulation resistance testing.
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .4 Carry out tests in presence of Consultant.

- .5 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .6 Submit test results for Consultant's review.

1.30 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings as indicated on drawings or as determined from co-ordination study.

1.31 GUARANTEE AND WARRANTY

- .1 At the substantial completion stage of this project this Contractor must provide a written guarantee indicating that any defects, not due to ordinary wear and tear or improper use which occur within the first year from the date of substantial completion will be corrected at the contractors expense.
- .2 **If the electrical sub-contractor's office is 50 kilometers (30 miles) or more from the project site, the sub-contractor is to provide a service/warranty work agreement for warranty period with a local electrical sub-contractor approved by Consultant. Include copy of service/warranty agreement in warranty section of operation and maintenance manual.**
- .3 Warranty period shall start from date of substantial completion.
- .4 Refer to individual specification sections for information on any special manufacturer's equipment warranties.

1.32 SYSTEM START UP

- .1 Provide consultant with written notice verifying all equipment operation and installation is complete prior to scheduled start-up period.
- .2 Start up shall be in presence of the following: owner or representative, contractor, and manufacturer's representative. Each person shall witness and sign off each piece of equipment. Consultant's attendance will be determined by consultant.
- .3 Arrange with all parties and provide 72 hours notice for start up procedure.
- .4 Simulate system start up and shut down and verify operation of each piece of equipment.
- .5 These tests are to demonstrate that the systems and equipment installed are operational as specified.
- .6 The contractor must describe during the start up session the required maintenance for each piece of equipment according to the manufacturer.
- .7 The contractor must provide all necessary tools (including a digital multimeter) to successfully complete the start up procedure.

1.33 OPERATION AND MAINTENANCE MANUAL

- .1 Provide operation and maintenance data for incorporation into manual as specified in other Sections of this Division.
- .2 Operation and maintenance manual to be approved by, and final copies deposited with, Consultant before final inspection. Make changes as requested and re-submit as directed by Consultant.
- .3 Submit copies of all noted maintenance manuals section files in pdf format on USB stick for approval. Approved maintenance manuals files on USB stick will be required at project completion.
- .4 Each manual must include (in "tabbed" sections) the following:
 - .1 Index
 - .2 List of General, Mechanical, Electrical Contractors and all associated sub-contractor names, addresses and contact numbers.
 - .3 List of suppliers and equipment wholesalers local to the project.
 - .4 One year warranty letter for all parts, equipment and workmanship.
 - .5 List of manufacturers, spare parts list and source.
 - .6 Copy of typewritten schedules for all new and renovated panels.
 - .7 Final certificate from the Electrical Safety Authority.
 - .8 Copy of electrical shop drawings which have been stamped and reviewed by Consultant.
 - .9 Electrical As-built drawings including contractor company's as built stamp.
 - .10 Any special warranties on equipment required (i.e. LED lighting, digital lighting control).
 - .11 Coordination study/Arc flash hazard study shop drawings
 - .12 Certificate of completion from all associated sub-contractors (as applicable).
 - .13 Lighting control system commissioning certificate and report.
- .5 Upon acceptance of Operation and Maintenance Manual by the consultant, a pdf file of the entire manual is to be provided on a USB stick. Only one USB stick is to be provided containing both the approved manuals and as-built drawings.

1.34 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor shall provide 2 sets of reproducible electrical drawings. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include field and contract changes to electrical systems.
 - .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection at all times.

- .2 As-built drawings:
 - .1 Identify each drawing in lower right hand corner in letters at least 3 mm (1/8") high as follows: - "AS-BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
 - .2 Submit hard copy to Consultant for approval. When returned, make corrections (if any) as directed.
 - .3 Once approved, submit completed reproducible paper as-built drawings as well as a scanned pdf file copy on USB stick with Operating and Maintenance Manuals.

1.35 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Manufacturers or their representatives are to provide demonstrations and instructions.
- .3 Use operation and maintenance manual, As-built drawings, audio visual aids, etc. as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 Where deemed necessary, Consultants may record these demonstrations on video tape for future reference.

1.36 SUBSTANTIAL PERFORMANCE

- .1 Complete the following to the satisfaction of the consultant prior to submission of substantial performance.
 - .1 As-built Drawings.
 - .2 Maintenance Manuals.
 - .3 System Start up.
 - .4 Instructions to Owners.
 - .5 Final Certificates (Electrical Safety Authority, Integrated Life Safety Systems Commissioning).

1.37 TRIAL USAGE

- .1 Consultant or owner may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.38 REVISION TO CONTRACT

- .1 Provide the following for each item in a given change notice:
 - .1 Itemized list of material with associated costs.
 - .2 Labour rate and itemized list of labour for each item.
 - .3 Copy of manufacturers/suppliers invoice if requested.

1.39 EQUIPMENT SUPPORTS

- .1 Equipment supports supplied by equipment manufacturer: shall be installed by the electrical contractor.
- .2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel meeting requirements of - Structural Steel Section. Submit structural calculations with shop drawings if necessary.
- .3 Mount base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. This installation of this pad shall be the responsibility of the electrical contractor.
- .4 This contractor shall be responsible for providing all anchor bolts and associated formed concrete bases for lighting standards as detailed.

1.40 SLEEVES

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete, or fire rated assemblies and as indicated.
- .2 Schedule 40 steel pipe.
- .3 Sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
- .4 Sizes: minimum 6 mm (1/4") clearance all around, between sleeve and conduit.
- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25 mm (1") above other floors.
- .6 Through foundation walls PVC sleeves are acceptable.
- .7 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with waterproof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Fill future-use sleeves with easily removable filler.

1.41 FIRESTOPPING

- .1 Firestopping material and installation within annular space between conduits, ducts, and adjacent fire separation.
- .2 Provide materials and systems capable of maintaining effective barrier against flame, smoke, and gases.
- .3 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .4 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation.

- .5 Provide "firewrap" blanket around services penetrating firewalls. Extent of blanket must correspond to ULC recommendations. In general wrap individual conduits with approved firewrap materials on each side of firewall. Refer to architectural drawings for FT ratings. Provide 1 and/or 2 layers of firewrap with transverse and longitudinal seams overlapped and/or butted (second layer offset from first layer). Cut edges are to be sealed with aluminum foil tape. Provide 50 mm stainless steel banding at 200 mm intervals. Install firewrap to manufacturers' recommendations for proper FT rating. Acceptable manufacturers are 3M Firemaster ductwrap or approved equal.
 - .6 The firestopping materials are not to shrink, slump or sag and be free of asbestos, halogens and volatile solvents.
 - .7 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.
 - .8 Firestop materials are to be capable of receiving finish materials in those areas, which are exposed and scheduled to receive finishes.
 - .9 Firestopping shall be inspected and approved by local authority prior to concealment or enclosure.
 - .10 Install material and components in accordance with ULC certification, manufacturers instructions and local authority.
 - .11 **Submit product literature and installation material on firestopping in shop drawing and product data manual.**
 - .12 Acceptable manufacturers:
 - .1 Rectorseal Corporation (Metacaulk)
 - .2 Proset Systems
 - .3 3M
 - .4 Hilti
 - .5 STI Firestop
- Note: Fire stop material must conform to requirements of local authorities having jurisdiction. Contractor to confirm prior to application and ensure material used is compatible with that used by other trades on site.**
- .13 Ensure firestop manufacturer representative performs on site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

1.42 PAINTING

- .1 Refer to Section Interior Painting and specified elsewhere.
- .2 Apply at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.
- .3 Prime and touch up marred finished paintwork to match original.
- .4 Restore to new condition, or replace equipment at discretion of consultant, finishes which have been damaged too extensively to be merely primed and touched up.

1.43 ACCESS DOORS

- .1 Supply access doors to concealed electrical equipment for operating, inspecting, adjusting and servicing.
- .2 Flush mounted 600 mm x 600 mm (24" x 24") for body entry and 300 mm x 300 mm (12" x 12") for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.
- .3 Material:
 - .1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.
 - .2 Remaining areas: use prime coated steel.
 - .3 Fire rated areas: provide ULC listed access doors.
- .4 Installation:
 - .1 Locate so that concealed items are accessible.
 - .2 Locate so that hand or body entry (as applicable) is achieved.
 - .3 Installation is specified in applicable sections.
- .5 Acceptable materials:
 - .1 Le Hage
 - .2 Zurn
 - .3 Acudor
 - .4 Nailor Industries Inc.

1.44 DELIVERY STORAGE & HANDLING

- .1 Follow Manufacturer's directions in delivery, storage, and protection, of equipment and materials.
- .2 Deliver equipment and material to site and tightly cover and protect against dirt, water, and chemical or mechanical injury, but have readily accessible for inspection. Store items subject to moisture damage (such as controls) in dry, heated space.

1.45 REPAIR, CUTTING, CORING AND RESTORATION

- .1 Be responsible for required digging, cutting, and patching incident to work of this Division and make required repairs afterwards to satisfaction of Consultant. Cut carefully to minimize necessity for repairs to existing work. Do not cut beams, columns, or trusses.
- .2 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- .3 Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .4 Cutting, patching, repairing, and replacing pavements, sidewalks, roads, and curbs to permit installation of work of this Division is responsibility of Section installing work.

- .5 Slots, cores and openings through floors, walls, ceilings, and roofs shall be provided by this contractor but performed by a trade specializing in this type of work. This Division shall see that they are properly located and do any cutting and patching caused by its neglect to do so.

1.46 EXISTING SYSTEMS

- .1 Connections into existing systems to be made at time approved by Consultant. Request written approval of time when connections can be made.
- .2 Be responsible for damage to existing plant by this work.

1.47 CLEANING

- .1 Clean interior and exterior of all electrical equipment provided including light fixture lenses.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

1.48 DISCONNECTION AND REMOVAL

- .1 Disconnect and/or remove equipment as indicated.
- .2 Cap and conceal all redundant and obsolete connections.
- .3 Provide a list of equipment to be removed to the owner, for his acceptance of same. Remove all equipment from site, which the owner does not retain.
- .4 Store equipment to be retained by owner on site where directed by consultant.

1.49 OWNER SUPPLIED EQUIPMENT

- .1 Connect to equipment supplied by the owner and make operable.

1.50 ENCLOSURES

- .1 This contractor must ensure that all electrical equipment mounted in sprinklered areas is provided with an enclosure in conformance with the Electrical Safety Code.

1.51 EXISTING CONCRETE SLAB X-RAY/SCANNING

- .1 This contractor shall retain the services of a qualified company to provide and X-Ray and/or scan of the existing buried services in walls and/or floors prior to starting any work in the affected area.
- .2 Failure to locate existing piping, conduit, rebar etc., shall not relieve this contractor of repair of same prior to installing his service.
- .3 This contractor shall be responsible for all repairs and/or replacement of existing services caused by cutting the existing concrete slabs and/or walls.

1.52 PHASING OF WORK

This work for this project shall be constructed in phases. Refer to the architectural drawings for phasing information and details. Misinterpretation of the drawings with respect to the extent of the phasing of the work shall not relieve the contractor of the work required to complete the entire contract.

END OF SECTION

Part 1 General

1.1 GENERAL PROVISIONS

- .1 Conform to the General Provisions of Division 1 and Electrical General Requirements Section.
- .2 This project is one of a retrofit nature in part, and which will require extensive demolition.
- .3 Allow for all remedial work in areas indicated on the drawings and as generally defined in the relevant sections of the specifications.

1.2 SCOPE OF WORK

- .1 The scope of work is essentially the selected disconnection and/or removal of services and/or equipment, devices etc. as indicated or required to complete the work.

Part 2 Products

2.1 GENERAL

- .1 This Division is to liaise with the Owners or Consultant for equipment being removed that may be suitable for reuse to that specified or handed over to the owner.
- .2 This Division to take full responsibility for any special tools or equipment required to disassemble or remove material from building.

Part 3 Execution

3.1 GENERAL

- .1 The general requirements are indicated on the drawings and on the outline specification in Division 1.
- .2 The general execution of the demolition is to be carried out in a clean and efficient manner.
- .3 Demolition of existing ceiling, walls etc., to facilitate removal of existing services or equipment or installation of new to be kept to a minimum and then restored to match existing.
- .4 All openings or holes created by removal of existing electrical systems which are not being reused are to be patched with the same material surrounding surfaces.
- .5 All new holes and openings to facilitate electrical systems are to be patched to match surrounding surfaces.
- .6 Protect all existing furnishings materials and equipment. Any damage occurring as a result of the work of this Division shall be repaired or replaced at the expense of this Division.

- .7 Where work involves breaking into or connecting to existing services, carry out work at times directed by the Owners in an expedient manner with minimum disruption to the facility and systems downtime.
- .8 Where unknown services are encountered immediately advise Consultant and confirm findings in writing.
- .9 Where the location of any services has been shown on the plans, such information is not guaranteed. It is this Division's responsibility to verify locations, etc., immediately after moving on site. Should for any reason the information obtained necessitates changes in procedure or design, advise the Consultant at once. If verification of existing conditions is not done at the outset and any problems arise, the responsibility for same is entirely this Division's.
- .10 Disconnect and/or remove equipment, devices, cabling, services, etc. as indicated.
- .11 Remove all redundant and obsolete systems, connections, and wiring.
- .12 Provide a list of equipment to be removed to the owner, for their acceptance of same. Remove all equipment from site that the owner does not retain.
- .13 Maintain equipment to be retained by owner on site where directed by consultant.
- .14 Demolition of all parts of the work must be completed within the confines of the work area and in such a way as the dust produced and risk to injury of will not adversely affect the building users.
- .15 Demolished areas of the existing building will remain in their current use in some cases. Demolition in these areas must be kept to the minimum required to complete the work.
- .16 Demolition shall take place within areas isolated from all other areas with appropriate hoarding, scaffolding, netting, fencing or other means of security between building users and the work.

END OF SECTION

Part 1 General

1.1 INTENT

- .1 Life safety and fire protection systems are to be installed to comply with the provisions of the current Ontario Building and Fire Codes. As a result, testing of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship between systems (functional testing).
- .2 The testing is to provide functional verification and documented confirmation that these building systems satisfy the intent of the Building Code.
- .3 These systems as applicable to any given project include but are not limited to fire alarm system and fire/smoke damper devices.

1.2 GENERAL

- .1 This testing process is the responsibility of the Integrated Testing Firm as a sub-contractor to the electrical trade. Electrical trade to include all costs associated with the Integrated Testing Coordinator in contract.
- .2 This process must be co-ordinated with suppliers and sub-contractors associated with these systems (mechanical and/or electrical).
- .3 This process must be co-ordinated with the project construction schedule and be completed, including all associated documentation, prior to the consultant's certification of the project for occupancy.
- .4 All applicable contractors, sub-contractors, and suppliers are to include all required costs in their respective tender costs.
- .1 All work is to be performed in accordance with CAN/ULC S1001-2011. Special consideration is to be given to the Sample Integrated Testing Plan (ITP), the review of life safety system design documents, and the provision of test plans and reports.
- .2 The work to be performed by this contractor is also described in CAN/ULC S1001-2011.
- .3 Refer to CAN/ULC S1001-11 Rev1-2019 Informative Annex (C) for Sample Integrated Testing Plan (ITP).

1.3 QUALITY ASSURANCE

- .1 The following criteria must be met in order to be considered an acceptable Integrated Testing Coordinator for this project:
 - .1 Manufacturers: Firms regularly engaged in functional testing and implementation of life safety and fire protection systems for not less than five years.
 - .2 Qualifications: Firms with at least five years of successful experience in facility construction, inspection, acceptance testing or commissioning as it relates to fire protection and life safety and equipment similar to that required for this project.

- .3 The Contractor shall be an established commissioning contractor that has had and currently maintains a locally run and operated business for at least five years.
- .4 The Contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the systems.
- .2 For bidder information only, experienced Life Safety Systems Testing Firms include these listed below or local branches of the companies noted in the vicinity of this project:
 - .1 Georgian Bay Fire and Safety Ltd.
1700 20th Street East
Owen Sound, Ontario
 - .2 Vintage Fire and Life Safety Ltd.
25 Coverdale Cres.
Kitchener, Ontario N2M 4X1
 - .3 Troy Life and Fire Safety
805 Boxwood Dr., Unit #201
Cambridge, Ontario N3E 1A4
 - .4 Control Tech Systems
31 Regal Road
Guelph, Ontario N1K 1B6
 - .5 Lonergan Engineering
4 Industrial Parkway South
Aurora, Ontario L4G 3W1

NOTE: This agent must be a third party firm NOT associated with this project in any way and be under contract with the electrical sub-contractor not the fire alarm supplier.

- .3 Other firms to these listed above, who feel they are capable, must submit in writing, to the Consultant's office confirmation of the items listed in the criteria above, a minimum of one week prior to tender close in order to be considered as a bidder.

1.4 GENERAL REQUIREMENTS

- .1 The Commissioning Process shall generally encompass and co-ordinate the following key areas:
 - .1 Integrated systems testing planning.
 - .2 Integrated systems testing implementation (functional testing).
 - .3 Integrated systems testing documentation.

1.5 RESPONSIBILITIES

- .1 General Contractor:
 - .1 The general contractor shall verify completeness of the building envelope, perimeter and interior items which affect proper operation of the noted systems.
 - .2 The general contractor will assure participation and co-operation of Sub-Contractors and Specialty Contractors (mechanical, electrical, building management, etc.) under the General Contractor's jurisdiction as required for the commissioning process.
- .2 Electrical Contractor:
 - .1 The Integrated Life Safety Systems Testing Coordinator (ITC) is being retained by the electrical contractor, however; this contractor's work to satisfy the ITC requirements shall be included in the tender price.
 - .2 Verify Functional performance of electrical systems for compliance with design intent as specified in the appropriate Specification sections.
 - .3 Provide the documentation with standard Functional performance reports on completion of the testing.
 - .4 Verify submissions for electrical system operation and maintenance manuals, as-built documents, spare parts listing, special tools listing, and other items as may be specified.
 - .5 As a minimum this contractor must include for:
 - .1 Providing the ITC with documentation of design and shop drawings.
 - .2 Provide documents for sequence of operation and maintenance of system.
 - .3 Testing of all components and accessories to confirm Alarm/Supervisory/Trouble at the fire panel.
 - .4 Testing and operation of any generator (s) as applicable to the project.
 - .5 Other items that may be requested by the ITC.
 - .6 Re-commissioning of any items that may have failed.
 - .7 Re-setting of the system to proper operation after tests are completed.
- .3 Equipment Manufacturers:
 - .1 The equipment manufacturers shall be responsible for providing labour, material, equipment, etc., required within the scope of the respective equipment to facilitate the commissioning process.
 - .2 The equipment manufacturers will perform Pre-Functional and Functional Performance Tests required by the commissioning process.
- .4 Design Engineer:
 - .1 The design engineer shall observe Functional Performance Testing, at his discretion.
 - .2 The design engineer shall provide technical capabilities for resolution of deficiencies, where required.

Part 2 Commissioning Process

2.1 OPERATIONS AND MAINTENANCE MANUALS

- .1 Furnish Final, reviewed Operation and Maintenance Manuals to the Consultant fourteen (14) days prior to scheduled Functional Performance Tests.

2.2 FUNCTIONAL PERFORMANCE TEST

- .1 The contractor shall be responsible for the Functional Performance Tests. These tests ensure that all equipment and systems are installed in accordance with the Specifications, Drawings, and manufacturers' requirements.
- .2 The contractor shall be responsible for co-ordinating schedule for Functional tests of various equipment and systems.
- .3 In the Functional Test, all noted systems and sub-systems shall be checked for the following:
 - .1 Verify that each element has been properly installed, properly identified, and that all connections have been made correctly.
 - .2 Verify that tests, meter readings, and specific mechanical/electrical performance characteristics agree with those required by equipment or system manufacturer.
 - .3 Re-commission any item(s) that may have failed.
 - .4 Notify the consultant in writing, at least fourteen (14) days prior to the date of Functional Performance Testing. Schedule the Functional performance tests over a period of consecutive business days.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.2 No.0.3-92, Test Methods for Electrical Wires and Cables.
- .2 CAN/CSA-C22.2 No.131-M89(R1994), Type TECK 90 Cable.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger.
- .2 Minimum size: 12 AWG.
- .3 Copper conductors: size as indicated, with 600 V insulation of chemically cross-linked thermosetting polyethylene material 90°C (194°F) rated T90 for indoor above grade installations and RW90 for below grade installations.

2.2 ARMoured CABLES

- .1 Conductors: insulated, copper minimum size as indicated above.
- .2 Type: AC90 (minimum size 12 AWG).
- .3 Armour: interlocking type fabricated from aluminum strip.
- .4 Connectors must be suitable for installed environment and approved for use with armoured cable.

Part 3 Execution

3.1 INSTALLATION OF BUILDING WIRES

- .1 Install wiring from source to load through raceways as specified.
- .2 Provide separate neutral conductors for all lighting circuits and circuits originating from surge protected panels. Size raceways accordingly.

3.2 INSTALLATION OF ARMoured CABLES

- .1 Group cables wherever possible.
- .2 Terminate cables in accordance with Wire and Box Connectors - 0 - 1000 V Section.

- .3 These cables are to be installed in concealed locations only. These concealed locations are considered to be stud walls and “drops” to stud walls, lighting fixtures, and ceiling mounted devices.
- .4 **These “drops” shall not be permitted to exceed 2.4 m (8'-0"). To limit these “drops” to lengths noted above provide additional branch wiring in conduit.**

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data for cabinets in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 MATERIALS

- .1 Splitters must conform to CSA C22.2 No. 76 (latest edition).
- .2 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition)

2.2 SPLITTERS

- .1 Sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
- .3 At least three spare terminals on each set of lugs in splitters less than 400 A.
- .4 Splitter length must match arrangement of equipment unless indicated otherwise.

2.3 JUNCTION AND PULL BOXES

- .1 Welded steel construction with screw-on flat covers for surface mounting.
- .2 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

Part 3 Execution

3.1 SPLITTER INSTALLATION

- .1 Install splitters and mount plumb, true and square to the building lines on 19 mm (3/4") painted plywood backboards.

3.2 JUNCTION AND PULL BOXES INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Install junction and pull boxes so as not to exceed 30 m (100') of conduit run between pull boxes and in conformance with the Electrical Safety Code.

3.3 IDENTIFICATION

- .1 Provide equipment identification in accordance with General Electrical Requirements Section.
- .2 Install size 2 identification labels indicating system name, voltage and phase.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Outlet boxes, conduit boxes, and fittings must conform to CSA C22.2 No. 18 (latest edition).

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 102 mm (4") square or larger outlet boxes as required for special devices.
- .3 Gang boxes where wiring devices are grouped.
- .4 Blank cover plates for boxes without wiring devices.
- .5 347 V outlet boxes for 347 V switching devices.
- .6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 SHEET STEEL OUTLET BOXES

- .1 Electro-galvanized steel single and multi gang flush device boxes for flush installation, minimum size 76 mm x 50 mm x 64 mm (3" x 2" x 2½") or as indicated. 102 mm (4") square outlet boxes when more than one conduit enters one side with extension and plaster rings as required. Iberville 1104 Series.
- .2 Electro-galvanized steel utility boxes for outlets connected to surface-mounted EMT conduit **in utility rooms**, minimum size 102 mm x 57 mm x 38 mm (4" x 2¼" x 1½"). Iberville 1110 Series.
- .3 102 mm (4") square or octagonal outlet boxes for lighting fixture outlets.
- .4 102 mm (4") square outlet boxes with extension and plaster rings for flush mounting devices in finished tile walls.

2.3 MASONRY BOXES

- .1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONDUIT BOXES

- .1 Cast FS or FD feraloy boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacle **in areas (other than utility rooms) where surface conduit is used.**

2.5 OUTLET BOXES FOR NON-METALLIC SHEATHED CABLE

- .1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 mm 50 mm x 63 mm (3" x 2" x 2-1/2") with two double clamps to take non-metallic sheathed cables.

2.6 FITTINGS- GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 32 mm (1- 1/4") and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm (1/4") of opening.
- .4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Reducing washers are not allowed.
- .5 Outlets if unwired are to be provided with blank coverplates to suit related sections of this specification.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA C22.2 No.65-1956(R1965) Wire Connectors.

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors: with current carrying parts of copper sized to fit copper conductors as indicated.
- .2 Fixture type splicing connectors: with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors for armoured cable, and flexible conduit, as required.

Part 3 Execution

3.1 INSTALLATION

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
 - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
 - .3 Install fixture type connectors and tighten. Replace insulating cap.

END OF SECTION

Part 1 **General**
Not Applicable.

Part 2 **Products**

2.1 **MATERIALS**

- .1 Grounding equipment must conform to CSA C22.2 No 41 (latest edition).

2.2 **EQUIPMENT**

- .1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe and electrically conductive metal gas piping.
- .2 Rod electrodes: copper clad steel 19 mm (3/4") diameter by 3 m (10') long.
- .3 Plate electrodes: galvanized steel, surface area 0.2 m², minimum 1.6 mm thick.
- .4 Insulated grounding conductors: green with insulation type that matches specified phase conductors. Gauge shall be in conformance with the latest edition of the Electrical Safety Code to suit required installation conditions.
- .5 Ground bus: copper, size as indicated, complete with insulated supports, fastenings, connectors.
- .6 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
 - .1 Grounding and bonding bushings.
 - .2 Protective type clamps.
 - .3 Bolted type conductor connectors.
 - .4 Thermit welded type conductor connectors.
 - .5 Bonding jumpers, straps.
 - .6 Pressure wire connectors.

Part 3 **Execution**

3.1 **INSTALLATION GENERAL**

- .1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. **Where EMT is used, run ground wire in conduit.**
- .2 Install connectors in accordance with manufacturer's instructions.
- .3 Protect exposed grounding conductors from mechanical injury.
- .4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process inspectable wrought copper compression connectors to ANSI/IEEE 837.
- .5 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .6 Soldered joints not permitted.

- .7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.
- .8 Install separate ground conductor to outdoor lighting standards.
- .9 Ground pad mounted transformers as detailed on the drawings.

3.2 ELECTRODES

- .1 Make ground connections to continuously conductive underground water pipe on street side of water meter. This shall apply to the installation or replacement of building water service.
- .2 Install water meter shunt.
- .3 Make ground connections to continuously conductive metal gas piping system. This shall apply to installation or replacement of gas appliances, as well as installation or modification of a building gas piping system.
- .4 Corrugated metal tubing shall not be used as a bonding means for the gas piping system.
- .5 Install concrete encased electrodes in building foundation footings, with terminal connected to grounding network.
- .6 Install rod or plate electrodes and make grounding connections.
- .7 Bond separate, multiple electrodes together.
- .8 Use #2/0 copper conductors for connections to electrodes. Size in conformance with the Electrical Safety Code.

3.3 EQUIPMENT GROUNDING

- .1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. transformers, switchgear, duct systems, frames of motors and distribution panels.

3.4 COMMUNICATION SYSTEMS

- .1 Install grounding connections for fire alarm as indicated.

3.5 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Electrical General Requirements Section.
- .2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of local authority having jurisdiction over installation.
- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA C22.2 No.18-92, Outlet Boxes, Conduit Boxes, and Fittings.
 - .2 CSA C22.2 No.45-M1981(R1992), Rigid Metal Conduit.
 - .3 CSA C22.2 No.56-1977(R1977), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No.83-M1985(R1992), Electrical Metallic Tubing.
 - .5 CSA C22.2 No.211.2-M1984(R1992), Rigid PVC (Unplasticized) Conduit.
 - .6 CAN/CSA C22.2 No.227.3-M91, Flexible Nonmetallic Tubing.

Part 2 Products

2.1 CONDUITS

- .1 Epoxy coated conduit: to CSA C22.2 No.45, with zinc coating and corrosion resistant epoxy finish inside and outside.
- .2 Electrical metallic tubing (EMT) with couplings: to CSA C22.2 No.83.
- .3 Rigid PVC conduit: to CSA C22.2 No.211.2.
- .4 Flexible metal conduit: to CSA C22.2 No.56, aluminum and liquid-tight flexible metal.
- .5 Flexible PVC conduit: to CAN/CSA C22.2 No.227.3, ENT.

