

DRAWING NOTES

DEMOLITION

- DEMOLISH AND REMOVE EXISTING CEILING CONSISTING OF 13MM GYPSUM BOARD, 22MM METAL FURRING AT 400MM O.C. SUSPENDED CARRYING CHANNELS AT 1200 O.C. REMOVE ALL EXISTING SUSPENSION WIRES.
- AT EACH EXISTING SKYLIGHT AND AT ALL SIDES OF EXISTING SKYLIGHT WELL, REMOVE EXISTING GYPSUM BOARD ON FIBRE BOARD FROM CEILING TO ROOF.
- REMOVE EXISTING CEILING TILE AND GRID TO ALLOW FOR NEW BULKHEAD.
- EXISTING SUSPENDED CEILING TILE AND GRID. REMOVE AND SALVAGE EXISTING CEILING TILE AND GRID TO FACILITATE INSTALLATION OF NEW MECHANICAL DUCT WORK AND REINSTALL WHEN NEW DUCT WORK IS COMPLETED AT EXISTING HEIGHT.
- EXISTING SUSPENDED GYPSUM BOARD CEILING TO REMAIN. CUT NEW OPENINGS FOR NEW LIGHT FIXTURES.
- REMOVE AND SALVAGE EXISTING EGG-CRATE CEILING TILES TO FACILITATE INSTALLATION OF NEW DUCTWORK. REINSTALL WHEN WORK IS COMPLETED.
- REMOVE EXISTING CEILING TILE TO FACILITATE INSTALLATION OF NEW DUCTWORK. REINSTALL WHEN WORK IS COMPLETED.
- REMOVE EXISTING GYPSUM BOARD CEILING (±600x400mm) TO PROVIDE ACCESS FOR MECHANICAL PIPING REMOVAL. REFER TO MECHANICAL DRAWINGS M-2.
- DEMOLISH EXISTING CEILING AND CEILING FRAMING TO ALLOW FOR NEW AIR DIFFUSER.
- REMOVE AND SALVAGE EXISTING SUSPENDED CEILING GRID AND EGG-CRATE TILE TO FACILITATE INSTALLATION OF NEW DUCTWORK. REINSTATE GRID AND EGG-CRATE TILE WHEN NEW DUCT WORK IS COMPLETED AT EXISTING HEIGHT.
- REMOVE EXISTING GYPSUM BOARD CEILING (±600x600mm) TO PROVIDE ACCESS TO EXISTING ROOF DRAIN ABOVE.

SPECIFICATIONS

GYPSUM BOARD ASSEMBLIES

MATERIALS:

- Gypsum sheathing board: to ASTM C79/C79M, standard 13 mm thick 1200 mm wide x maximum practical length.
- Metal furring runners, hangers, tie wires, inserts, anchors.
- Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- Resilient clips drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- Nails: to ASTM C514.
- Steel drill screws: to ASTM C1002.
- Stud adhesive: to CAN/CGSB_71.25 ASTM C557.
- Laminating compound: as recommended by manufacturer, asbestos_free.
- Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc coated by hot dip process 0.5 mm base thickness, perforated flanges, one piece length per location.
- Joint compound: to ASTM C475, asbestos_free.

ERECTION

- Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.
- Do application of gypsum sheathing in accordance with ASTM C1280.
- Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.
- Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- Install work level to tolerance of 1:1200.
- Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.
- Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

INSTALLATION

- Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.
- Install casing beads around perimeter of suspended ceilings.
- Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- Install access doors to electrical and mechanical fixtures specified in respective sections. Rigidly secure frames to furring or framing systems.
- Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.
- Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:
 - Levels of finish:
 - Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
 - Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.
 - Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
 - Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
 - Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
 - Mix joint compound slightly thinner than for joint taping.
 - Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

PAINTING

- Product Data:
 - Submit product data and instructions for each paint and coating product to be used.
- Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS). Indicate VOCs during application.
- Submit duplicate 200 x 300 mm sample panels of each paint, specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards.
- Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

MATERIALS

- Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- Provide paint materials for paint systems from single manufacturer.
- Only qualified products with E2 "Environmentally Friendly" rating are acceptable for use on this project.
- Conform to latest MPI requirements for interior painting work including preparation and priming.

COLOUR

- Match existing ceiling and wall colour.

INTERIOR PAINTING SYSTEM

- Plaster and gypsum board: ceiling
 - INT 9.1A - Latex flat finish.
- Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
 - INT 9.2A - Latex gloss level 4 finish (over latex sealer) or match existing gloss level.

EXECUTION

- Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.
- Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- Apply paint materials in accordance with paint manufacturer's written application instructions.

PREPARATION

- Protect existing building surfaces and adjacent structures from paint splatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Engineer.
- Protect items that are permanently attached such as Fire Labels on doors and frames.
- Protect factory finished products and equipment.
- Protect building occupants in and about the building.
- Surface Preparation:
 - Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-install after painting is completed.
- Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Engineer.
- Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - Remove dust, dirt, & other surface debris by vacuuming, wiping with dry, clean cloths.
 - Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
 - Do not apply paint until prepared surfaces have been accepted by NCC Representative.

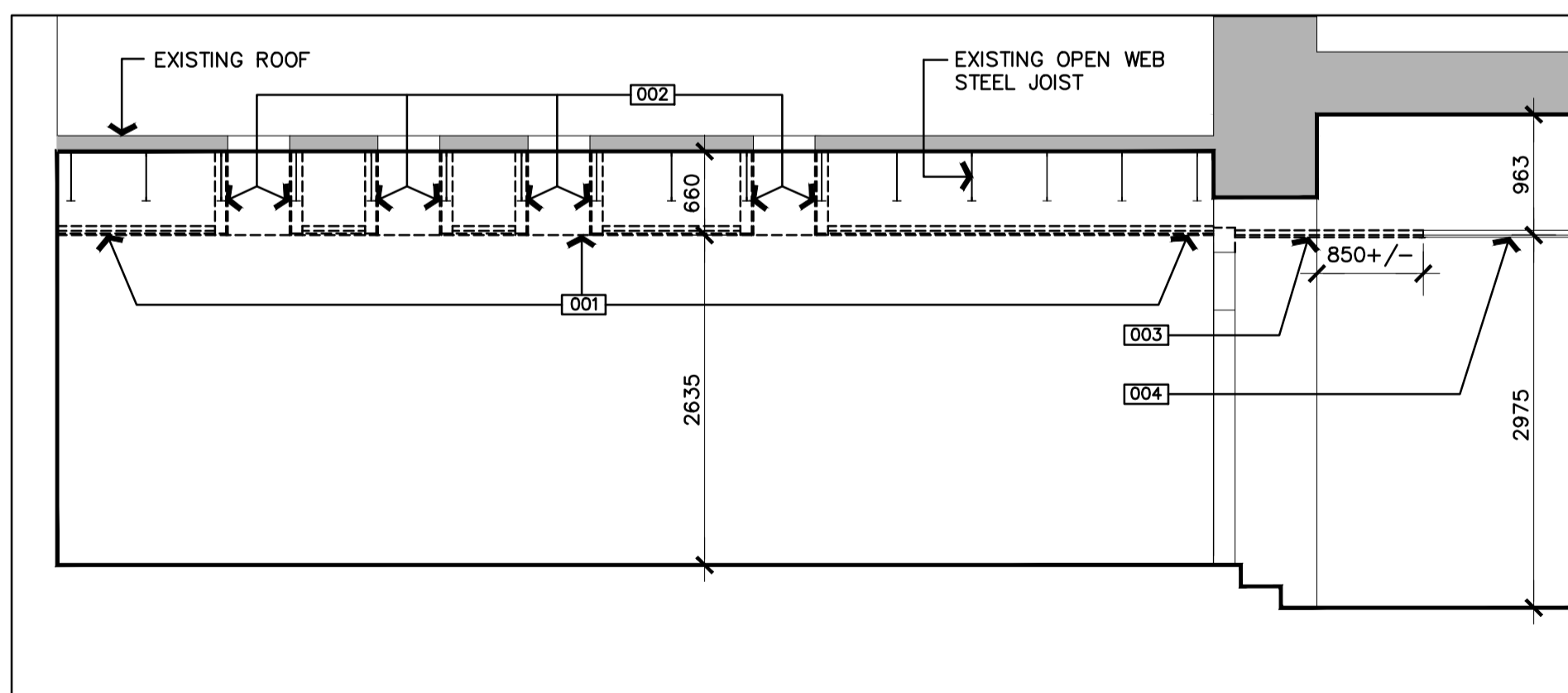
APPLICATION

- Apply paint in uniform layer using brush and/or roller type suitable for application.
- Work paint into cracks, crevices and corners.
- Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- Sand and dust between coats to remove visible defects.



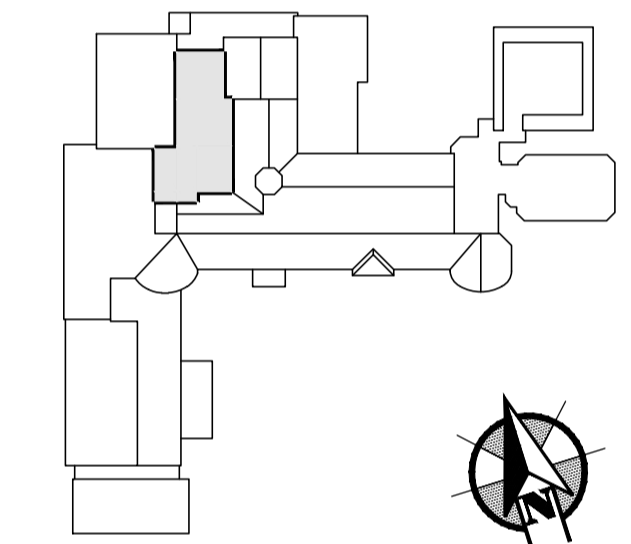
1 A000 DEMOLITION-GROUND FLOOR REFLECTED CEILING PLAN

1:75



2 A000 TYPICAL CROSS SECTION

1:50



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ISS#01	ISSUED FOR TENDER	DEC/16/2014
no.	description	date

**PANTRY COOLING SYSTEM
 UPGRADE**

drawing
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**REFLECTED CEILING
 PLAN**

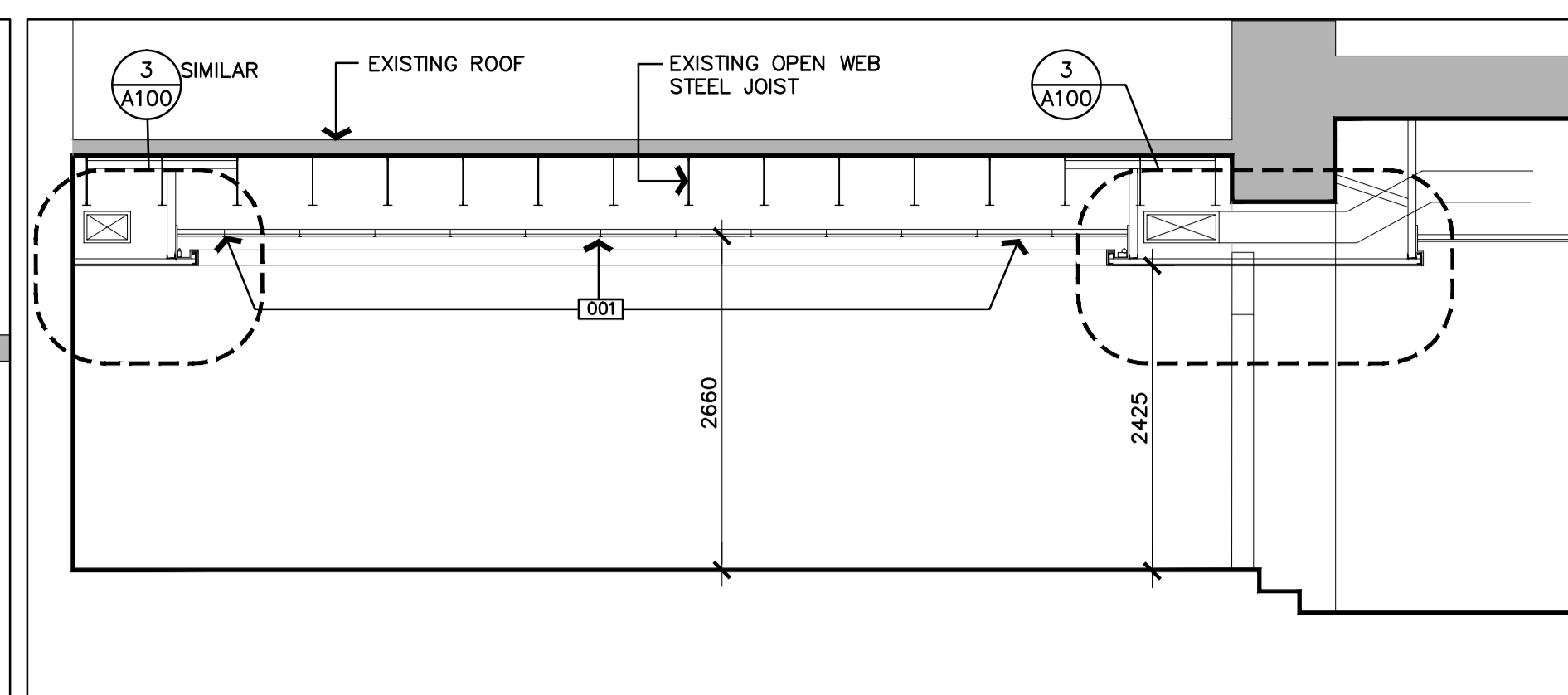
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drawn by	X'Y'g'g'h'f' d'UF	K.L.
date	16-DEC-2014	scale
		1/4" = 1'-0"
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		A100

**DRAWING NOTES
 NEW CONSTRUCTION**

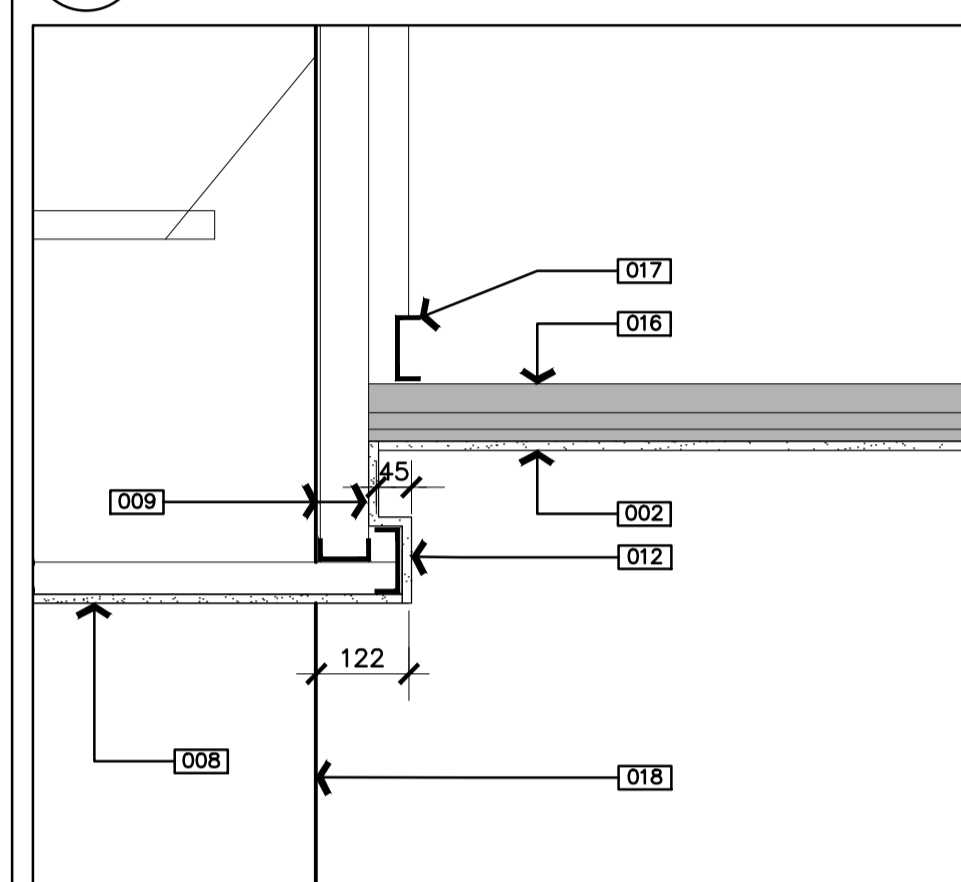
- NEW ACOUSTIC CEILING TILE, CEILING GRID AND SUSPENSION SYSTEM.
- NEW 13MM GYPSUM BOARD OVER EXISTING GYPSUM BOARD. PROVIDE NEW PAINT FINISH.
- PATCH AND REPAIR EXISTING GYPSUM BOARD CEILING WHERE DAMAGED FROM NEW ELECTRICAL INSTALLATION, REFER TO ELECTRICAL PLANS. PROVIDE NEW PAINT FINISH TO CEILING.
- NEW GYPSUM BOARD BULKHEAD, SEE DETAILS.
- WHERE NEW BULKHEAD BUTTS INTO EXISTING STONE WALL PROVIDE 16mm WIDE GYPSUM BOARD REVEAL.
- PROVIDE NEW CEILING GRID AND CEILING TILE.
- PATCH AND REPAIR WALL AROUND NEW MECHANICAL DUCT AND PROVIDE NEW PAINT FINISH.
- TYPICAL BULKHEAD CONSTRUCTION:
 13MM GYPSUM BOARD ON 42MM METAL STUD FRAMING AT 400MM ON CENTER. PAINT FINISH.
- 13MM GYPSUM BOARD ON 64MM METAL STUD FRAMING AT 400MM ON CENTER.
- SECURE NEW FRAMING TO EXISTING STRUCTURE.
- EXTEND GYPSUM BOARD ABOVE FINISH CEILING. TYPICAL.
- 13MM GYPSUM BOARD ON 90MM METAL STUD. TYPICAL.
- EXISTING CEILING GRID.
- PROVIDE TWO LAYERS 13MM GYPSUM BOARD.
- PROVIDE 13MM GYPSUM BOARD TO ALL SIDES OF BULKHEAD NICHE. PAINT FINISH.
- EXISTING GYPSUM BOARD CEILING AND SUSPENSION SYSTEM.
- PROVIDE NEW SUPPORT WHERE EXISTING CEILING SYSTEM IS CUT.
- FACE OF STONE WALL BEYOND.
- PROVIDE DIAGONAL METAL STUD BRACING AT 1200MM ON CENTER.
- PROVIDE NEW METAL FRAMING AND SUSPENSION WHERE REMOVED. NEW FRAMING TO SUPPORT NEW GYPSUM BOARD.
- PROVIDE NEW GYPSUM BOARD AND METAL FRAMING PIPE CHASE FROM FLOOR TO CEILING. PROVIDE FIRESTOP AROUND PIPE PENETRATION AT FLOOR TO PROVIDE 2HR FIRE RATING.
- PROVIDE NEW 300x300mm ACCESS HATCH IN GYPSUM BOARD BULKHEAD.
- PATCH, PRIME AND MAKE GOOD EXISTING GYPSUM BOARD CEILING WHERE REMOVED FOR ACCESS. PAINT FINISH.

