



2 Site Plan
1 : 1200

Zoning Info

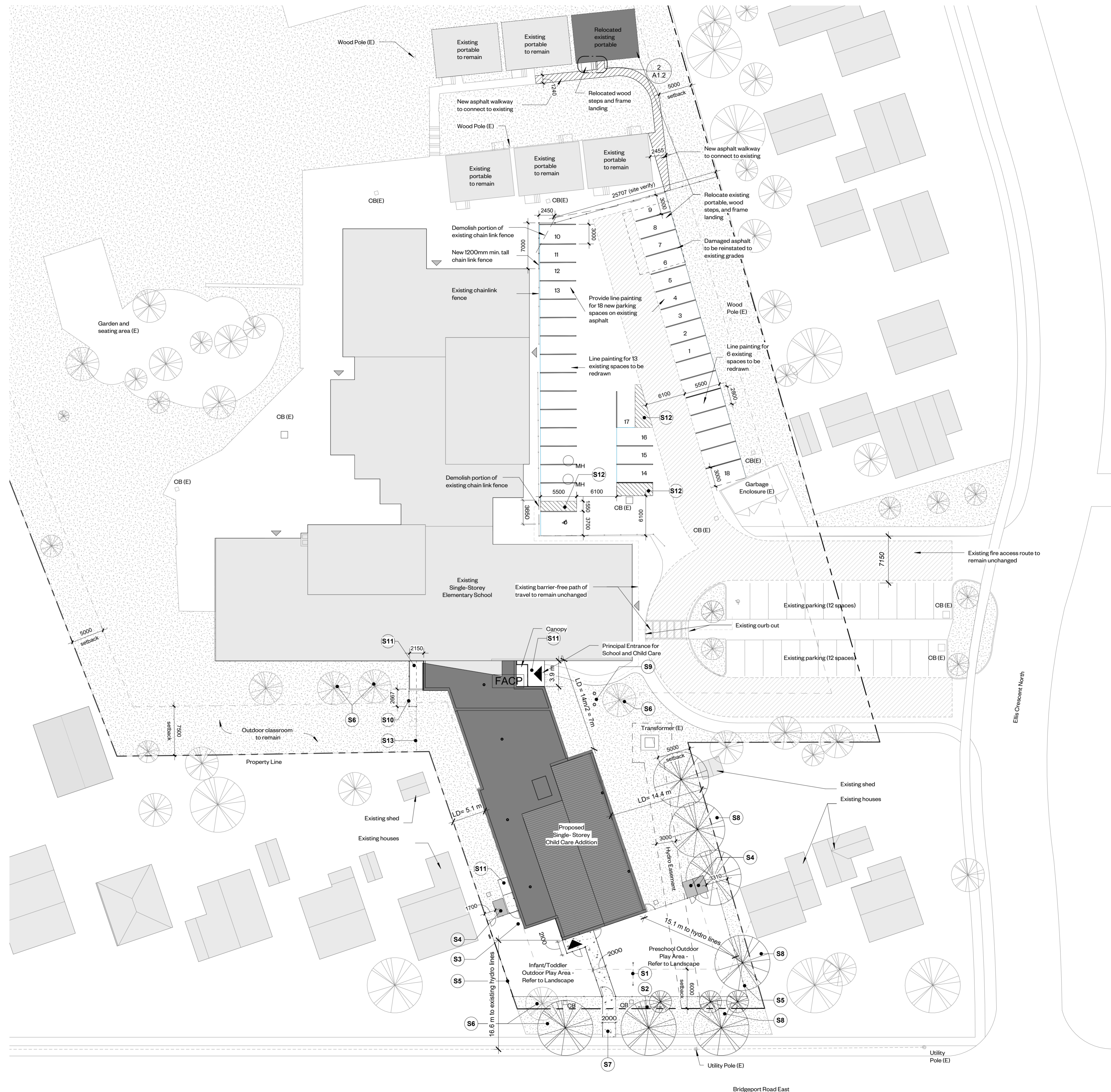
subject to: by-law 2018-50
current zoning: S

Lot Area: 29,182 m²

Regulation	Required	Existing	Proposed
Max. lot coverage	60%	8%	10%
Side setback (east)	5m	38m	13.2m
Side setback (west)	5m	19.6m	5.2m
Front setback	7.5m	55m	10.4m
Rear setback	7.5m	144m	unchanged
Parking school daycare total	42 18 60	48 0 48	42 18 60
Max. building height	14m	7.1m	unchanged

Note	Description
S1	Existing sign to be uninstalled and relocated as indicated.
S2	Relocate existing sign to this location. See also Electrical.
S3	New 1500mm wide asphalt walkway - see Landscape
S4	Storage shed - see Landscape.
S5	Perimeter fence around play areas typ (min 1500mm height) - see Landscape
S6	Existing tree to be protected - see Landscape
S7	New concrete walkway - provide flush transition to existing municipal sidewalk
S8	New trees - see Landscape
S9	Provide 2 new flagpoles c/w foundations
S10	Remove existing fence and relocate/modify as shown
S11	Frost slab - see Structural
S12	Diagonal yellow painted stripes on asphalt
S13	Existing fence and gate to remain

1 Partial Site Plan
1 : 300



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Site Plan Legend

- (E) Existing
- ▲ Exit
- CB Catch Basin
- LS Light Standard
- MH Man Hole
- 1829 Existing dimension
- Tree Protection Fence Vertical Hoarding - see Landscape & Tree Protection Plan
- New concrete

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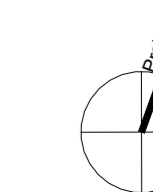
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CSV L'Harmonie Daycare Addition

158 Bridgeport Road East
Waterloo

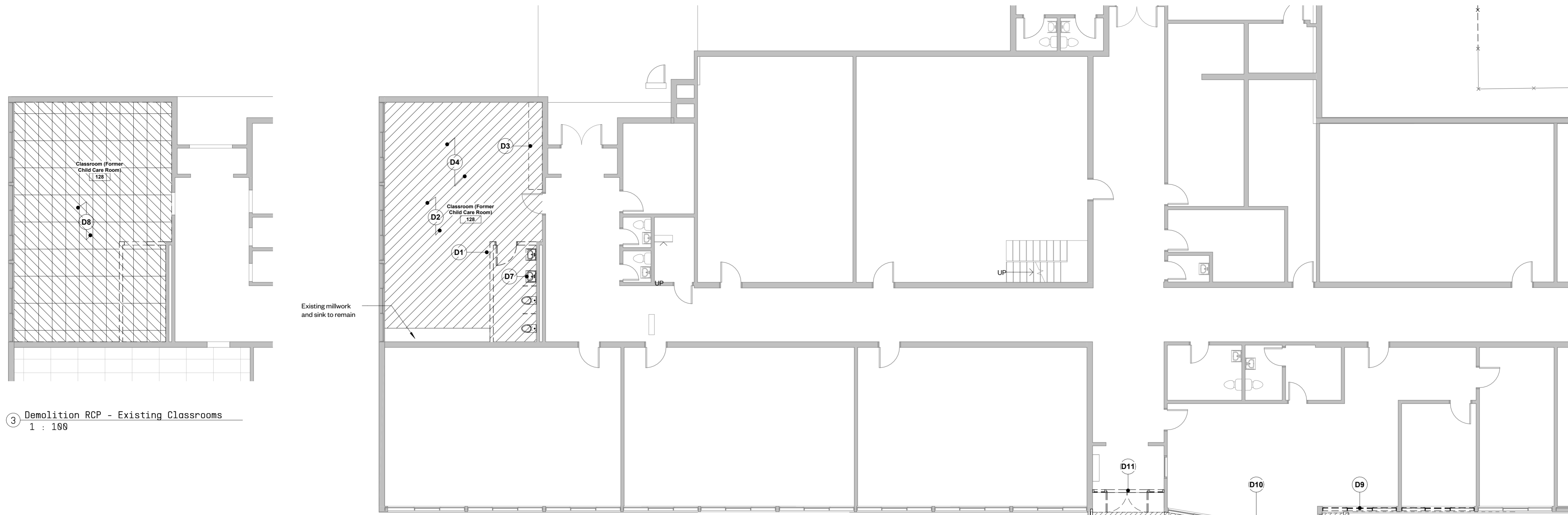
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Site Plan



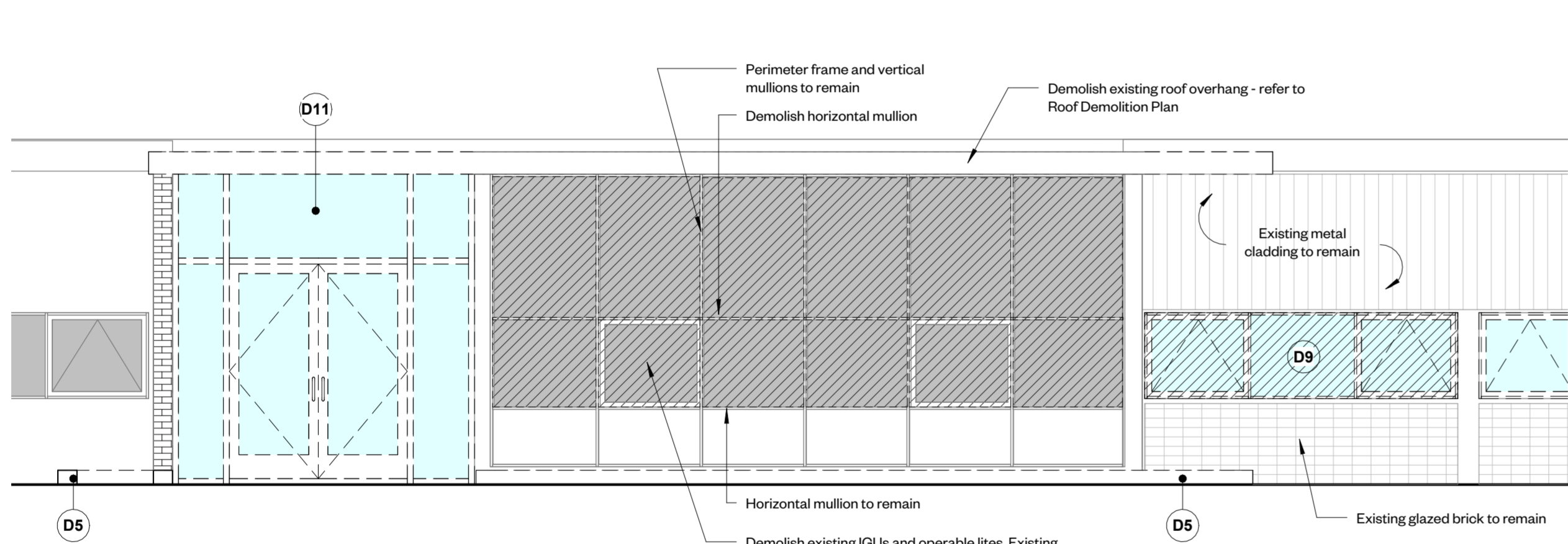
drawing number

A1.0

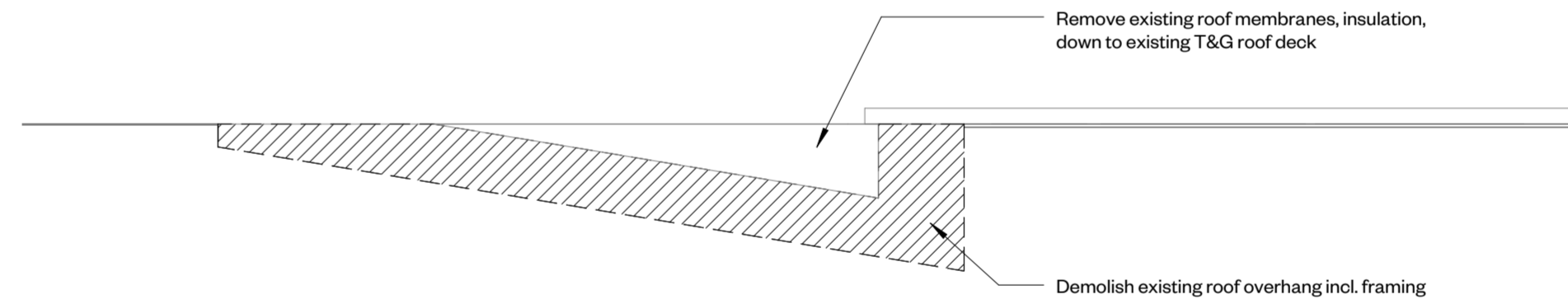


3 Demolition RCP - Existing Classrooms
1 : 100

2 Demolition Plan
1 : 100



1 Elevation - Demolition @ Admin Area
1 : 50



4 Roof Demolition @ Admin Area
1 : 100

Note	Description
D1	Remove WC walls c/w interior tile finish.
D2	Hatch denotes extent of floor finish and base to be removed. Prepare slab to receive new resilient floor finish. Patch drain locations.
D3	Demolish existing millwork including plumbing fixtures.
D4	Make good all finishes: Resilient Floor tile, GWB with Paint finish, ACT
D5	Demolish existing poured concrete planter incl. foundation.
D6	Demolish existing fascia, soffit, and roof structure as needed to facilitate connection to new addition
D7	Remove all fixtures, cap all mech services and make good penetrations.

Note	Description
D8	Hatch denotes extent of existing ACT grid and tiles to be removed. Remove existing light fixtures and ceiling mounted equipment and return to owner.
D9	Demolish existing window and frame.
D10	Demolish existing glazed units and mullion - refer to demolition elevation.
D11	Demolish existing door, screen, and frame.

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- Demolition Legend**
- Existing CMU partition to be demolished
 - Existing wall partition system to be demolished
 - Existing element to be demolished
 - Approximate extent of flooring to be removed
 - Approximate extent of ceiling to be removed
 - Existing door leaf and frame to be demolished

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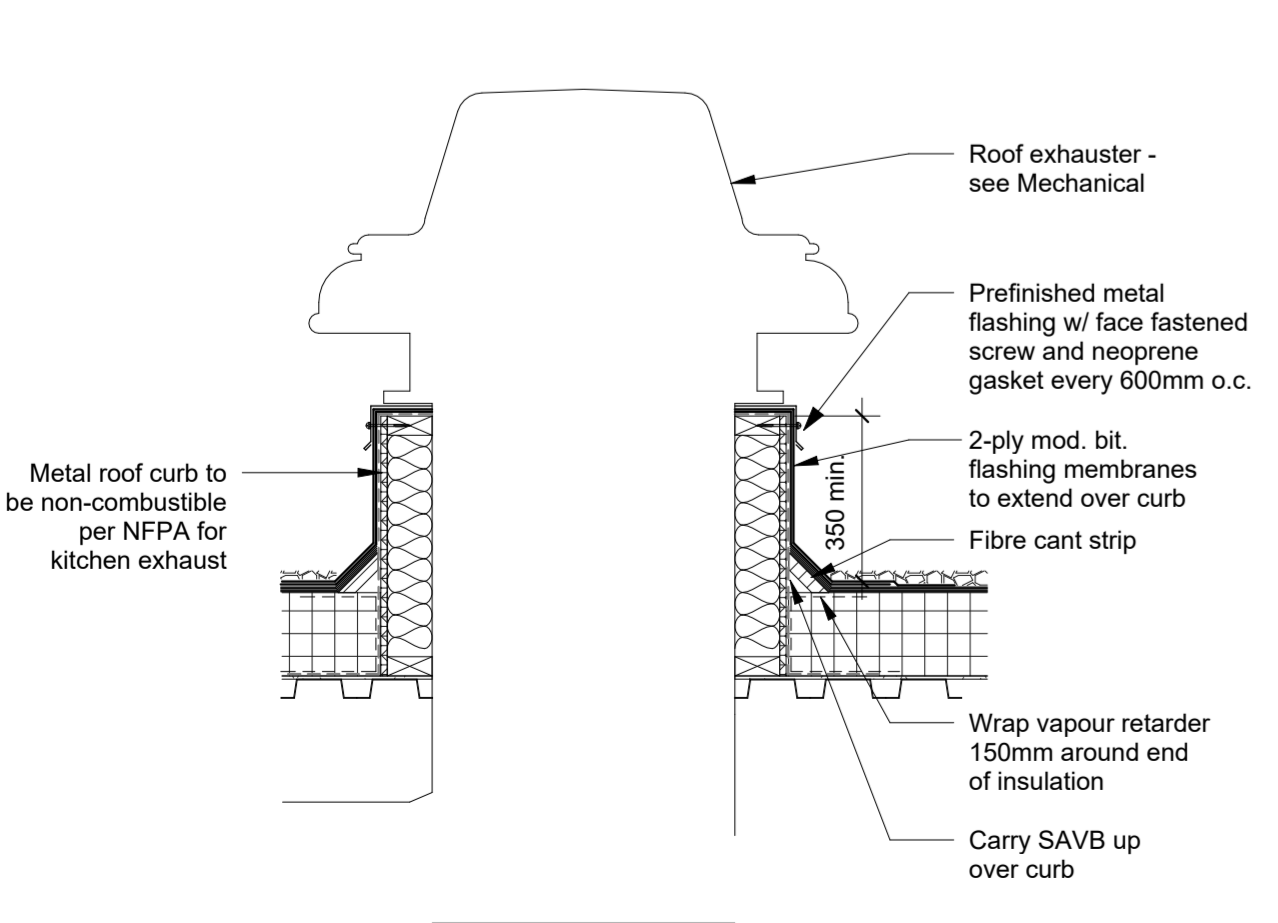
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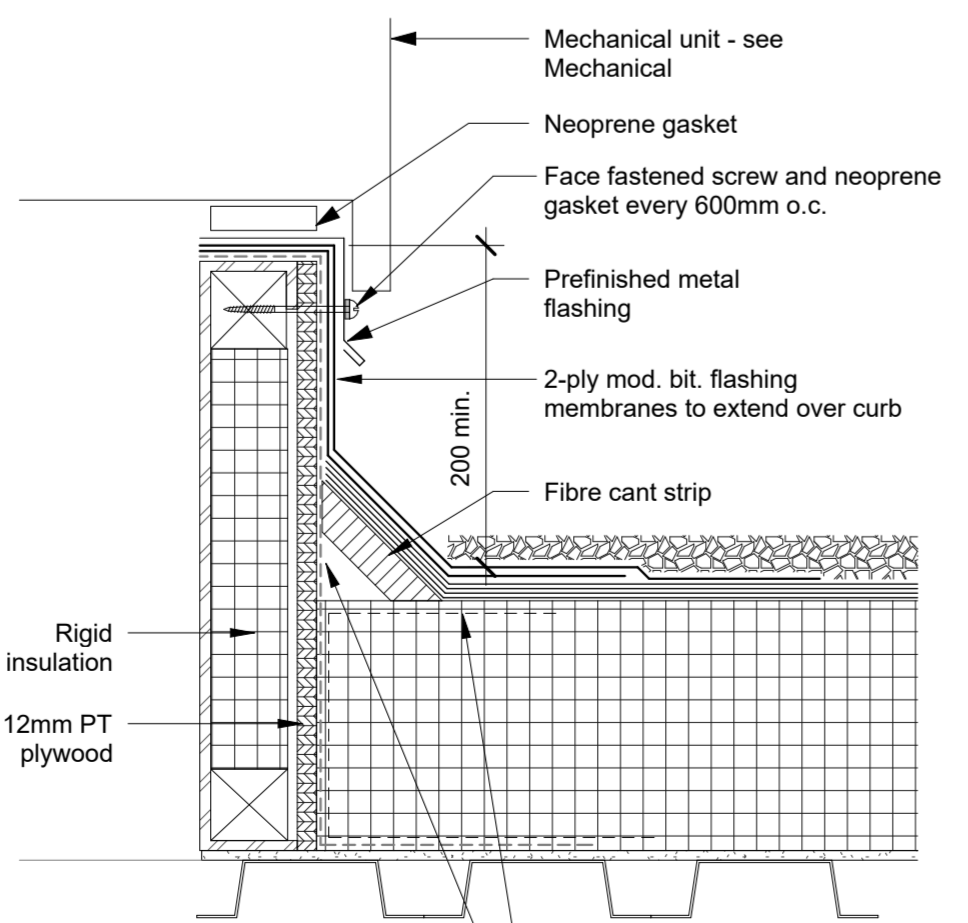
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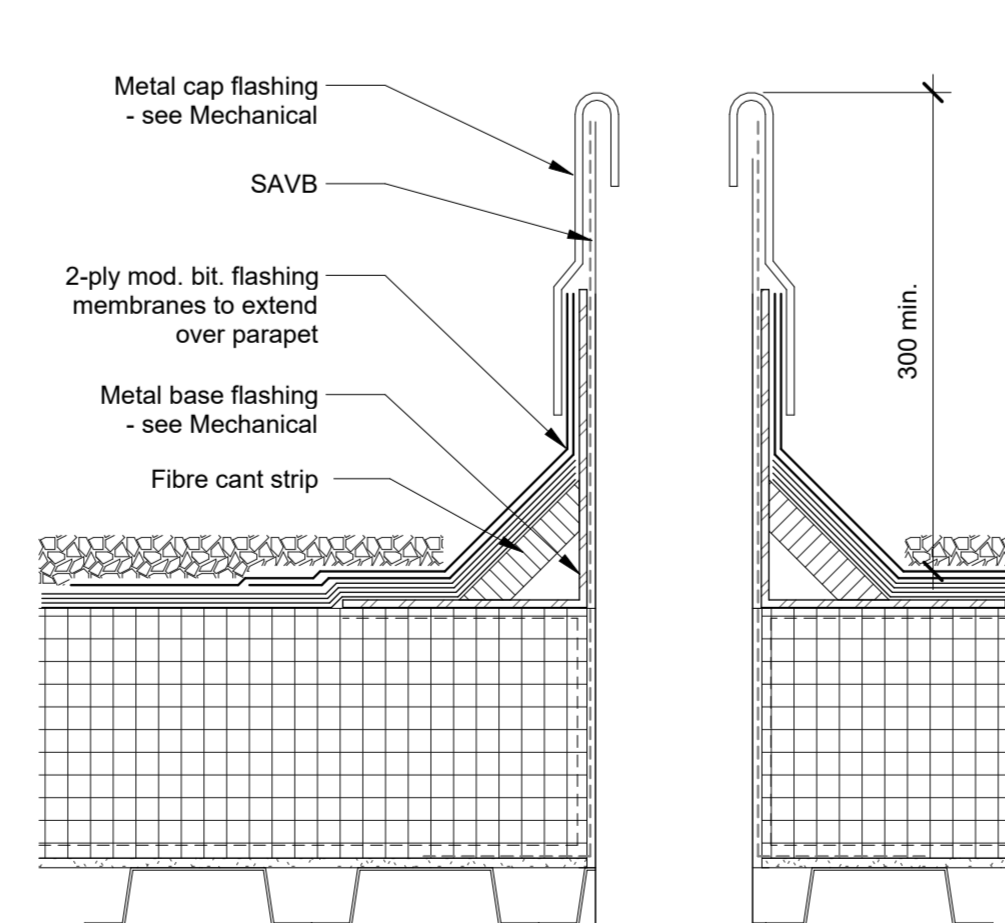
Demolition Plans/RCP/Elevation & Typical Roof Details