2.2 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 53 mm (2") and smaller. Two hole steel straps for conduits larger than 53 mm (2").
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1.5 m (5'0") oc.
- .4 Threaded rods, 6 mm (1/4") diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

- .1 EMT fittings shall be set screw style (zinc alloy).
- .2 Flexible metal conduit fittings shall be screw-in type.
- .3 Liquid type flexible metal conduit fittings shall be sealtite type.
- .4 PVC fittings shall be PVC type complete with PVC adaptors at all boxes.

- .5 Coating: same as conduit.
- .6 Factory "ells" where 90° bends are required for 27 mm (1") and larger conduits.
- .7 Where bushings are noted to be provided they must be "screwed" type fastened to a conduit connector. Push-fit or glued in place bushings will NOT be accepted.

2.4 FISH CORD

- .1 Nylon twine.

Part 3 Execution

3.1 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits except in mechanical/ electrical service rooms and in unfinished areas. Where devices are to be installed on existing walls in finished area, which cannot be "fished", install feeds in a surface metal raceway equal to Wiremold V700 series. Coordinate surface installations with consultant prior to rough-in.
- .3 **Use electrical metallic tubing (EMT) for all branch circuits unless specified otherwise.**
- .4 Use flexible metal conduit for connection to motors in dry areas, connection to recessed fixtures without a prewired outlet box, connection to surface or recessed fixtures, work in movable metal partitions.
- .5 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations and for connections to kitchen equipment.
- .6 Conduits terminating at electrical equipment in sprinklered areas are to be provided with insulated compression style connectors equal to Thomas & Betts Cat. #TC8XXSC or approved equal.
- .7 **Minimum conduit size for branch circuits shall be 21 mm (3/4").** Single drops from ceiling mounted junction boxes down to a light switch or duplex receptacle may be reduced to 16 mm (1/2").
- .8 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .9 Mechanically bend steel conduit over 27 mm (1") diameter.
- .10 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .11 Install fish cord in empty conduits.
- .12 Run 2- 27 mm (1") spare conduits up to accessible ceiling space from each flush panel. Terminate these conduits in 152 mm x 152 mm x 102 mm (6" x 6" x 4") junction boxes in ceiling space.
- .13 Remove and replace blocked conduit sections. Do not use liquids to clean out conduits.
- .14 Dry conduits out before installing wire.

3.2 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m (5') clearance.
- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended or surface channels.
- .5 Do not pass conduits through structural members except as indicated.
- .6 Do not locate conduits less than 75 mm (3") parallel to steam or hot water lines with minimum of 25 mm (1") at crossovers.
- .7 Do not fasten surface conduit to roof deck. Provide standoffs or supports as manufactured by Caddy or use unistrut trapeze fastened to structure.**

3.3 CONCEALED CONDUITS

- .1 Do not install horizontal runs in masonry walls.
- .2 Do not install conduits in terrazzo or concrete toppings.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS

- .1 Submit shop drawings for each system in Conformance with The Electrical General Requirements Section.

1.2 PRODUCT/MAINTENANCE DATA

- .1 Submit product/maintenance data for each system for inclusion in maintenance manual conforming to The General Electrical Requirements Section.

1.3 SCOPE

- .1 The scope of this Section will include the following systems.
 - .1 Surface mounted raceway.
 - .2 Hand dryers.
 - .3 Occupancy sensors.
 - .4 Digital Occupancy & Daylight Control Systems.

Part 2 Products

2.1 SURFACE MOUNTED RACEWAY

- .1 The two-compartment surface raceway shall be complete with the following features:
 - .1 Surface non-metallic raceway is to be utilized in dry interior locations only as covered in Article 352 Part B of the National Electrical Code, as adopted by the National Fire Protection Association and as approved by the American National Standards Institute.
 - .2 The surface non-metallic raceway system specified herein for branch circuit wiring and/or data network, voice, video and other low-voltage wiring shall be the 5400 System as manufactured by the Wiremold Company.
 - .3 The raceway and all system components must be UL Listed, and exhibit non-flammable self-extinguishing characteristics tested to comparable specifications of UL94V-0. The raceway base and cover shall be manufactured by rigid compound, available in ivory or white colours (Architect Selection).
 - .4 The raceway shall be a two-piece design with a base and a snap-on cover. Total width shall be 133 mm (5.1/4") by 44.5 mm (1.3/4") deep with an approximate thickness of 2.4 mm (1/12"). The base and cover shall be available in 2.4 m (8') lengths. The raceway shall be available with two multiple wiring channels formed by integral barriers in the base.
 - .5 The cover shall span the entire width of the base concealing all of the wiring channels.

- .6 A full complement of fittings must be available including, but not limited to flat, internal and external elbows, tees entrance fittings, cover clips and end caps. They shall be manufactured of a rigid PVC compound. The fittings shall have a matte texture, in ivory or white colours to match the base and cover. They shall overlap the cover and base to hide uneven cuts. All fittings shall be supplied with a base where applicable to eliminate mitring. A transition fitting shall be available to adapt to other Wiremold series raceways.
- .7 Device brackets shall be available for mounting standard devices in-line with the raceway. Faceplates shall match and fit flush in the device plate. They shall be manufactured of rigid PVC compound. They shall be ivory or white colours to match raceway base cover (Architect selection). Contractor is to provide devices as noted.
- .8 The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP (including Category 5e and 6), STP (150 ohm) Fibre Optic, Coaxial and other cabling types with face plates and bezels to facilitate mounting. The electrical contractor is to provide adapter plates for faceplates to be provided by the voice/data sub-contractor. The recommended plate is a Deco adapter 3-port plate style, confirm with voice/data sub-contractor.
- .2 Acceptable alternate manufacturers include:
 - .1 Hubbell Base Trak
 - .2 Panduit Pan-Way

2.2 HAND DRYERS

- .1 Hand dryers where noted on the drawings are to be supplied and installed by this Division with the following features:
 - .1 Surface mounting.
 - .2 Fixed nozzle.
 - .3 White finish with automatic activation.
 - .4 Rating of 1800 W at 120 V.
 - .5 NOVA 5-0212
 - .6 Approved alternate:
 - .1 World Dryer Cat. #XA5-2-974.

2.3 OCCUPANCY SENSORS

- .1 Where noted on drawings the wall mounted (passive technology) occupancy sensors used in storage and similar spaces shall be based on:
 - .1 Sensor switch Cat. #WSX-VOLT-X (colour by architect).

- .2 Where noted on the drawings, the wall mounted switch style occupancy sensor used in Administrative Offices and Seminar/Meeting Rooms shall be a dual technology switch with either single or double relay (circuit) as noted on the drawings. Colour to suit architect.

Note: For dual relay switches, program the sensor for 15 minutes off delay and enabled walk-thru based on:

- .1 Sensor switch Cat. # WSX PDT
- .3 Provide other occupancy sensors to suit the detail on the drawings.
- .4 All sensors shall be set to 5 minutes "delay to off" unless otherwise directed.
- .5 Occupancy sensors are to be supplied part of cash allowance. Refer to Division 1 for cash allowances. Occupancy sensors are to be installed and connected by this electrical contractor.

2.4 DIGITAL OCCUPANCY & DAYLIGHT CONTROL SYSTEMS

- .1 Provide conduit and cabling for Central Lighting Control System.
- .2 Controls devices (i.e., network lighting manager, hubs, bridges, low voltage switches, low voltage occupancy sensors, etc.) are to be part of cash allowance. Controls devices are to be installed and connected by this electrical contractor.
- .3 Electrical design drawing lighting schematics are generic and meant to show intent of controls approach only. Contact Wharton Sales Co. (WSC) Lighting System for lighting control system schematics, wiring diagrams, controls risers, and installation instructions prior to bid.
 - .1 WSC Lighting System contact information:
Kory Kieswetter – Tel: 519-575-5483
- .4 All devices have RJ-45 female ports. Making network control cables on site is required.
- .5 Cabling for system shall be Category 5e as per manufacturer's recommendations.
 - .1 Cable shall be 4 pair, 24 AWG solid bare annealed copper conductors, ANSI/TIA/EIA-568-B.2 and ISO/IEC 11801 category 5e compliant.
 - .2 The jacket shall be printed with TRU-Mark™ 1000' to 0' marking system, CMP (FT-6) rated with outer sheath colour for each level in the system to be according to advisement by school board representative.
 - .3 Shall be suitable for use indoor, riser or plenum, and horizontal applications.

Part 3 Execution

3.1 SURFACE MOUNTED RACEWAY

- .1 Raceway is to be supplied and installed c/w all necessary fittings, hardware and device brackets for configuration as noted in the drawings for a complete functional installation.

- .2 Install conduit system, wiring and devices as indicated.
- .3 Ensure raceway is installed as per manufacturer recommendations.
- .4 Where the raceway ends at a wall install end cap.

3.2 HAND DRYERS

- .1 Install and connect hand dryers in conformance with manufacturer's recommendations.
- .2 Hand dryers are to be mounted at a height to suit age of expected users'. Unless otherwise noted confirm height with manufacturer, owner, Architect, and/or consultant prior to rough in.
- .3 Once installed this contractor is to caulk the joint between dryer and wall surface with a bead of white silicone.

3.3 DIGITAL OCCUPANCY & DAYLIGHT CONTROL SYSTEMS

- .1 Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
- .2 Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.
 - .1 Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.
- .3 Install power packs in accessible maintenance areas unless noted otherwise. Provide access doors if power packs are installed above drywall ceilings.
- .4 It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper coverage within the range of coverage as per the manufacturer's recommendations. The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective rooms.
- .5 Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
 - .1 Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - .2 Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 - .3 Load Parameters (e.g. blink warning, etc.)
- .6 Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.
- .7 Include the following support service visits to site:
 - .1 Pre-wiring visit.
 - .2 ASHRAE functional testing coordination visit.
 - .3 Final system commissioning visit.

- .9 Contact owner representatives a minimum of 30 days prior to commissioning of lighting controls:
 - .1 Steve Allum 905-632-6314 x 187 allums@hcdsb.org
 - .2 Josh Duffield 905-632-6314 x 185 duffieldj@hcdsb.org
- .10 Factory Commissioning
 - .1 Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.
 - .2 The electrical contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the system startup and adjustment date.
 - .3 Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
 - .4 Factory commissioning shall include functional testing and documentation of the control system conforming to the "Functional Testing" requirements included in the current ASHRAE standard. This cost shall be included in the Tender Price.
- .11 Cabling Installation
 - .1 Cabling Contractor is to adhere to all Standards, regulations and documents listed following.
 - .2 All products installed must meet or exceed all local, provincial, and federal building, fire, health, safety and electrical codes.
 - .3 The responsibility of this sub-contractor is to include but not be limited to:
 - .4 Supply and installation of data cabling to every digital lighting control device as per manufacturer's recommendations.
 - .5 Termination of data cabling as per manufacturer's recommendations.
 - .6 General installation practices shall be as follows:
 - .1 Supply and install cabling to locations as detailed on floor plan(s). The Cabling Contractor shall use the cabling support system (supplied by others) to distribute the cables throughout the facility. Where the cables leave the cable support system and extend to the termination point they shall use the conduit provided or cable management system. Any horizontal exposed cable must be installed in surface raceways equal to Wiremold Series 700.
 - .2 All Cables and components to be installed and terminated in accordance with CSA, ANSI/EIA/TIA-568 and its' Amendments as well as UL Guidelines. Particular attention must be given to maintaining the integrity of the pair twists, bend radius and ensuring proper distance is kept from fluorescent light fixtures, electrical cables or any other source of EMI.

- .3 The maximum horizontal run length is not to exceed 457 m (1,500').
- .4 Avoid scraping, denting, or otherwise damaging cables, before, during or after installation. The Cabling Contractor without any additional compensation shall replace damaged cables.
- .5 Ensure that all cable lengths are sufficient to allow for slack, vertical runs, wastage, connectorization and future moves.
- .6 Bush, ream and remove any sharp projections on all conduits prior to installation of communications cables.
- .7 When terminating copper cables remove only enough cable jacket to perform termination, untwist pairs a maximum of 13 mm (1/2") for, Enhanced Category 5.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.
- .2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

Part 2 Products

2.1 PANELBOARDS

- .1 Panel boards must conform to CSA C22.2 No. 29 (latest edition).
- .2 Panelboards: product of one manufacturer.
- .3 Install circuit breakers in panelboards before shipment.
- .4 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand. **Series rating is acceptable – submit information with shop drawings. Provide lamicoid label on feeder breaker. Lamicoid label to state “Series Rating Breaker.” Lamicoid label to be size 2.**
- .5 Bus and breakers must be rated for 22KA (symmetrical) interrupting capacity or as indicated.
- .6 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.
- .7 Panelboard mains, number of circuits, and number and size of branch circuit breakers as indicated.
- .8 Two keys for each panelboard and key panelboards alike.
- .9 Aluminum bus with neutral of same ampere rating as mains.
- .10 Mains must be suitable for bolt-on breakers. Provide main (if applicable) and branch breakers as bolt-on style.
- .11 Trim with concealed front bolts and hinges.
- .12 Trim and door finish must be baked grey enamel.
- .13 All panels regardless of voltage and amperage must be provided with a lockable door.
- .14 Branch circuit panelboards (250 AMP or smaller) must be one of the following:
 - .1 Eaton Cat # POW-R-LINE-C PRL-1 or PRL-2
 - .2 Schneider Electric Cat # NQ Series for up to 240V or NF Series for up to 600V
 - .3 Siemens Cat #Sentron P1 Series

- .15 Panels ranging in width from 368 to 558 mm (14½" to 22"), depth from 100 to 150 mm (4" to 6") and height from 533 to 1143 mm (21" to 45") are to be retrofitted. Retrofit panels must allow for the installation of new panel interior and trim to suit the existing recessed panel tub. Note: Panel manufacturers bidding this project that do not carry a panel retrofit kit must allow in their price the cost to remove the existing panel tub and replace with new including all necessary wall repairs. Retrofit panelboards shall be Cutler Hammer Cat. # PIR-X-3-A-X-X.

2.2 BREAKERS

- .1 Breakers: to Moulded Case Circuit Breakers Section.
- .2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- .3 Main breaker (as specified) must be separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.
- .4 Lock-on devices for fire alarm, stairway, exit and night light circuits.

2.3 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Electrical General Requirements Section.
- .2 Nameplate for each panelboard size 4 engraved description as indicated. In finished areas install label on inside of panel, and in service areas install label on exterior of panel.
- .3 Nameplate for each circuit in distribution panelboards size 2 engraved "name of load" as indicated.
- .4 Complete circuit directory with typewritten legend showing location of each circuit. **Include a copy of the directories in the maintenance manuals.**

Part 3 Execution

3.1 INSTALLATION

- .1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.
- .2 Install surface mounted panelboards on plywood backboards. Where practical, group panelboards on common backboard. Plywood shall be 21mm (¾") fire rated or painted with intumescent fire block paint having a minimum of 1h rating, unless noted otherwise.
- .3 Mount panelboards to height specified in Electrical General Requirements Section or as indicated.
- .4 Connect loads to circuits.
- .5 Connect neutral conductors to common neutral bus.
- .6 Install series rating lamicides adjacent to all breakers utilized to achieve series ratings.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded case circuit breakers must conform to CSA C22.1 No.5.1-M91 (latest edition.)
- .2 Bolt-on moulded case circuit breaker quick-make, quick-break type, for manual and automatic operation.
- .3 Common-trip breakers: with single handle for multi-pole applications.
- .4 Unless otherwise indicated moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

Part 3 Execution

3.1 INSTALLATION

- .1 Install circuit breakers as indicated complete with all necessary mounting hardware and filler panels if necessary.

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 SWITCHES

- .1 General purpose AC switches must conform to CSA C22.2 No. 111 (latest edition).
- .2 15 or 20 A, 120 V, single pole, double pole, three-way, four-way, keyed, or motor rated switches complete with pilot light.
- .3 Manually-operated general purpose ac switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine molding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Toggle style (Rocker style) (architect to select colour).
- .4 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .5 Switches of one manufacturer throughout project.
- .6 Acceptable materials:
 - single pole: Hubbell Cat # HBL1201 Series
 - three way: Hubbell Cat # HBL1203 Series
 - four way: Hubbell Cat # HBL1204 Series
 - Keyed: Hubbell Cat. #HBL1221 Series complete with 2 keys per switch
 - (Keys): Hubbell Cat. #HBL1209
 - Motor rated: Hubbell Cat. #HBL1221PL c/w pilot light (20 A):
- .7 Acceptable alternate manufacturers include:
 - .1 Pass & Seymour
 - .2 Leviton.

2.2 RECEPTACLES

- .1 Receptacles, plugs, and other similar wiring devices must conform to CSA 22.2 No 42 (latest edition).
- .2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features (20A where noted):
 - .1 Urea molded housing (Colour by architect).
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and rivetted grounding contacts.
- .3 Other receptacles with ampacity and voltage as indicated.
- .4 Receptacles of one manufacturer throughout project.
- .5 Acceptable materials:

Standard duplex receptacle	Hubbell Cat # HBL5252CN
Ground fault protected T-slot receptacles	Hubbell Cat. # GF20L A complete with Decora style coverplate to suit specification below
T-slot receptacles	Hubbell Cat. #HBL5352
Dryer receptacle	Hubbell Cat # HBL9430A
Range receptacle	Hubbell Cat # HBL9450A
Tamper resistant receptacle	Hubbell Cat # BR15TR
Tamper resistant T-slot receptacle	Hubbell Cat. #BR20TR
Tamper resistant ground fault protected receptacle	Hubbell Cat. #GFTR15
Tamper resistant ground fault protected T-slot receptacle	Hubbell Cat. #GFTR20 complete with Decora style coverplate to suit specification below

- .6 Acceptable alternate manufacturers include:
 - .1 Pass & Seymour
 - .2 Leviton

2.3 COVER PLATES

- .1 Cover plates from one manufacturer throughout project.
- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Stainless steel, brushed, 1 mm (1/32") thick cover plates for wiring devices mounted in flush-mounted outlet box.
- .4 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- .5 Weatherproof cover plates complete with gaskets and "heavy-duty in use" covers in conformance with the Electrical Safety Authority. Provide product equal to Intermatic Cat. #WP5100C.

Part 3 Execution

3.1 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Mount toggle switches at height specified in Electrical General Requirements Section or as indicated.
- .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height specified in Electrical General Requirements Section or as indicated.
- .3 Cover plates:
 - .1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
 - .2 Install suitable common cover plates where wiring devices are grouped.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submit product data in accordance with Electrical General Requirements Section.

Part 2 Products

2.1 DISCONNECT SWITCHES

- .1 Enclosed manual air break switches must conform to CSA C22.1 No.4 (latest edition).
- .2 Fuseholder assemblies must conform to CSA C22.2 No.39 (latest edition).
- .3 Fusible, and/or non-fusible, horsepower rated disconnect switches, size as indicated.
- .4 Provision for padlocking in off switch position by three locks.
- .5 Mechanically interlocked door to prevent opening when handle in ON position.
- .6 Fuses: size as indicated, to Fuses - Low Voltage Section.
- .7 Fuseholders: relocatable and suitable without adaptors, for type and size of fuse indicated.
- .8 Quick-make, quick-break action.
- .9 ON-OFF switch position indication on switch enclosure cover.

2.2 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Electrical General Requirements Section.
- .2 Indicate name of load controlled on size 4 nameplate.

2.3 ACCEPTABLE MANUFACTURERS

<u>Manufacturer</u>	<u>General Purpose</u>	<u>Weather Proof</u>
Eaton	IHD Series	3HD Series
Schneider Electric	Type A Series	Type R Series
Siemens	ID Series	NFR/FR Series
GE Industrial	TH Series	TH Series

Part 3 Execution

3.1 INSTALLATION

- .1 Install disconnect switches complete with fuses if applicable. .

END OF SECTION

Part 1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Electrical General Requirements Section.
- .2 Indicate:
 - .1 Mounting method and dimensions.
 - .2 Starter/contactor size and type.
 - .3 Layout of identified internal and front panel components.
 - .4 Enclosure types.
 - .5 Wiring diagram for each type of starter.
 - .6 Interconnection diagrams.

1.2 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for incorporation into manual specified in Electrical General Requirements Section.
- .2 Include operation and maintenance data for each type and style of starter/contactor.

1.3 MAINTENANCE MATERIALS

- .1 Provide maintenance materials in accordance with Electrical General Requirements Section.
- .2 Provide listed spare parts for each different size and type of starter:
 - .1 1 operating coil.
 - .2 3 fuses.
 - .3 10% indicating lamp bulbs used.

Part 2 Products

2.1 MATERIALS

- .1 Starters: must conform to CSAC22.2 No. 14 (latest edition) and EEMAC E14-1.
- .2 Control transformers must conform to CSAC22.2 No. 66 (latest edition).
- .3 Auto-transformers must conform to CSAC22.2 No 47 (latest edition).
- .4 Contactors must conform to CSA C22.2 No. 14 (latest edition).
- .5 Half size starters will not be accepted. NEMA and IEC rated starters are acceptable.

2.2 MANUAL MOTOR STARTERS

- .1 Single and Three phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
 - .1 Switching mechanism, quick make and break.
 - .2 One or Three overload heaters, manual reset, trip indicating handle.

- .3 Toggle switch: standard duty labeled "on"/"off".
- .4 Indicating light: standard duty type and red colour.
- .5 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

- .1 Magnetic and combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
 - .1 Contactor solenoid operated, rapid action type.
 - .2 Motor overload protective device in each phase, manually reset from outside enclosure.
 - .3 Wiring and schematic diagram inside starter enclosure in visible location.
 - .4 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.
- .2 Combination type starters to include fused disconnect switch with operating lever on outside of enclosure to control disconnect, and provision for:
 - .1 Locking in "OFF" position with up to 3 padlocks.
 - .2 Independent locking of enclosure door.
 - .3 Provision for preventing switching to "ON" position while enclosure door open.
- .3 Accessories:
 - .1 Pushbuttons Selector switches standard duty labeled as indicated.
 - .2 Indicating lights: standard duty type and color as indicated.
 - .3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.
 - .4 1 red pilot light for "stop" or "off" and 1 green light for "start" or "on".

2.4 CONTROL TRANSFORMER

- .1 Single phase, dry type, control transformer with primary voltage as indicated and secondary voltage to suit remote control device, complete with secondary fuse, installed in with starter as indicated.
- .2 Size control transformer for control circuit load plus 20% spare capacity.

2.5 CONTACTORS

- .1 Electrically held and controlled by pilot devices as indicated and rated for type of load controlled.
- .2 Complete with 2 normally open and 2 normally closed auxiliary contacts unless indicated otherwise.
- .3 Mount in CSA Enclosure 1 unless otherwise indicated.
- .4 Include following options in cover:
 - .1 Red indicating lamp.
 - .2 Hand - Off - Auto selector switch.

- .5 Control transformer: mounted in contactor enclosure.
- .6 Contactors must be definite purpose.

2.6 FINISHES

- .1 Apply finishes to enclosure in accordance with Electrical General Requirements Section.

2.7 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Electrical General Requirements Section.
- .2 Manual starter designation label: black plate, white letters, size 1, engraved as indicated.
- .3 Magnetic starter designation label: black plate, white letters, size 2, engraved as indicated.
- .4 Contactor designation label:
black plate, white letters, size 4, indicating name of load controlled.

2.8 ACCEPTABLE MANUFACTURERS

- .1 The acceptable manufacturers are as follows:
 - .1 Allen Bradley
 - .2 Eaton
 - .3 Siemens
 - .4 Group Schneider
 - .5 Klockner Moeller

Part 3 Execution

3.1 INSTALLATION

- .1 Install starters, connect power and control as indicated.
- .2 Ensure correct fuses and overload devices elements installed.

3.2 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Electrical General Requirements Section.
- .2 Operate switches, contactors to verify correct functioning.
- .3 Perform starting and stopping sequences of contactors and relays.
- .4 Check that sequence controls, interlocking with other separate related starters, equipment, control devices, operate as indicated.
- .5 Install contactors and connect auxiliary control devices.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)
 - .1 ANSI/IEEE C62.41- 1991, Recommended Practices for Surge Voltages in Low-Voltage AC Power Circuits.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM F1137- 88 (1993), Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.
- .3 United States of America, Federal Communications Commission (FCC)
 - .1 FCC (CFR47) EM and RF Interference Suppression.
- .4 IESNA LM-79-08, IES Electrical Method for the Electrical and Photometric Measurements of Solid State Lighting Products.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings in accordance with Electrical General Requirements Section for all light fixtures supplied under this contract.
- .2 Submit complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.
- .3 Photometric data to include: VCP Table spacing criterion.

1.3 SCOPE

- .1 This contractor is responsible to supply and install all lighting fixtures as scheduled and/or indicated including lamp and those accessories required for a complete lighting system. This contractor must coordinate lighting installations with all other Divisions of this project.
- .2 All fixtures must be CSA approved or approved at this contractor's expense by the Special Inspection Division of the Electrical Safety Authority.

1.4 GUARANTEE

- .1 Guarantees for materials replacement shall be as follows from date of substantial completion.
 - .1 LED lamps: 3 months
 - .2 LED fixtures, and driver: 5 years.
- .2 The labour required to replace these ballasts, lamps or drivers must be included in the above guarantee, however only for the extent of the contract guarantee and warranty period as noted in Electrical General Requirements.

Part 2 Products

2.1 FIXTURE CONSTRUCTION

- .1 Fixtures must be constructed of 20 gauge (minimum) cold rolled steel. All metal edges require smooth finish.
- .2 Light leaks must be prevented by providing gasketting, stops, and barriers.
- .3 Fixtures must be finished in high reflective baked white enamel. This surface must have a reflectance of not less than 85%.
- .4 **All fixtures operating on 347 Volts must be provided with an integral disconnecting means conforming to Rule #30-308(4) of the Electrical Safety Code.**

2.2 FIXTURE LENS

- .1 Unless otherwise noted fixture lenses shall be as follows:
 - .1 Lens thickness: 3.2 mm (1/8")
 - .2 Material: injection moulded clear prismatic virgin acrylic
 - .3 Frame: hinged, latched, steel.

2.3 LED FIXTURES

- .1 Fixture LED's must be tested in conformance with IESNA LM80 standard.
- .2 LED's must be selected using a binning algorithm to ensure colour and lumen output of a given fixture are consistent, as well as meet or surpass ANSI C78.377 specification for the rated lifetime of the fixture. Colour accuracy between products must be within a 2-step MacAdam ellipse.
- .3 Luminaires must be tested to IESNA LM79 by an independent approved laboratory.
- .4 Luminaires must be tested prior to shipping.
- .5 Luminaires must be ULC certified and approved for use in Canada.
- .6 Fixtures must maintain a minimum of 90% of their initial light output for 60,000 hours. Submit test results upon request.
- .7 Lumen values indicated for fixtures in the project documents are to be considered as "absolute" or "delivered" values.
- .8 Other than for specialty fixtures, and unless otherwise indicated, the maximum driver current is to be 750 mA.

2.4 EMERGENCY LIGHTING UNITS

- .1 Emergency lighting units must conform to CSA C22.2 No 141 (latest edition).
- .2 Supply voltage: as noted on drawings.
- .3 Output voltage: 12 V DC.
- .4 Battery: sealed, maintenance free, 10 year life.

Note: Battery units must be capable of supplying the wattage indicated for a minimum of 30 minutes.
- .5 Charger: solid state, multi rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.
- .6 Solid state transfer circuit.
- .7 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.
- .8 Signal lights: "AC Power ON" condition and "charging" condition.
- .9 Lamp heads: integral on unit, 345° horizontal and 180° vertical adjustment. Lamp type: minimum 4 watt LED.

- .10 Cabinet suitable for direct of shelf mounting to wall and complete with knockouts for conduit. Removable or hinged front panel for easy access to batteries.
- .11 Auxiliary equipment:
 - .1 Test switch.
 - .2 Ac input and DC output terminal blocks inside cabinet.
 - .3 Shelf.
 - .4 Cord and plug connection for AC. (**Not applicable on 347 V units**).

2.5 REMOTE EMERGENCY LIGHTING FIXTURES

- .1 Remote emergency lighting fixtures must conform to CSA C22.2 No141 (latest edition).
- .2 Fixtures shall be small "micro" size or recessed style as indicated in the Light Fixture Schedule.
- .3 Fixtures must be adjustable type heads with canopy.
- .4 Fixtures are to be provided with protective lexan cube when specified in the Light Fixture Schedule.
- .5 Unless otherwise indicated surface mounted fixtures in washrooms, locker rooms, changerooms, and gymnasiums must be provided with wire guard.