PAINT FINISH LEGEND:

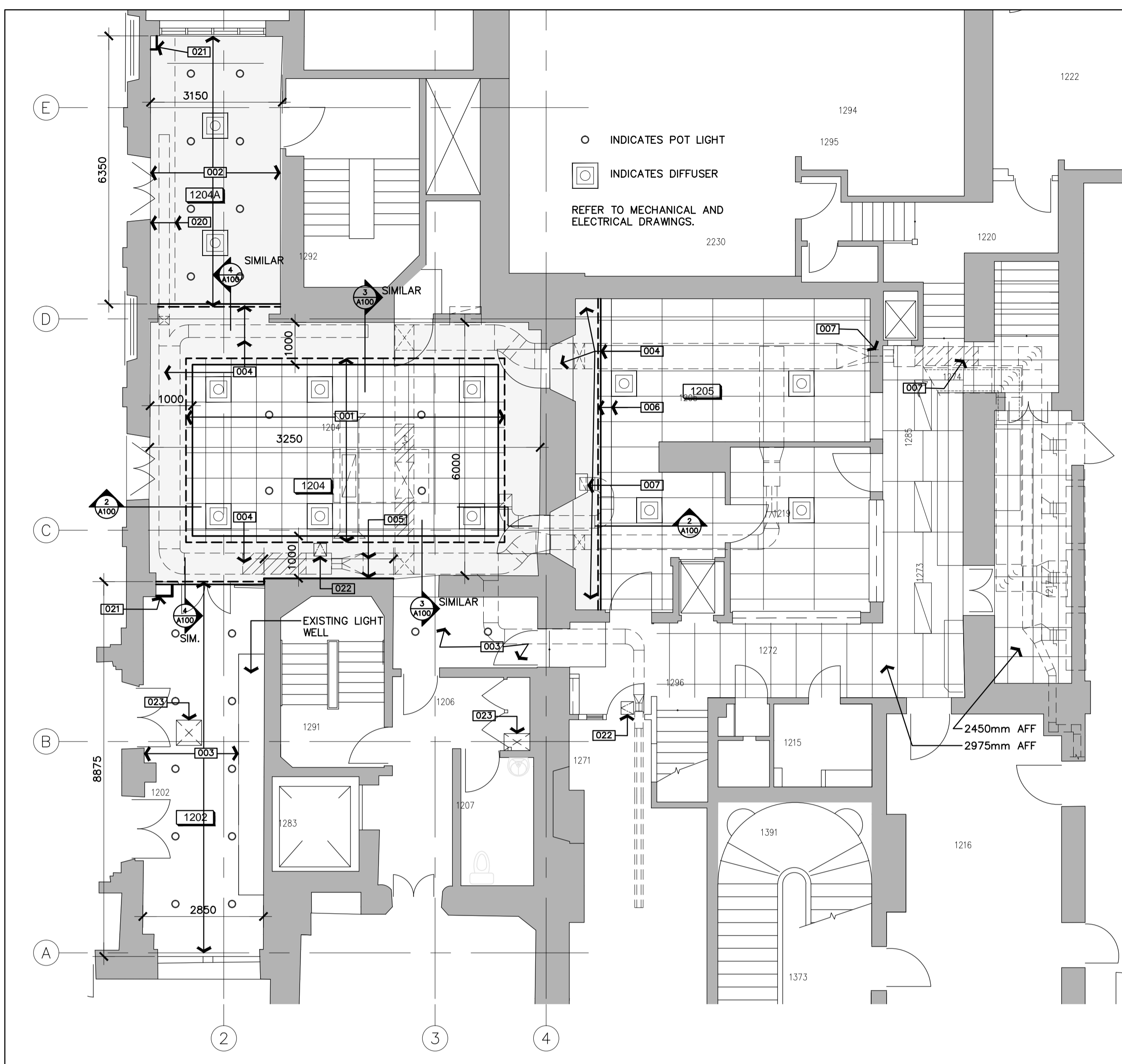
- PROVIDE NEW PAINT FINISH TO ALL EXISTING WALLS IN SERVERY BALLROOM 1204 AND ADJACENT RM 1204A.
- PAINT WALL BELOW NEW BULKHEAD AT RM1205
- PAINT CEILING OF ATRIUM 1202
- PAINT ALL NEW GYPSUM BOARD BULKHEADS AND NEW GYPSUM BOARD CEILING SURFACES.



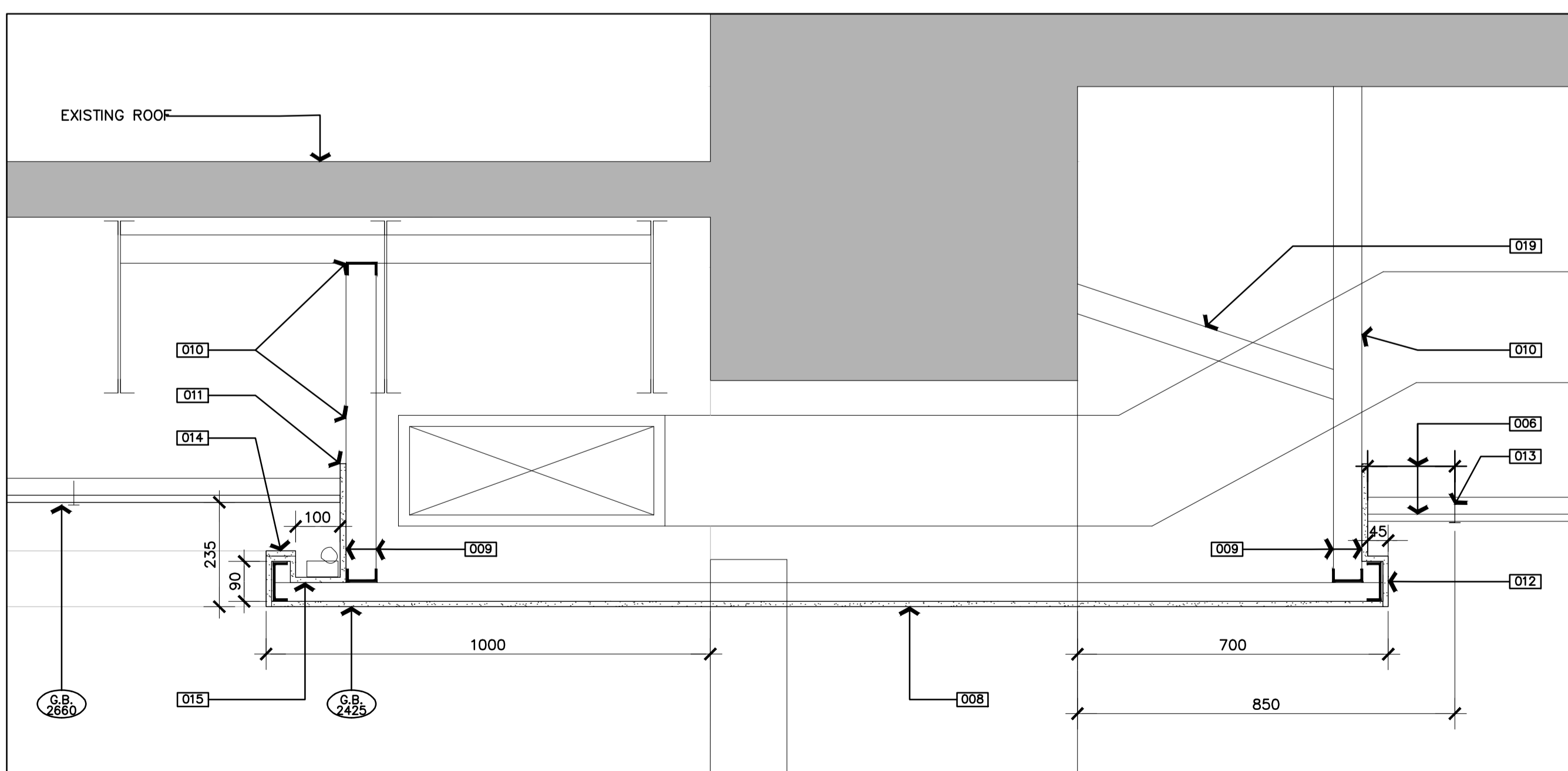
2 TYPICAL CROSS SECTION
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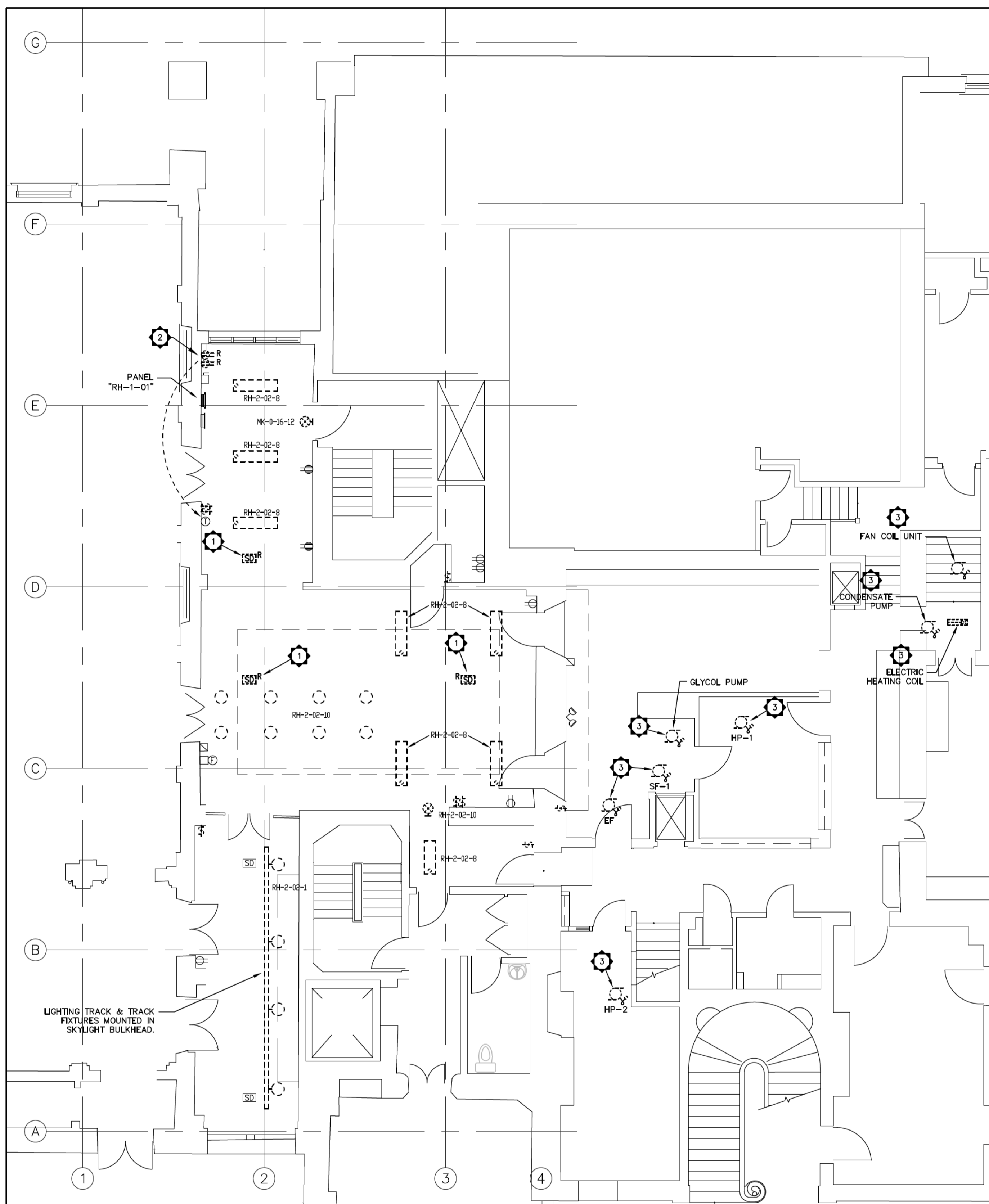
4 BULKHEAD DETAIL
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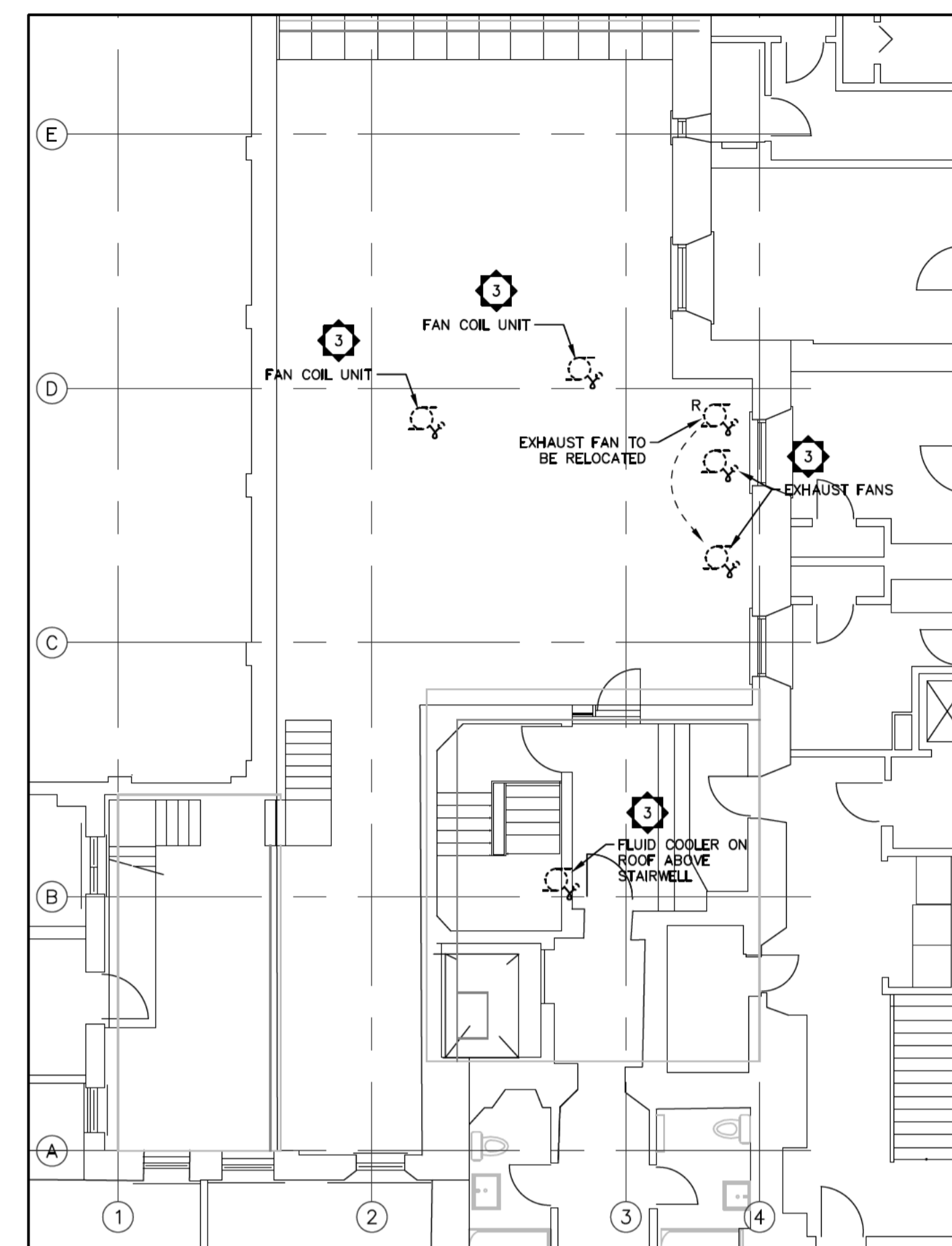
1 NEW-GROUND FLOOR REFLECTED CEILING PLAN
 1:75



3 TYPICAL BULKHEAD DETAIL
 1:10



1 GROUND FLOOR PLAN - PARTIAL
E1 1:75
0 1m 2m 3m 4m



2 ROOF PLAN - PARTIAL
E1 1:100
0 1m 2m 3m 5m

GENERAL NOTES:

- EXCEPT AS NOTED OTHERWISE, ALL EXISTING EQUIPMENT TO BE DEMOLISHED IS SHOWN IN THICK DASHED LINES.
- EXCEPT AS NOTED OTHERWISE ALL EXISTING EQUIPMENT TO BE RELOCATED IS SHOWN IN THICK DASHED LINES AND IS MARKED WITH THE LETTER 'R'.
- EXCEPT AS NOTED OTHERWISE ALL RELOCATED EQUIPMENT IS SHOWN IN THICK SOLID LINES AND IS MARKED WITH THE LETTER 'R'.
- EXCEPT AS NOTED OTHERWISE, ALL EXISTING EQUIPMENT TO REMAIN IS SHOWN IN THIN SOLID LINES.
- EXCEPT AS NOTED OTHERWISE, ALL NEW EQUIPMENT IS SHOWN IN THICK SOLID LINES.
- ELECTRICAL CONTRACTOR IS RESPONSIBLE TO VERIFY THE EXISTING INSTALLATION ON SITE AND CONFIRM ALL EXISTING CIRCUITS TO BE DEMOLISHED AND/OR REUSED.
- CONTRACTOR SHALL RE-USE THE EXISTING NORMAL & EMERGENCY LIGHTING CIRCUITS FOR THE NEW DESIGN UNLESS OTHERWISE NOTED.
- THE LOCATIONS OF EXISTING DEVICES SHOWN IS FOR INFORMATION PURPOSES ONLY. CONTRACTOR TO VERIFY THE EXACT LOCATION ONSITE.
- CONTRACTOR SHALL PROTECT THE EXISTING FIRE ALARM SYSTEM THROUGHOUT THE BUILDING DURING THE RENOVATION'S OF THE BUILDING AND ENSURE THE SYSTEM IS FULLY OPERATIONAL WITH NO FAULTS AT THE COMPLETION OF THE PROJECT.

SPECIFIC NOTES:

- CONTRACTOR TO RELOCATE THE EXISTING SMOKE DETECTOR ONTO THE NEW CEILING. TEST & VERIFY AS PER CAN/ULC.
- CONTRACTOR TO RELOCATE THE EXISTING TWO (2) DUPLEX OUTLETS. EXTEND EXISTING CIRCUITS TO SUIT.
- ELECTRICAL CONTRACTOR TO DISCONNECT POWER TO INDICATED MECHANICAL EQUIPMENT AND REMOVE ALL WIRING AND CONDUIT BACK TO PANEL.