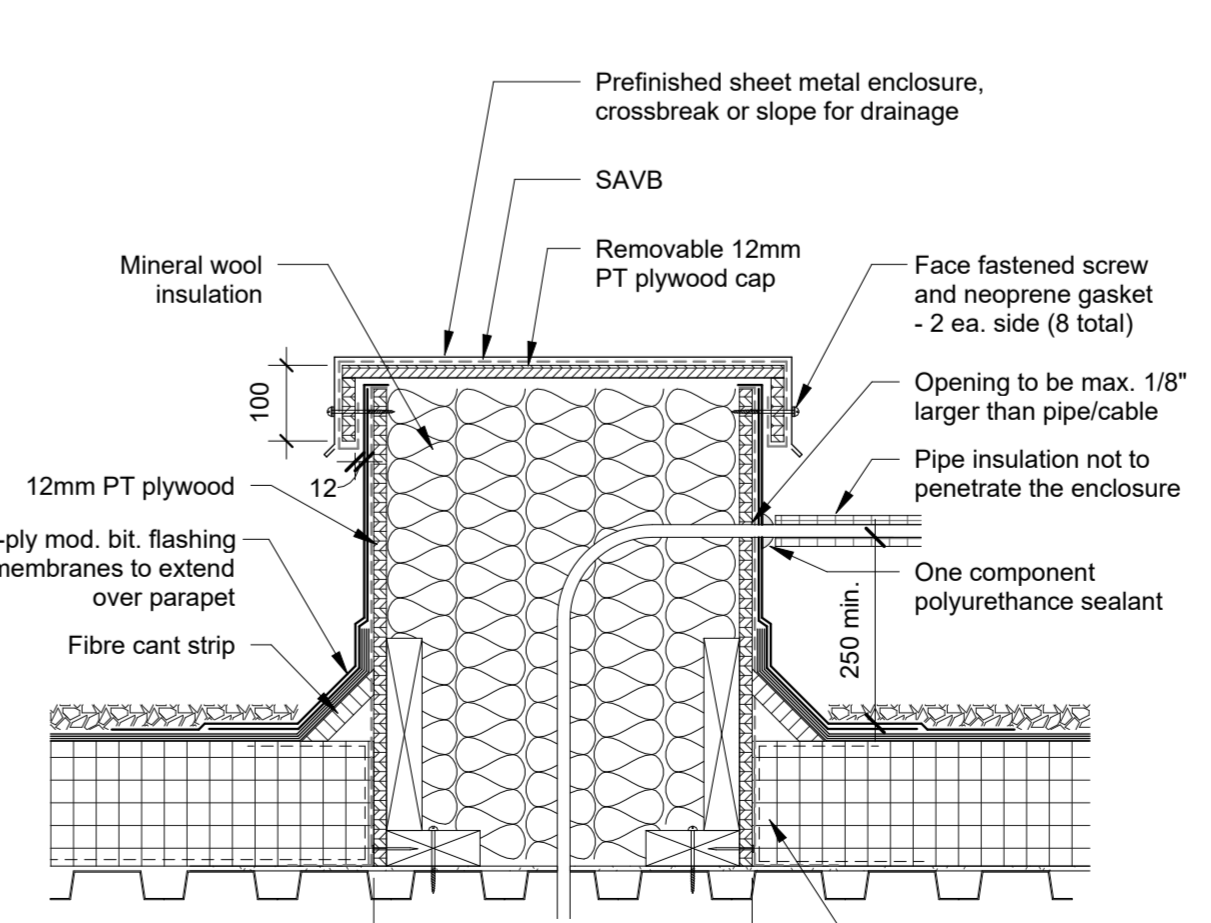
5 Roof Exhaust, Typical
1 : 15



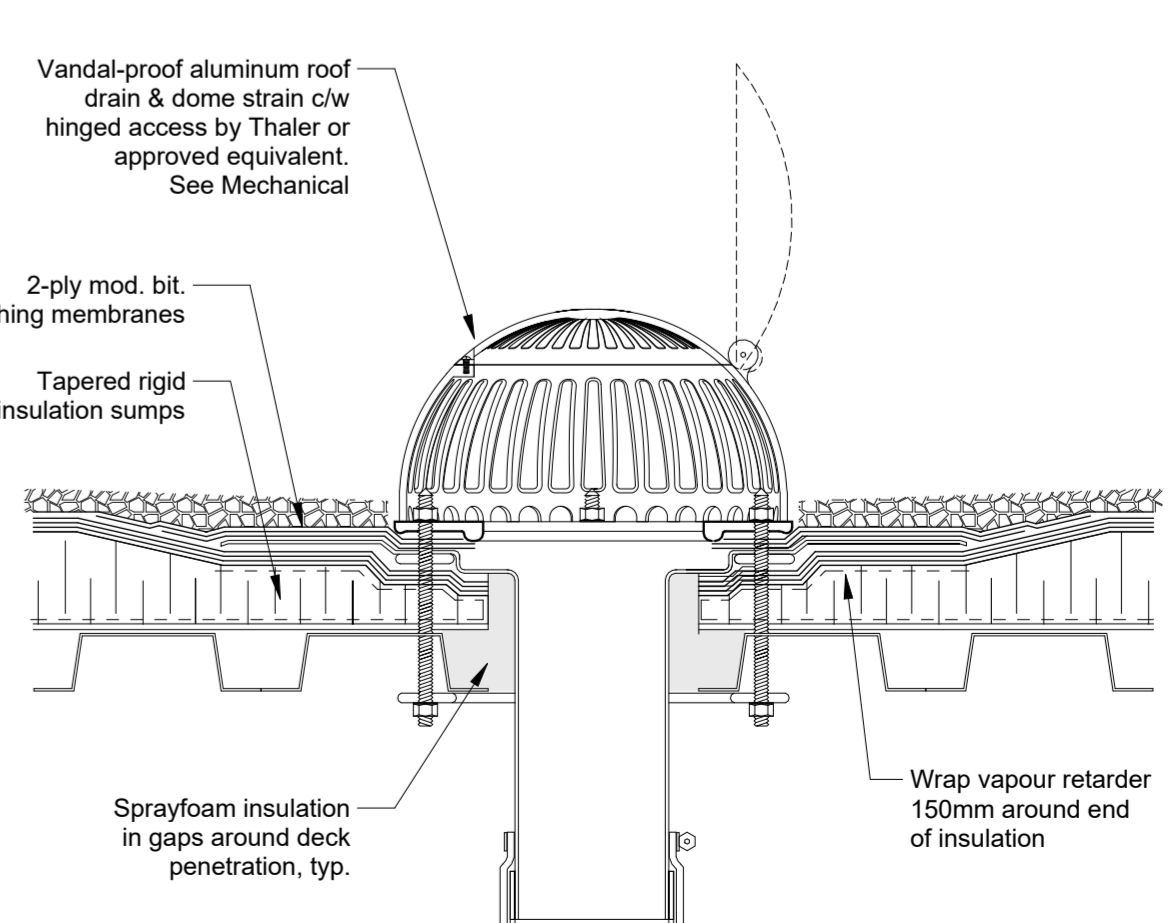
6 Roof Curb, Typical
1 : 5



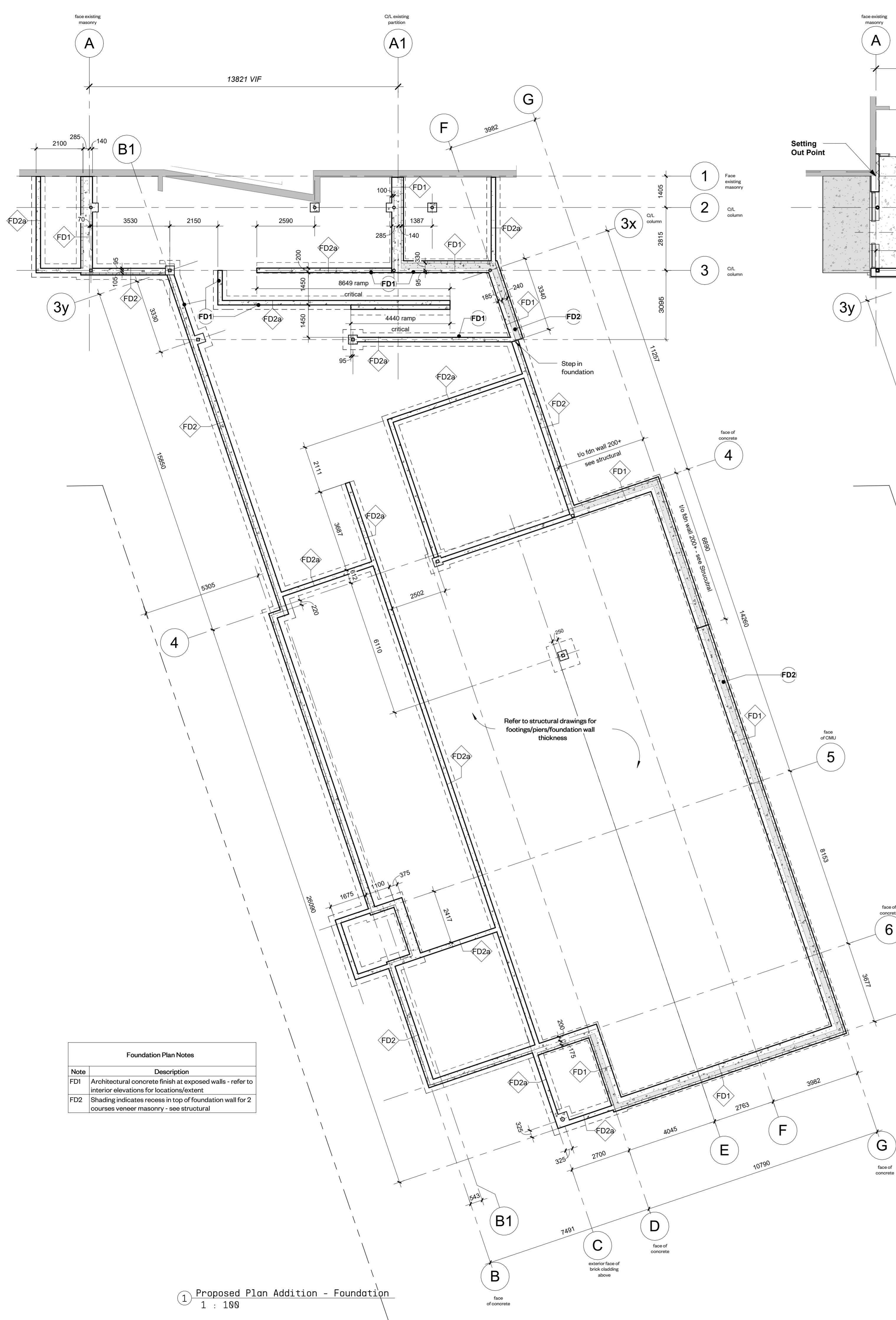
7 Vent Through Roof, Typical
1 : 5



8 Pipe Through Roof, Typical
1 : 10



9 Roof Drain, Typical
1 : 5



Foundation Plan Notes	
Note	Description
FD1	Architectural concrete finish at exposed walls - refer to interior elevations for locations/extent
FD2	Shading indicates recess in top of foundation wall for 2 courses veneer masonry - see structural

1 Proposed Plan Addition - Foundation
1 : 100

2 Proposed Plan Addition - Slab Plan
1 : 100

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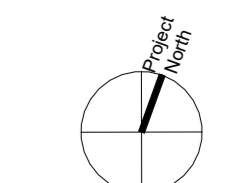
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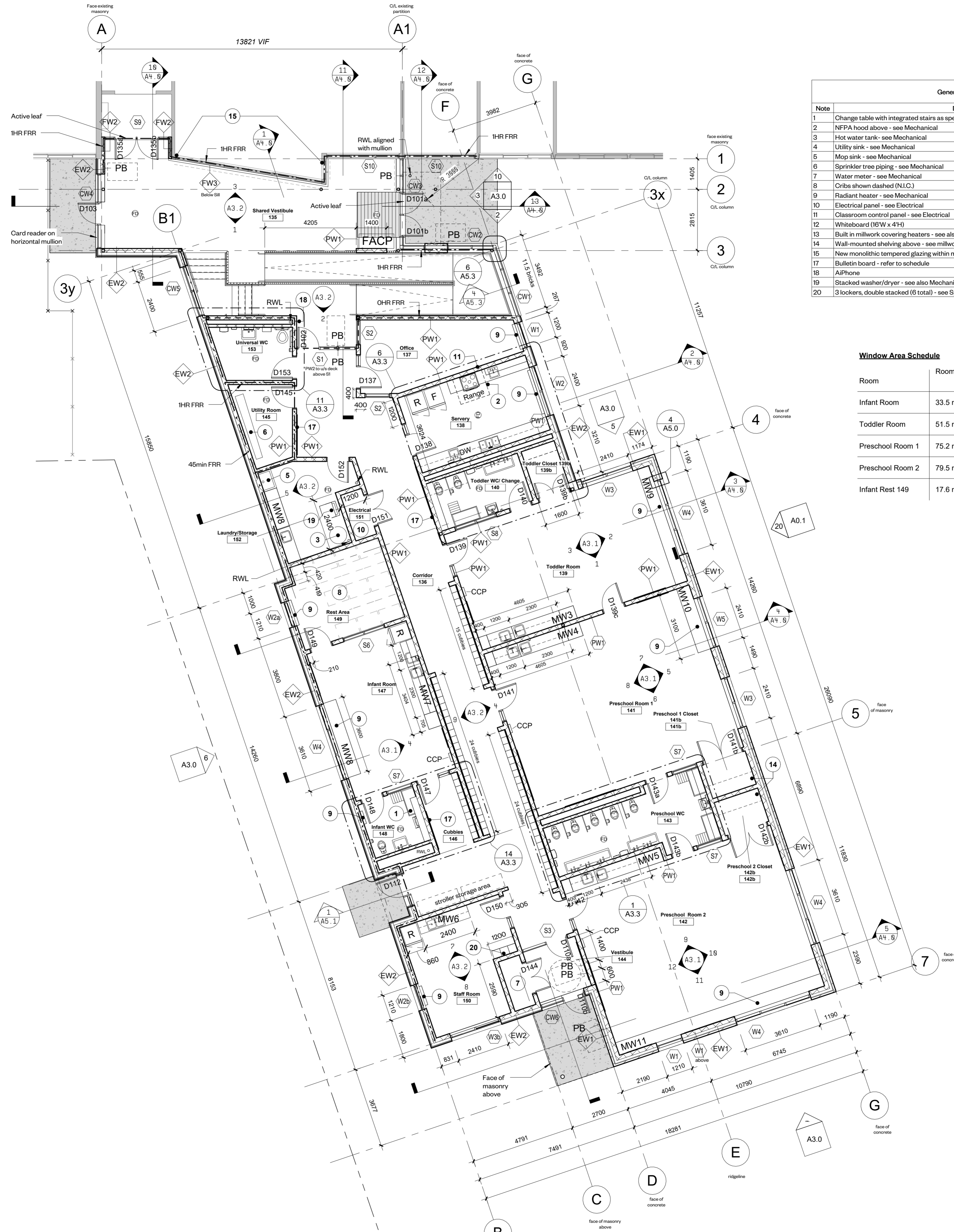
CSV L'Harmonie Daycare
Addition
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2207	1:100
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Foundation Plan & Slab Plan



drawing number
A2.0



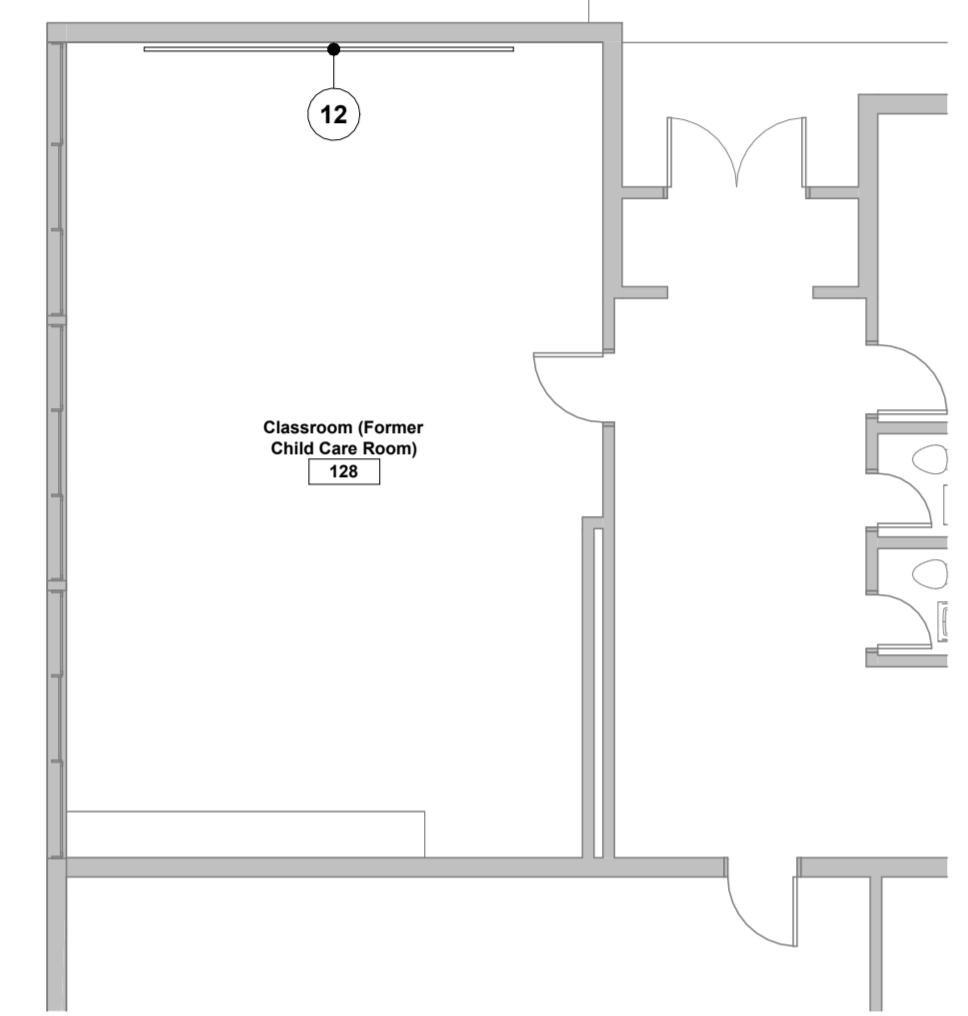
General Notes	
Note	Description
1	Change table with integrated stairs as specified
2	NFPA hood above - see Mechanical
3	Hot water tank - see Mechanical
4	Utility sink - see Mechanical
5	Mop sink - see Mechanical
6	Sprinkler tree piping - see Mechanical
7	Water meter - see Mechanical
8	Crabs shown dashed (N.I.C.)
9	Radiant heater - see Mechanical
10	Electrical panel - see Electrical
11	Classroom control panel - see Electrical
12	Whiteboard (6'W x 4'H)
13	Built in millwork covering heaters - see also Electrical
14	Wall-mounted shelving above - see millwork detail
15	New monolithic tempered glazing within modified curtainwall framing - see interior elevation
16	Bulletin board - refer to schedule
17	iPhone
18	Stacked washer/dryer - see also Mechanical
20	3 lockers, double stacked (6 total) - see Specification 10 51 00

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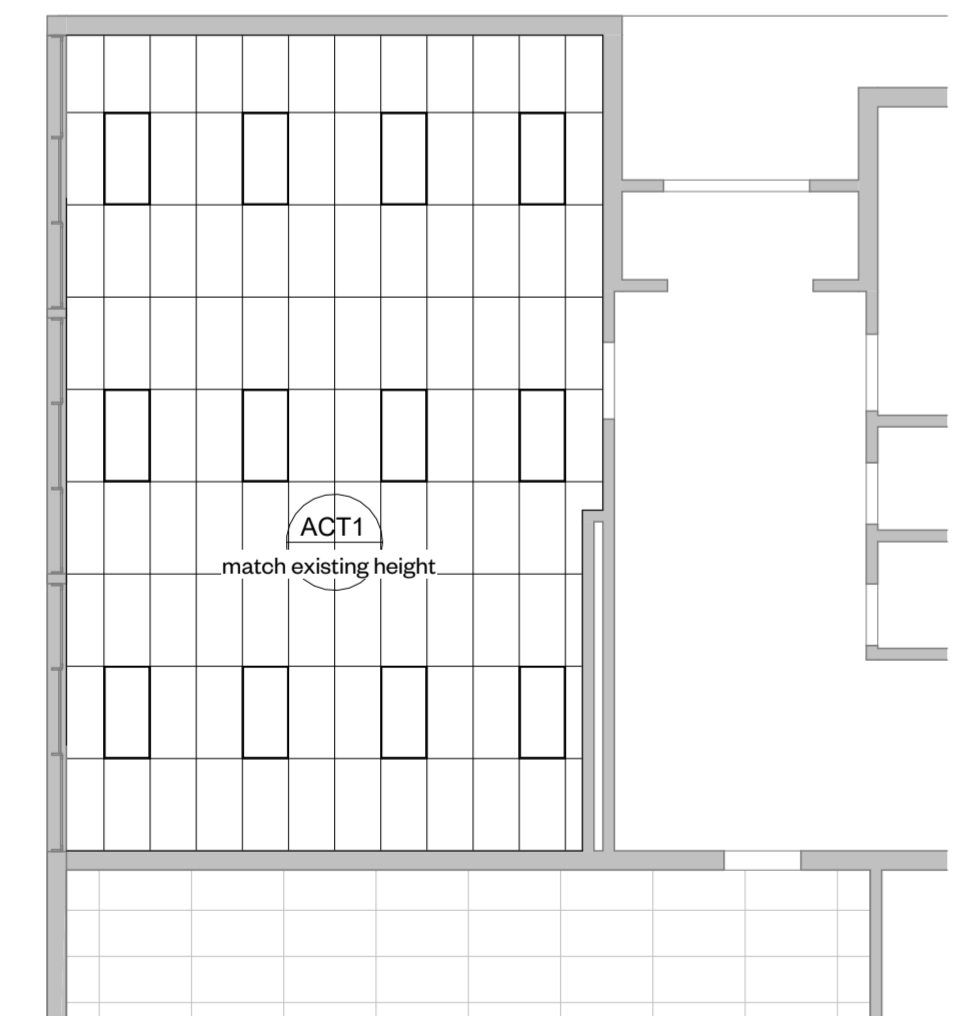
Window Area Schedule			
Room	Room Area	Required Window Area	Proposed Window Area
Infant Room	33.5 m ²	10% = 3.35 m ²	3.6 m ²
Toddler Room	51.5 m ²	10% = 5.15 m ²	6.0 m ²
Preschool Room 1	75.2 m ²	10% = 7.52 m ²	7.6 m ²
Preschool Room 2	79.5 m ²	10% = 7.95 m ²	9.5 m ²
Infant Rest 149	17.6 m ²	5% = 0.88 m ²	1.2 m ²

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- Legend**
- Existing partition to remain
 - New partition as scheduled
- Symbols Legend**
- Partition Tag - refer to partition schedule
 - Exterior Wall Tag - refer to partition schedule
 - New Door tag - refer to schedule
 - Exit
 - CCP Classroom Control Panel - see Electrical
 - FACP Fire Alarm Annunciator Panel - see Electrical
 - PB Actuator for Auto Door Operator - see also Electrical



3 Proposed Plan - Existing Child Care Room Renovation
1 : 100



1 Proposed RCP - Existing Child Care Room Renovation
1 : 100

10 Proposed Plan Addition
1 : 100

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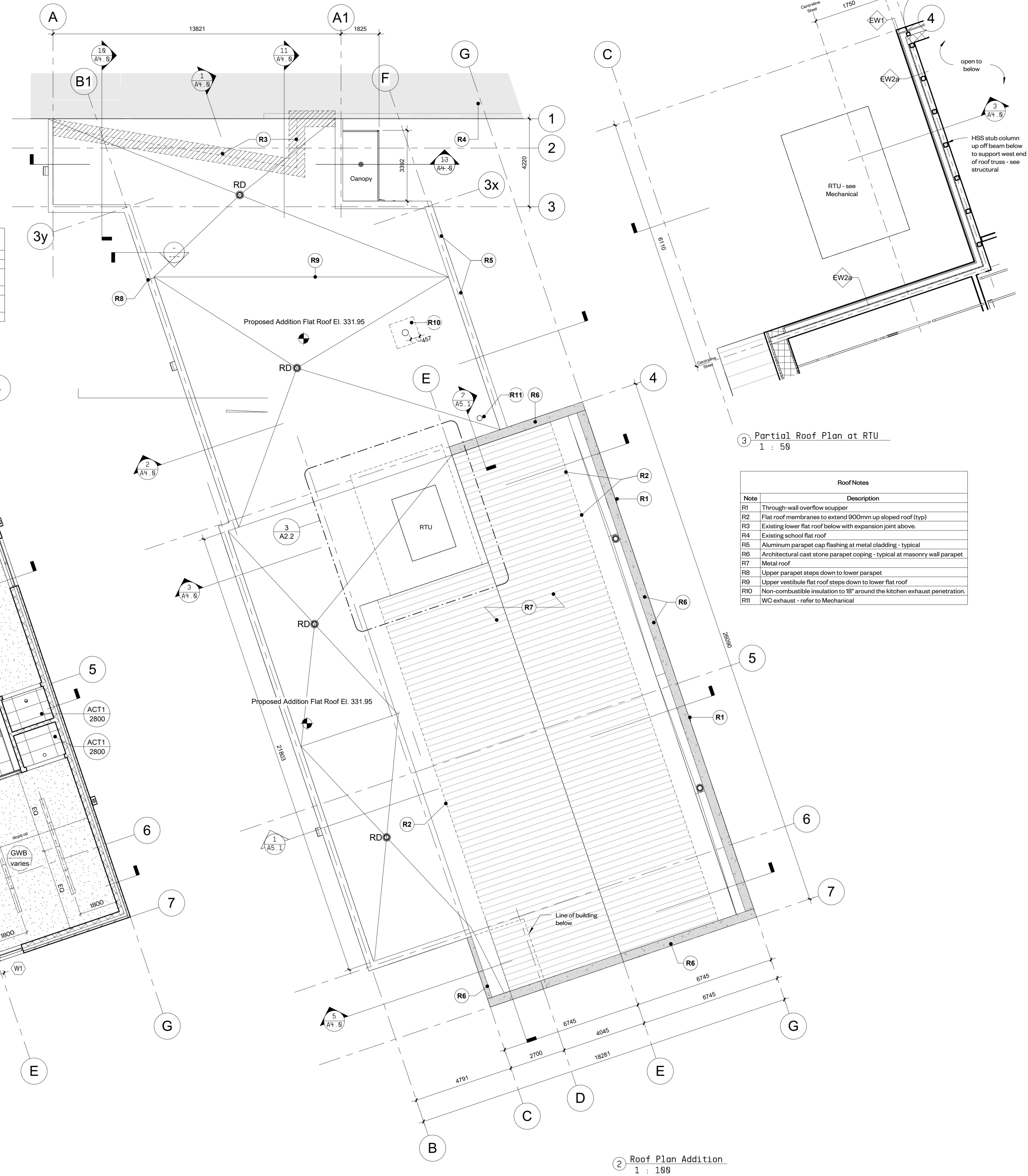
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Proposed Floor Plans



Note	Description
C1	Wood soffit
C2	Paint out exposed roof deck and ceiling mounted services (typ)
C3	Paint exposed steel structure (typ)
C4	Refer to Electrical and Mechanical for full extent of ceiling mounted devices
C5	NFPA hood - see Mechanical

1 RCP Addition
1 : 100



Note	Description
R1	Through-wall overflow scupper
R2	Flat roof membranes to extend 900mm up sloped roof (typ)
R3	Existing lower flat roof below with expansion joint above.
R4	Existing school flat roof
R5	Aluminum parapet cap flashing at metal cladding - typical
R6	Architectural cast stone parapet coping - typical at masonry wall parapet
R7	Metal roof
R8	Upper parapet steps down to lower parapet
R9	Upper vestibule flat roof steps down to lower flat roof
R10	Non-combustible insulation to 18" around the kitchen exhaust penetration.
R11	WC exhaust - refer to Mechanical