2.6 ACCEPTABLE LIGHTING MANUFACTURERS

- .1 Refer to the light fixture schedule as indicated on drawings.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate and install luminaires as indicated. Luminaires are not to be supported from the roof deck. Provide additional unistrut support channel and/or support from structure. Coordinate with consultant on site.
- .2 Ball align hangers must be provided for rod suspended fixtures.
- .3 Fixtures surface mounted to suspended ceilings must be secured through ceiling assembly to cross member supports. These supports are to be steel channels or angles independently secured **to structure** using # 12 "jack" chain. Each chain must be secured so no fixture weight is added to the ceiling assembly.
- .4 Plaster frames/flange kits must be provided by this Division for fixtures recessed in plaster and/or drywall ceilings.
- .5 Where specified, fixtures to be chain hung shall be hung using "jack" chain with a capacity to suit the fixture weight. Branch circuit wiring feeding these fixtures shall be AC90 cable "ty-wrapped" at 900mm (36") intervals along length of drop. Final appearance must be neat and professional.
- .6 Install exit lighting units with illuminated faces and chevrons/arrows indicating path(s) of exit as indicated. Unless otherwise noted install exit fixtures at 2400 mm (8' 0") above finished floor.

- .7 Install emergency lighting units and associated remote mounted fixtures as indicated.
- .8 Direct "heads" on units and remote mounted fixtures to illuminate path(s) of exit.
- .9 Install emergency lighting units and remote fixtures at 300mm (12") below finished ceiling, unless indicated otherwise.
- .10 Provide a 15 A 120 V duplex receptacle (connected to circuit indicated) adjacent to unit. **Not applicable on 347 V units. This receptacle connection is to be no lower than 8' 0" (2400 mm) AFF.**
- .11 **Special installation: Secure fixtures to structure to conform to the Electrical Safety Code using "jack chain" NOT ceiling suspension wire. Where coreslab is used, suspension point must be independent of the one used for suspension of the ceiling assembly. As an alternate to jack chain the contractor may use a pre-manufactured aircraft cable suspension and fastening system as manufactured by Gripple (Gripple Cat. #HF02-10F2). Provide minimum 2 per fixture.**
- .12 All battery units are to be provided with a visible lamicoid label indicating the unit number as per drawings.

3.2 WIRING

- .1 Connect luminaires to lighting circuits as indicated.
- .2 Connect exit fixtures to exit lighting circuits and unit equipment (if applicable).
- .3 Connect unit equipment to circuits as indicated.
- .4 All wiring of remote emergency fixtures shall be minimum #10 T90 for each circuit and run in conduit. Wiring must be sized in conformance with manufacturer's recommendations for distances required.

3.3 LUMINAIRE ALIGNMENT

- .1 Align luminaires mounted in continuous rows to form straight uninterrupted line.
- .2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 DELIVERIES

- .1 Fixtures are to be completely assembled at the manufacturer's plant and delivered to the project site in original unitized containers. Ensure that a dry, protected and secure space is available for proper storage before scheduling delivery of fixtures.

3.5 TESTING/CERTIFICATION

- .1 At the completion of the project and in the presence of the consultant, test all exit and emergency fixtures. On company letterhead, the contractor is to prepare a chart indicating:
 - .1 Project
 - .2 Date
 - .3 Equipment type
 - .4 Certification of correct connection

- .5 Certification of correct operation
- .6 Duration of test in minutes (minimum 30)
- .7 Actual period of testing (time of day)

.2 Provide "Integrated Testing" of this life safety system in conformance with the noted specification section. Include all associated costs in tender.

3.6 EQUIPMENT ALLOWANCES

- .1 The manufacturer and electrical contractor are to allow in their bid the cost to add two (2) additional standard remote emergency lighting units to be installed and tested in locations as directed by the consultant. Note: This installation and test will be occurring after the initial testing/certification testing is complete.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.
- .2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.
- .3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.
- .4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.
- .5 CAN/ULC-S528 (latest edition), Manual Pull Stations.
- .6 CAN/ULC-S529 (latest edition), Smoke Detectors.
- .7 CAN/ULC-S530 (latest edition), Heat Actuated Fire Detectors, Fire Alarm.
- .8 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.
- .9 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.
- .10 OBC-2012, Ontario Building Code.

1.2 DESCRIPTION OF SYSTEM

- .1 System includes:
 - .1 Existing control panel.
 - .2 Trouble signal devices.
 - .3 Power supply facilities.
 - .4 Addressable manual alarm stations.
 - .5 Addressable automatic alarm initiating devices.
 - .6 Audible and visual signal devices.
 - .7 End-of-line devices.
 - .8 Annunciators.
 - .9 Ancillary devices.
 - .10 Interface and zone modules.
 - .11 Remote trouble indicator.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Electrical General Requirements Section.
- .2 Include:
 - .1 New devices and components.

1.4 OPERATION AND MAINTENANCE DATA

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Electrical General Requirements Section.
- .2 Include:
 - .1 Operation and maintenance instructions for complete fire alarm system to permit effective operation and maintenance.
 - .2 Technical data - illustrated parts lists with parts catalogue numbers.
 - .3 Copy of approved shop drawings.
 - .4 List of recommended spare parts for system.

1.5 SYSTEM OPERATION

- .1 Operation of any alarm initiating device to:
 - .1 Cause audible and visual signal devices to sound throughout building.
 - .2 Transmit signal to fire department via monitoring station.
 - .3 Cause zone of alarm device to be indicated on control panel and remote annunciator(s).
 - .4 Cause air conditioning and ventilating fans to shut down and to function so as to provide required control of smoke movement.
 - .5 Cause fire doors and smoke control doors if normally held open, to close automatically.
 - .6 Log the alarm in the historical alarm log file.
- .2 System Reset
 - .1 It shall not be possible to reset the fire alarm system until all the alarm zones have been properly reset or cleared.
- .3 System Trouble Operation
 - .1 Any system trouble shall cause the following to occur:
 - .1 An audible and visual trouble signal shall sound at the main control panel LCD Display Only until acknowledged by an operator.
 - .2 Log the trouble condition in the separate Historical Trouble Log File.

1.6 PERFORMANCE CRITERIA

- .1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.7 QUALITY ASSURANCE

- .1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "U.L.C." label.

- .2 Each and all items of the fire alarm system shall be covered by a one year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.
- .3 All control equipment must have Transient Protection Devices to comply with U.L.C. requirements.

Part 2 Products

2.1 GENERAL

- .1 The existing fire alarm system is an addressable, single stage, zoned, non-coded, indicating, fully integrated fire alarm. Relocate devices and/or provide new to suit renovation drawings.

2.2 ADDRESSABLE MANUAL ALARM STATIONS

- .1 Manual alarm stations shall be addressable, single action, non-coded, semi-flush mounted type. Pull stations shall be break-glass style. Contacts are to activate when the handle is pulled down.
- .2 Addressable pull station electronics shall be mounted to the back plate of the station. The station's address will be set at the time of installation. Device addressing shall be accomplished by either an electrical or mechanical means.
- .3 Where noted on drawings, stations are to be equipped with tamperproof guard equal to Stopper II Cat. # STI-1100.

2.3 INTELLIGENT DETECTORS-GENERAL OPERATION

- .1 Addressable devices shall use simple to install and maintain decade, numbered 0 to 9, address switches. Detectors that have expanded addressing will have decade switch numbered from 0 to 15 for the most significant digit to allow detector addressing from 1 to 250.
- .2 Device addressing shall be accomplished by either an electrical or mechanical means.
- .3 Detectors shall be intelligent (analog) and addressable and shall connect with two wires to the fire alarm control panel signalling line circuits.
- .4 Addressable smoke detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
- .5 The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.

- .6 Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.
- .7 The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.
- .8 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
- .9 Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).
- .10 Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
- .11 Detectors shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LEDs shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.
- .12 Addressable devices shall provide address-setting means using decimal switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.
- .13 The sensors shall be of a low profile design and ULC listed for both ceiling and wall mount applications.
- .14 Automatic smoke sensors shall be equipped with a dust cover, which shall be removed at the time of verification to prevent dust and dirt entering the smoke chamber during construction.
- .15 A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

2.4 INTELLIGENT MULTI-DETECTOR

- .1 The intelligent multi-detector shall be an addressable device, which is designed to monitor photoelectric, ionization, and thermal technologies in a single sensing device. This detector shall utilize advanced electronics which react to smaller products of combustion found in fast flaming fires (ionization), slow smouldering fires (photoelectric), and heat (thermal) all within a single sensing device.
- .2 The multi-detector shall include two bicolor LEDs, which flash green in normal operation and turn on steady red in alarm.

- .3 Detectors are to be provided with relay base where noted on the drawings.
- .4 Separately mounted photoelectric ionization and heat detectors in the same location are not acceptable alternatives.

2.5 FIXED TEMPERATURE HEAT DETECTOR

- .1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the/ time required to process an alarm. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. The heat detector shall have a nominal alarm point rating of 57°C (135°F). The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.6 FIXED TEMPERATURE/RATE OF RISE HEAT DETECTOR

- .1 These heat detectors shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm, The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 57°C (135°F) and a rate-of-rise alarm point of 9°C (15°F) per minute. The heat detector shall be rated for ceiling installation at a minimum of 21.3m (70') centres and be suitable for wall mount applications.

2.7 PHOTOELECTRIC SMOKE DETECTOR

- .1 The intelligent photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. The detector shall continually monitor any changes in sensitivity due to the environmental affects of dirt, smoke, temperature, aging, and humidity. The photo detector shall be rated for ceiling installation at a minimum of Soft (Olin) centres and be suitable for wall mount applications.
- .2 The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment:
 - .1 Temperature: 0°C to 49°C (32°F to 120°F)
 - .2 Humidity: 0-93% RH, non-condensing
 - .3 Elevation: no limit
- .3 Detectors are to be provided with relay base where noted on the drawings.

2.8 STANDARD DETECTOR MOUNTING BASES

- .1 Provide standard detector mounting bases suitable for mounting on North American 1-gang, 85mm (3 ½ ") or 100 mm (4") octagon box and 100 mm (4") square box. The base shall, contain no electronics, support all detector types and have the following minimum requirements:
 - .1 Removal of the respective detector shall not affect communications with other detectors.
 - .2 Terminal connections shall be made on the room side of the base. Bases which must be removed to gain access to the terminals shall not be acceptable.

2.9 AUDIBLE/VISUAL SIGNAL DEVICES

- .1 Mini Horns: flush mounted temporal mini horn, 24Vdc operation, selectable HIGH/LOW setting 94.5 dBA (high)/89.8 dBA (low) at 3 m (10'), white or red coverplate, FM and ULC listed. Suitable for mounting on a single gang box.
- .2 Strobe: semi-recessed, 24Vdc operation, complete with selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe, red finish, FM and ULC listed. Suitable for mounting on a single gang box.
- .3 Mini Horn/Strobe: flush mounted temporal combination mini horn/strobe, 24 Vdc operation, selectable HIGH/LOW setting 94.5 dBA (high)/89.8 dBA (low) at 3 m (10') selectable 15/30/75/110 candela output (unless otherwise noted set at 75 cd), synchronized strobe white or red coverplate, FM and ULC listed. Suitable for mounting on a single gang box.

NOTES:

- .1 **Signal devices with integral strobe lights in high abuse areas (i.e. gymnasium, change rooms, etc.) must be provided with protective wireguards.**
- .2 **Any surface mounted signal devices must be provided with suitable backboxes supplied by the manufacturer.**
- .3 **Provide synchronization modules to suit signal devices (if required by manufacturer).**
- .4 **Set signal devices in classrooms to LOW setting.**

2.10 END OF LINE RESISTORS

- .1 End-of-line resistors for signalling circuits shall be sized to ensure the correct supervisory current flows in each circuit.
- .2 End-of-line resistors shall be mounted on a stainless steel plate for mounting on a standard single gang box and bear the ULC label.

2.11 INTELLIGENT MODULES – GENERAL OPERATION

- .1 The modules shall have a minimum of 2 diagnostic LED's mounted behind a finished coverplate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:
 - .1 Temperature: 0°C to 49°C (32°F to 120°F).
 - .2 Humidity: 0-93% RH, non-condensing.

2.12 MONITOR MODULE

- .1 The monitor modules shall have the following operating characteristics:

A flashing LED indicates that the module is in communication with the control panel. The LED latches steady on alarm (subject to current limitations on the loop).
- .2 The monitor modules shall have the following features:

Nominal operating voltage:	15 to 32 VDC.
Maximum current draw:	5.1 mA (LED on)
Average operating current:	400 uA (LED flashing)
EOL resistance:	47K ohms.
Temperature range:	0°C to 49°C (32°F to 120°F)
Humidity range:	10% to 93% noncondensing
Dimensions:	114.3mm (4.5") high x 101.6 mm (4") wide x 31.75 mm (1.25") deep. Mounts to a 101.6 mm (4") square x 53.975 mm (2.1/8") deep box.

2.13 ISOLATOR MODULE

- .1 Fault isolator modules shall be provide to automatically isolate wire-to-wire short circuits on an SLC loop. The fault isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop. If a wire-to wire short occurs, the fault isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the fault isolator module shall automatically reconnect the isolated section of the SLC loop. The fault isolator module shall not require any address-setting, and its' operations shall be totally automatic. It shall not be necessary to replace or reset a fault isolator module after its normal operation. The fault isolator module shall mount in a standard 10.16 cm (4") deep electrical box, in a surface-mounted backbox, or in the fire alarm control panel. It shall provide a single LED which shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.14 CONTROL MODULE

- .1 Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

- .2 The control module NACs may be wired for Style Z or Style Y (Class A/B) with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% or all auxiliary relay or NACs may be energized at the same time on the same pair of wires.
- .3 The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 Amps at 30 VDC.

2.15 REMOTE TROUBLE INDICATOR

- .1 A system remote trouble indicator where noted on the drawings shall be provided complete with the following features:
 - .1 Flush mounted in a double gang box.
 - .2 Trouble LED.
 - .3 Trouble buzzer.

2.16 SYSTEM WIRING

- .1 The system wiring must be FSA rated in conformance with the Electrical Safety Code to suit the type of installation.
- .2 Wiring shall be minimum #18 AWG twisted shielded pair in conduit. "Securex 2" armoured cable will be permitted to be used for "drops" to devices on accessible ceilings.
- .3 As indicated on system riser diagram initiating device wiring shall be run in a loop with a home run from the last device to the control panel (Class 'A' configuration). Wiring from the "loop" module to conventional devices must be supervised, run in conduit, and conform to the standards of the Electrical Safety Code.
- .4 Signal wiring is to be cross connected in a class 'B' configuration.
- .5 Install isolator modules and end of line resistors in service rooms no higher than 2.4 M AFF. Provide location of these devices at the time of shop drawing submission.
- .6 **These are the basic wiring requirements for system operation. Prior to tender close manufacturer and contractor are to confirm all necessary wiring specifications and requirements.**

2.17 APPROVED EQUIPMENT

<u>DEVICE</u>	<u>AUTOCALL</u>
<u>Control Panel</u>	
	4007-ES
<u>Intelligent Devices</u>	
Addressable Multi-Sensor	FSP-851TA
Addressable Base	B710LPA
Addressable Base c/w Relay	B224RBA
Monitor Module	FMM-1A
Control Module	FCM-1 or FRM-1
Isolator Module	ISO-XA
<u>Conventional and Auxiliary Devices</u>	
Strobe	SRA (System Sensor)
Remote Trouble Indicator	RTB

Part 3 Execution

3.1 INSTALLATION

- .1 New components shall be installed in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation, All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.
- .2 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .3 Locate and install detectors and connect to alarm circuit wiring. **Do not mount detectors within 1 m (39") of air outlets.** Maintain at least 600 mm (24") radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.
- .4 Connect alarm circuits to main control panel.
- .5 Locate and install signal devices and connect to signalling circuits.
- .6 Connect signalling circuits to main control panel.
- .7 Install end-of-line devices at end of applicable alarm and signalling circuits.
- .8 **Connect smoke damper integral detector outputs to monitor modules and include dual voltage relay for supervision of AC power to smoke damper as trouble condition as detailed on design drawings.**

3.2 FIELD QUALITY CONTROL

- .1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.3 ACCEPTABLE INSTALLER

- .1 The fire alarm/life safety system specified herein shall be installed by an Authorized Electrical Contractor who is CFAA certified.

3.4 EXAMINATION

- .1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm / Life Safety System and all associated components are to be installed shall be made.
- .2 Any of these area(s) which are found to be outside the manufacturers' recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Building Owners Representative, and the Consultant.
- .3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.5 DEMONSTRATION

- .1 Each of the intended operations of the installed Fire Alarm / Life Safety System shall be demonstrated to the Building Owners' Representative and the Consultant.

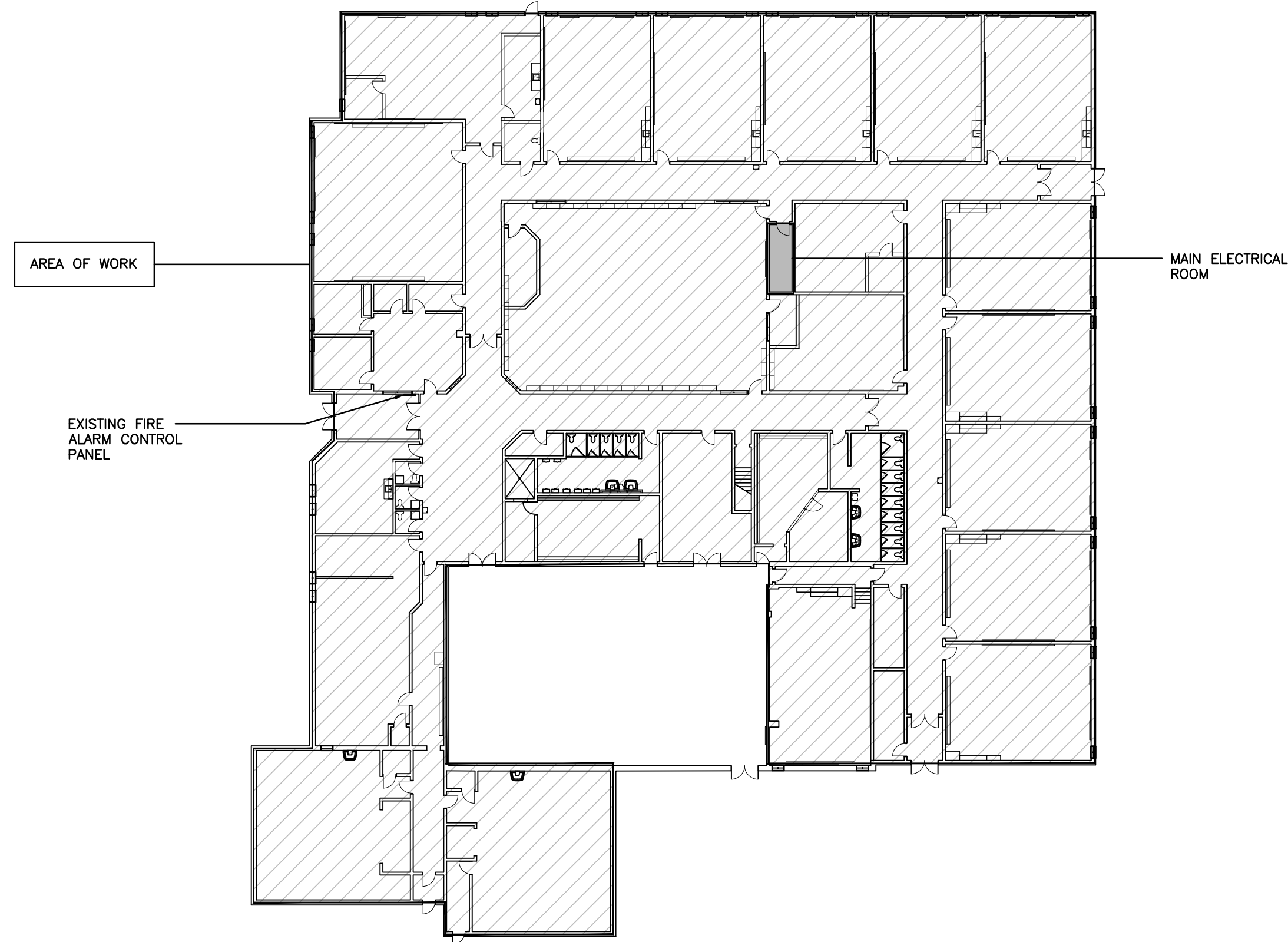
3.6 SYSTEM TEST

- .1 Perform tests in accordance with General Electrical Requirements Section and CAN/ULC-S537-(latest edition) Standard for the Verification of Fire Alarm Systems.
- .2 Fire alarm system:
 - .1 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm and ancillary devices.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.
 - .4 Class A circuits.
 - .1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on all circuits for capability of providing alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .5 Class B circuits
 - .1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

- .3 The control panel shall continuously perform as automatic self-test routine on each sensor, which will functionally check the sensor electronics and ensure the accuracy of the valves being transmitted to the control panel.
- .4 Automatic testing will occur at a rate of one sensor every four minutes.
- .5 The sensor's average analogue value is the average of the last 2000 recorded analogue entries of its chamber.
- .6 Any sensor that fails this test shall indicate a '**SELF-TEST ABNORMAL**' trouble condition with the sensor's address at the control panel.
- .7 The system shall automatically indicate when an individual sensor needs cleaning. When the sensor's average value reaches a predetermined value, a '**DIRTY SENSOR**' trouble condition shall be audibly and visually indicated at the local control panel for that sensor. IF a '**DIRTY SENSOR**' indication is left unattended and its average value increases to a second predetermined value, an '**EXCESSIVELY DIRTY SENSOR**' trouble condition shall be indicated at the local control panel for that sensor. To prevent false alarms, these '**DIRTY**' conditions shall in no way decrease the amount of smoke obscuration necessary to generate an alarm condition.
- .8 An operator having a proper access level, shall have the capability to manually access the following information from the control panel:
 - .1 Primary Status
 - .2 Device Type
 - .3 Present Average Value
 - .4 Present Sensitivity Selected*
 - .5 Highest Peak Detection Values (HVP)*
 - .6 Sensor Range (Normal, Dirty, Excessively Dirty)

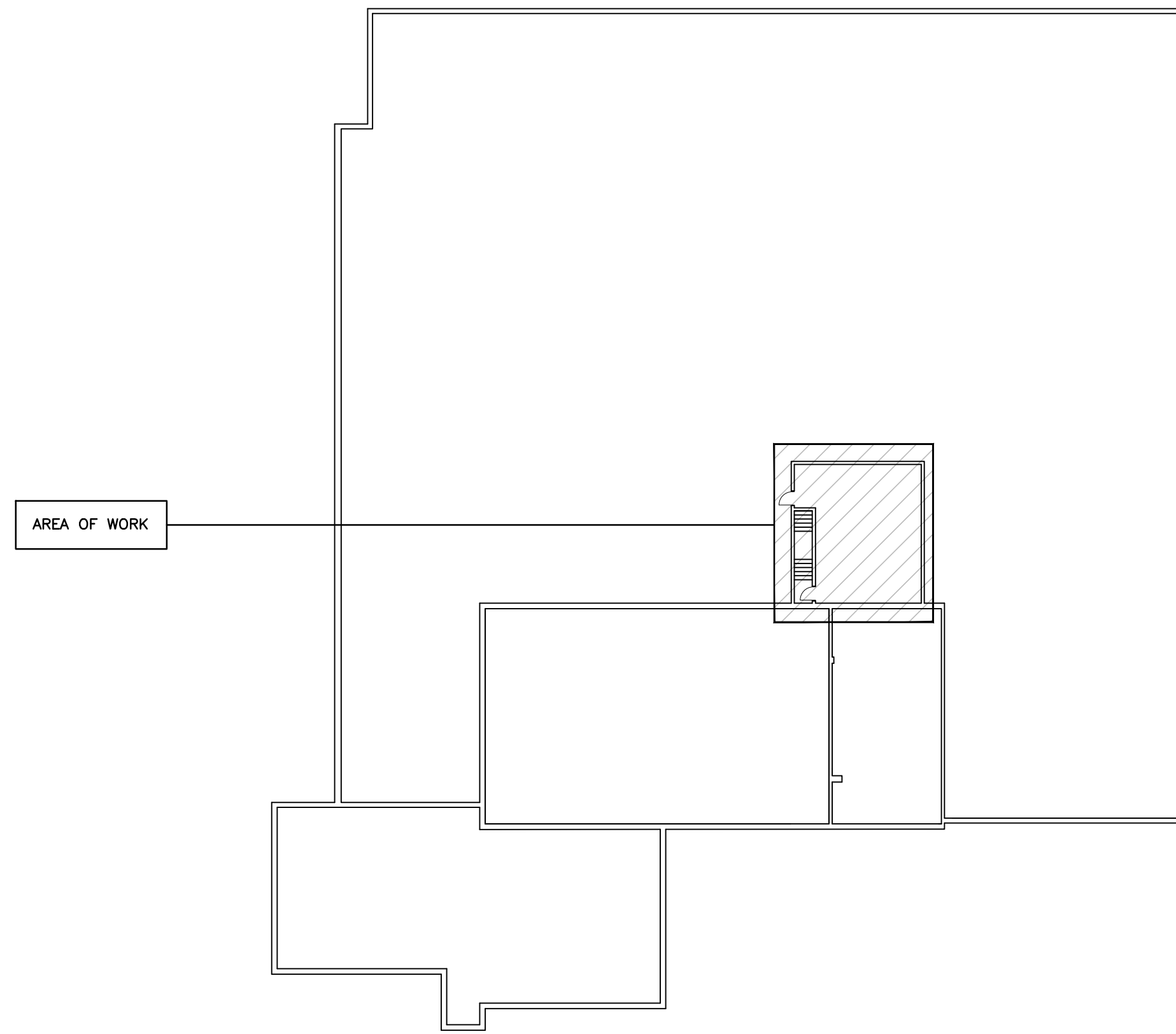
* Values shall be in 'percent of smoke obscuration' format so that no interpretation is required by the operator.
- .9 **Provide "Integrated Testing" of this life safety system in conformance with the noted specification section. Include all associated costs in tender.**

END OF SECTION



OVERALL PLAN - GROUND FLOOR
SCALE: 1:200

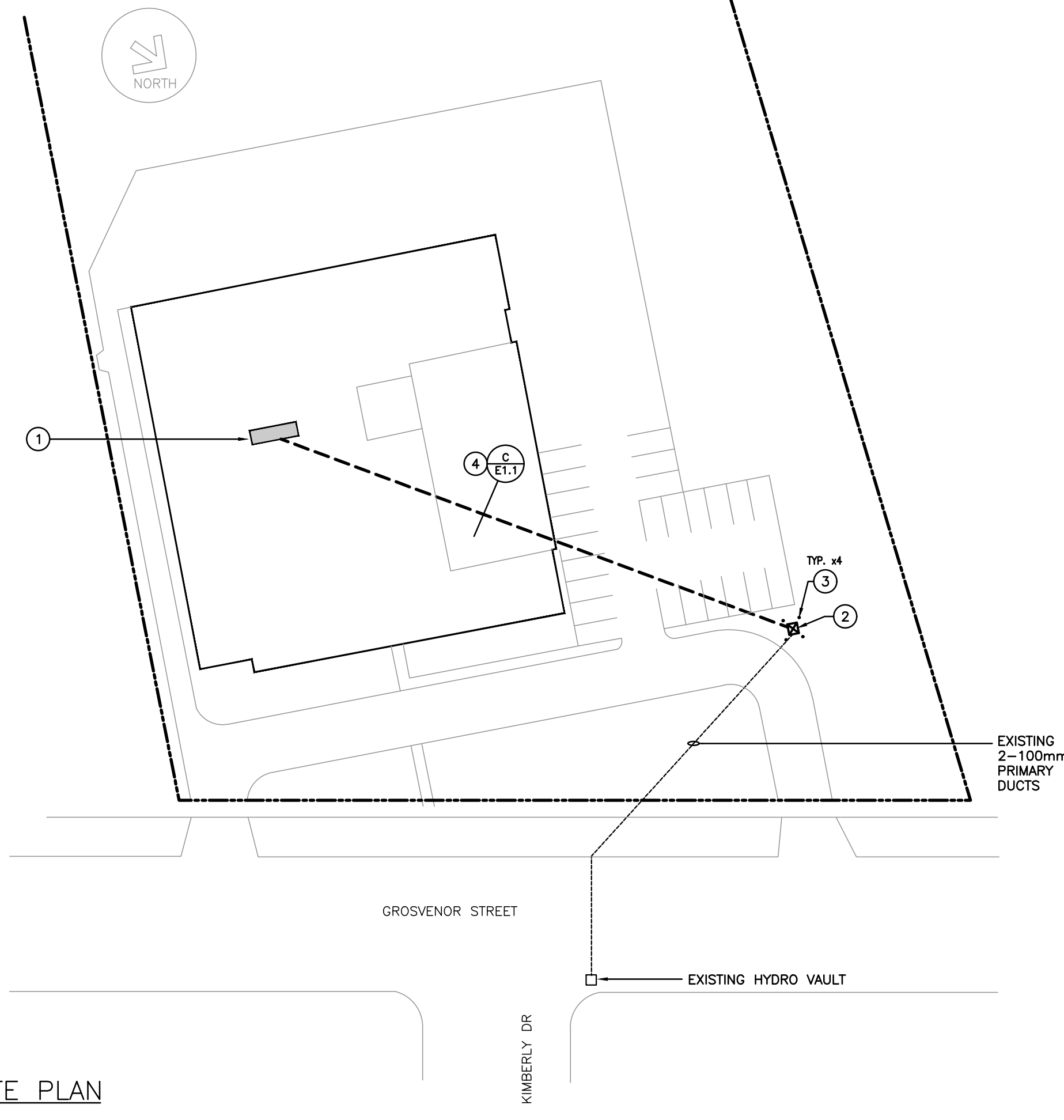
NOTE:
ALL ELECTRICAL DRAWING LAYOUTS ARE
ROTATED 90° CLOCKWISE TO THAT OF THE
ARCHITECTURAL SETS



OVERALL PLAN - ROOF
SCALE: 1:200

SPECIFIC NOTES

- INDICATES APPROXIMATE LOCATION OF MAIN ELECTRICAL/METER ROOM. REFER TO FLOOR PLANS FOR EXACT LOCATION.
- INDICATES LOCATION OF NEW PAD MOUNTED TRANSFORMER. REFER TO DETAIL A/E1.1.
- INDICATES PROTECTIVE BOLLARDS PER DETAIL B/E1.1.
- INDICATES EXISTING ROUTING OF 2-100mm SECONDARY DUCTS. ONE IS USED AND ONE IS SPARE. CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING FEEDER CABLE (4-300MCM RW90) IN USED DUCT, PULL BACK AND DISPOSE. CONTRACTOR SHALL INCLUDE FOR CLEANING OUT DUCT SUITABLE FOR PULLING CABLE, WASHING, AUGERING, BRUSHING AND OTHER NECESSARY OPERATIONS TO CLEAN OUT EXISTING DUCT UNTIL PROPER MANDREL OR SLUG CAN BE PULLED THROUGH PROVING DUCT SATISFACTORY FOR USE.