LEGEND

SYMBOL	DESCRIPTION
	FLUORESCENT LIGHTING FIXTURE, CEILING MOUNTED
	SINGLE POLE TOGGLE SWITCH
	WIRELESS SWITCH
	LIGHTING FIXTURE, CEILING MOUNTED
	EXIT LIGHT c/w DIRECTIONAL ARROWS, CEILING MTD
	EXIT LIGHT c/w DIRECTIONAL ARROWS, WALL MTD
	REMOTE SINGLE/DOUBLE EM LTG HEADS, WALL MTD
	DUPLEX RECEPTACLE, 120V, 15A
	DUPLEX RECEPTACLE, SURGE SUPPRESSOR TYPE
	ELECTRICAL DISTRIBUTION PANEL
	OUTLET BOX & FLEX CONNECTION TO EQUIPMENT
	DISCONNECT SWITCH
	MAGNETIC MOTOR STARTER
	ELECTRIC HEATING COIL
	PULL STATION
	AUDIBLE DEVICE
	SMOKE DETECTOR
	THERMOSTAT
	MOTOR - 120V, 1φ, HP AS INDICATED

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2	ISSUED FOR TENDER	16-12-2014
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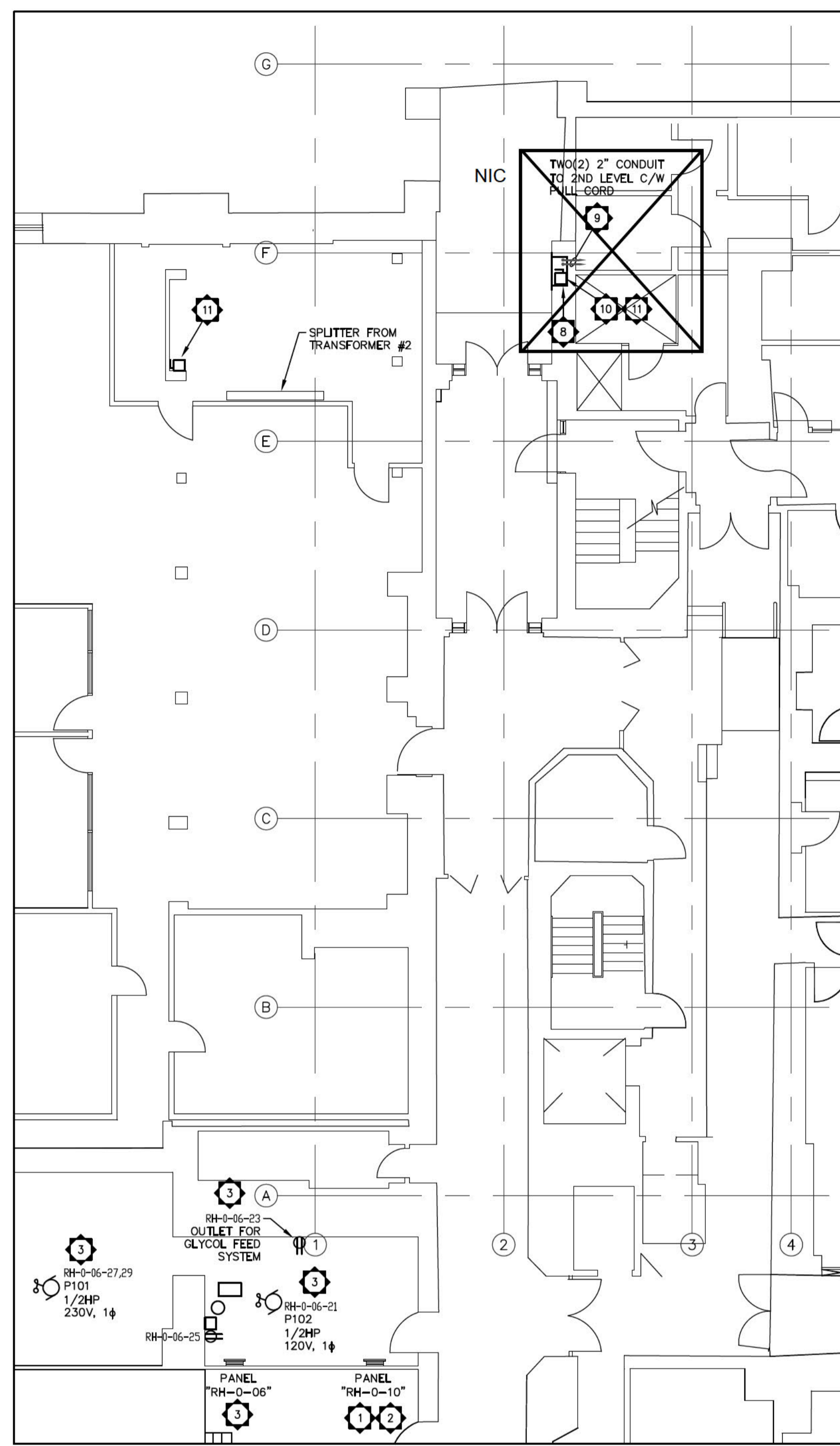
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PANTRY COOLING SYSTEM
UPGRADES

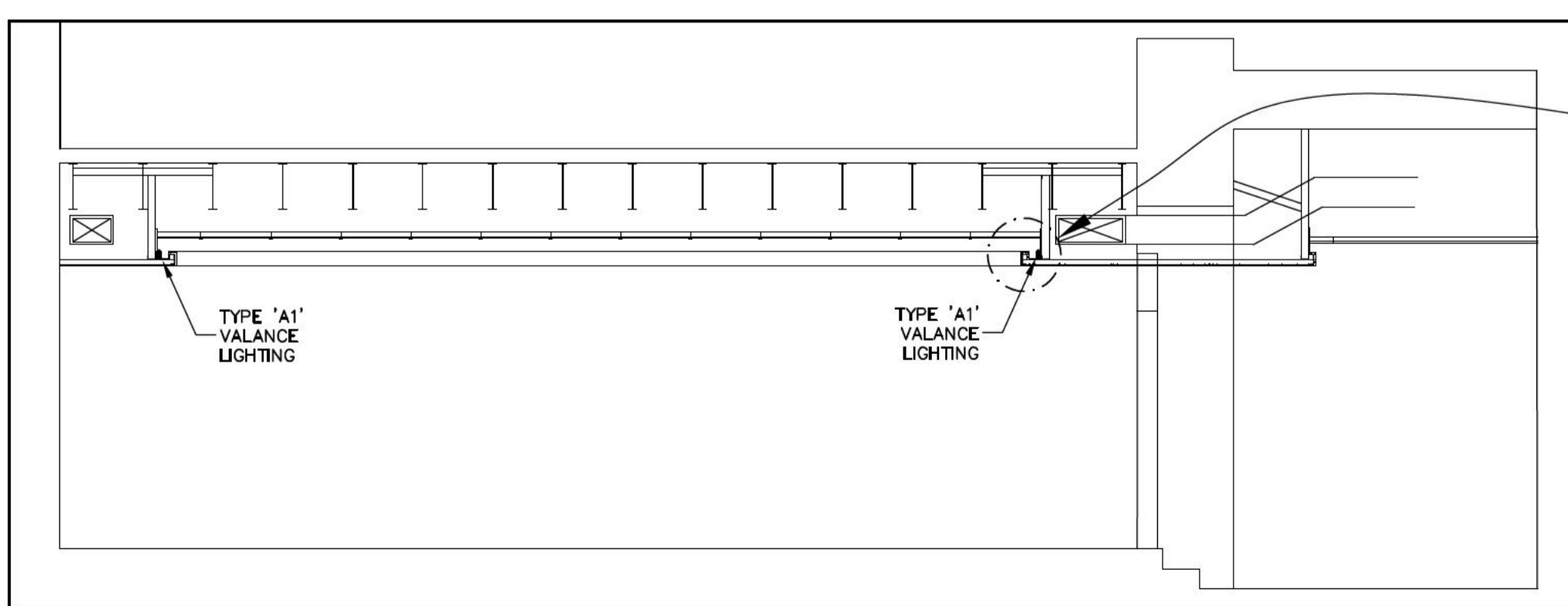
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LIGHTING, POWER &
SYSTEMS
DEMOLITION PLAN

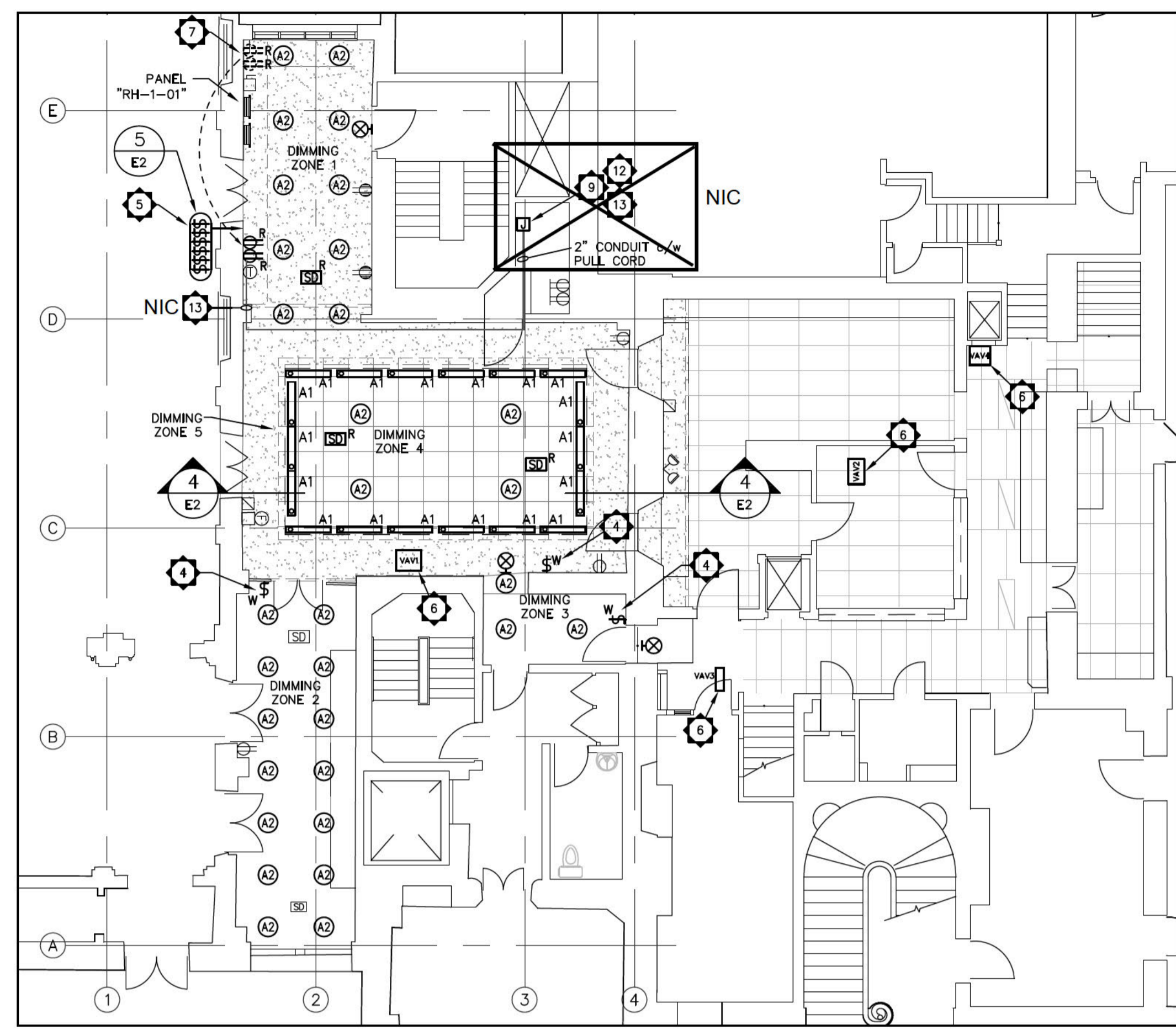
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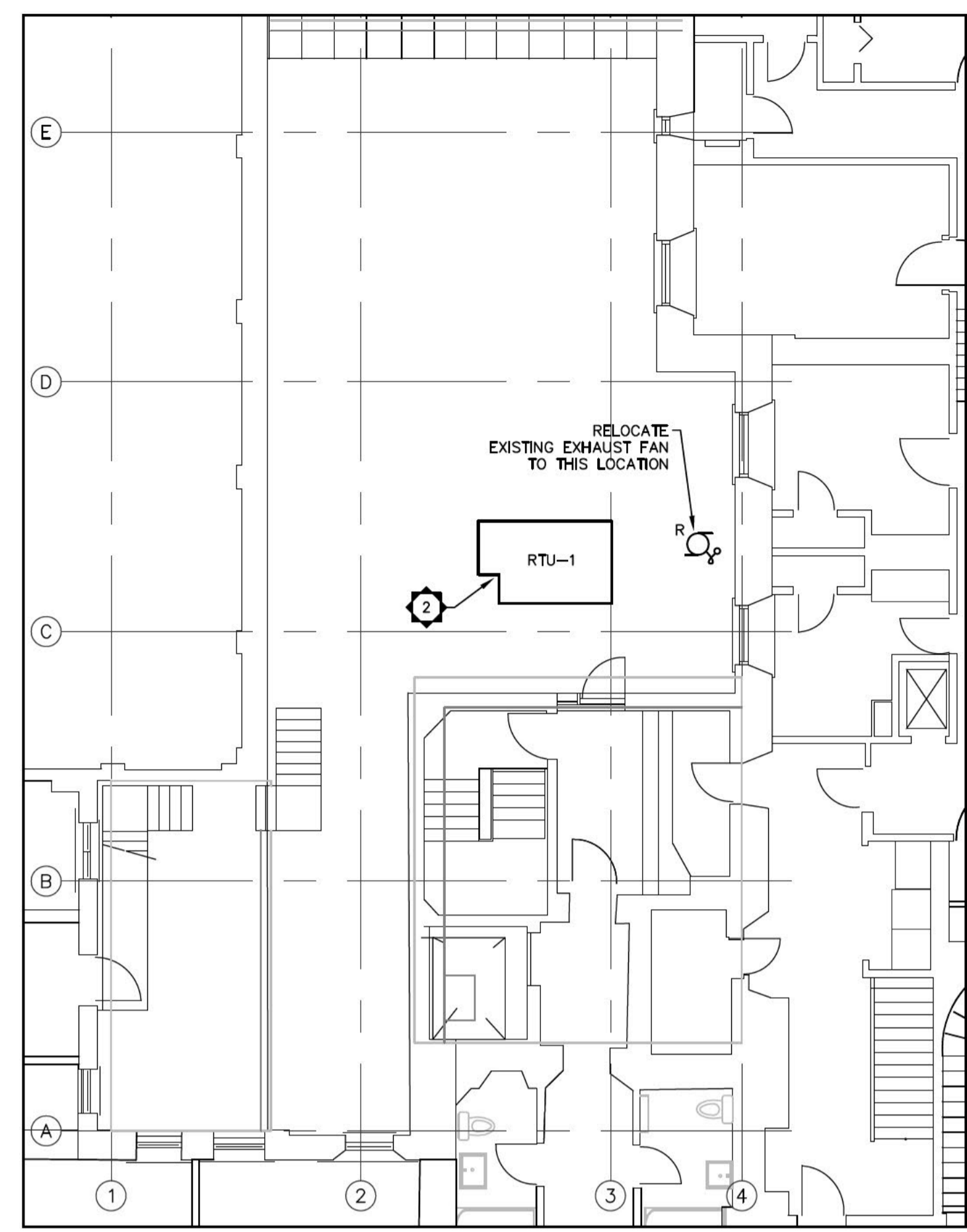
1 BASEMENT PLAN - PARTIAL
E2 1:100



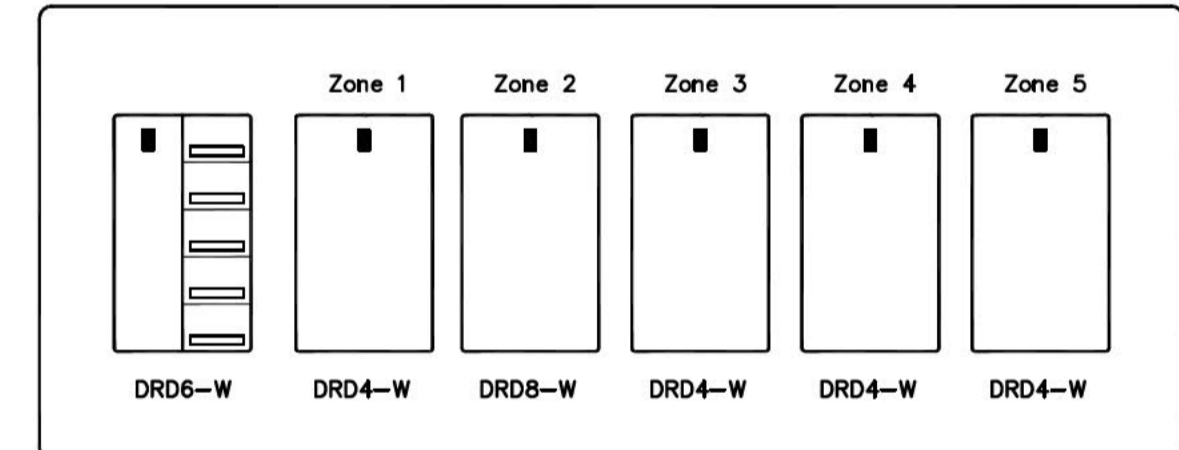
4 SIDE VIEW
E2 1:50



2 GROUND FLOOR PLAN - PARTIAL
E2 1:100



3 ROOF PLAN - PARTIAL
E2 1:100



5 LIGHTING SWITCH LAYOUT
E2 1:100

GENERAL NOTES / NOTES GÉNÉRALES:

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- CONTRACTOR SHALL RE-USE THE EXISTING NORMAL & EMERGENCY LIGHTING CIRCUITS FOR THE NEW DESIGN UNLESS OTHERWISE NOTED.
- THE LOCATIONS OF EXISTING DEVICES SHOWN IS FOR INFORMATION ONLY. CONTRACTOR TO VERIFY THE EXACT LOCATION ON SITE.
- CONTRACTOR SHALL PROTECT THE EXISTING FIRE ALARM SYSTEM THROUGHOUT THE BUILDING DURING THE RENOVATION'S OF THE BUILDING AND ENSURE IT IS FULLY OPERATIONAL WITH NO FAULTS AT THE COMPLETION OF THE PROJECT.