2 Roof Plan Addition
1 : 100

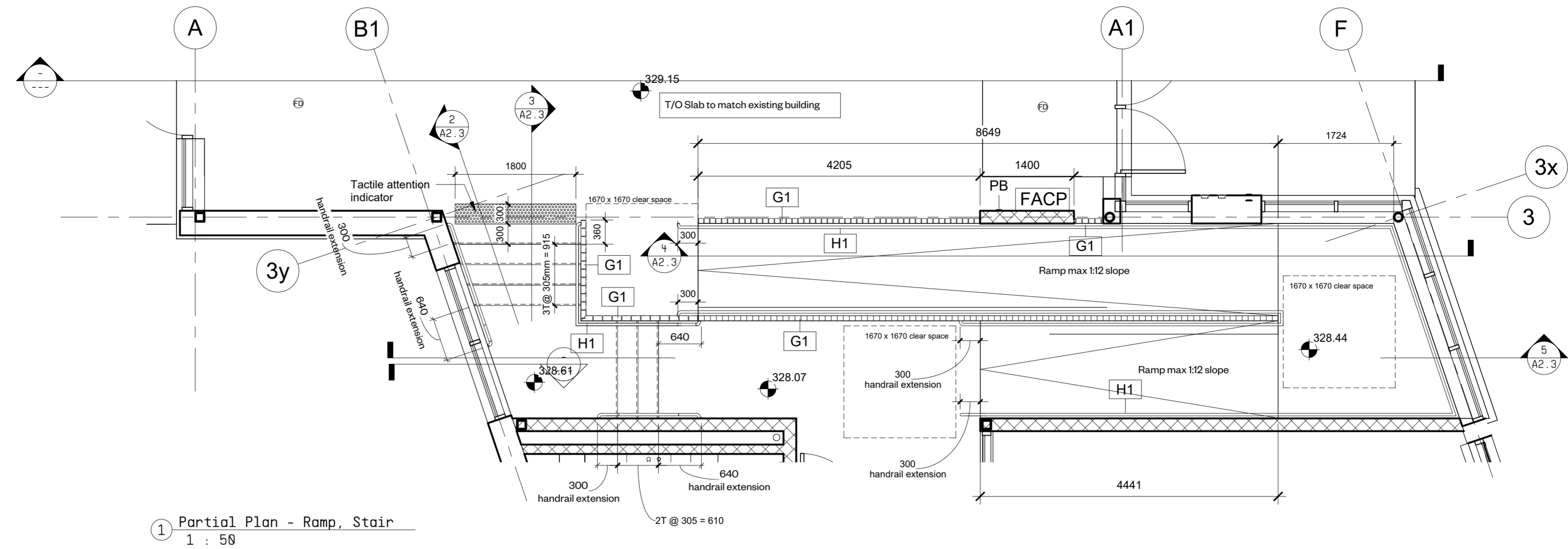
3 Partial Roof Plan at RTU
1 : 50

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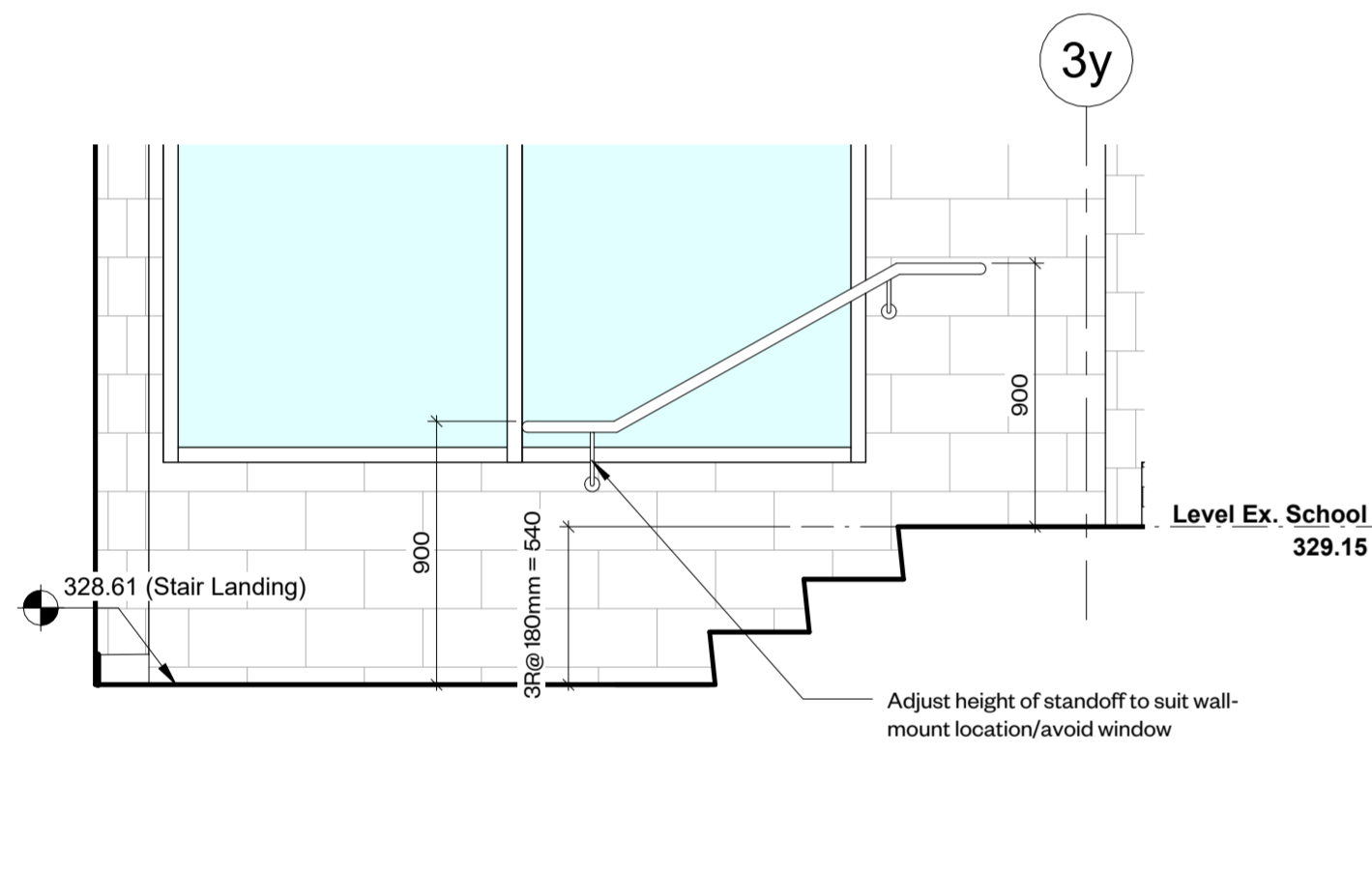
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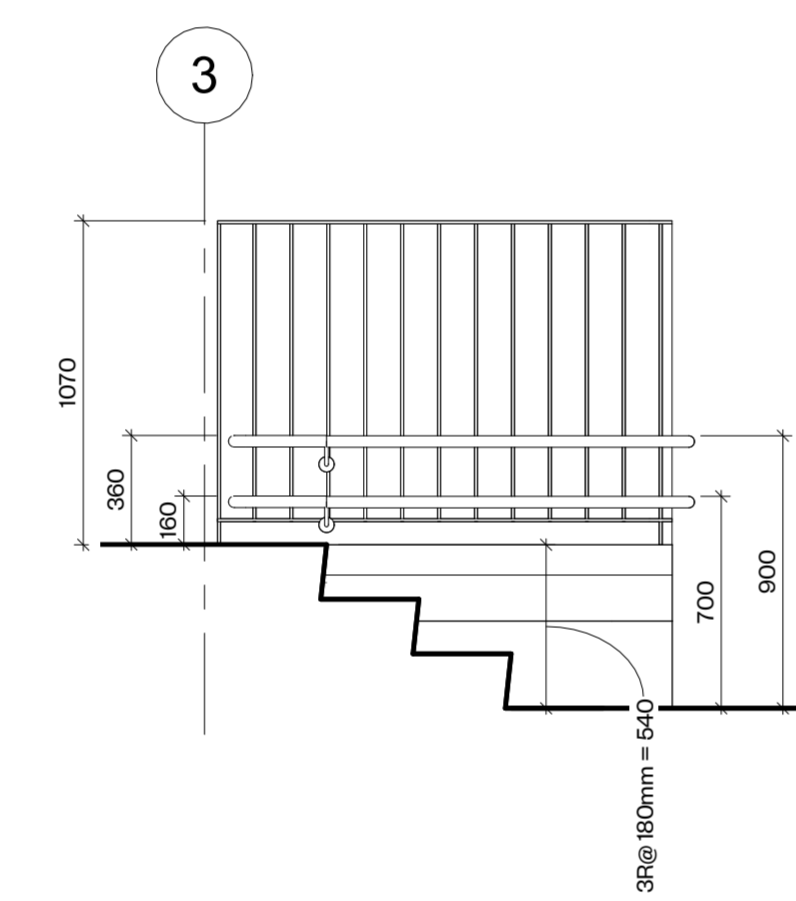
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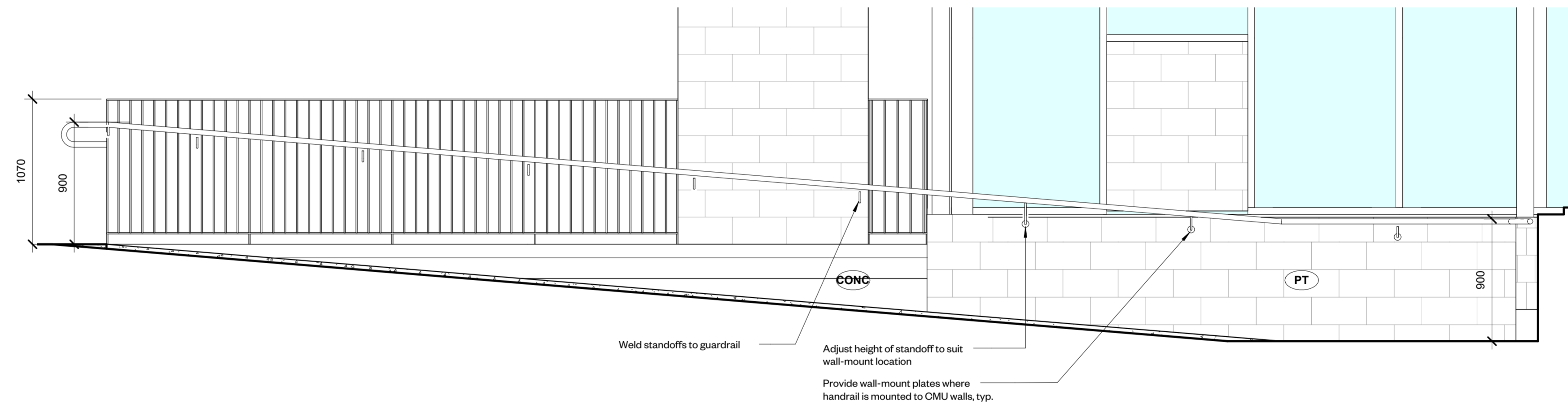
1 Partial Plan - Ramp, Stair
1 : 50



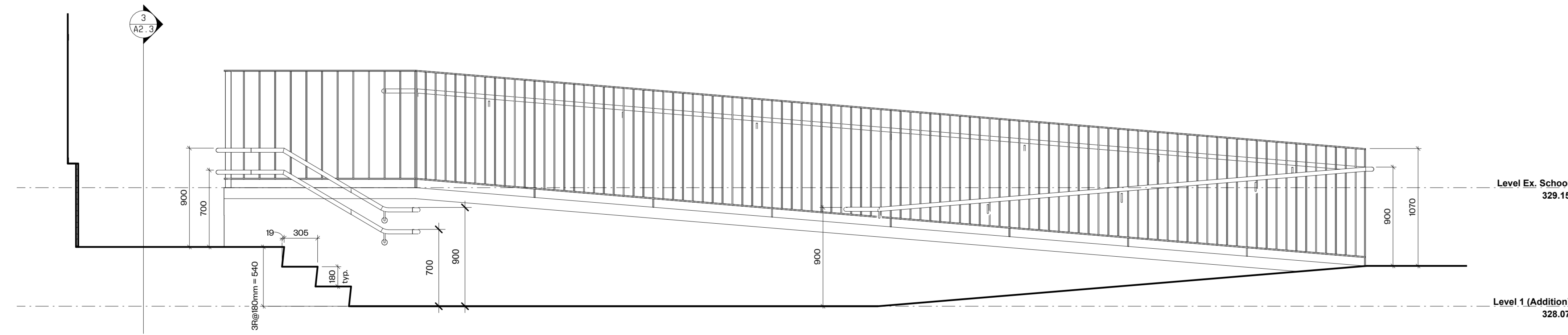
2 Section - Through Stair Looking West
1 : 25



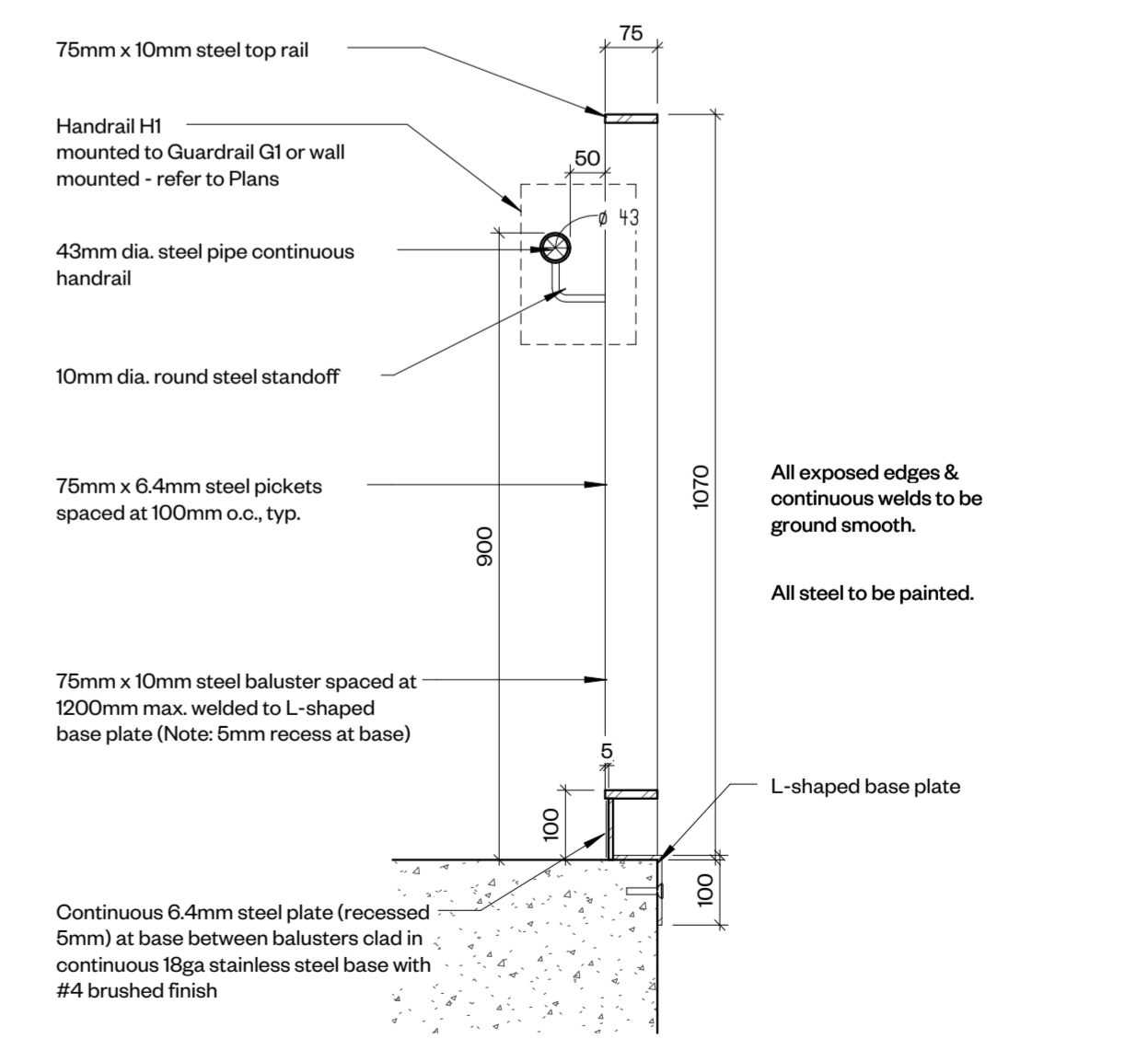
3 Section - Through Stair Looking East
1 : 25



4 Section - Through Ramp Looking North
1 : 25



5 Section - Through Ramp & Stairs Looking North
1 : 25



6 Guardrail G1 & Handrail H1
1 : 10

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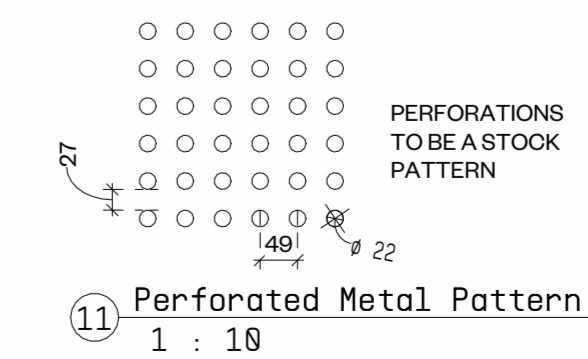
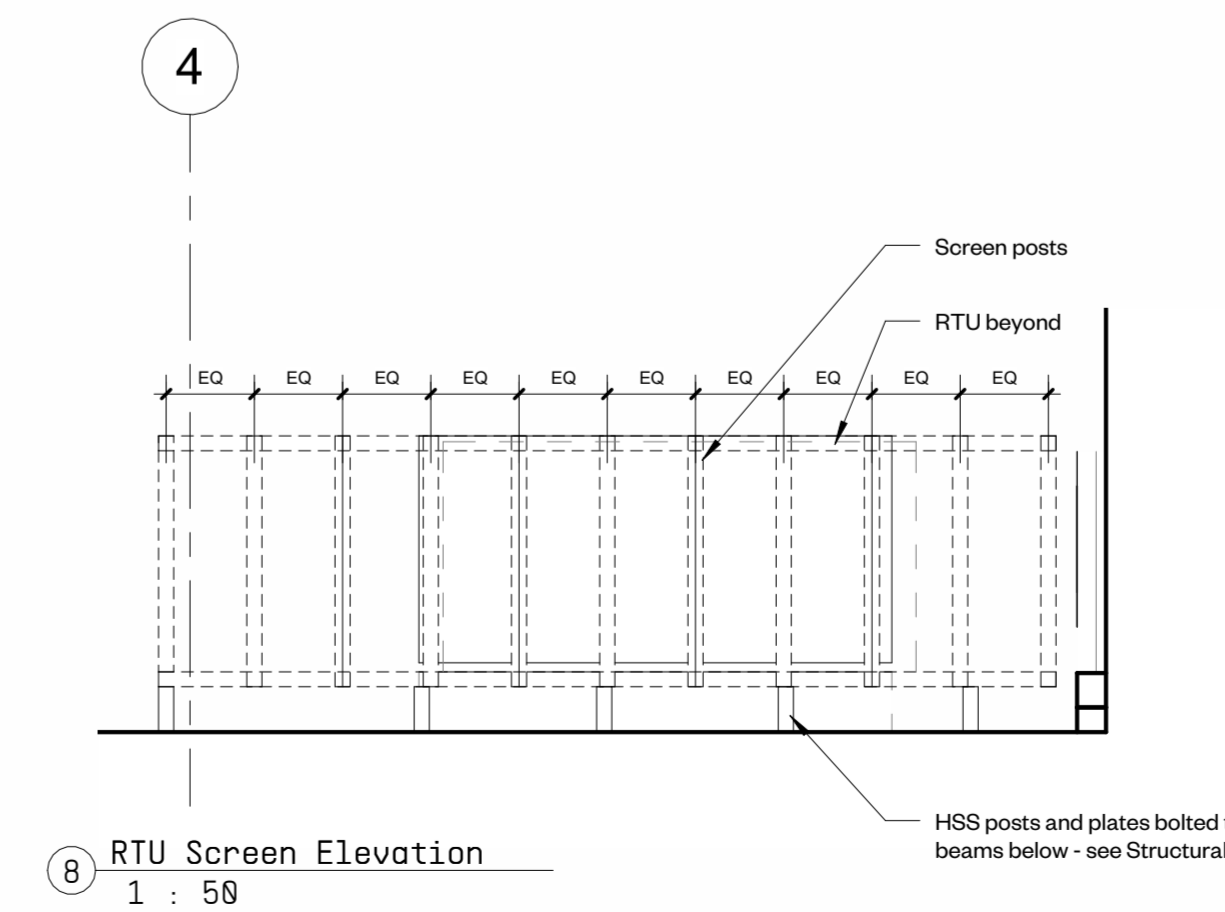
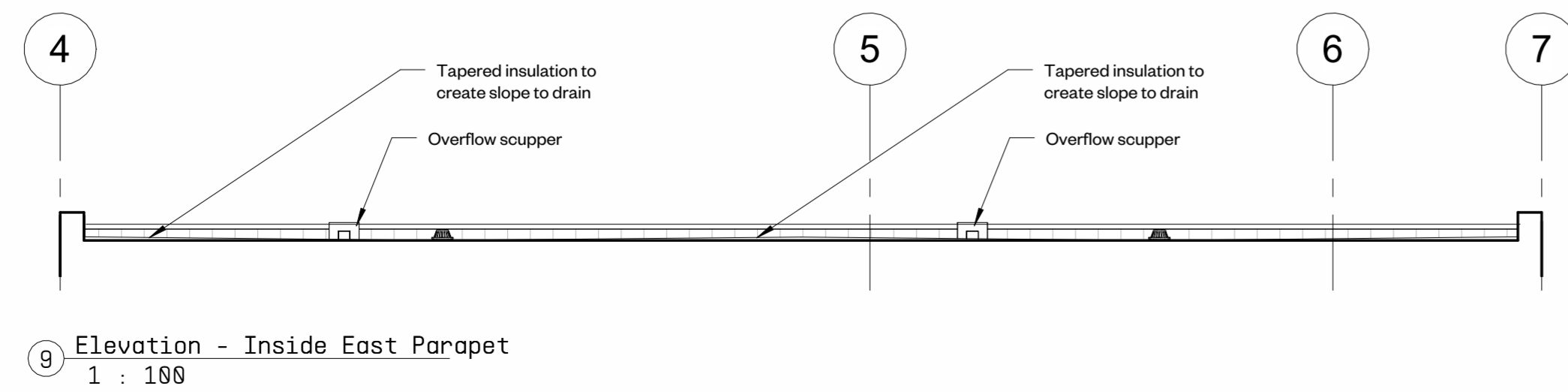
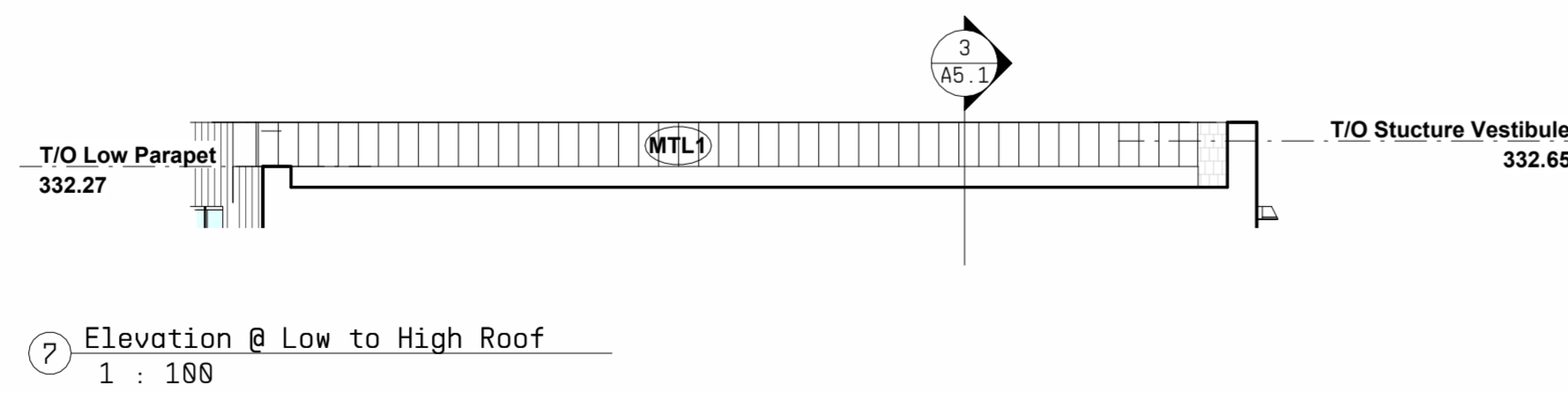
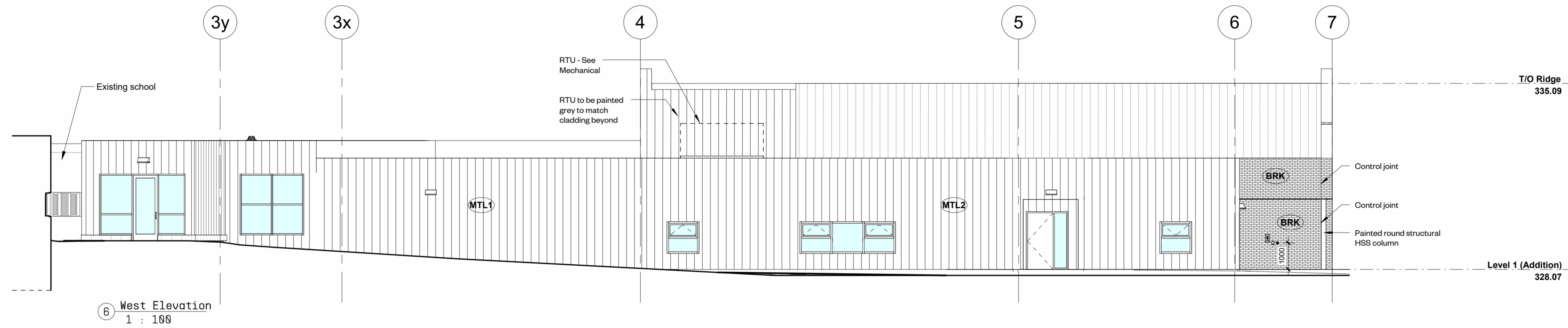
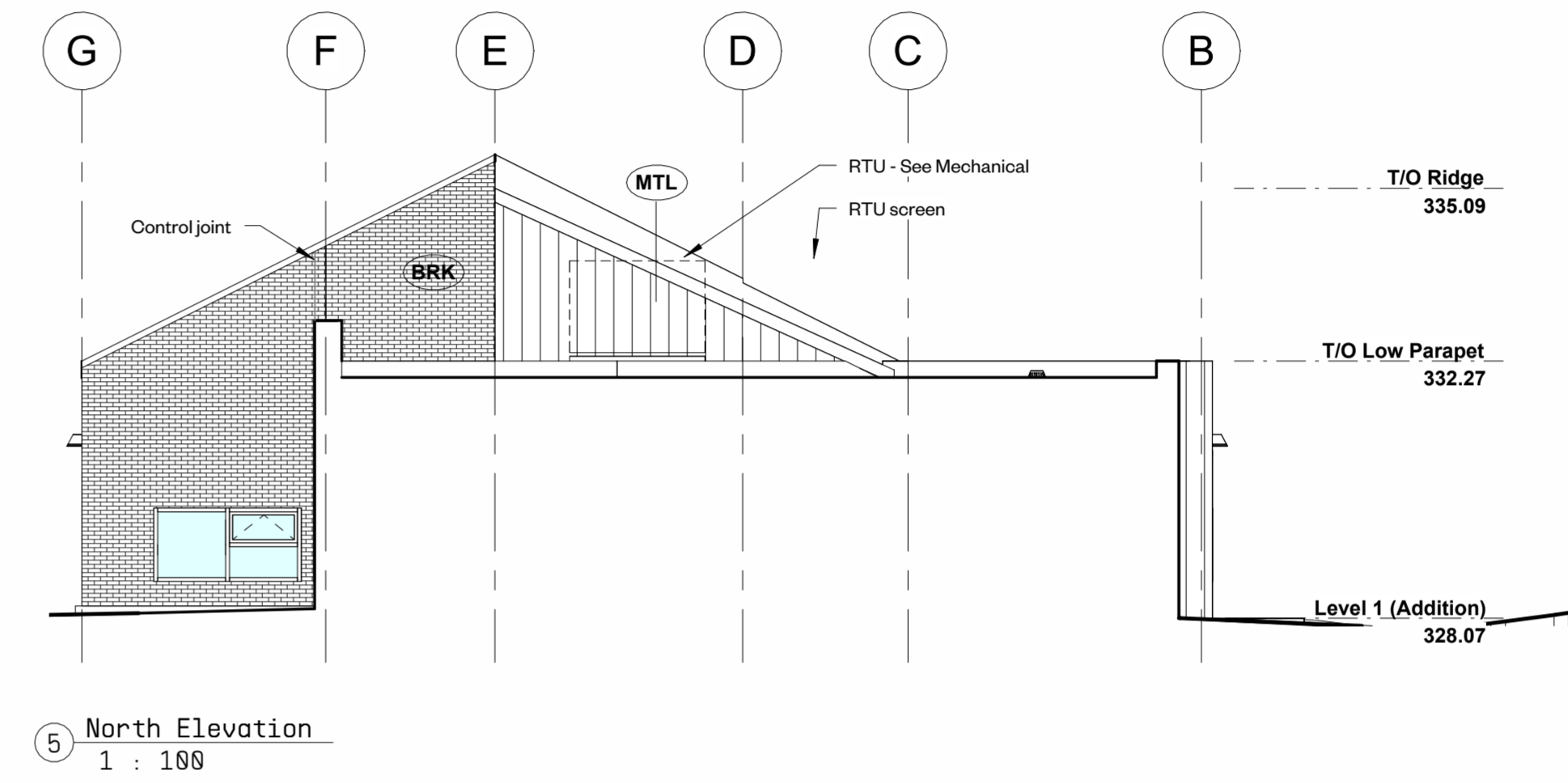
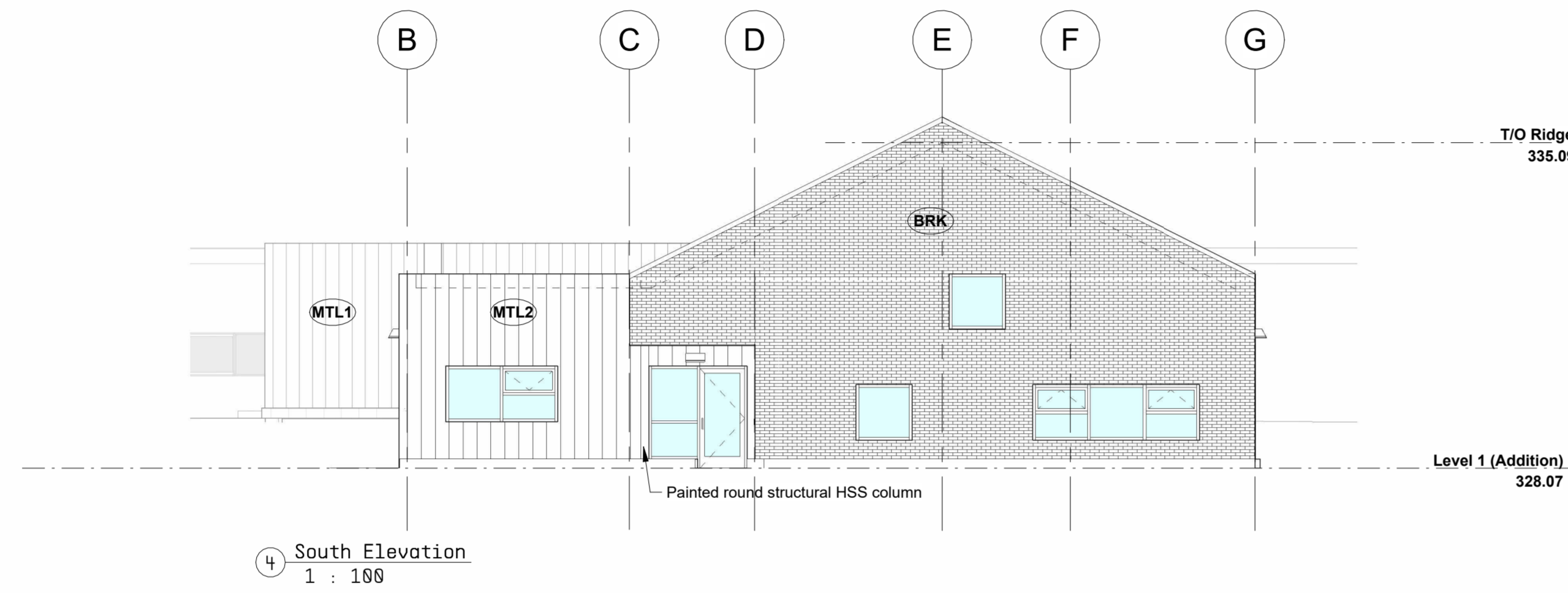
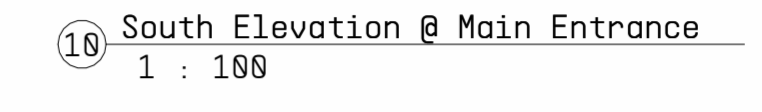
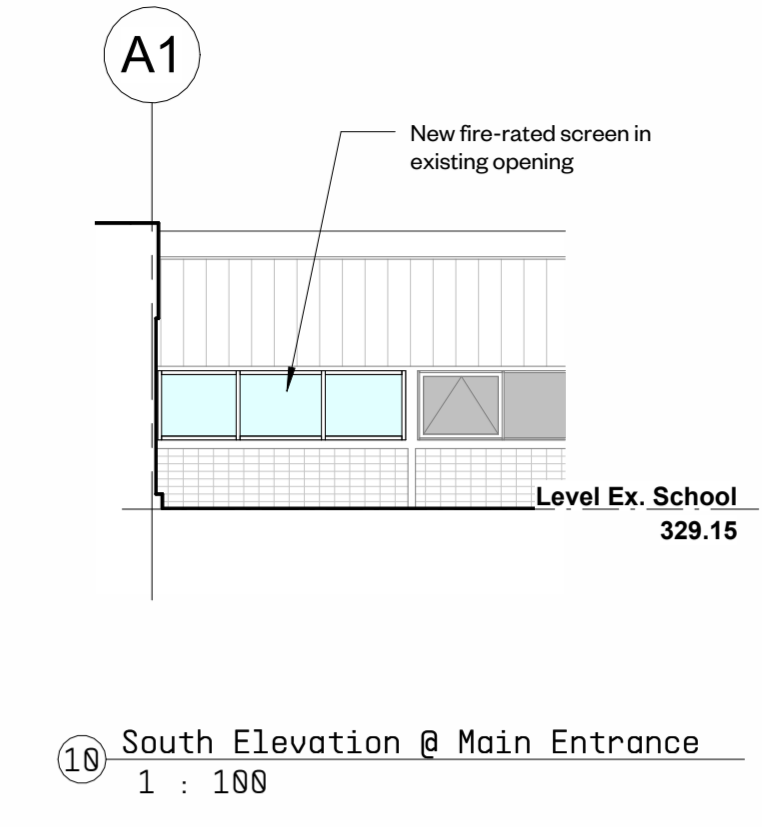
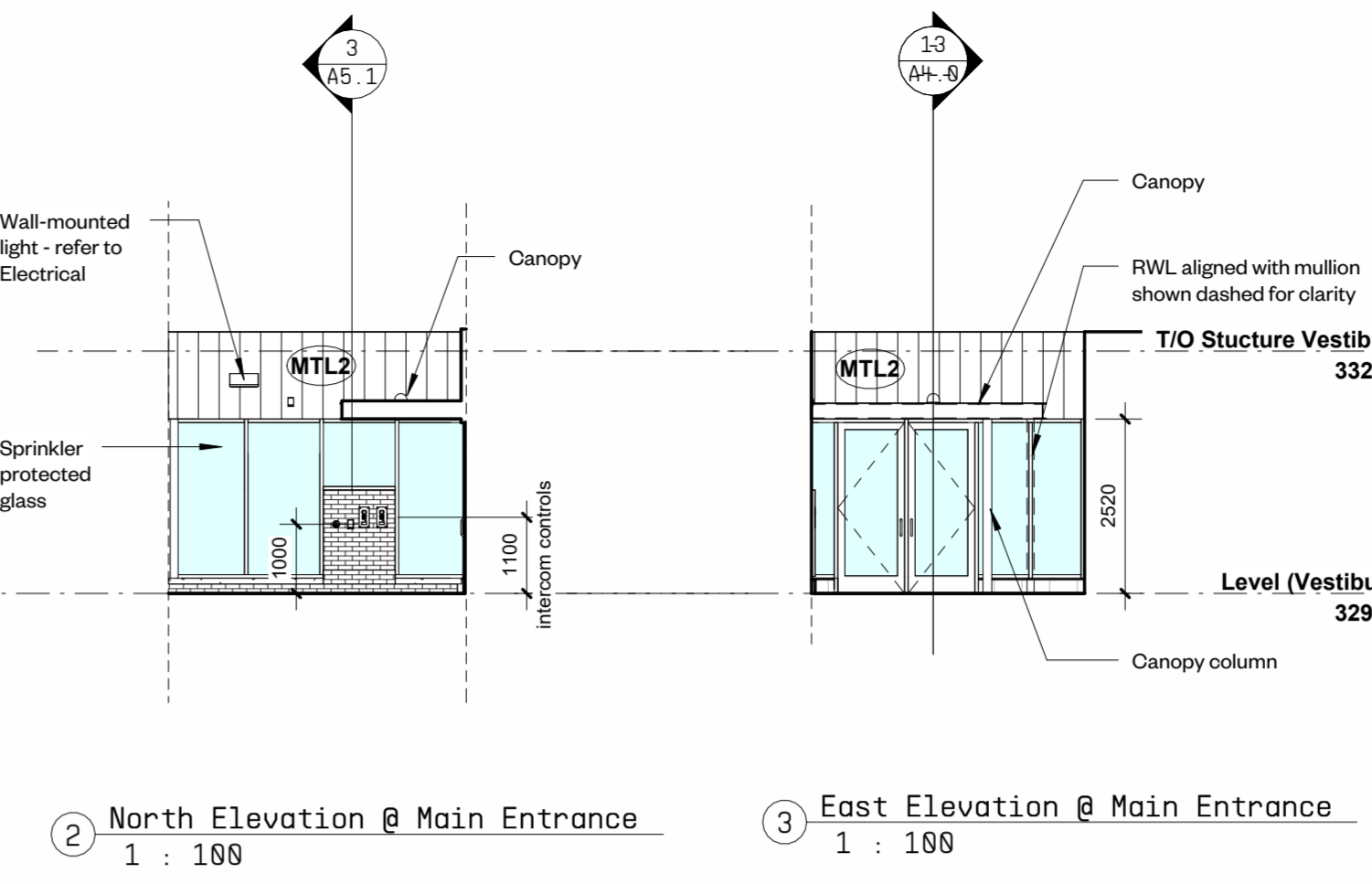
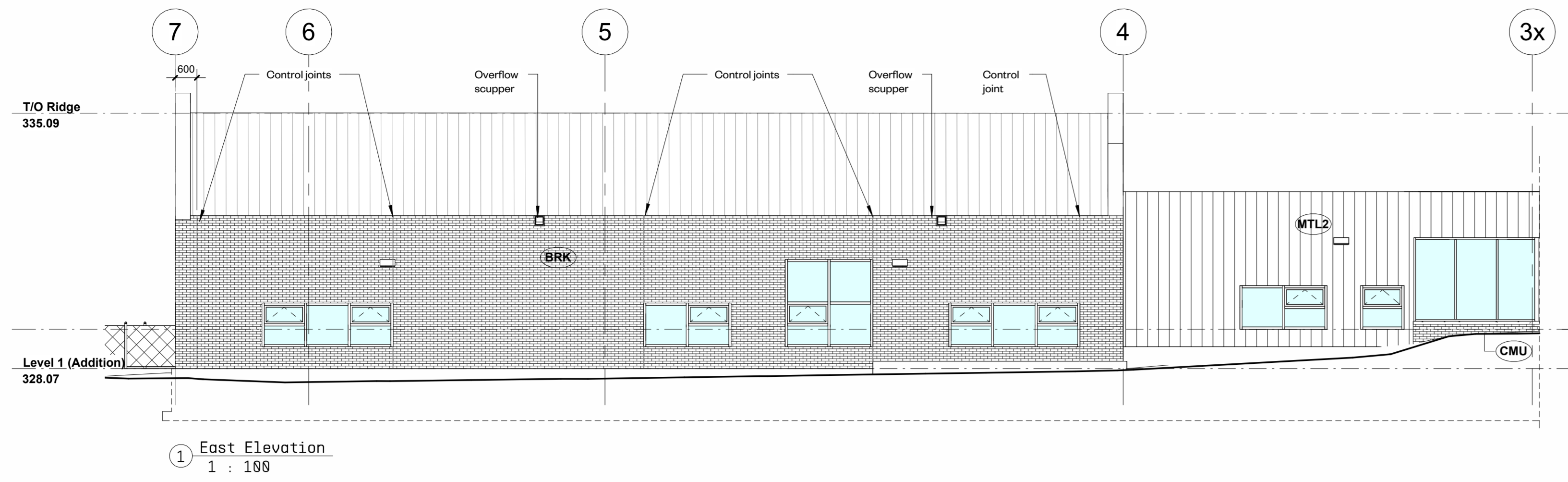
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Partial Plan - Ramp & Stair Details