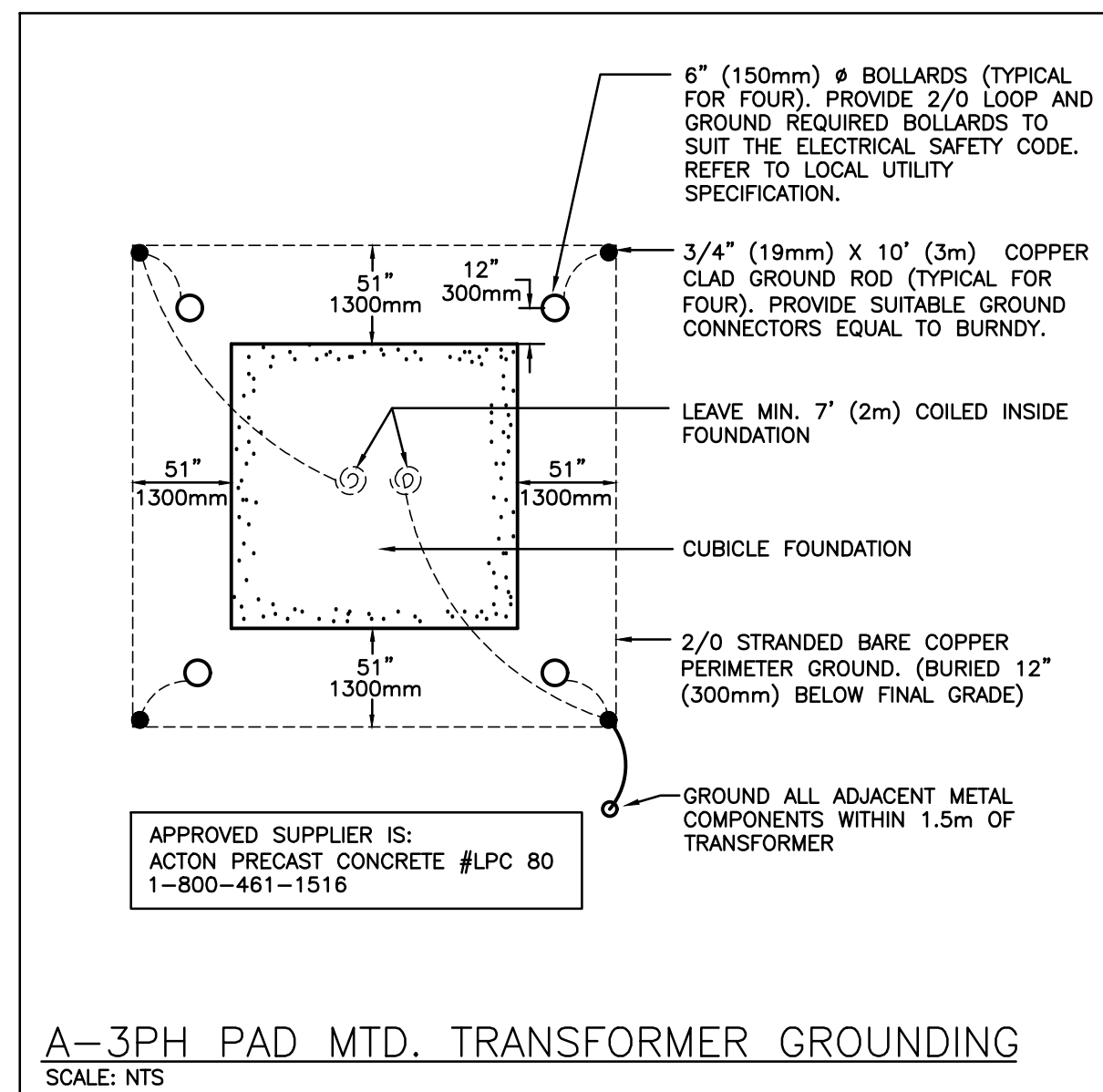


PARTIAL SITE PLAN
SCALE: 1:400

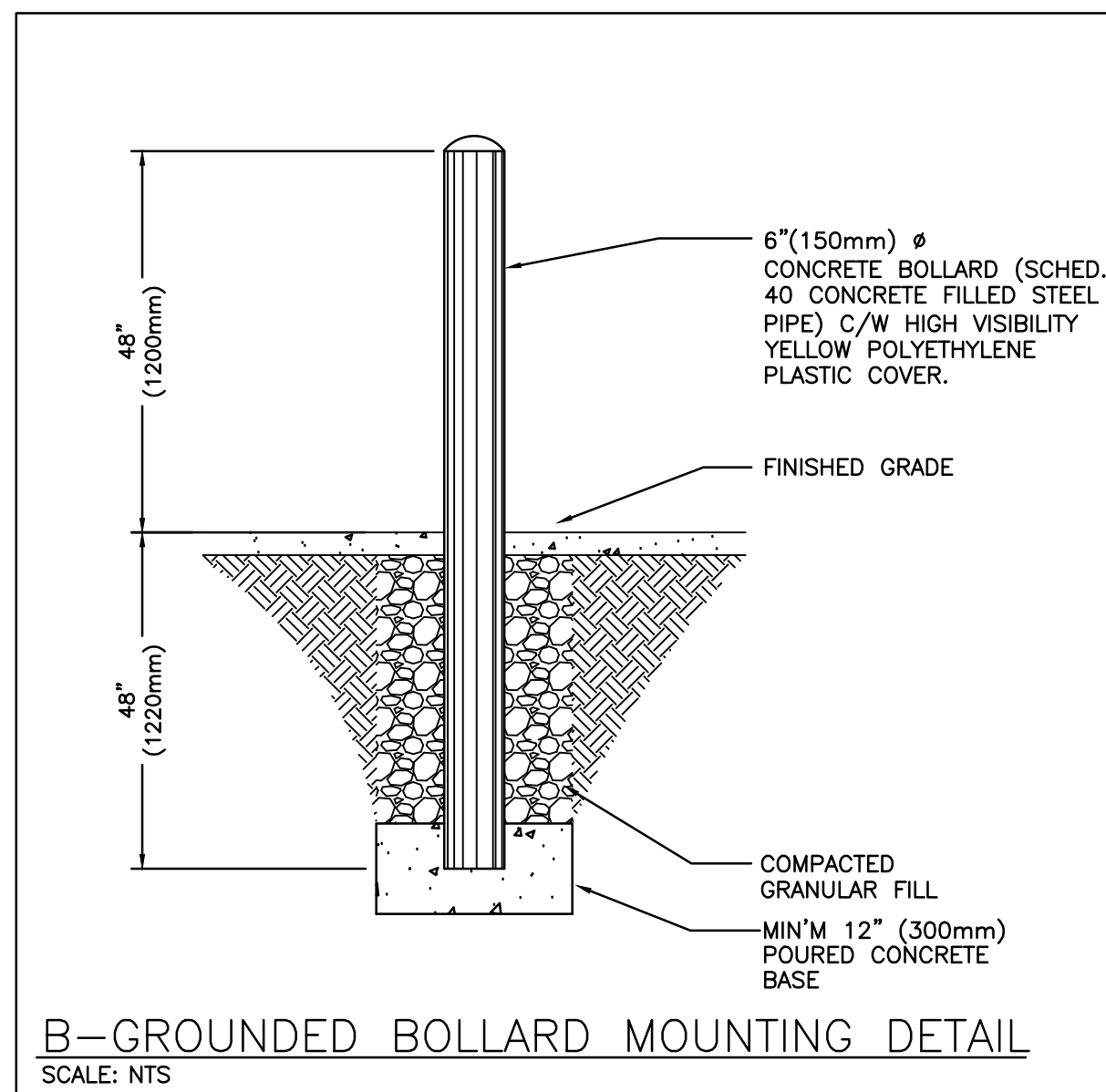
ELECTRICAL SYMBOLS

NOTE: ALL SYMBOLS MAY NOT BE USED

LIGHTING		POWER	
[Symbol]	LIGHT FIXTURE TYPE AS INDICATED	[Symbol]	WALL MOUNTED RECEPTACLE (15A-120V)
[Symbol]	LIGHT FIXTURE (HATCHING DENOTES NIGHTLIGHT)	[Symbol]	WALL MOUNTED T-SLOT RECEPTACLE (20A-120V)
[Symbol]	CEILING OR WALL MOUNTED LIGHT FIXTURE TYPE AS INDICATED	[Symbol]	T-SLOT RECEPTACLE MTD. ABOVE COUNTER (20A-120V)
[Symbol]	POLE MOUNTED LIGHT FIXTURE	[Symbol]	RECEPTACLE MTD. ABOVE COUNTER S=SPLIT (15A-120V)
[Symbol]	SINGLE OR TWIN EMERGENCY LIGHTING FIXTURE	[Symbol]	DIRECT CONNECTION
[Symbol]	SINGLE POLE SWITCH (3=3 WAY, 4=4 WAY, P=PILOT LIGHT, K=KEYED, DM=DIMMER, M=MOTOR RATED)	[Symbol]	JUNCTION BOX
[Symbol]	OCCUPANCY SENSOR (PASSIVE)	[Symbol]	PULLBOX
[Symbol]	CEILING MOUNTED MOTION SENSOR	[Symbol]	PANEL AS INDICATED
[Symbol]	WALL MOUNTED MOTION SENSOR	[Symbol]	FUSED DISCONNECT
[Symbol]	DIGITAL WALL STATION. "X" DENOTES NUMBER OF BUTTONS	[Symbol]	UNFUSED DISCONNECT
[Symbol]	LIGHTING NETWORK BRIDGE	[Symbol]	VARIABLE FREQUENCY DRIVE
[Symbol]	DIGITAL ROOM CONTROL POWER PACK	[Symbol]	TIME CLOCK
GENERAL		[Symbol]	MANUAL STARTER
ER	INDICATED EXISTING ITEM TO REMAIN	[Symbol]	MAGNETIC STARTER
D	INDICATES EXISTING ITEM TO BE DELETED	[Symbol]	COMBINATION MAGNETIC STARTER
R	INDICATES EXISTING ITEM TO BE RELOCATED/IN RELOCATED POSITION	[Symbol]	HAND DRYER
WG	WIREGUARD	[Symbol]	PUSH-BUTTON STATION (QUANTITY OF BUTTONS AS PER PLANS)
GF	GROUND FAULT	[Symbol]	CONTACTOR
WP	WEATHERPROOF	[Symbol]	THERMOSTAT (RA=REVERSE ACTING)
IG	ISOLATED GROUND	[Symbol]	TRANSFORMER
[Symbol]	NOTE INDICATOR	ACCESS CONTROL	
[Symbol]	MECHANICAL ITEM NO.	[Symbol]	ELECTRIC STRIKE. CONFIRM ROUGH WITH DOOR HARDWARE.
ELECTRIC HEAT		[Symbol]	"PUSH-TO-LOCK" BUTTON
[Symbol]	BASEBOARD ELECTRIC HEATER (TYPE AS INDICATED)	[Symbol]	EMERGENCY PUSH BUTTON STATION
STANDARD CIRCUIT LABELING		[Symbol]	"ASSISTANCE REQUIRED" DOME LIGHT WITH SOUNDER
POWER PANEL LABEL CIRCUIT INDICATION SWITCH LEG (IF APPLICABLE)		[Symbol]	"ASSISTANCE REQUIRED" INDICATOR LIGHT WITH SOUNDER
		FIRE ALARM	
		[Symbol]	ALARM STROBE
		[Symbol]	FIRE SMOKE DAMPER



A-3PH PAD MTD. TRANSFORMER GROUNDING
SCALE: NTS



B-GROUNDED BOLLARD MOUNTING DETAIL
SCALE: NTS

Client
HALTON CATHOLIC DISTRICT SCHOOL BOARD
Project
HOLY FAMILY SCHOOL

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2	Issued for Coordination	2024-03-11
3	Issued for Bids & Building Permit	2024-03-26

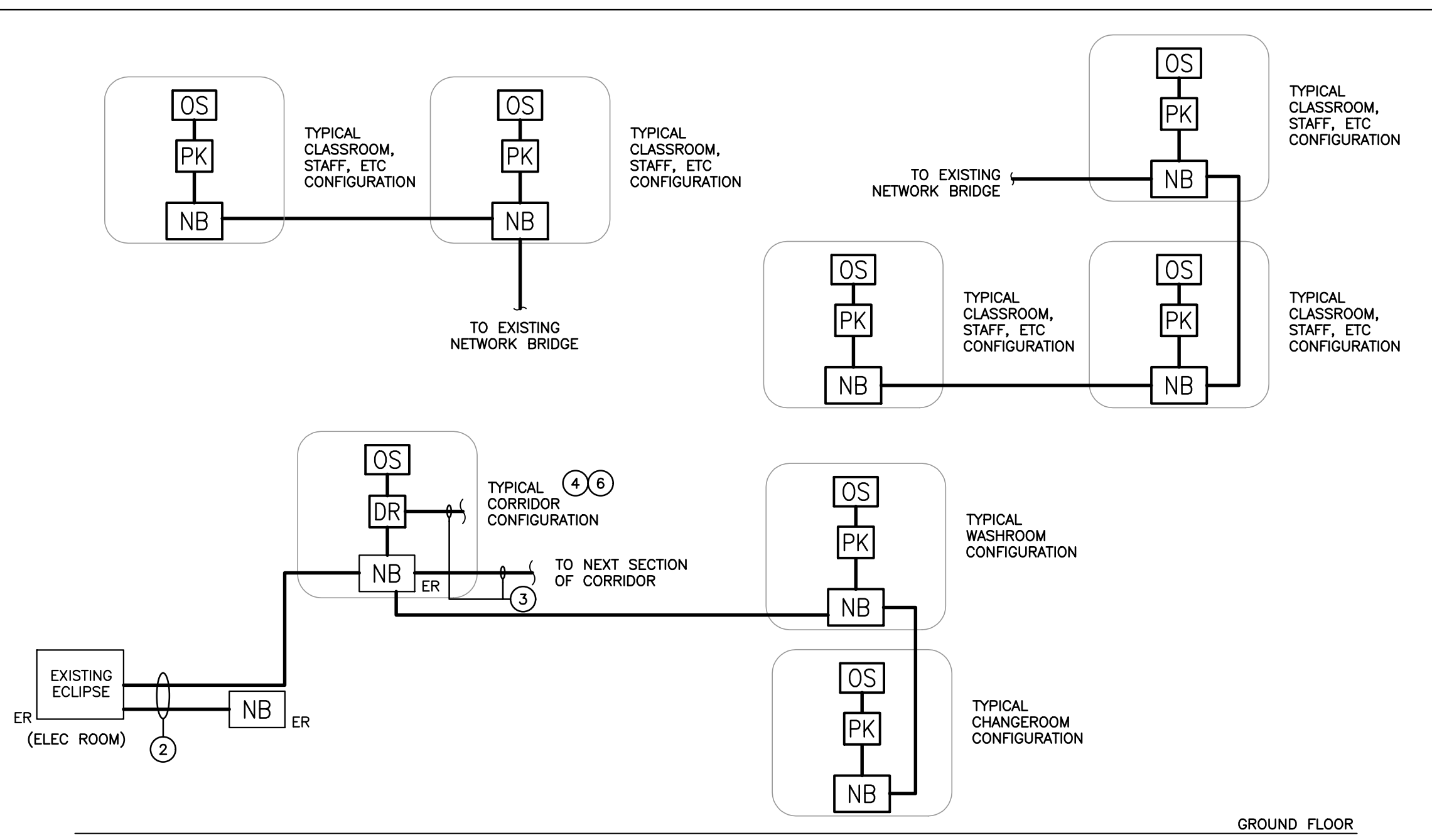
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Drawing Title
SITE PLAN, LEGEND AND OVERALL PLANS

Scale: AS NOTED
Date:
Drawn by: CP
Checked by: MEK
Job No.: **2325**
Drawing No.: **E11**

This drawing is issued in 24"x36" sheet size. If not the above size, interpret the drawing accordingly.



NOTES

- REFER TO INDIVIDUAL SPACE CONTROL SYSTEMS, DETAILS AND FLOOR PLANS FOR QUANTITY OF RELAYS, DEVICES, ZONES AND DIGITAL WALL STATION CONTROLS.
- CONTRACTOR TO INSTALL MS/TP CABLE FROM NETWORK MANAGER (ECLIPSE CONTROLLER) TO EACH NETWORK BRIDGE AND BETWEEN NETWORK BRIDGES PER MANUFACTURERS RECOMMENDATIONS.
- INDICATES CONTROL CABLE BETWEEN DEVICES AND RELAY DIMMING CONTROLLERS AND TO NETWORK BRIDGES.

A-NETWORK LIGHTING CONTROL

SCALE: NTS

LIGHTING CONTROL SYSTEMS SEQUENCE OF OPERATION

Space Type	Room Names	Control Sequence / Control Device(s)	Control System
Corridors/Vestibules	TYPICAL FOR SCHOOL CORRIDORS, VESTIBULES, STAIRWELLS	Sequence: AUTO ON: Segment manager signal corridor zones after school opening to allow occupancy sensors to adjust fixture brightness. ON FULL: Lights turned to 100% output via occupancy in each corridor zone. NORMAL HOURS AUTO ADJUST: 5 minutes after corridor zone is vacated, lights dim to 40% output. AUTO OFF: Network manager signal corridor zones after school closing to restrict occupancy sensors to switch fixtures on/off only. AFTER HOURS AUTO OFF: 5 minutes after corridor zone is vacated, lights turn off.	DIGITAL RELAY SYSTEM C/W NETWORK MANAGER CONTROL
Enclosed Offices	TYPICAL	Sequence: ON: Lights turned on manually via wall station(s). ADJUST: The occupant manually adjusts lighting within the room to desired level or preset in each group via wall dimmer. OFF: 10 minutes after the room has been vacated, the lights will automatically turn off.	DIGITAL ROOM CONTROL SYSTEM
Public Washrooms /Change Rooms /Private Washrooms	TYPICAL	Sequence: ON: Lights turned on automatically via occupancy sensor (where applicable). OFF: 5 minutes after the room has been vacated, the lights will automatically turn off. AUTO OFF: Network manager signal corridor zones after school closing to restrict occupancy sensors to switch fixtures on/off only.	DIGITAL RELAY SYSTEM C/W NETWORK MANAGER CONTROL
Classrooms/Staffrooms	TYPICAL	Sequence: ON: Lights turned on manually via wall station(s) (vacancy mode). ADJUST: The occupant manually adjusts lighting within the room to desired level via wall dimmer. OFF: 10 minutes after the room has been vacated, the lights will automatically turn off. OVERRIDE: User manually adjusts fixture zone lighting levels or on/off and that state shall remain without reverting to previous state unless sensors do not detect occupancy for extended period, whereby normal sensor operation is to resume. AUTO OFF: Network manager signal zones after school closing to restrict occupancy sensors to switch fixtures on/off only.	DIGITAL RELAY SYSTEM C/W NETWORK MANAGER CONTROL
Library/Stage	TYPICAL	Sequence: ON: Lights turned on manually via wall station(s) (vacancy mode). ADJUST: The occupant manually adjusts lighting within the room to desired level via wall dimmer. OFF: 5 minutes after the room has been vacated, the lights will automatically turn off. OVERRIDE: User manually adjusts fixture zone lighting levels or on/off and that state shall remain without reverting to previous state unless sensors do not detect occupancy for extended period, whereby normal sensor operation is to resume. AUTO OFF: Network manager signal zones after school closing to restrict occupancy sensors to switch fixtures on/off only.	DIGITAL RELAY SYSTEM C/W NETWORK MANAGER CONTROL

SYSTEM DESCRIPTIONS:

DIGITAL RELAY SYSTEM C/W NETWORK MANAGER

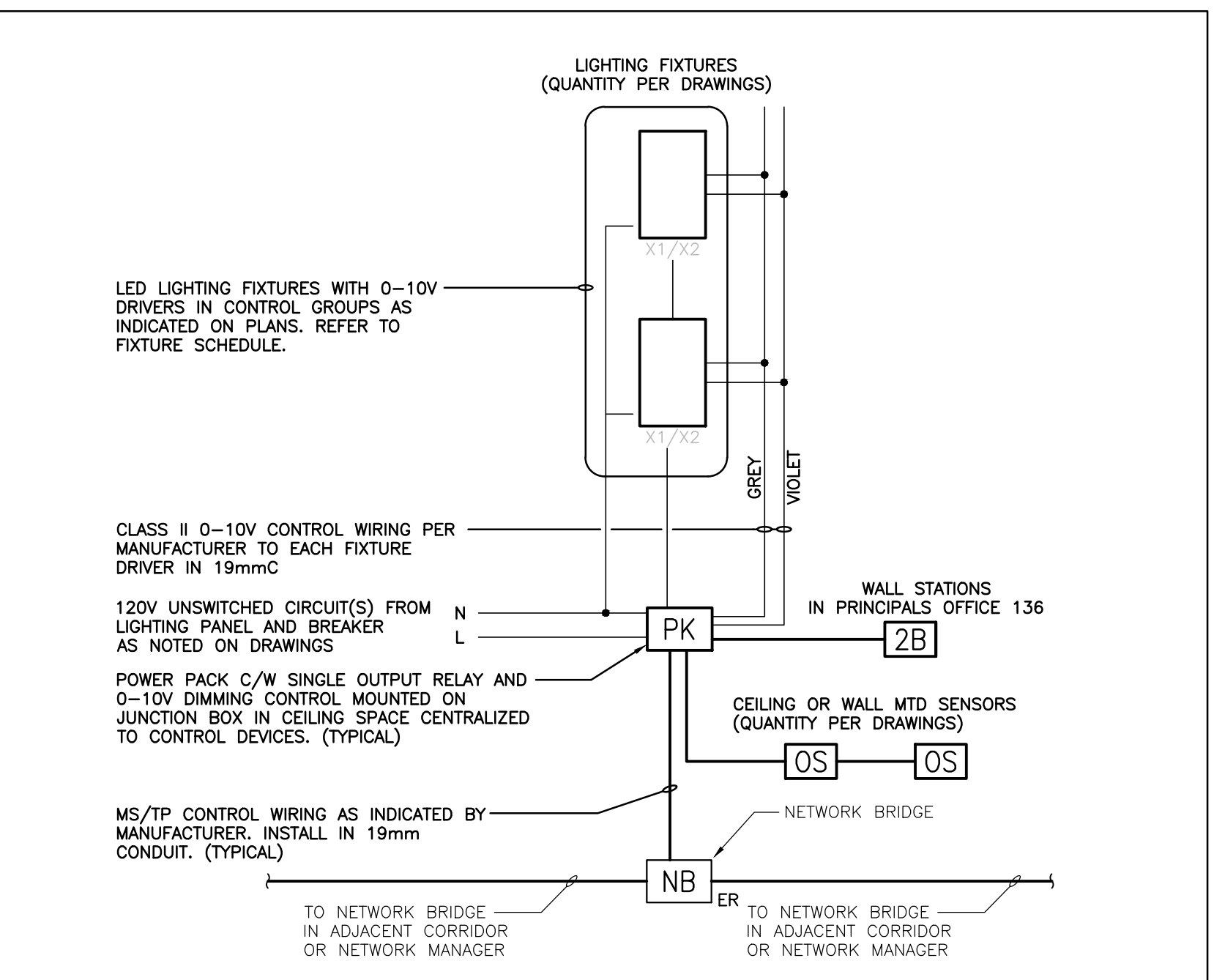
DIGITAL ROOM CONTROL RELAY POWER PACKS C/W PLUG AND PLAY DIGITAL SENSORS AND WALL MOUNT CONTROL STATIONS.
REFER TO SPECIFICATIONS SECTION 26 51 16.

LINE VOLTAGE OCCUPANCY CONTROL SYSTEM

LINE VOLTAGE WALL SENSOR SWITCHES AND LINE VOLTAGE POWER PACKS WITH HARD WIRED SENSORS.
REFER TO SPECIFICATIONS SECTION 26 05 75.