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	CATALOGUE NUMBER	LAMPS PER FIXTURE				VOLTS	TOTAL WATTS	MOUNTING	REMARKS	
			NO.	TYPE	WATTS	COLOUR					LUMENS
A1	COOPER LIGHTING - AMETRIX LED MINI COVE ARCHITECTURAL WALL FIXTURE WITH SINGLE ROW OF LED'S AND CLEAR LENS	LC-1-35K-1C-120-24	1	ALM 2.0 COOPER LED	17W	3500K	1503.30	120	17	WALL	DIMMABLE DRIVER (*)
A2	COOPER LIGHTING - PORTFOLIO 6" 50" CUTOFF RECESSED DOWNLIGHT, MEDIUM DISTRIBUTION WITH SPECULAR CLEAR TRIM	LD6A10D010TE ERM6A10B35 6LM1UJ	1	HIGH LUMEN LED	14.9W	3500K	1044.18	120	14.9	RECESSED	DIMMABLE DRIVER (*)

(*) DIMMABLE DRIVER COMPATIBLE WITH WATTSTOPPER MIRO DECORATOR WIRELESS RF CONTROLLER

SPECIFIC NOTES:

- CONTRACTOR TO PROVIDE & INSTALL A NEW 3-POLE 15A BREAKER (TO MATCH EXISTING) IN PANEL RH-0-10 TO FEED THE NEW RTU-1.
- CONTRACTOR TO PROVIDE & INSTALL A NEW 3#10+GRD IN 27mmC FROM PANEL RH-0-10 IN OPEN AREAS AND TRANSITION TO 3C#10TECK IN WALL & CEILING SPACES TO FEED THE NEW RTU-1. CONTRACTOR TO PROVIDE THE ELECTRICAL CONNECTIONS TO THE UNIT.
- CONTRACTOR TO PROVIDE & INSTALL ONE(1) 15A-2P AND FOUR(4) 15A-1P NEW BREAKERS (TO MATCH EXISTING) IN PANEL RH-0-06 TO FEED P101 & P102, THE NEW OUTLETS AND GLYCOL SYSTEM OUTLET.
- CONTRACTOR TO PROVIDE & INSTALL A 120V FEED FROM EXISTING CIRCUITS TO FEED THE WALL MOUNTED WIRELESS LIGHTING CONTROL SWITCHES.
- CONTRACTOR SHALL USE EXISTING LIGHTING CIRCUIT RH-2-02-8 TO FEED ZONES 1 & 2 AND LIGHTING CIRCUIT RH-2-02-10 TO FEED ZONES 3, 4 & 5.
- CONTRACTOR TO PROVIDE & INSTALL A 120V FEED TO THE NEW VAV BOXES, FED FROM CIRCUIT RH-2-02-1.
- CONTRACTOR TO RELOCATE THE 2x DUPLEX OUTLETS. EXTEND EXISTING WIRING AND CONDUIT TO SUIT.
- NIC
- NIC
- NIC
- NIC
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- NIC



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2	ISSUED FOR TENDER	15-12-2014
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**PANTRY COOLING SYSTEM
UPGRADES**

drawing
dessin
ELECTRICAL
**LIGHTING, POWER &
SYSTEMS
CONSTRUCTION**

approved by
approuvé par D.G.
 designed by
conçu par D.G.
 drawn by
dessiné par G.G.
 date 15-OCT-2014 scale
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 NCC project no. sheet no.
no. du projet de la CCN no. de la feuille
 DC-1110-24 E2

ELECTRICAL SPECIFICATION

GENERAL PROVISIONS

DEFINITIONS

"Provide" means supply and install.
 "Approval" means approval in writing from the Consultant or authorities having jurisdiction.
 "Consultant" means the Engineer or the consulting engineering firm.
 "Owner" means the owner or owner representative.

GENERAL CONDITIONS

Conform to requirements of the General Conditions. Provide all labour, materials, products, equipment, services and all incidentals required to complete, test and commission all electrical work shown on the drawings and/or noted hereunder.

Electrical work shall be carried out by a contractor holding a valid Contractor's license and qualified electricians who hold valid Ontario Certificates of Qualification.

CODES AND STANDARDS

Do complete installation in accordance with applicable codes, including but not necessarily limited to current electrical code CSA C22.1, pertinent ESA (Electrical Safety Authority) bulletins and the requirements of all authorities having jurisdiction.

PERMITS AND FEES

Obtain permits necessary for the execution of the electrical work. On completion of the work furnish copies of the Certificates of Acceptance from the Inspection Authority and pertinent authorities having jurisdiction. Pay all associated costs and fees, including any premiums associated with work schedule.

WARRANTY

Warrants all work, materials, equipment and installations to be free of all defects, for 12 months from date of acceptance by the Owner or Owner's representative.

SITE VISIT

Acquire full working knowledge of building site and any existing conditions which may affect the work. Visit site prior to Tender submission.

CONTRACT DRAWINGS

Contract drawings for electrical work, are in part diagrammatic, intended to convey the scope of work and general arrangement of equipment, conduit and outlets. Before installation, verify the physical location of all electrical equipment with all other installations and report any obstructions or interferences. No extra payments arising from failure to make this verification will be considered.

Drawings indicate the general layout of the complete electrical system, arrangement of feeders, circuits, outlets, switches, controls, panelboards, distribution centres, light fixtures and other work.

The drawings indicate the general location and routes to be followed, but do not show all conduit and/or wiring or all the structural, mechanical and architectural details. Plan and install conduit runs respecting all applicable conditions including structural, architectural and mechanical details. Bring obvious discrepancies or omissions to the attention of the Consultant during the Tender Period, at least five working days prior to Tender Closing.

SHOP DRAWINGS

Submit one (1) electronic copy of shop drawings in PDF format, stamped by the electrical contractor, to the Consultant with transmittal for review. Review of shop drawings indicates only that the quality and general design of the equipment is acceptable. Verification of detailed design compliance, dimensions and quantities, or the location of connections to equipment, shall be the responsibility of the Contractor. Contractor shall verify shop drawings prior and after review by consultant to ensure proposed equipment suitable with proposed installation by the contractor.

Review of breaker quantities in electrical panel shop drawings shall be sole responsibility of the contractor.

Show details of construction, dimensions, capacities, weights, all electrical data and performance characteristics, on shop drawings. All wiring diagrams, control schematics and descriptions of operation must also be included. Submit shop drawings for:
 - Power distribution equipment, including Panelboards, breakers, disconnect switches, D.T.T., T.V.S.S., receptacles, switches etc. and all motor control equipment.
 - Lighting fixtures with complete information on dimensions, weights, etc. photometric data, lamps, ballasts, voltage, sound ratings and internal wiring diagrams.

DEMONSTRATION AND INSTRUCTION

Provide demonstration and instruction sessions to familiarize facility operation and maintenance personnel with electrical systems and their operation and maintenance.

COMMISSIONING

General Electrical Installation:
 Inspect, test and commission all equipment and work provided under this contract to demonstrate and verify correct operation. Rectify and replace, at no cost to the Owner, any faulty operation and faulty equipment.
 Prior to energising, megger all feeders using a 500V instrument for up to 347V systems, and record results. Check insulation resistance to ground before energizing.
 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Engineer and local authority having jurisdiction over installation.
 Inspect, test and commission all motor controls.
 Inspect, test and commission all lighting fixtures, lighting components e.g. ballasts, lamps etc., related switching and operation of emergency and exit lights.

OPERATION AND MAINTENANCE MANUAL

Submit one manual to the Consultant for approval prior to formal submission of three copies to the Owner. Include in manuals, information based on the requirement listed under shop drawings. Operation and maintenance data to be sufficiently detailed with respect to design elements, operational procedures, technical data, construction features, component functions and maintenance requirements to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion of the system. Include also all updated panel schedules, testing and commissioning results, certificate of acceptance by authorities having jurisdiction.

AS-BUILT DRAWINGS

Submit to the Owner one complete set of prints of drawings showing accurate as-built electrical installations including all conduit and wiring. Revisions shall be noted in red ink. Provide neatly typed updated panel directories for all panels affected including existing panel information.

PROTECTION

Take precautions to protect the occupants and personnel from injury due to live circuits. Protect all finished and unfinished work from damage due to carrying out this work. Also provide full dust protection during construction. Keep equipment dry and clean at all times. Protect all existing services to remain in and around the areas of renovations.

EXISTING SERVICES

Give the Owner ample notice of each necessary interruption of electrical service during the course of the work. Unavoidable interruptions to existing systems/installations, if any, shall be of the shortest possible duration and each such interruption shall require the specific approval of the Owner. Submit a schedule of all anticipated interruptions, identifying exactly what the interruption is, how long it will be, when it is planned to occur and which area(s) will be affected. Give the Owner a minimum of two weeks notice related to each necessary interruption. The Owner reserves the right to deny approval for an interruption on any specific date or time. In this case, an alternative time shall be mutually selected.

DEMOLITION

Refer to Demolition Notes on drawing 'E1'. Render safe the installations at locations from which the existing installations and equipment has been removed as part of this work.
 Remove from the site all existing equipment and materials, which becomes obsolete as a result of this work except where specifically noted otherwise.

CUTTING AND PATCHING

Arrange for the General contractor to do all cutting/core drilling and patching required for the electrical installations. Before carrying out any cutting, obtain written approval from the Owner.

FIREPROOF PATCHING

Where conduits or single conductor cables pass through fire rated floor slabs, fire rated ceilings or fire rated walls, seal opening around with same to maintain fire separation using Electrovort "Flameseal" putty #AA400 or approved ULC rated equivalent.

CLEAN UP AND REPAIR

Carry out the required cleanup at the end of each day in work areas. Remove all tools, equipment, ladders and empty cardboard boxes etc. and leave the premises clean.
 The Electrical Contractor shall also be responsible for making good any damage to walls, floors, ceilings, woodwork, finishes, etc. caused directly or indirectly as a result of his work.

SEISMIC REQUIREMENTS

Comply with all pertinent Code requirements. Electrical equipment and associated services requiring seismic restraints shall include, but not necessarily be limited to all floor mounted equipment, lighting fixture and Life safety related systems and installations such as emergency power and egress lighting.

Electrical contractor shall retain and pay for the services of a Structural Engineer licensed in Ontario to provide stamped shop drawings for seismic support system to suit the electrical installation. Provide letter of compliance from Structural Engineer.

GENERAL MATERIALS

MATERIALS AND EQUIPMENT

Equipment and material supplied as part of the electrical work shall be new and CSA approved for the application.

CONDUIT

Wiring shall be in conduit unless specifically indicated otherwise. Provide EMT throughout c/w watertight coupling and connectors except where specified otherwise. Conceal in ceiling space or wall cavities
 conduits/raceways in all areas except in mechanical and electrical rooms or where specifically indicated otherwise. Surface mounted raceway in finished areas only as permitted by NCC. Install conduits parallel to building lines. Install Polypropylene, minimum 180 kg pull strength pull cords in empty raceways and fasten cords at each end. Install minimum 600mm and maximum 1000mm length of flexible galvanized steel conduit for connections to equipment which may vibrate (such as transformers or equipment with motors), and to equipment not permanently fixed or which must be moved for servicing. Install liquid-tight flexible metallic conduit for such applications in damp locations.

FASTENING AND SUPPORTS

Use lead anchors to secure equipment to solid masonry, tile and plaster surfaces. Use expandable inserts to secure equipment to poured concrete. Use toggle bolts to secure equipment to hollow masonry walls or suspended ceilings. Support groups of conduits and cables, and equipment on 41mm x 41mm x 2.5mmthick galvanized channels equal to Unistrut P-series, using clips, spring loaded bolt, cable clamps and the like, designed as accessories to basic channel members. For surface mounting of two or more conduits use channels at 1.5 m or less on centre spacing.

CONDUIT AND CABLE IDENTIFICATION

Colour code conduits, boxes and metallic sheathed cables. For boxes, identify the cover as well as inside each box. Follow base building system of identification. Otherwise agree on identification system with the Consultant.

WIRING

- Type RW-90 copper, 600V to maximum #10 AWG and 1000V #8 and larger, XLPE insulation. Solid conductors to #10 AWG, stranded conductors #8 AWG and larger. Minimum branch circuit conductors shall be #12 AWG except for 120V control circuits, minimum size of wire shall be #14 AWG. Wiring for branch circuits shall be sized to limit the voltage drop from the Panelboard to the furthest outlet to 2% when carrying 80% of the branch circuit breaker rated current.
- Type AC-90 will be permitted from conduit system junction boxes to wiring devices in the wall cavity. Max. horizontal 3 meters from junction box to wall.
- Type AC-90 shall not be used for any other application that is exposed.

WIRING IDENTIFICATION

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. Colour code: to CSA C22.1.

GROUNDING / BONDING

Bond to ground all equipment with approved fittings and bond conductors of ample capacity as required by Grounding to CSA C22.1, "Electrical Safety Code".

Install complete permanent, continuous, system and circuit, equipment, grounding/bonding systems including, electrodes, conductors, connectors, accessories, as indicated, to conform to requirements of Consultant, and local authority having jurisdiction over installation. Provide insulated ground wires for all branch circuits and motor circuits by running the bonding wires in the same conduit as follows:
 For branch circuits using shared neutrals, install one bonding wire per neutral.
 For circuits using individual neutrals for each circuit, use one bonding wire per circuit.
 Minimum size of bonding wire to be #12 AWG copper. Install continuous bonding conductors through all conduits/raceways for systems operating above 50 volts, bond at each box and device. Bond to ground all metallic raceways for systems, i.e. fire alarm, telephone, cablevision, voice and data etc.

RECEPTACLES

Commercial Specification Grade 15A, 120V. Standard of acceptance Hubbell (white) color or equivalent products.

LOCATION OF OUTLETS

Do not install outlets back-to-back in wall; allow minimum 300 mm horizontal clearance between boxes. Vertically align outlets of different systems when shown in close proximity to each other and occurring at different mounting heights. Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

MOUNTING HEIGHTS

Mounting height of equipment is from finished floor to centreline of equipment unless otherwise specified or indicated. Install electrical equipment at the following heights unless indicated otherwise:
 Local Switches: 1200mm A.F.F.
 Wall Receptacles: 450mm A.F.F.
 Receptacles over counter: 175mm above counters splashback.
 Panelboards: 1800mm to top

COVERPLATES

Brushed finish stainless steel type 301, minimum 1 mm thick, chrome plated screws.

PLYWOOD BACKBOARD

Provide plywood backboard to mount all surface mounted electrical distribution, systems, and as indicated on drawings. Plywood shall be 19mm thick, G15 with the good side out, painted with two (2) coats of light gray enamel fire retardant paint. Provide all such backboards c/w non-combustible sheath (16mm drywall) in combustible construction or where required by Code.

MOULDED CASE BREAKERS

Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient. Common-trip breakers with single handle for multi-pole applications. 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.

Interrupting capacity of new breakers must be greater than or equal to the interrupting rating of breakers within panel. If interrupting ratings differ between breakers the highest interrupting rating must be selected. If a series rating is indicated on panel contractor is responsible for purchasing breakers, which maintain the series rating. Breakers supplied by contractor must match the manufacturer of panel.

DISCONNECT SWITCHES

Heavy duty disconnect switches, EEMAC 1 in dry locations, EEMAC 3 in damp locations, quick-make/quick-break mechanisms, visible blades, arc quencher for switches rated 500V. Mechanically interlocked cover to prevent opening in 'on' position, except by defeat mechanism. ON-OFF switch position indication on switch enclosure cover. Provision for padlocking in both 'on' and 'off' positions. HRC fuse holders size as indicated.

FUSES

HRC fuses minimum 100,000A I.C. HRCI-J, for ratings 0-600A. Where time delay characteristic (J1 or L1) is indicated, fuses shall carry 500% of rating for 10 seconds and be labeled "TIME DELAY".

EQUIPMENT IDENTIFICATION

Identify all equipment using suitably sized lamacoid nameplates. Identify at least the following equipment with labels of size appropriate to the equipment:
 Receptacles: Indicate panel name and circuit number. Where there is only one receptacle on the circuit indicate this also by using the abbreviation "DED" with the circuit number.
 Switches: Indicate circuit number. Also indicate the area served where the switch is remotely located and/or is in a group of switches.

LIGHTING

LIGHTING FIXTURES

Refer to Lighting Fixture Schedule. Provide lighting fixtures complete with lamps as noted or indicated on lighting fixture schedule. Fixtures shall be complete with factory assembled ballasts and accessories for field installation, wiring and lamping.

LIGHTING CONTROLS

WattStopper Wireless, in-wall MRO Decorator Room Scene Controller or approved equivalent.

WattStopper Wireless MRO Decorator Universal Dimmers or approved equivalent.

WattStopper Wireless MRO Decorator Multi-Location Controller or approved equivalent.

WattStopper 6 gang plate cover & 3 single covers or approved equivalent.

EXIT/SORTIE SIGN

Emergl-Lite X10 LED Series L-W-X-14-R Exit/Sortie or approved equivalent.

FIRE ALARM

Verification of Fire Alarm Systems and requirements of authorities having jurisdiction.
 As per CAN/ULC s537 04 and a certificate of verification shall be issued.