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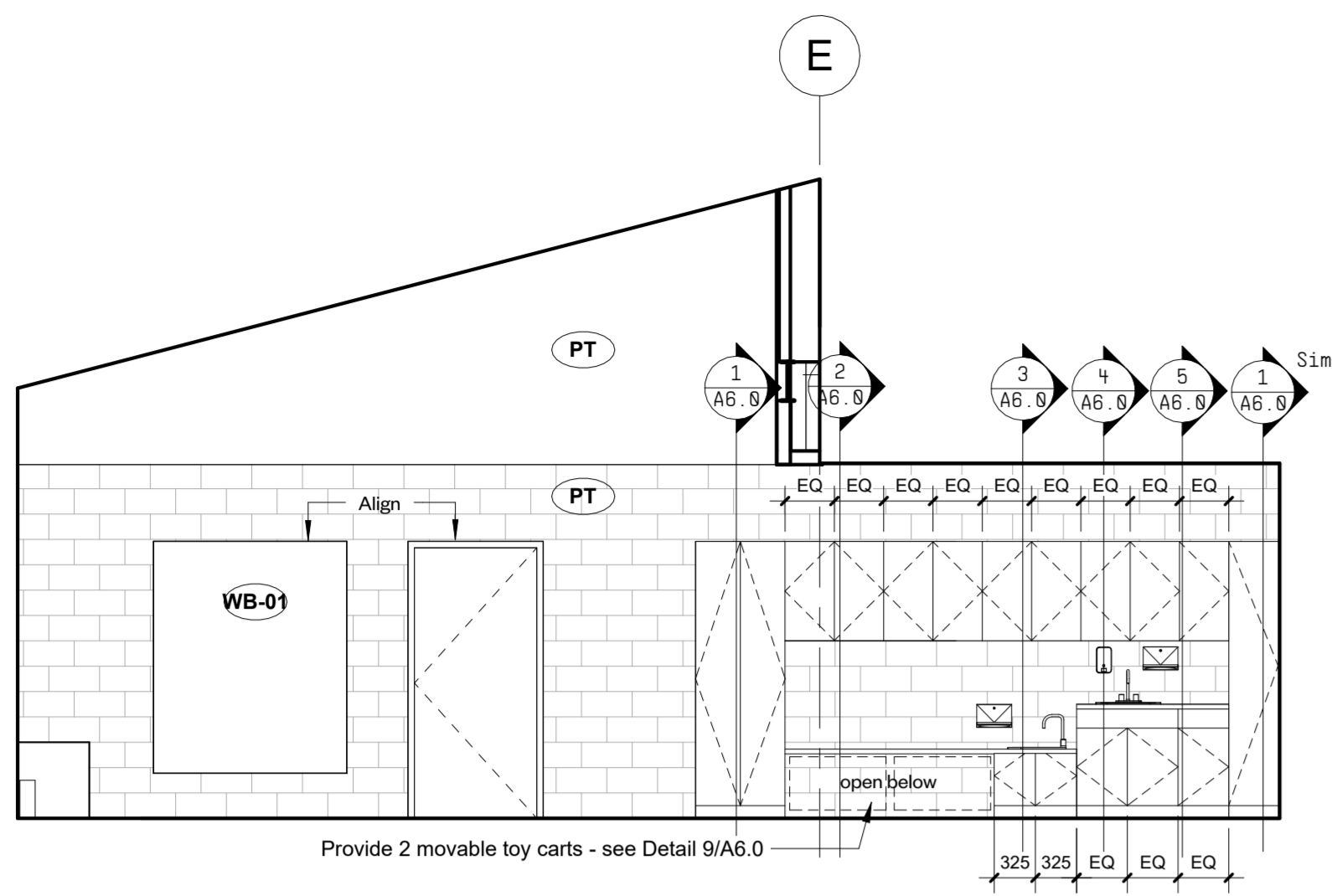
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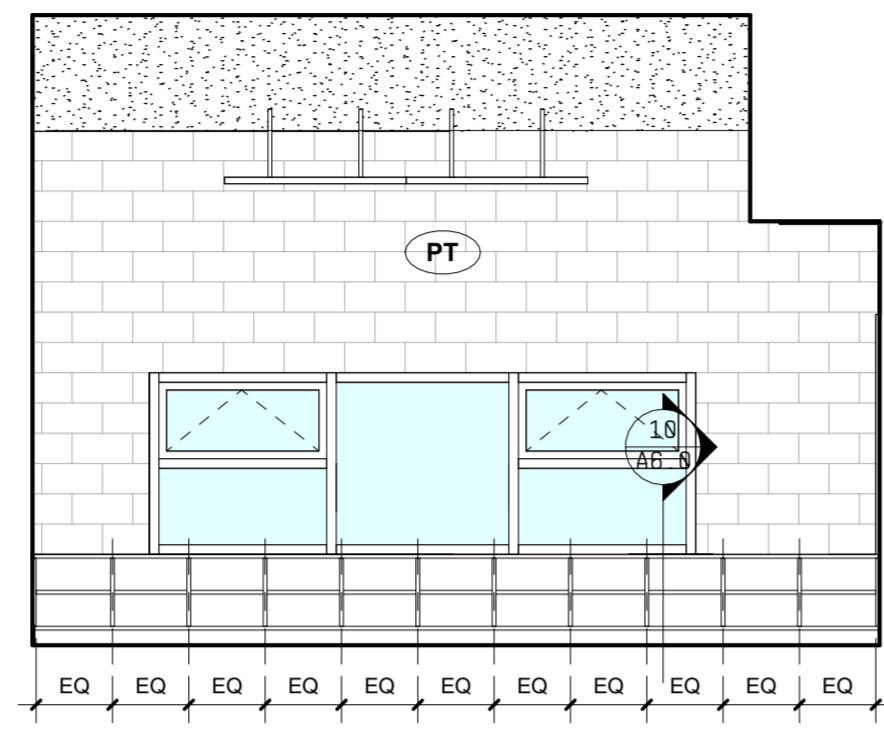
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Exterior Elevations

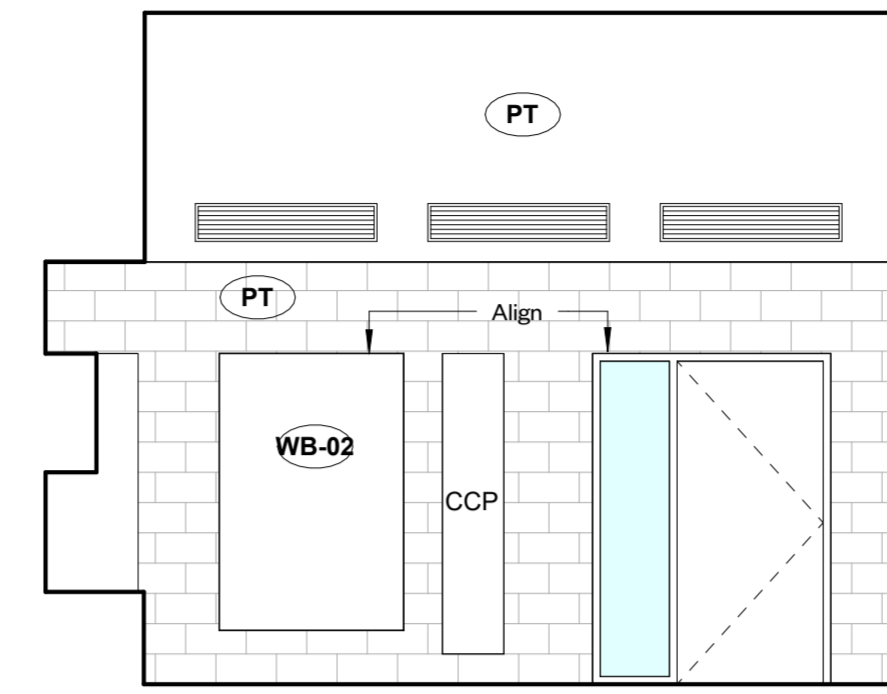
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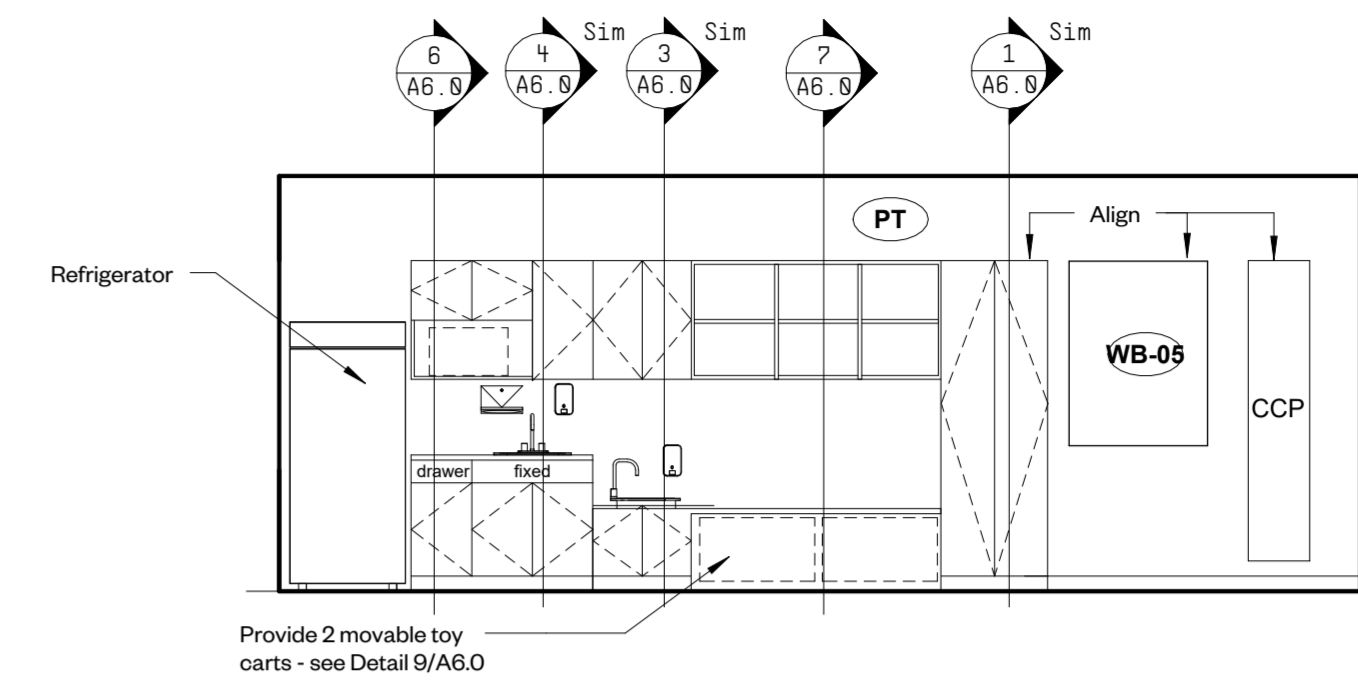
1 Interior Elevation - Toddler Room 139 South
1 : 50



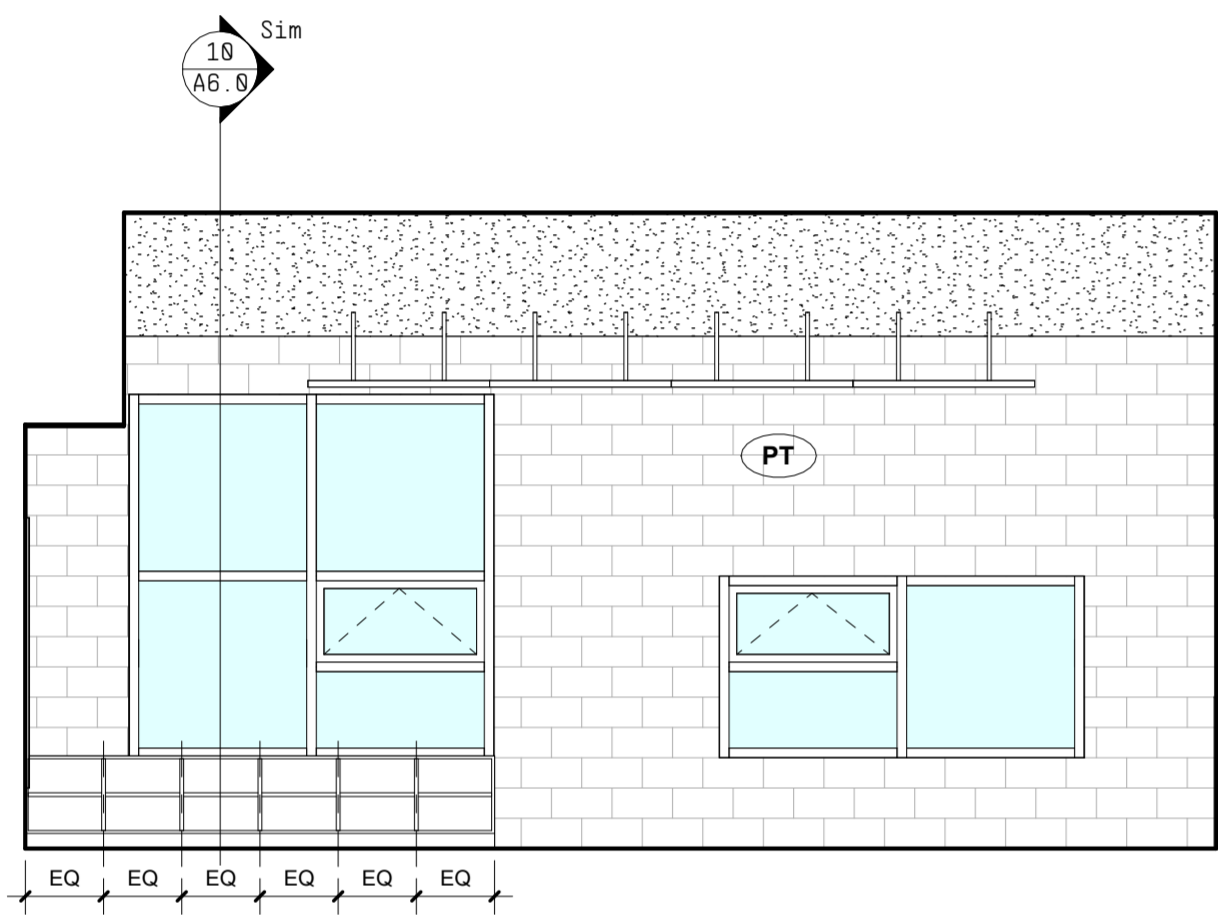
2 Interior Elevation - Toddler East
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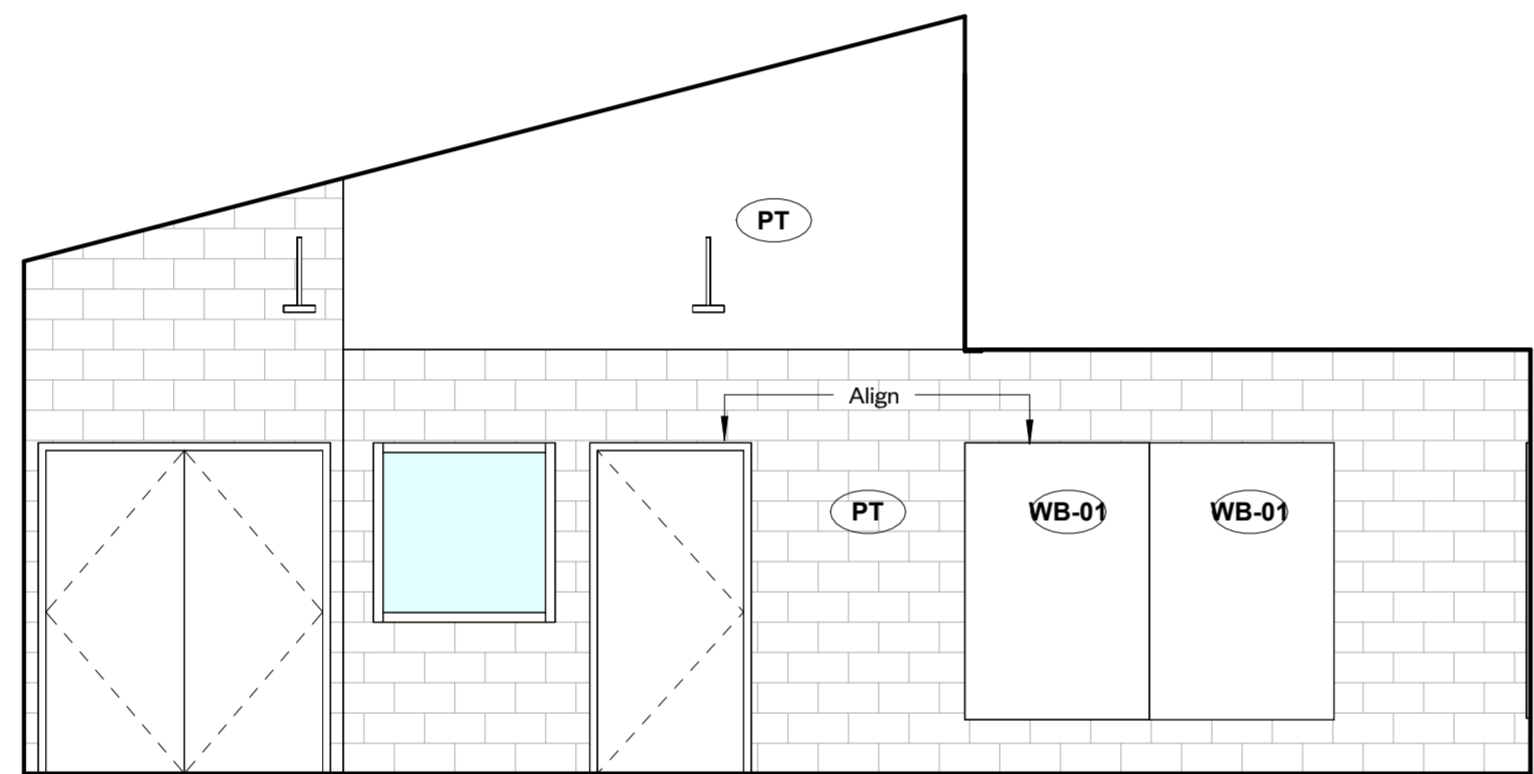
3 Interior Elevation - Toddler West
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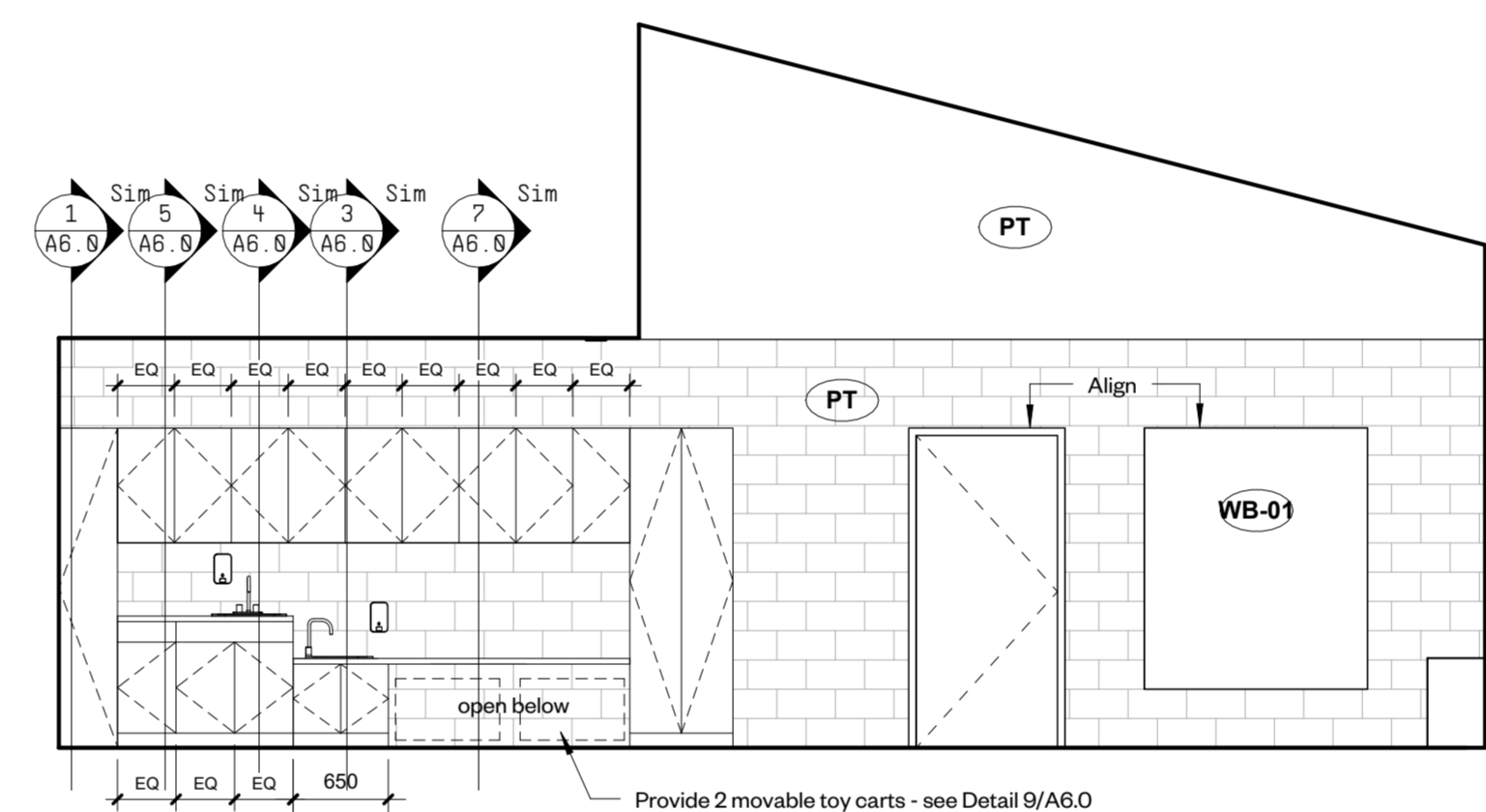
4 Interior Elevation - Infant Room 147 East
1 : 50