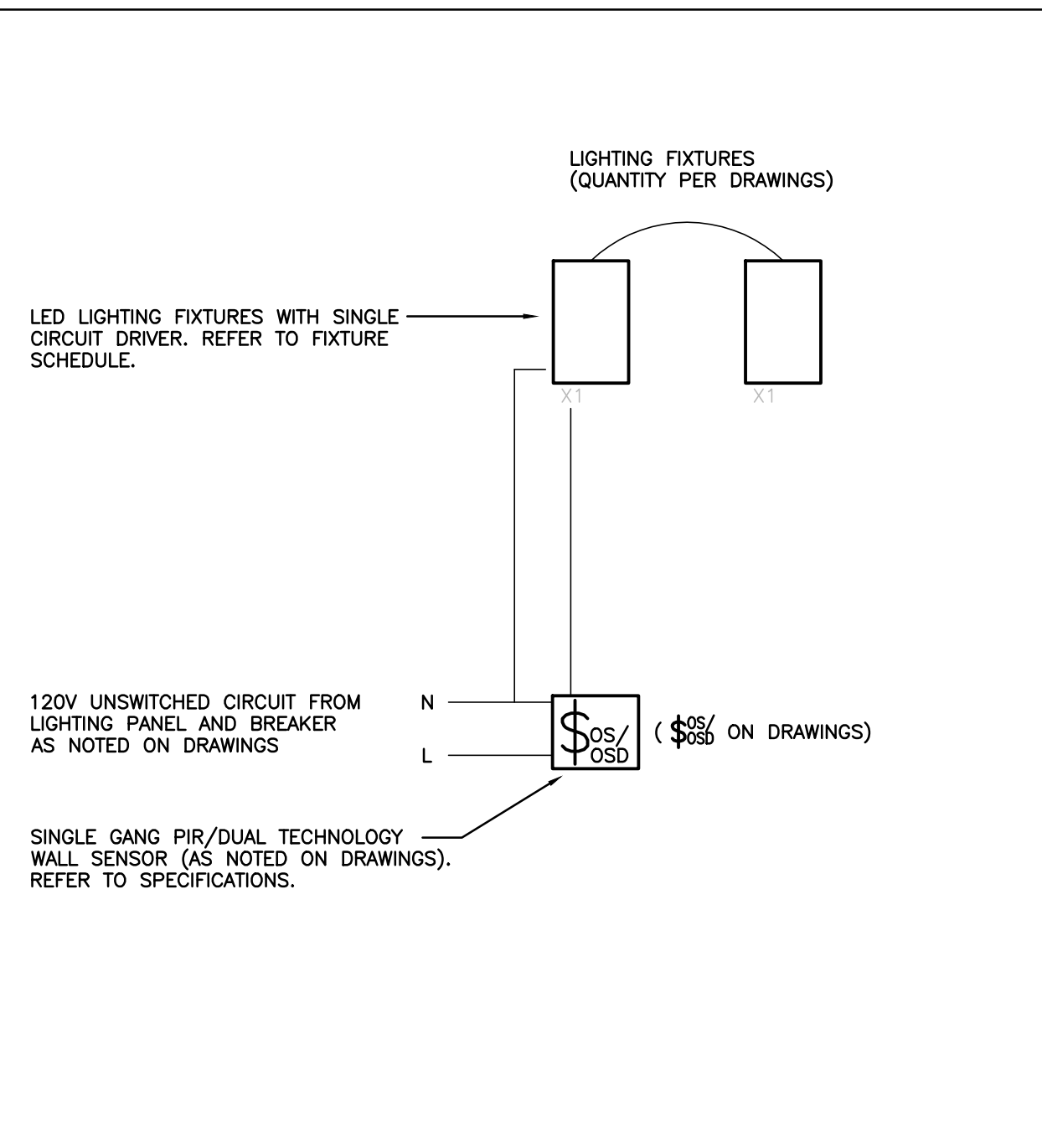
NOTES:

- ALL DIGITAL RELAY SYSTEMS NOTED WITH NETWORK CONTROL SHALL BE INTERCONNECTED VIA NETWORK BRIDGES (WHERE SHOWN) AND MS/TP TO NETWORK MANAGER, HOWEVER ALL ROOMS ARE TO BE PROGRAMMED TO FUNCTION INDEPENDENTLY.



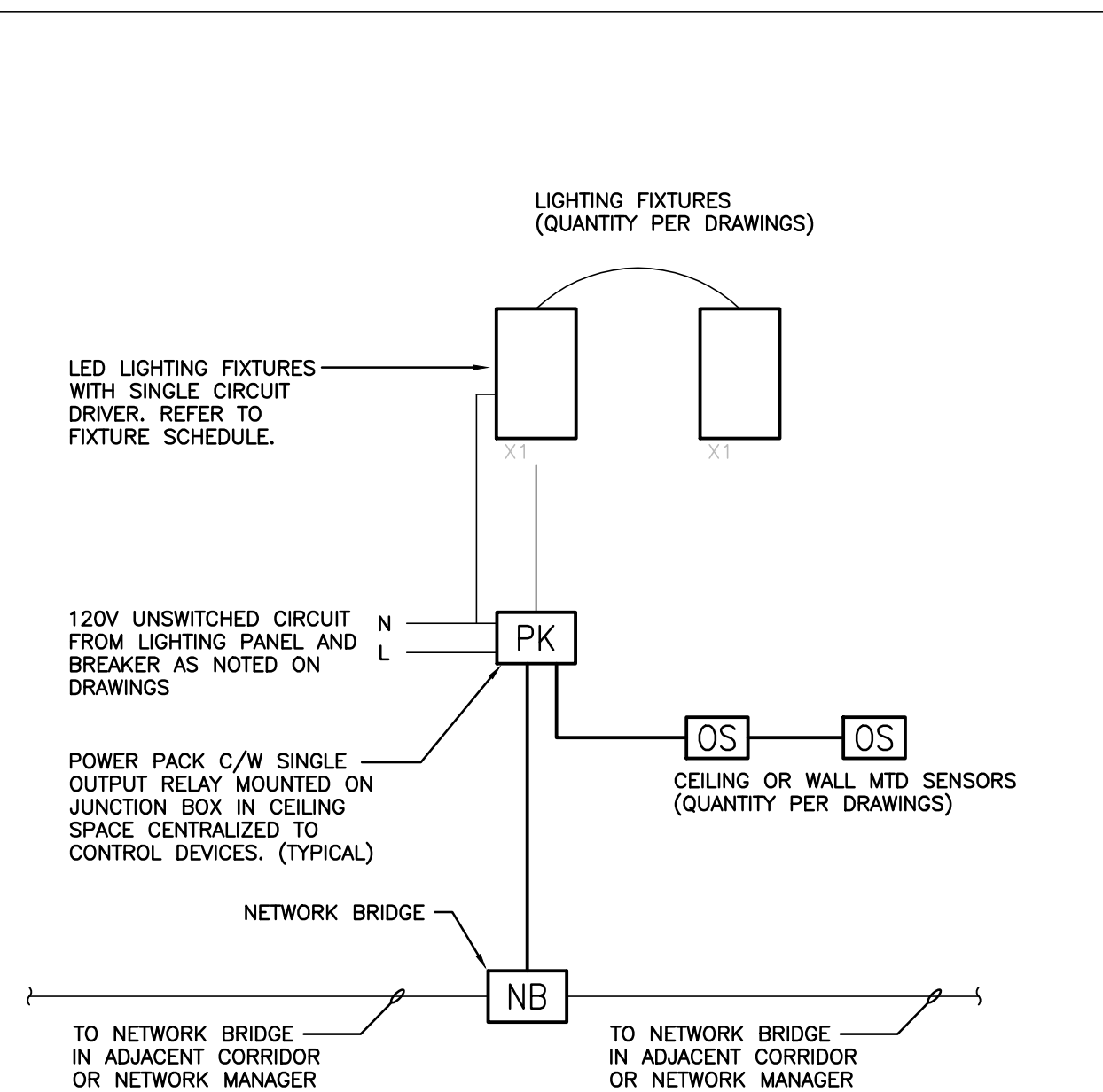
B-TYPICAL CORRIDOR SECTION OCCUPANCY CONTROL

SCALE: N.T.S.



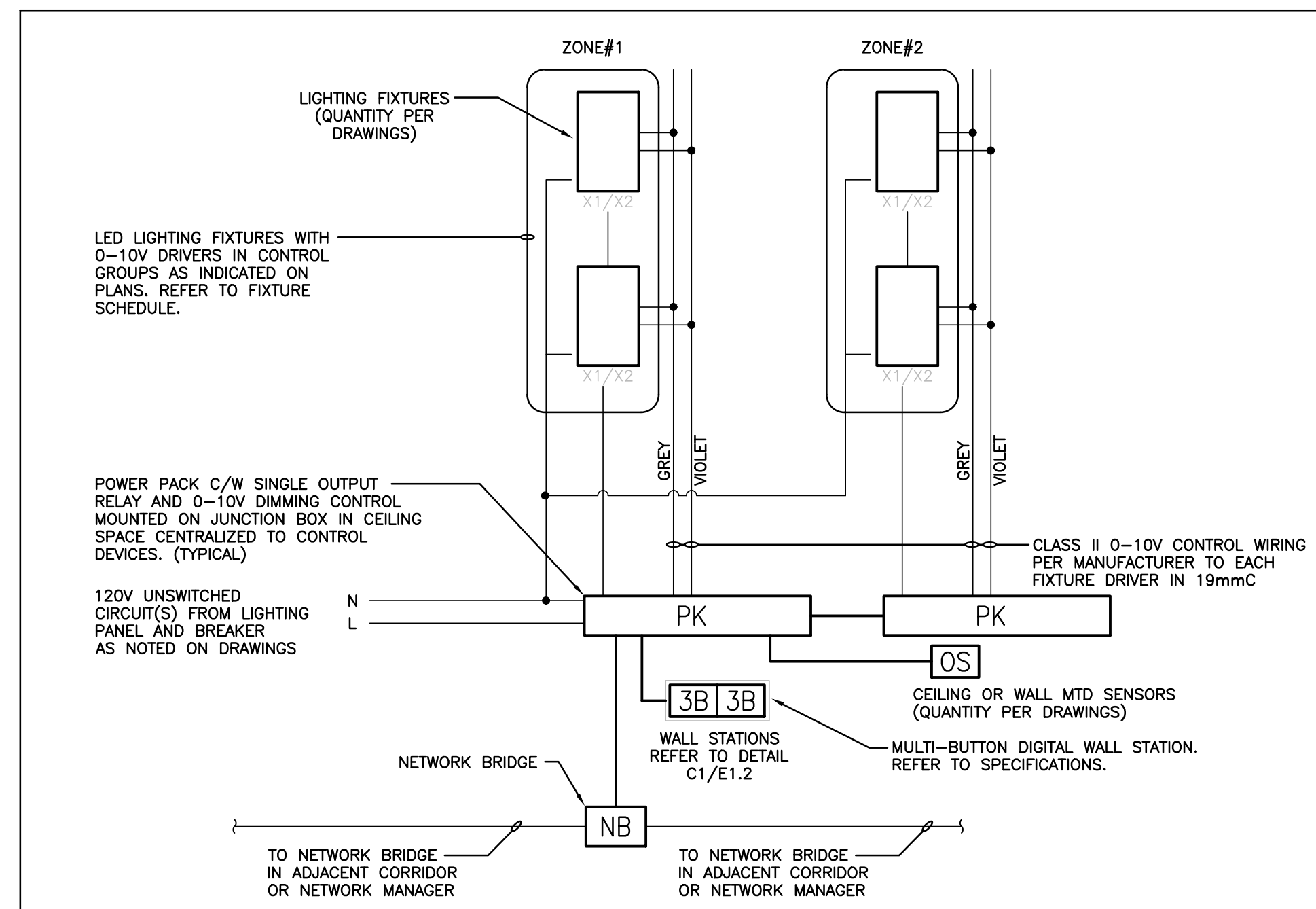
D-OCCUPANCY CONTROL

SCALE: N.T.S.



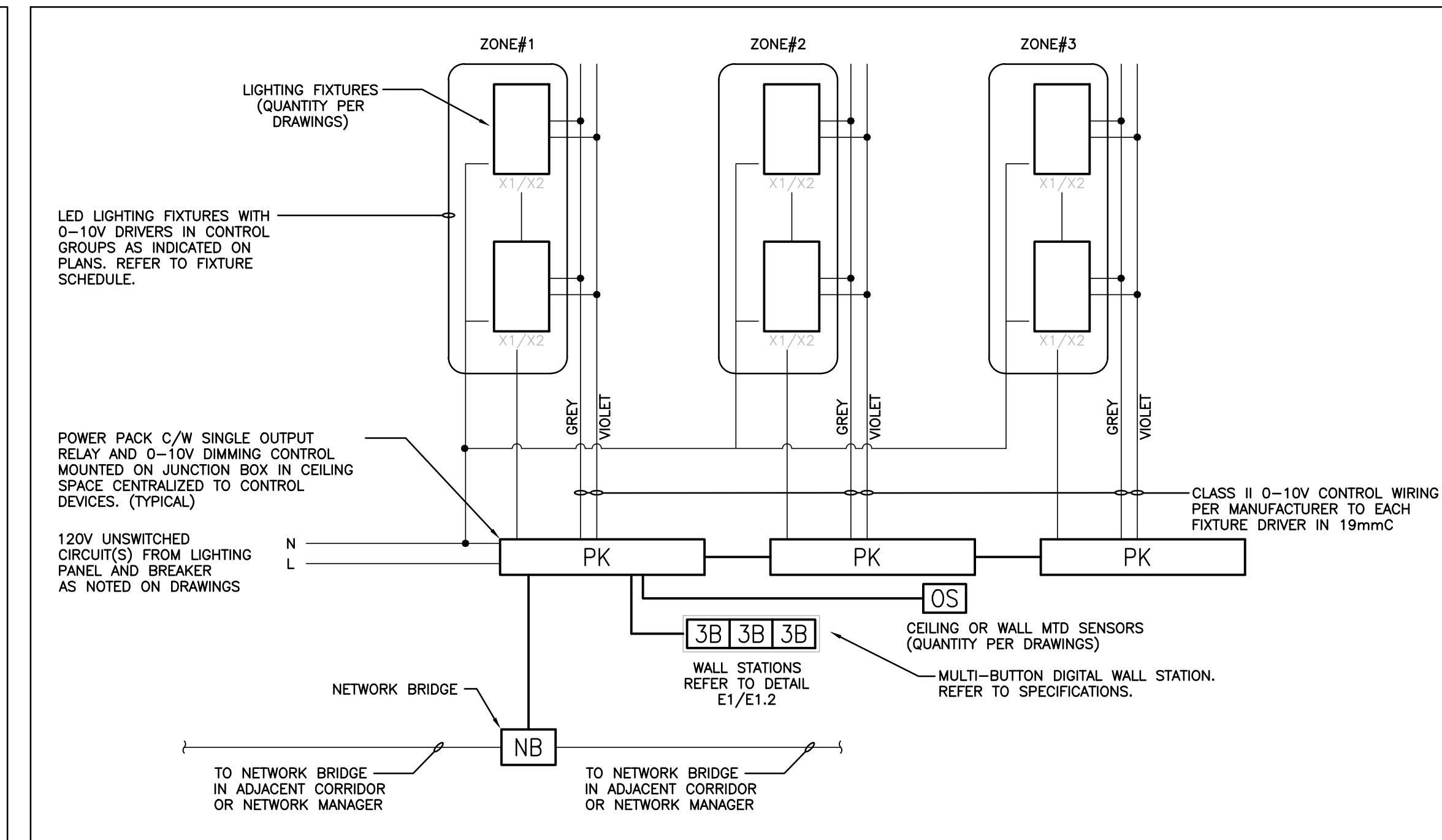
F-WASHROOM/CHANGEROOM OCCUPANCY CONTROL

SCALE: N.T.S.



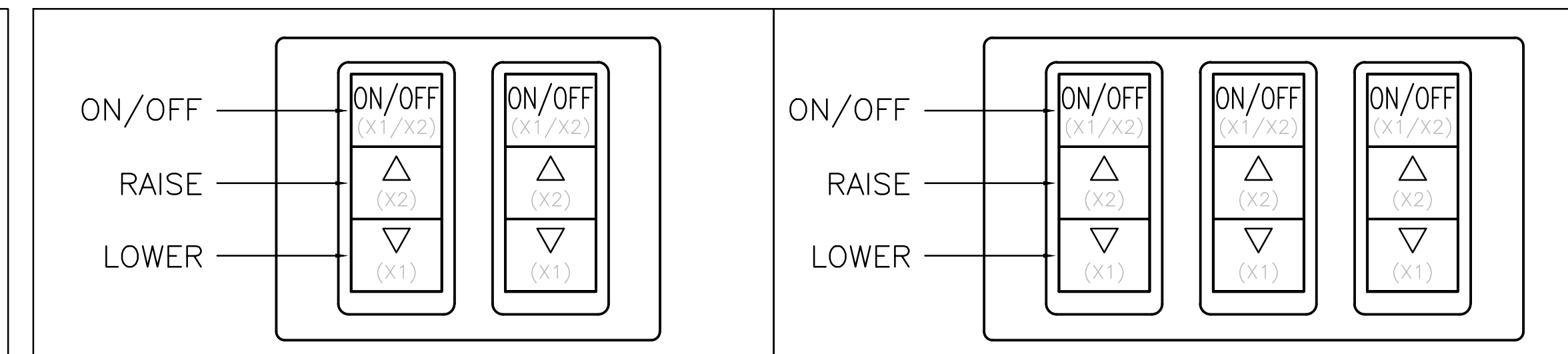
C-TYPICAL CLASSROOM/LIBRARY OCCUPANCY CONTROL /W DIMMING

SCALE: N.T.S.



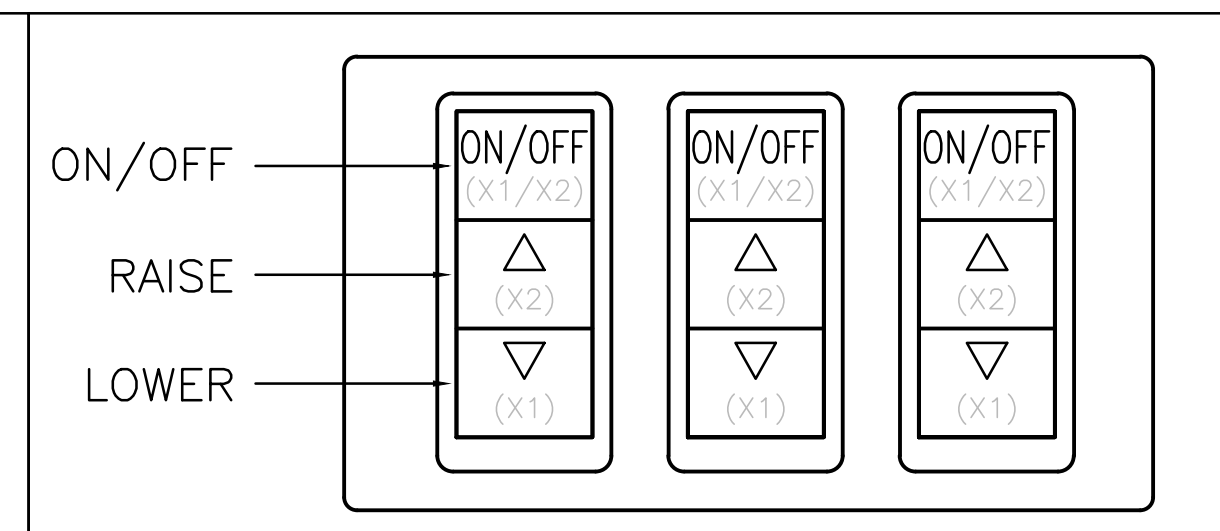
E-TYPICAL KINDERGARTEN OCCUPANCY CONTROL /W DIMMING

SCALE: N.T.S.



C1-CLASSROOM BUTTON CONFIGURATION

SCALE: NTS

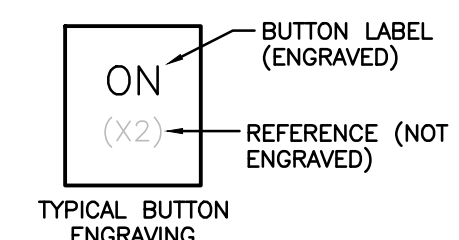


E1-KINDERGARTEN BUTTON CONFIGURATION

SCALE: NTS

NOTES:

- REFER TO LIGHTING PLANS FOR GROUPINGS.
- WALL STATION BUTTONS TO BE ENGRAVED WITH LABELS ACCORDING TO LEVEL AS NOTED. COORDINATE LABELS WITH SCHOOL BOARD REPRESENTATIVE. PROVIDE BUTTON ENGRAVING WORKSHEET WITH SHOP DRAWING SUBMISSION FOR REVIEW. WORKSHEETS TO BE COMPLETED FOR EACH CONTROL STATION GROUP. USE SINGLE MULTI-GANG FACEPLATE WITH P-TOUCH LABEL AS NOTED, FINISH PER SPECIFICATIONS.
- REFER TO SPECIFICATIONS FOR INFORMATION REGARDING PROGRAMMING OF INPUT DEVICES AND DIGITAL WALL STATIONS PER ROOM TYPE.
- IF PHILLIPS CONTROLS ARE USED AND CONTROL PANELS ARE SPECIFIED AT THE ROOM ENTRIES THE OPENINGS FOR NOTED SWITCHES ARE TO BE ENLARGED. COORDINATE WITH CONTROL PANEL SUPPLIER.



HALTON CATHOLIC DISTRICT SCHOOL BOARD
Project: **HOLY FAMILY SCHOOL**

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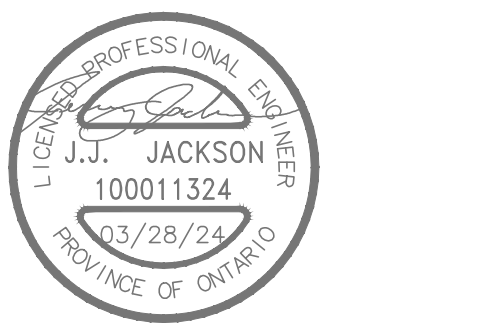
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Consulting Engineers Ltd.
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Kalos Engineering Inc.
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Drawing Title:
LIGHTING CONTROL DETAILS

Scale: AS NOTED Date:
Drawn by: **CP** Checked by: **MEK**
Job No.: **2325** Drawing No.: **E12**

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Drawing Title
GROUND FLOOR PLAN DEMOLITION PHASE 1

Scale: AS NOTED
Date:
Drawn by: CP
Checked by: MEK
Job No.
2325
Drawing No.
E21

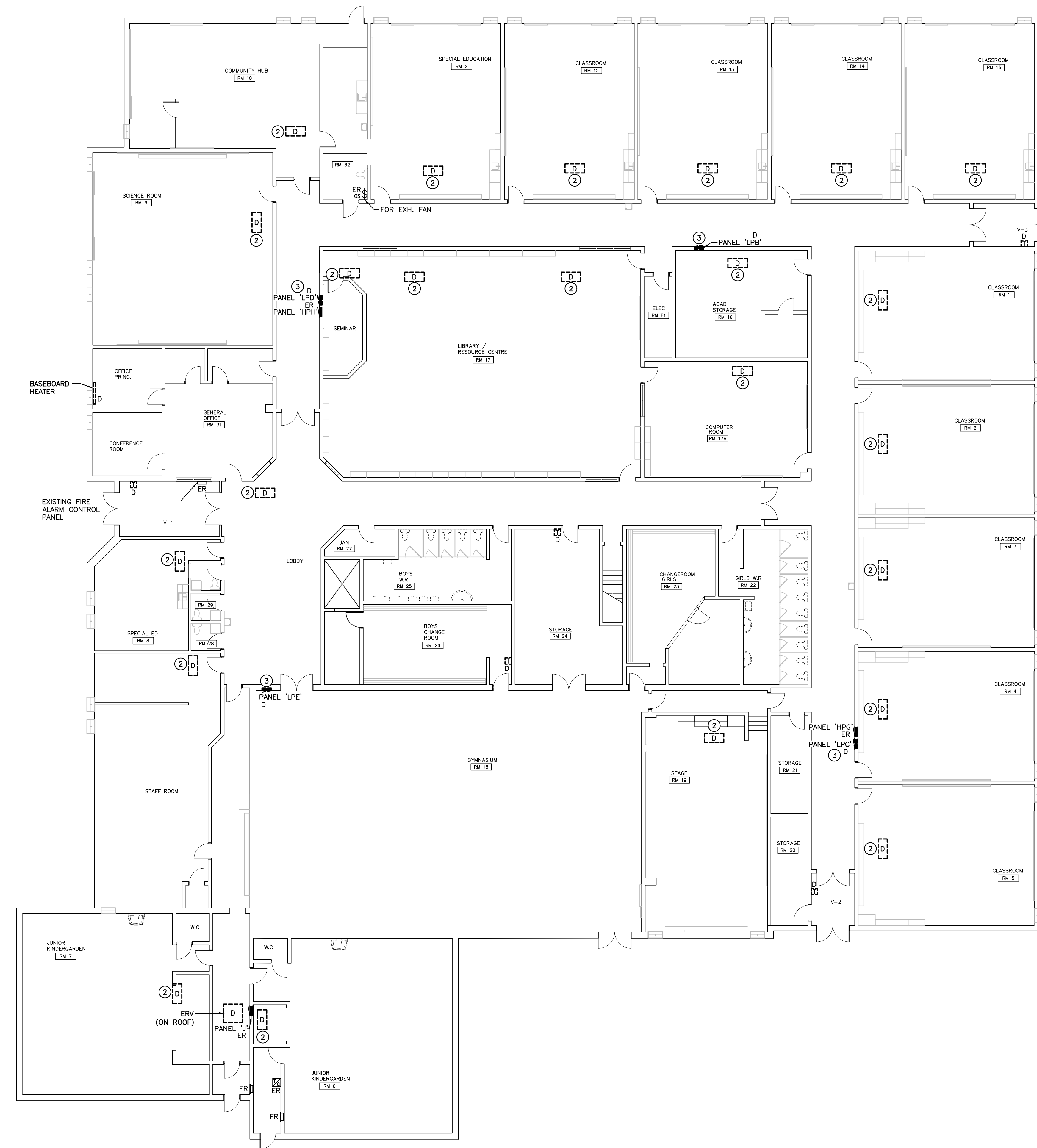
This drawing is sized for 24"X36" sheet size. If not the above size, interpret the drawing accordingly.

GENERAL DEMOLITION NOTES

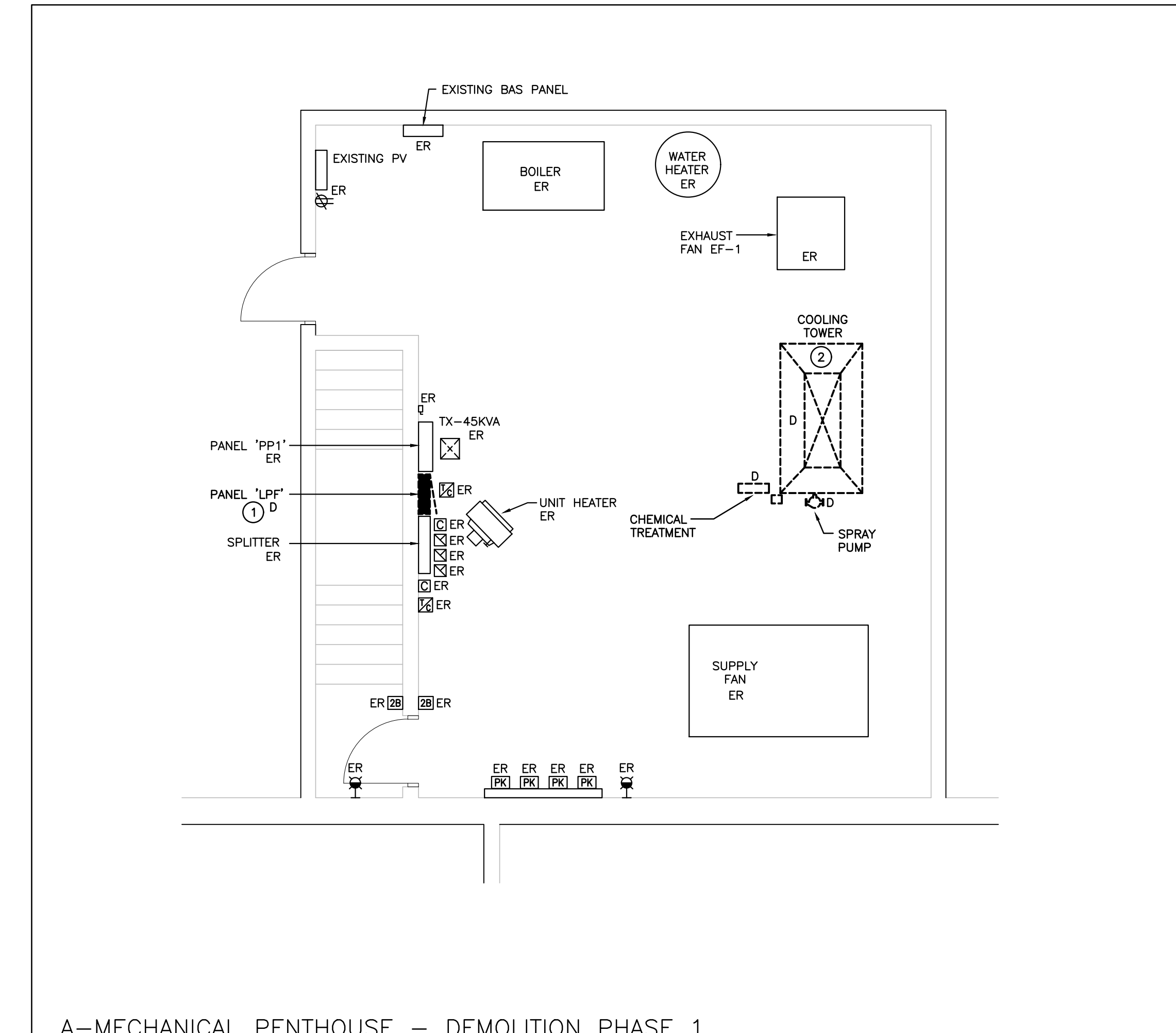
- 'ER' DENOTES EXISTING ITEM TO REMAIN.
- EXISTING ELECTRICAL EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS NOTED OTHERWISE.
- 'R' INDICATES EXISTING ITEM TO BE RELOCATED. REFER TO RENOVATION DRAWINGS AND RELOCATE DEVICE AND WIRING TO SUIT. UNLESS OTHERWISE NOTED.
- 'D' INDICATES EXISTING ITEM TO BE DELETED. UNLESS OTHERWISE NOTED DISCONNECT AND REMOVE NOTED DEVICE AND WIRING BACK TO SOURCE.
- ALL LIGHTING FIXTURES BEING RELOCATED SHALL BE CLEANED AND CHECKED PRIOR TO BEING REINSTALLED.
- THIS CONTRACTOR IS RESPONSIBLE TO TURN OVER EXISTING LED BULBS TO SCHOOL BOARD.