Capital Planning and Real Asset Management Branch
 Direction de l'aménagement de la capitale et gestion de l'immobilier

Design and Construction Division
 Division design et construction

director - Claude Robert - directeur

consultant
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Issued or revised
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no.	description	date
2	ISSUED FOR TENDER	15-12-2014
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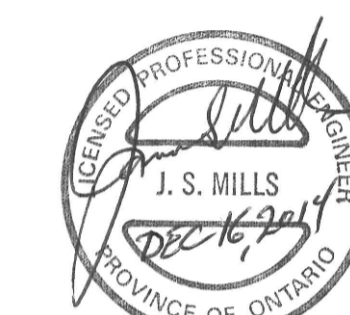
project
 projet

PANTRY COOLING SYSTEM UPGRADES

drawing
 dessin **ELECTRICAL**

SPECIFICATIONS

approved by approuvé par	D.G.
designed by conçu par	D.G.
drawn by dessiné par	G.G.
date no. du projet de la CCN	scale échelle AS SHOWN sheet no. no. de la feuille
DC-1110-24	E3



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project
projet

PANTRY COOLING SYSTEM UPGRADES

drawing
dessin

LEGEND, DRAWING LIST AND SPECIFICATIONS

approved by approuvé par	J.M.
designed by conçu par	N.B.
drawn by dessiné par	D.M.D.
date	15-OCT-2014
NCC project no. no. du projet de la CCN	scale échelle AS SHOWN
DC-1110-24	sheet no. no. de la feuille
	M1

MECHANICAL SPECIFICATIONS

- Scope of Work
 - Provide labour, equipment and services necessary to properly complete the mechanical work indicated on drawings.
 - This work will coincide with the replacement of the roof over Room 1204 and stairwell 2291. Coordinate the work under this Division with all other sections.
 - Be prepared to attend a start-up meeting to establish the required delivery dates for the equipment provided by this Division and provide input into the construction schedule. The schedule will be critical to allow the building to operate normally when special functions take place.
 - Assist in testing and balancing (TAB) the air and water systems.
 - Provide three copies of operating and maintenance manuals for all equipment supplied under this contract. Supply in 3-ring hardback binders.
- Permits and Fees
 - Obtain and pay for permits and fees necessary for the execution of the mechanical work. Conform to all applicable codes and by-laws. Obtain certificates of acceptance from all the inspection authorities.
- Site Visit
 - Acquire full working knowledge of building site and any existing conditions which may affect the work. Visit site prior to tender submission. Failure to do so will not be accepted as a reason to submit claims for unforeseen conditions to complete the work.
- Protection
 - Take precautions to protect the occupants and building from injury or damage due to construction activities.
- Contract Drawings
 - Contract drawings for mechanical work are in part diagrammatic, intended to convey the scope of work and general arrangement of equipment, components and piping. Before installation, verify the physical location of all equipment with other trades and report any obstructions or interferences. No extra payments are required from failure to make this verification will be considered.
- Existing Services
 - Give the owner ample notice of each necessary interruption to existing mechanical systems during the course of the work. Keep the duration of interruptions as short as possible. The owner reserves the right to deny approval for an interruption on any specific date or time. In this case, an alternative time shall be mutually selected.
- Cutting and Patching
 - Cutting and patching by the general contractor.
 - This Division is required to locate any openings for mechanical work and co-ordinate with general contractor and structural engineer.
- Demolition
 - Remove from the construction site existing mechanical equipment which becomes obsolete as a result of the work except as otherwise stated.
- Shop Drawings
 - Submit to the Engineer for approval one (1) copy of shop drawings in PDF format (electronic) for all new equipment, products and systems including wiring diagrams and control schematics.
 - Submit data sheet for all firestopping materials clearly identifying ulc assembly number.
- Warranty
 - Warranty all work for twelve (12) months from date of acceptance, except where noted otherwise.
- Materials
 - Materials and equipment to be new and free from damage, blemishes, oxidation, etc. unless otherwise indicated. Materials used for similar purposes and functions shall be the product of one manufacturer unless specified otherwise.
- Accessories
 - Provide accessory items or materials required such as equipment supports, fabricated bases, brackets, cleats, connectors, sealants, lubricants, cleaners, protection, etc., to ensure complete and totally functional systems are provided to the owner.
- Seismic Protection
 - The design and construction of all mechanical/electrical components and their connections, including, but not limited to, machinery, fixtures, ducts, and pipes (including contents), to be in accordance with Ontario Building Code 2012.
 - Design of structural seismic elements, including connections, to be performed by a registered structural engineer engaged by the Contractor and licensed in the Province of Ontario, who shall seal and sign the design drawings. The sealed drawings shall be submitted along with the mechanical and electrical shop drawings for review. The structural engineer who seals the drawings shall carry out sufficient on-site review of the mechanical/electrical work to ensure and to certify in writing that the work is in general compliance with his design.
- Identification
 - Identify contents of piping; follow the legend used for existing services and direction of flow by arrows. To CAN/CGSB 24.3.
 - Identify supply and return air with 50 mm high stencilled letters and direction of air flow by arrows.
- Thermal Insulation for Ductwork
 - Rigid Insulation:
 - Ducting and Fittings: Rigid insulation with vapour barrier to be composed of fibrous glass or mineral wool fibres formed into rigid board having a factory-applied vapour barrier, and suitable for application on exposed or concealed rectangular ducts and plenums.
 - Specification compliance:
 - ASTM C612, Class 1,
 - ASTM C411, (NFPA 90A), latest edition
 - Flexible Duct Insulation:
 - Ducting and Fittings: Flexible insulation with factory-applied vapour barrier to be composed of fibrous glass formed into a flexible blanket and be suitable for application on exterior of round ducts. Do not use on rectangular ductwork. Flexible insulation shall meet or exceed the following physical property.
 - Specification compliance:
 - CGSB 51-99-116 (Type 1)
 - Class 6 ASTM C411-05, to meet CUA-90A (NFPA 90A)
 - NFPA 90A), latest edition
- Vapour Barrier:
 - The vapour barrier shall be composed of aluminium foil.
- Application:
 - Insulate all new exhaust systems with 25 mm thick insulation, for a minimum distance of 5.0 m. from roof or wall penetration and all supply ductwork on systems incorporating air conditioning.
- Finishes:
 - All concealed ductwork will be left with factory-applied vapour barrier facing as specified above, with no further finish required.
 - All exposed ductwork to have painted canvas jacket finish.
- Thermal Insulation for Piping
 - Thermo-canvas jackets, c/w ULC S-102 label:
 - Hazard classification not to exceed flame-spread rating of 25, smoke developed 50.
 - Use 225g thermo-canvas jacket on all insulated, exposed valves, piping and fittings.
 - Insulation:
 - Preformed mineral fibre insulation with integral jacket shall be composed of incombustible, fine diameter, glass fibres or mineral wool fibres, bonded together with an inert thermosetting resin and have a factory-applied, all-service type vapour barrier jacket. Insulation to be preformed into 900 mm cylindrical sections or segments to suit standard pipe sizes. For insulation thickness see schedule herein.
- Pipe Insulation Schedule:

Service	Thickness
Rainwater Leaders *	25 mm
Chilled Water	25 mm
Hot Water Heating	40 mm

*Drain hoppers, all horizontal runs and all piping for a minimum of 5.0 m from roof drain
- Piping Material Schedule

Service	Pipe	Joint	Fitting	Pressure Rating
Chilled Water and Heating Hot Water	Sched. 40 Steel	Screwed	Malleable steel	1035 kPa
Sprinkler	Sched. 40 Steel	Welded or victaulic	Malleable or victaulic	2070 kPa
- Piping Installation
 - Install piping straight and parallel with building lines using correct pitch for drainage and venting. Use standard fittings for changes in direction.
 - Use dielectric couplings for joining pipes of dissimilar metals.
 - Install unions to allow the removal of equipment.
 - Provide sprinkler piping to NFPA 13 (latest edition).
 - Provide new system cleaner as prescribed by a chemical treatment company to remove oil, mill scale and iron oxide from the system by recirculating and flushing under the chemical supplier's supervision.
 - Provide hose-end drain valves at the lowest point of the systems to ensure a complete drain down.
 - Provide firestopping around all new services passing through rated assemblies. Firestopping to be ULC listed, and to match wall/floor assembly rating.
 - Use of existing penetrations permitted provided that entire penetration is firestopped after use.
- Valves
 - Gate valves: bronze body rising stem, solid bronze wedge disc, threaded ends, Class 125. Application: isolating equipment.
 - Globe valves: bronze body, rising stem, PFTE disc, threaded ends, Class 125. Application: flow control, emergency bypass.
 - Circuit balancing valves (CBV): Y pattern Class 125 with pressure/temperature read-out ports, valve stem ring scale and handwheel with hidden memory stop. Application: precision balancing for TAB.
 - Check valves: bronze, Y pattern, threaded ends, Class 125.
 - Provide brass valve tags. Numbers in sequence with existing schedule to be provided by the Engineer.
- Roof drains
 - Cast iron body, cast aluminium dome strainer, deck clamps, sump receiver and combined flashing and gravel stops to suit roof construction.
- Thermometers and gauges
 - Thermometers: industrial, variable angle, liquid filled, 175 mm scale with brass or stainless steel wells. Hot water: 0 - 100°C. Chilled water: 0 - 50°C.
 - Pressure gauges: 112 mm dial type to ASME B40.100, phosphor bronze bourdon tube having 0.5% accuracy over full scale. Black aluminium casing with chrome ring. Install with lever handle cocks as indicated.
- Air vents
 - Float vent with brass body and shut-off valve, 4 mm male thread rated at 620 kPa.
 - Provide manual air vents on glycol system.
 - Install at all system high points.
- Hydraulic Relief Valves
 - ASME rated, bronze body automatic pressure temperature relief valves. Pipe to nearest drain.
- Pumps
 - In-line wet rotor type with cast iron body, stainless steel impeller, shaft, seal ring and bearing plate.
 - Non-overloading motor with thermal protection shall be cooled and lubricated by the pumped fluid.
 - P-101: Variable speed, E.C. motor, 0-10v control module with 'off' contact.
 - 0-1v = pump off, 1-3v = pump min. speed, 3-10v pump modulation.
 - P-102: Three speed controller with indicator lights mounted on the motor.
 - Capacities:
 - P-101: 0.63 l/s at 42 kPa head. E.C. Motor: 65W 230V/1/60
 - P-102: 0.70 l/s at 84 kPa head. Motor: 375W 120V/1/60
 - Acceptable Manufacturers: Grundfos, Wilo, Taco

- Heat exchanger
 - Water to 40% ethylene glycol.
 - Type 316 stainless steel with EPDM gaskets.
 - Hot side: 0.69 l/s Ent. Water: 46.11°C - Lvg. Water: 32.22°C. P.D.:27kPa
 - Cold side: 0.65 l/s Ent. Glycol: 29.44°C - Lvg. Glycol: 43.33°C. P.D.:32kPa
 - Minimum heating capacity : 37.7 kW.
 - Acceptable Manufacturers: Armstrong or approved alternate.
- Expansion tank
 - Sealed, diaphragm, air cushion type, factory charged for 80 kPa.
 - Welded steel construction, max. working pressure 880 kPa.
 - Tank volume: 29 litres. Acceptance volume: 9.5 litres.
 - Acceptable Manufacturers: Amtrol or approved alternate.
- Glycol system feeder
 - 25 litre storage/mixing tank c/w 0.04 l/s pump, suction hose with inlet strainer and check valve, low fluid cut-out switch, pressure switch with two SPST contacts and liquid filled pressure gauge.
 - Provide power cord for plugging into wall 115V wall outlet, mounting shelf and audible alarm.
 - Acceptable Manufacturers: Axiom or approved alternate.
- Glycol
 - Provide pre-mixed industrial 40% ethylene glycol to charge system and fill feeder to maximum level. Add chemical treatment.
- Fire Protection
 - Sprinklers
 - Relocate existing sprinklers to suit new ceiling arrangement and add new heads as indicated.
 - Provide sprinkler coverage in accordance with NFPA 13 (latest edition) to light hazard coverage.
 - New heads to be recessed and match existing heads.
- Rigid Ductwork
 - Fabricate and install low pressure sheet metal ductwork and fittings in accordance with SMACNA low pressure duct construction standards (latest edition). Sizes indicated are clear inside dimensions (free area).
 - Kitchen exhaust ductwork: 316 stainless steel all welded construction. Reuse parts of the existing ductwork where possible.
- Flexible Ductwork
 - Uninsulated flexible duct to be Flexmaster triple lock aluminium, or approved alternative.
 - Insulated flexible duct to be triple lock thermal with 25 mm thick glass fibre insulation with UL listed vapour barrier.
 - Use flexible ductwork where indicated for duct runouts. Do not exceed 2.5 metres in any one runout.
 - Attach flexible ducts to duct collars using gear drive clamps.
- Acoustic Lining
 - Lining shall consist of 25 mm rigid fibreglass with neoprene-coated vapour barrier secured to inside of duct with approved adhesive and metal clips and washers at 300 mm centres. Seal edges, joints and termination ends with approved fire resistant mastic. Duct sizes indicated are free area dimensions. Increase sheet metal sizes accordingly. Acoustic insulation to be installed on ducts only where shown on drawings.
- Balancing Dampers
 - Provide balancing dampers with locking quadrants in all branch duct runouts, as close to main duct as practical, and in locations indicated.
- Fire Dampers
 - Provide "out-of-airstream" fire dampers with ULC labels, meeting the requirements of NFPA-90A, CUA-90A and the Ontario Building Code in locations indicated. Install according to SMACNA standards.
- Grilles and Diffusers
 - Grilles and diffusers are to be the product of a single manufacturer, in factory-applied "off-white" finish and mounted with concealed fasteners.
 - Type A. Square ceiling high induction helicoidal jet diffuser complete with plenum box in 600x600 panel to fit lay-in tile.
- Roof-Mounted Unit (RTU)
 - Certification: UL Std. 1995/CSA C22.2 No.236 and comply with ASRAE 15 Safety Standard for Mechanical refrigeration. Unit Efficiency Ratio (EER) shall be equal or greater than prescribed by ASHRAE 90.1.
 - Unit shall be factory assembled, wired and tested. A run test 2010 report shall be supplied with the unit.
 - All cabinet walls, access doors and roof shall be fabricated of double wall rigid polyurethane foam panels. Hinged access doors shall have zinc-cast lockable handles
 - Unit shall be equipped with double wall 304 stainless steel sloped drain pan below cooling coil.
 - Supply fan shall be a backward inclined plenum type and relief fan shall be forward curved type. Fans shall be mounted on vibration isolators. Both fans shall be equipped with direct drive motors. Premium efficiency inverter type motors suitable for variable frequency drive duty shall be supplied. Electrical characteristics: 575/3/60.
 - Variable Frequency Drives (VFD): supplied by Siemens to provide consistency of drives installed in the building. The VFDs will be shipped to the RTU manufacturer for factory installation and wiring.
 - Coils: Certified in accordance with AHRI standard 410 and leak tested. Coils shall be constructed of copper tubes and aluminium fins mechanically bonded to the tubes and galvanized steel end casings. Coil face velocity not to exceed 1.4 m/s.
 - Filters: Prefilter - 50 mm thick pleated type MERV 7
Afterfilter - 100 mm thick pleated filter MERV 13
 - Mixing plenum: Low leakage type dampers with extruded aluminium insulated blades with less than 2% leakage at 500 Pa differential across the dampers. Dampers sized for 100% economizer cooling. Outside air openings to have rain hoods and birdscreens.
 - Curb: Seismic rated insulated and fully gasketed, 450 mm high. Curb to be supplied to the Roofing Contractor for installation.
 - Controls: supplied by Siemens for factory installation and internal wiring to terminal block in control cabinet.
 - Electrical: factory installed and wired fused disconnect switch and power block to provide a single power connection to the unit. Characteristics: 575/3/60.
 - Capacities:
 - Supply fan: 1610 l/s at 380 Pa external static pressure. Motor: 3.75 kW
 - Relief fan: 1510 l/s at 180 Pa static pressure. Motor: 1.5 kW
 - Heating Coil: 1610 l/s from 12.06 - 30.95°C with 0.65 l/s 40% EG entering at 65°C. Pressure drops : Air-150Pa liquid-33kPa.
 - Cooling Coil: 1610 l/s from 24°CDB/17.2°CWB to 12.8°CDB/12.2°CWB with 1.89 l/s 30% EG entering at 6.7°C. Pressure drops : Air-120Pa Liquid-12kPa.
 - Acceptable Manufacturers: AAN or approved alternate.
- Silencers
 - Packaged silencers shall be constructed with acoustic grade fibreglass with perforated metal and film liner and galvanized metal casing.
 - Sound absorbing characteristics and sizes as indicated. See schedules on dwg. M6.
- Variable Air Volume (VAV) terminals
 - Manufacture casings from 0.85 mm galvanized steel lined with 25 mm thick acoustic insulation to UL 181 and NFPA-90A. Damper shall be 1.31 thick steel with peripheral gasket and self lubricating bearings.
 - Electronic controls shall be calibrated and set at the factory and accommodate field calibration and readjustment of air volume settings. A 20VA transformer 115V to 24V also to be installed in the factory. Controller and actuator supplied by Siemens to be factory installed and wired.
 - VAV terminals to be pressure independent. Pitot rack air velocity sensor to be standard to the manufacturer and wired to the controller.
 - Sizes and capacities as indicated in the schedule.
 - Provide attenuators as indicated.
- Controls
 - The control system shall be an extension of the existing Siemens Building Automation System (BAS) currently operating in the building. The system required for this project will include all hardware, software and control wiring.
 - Supply control field hardware to be installed and wired at the manufacturer's factories supplying the RTU and VAV terminals.
 - The software engineer is required to meet with the Engineering consultants to review and amend the control sequences before writing the software.
 - Air Handling unit - Unoccupied Period (System OFF)
 - Damper in their normal position - outdoor and exhaust dampers closed.
 - Supply and relief fan are OFF. Pumps are OFF.
 - Occupied Period (System ON)
 - In winter on start command the heating pumps P-101 and P-102 will start to supply the heating coil. If either pump fails to start an alarm will be announced and the fans will not start under this condition.
 - The outdoor air damper opens to the minimum position, a turret switch is tripped and the supply fan is started. After the supply fan operation is confirmed, heating/cooling and damper control loops are enabled.
 - The supply air temperature is reset based on the return air temperature and operator adjustable. Initial setpoints: 23°C in winter and 24°C in summer.
 - The supply fan speed is ramped up to maintain sufficient air flow to the VAV terminal to maintain the air valve with the highest demand between 80% and 90% open. A differential pressure sensor will monitor the duct pressure at the Dining Room terminal VAV-4 to maintain 10 Pa (operator adjustable).
 - A CO² sensor in the return air modulates the outdoor air damper to maintain 600 to 800 ppm. Once the outside damper opens above the minimum position of 20% (operator adjustable), the relief fan is started and ramped up to maintain the mixing box at a negative pressure of 15 Pa (operator adjustable).
 - In the heating season the primary heating pump and (secondary) glycol heating pump are started. The temperature of the glycol fluid is controlled from a supply air sensor and reset from the return air temperature by modulating the speed of P-101 on the primary side of the heat exchanger.
 - When the outside air enthalpy is lower than the supply air enthalpy set point by 2°C (adjustable), the supply air sensor modulates the outside air dampers open. The heating and cooling coil control loops will be disabled during the economizer cooling cycle.
 - When the outside air enthalpy is equal or higher than the supply enthalpy, the chilled water two-way valve will modulate to maintain the supply air temperature and reset from the return air temperature.
 - A deadband of 1°C will prevent simultaneous heating and cooling.
 - Monitor the filter differential pressures.
 - Room sensors shall control the VAV terminals through a factory installed and wired controller and damper actuator. Airflow feedback provided to the BAS.
 - Update the BAS manual, graphics and system architecture with the additions and alterations to the existing system.
 - Submit to the Engineer a commissioning report indicating the completion of software verification and hardware terminations.
 - Provide training for the building operators (3 hours).
- Commissioning
 - The manufacturer's technical representative shall commission the RTU in conjunction with a technician from the control company (Siemens).
 - The installation of the unit will be thoroughly checked and any deficiencies corrected.
 - The unit will be run through heating, cooling, economizer cooling, high and low airflow (simulated if required due to ambient conditions) cycles and a report issued to record the findings. Three copies of the report will be issued to the Engineer.
 - Provide demonstration and instruction to the operating and maintenance staff using: O & M manuals and as-built drawings prepared by this contractor.
- Balancing (TAB)
 - Carry out a complete air and water balancing procedure on all system included under this contract. This work is to be performed by an independent testing and balancing firm engaged in the commissioning of HVAC systems. Coordinate all work with the engineer and outline balancing procedures for their approval. Provide four (4) copies of the final report on system status.
 - Adjust ceiling diffuser air stream horizontally & vertically to provide air movement and comfort for the occupants primarily in the cooling season.
 - Acceptable balancing companies:
 - Kanata Air Balancing
 - Aerodynamics & Associates
 - Maximo
 - Capital Air Flow
 - All other companies must pre-qualify with the Engineer seven (7) working days prior to tender closing.