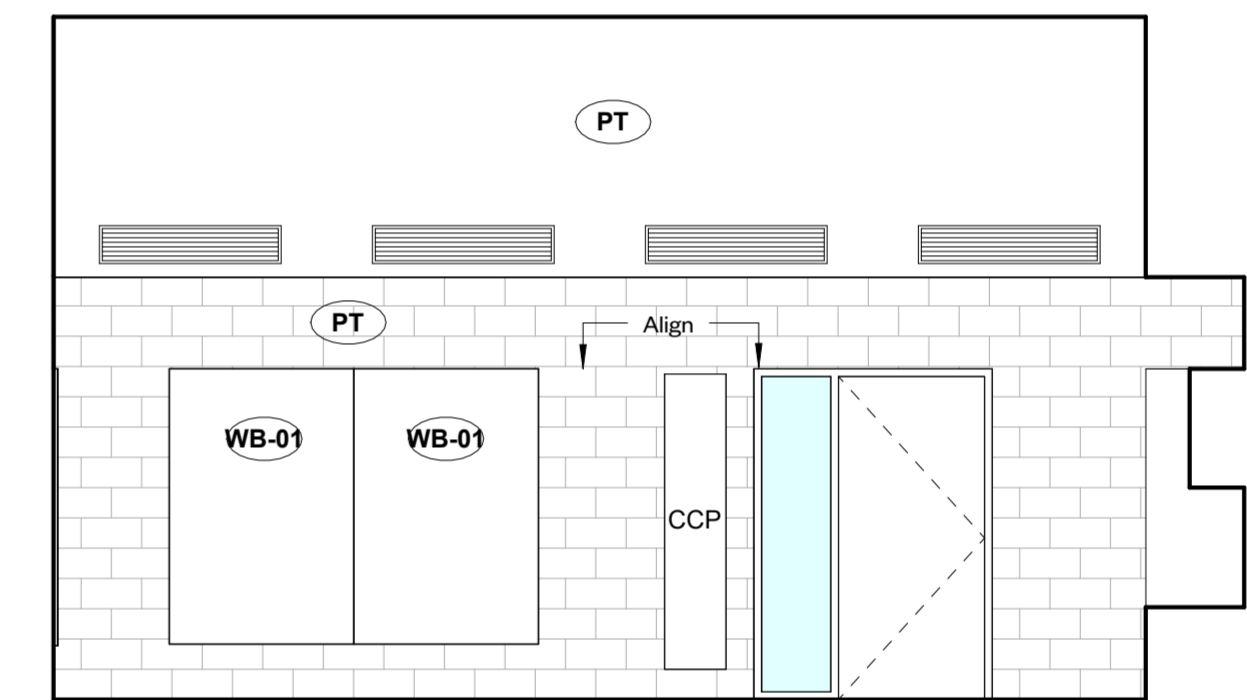
5 Interior Elevation - Preschool 1 East
1 : 50



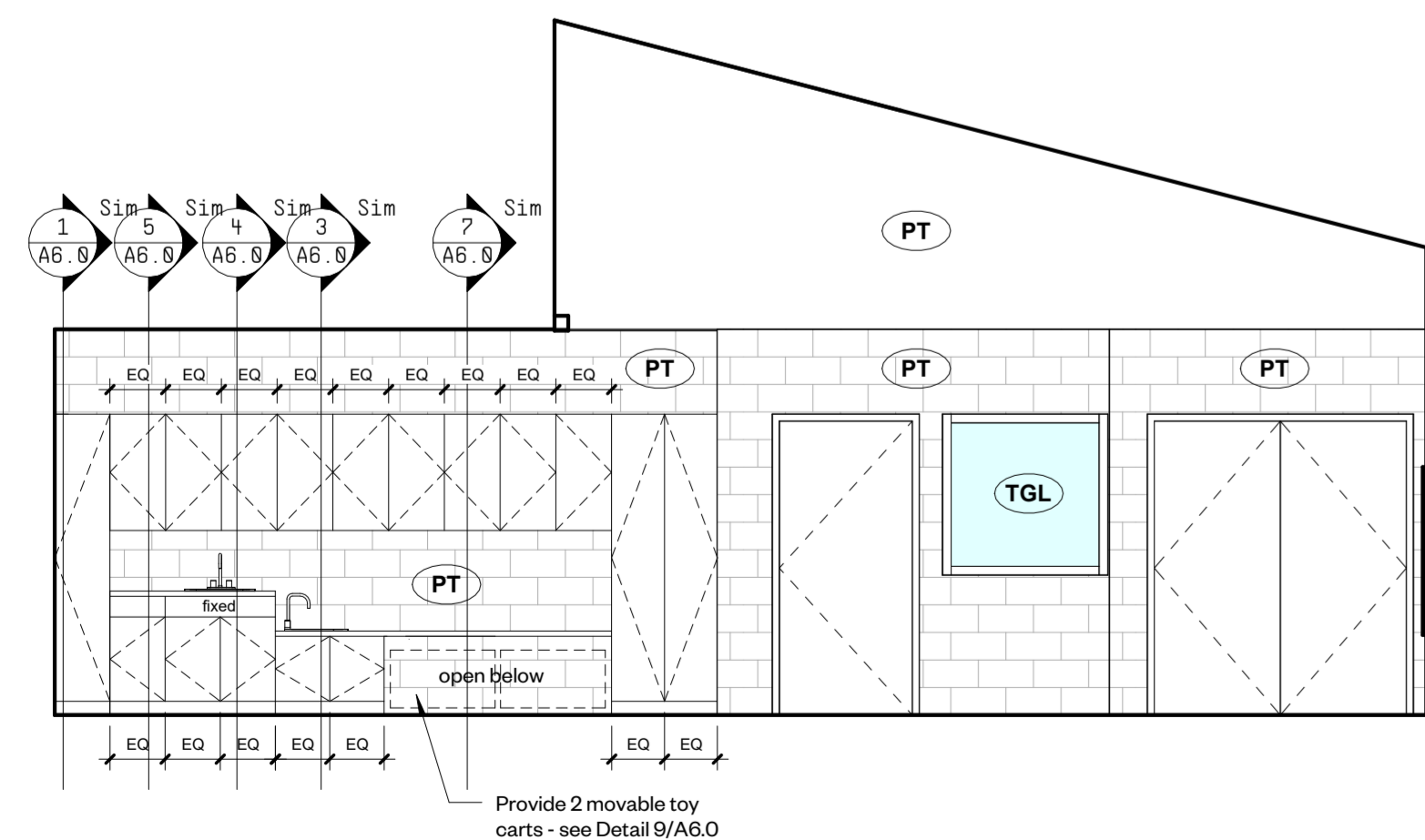
6 Interior Elevation - Preschool Room 1 South
1 : 50



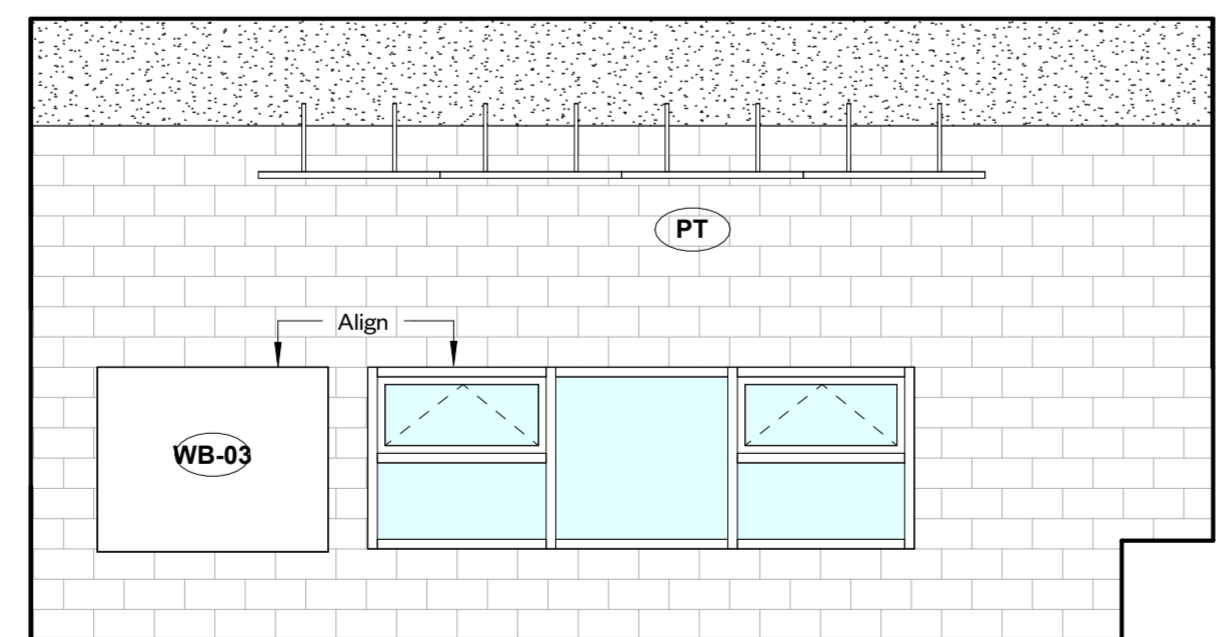
7 Interior Elevation - Preschool Room [1] 141 North
1 : 50



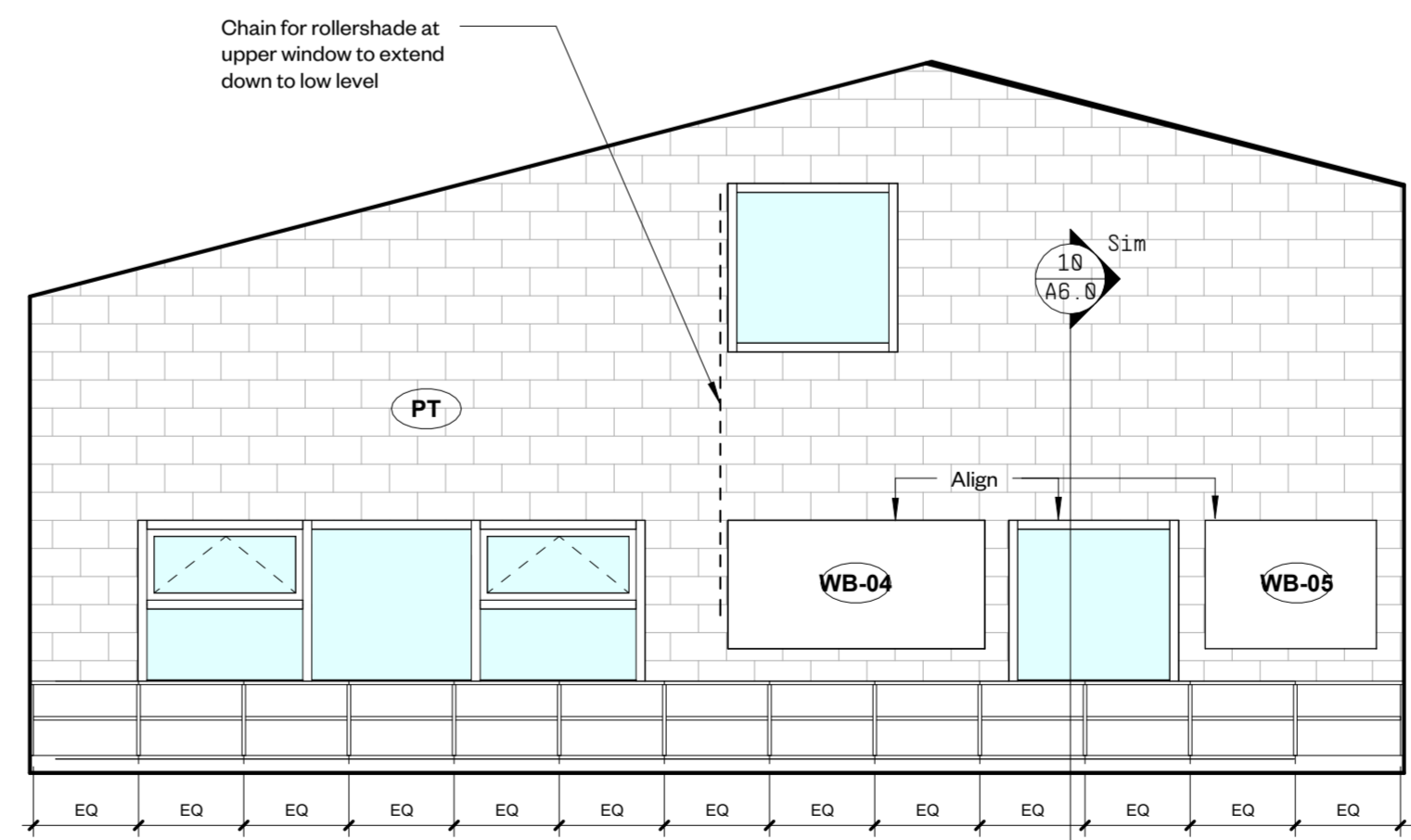
8 Interior Elevation - Preschool Room 1 West
1 : 50



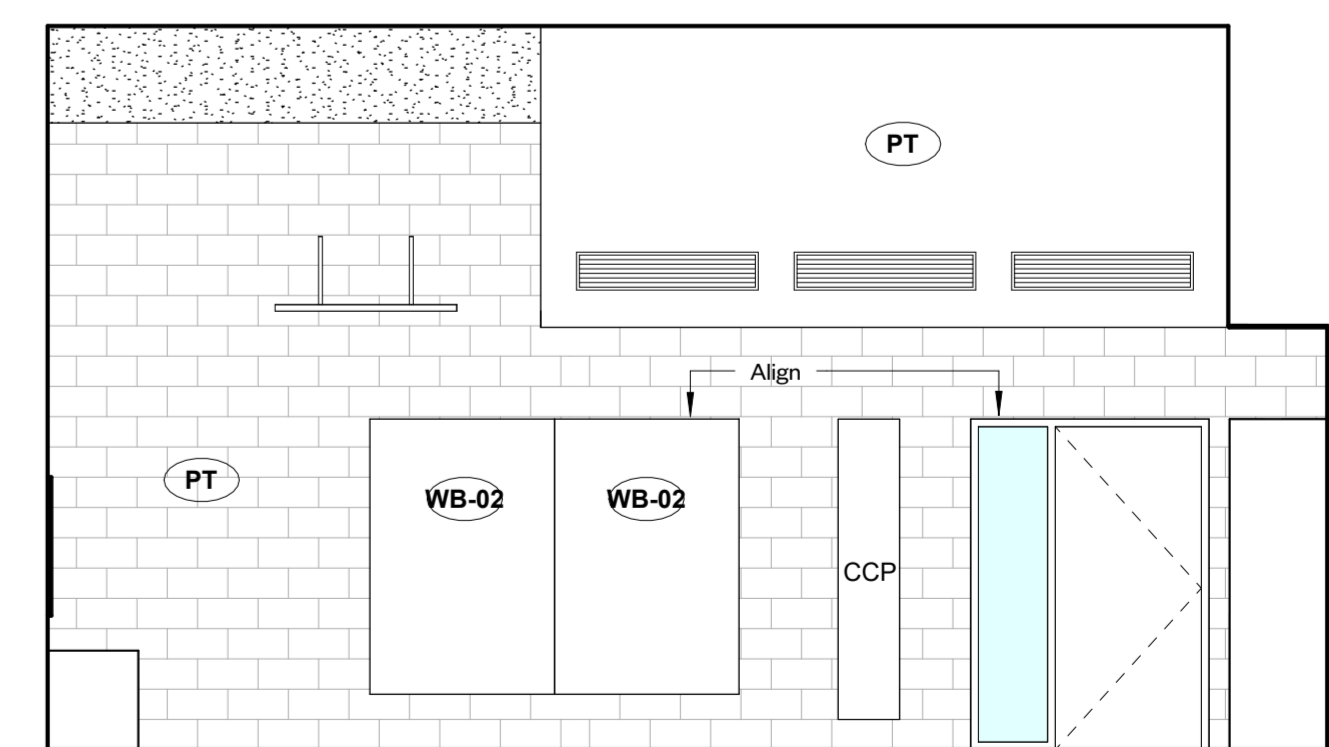
9 Interior Elevation - Preschool Room 142 North
1 : 50



10 Interior Elevation - Preschool Room 142 East
1 : 50



11 Interior Elevation - Preschool Room 142 South
1 : 50



12 Interior Elevation - Preschool Room 142 West
1 : 50

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Rev	Description	Date
7	Issued for 80% Review	30 Nov 2022
9	Issued for 80% Cost Estimate and Review	23 Dec 2022
15	Issued for 90% Client Review	22 Dec 2023
16	Issued for Permit	26 Jul 2024
18	Issued for Tender	10 Oct 2024

Materials Legend

ACT	Acoustic Ceiling Tile
ALUM	Aluminum
BRK	Brick
CER	Ceramic Tile
CMU	Concrete/Masonry Unit
EXIST	Existing
EXP	Exposed
FGL	Fire-Rated Glass
GF	Glazing Fim
GLB	Glazed CMU
GWB	Gypsum Wallboard
PLY	Fire Rated Plywood
POR	Porcelain Tile
PLAM	Plastic Laminate
PT	Paint Finish
RB	Rubber Base
RES	Resilient Sheet Flooring
SCON	Sealed Concrete
SS	Stainless Steel
TGL	Tempered Glass
WD	Solid Wood
WV	Wood Veneer

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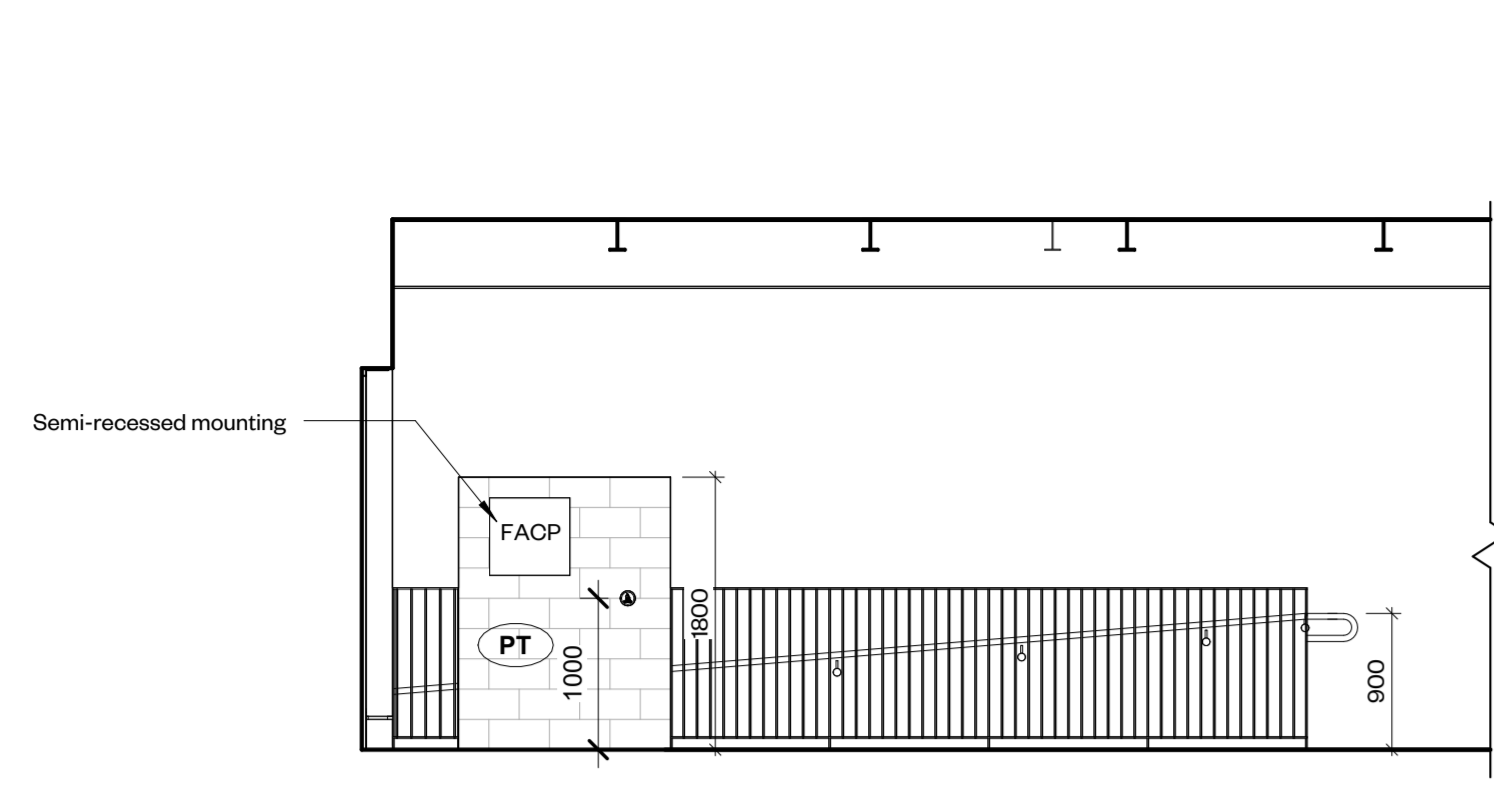
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416.981.8855
info@workshopto.ca
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CSV L'Harmonie Daycare Addition

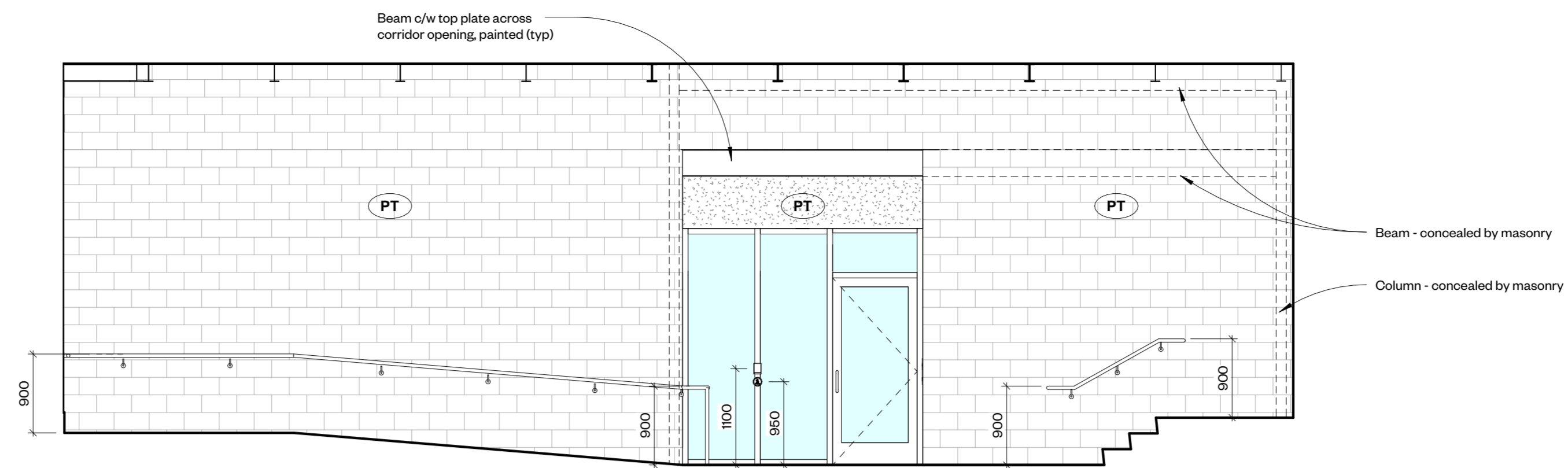
158 Bridgeport Road East
Waterloo

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2207	As indicated
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10 October 2024	Issued for Tender