SPECIFIC DEMOLITION NOTES

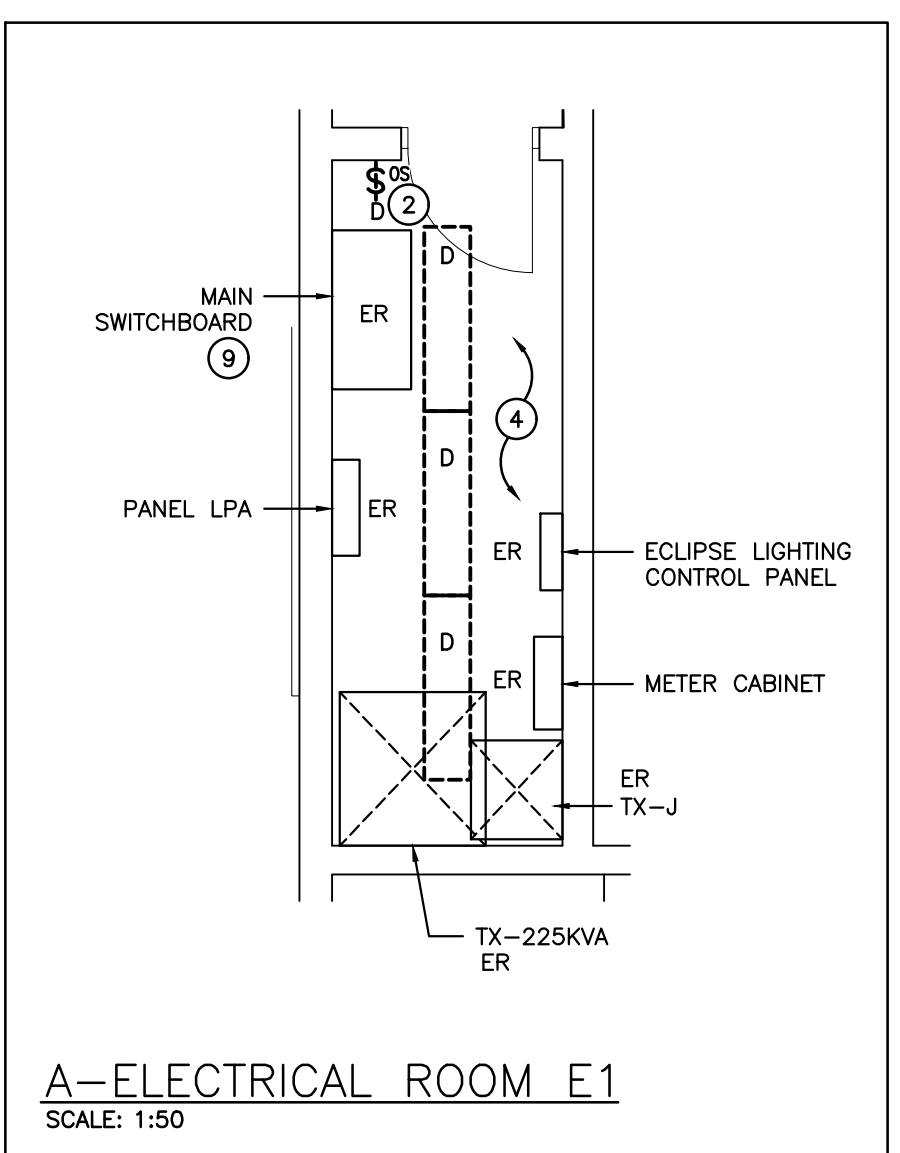
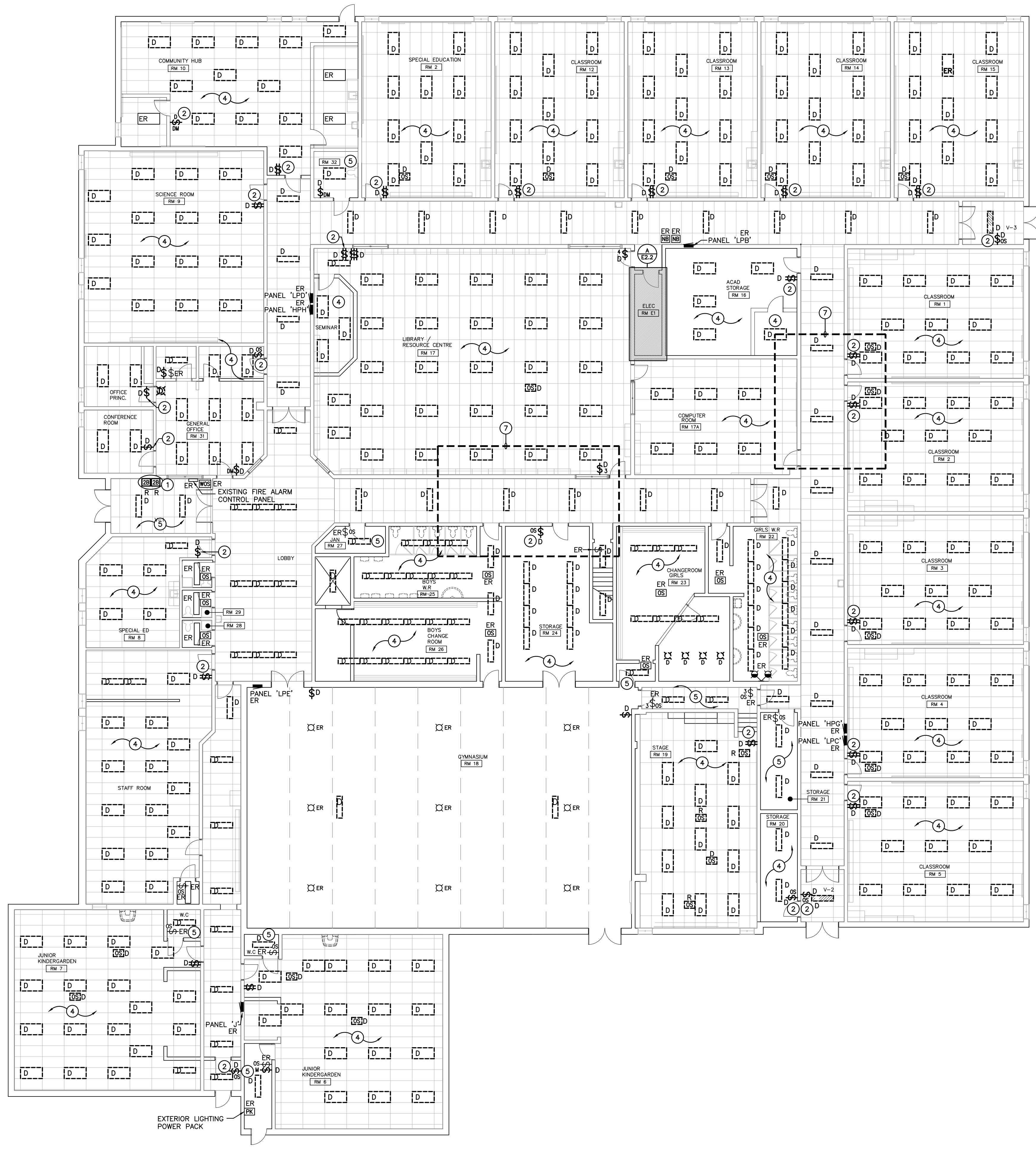
- INDICATED PANEL TO BE DISCONNECTED AND REMOVED COMPLETE. EXISTING FEEDERS AND BRANCH WIRING SHALL BE STUBBED UP TO JUNCTION BOXES HIGH ON WALL FOR RECONNECTION TO NEW REPLACEMENT PANEL.
- INDICATED MECHANICAL UNIT IS BEING REPLACED WITH NEW UNIT HAVING THE SAME POWER REQUIREMENTS. DISCONNECT AND RE-CONNECT EXISTING FEEDER.
- INDICATED PANEL TO BE DISCONNECTED AND REMOVED COMPLETE. EXISTING FEEDERS AND BRANCH WIRING SHALL BE STUBBED UP TO JUNCTION BOXES WITHIN ACCESSIBLE CEILING SPACE FOR RECONNECTION TO NEW REPLACEMENT PANEL.



GROUND FLOOR PLAN - DEMOLITION PHASE 1
SCALE: 1:125



A-MECHANICAL PENTHOUSE - DEMOLITION PHASE 1
SCALE: 1:50



GENERAL DEMOLITION NOTES

- 'ER' DENOTES EXISTING ITEM TO REMAIN.
- EXISTING ELECTRICAL EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS NOTED OTHERWISE.
- 'R' INDICATES EXISTING ITEM TO BE RELOCATED. REFER TO RENOVATION DRAWINGS AND RELOCATE DEVICE AND WIRING TO SUIT. UNLESS OTHERWISE NOTED.
- 'D' INDICATES EXISTING ITEM TO BE DELETED. UNLESS OTHERWISE NOTED DISCONNECT AND REMOVE NOTED DEVICE AND WIRING BACK TO SOURCE.
- ALL LIGHTING FIXTURES BEING RELOCATED SHALL BE CLEANED AND CHECKED PRIOR TO BEING REINSTALLED.
- THIS CONTRACTOR IS RESPONSIBLE TO TURN OVER EXISTING LED BULBS TO SCHOOL BOARD.

SPECIFIC DEMOLITION NOTES

- 1 INDICATED BUTTON STATIONS FOR CORRIDOR LIGHTING AND WASHROOM LIGHTING THROUGHOUT SCHOOL. RELOCATE CORRIDOR BUTTON STATION TO PRINCIPAL'S OFFICE AND WASHROOM BUTTON STATION TO ELECTRICAL ROOM AS SHOWN ON RENOVATION DRAWINGS.
- 2 INDICATED LIGHTING SWITCH(ES) TO BE DISCONNECTED AND REMOVED COMPLETE. WIRING IS TO BE BROUGHT UP TO CEILING SPACE AND MAINTAIN EXISTING BACKBOX FOR NEW CONTROLS. REFER TO RENOVATION PLAN FOR ADDITIONAL INFORMATION.
- 3 INDICATED MECHANICAL UNIT IS BEING REPLACED WITH NEW UNIT HAVING THE SAME POWER REQUIREMENTS. DISCONNECT AND RE-CONNECT EXISTING FEEDER.
- 4 LIGHTING WITHIN THIS AREA ARE TO BE DISCONNECTED AND REMOVED COMPLETE. MAINTAIN EXISTING LIGHTING CIRCUIT FOR RECONNECTION TO NEW FIXTURES WITH NEW CONTROLS AS SHOWN ON RENOVATION DRAWING.
- 5 LIGHTING WITHIN THIS AREA ARE TO BE DISCONNECTED AND REMOVED COMPLETE. MAINTAIN EXISTING LIGHTING CIRCUIT AND CONTROLS FOR RECONNECTION TO NEW FIXTURES AS SHOWN ON RENOVATION DRAWING.
- 6 INDICATED PANEL TO BE DISCONNECTED AND REMOVED COMPLETE. EXISTING FEEDERS AND BRANCH WIRING SHALL BE STUBBED UP TO JUNCTION BOXES HIGH ON WALL FOR RECONNECTION TO NEW REPLACEMENT PANEL.
- 7 ANY EXISTING DEVICES WITHIN CEILING OF OUTLINED AREA ARE TO BE REMOVED AND RE-INSTALLED TO SUIT WORK ABOVE FOR STRUCTURAL REINFORCEMENT.
- 8 INDICATED PANEL TO BE DISCONNECTED AND REMOVED COMPLETE. EXISTING FEEDERS AND BRANCH WIRING SHALL BE STUBBED UP TO JUNCTION BOXES WITHIN ACCESSIBLE CEILING SPACE FOR RECONNECTION TO NEW REPLACEMENT PANEL.
- 9 CONTRACTOR SHALL DISCONNECT AND REMOVE FUSES FROM MAIN SWITCHBOARD AND REPLACE WITH NEW 400A, SAME-IN-KIND.

THIS WORK FOR THIS PROJECT SHALL BE CONSTRUCTED IN PHASES. REFER TO ARCHITECTURAL DRAWINGS FOR PHASING INFORMATION AND DETAILS. MISINTERPRETATION OF THE DRAWINGS WITH RESPECT TO THE EXTENT OF THE PHASING OF THE WORK SHALL NOT RELIEVE THE CONTRACTOR OF THE WORK REQUIRED TO COMPLETE THE ENTIRE CONTRACT.



No.	Revisions	Date
1	Issued for Coordination	2024-03-08
2	Issued for Coordination	2024-03-11
3	Issued for Bids & Building Permit	2024-03-26

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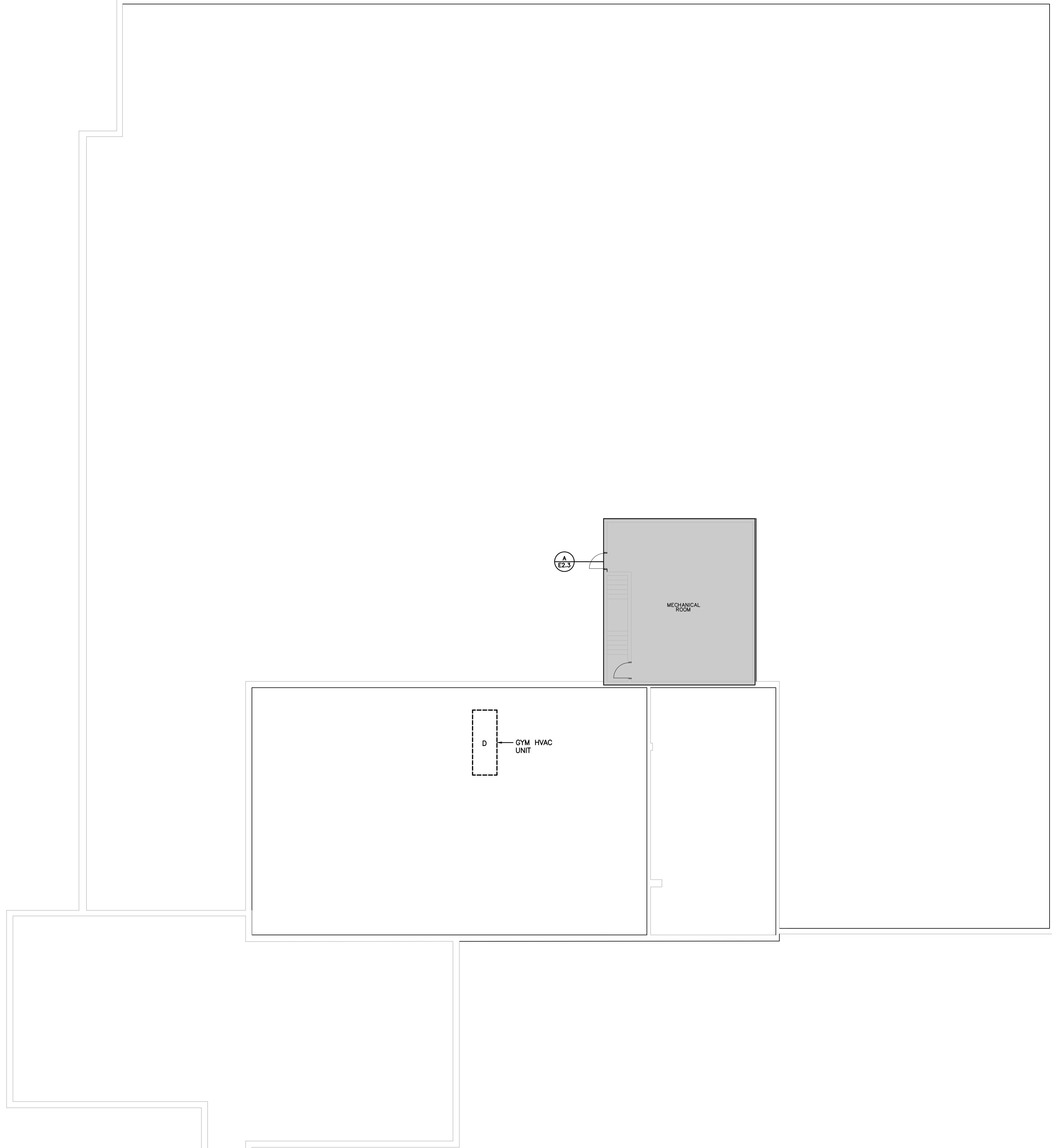


GROUND FLOOR PLAN - DEMOLITION PHASE 2
SCALE: 1:125

Drawing Title
GROUND FLOOR PLAN DEMOLITION PHASE 2

Scale: AS NOTED	Date:
Drawn by: CP	Checked by: MEK
Job No: 2325	Drawing No: E22

This drawing is issued for 24"X36" sheet size. If not the above size, interpret the drawing accordingly.



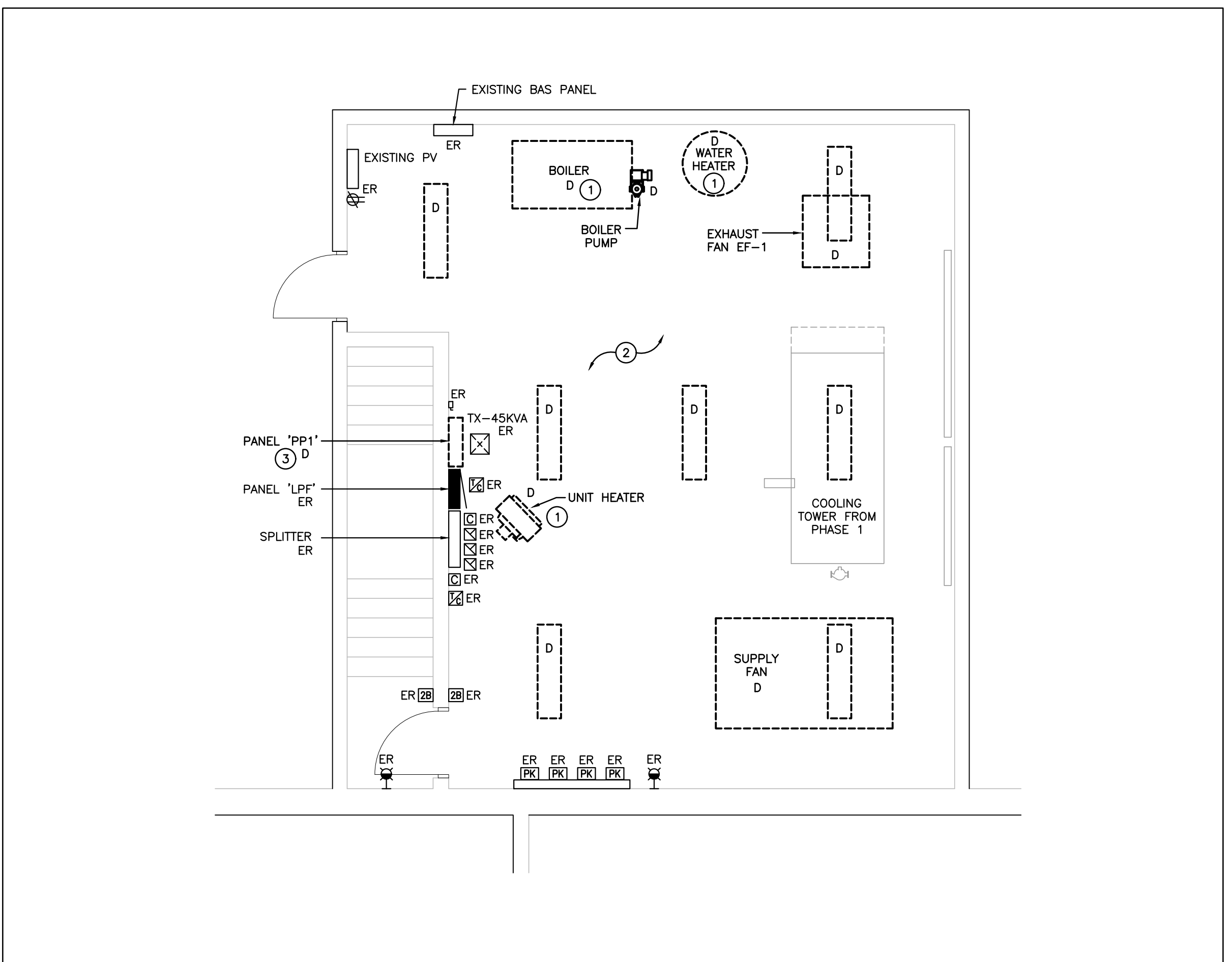
ROOF PLAN - DEMOLITION PHASE 2
SCALE: 1:125

GENERAL DEMOLITION NOTES

- 'ER' DENOTES EXISTING ITEM TO REMAIN.
- EXISTING ELECTRICAL EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS NOTED OTHERWISE.
- 'R' INDICATES EXISTING ITEM TO BE RELOCATED. REFER TO RENOVATION DRAWINGS AND RELOCATE DEVICE AND WIRING TO SUIT. UNLESS OTHERWISE NOTED.
- 'D' INDICATES EXISTING ITEM TO BE DELETED. UNLESS OTHERWISE NOTED DISCONNECT AND REMOVE NOTED DEVICE AND WIRING BACK TO SOURCE.
- ALL LIGHTING FIXTURES BEING RELOCATED SHALL BE CLEANED AND CHECKED PRIOR TO BEING REINSTALLED.
- THIS CONTRACTOR IS RESPONSIBLE TO TURN OVER EXISTING LED BULBS TO SCHOOL BOARD.

SPECIFIC DEMOLITION NOTES

- 1 INDICATED MECHANICAL UNIT IS BEING REPLACED WITH NEW UNIT HAVING THE SAME POWER REQUIREMENTS. DISCONNECT AND RE-CONNECT EXISTING FEEDER.
- 2 LIGHTING WITHIN THIS AREA ARE TO BE DISCONNECTED AND REMOVED COMPLETE. MAINTAIN EXISTING LIGHTING CIRCUIT AND CONTROLS FOR RECONNECTION TO NEW FIXTURES AS SHOWN ON RENOVATION DRAWING.
- 3 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING PANEL COMPLETE. REMOVE EXISTING WIRING/CONDUIT BACK TO SOURCE SWITCHBOARD.



A-MECHANICAL PENTHOUSE - DEMOLITION PHASE 2
SCALE: 1:50

THIS WORK FOR THIS PROJECT SHALL BE CONSTRUCTED IN PHASES. REFER TO ARCHITECTURAL DRAWINGS FOR PHASING INFORMATION AND DETAILS. MISINTERPRETATION OF THE DRAWINGS WITH RESPECT TO THE EXTENT OF THE PHASING OF THE WORK SHALL NOT RELIEVE THE CONTRACTOR OF THE WORK REQUIRED TO COMPLETE THE ENTIRE CONTRACT.