H.V.A.C.

SYMBOL	DESCRIPTION
	SUPPLY AIR DUCT UP
	RETURN OR EXHAUST AIR DUCT UP
	CIRCULAR AIR DUCT UP
	SUPPLY AIR DUCT DOWN
	RETURN OR EXHAUST AIR DUCT DOWN
	CIRCULAR AIR DUCT DOWN
	ACOUSTICALLY LINED DUCT
	THERMALLY INSULATED DUCT
	FLEXIBLE DUCT CONNECTION
	BALANCING DAMPER
	DUCT BRANCH (TAKE-OFF) WITH DAMPER
	MOTORIZED DAMPER
	FIRE DAMPER
	THERMOSTAT / SENSOR
	ACCESS DOOR
B.G.C.	BY GENERAL CONTRACTOR
A.D.	ACCESS DOOR
OA	OUTSIDE AIR
SA	SUPPLY AIR
RA	RETURN AIR
EA	EXHAUST AIR
FD	FIRE DAMPER
BD	BALANCING DAMPER
BDD	BACKDRAFT DAMPER
MD	MOTORIZED DAMPER
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED
UC	UNDERCUT DOOR
DG	DOOR GRILLE
SP	SPEED SWITCH
	SUPPLY DIFFUSER
	LINEAR DIFFUSER
	RETURN GRILLE
	RETURN AIR FLOW
	SUPPLY AIR FLOW
	BREAK LINE
	SIZE mmxmm DIFFUSER TYPE FLOW L/S

HEATING/CHILLED WATER PIPING

SYMBOL	DESCRIPTION
	HEATING WATER SUPPLY
	HEATING WATER RETURN
	CHILLED WATER SUPPLY
	CHILLED WATER RETURN
	GLYCOL HOT WATER SUPPLY
	GLYCOL HOT WATER RETURN
	SPRINKLER
	REDUCER
	PIPE DOWN
	PIPE UP
	PIPE CAP
	UNION
	GATE VALVE
	GLOBE VALVE
	CHECK VALVE
	BALL VALVE
	PLUG VALVE
	CIRCUIT BALANCING VALVE
	BUTTERFLY VALVE (LUG TYPE)
	STRAINER
	THERMOMETER
	PRESSURE GAUGE WITH SHUT-OFF BALL VALVE
	2-WAY CONTROL VALVE - ELECTRIC
	3-WAY CONTROL VALVE - ELECTRIC
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED
	SAFETY RELIEF VALVE
	AUTOMATIC AIR VENT WITH BALL VALVE
	MANUAL AIR VENT WITH BALL VALVE
	IN LINE PUMP
	DRAIN VALVE
	RECESSED SPRINKLER HEAD
	SPRINKLER HEAD

CONTROLS

SYMBOL	DESCRIPTION
	TEMPERATURE SENSOR
	DIFFERENTIAL PRESSURE SENSOR/TRANSMITTER
	CO ₂ SENSOR
	V.A.V. BOX
	PRESSURE SENSOR

GENERAL WORK

SYMBOL	DESCRIPTION
	NEW WORK
	EXISTING WORK TO REMAIN
	EXISTING WORK TO BE REMOVED
	WORK TO BE RELOCATED AND RE-USED

PLUMBING

SYMBOL	DESCRIPTION
	CONDENSATE DRAINAGE
	ROOF DRAIN
	PLUMBING VENT
	PITCH POCKET / PIPE ENCLOSURE

DRAWING LIST

M1	LEGEND, DRAWING LIST AND SPECIFICATIONS
M2	HVAC DEMOLITION
M3	BASEMENT HVAC NEW WORK
M4	GROUND FLOOR HVAC NEW WORK
M5	ROOF PLAN HVAC NEW WORK
M6	SCHEDULES AND TYPICAL DETAILS



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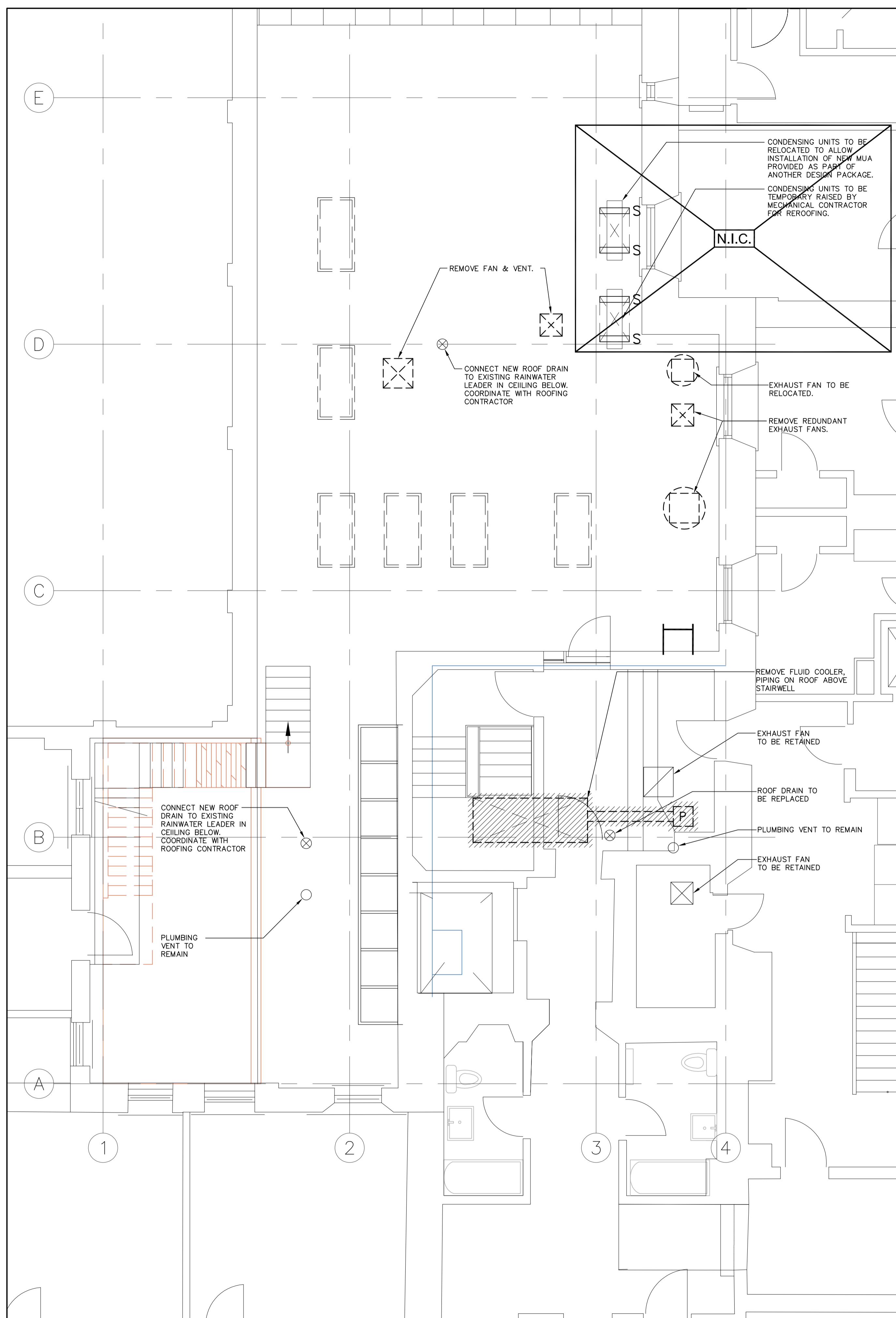
project
projet

PANTRY COOLING SYSTEM
UPGRADES

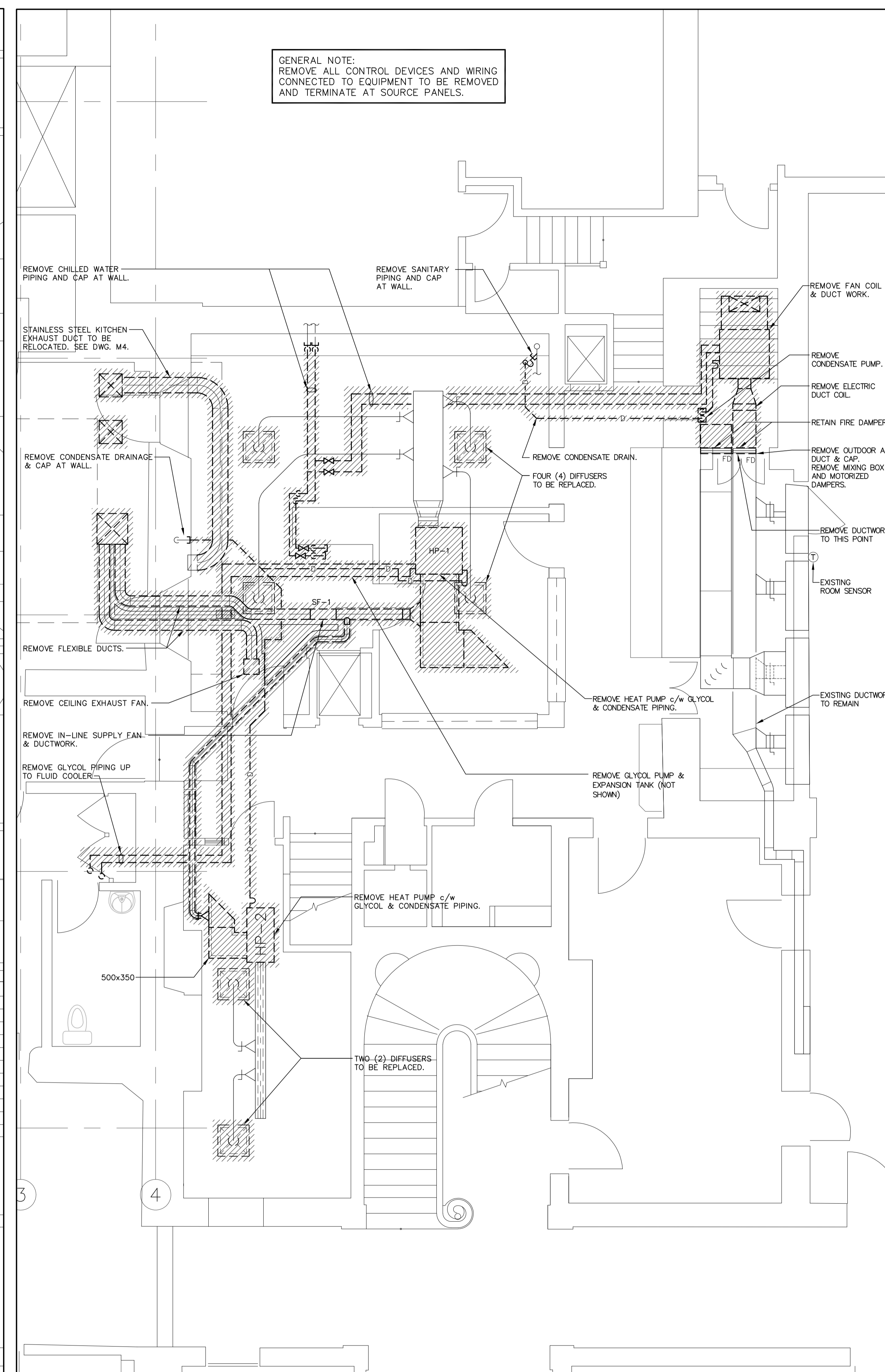
drawing
dessin MECHANICAL

HVAC DEMOLITION

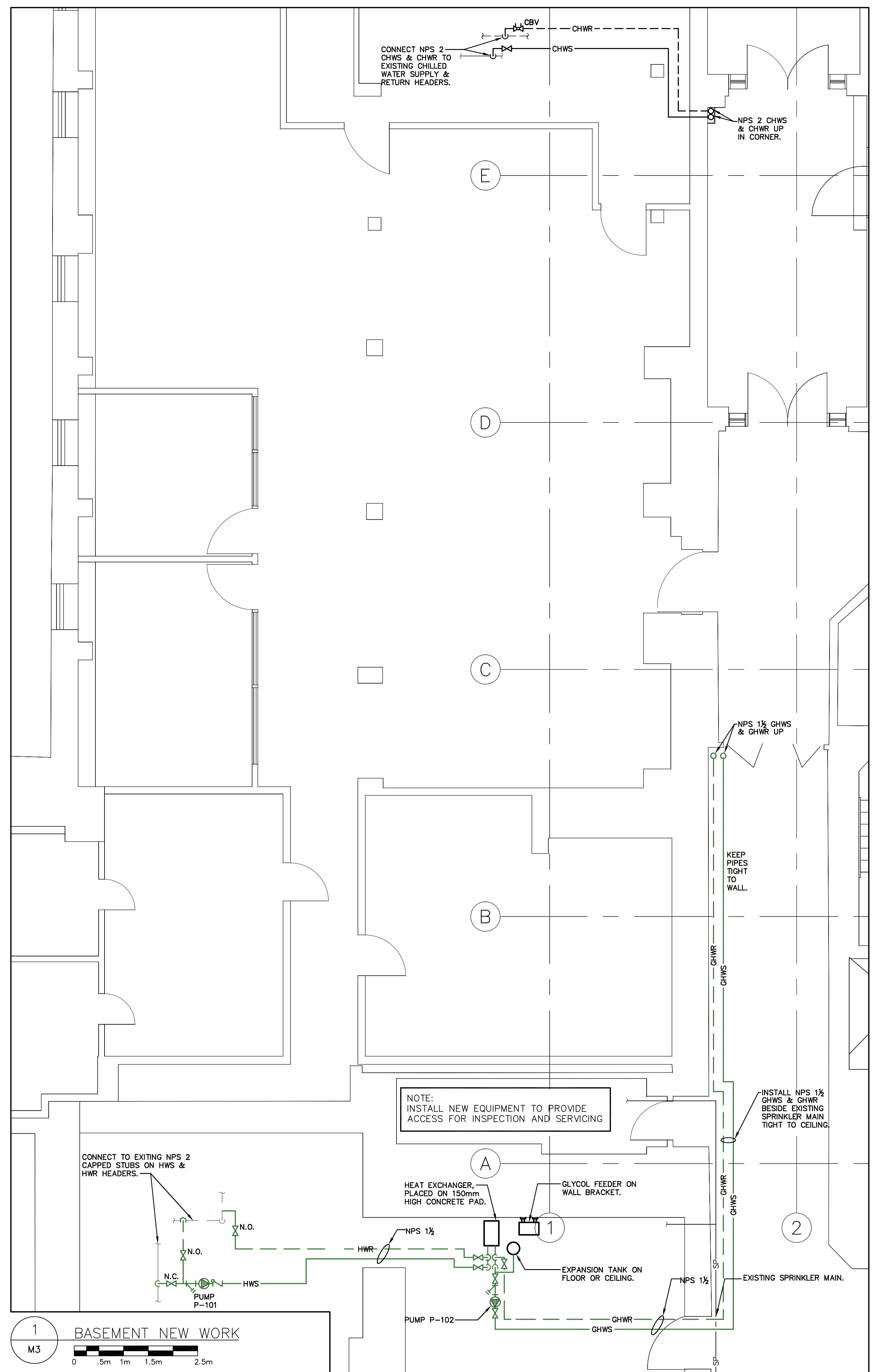
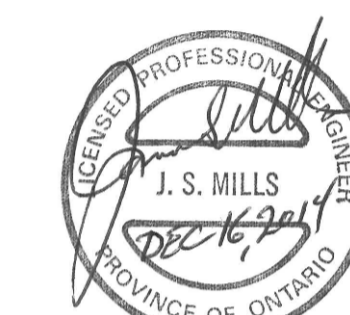
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designed by conçu par	N.B.
drawn by dessiné par	D.M.D.
date no. du projet de la CCN	15-OCT-2014 DC-1110-24
scale échelle	AS SHOWN
sheet no. no. de la feuille	M2