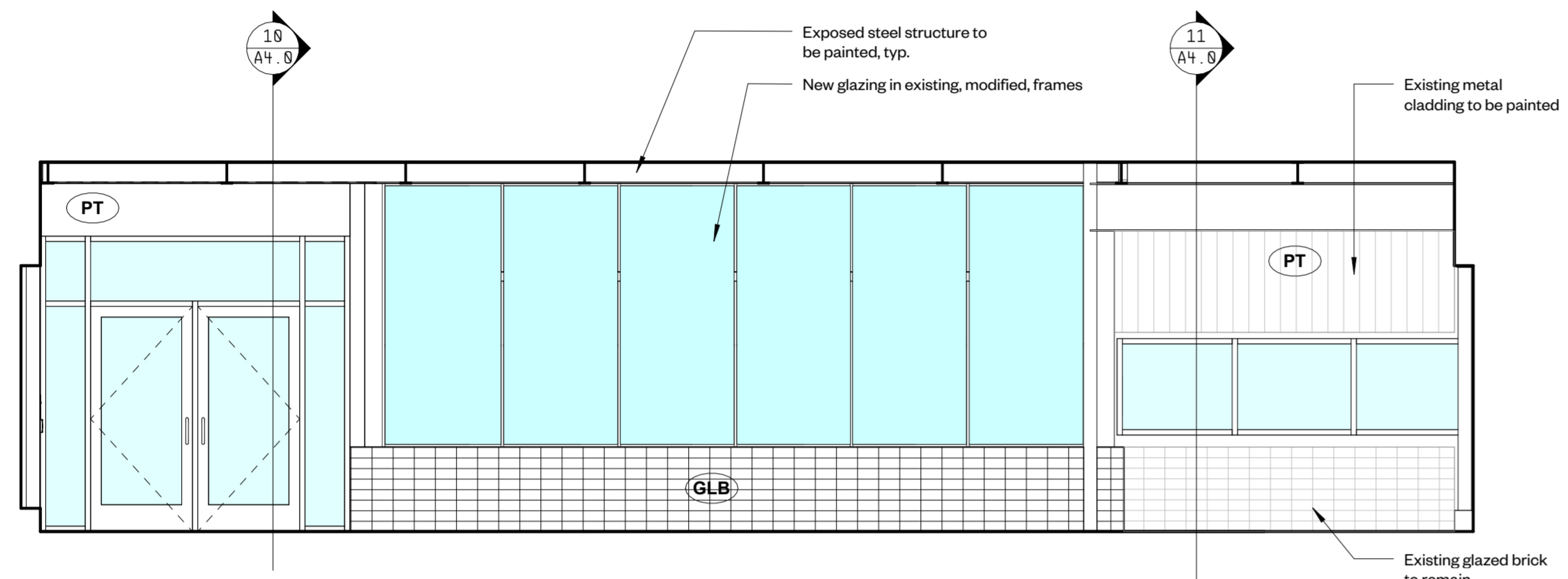
Interior Elevations - Classrooms



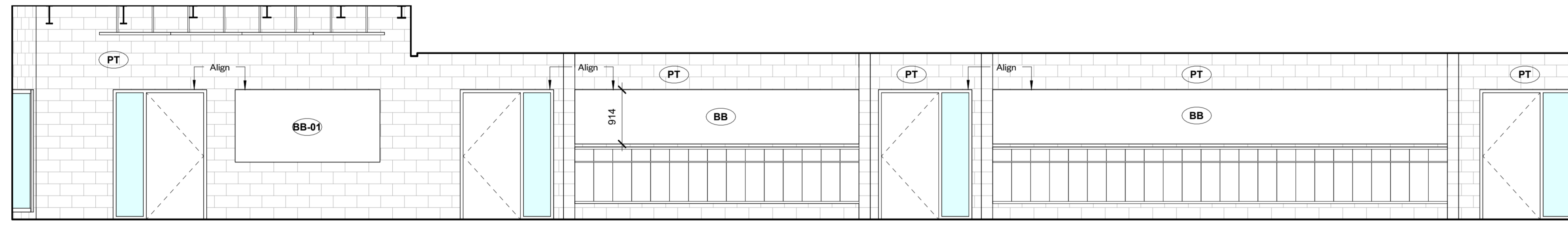
1 Interior Elevation - Shared Vestibule looking South from Upper Landing
1 : 50



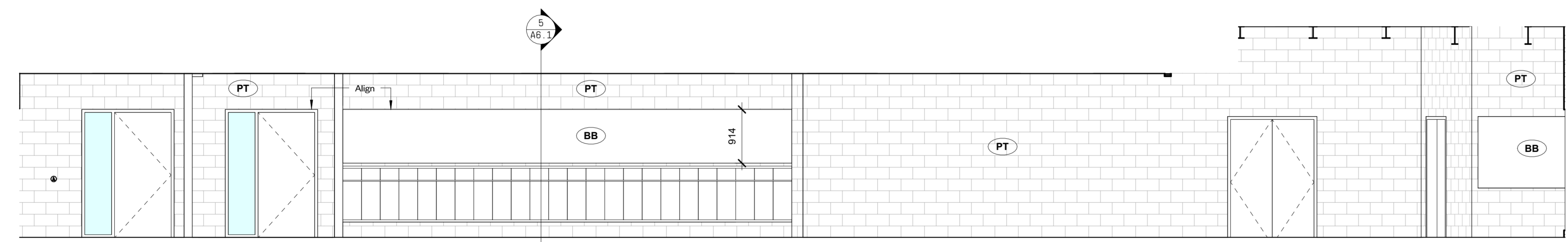
2 Interior Elevation - Shared Vestibule Looking South
1 : 50



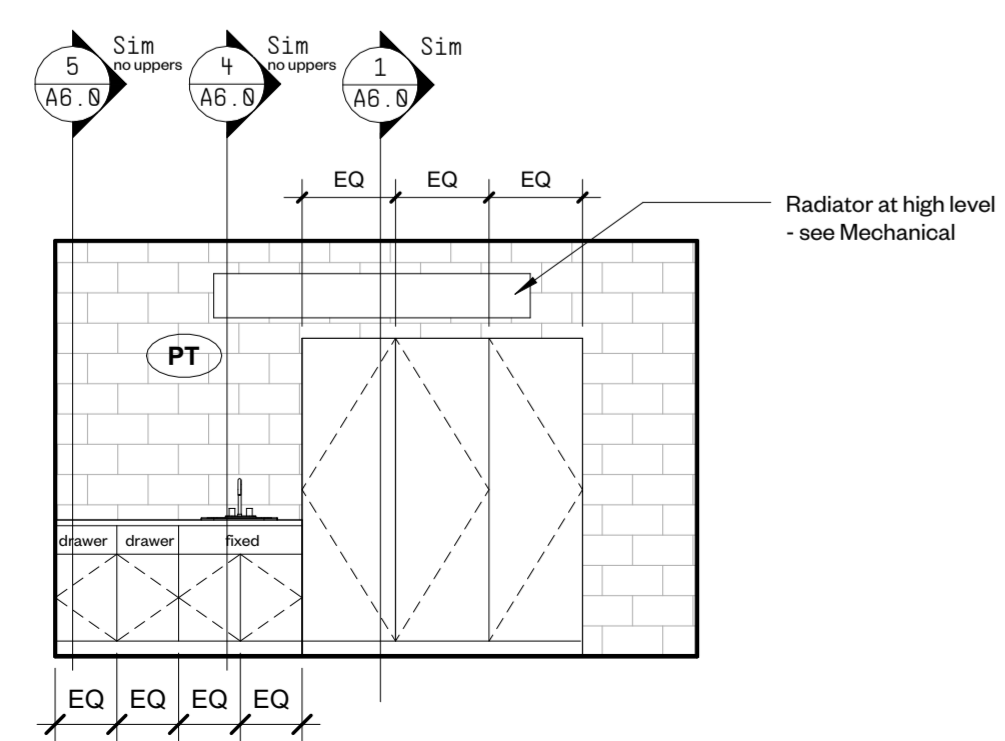
3 Interior Elevation - Shared Vestibule North
1 : 50



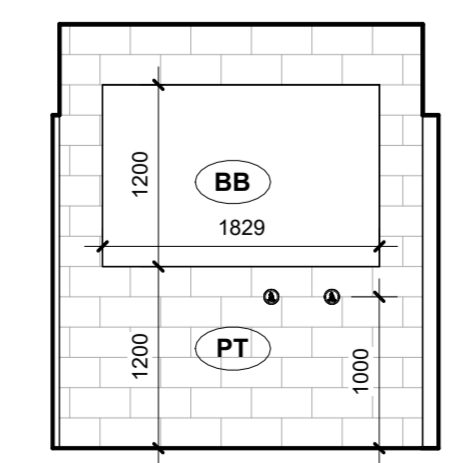
4 Interior Elevation - Corridor 136 East
1 : 50



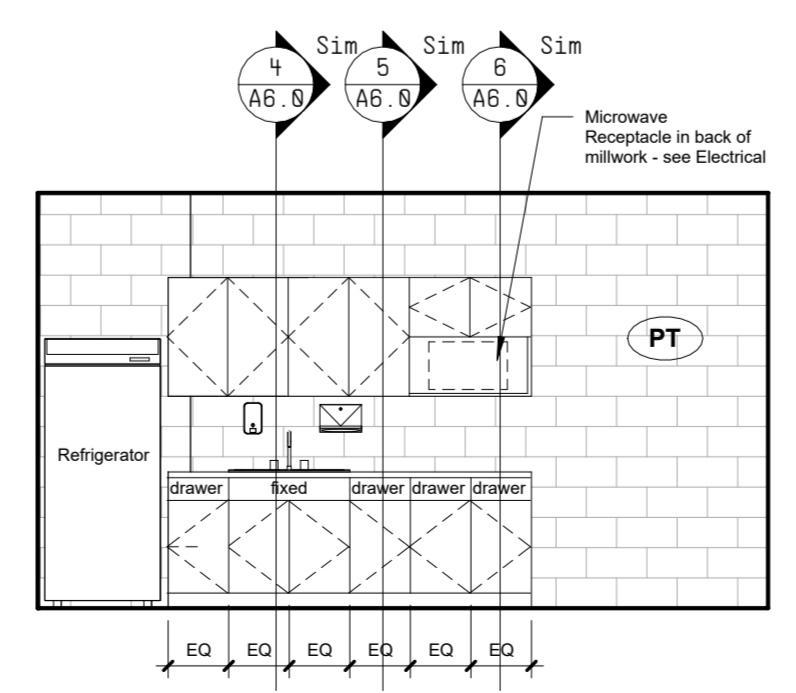
9 Interior Elevation - Corridor 136 West
1 : 50



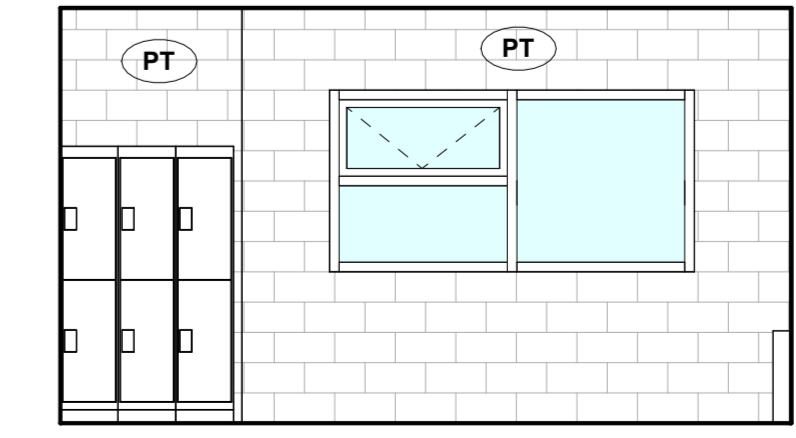
5 Interior Elevation - Laundry/ Storage 152 West
1 : 50



6 Interior Elevation - Vestibule 144 East
1 : 50



7 Interior Elevation - Staff Room 150 North
1 : 50



8 Interior Elevation - Staff Room 150 South
1 : 50

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Rev	Description	Date
16	Issued for Permit	26 Jul 2024
18	Issued for Tender	10 Oct 2024

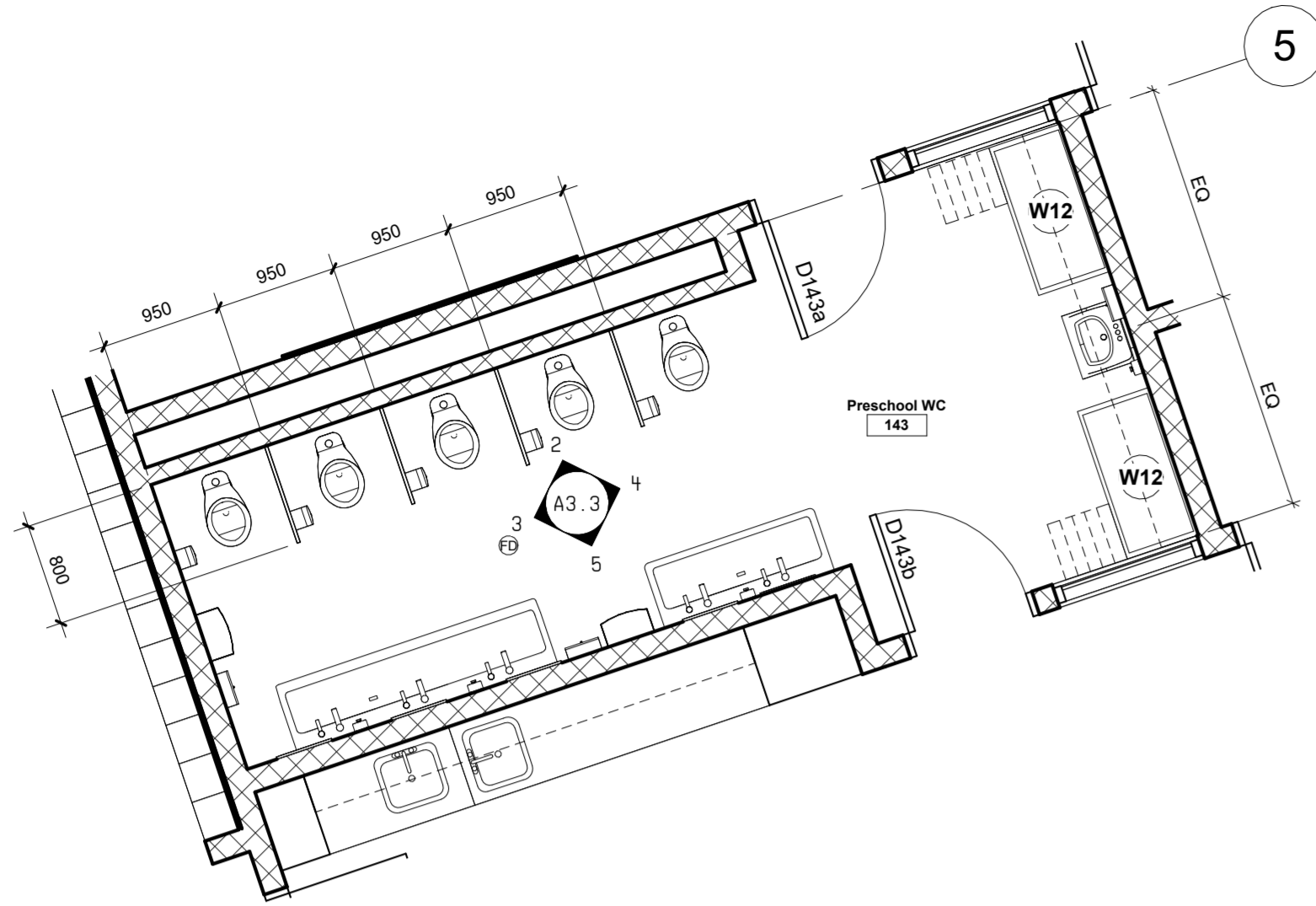
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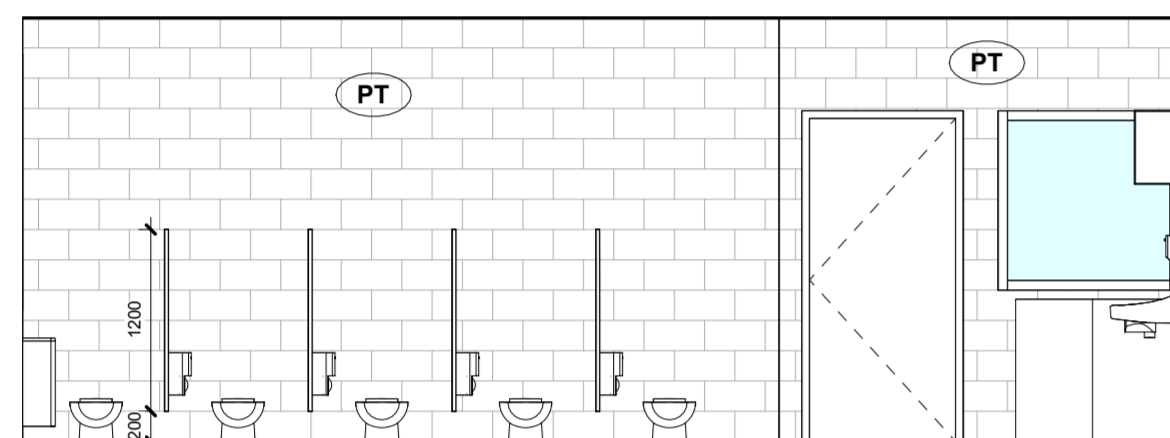
CSV L'Harmonie Daycare Addition
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2207	1:50
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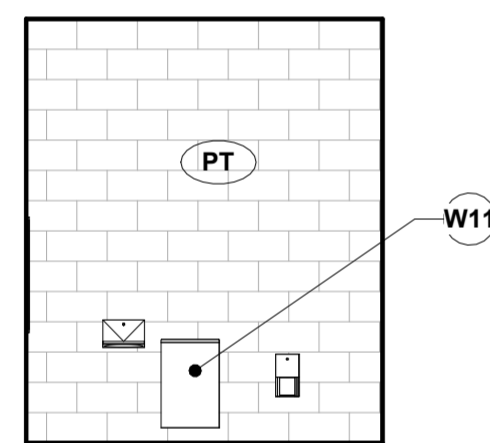
Interior Elevations - Corridors & Ancillary Rooms



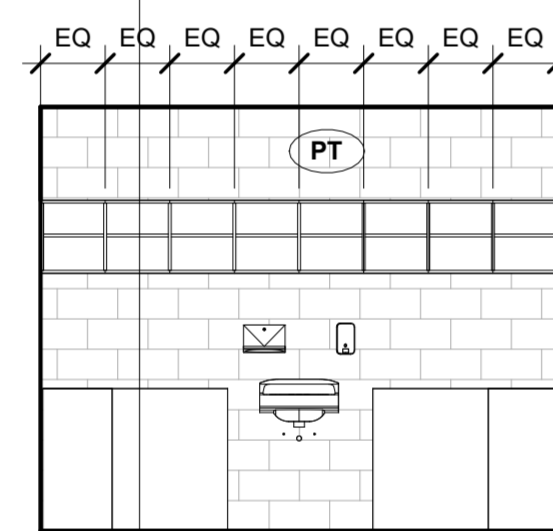
1 Detail Plan - Preschool WC 143
1 : 50



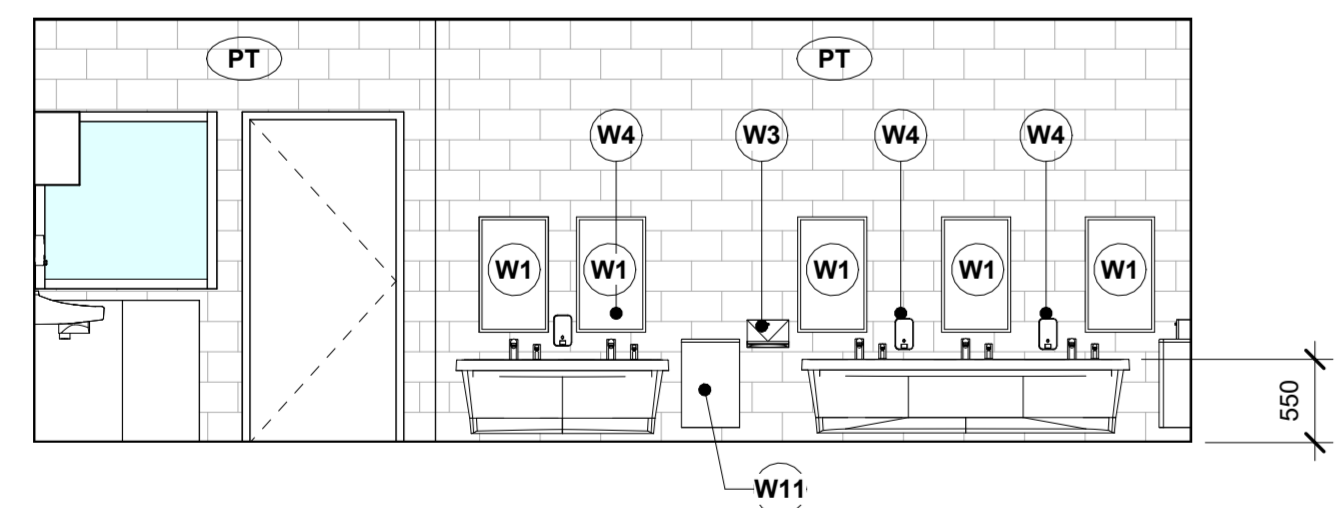
2 Elevation - Preschool WC 143 North
1 : 50



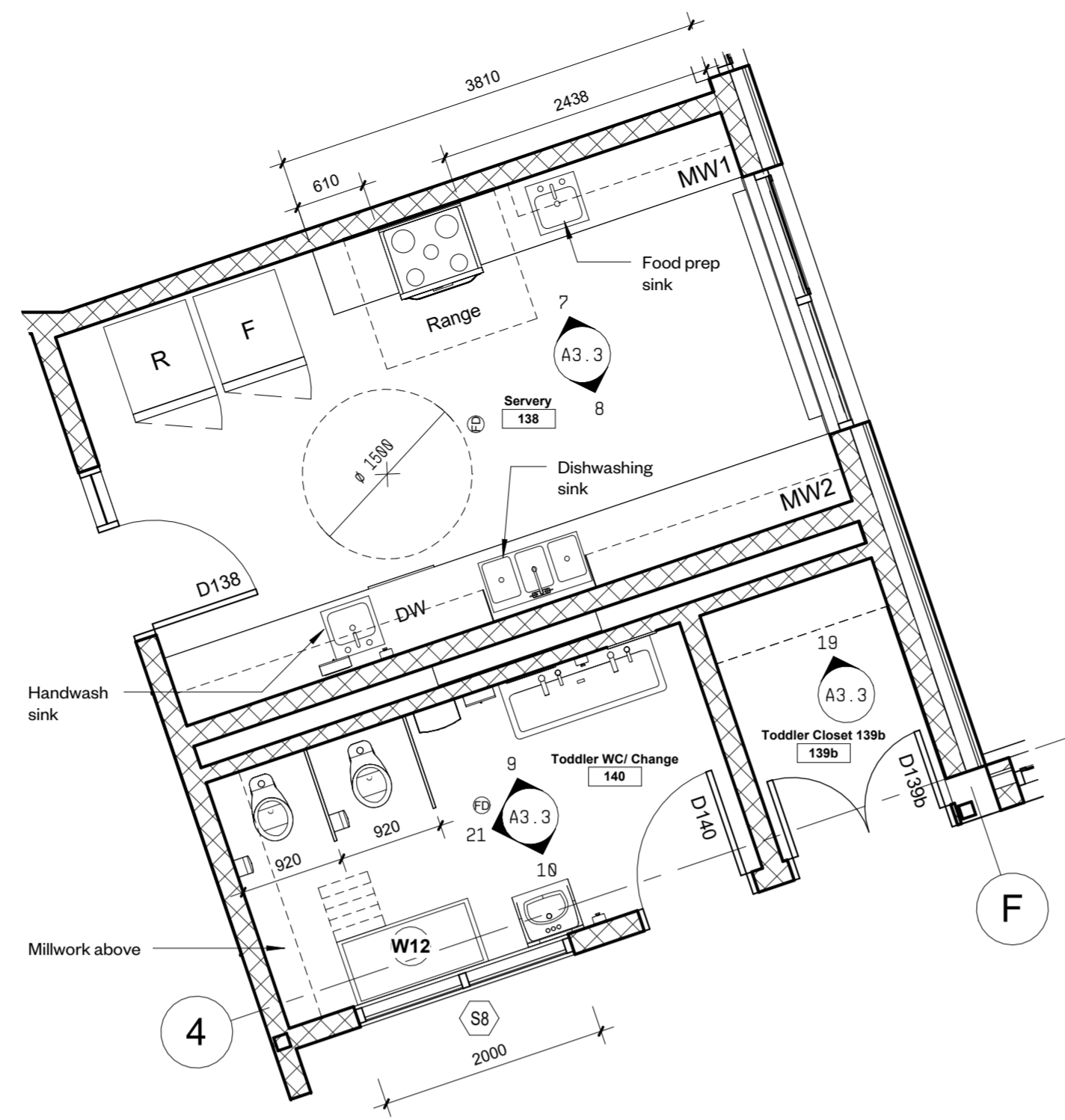
3 Elevation - Preschool WC 143 West
1 : 50



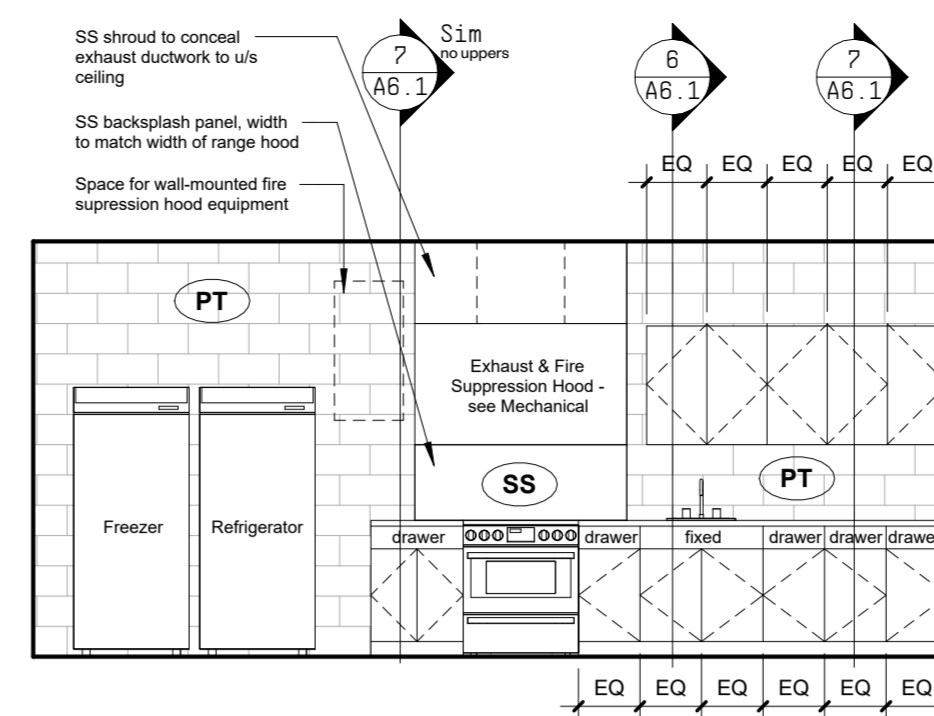
4 Elevation - Preschool WC 143 East
1 : 50



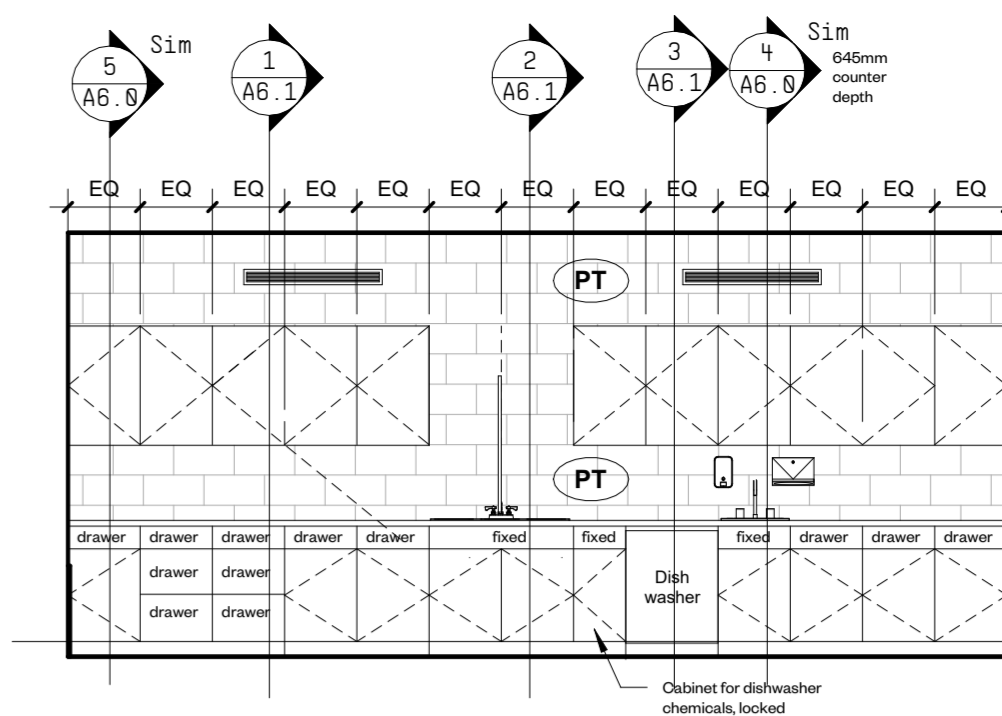
5 Elevation - Preschool WC 143 South
1 : 50