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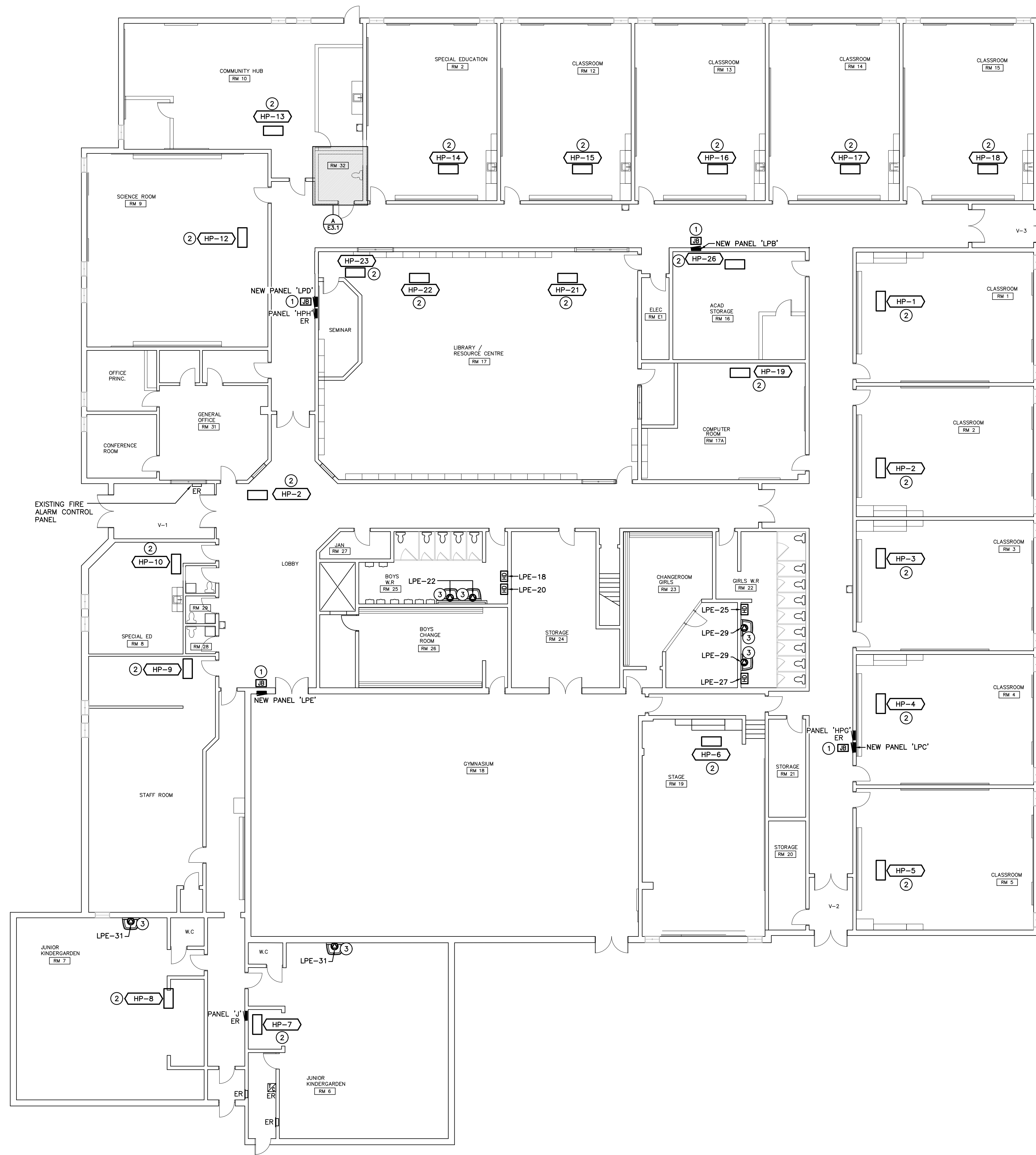
Drawing Title:
ROOF PLAN DEMOLITION PHASE 2

Scale: AS NOTED
Date:

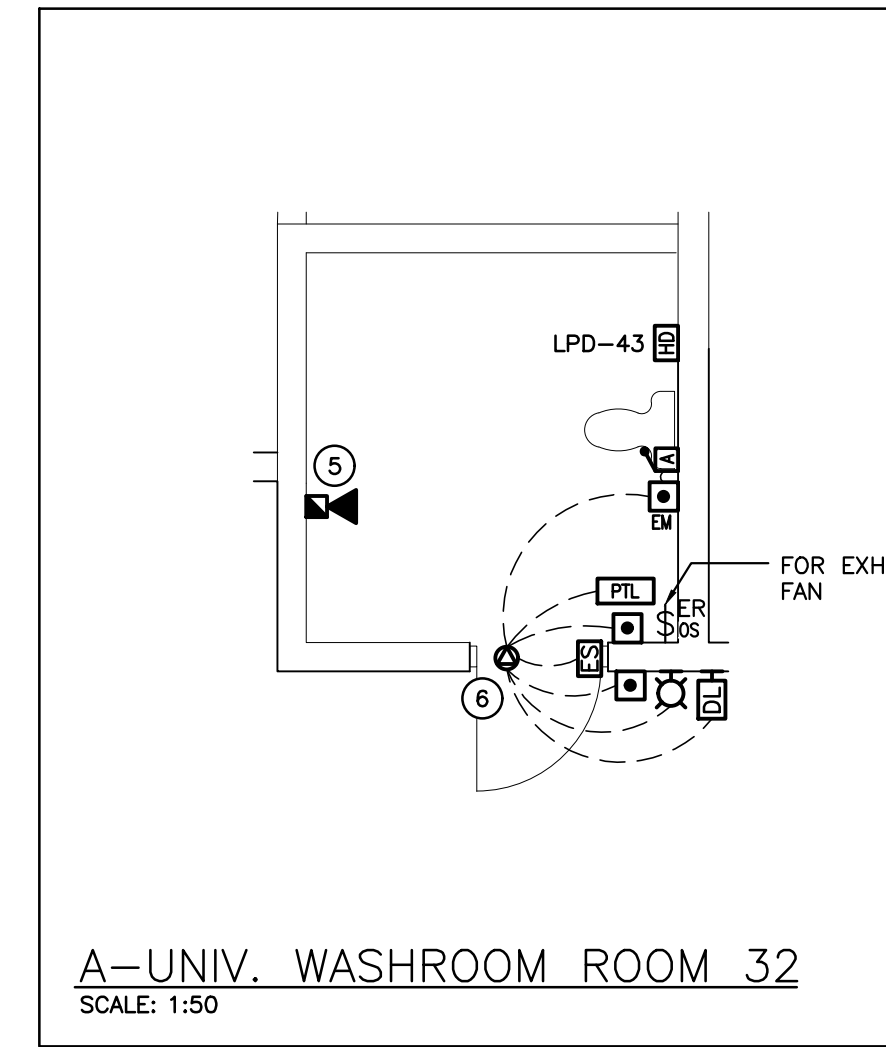
Drawn by: CP
Checked by: MEK

Job No.: **2325**
Drawing No.: **E23**

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GROUND FLOOR PLAN - RENOVATION PHASE 1
SCALE: 1:125



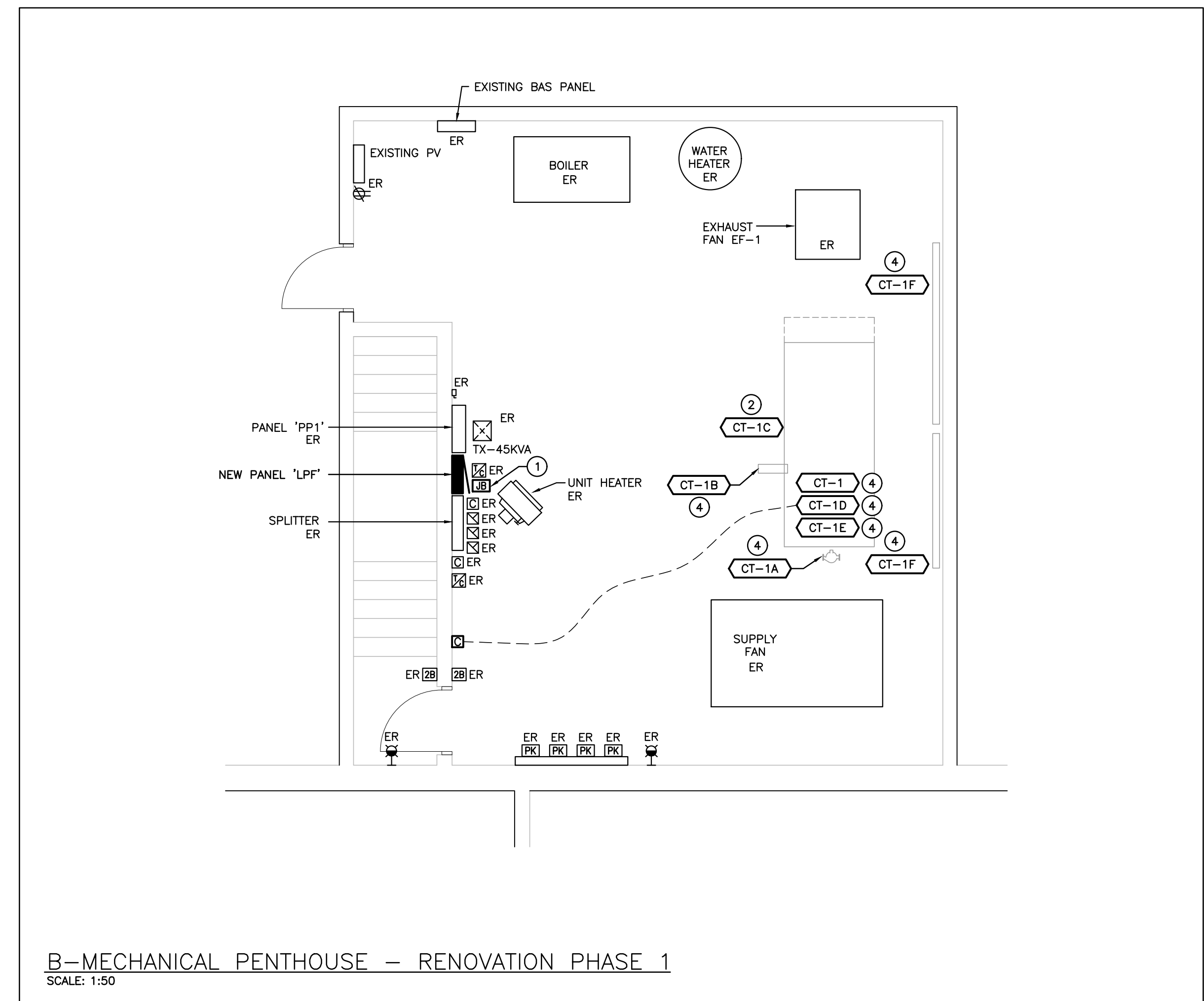
A--UNIV. WASHROOM ROOM 32
SCALE: 1:50

GENERAL RENOVATION NOTES

- 'ER' INDICATES EXISTING ITEM TO REMAIN.
- 'R' INDICATES EXISTING ITEM IN RELOCATED POSITION.
- ALL DEVICES SHOWN ARE NEW UNLESS OTHERWISE NOTED.
- EXISTING ELECTRICAL EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.
- MAINTAIN SERVICE TO ALL EXISTING DEVICES TO REMAIN.
- REVISE PANEL DIRECTORIES TO SUIT CHANGES (TYPED).

SPECIFIC RENOVATION NOTES

- INDICATES OVERHEAD FEEDERS (FROM EXISTING DEMOLISHED PANEL) FOR RE-FEEDING OF EXISTING FEEDER BRANCHES. EXTEND EXISTING OUTGOING FEEDER TO JUNCTION BOXES AND CONNECT TO NEW BRANCH DEVICE IN REPLACEMENT PANEL.
- RECONNECT EXISTING FEEDER MADE AVAILABLE DURING DEMOLITION TO REPLACEMENT MECHANICAL EQUIPMENT.
- PROVIDE 120V CONNECTION TO PLUMBING FIXTURE. COORDINATE REQUIREMENTS WITH MECHANICAL CONTRACTOR AND PLUMBING SHOP DRAWINGS PRIOR TO ROUGH-IN.
- INDICATED MECHANICAL ITEM TO BE WIRED THROUGH COOLING TOWER CONTROL PANEL. REFER TO EQUIPMENT WIRING SCHEDULE AND DETAIL B/E4.1 FOR ADDITIONAL INFORMATION.
- CONNECT INDICATED DEVICE TO THE LOCAL SIGNAL CIRCUIT. ALL WIRING MUST BE SUPERVISED.
- INDICATES POWER AND ROUGH-IN FOR POWER DOOR OPERATOR. COORDINATE EXACT REQUIREMENTS AND LOCATION WITH ARCHITECTURAL DESIGNER AND DOOR HARDWARE SUPPLIER PRIOR TO ROUGH-IN. REFER TO B/E1.4 FOR ADDITIONAL INFORMATION.



B--MECHANICAL PENTHOUSE - RENOVATION PHASE 1
SCALE: 1:50

THIS WORK FOR THIS PROJECT SHALL BE CONSTRUCTED IN PHASES. REFER TO ARCHITECTURAL DRAWINGS FOR PHASING INFORMATION AND DETAILS. MISINTERPRETATION OF THE PHASING WITH RESPECT TO THE EXTENT OF THE WORK SHALL NOT RELIEVE THE CONTRACTOR OF THE WORK REQUIRED TO COMPLETE THE ENTIRE CONTRACT.



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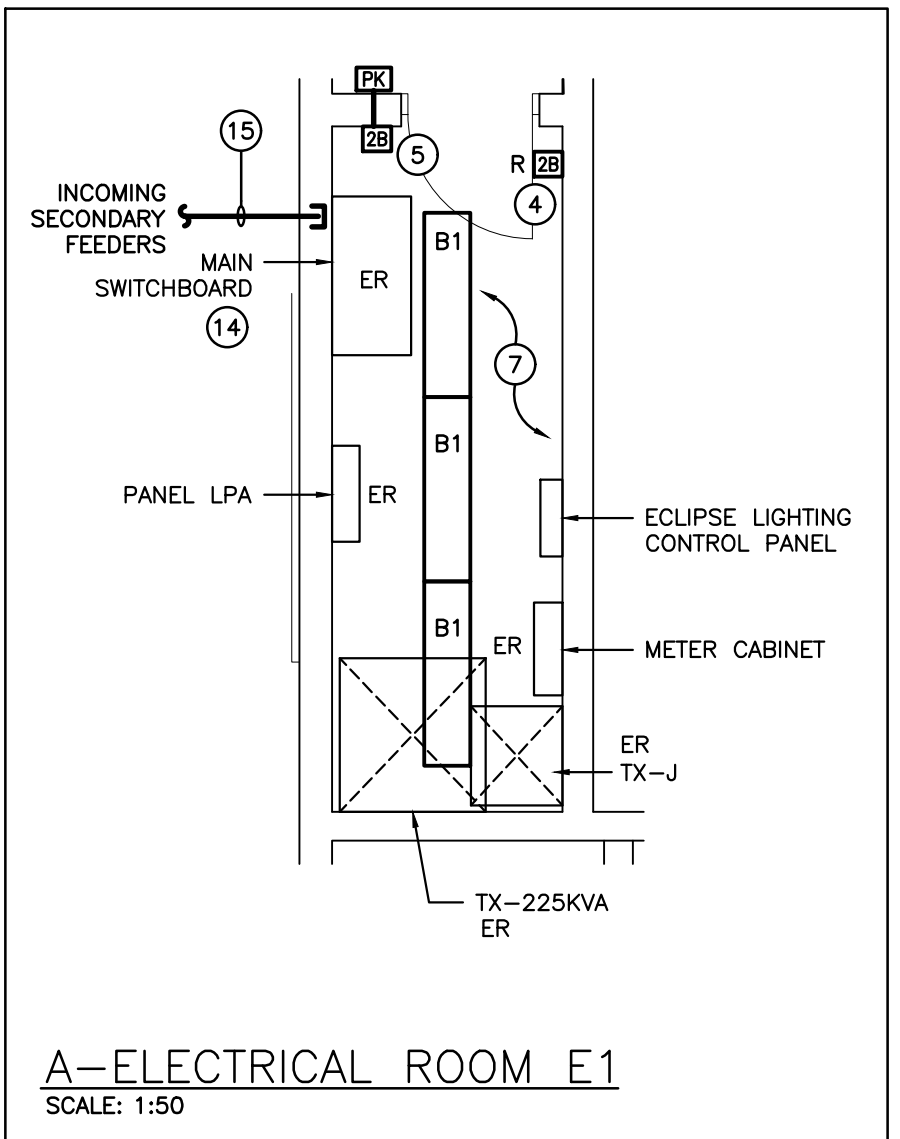
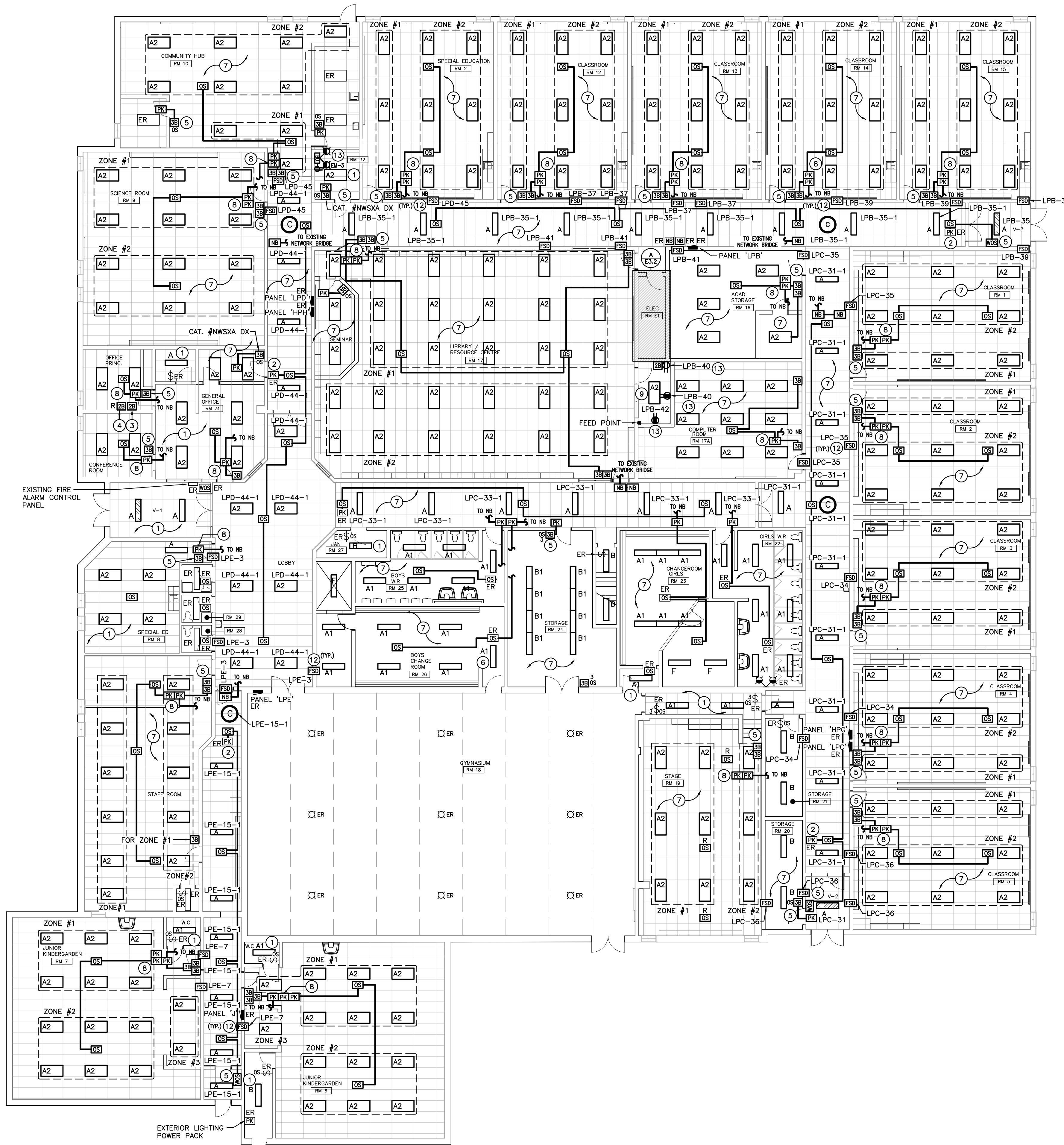
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Drawing Title
GROUND FLOOR PLAN RENOVATION PHASE 1

Scale: AS NOTED Date:
Drawn by: CP Checked by: MEK
Job No. 2325 Drawing No. E31

This drawing is issued for 24" x 36" sheet size. If not the above size, interpret the drawing accordingly.



A-ELECTRICAL ROOM E1
SCALE: 1:50

GENERAL RENOVATION NOTES

- 'ER' INDICATES EXISTING ITEM TO REMAIN.
- 'R' INDICATES EXISTING ITEM IN RELOCATED POSITION.
- ALL DEVICES SHOWN ARE NEW UNLESS OTHERWISE NOTED.
- EXISTING ELECTRICAL EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.
- MAINTAIN SERVICE TO ALL EXISTING DEVICES TO REMAIN.
- REVISE PANEL DIRECTORIES TO SUIT CHANGES (TYPED).

SPECIFIC RENOVATION NOTES

- 1 LIGHTING WITHIN AREA TO BE CONNECTED TO EXISTING CIRCUIT WIRING AND LIGHTING CONTROLS MADE AVAILABLE DURING DEMOLITION.
- 2 COORDINATE EXACT LOCATION OF EXISTING CORRIDOR POWER PACK ON SITE.
- 3 INDICATES NEW 2B SWITCH FOR ON/OFF CONTROL OF ALL LIGHTING WIRED THROUGH NETWORK BRIDGES.
- 4 INDICATES BUTTON STATION RELOCATED FROM VESTIBULE. PROVIDE NEW LOCKABLE COVER.
- 5 UTILIZE EXISTING BACKBOX MADE DURING DEMOLITION FOR NEW LIGHTING SWITCH/STATION AS SHOWN. PROVIDE BLANK COVERPLATE FOR ANY SPACES.
- 6 REVISE SWITCHING OF INDICATED LIGHTING FIXTURE FROM WASHROOM TO CHANGEROOM LIGHTING CONTROL CIRCUIT.
- 7 LIGHTING WITHIN AREA TO BE CONNECTED TO EXISTING CIRCUIT AND WIRING MADE AVAILABLE DURING DEMOLITION WITH NEW CONTROLS AS SHOWN.
- 8 INDICATES POWER PACK(S) INSTALLED WITHIN ACCESSIBLE CEILING SPACE FOR CONTROL OF NOTED MOTION SENSOR(S).
- 9 CONNECT INDICATED FIXTURE TO LINE SIDE OF LOCAL LIGHTING CIRCUIT.
- 10 INDICATES OVERHEAD FEEDERS (FROM EXISTING DEMOLISHED PANEL) FOR RE-FEEDING OF EXISTING FEEDER BRANCHES. EXTEND EXISTING OUTGOING FEEDER TO JUNCTION BOXES AND CONNECT TO NEW BRANCH DEVICE IN REPLACEMENT PANEL.
- 11 CIRCUIT FIXTURE WITHIN SERVER ROOM OFF LOCAL LIGHTING CIRCUIT OF ELECTRICAL ROOM EXCEPT WITH DIFFERENT SWITCHING LEG.
- 12 INDICATES 120V POWER AND FIRE ALARM CONNECTIONS TO SMOKE/FIRE DAMPER WITH INTEGRAL SMOKE DETECTOR. ADD ONE TROUBLE SIGNAL TO FIRE ALARM PANEL FOR THE SUPERVISION OF 120V POWER CONNECTION. ALARM SIGNAL TO INTEGRAL SMOKE DETECTOR SHALL BE CONNECTED TO LOCAL SIGNALING ZONE. COORDINATE EXACT LOCATION/CONNECTION REQUIREMENTS WITH MECHANICAL CONTRACTOR. SMOKE/FIRE DAMPER AND ASSOCIATED INTEGRAL SMOKE DETECTOR TO BE PROVIDED AND INSTALLED BY MECHANICAL CONTRACTOR. PROVIDE TWO MONITORING MODULES PER SMOKE/FIRE DAMPER ONE TO SUPERVISE 120V POWER SUPPLY CONNECTION TO THE DAMPER ACTUATOR, AND ONE FOR INTEGRAL SMOKE DETECTOR ALARM SIGNAL.
- 13 FEED INDICATED DEVICE USING SURFACE METAL RACEWAY EQUAL TO WIREMOLD SERIES 700.
- 14 REFER TO DISTRIBUTION RISER DIAGRAM FOR REPLACEMENT 400A FUSE WITHIN MAIN SWITCHBOARD.
- 15 INDICATES INCOMING SECONDARY DUCTS FROM EXTERIOR PADMOUNT TRANSFORMER. REFER TO SITE PLAN AND DISTRIBUTION RISER DIAGRAM FOR ADDITIONAL INFORMATION.

GROUND FLOOR PLAN - RENOVATION PHASE 2
SCALE: 1:125

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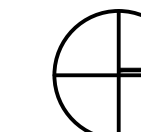


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True North Project North

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ROOF PLAN RENOVATION PHASE 2

Scale: AS NOTED	Date:
Drawn by: CP	Checked by: MEK
Job No:	Drawing No:
2325	E33

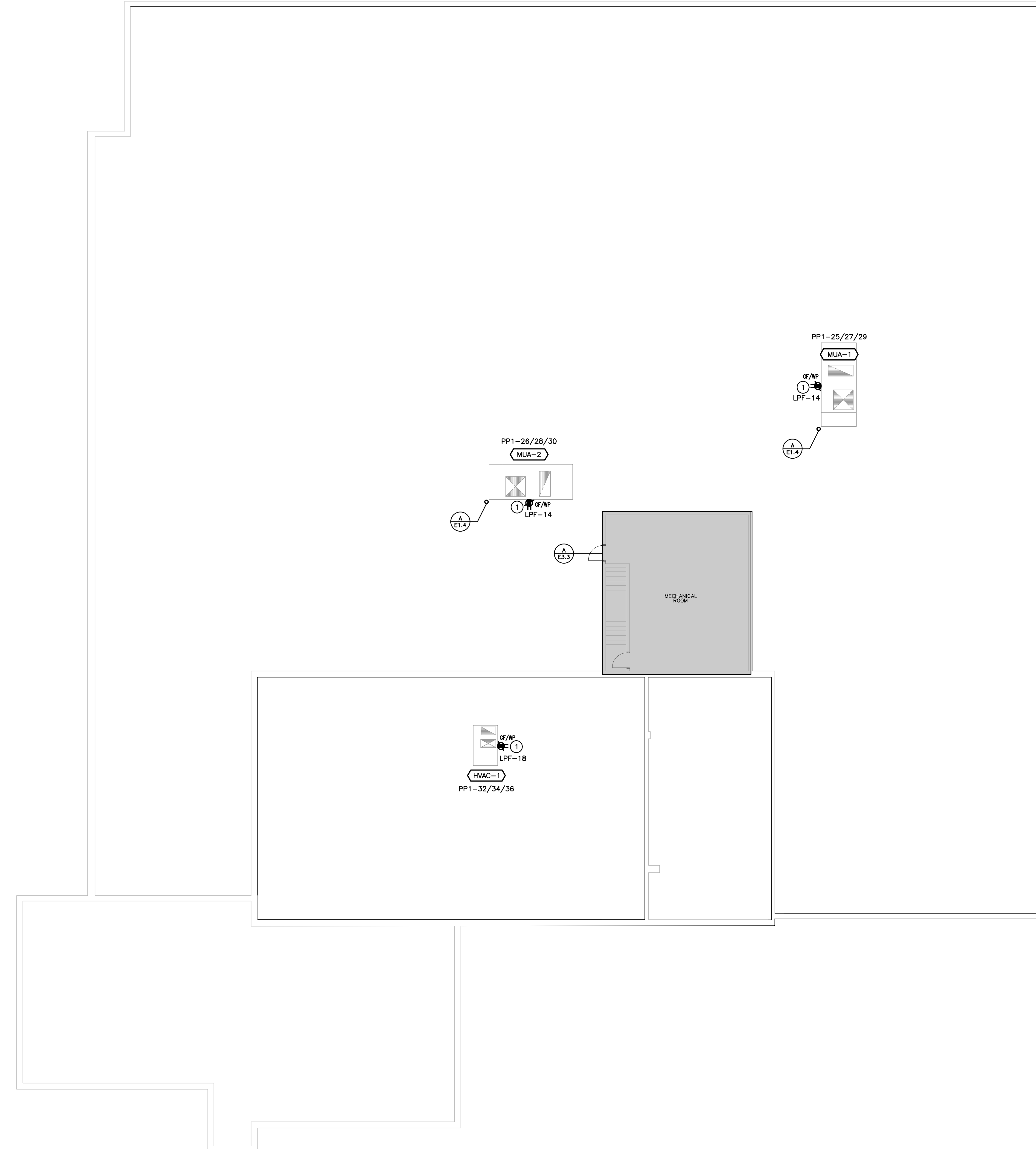
This drawing is issued in 24"x36" sheet size.
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GENERAL RENOVATION NOTES

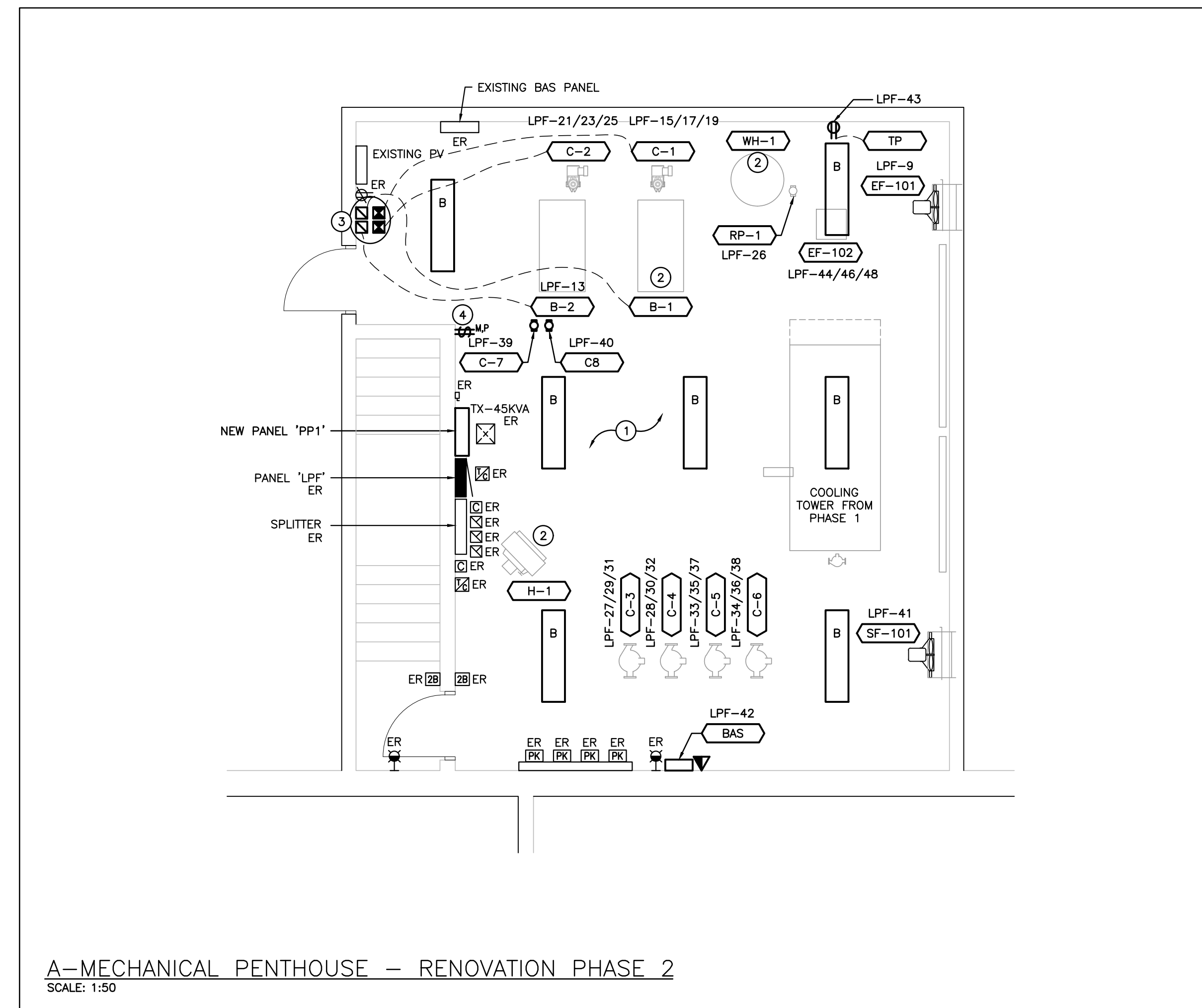
- 'ER' INDICATES EXISTING ITEM TO REMAIN.
- 'R' INDICATES EXISTING ITEM IN RELOCATED POSITION.
- ALL DEVICES SHOWN ARE NEW UNLESS OTHERWISE NOTED.
- EXISTING ELECTRICAL EQUIPMENT NOT SHOWN SHALL REMAIN UNLESS OTHERWISE NOTED.
- MAINTAIN SERVICE TO ALL EXISTING DEVICES TO REMAIN.
- REVISE PANEL DIRECTORIES TO SUIT CHANGES (TYPED).