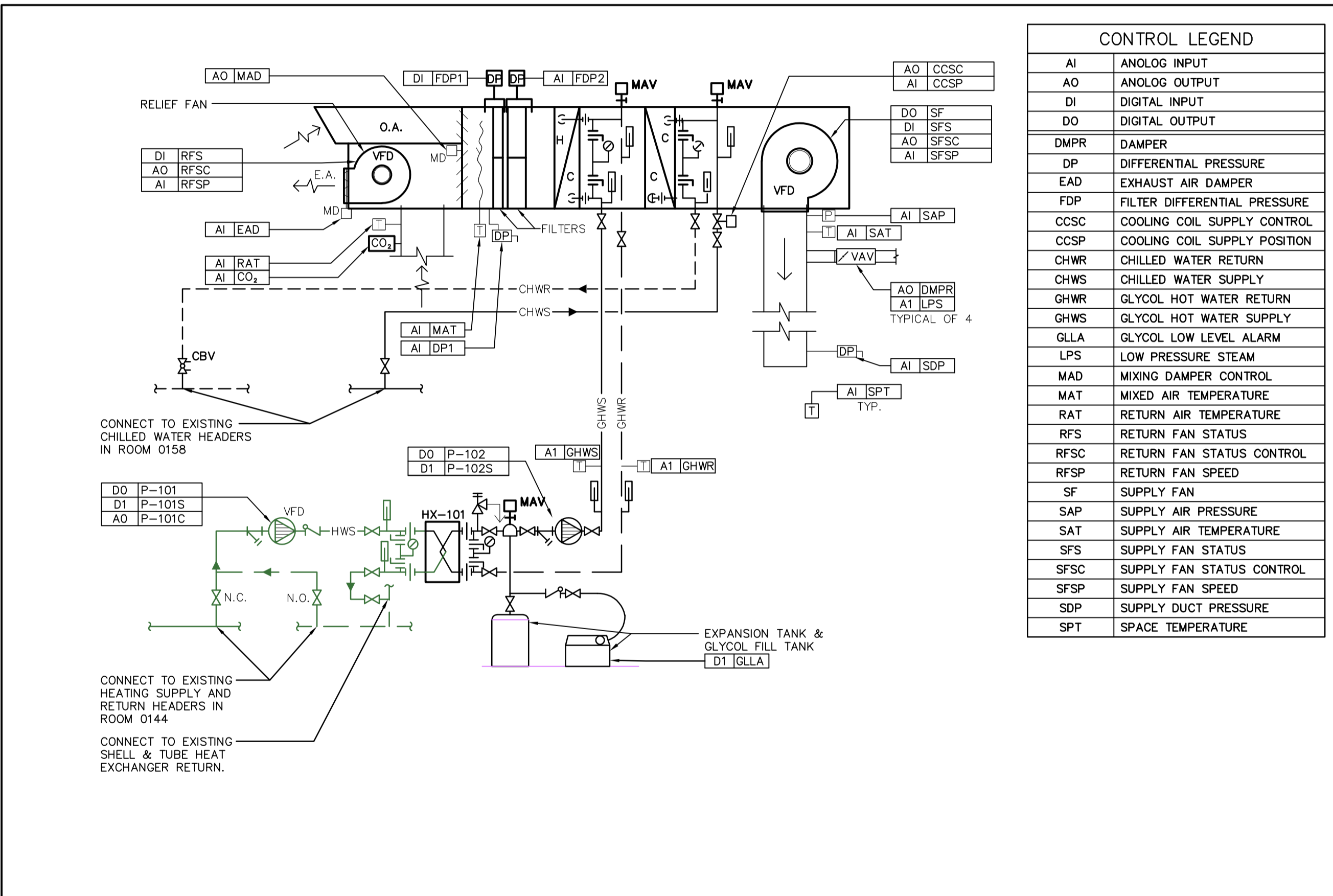
1 ROOF PLAN DEMOLITION
M2



2 GROUND FLOOR DEMOLITION
M2



2 PANTRY
M3 0 .5m 1m 1.5m 2.5m



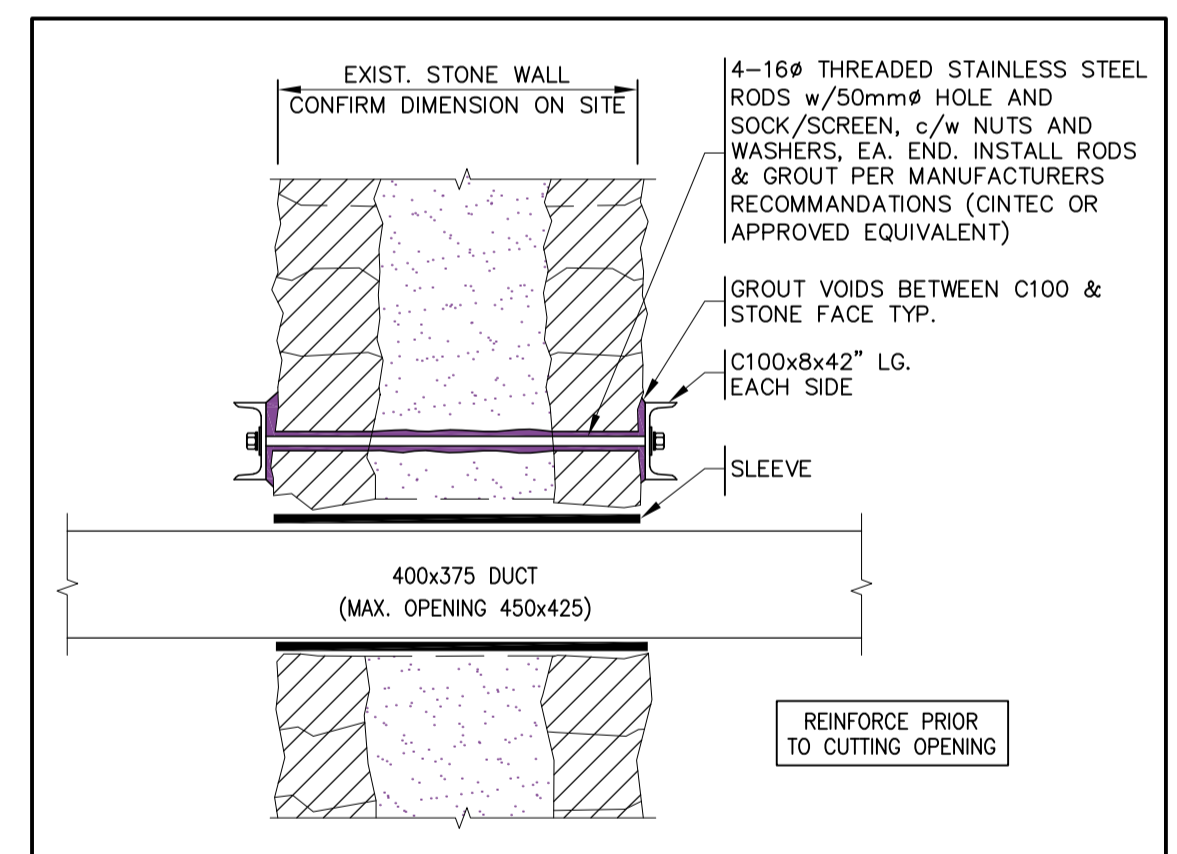
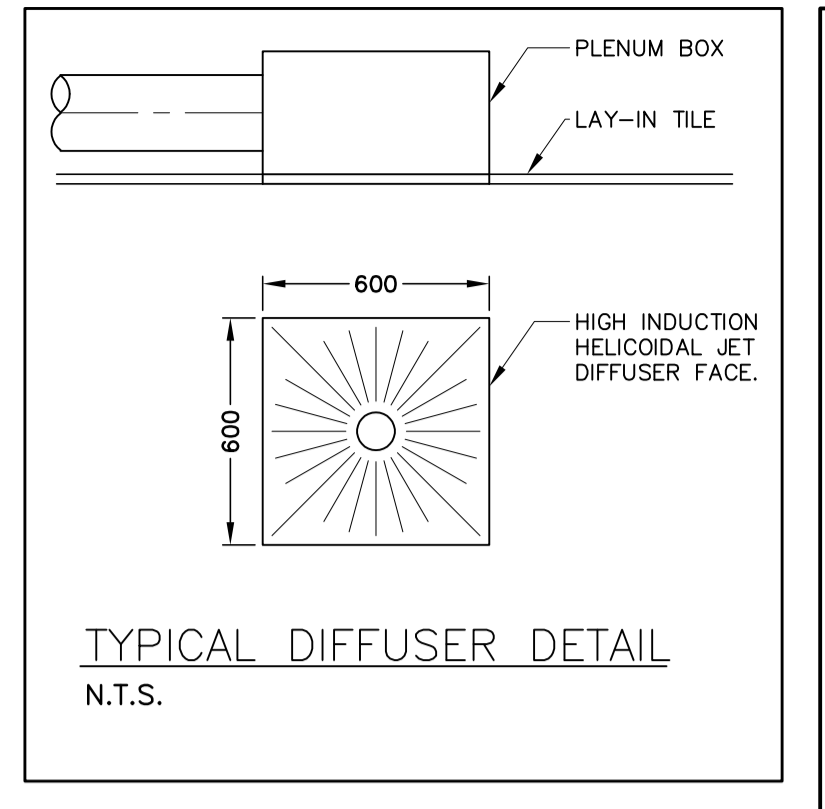
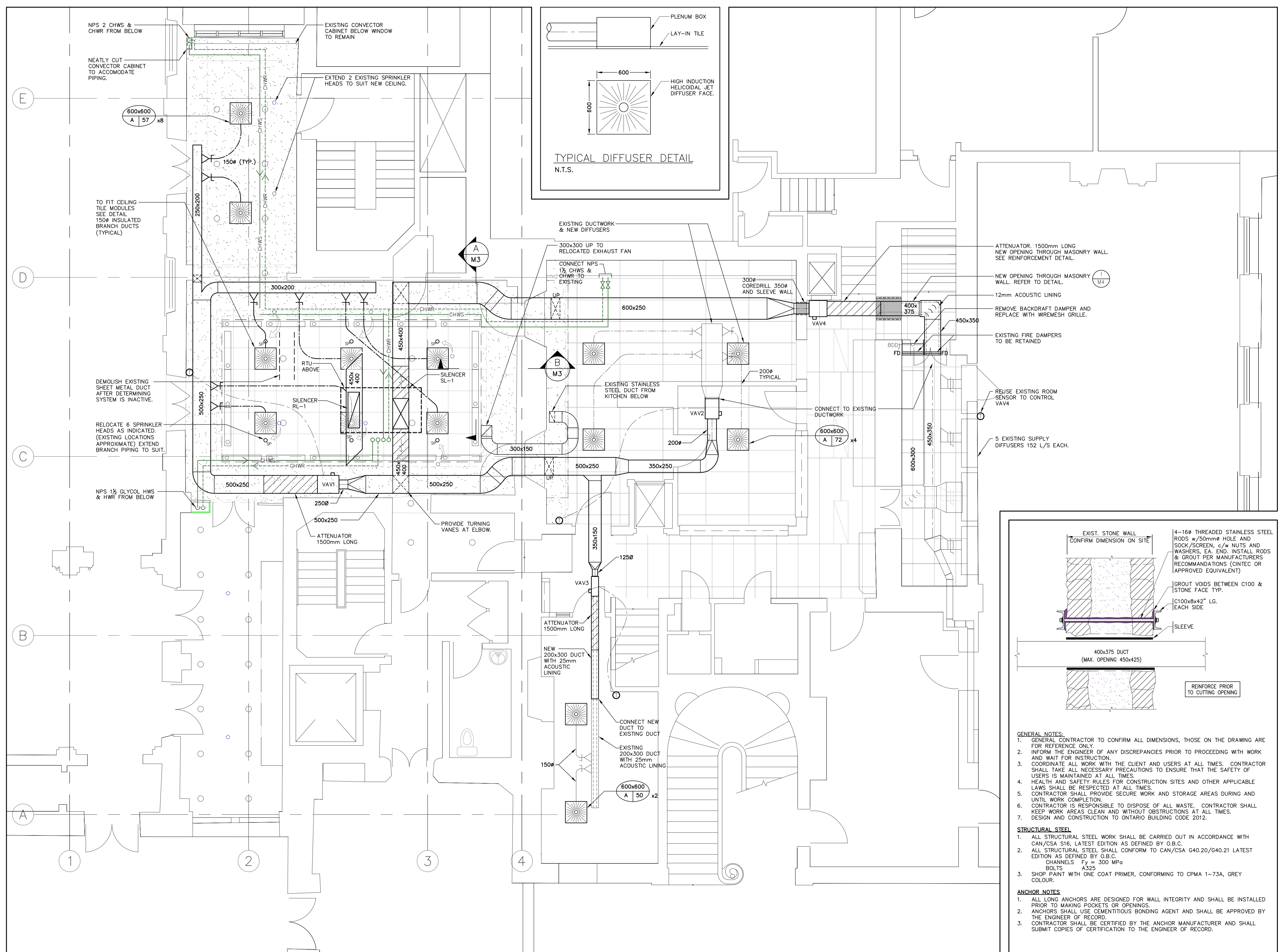
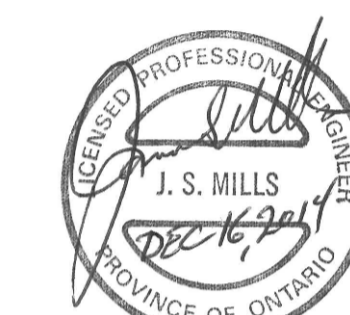
CONTROL LEGEND	
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
DAMPER	
DP	DIFFERENTIAL PRESSURE
EAD	EXHAUST AIR DAMPER
FDP	FILTER DIFFERENTIAL PRESSURE
CCSC	COOLING COIL SUPPLY CONTROL
CCSP	COOLING COIL SUPPLY POSITION
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
GHWR	GLYCOL HOT WATER RETURN
GHWS	GLYCOL HOT WATER SUPPLY
GLLA	GLYCOL LOW LEVEL ALARM
LPS	LOW PRESSURE STEAM
MAD	MIXING DAMPER CONTROL
MAT	MIXED AIR TEMPERATURE
RAT	RETURN AIR TEMPERATURE
RFS	RETURN FAN STATUS
RFSC	RETURN FAN STATUS CONTROL
RFSP	RETURN FAN SPEED
SF	SUPPLY FAN
SAP	SUPPLY AIR PRESSURE
SAT	SUPPLY AIR TEMPERATURE
SFS	SUPPLY FAN STATUS
SFSC	SUPPLY FAN STATUS CONTROL
SFSP	SUPPLY FAN SPEED
SDP	SUPPLY DUCT PRESSURE
SPT	SPACE TEMPERATURE

3 PIPING SCHEMATIC & CONTROLS
M3

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PANTRY COOLING SYSTEM UPGRADES

approved by / approuvé par J.M.
designed by / conçu par N.B.
drawn by / dessiné par L.S.
date 15-OCT-2014 scale AS SHOWN
NCC project no. / sheet no.
no. du projet de la CCN / no. de la feuille
DC-1110-24 M3



GENERAL NOTES:

- GENERAL CONTRACTOR TO CONFIRM ALL DIMENSIONS, THOSE ON THE DRAWING ARE FOR REFERENCE ONLY.
- INFORM THE ENGINEER OF ANY DISCREPANCIES PRIOR TO PROCEEDING WITH WORK AND WAIT FOR INSTRUCTION.
- COORDINATE ALL WORK WITH THE CLIENT AND USERS AT ALL TIMES. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT THE SAFETY OF USERS IS MAINTAINED AT ALL TIMES.
- HEALTH AND SAFETY RULES FOR CONSTRUCTION SITES AND OTHER APPLICABLE LAWS SHALL BE RESPECTED AT ALL TIMES.
- CONTRACTOR SHALL PROVIDE SECURE WORK AND STORAGE AREAS DURING AND UNTIL WORK COMPLETION.
- CONTRACTOR IS RESPONSIBLE TO DISPOSE OF ALL WASTE. CONTRACTOR SHALL KEEP WORK AREAS CLEAN AND WITHOUT OBSTRUCTIONS AT ALL TIMES.
- DESIGN AND CONSTRUCTION TO ONTARIO BUILDING CODE 2012.

STRUCTURAL STEEL

- ALL STRUCTURAL STEEL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH CAN/CSA S16, LATEST EDITION AS DEFINED BY O.B.C.
- ALL STRUCTURAL STEEL SHALL CONFORM TO CAN/CSA G40.20/G40.21 LATEST EDITION AS DEFINED BY O.B.C.
CHANNELS F_y = 300 MPa
BOLTS A325
- SHOP PAINT WITH ONE COAT PRIMER, CONFORMING TO CPMA 1-73A, GREY COLOUR.

ANCHOR NOTES

- ALL LONG ANCHORS ARE DESIGNED FOR WALL INTEGRITY AND SHALL BE INSTALLED PRIOR TO MAKING POCKETS OR OPENINGS.
- ANCHORS SHALL USE CEMENTITIOUS BONDING AGENT AND SHALL BE APPROVED BY THE ENGINEER OF RECORD.
- CONTRACTOR SHALL BE CERTIFIED BY THE ANCHOR MANUFACTURER AND SHALL SUBMIT COPIES OF CERTIFICATION TO THE ENGINEER OF RECORD.

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PANTRY COOLING SYSTEM UPGRADES

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GROUND FLOOR HVAC NEW WORK

approved by
approuvé par J.M.

designed by
conçu par N.B.

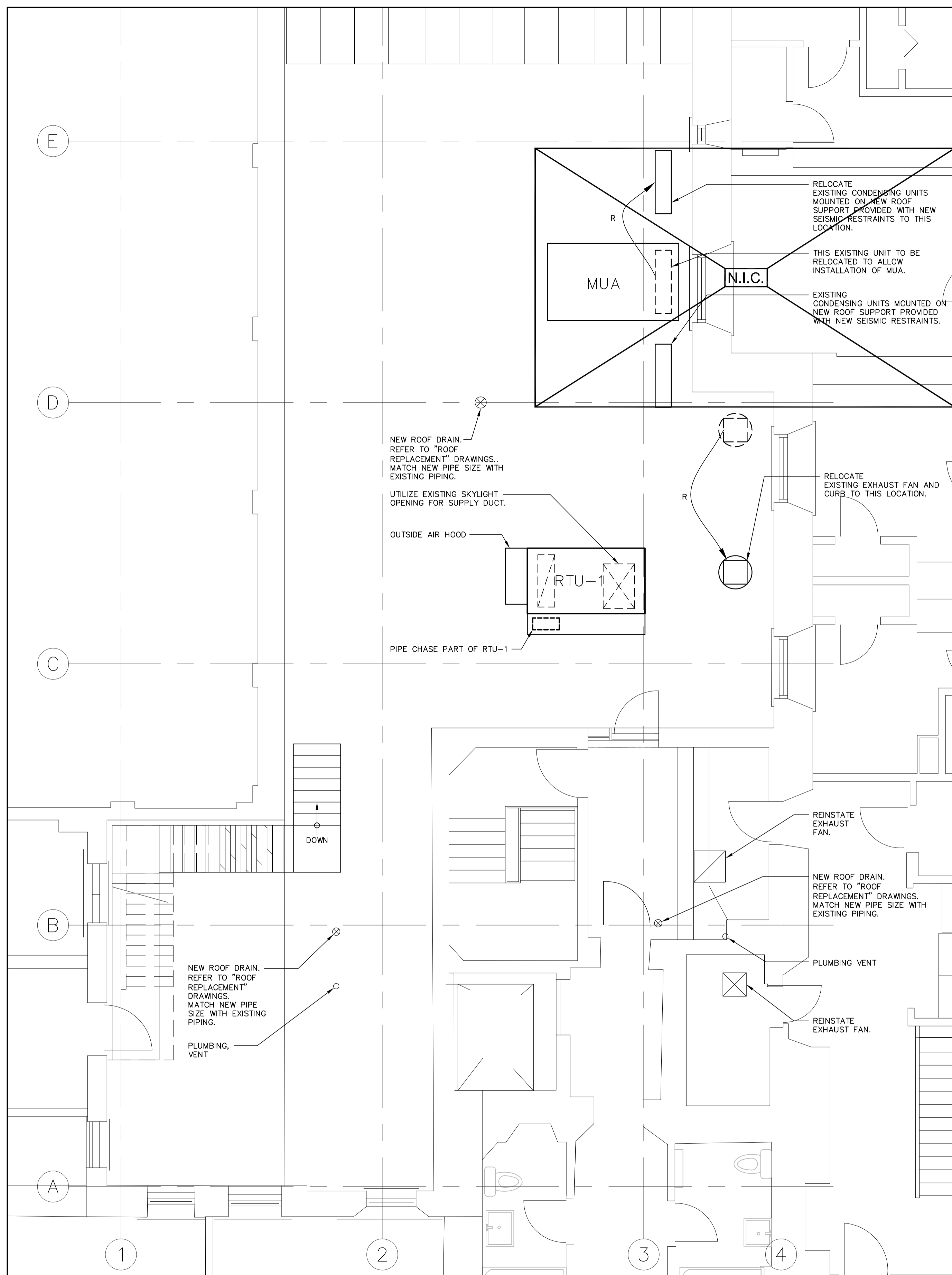
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date 15-OCT-2014 scale échelle AS SHOWN

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no. du projet de la CCN no. de la feuille