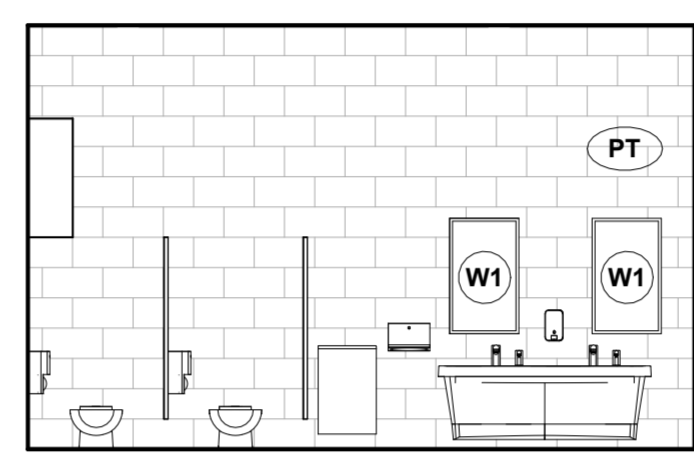
6 Detail Plan - Servery 138 and Toddler WC/Change 140
1 : 50



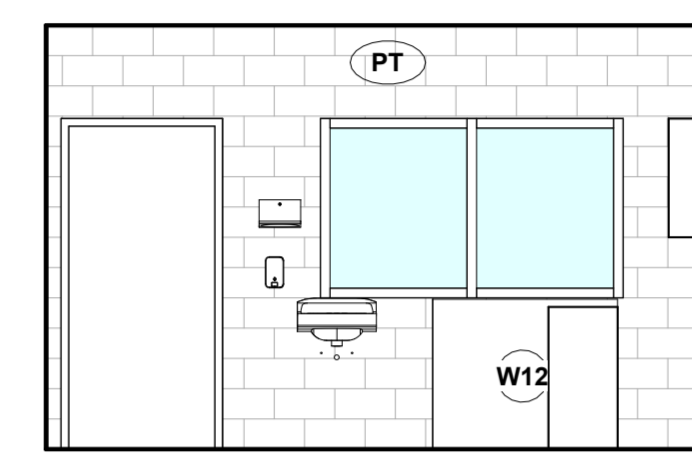
7 Elevation - Servery 138 North
1 : 50



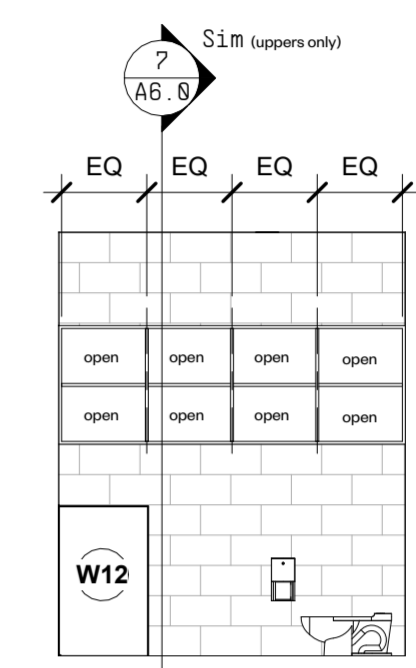
8 Elevation - Servery 138 South
1 : 50



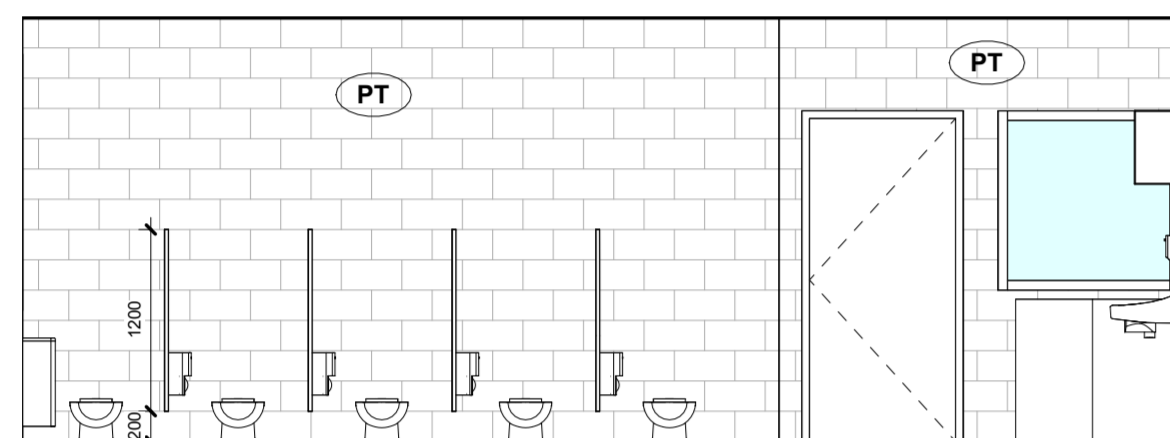
9 Elevation - Toddler WC 140 North
1 : 50



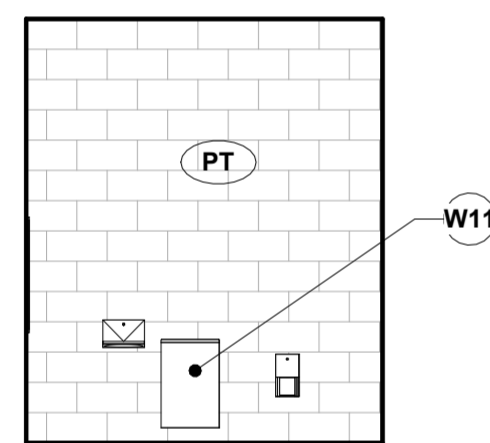
10 Elevation - Toddler WC 140 South
1 : 50



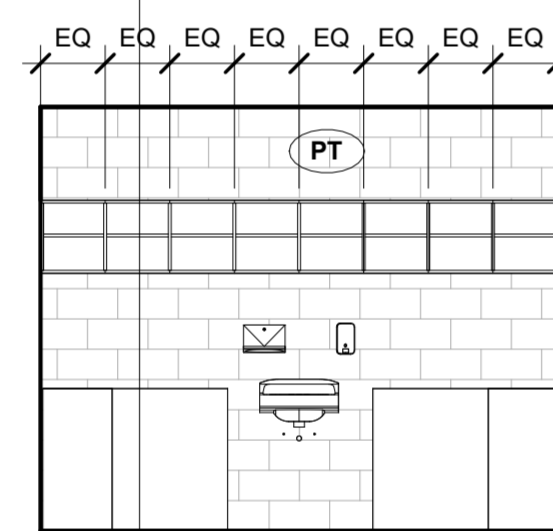
11 Elevation - Toddler WC 140 West
1 : 50



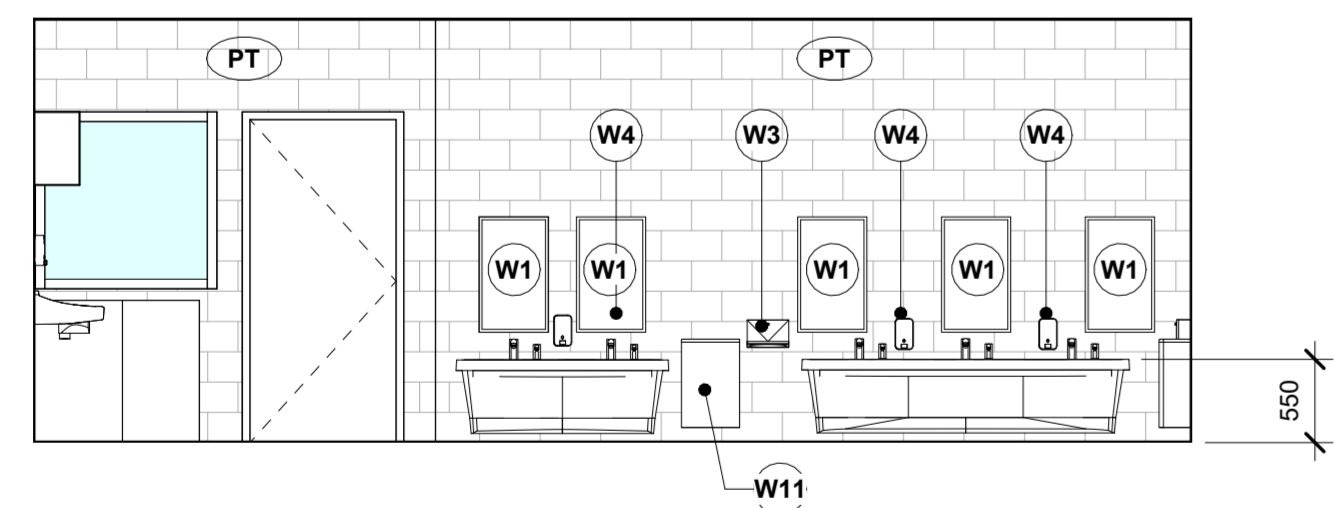
2 Elevation - Preschool WC 143 North
1 : 50



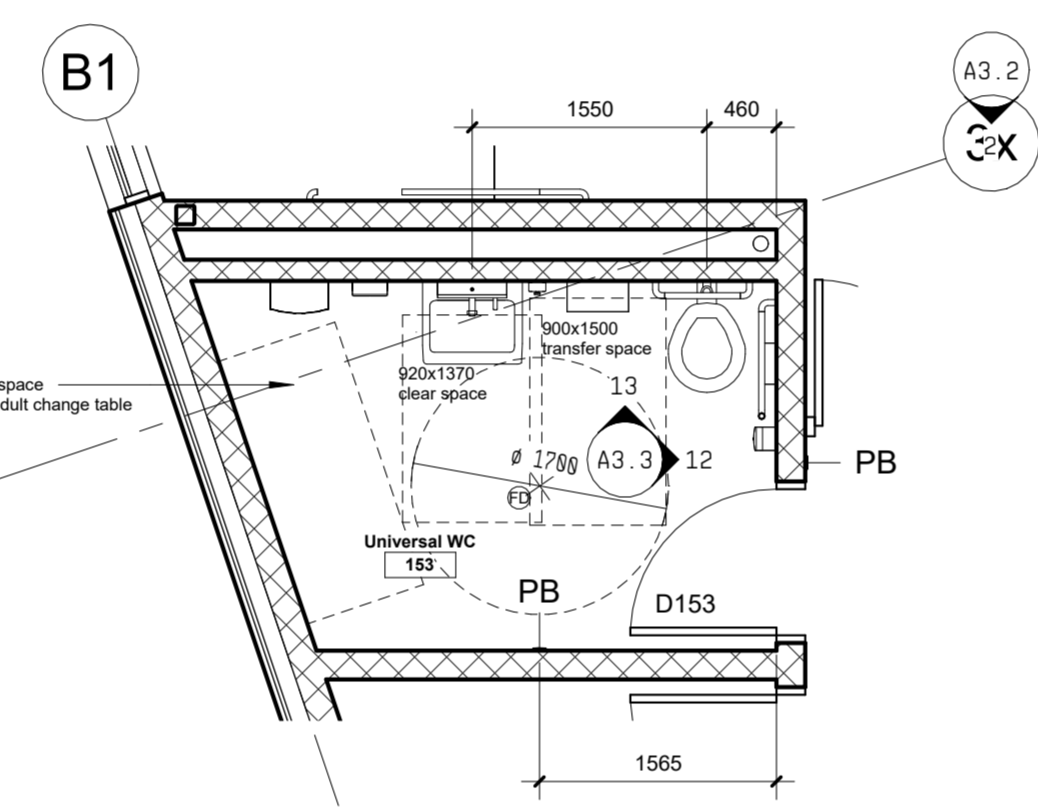
3 Elevation - Preschool WC 143 West
1 : 50



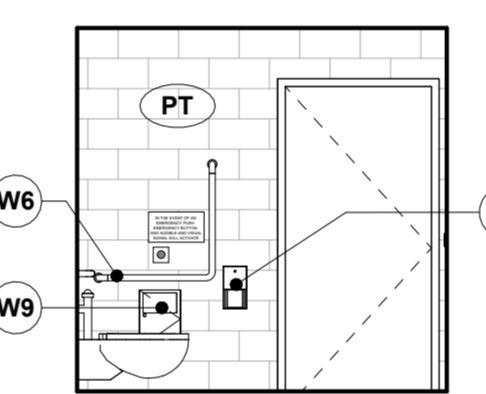
4 Elevation - Preschool WC 143 East
1 : 50



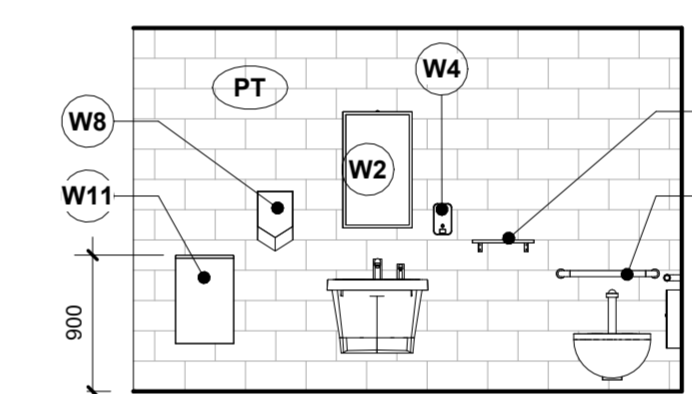
5 Elevation - Preschool WC 143 South
1 : 50



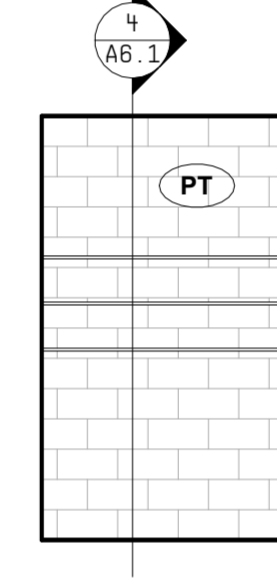
11 Detail Plan - Universal WC
1 : 50



12 Elevation - WC 153 East
1 : 50



13 Elevation - WC 153 North
1 : 50



19 Typical Closet Shelves
1 : 50

Materials Legend

ACT	Acoustic Ceiling Tile
ALUM	Aluminum
BRK	Brick
CER	Ceramic Tile
CMU	Concrete Masonry Unit
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FGL	Fire-Rated Glass
GF	Glazing Film
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GWB	Gypsum Wallboard
PLY	Fire Rated Plywood
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PLAM	Plastic Laminate
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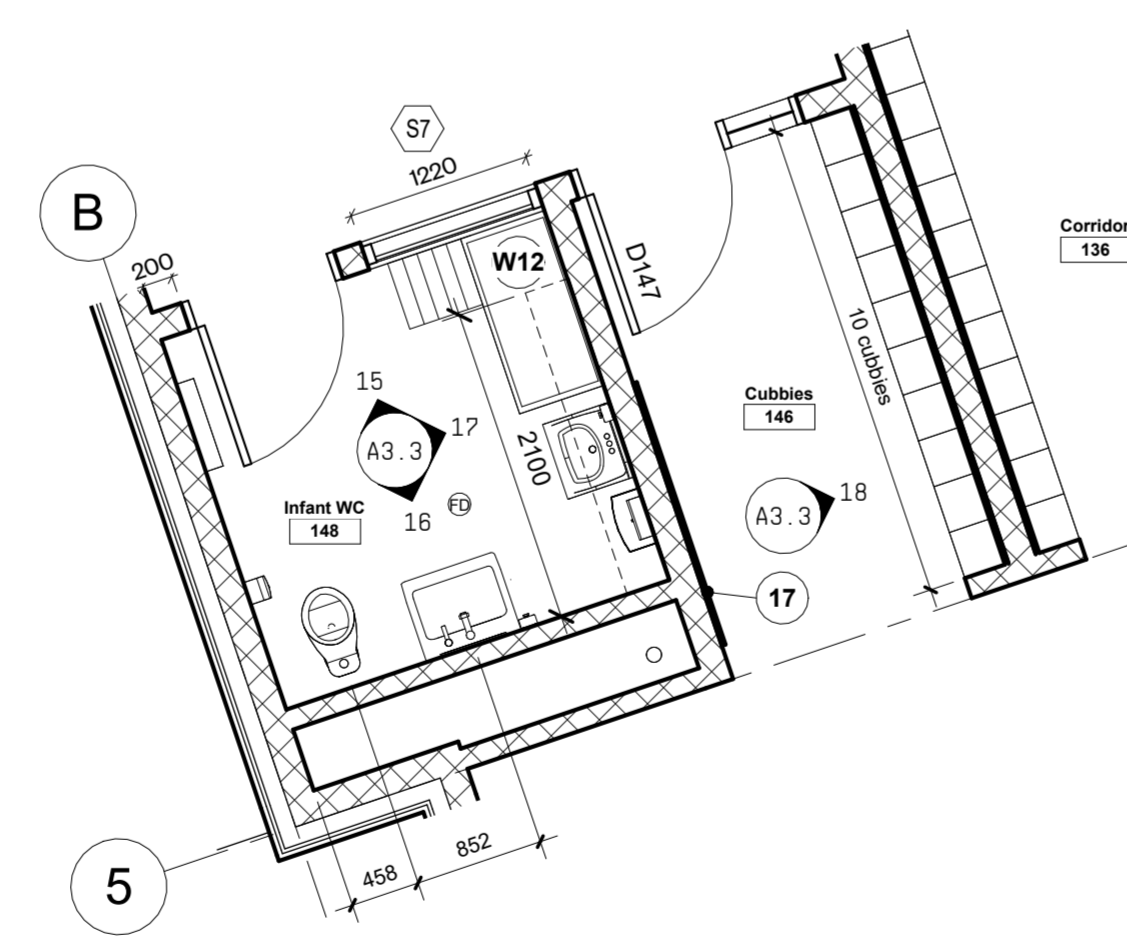
Rev	Description	Date
7	Issued for 80% Review	30 Nov 2022
9	Issued for 80% Cost Estimate and Review	23 Dec 2022
15	Issued for 90% Client Review	22 Dec 2023
16	Issued for Permit	26 Jul 2024
17	Permit Response	07 Oct 2024
18	Issued for Tender	10 Oct 2024

Legend

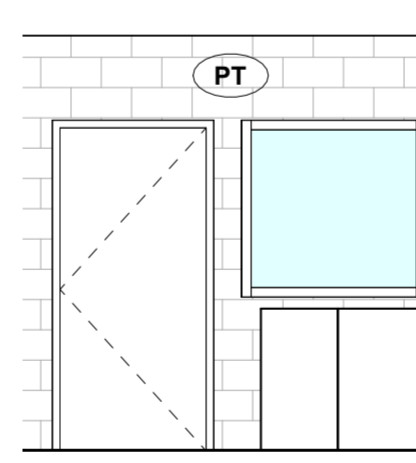
- Existing partition to remain
- New partition as scheduled

Symbols Legend

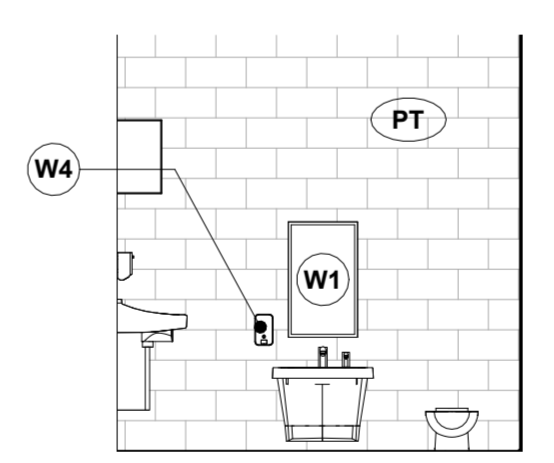
- Partition Tag - refer to partition schedule
- Exterior Wall Tag - refer to partition schedule
- New Door tag - refer to schedule
- Exit
- CCP Classroom Control Panel - see Electrical
- FACP Fire Alarm Annunciator Panel - see Electrical
- PB Actuator for Auto Door Operator - see also Electrical



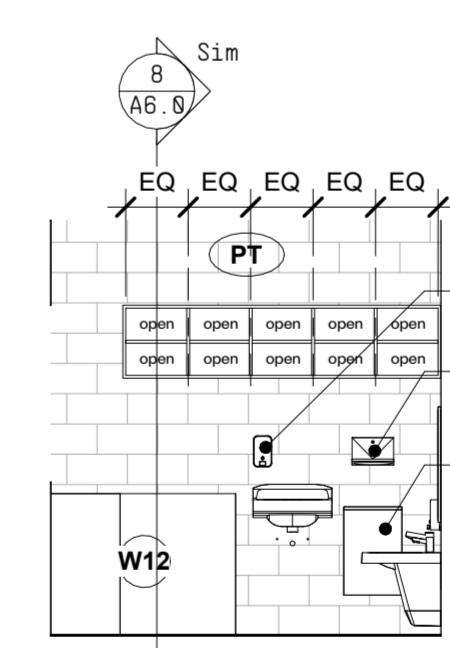
14 Detail Plan - Cubbies 146 and Infant WC
1 : 50



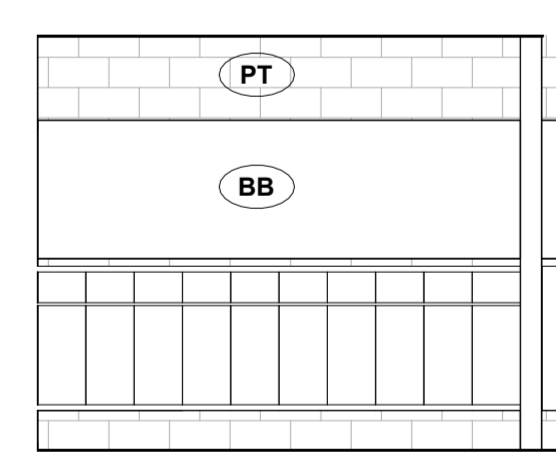
15 Elevation - Infant WC 148 North
1 : 50



16 Elevation - Infant WC 148 South
1 : 50



17 Elevation - Infant WC 148 East
1 : 50



18 Elevation - Cubbies 146 East
1 : 50

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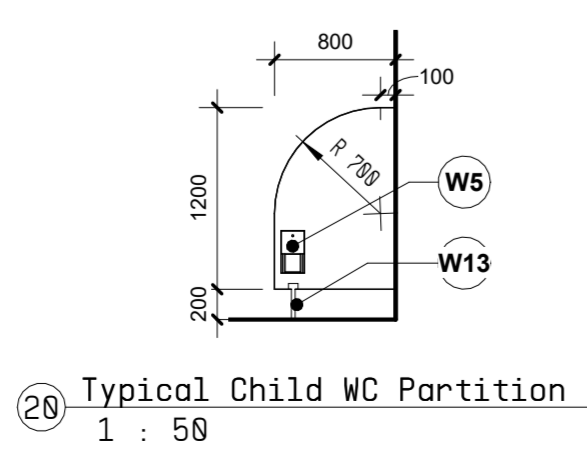
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CSV L'Harmonie Daycare Addition
158 Bridgeport Road East
Waterloo

PROJECT CODE: 2207
SCALE: As indicated
DATE: 10 October 2024
STATUS: Issued for Tender

Washroom Accessories

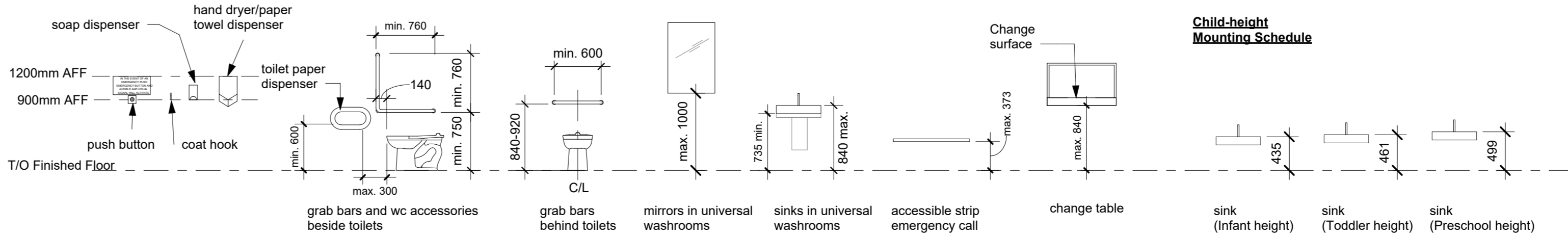
Note	Description
W1	Mirror
W2	Mirror, tilted
W3	Paper towel dispenser
W4	Soap dispenser
W5	Toilet paper dispenser
W6	L-shaped grab bar
W7	Horizontal grab bar
W8	Hand dryer
W9	Sanitary napkin disposal
W10	Shelf
W11	Wall-mounted waste disposal
W12	Prefabricated change table with integrated stairs
W13	SS Floor Mounted Toilet Partition Pilaster Support (typ)



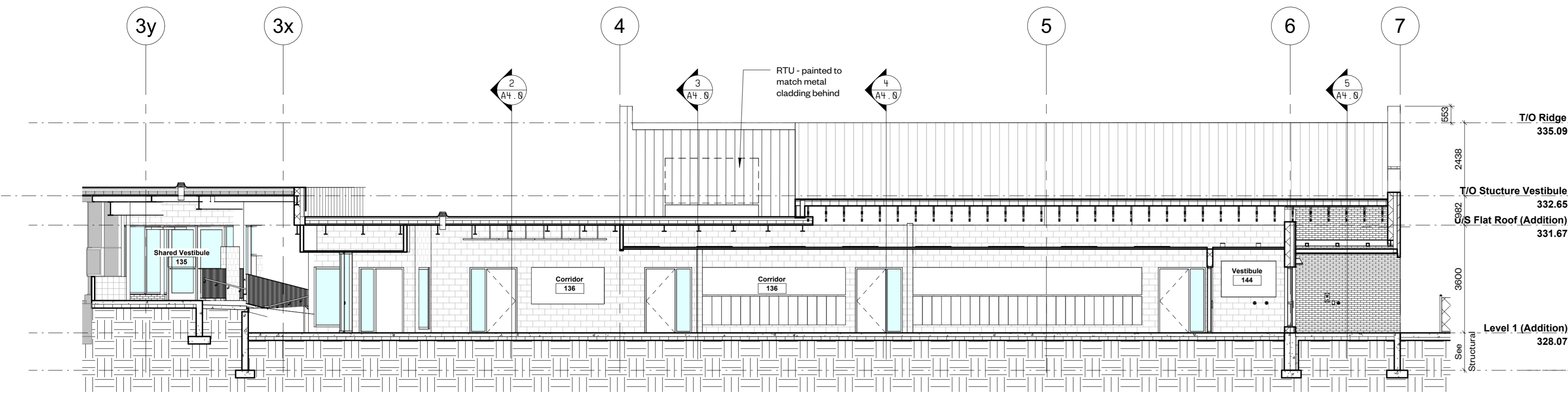
20 Typical Child WC Partition
1 : 50

Mounting Schedule

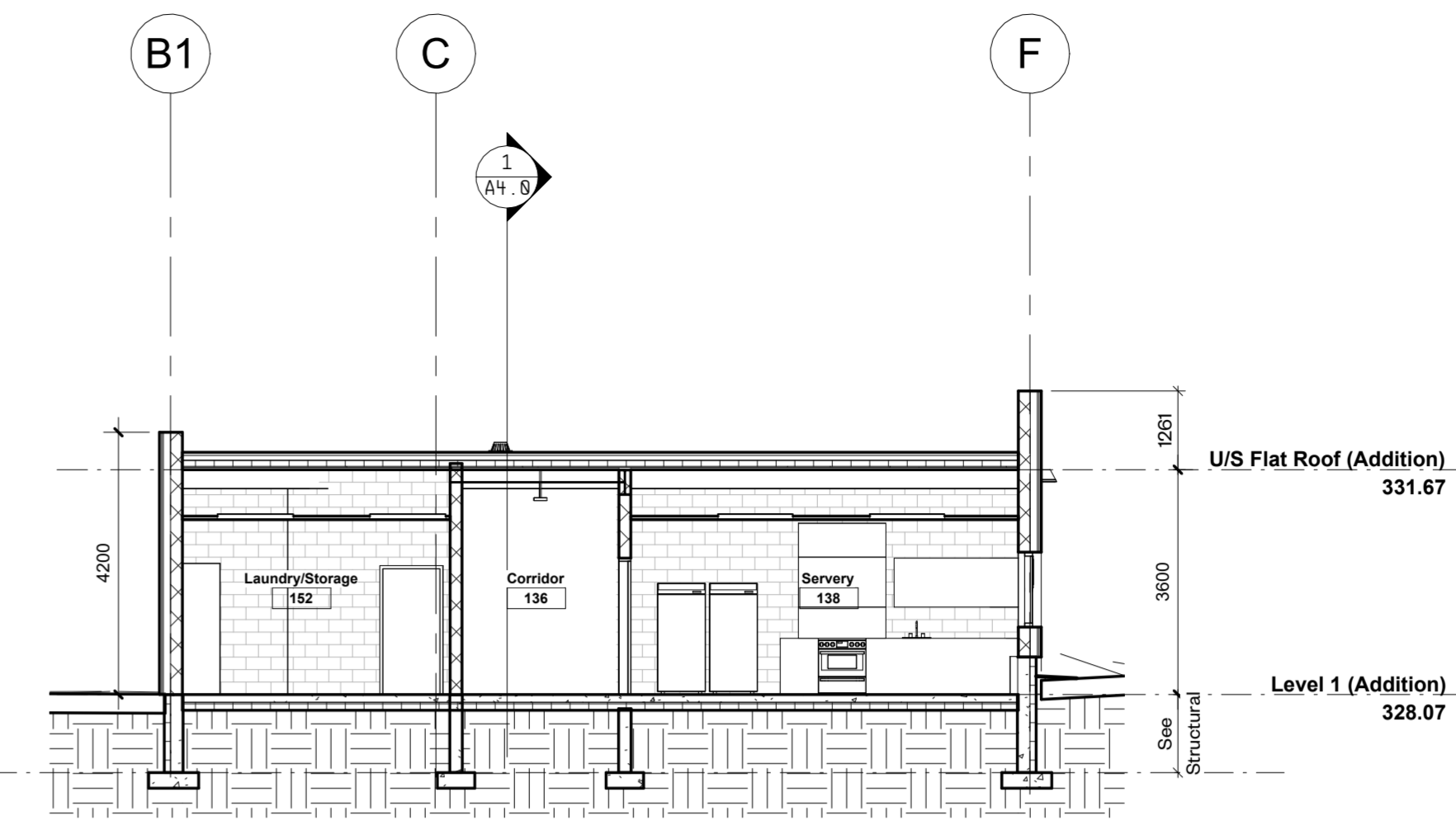
Notes:
1. All controls (power door operator, elevator call buttons, fire alarms, switches, emergency call button and fire extinguishers, coat hooks etc.) to be between 3' and 4' AFF.
2. Locations of all accessories and controls to be marked on site prior to installation for final sign off.