SPECIFIC RENOVATION NOTES

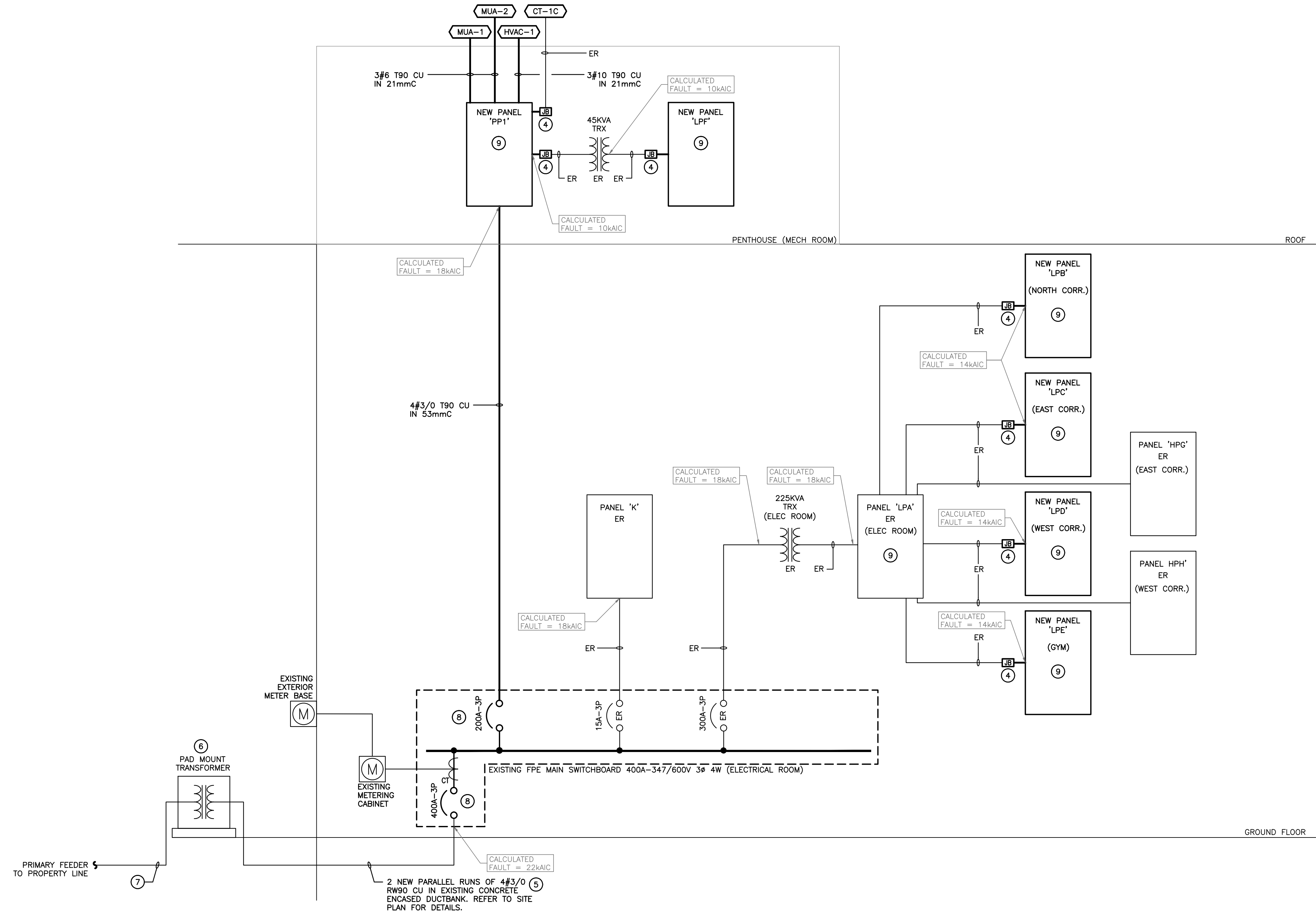
- 1 PROVIDE T-SLOT GROUND FAULT RECEPTACLE COMPLETE WITH "HEAVY DUTY IN-USE" WEATHER-PROOF COVER. COORDINATE PLACEMENT WITH MECHANICAL TRADE. INDICATED DEVICE IS TO BE MOUNTED ±36" (900mm) ABOVE FINISHED ROOF LEVEL.
- 2 RECONNECT EXISTING FEEDER MADE AVAILABLE DURING DEMOLITION TO REPLACEMENT MECHANICAL EQUIPMENT.
- 3 INDICATES MANUAL/COMBINATION STARTERS FOR BOILER AND BOILER PUMPS. MOUNT STARTERS AT 1800mm A.F.F. PROVIDE LAMICOID LABEL INDICATING DEVICE CONTROLLED.
- 4 INDICATES PROPOSED LOCATION TO INSTALL MOTOR RATED SHUT-OFF SWITCHES C/W PILOT LIGHT FOR NEW BOILERS. MOUNT SWITCHES 1800mm A.F.F. PROVIDE LAMICOID LABEL NOTING EQUIPMENT CONTROLLED.



ROOF PLAN – RENOVATION PHASE 2
SCALE: 1:125



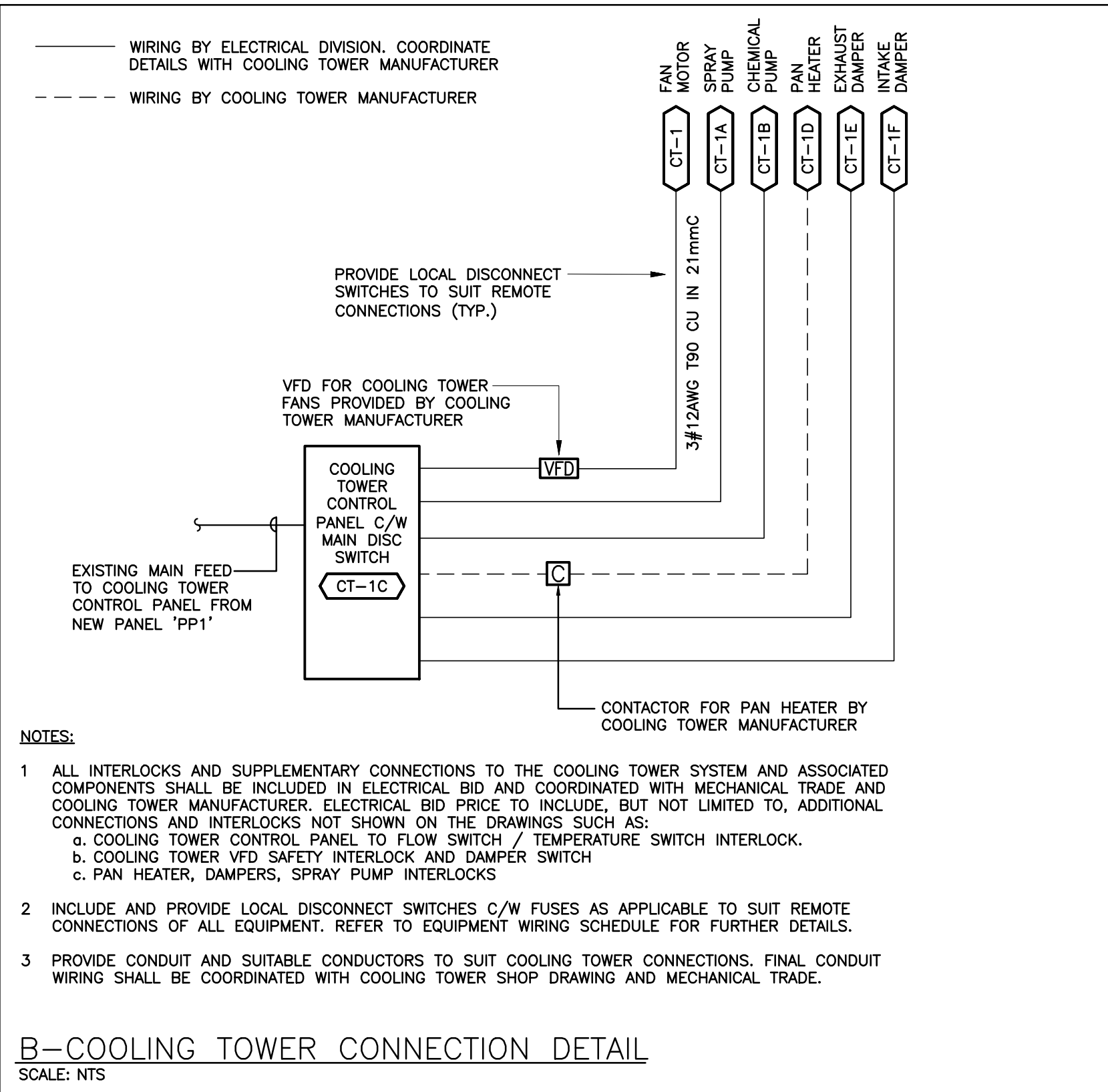
A-MECHANICAL PENTHOUSE – RENOVATION PHASE 2
SCALE: 1:50



A-PARTIAL DISTRIBUTION RISER DIAGRAM
SCALE: NTS

DISTRIBUTION RISER NOTES

- REFER TO SPECIFICATION FOR INFORMATION REGARDING MOULDED CASE CIRCUIT BREAKERS.
- INSTALL GROUND WIRE TO SUIT THE ELECTRICAL SAFETY CODE IN ALL CONDUIT.
- ALL LIGHTING CIRCUITS ARE TO BE PROVIDED WITH SEPARATE NEUTRALS. SIZE BRANCH CONDUITS ACCORDINGLY.
- INDICATED JUNCTION BOX TO HOLD EXISTING FEEDERS AND BRANCH WIRING DURING DEMOLITION AND THEN SHALL BE RECONNECTED TO REPLACEMENT PANEL.
- CONTRACTOR TO ENSURE ALL SECONDARY CABLES ARE OF EQUAL LENGTH. EXCESS CABLE FROM SHORTER DUCTS MAY BE COILED NEATLY IN UTILITY TRANSFORMER BASE. CONTRACTOR TO TEST RESISTANCE IS EQUAL BETWEEN ALL CABLES AS PER SPECIFICATIONS. CONNECTION OF SECONDARY CABLES AT TRANSFORMER SHALL BE DONE BY UTILITY.
- INDICATES NEW TAMPERPROOF PADMOUNT TRANSFORMER PROVIDED BY UTILITY. NEW TRANSFORMER PLUS ALL WORK DONE BY UTILITY INCLUDED IN THIS CONTRACT AS PART OF CASH ALLOWANCE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- INDICATES EXISTING PRIMARY DUCTS BY UTILITY. CONTRACTOR SHALL COORDINATE WITH UTILITIES IF NEW FEEDERS ARE REQUIRED FOR NEW TRANSFORMER. CONNECTION OF PRIMARY CABLES AT TRANSFORMER SHALL BE DONE BY UTILITY.
- INDICATES NEW BREAKER. CONTRACTOR SHALL COORDINATE WITH SCHNEIDER SERVICES FOR REPLACEMENT OF THE EXISTING FUSED DISCONNECT WITH A NEW BREAKER IN EXISTING FP CDP SWITCHBOARD. THIS WORK IS INCLUDED AS A CASH ALLOWANCE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- REFER TO PANEL SCHEDULE FOR ALL EXISTING CIRCUITS THAT REQUIRE RECONNECTION.



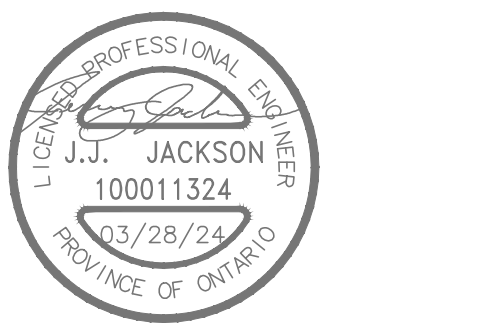
B-COOLING TOWER CONNECTION DETAIL
SCALE: NTS

Client
HALTON CATHOLIC DISTRICT SCHOOL BOARD
Project
HOLY FAMILY SCHOOL
Architects
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Consultants
DEI
Consulting Engineers Inc.
MECHANICAL | ELECTRICAL | PLUMBING
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300 York Boulevard
Hamilton, ON L8R3K6
Tel: 905-333-9119
Abatement Consultant
Maple Environmental Inc.
428 South Service Road, East - Suite 116
Oakville, ON L6J 2K6
Tel: 905-257-4408

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Drawing Title:
PARTIAL DISTRIBUTION RISER DIAGRAM
Scale: AS NOTED
Date:
Drawn by: CP
Checked by: MEK
Job No.: **2325**
Drawing No.: **E41**

This drawing is sized for 24"X36" sheet size. If not the above size, interpret the drawing accordingly.

DEMOLISHED PANEL 'LPB' SCHEDULE

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS:
MOUNTING: RECESSED
NOTES: EXISTING FPE TYPE NBLP

Table listing electrical loads for panel LPB, including Hallway Lights, Room 11 Plugs, Room 10 Plugs, etc., with columns for load type, panel number, and description.

NEW PANEL 'LPB'

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS: FULL
MOUNTING: RECESSED
NOTES:

Table listing electrical loads for new panel LPB, including Hallway Lights, Room 11 Plugs, Room 10 Plugs, etc., with columns for load type, panel number, and description.

NOTE: THE INDICATED PANEL ASSEMBLY MUST HAVE AN INTERRUPTING CAPACITY OF 22000 A. PROVIDE BY EITHER FULLY RATED BREAKERS OR INTEGRATED EQUIPMENT RATING WITH THE UPSTREAM BREAKER.

* INDICATES 33mA GROUND FAULT STYLE BREAKER
THE CONTRACTOR IS TO COORDINATE ROOM NAMES AND NUMBERS NOTED WITH THE FINAL ROOM INFORMATION ISSUED DURING CONSTRUCTION AND ADJUST DIRECTORIES TO SUIT.

DEMOLISHED PANEL 'LPC' SCHEDULE

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS:
MOUNTING: RECESSED
NOTES: EXISTING FPE TYPE NBLP

Table listing electrical loads for panel LPC, including Storage Room Lights, Washroom Lights, Motorized Valve, etc., with columns for load type, panel number, and description.

NEW PANEL 'LPC'

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS: FULL
MOUNTING: RECESSED
NOTES:

Table listing electrical loads for new panel LPC, including Storage Room Lights, Washroom Lights, Motorized Valve, etc., with columns for load type, panel number, and description.

NOTE: THE INDICATED PANEL ASSEMBLY MUST HAVE AN INTERRUPTING CAPACITY OF 22000 A. PROVIDE BY EITHER FULLY RATED BREAKERS OR INTEGRATED EQUIPMENT RATING WITH THE UPSTREAM BREAKER.

* INDICATES 33mA GROUND FAULT STYLE BREAKER
THE CONTRACTOR IS TO COORDINATE ROOM NAMES AND NUMBERS NOTED WITH THE FINAL ROOM INFORMATION ISSUED DURING CONSTRUCTION AND ADJUST DIRECTORIES TO SUIT.

DEMOLISHED PANEL 'LPD' SCHEDULE

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS:
MOUNTING: RECESSED
NOTES: EXISTING FPE TYPE NBLP

Table listing electrical loads for panel LPD, including Existing Load, Room 15 Comp. Rec, etc., with columns for load type, panel number, and description.

NEW PANEL 'LPD'

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS: FULL
MOUNTING: RECESSED
NOTES:

Table listing electrical loads for new panel LPD, including Existing Load, Room 15 Comp. Rec, etc., with columns for load type, panel number, and description.

NOTE: THE INDICATED PANEL ASSEMBLY MUST HAVE AN INTERRUPTING CAPACITY OF 22000 A. PROVIDE BY EITHER FULLY RATED BREAKERS OR INTEGRATED EQUIPMENT RATING WITH THE UPSTREAM BREAKER.

* INDICATES 33mA GROUND FAULT STYLE BREAKER
THE CONTRACTOR IS TO COORDINATE ROOM NAMES AND NUMBERS NOTED WITH THE FINAL ROOM INFORMATION ISSUED DURING CONSTRUCTION AND ADJUST DIRECTORIES TO SUIT.

DEMOLISHED PANEL 'LPE' SCHEDULE

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS:
MOUNTING: RECESSED
NOTES: EXISTING FPE TYPE NBLP

Table listing electrical loads for panel LPE, including Existing Load, Space, etc., with columns for load type, panel number, and description.

NEW PANEL 'LPE'

VOLTAGE: 120/208 VOLTS
PHASE: 3P, 4W
MAINS: 225A
NEUTRAL BUS: FULL
MOUNTING: RECESSED
NOTES:

Table listing electrical loads for new panel LPE, including Existing Load, Fire/Smoke Dampers, etc., with columns for load type, panel number, and description.

NOTE: THE INDICATED PANEL ASSEMBLY MUST HAVE AN INTERRUPTING CAPACITY OF 22000 A. PROVIDE BY EITHER FULLY RATED BREAKERS OR INTEGRATED EQUIPMENT RATING WITH THE UPSTREAM BREAKER.

* INDICATES 33mA GROUND FAULT STYLE BREAKER
THE CONTRACTOR IS TO COORDINATE ROOM NAMES AND NUMBERS NOTED WITH THE FINAL ROOM INFORMATION ISSUED DURING CONSTRUCTION AND ADJUST DIRECTORIES TO SUIT.

HALTON CATHOLIC DISTRICT SCHOOL BOARD
Project: HOLY FAMILY SCHOOL

Architects: Snyder Architects Inc.
100 Broadview Ave., Suite 301, Toronto, ON M4M 3H3
T. 416.966.5444
www.snyderarchitects.ca

Consultants: DEI Consulting Engineers Ltd.
Mechanical, Electrical, Acoustic
Structural Consultants: Kalos Engineering Inc.
300 York Boulevard, Hamilton, ON L8R3K6
Tel: 905-333-9119

Abatement Consultant: Maple Environmental Inc.
428 South Service Road, East - Suite 116, Oakville, ON L6J 2J6
Tel: 905-257-4408

THIS WORK FOR THIS PROJECT SHALL BE CONSTRUCTED IN PHASES. REFER TO ARCHITECTURAL DRAWINGS FOR PHASING INFORMATION AND DETAILS. MISINTERPRETATION OF THE DRAWINGS WITH RESPECT TO THE EXTENT OF THE PHASING OF THE WORK SHALL NOT RELIEVE THE CONTRACTOR OF THE WORK REQUIRED TO COMPLETE THE ENTIRE CONTRACT.

Table with columns: No., Revisions, Date. Contains revision history for coordination and permit issuance.

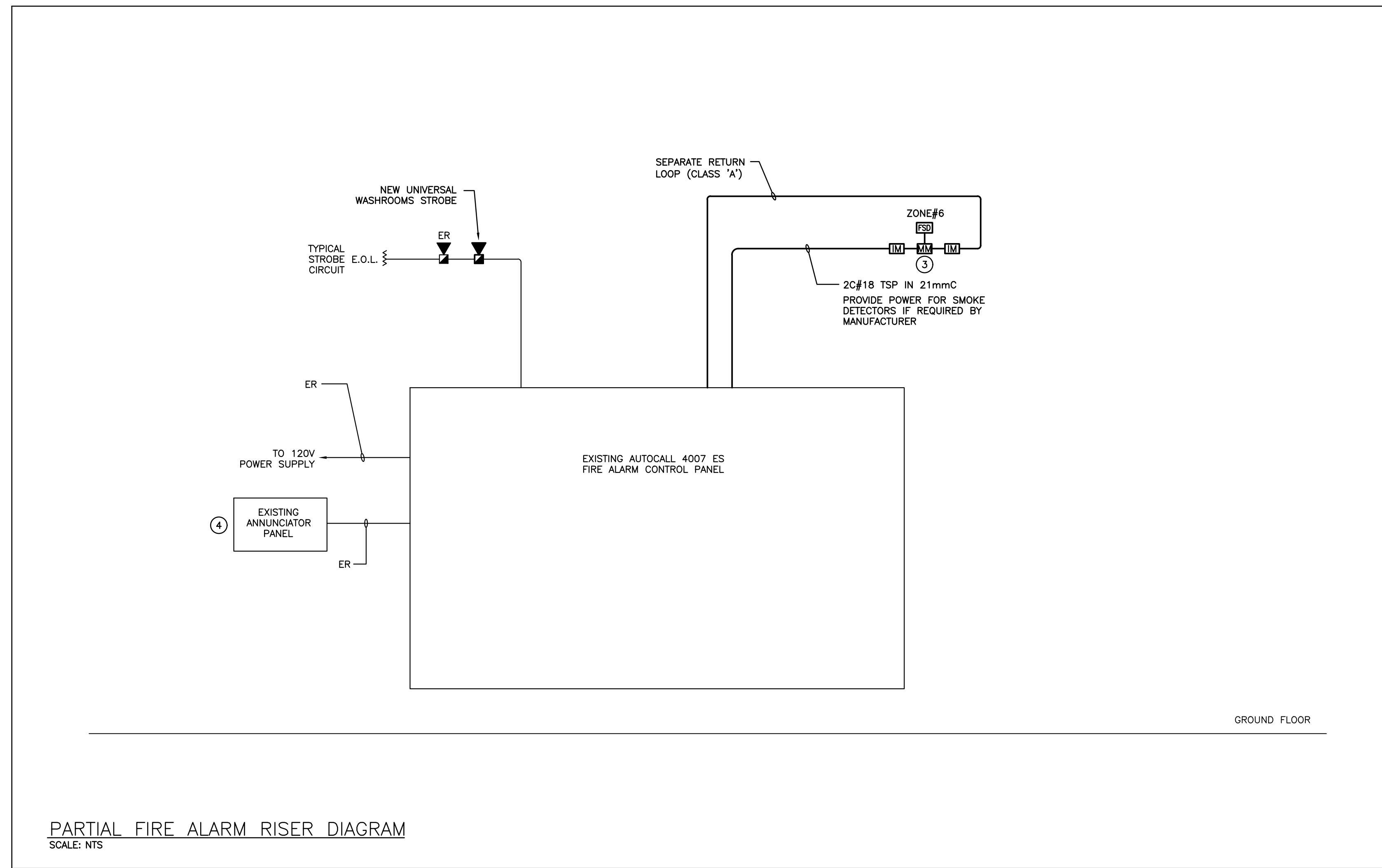
The contractor shall verify all dimensions and report all errors and discrepancies to the Consultant before commencement of the work. The drawings show general arrangement of services. Follow as closely as actual building construction will permit. Obtain approval for relocation of service from Consultant before commencement of the work. The drawings do not indicate all offsets fitting and accessories which may be required. Provide the same to meet the required conditions. Drawings and specifications, etc., prepared and issued by the Consultant are the property of the Consultant and must be returned at the completion of the project. These documents are not to be duplicated or copied without the consent of the Consultant. Do not scale this drawing. © 2024 DEI Consulting Engineers



Panel SCHEDULES

Table with columns: Scale, Date, Drawn by, Checked by, Job No., Drawing No. Values: AS NOTED, CP, MEK, 2325, E42

This drawing is issued for 24"X36" sheet size. If not the above size, interpret the drawing accordingly.



PARTIAL FIRE ALARM RISER DIAGRAM
SCALE: NTS

NOTES

- REFER TO FLOOR PLANS FOR EXACT LOCATION AND QUANTITIES OF DEVICES.
- CONTRACTOR TO CONFIRM WIRE SIZE FOR SIGNAL CIRCUIT WITH MANUFACTURER BASED ON LENGTH OF CIRCUIT RUN AND QUANTITY OF SIGNALS
- INDICATES 120V POWER AND FIRE ALARM CONNECTIONS TO SMOKE/FIRE DAMPER WITH INTEGRAL SMOKE DETECTOR. REFER TO FIRE ALARM SPECIFICATIONS, COORDINATE EXACT LOCATION/CONNECTION REQUIREMENTS WITH MECHANICAL CONTRACTOR. SMOKE/FIRE DAMPER AND ASSOCIATED INTEGRAL DETECTOR TO BE PROVIDED AND INSTALLED BY MECHANICAL CONTRACTOR. PROVIDE MONITORING MODULE(S) PER SMOKE/FIRE DAMPER TO 120V POWER SUPPLY CONNECTION TO THE DAMPER ACTUATOR, AND INTEGRAL SMOKE DETECTOR ALARM AS SIGNAL. A TROUBLE CONDITION SHALL BE ACTIVATED DUE TO THE LOSS OF AC POWER AT THE MAIN CONTROL PANEL, CONSISTING OF AUDIBLE AND VISUAL TROUBLE SIGNAL UNTIL ACKNOWLEDGED BY OPERATOR.
- CONTRACTOR TO INCLUDE FOR UPDATES TO EXISTING REMOTE ANNUNCIATOR. PASSIVE GRAPHIC TO BE UPDATED BY OWNER.

ALL EXISTING ZONES ARE NOT SHOWN ON RISER. OBTAIN COPY OF EXISTING GRAPHIC AND UPDATE TO SUIT NEW LAYOUT AND ADDITIONAL ZONES. SUBMIT SHOP DRAWING. INCLUDE FOR INTEGRATED LIFE SAFETY TESTING PER SPECIFICATIONS.

FIRE ALARM ANNUNCIATOR SCHEDULE

Zone	Description	Alarm	Supervisory	Existing	New
1	MAIN SCHOOL	●		●	
2	KINDERGARTEN	●		●	
3	MECH ROOM	●		●	
4	MECH STAIRS	●		●	
5	ELECTRICAL ROOM	●		●	
6	GROUND FLOOR FIRE/SMOKE DAMPERS	●			●
7	SPACE				
8	SPACE				
9	SPACE				
10	SPACE				
11	SPACE				
12	SPACE				
13	SPACE				
14	SPACE				
15	SPACE				
16	SPACE				
17	SPACE				
18	SPACE				
19	SPACE				
20	SPACE				
21	SPACE				
22	SPACE				
23	SPACE				
24	SPACE				

Client
HALTON CATHOLIC DISTRICT SCHOOL BOARD
Project
HOLY FAMILY SCHOOL

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Consultants
DEI
Consulting Engineers
MECHANICAL | ELECTRICAL | PLUMBING | AUTOMATIC

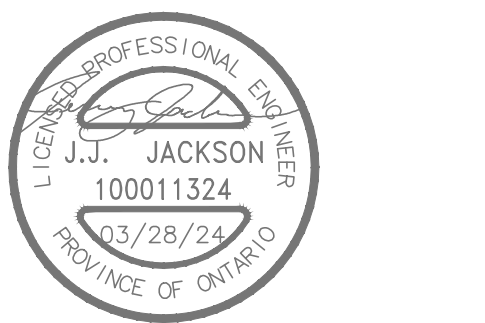
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True North		Project North	
No.	Revisions	Date	
1	Issued for Coordination	2024-03-08	
2	Issued for Coordination	2024-03-11	
3	Issued for Bids & Building Permit	2024-03-26	

The contractor shall verify all dimensions and report all errors and discrepancies to the Consultant before commencement of the work.
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Drawing Title:
PARTIAL FIRE ALARM RISER DIAGRAM

Scale: AS NOTED Date:
Drawn by: CP Checked by: MEX
Job No: 2325 Drawing No: E5.1

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