1 GROUND FLOOR NEW WORK
M4

2 WALL REINFORCEMENT DETAIL
M4 N.T.S.



1 ROOF PLAN NEW WORK
 M5
 0 .5m 1m 1.5m 2.5m

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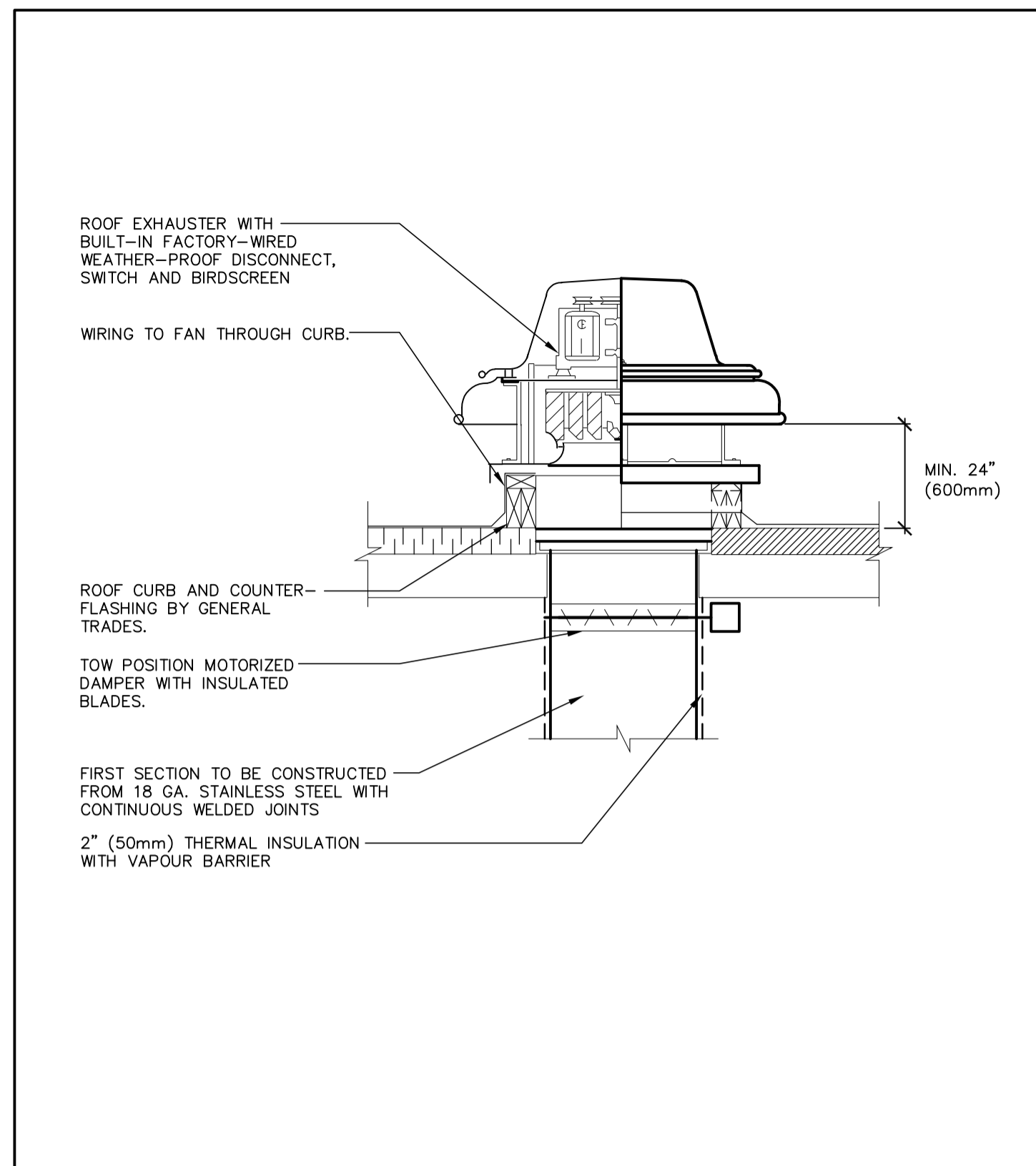
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PANTRY COOLING SYSTEM
 UPGRADES

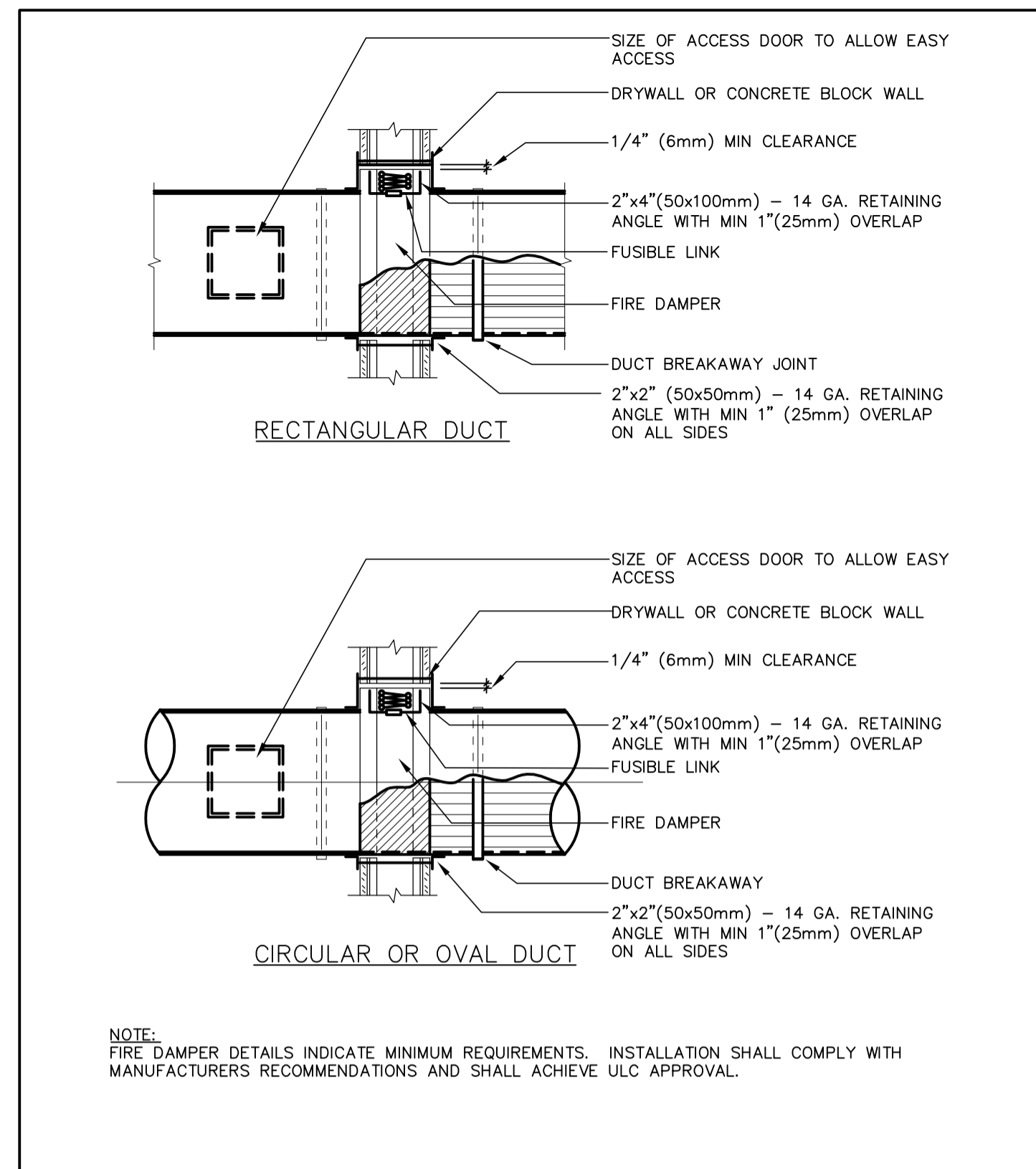
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ROOF PLAN
 HVAC NEW WORK

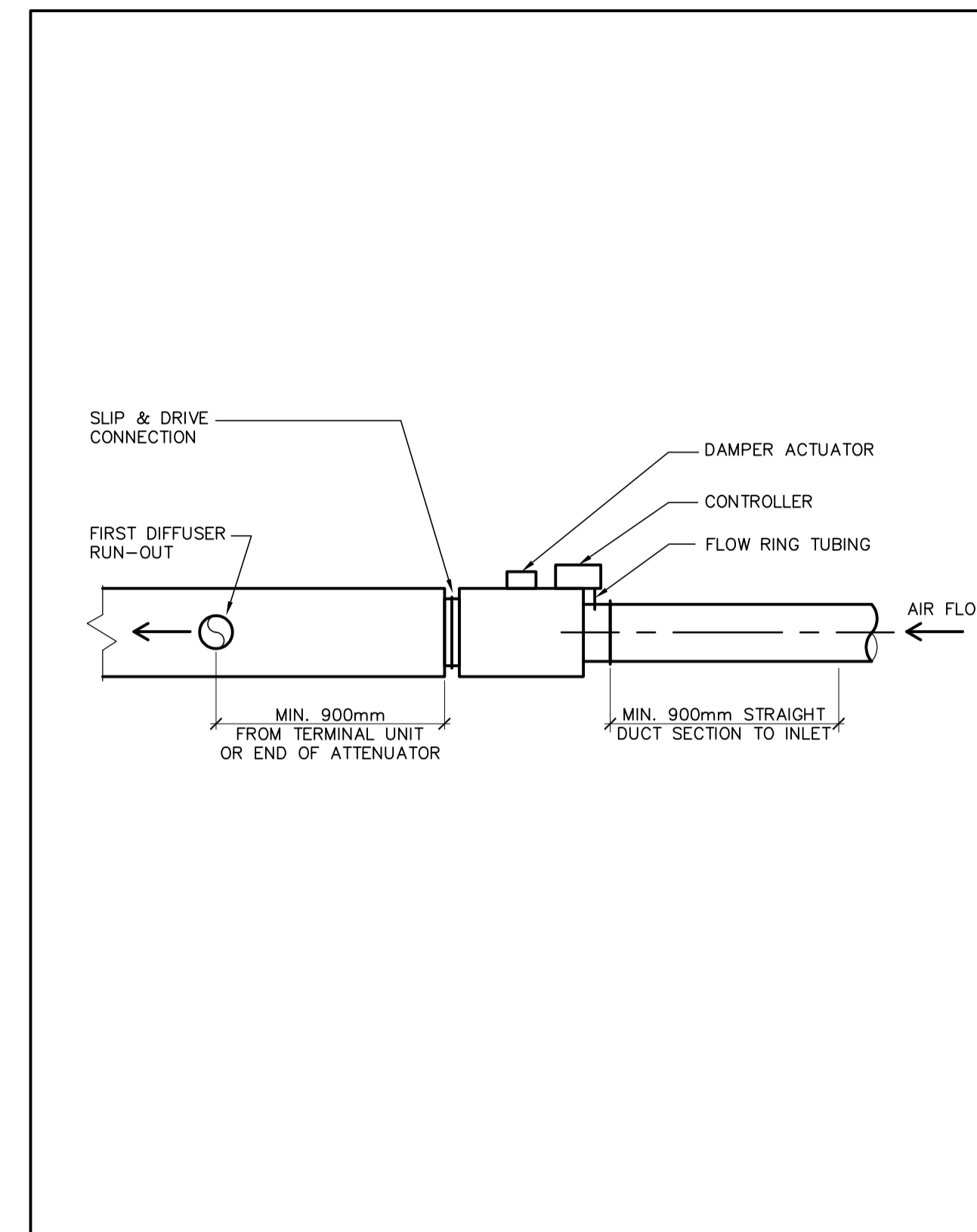
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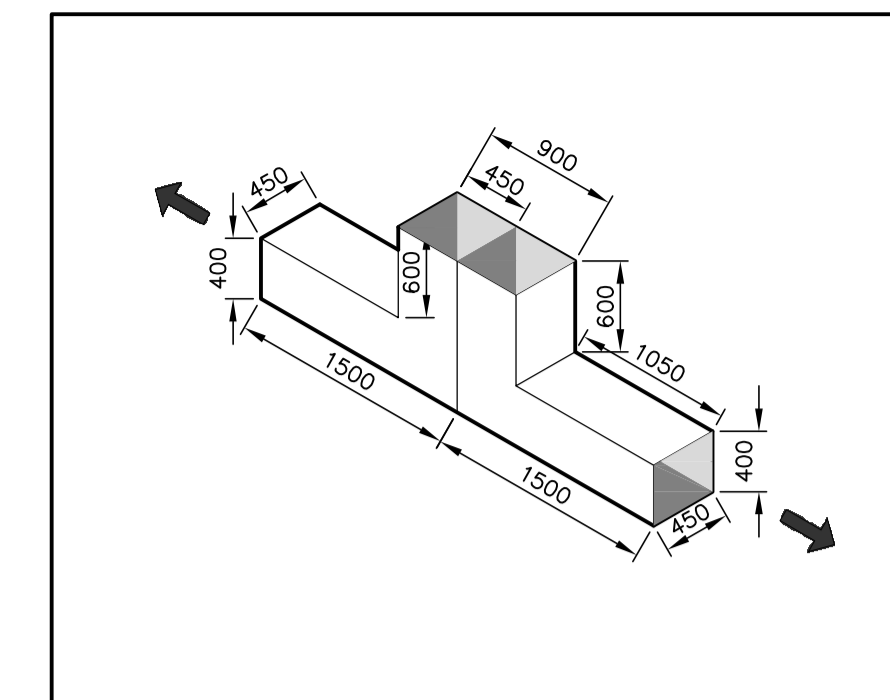
1 ROOF EXHAUST FAN
M6 N.T.S.



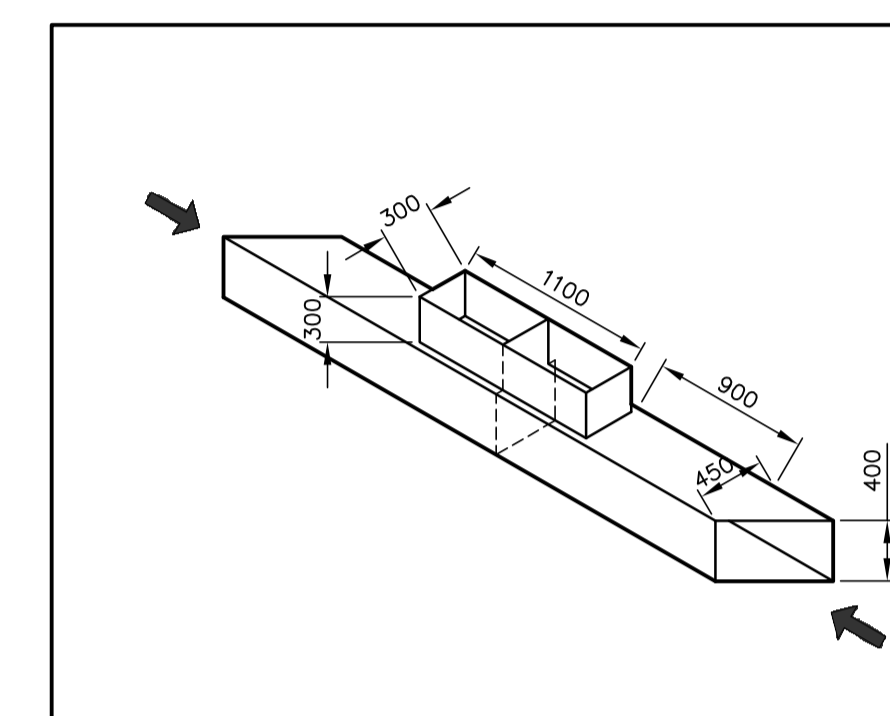
2 VERTICAL FIRE DAMPER
M6 N.T.S.



3 VAV TERMINAL UNIT INSTALLATION DETAIL
M6 N.T.S.



4 SUPPLY AIR SILENCER SL-1
M6 N.T.S.



5 RETURN AIR SILENCER RL-1
M6 N.T.S.

No.	MAX FLOW L/S	MIN FLOW L/S	INLET DIA. mm	NC @ 250Pa *		NOTES
				DISCHARGE	RADIATED	
VAV1	455	100	250	22	22	1500mm ATTENUATOR
VAV2	285	60	200	23	23	
VAV3	100	20	125	<20	<20	1500mm ATTENUATOR
VAV4	760	75	300	26	25	1500mm ATTENUATOR

* ACCEPTABLE MANUFACTURERS: E.H. PRICE, NAILOR OR APPROVED ALTERNATE.
* NC VALUES BASED ON ARI STD.085.98

TAG	Qty	FAN SYSTEM	FACE DIMENSION		LENGTH (mm)	AIR FLOW (l/sec)	VELOCITY (m/sec)	SILENCER P.D.† (Pa)	P.D. incl System Effects† (Pa)	DYNAMIC INSERTION LOSS								MODEL	NOTES
			W (mm)	H (mm)						63	125	250	500	1000	2000	4000	8000		
SL-1	1	RTU	900	450	2100	1607	+3	50	65	9.0	16.0	26.0	31.0	33.0	25.0	20.0	17.0	RED	1,2,3,4,5
RL-1	1	RTU	1100	300	1500	1509	-5	15	36	4.0	8.0	12.0	11.0	12.0	9.0	9.0	8.0	RD	1,3,5

Casing to be HTL equivalent to 8 gauge duct wall to control breakout. Tee-shaped elbow silencer. Inlet duct connection 900x450. Outlet legs to be 400x450.
Silencer to be mounted vertically in riser ductwork.

NOTES
 - Length shown for elbow silencers is centreline length. Exact dimensions to be confirmed by Contractor from field measurements.
 - Velocity shown is + (forward flow) or - (reverse flow) as defined by ASTM E477-06a
 - Pressure drop, dynamic insertion loss and self generated noise per ASTM E477-06a
 - Maximum pressure drop with system effects = silencer pressure drop per ASTM E477-06a + system effects for nearby duct elements.
 - Maximum pressure drop with system effects = silencer pressure drop per ASTM E477-06a + system effects for nearby duct elements.
 - See appendix
 .1 RD = Rectangular Dissipative
 RED = Rectangular Elbow Dissipative
 .2 HTL casing
 .3 Galvanized construction
 .4 Elbow silencer
 .5 Provide, for approval, acoustical calculations for all systems with silencers to demonstrate that the resultant ductborne fan sound level, including airborne and breakout noise, in the occupied spaces meet NC35-40.
 * The scheduled silencer pressure drop(s) are reported in accordance with ASTM E477 test methods.
 † Silencer pressure drop including estimated system effects based on less than ideal inlet and outlet flow conditions.

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PANTRY COOLING SYSTEM
UPGRADES

drawing
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MECHANICAL

SCHEDULES AND
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