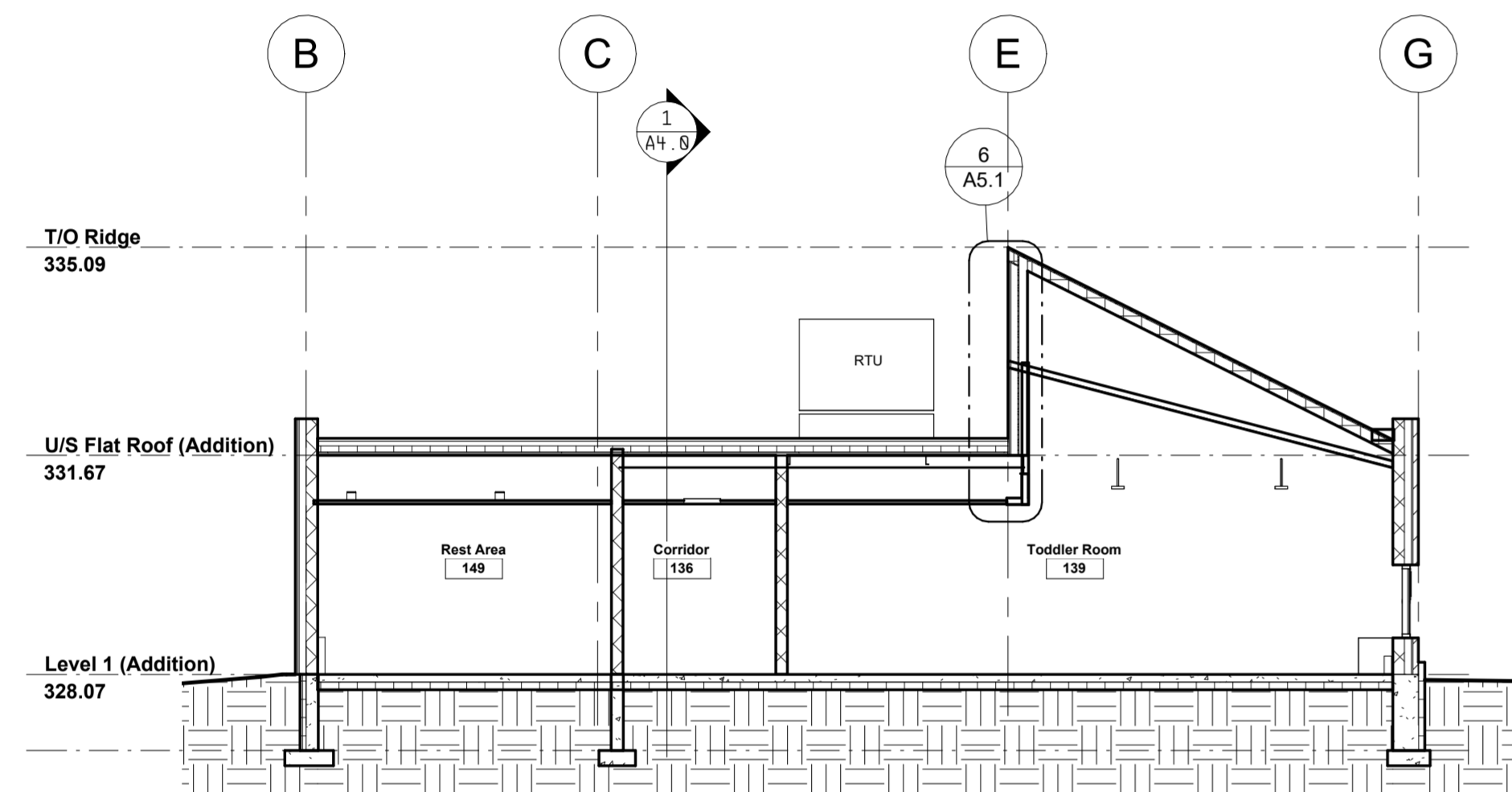
Detail Plans and Interior Elevations



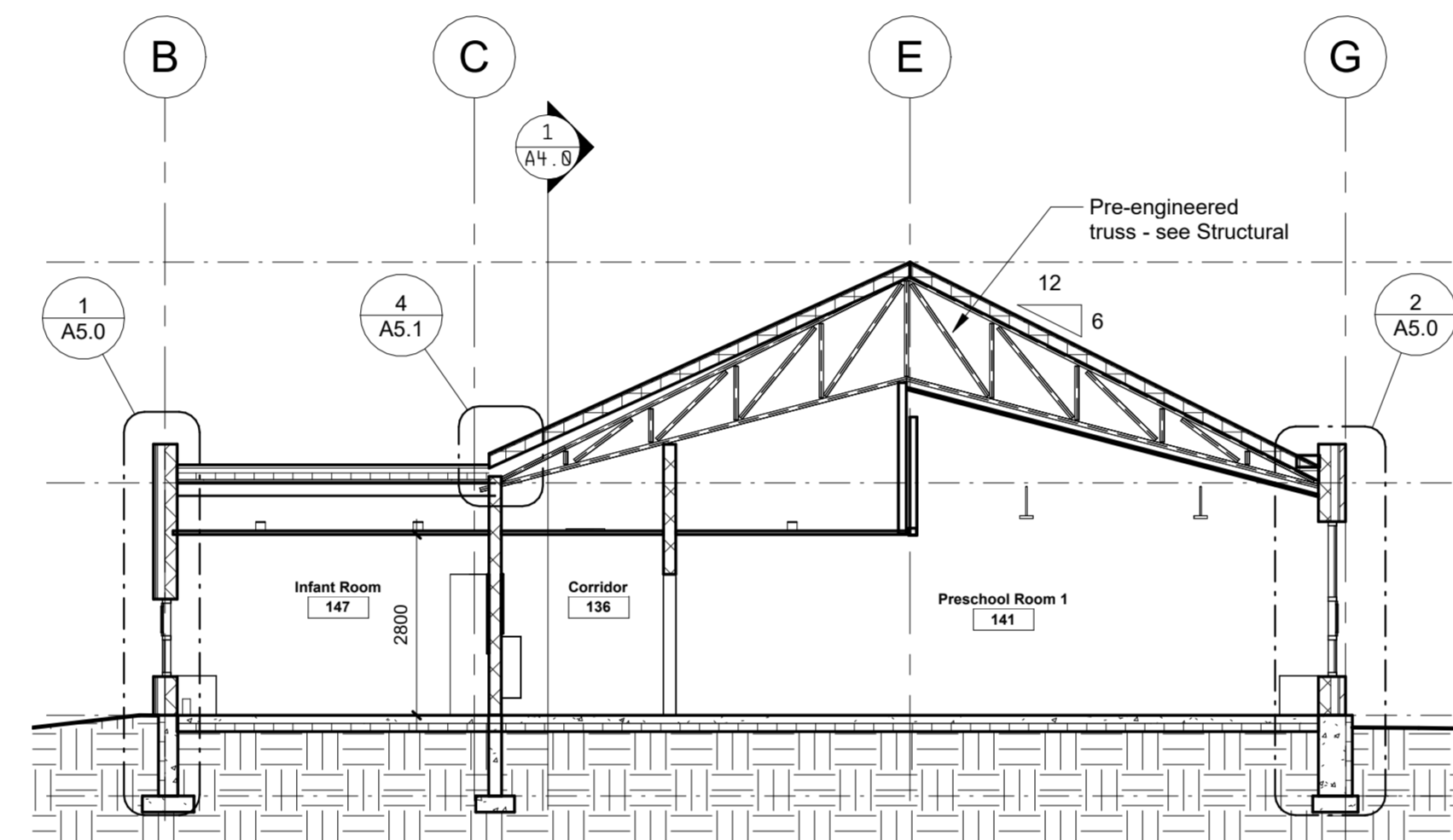
1 Section - Addition looking East
1 : 100



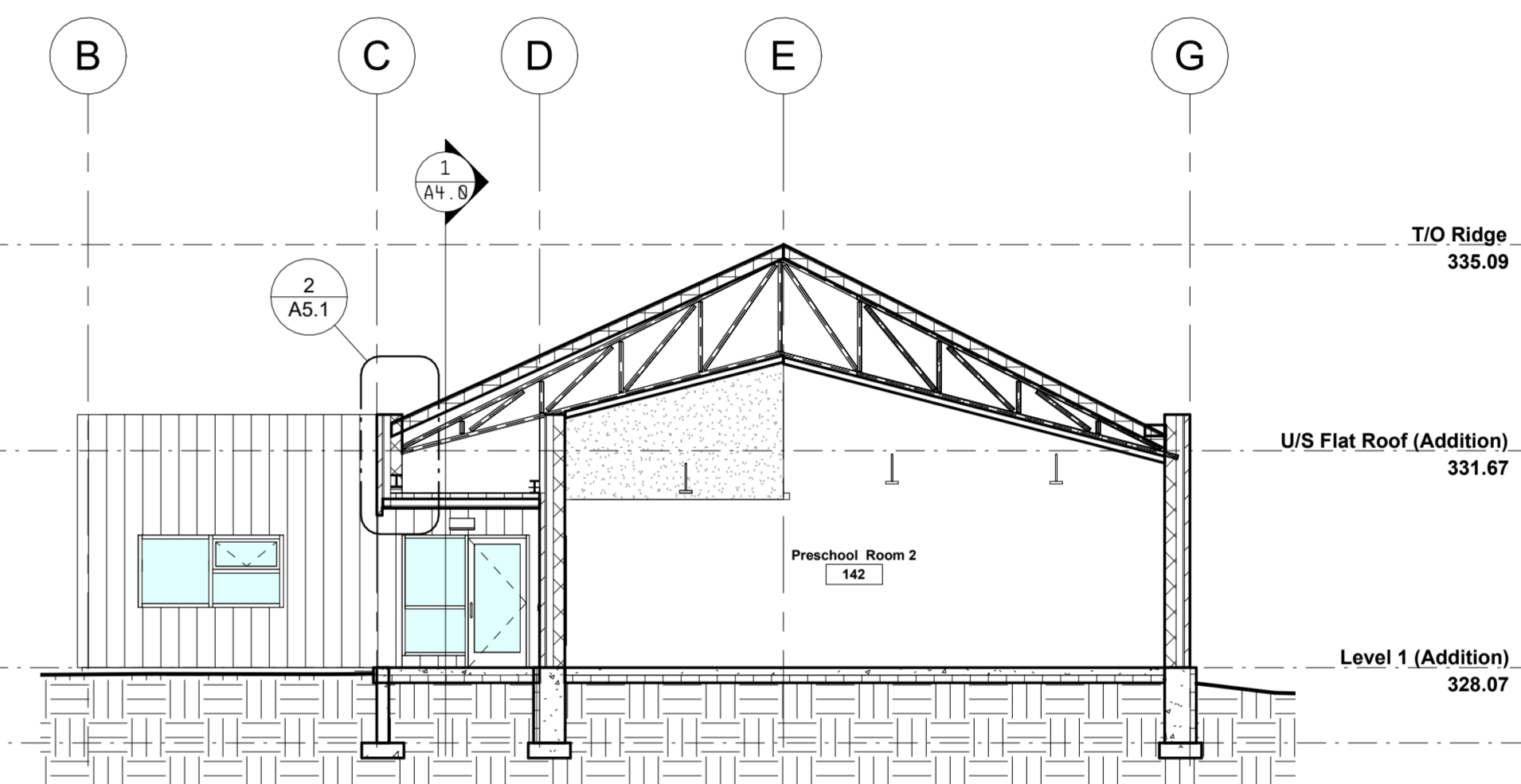
2 Section - Addition looking North @ Flat Roof
1 : 100



3 Section - Addition looking North @ RTU
1 : 100



4 Section - Addition looking North @ Sloped Roof
1 : 100

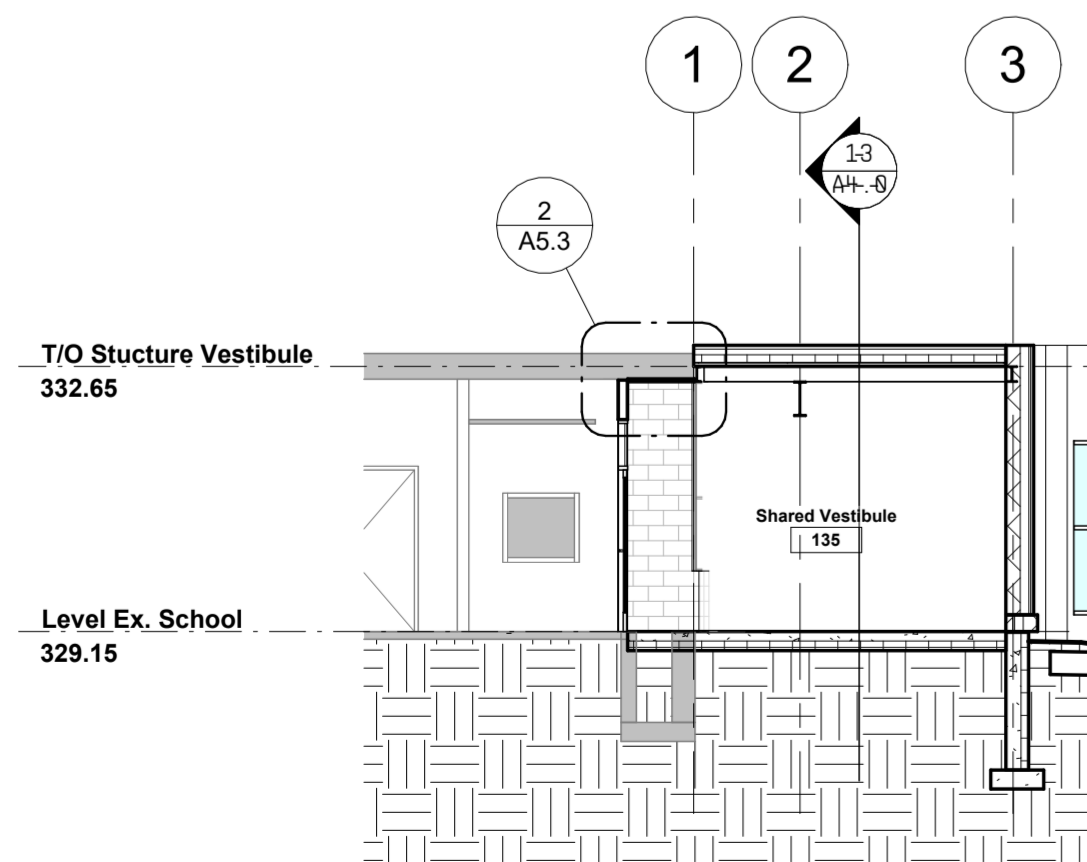


5 Section - Addition looking North1
1 : 100

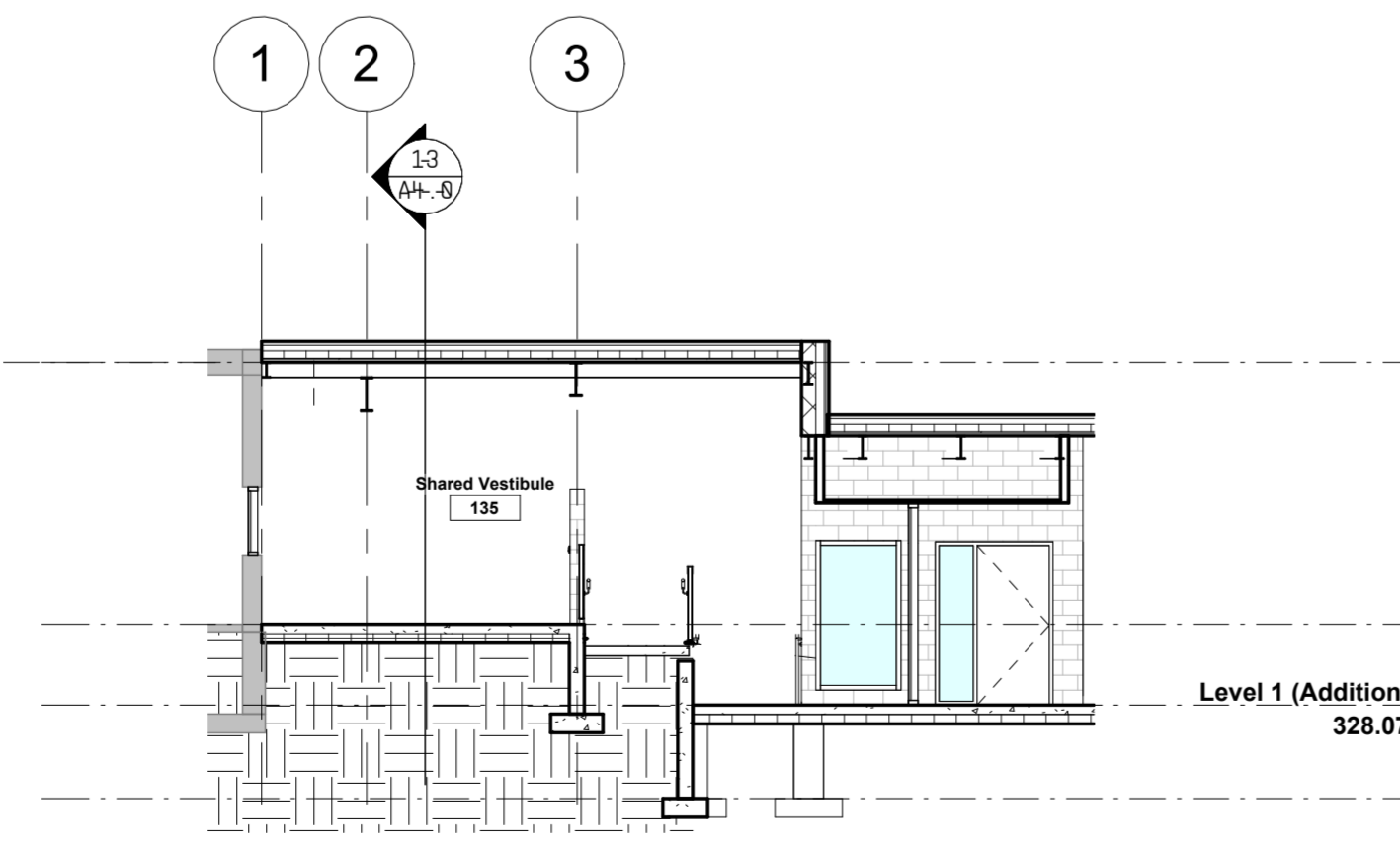
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Rev	Description	Date
5	Issued for Review	18 Oct 2022
6	Issued for Coordination	07 Nov 2022
7	Issued for 60% Review	30 Nov 2022
8	Issued for Coordination	16 Dec 2022
9	Issued for 80% Cost Estimate and Review	23 Dec 2022
15	Issued for 90% Client Review	22 Dec 2023
16	Issued for Permit	26 Jul 2024
17	Permit Response	07 Oct 2024
18	Issued for Tender	10 Oct 2024

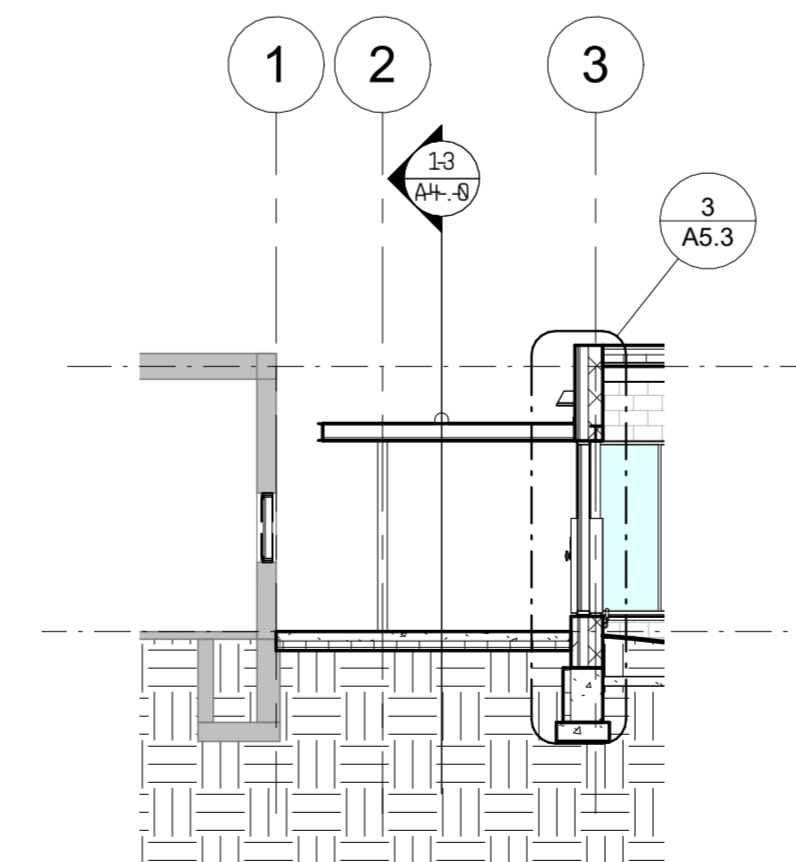
Sections thru Shared Entrance Lobby



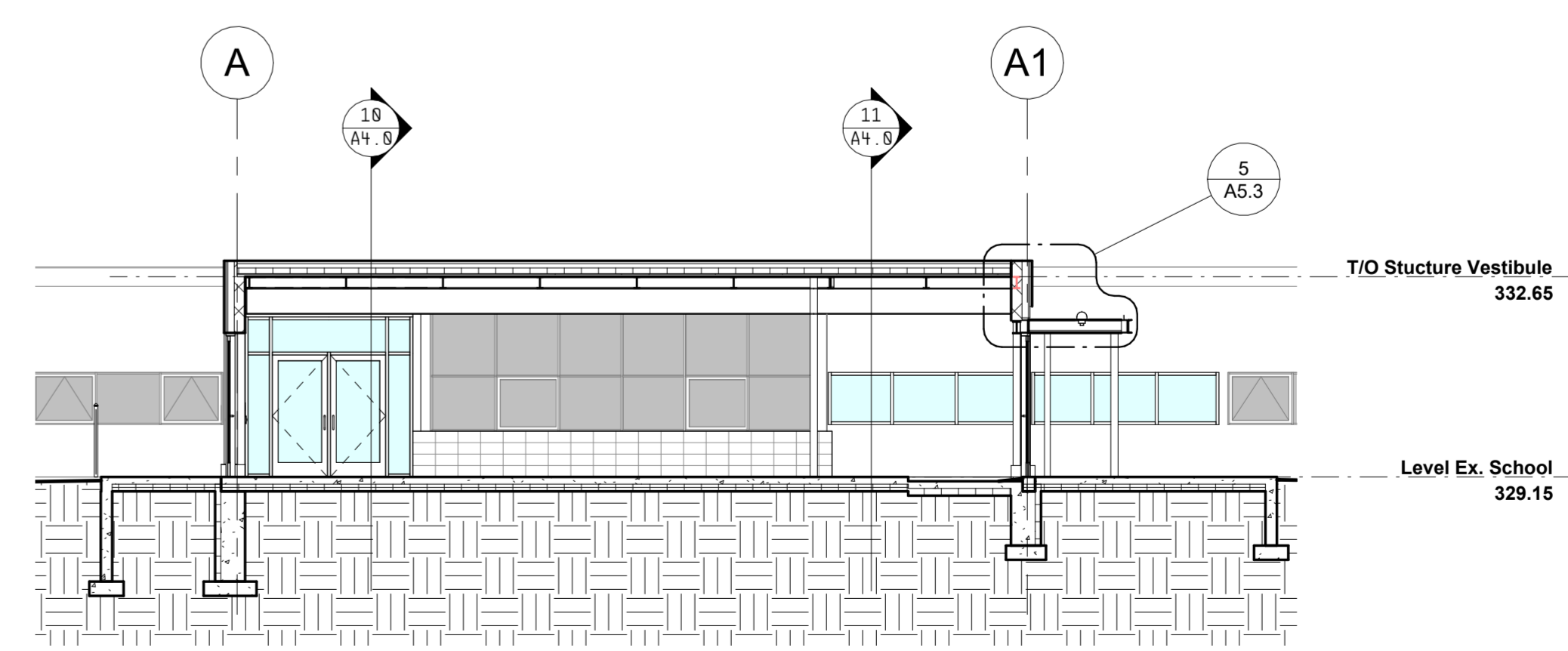
10 Section - Vestibule looking
1 : 100



11 Section - Vestibule looking East
1 : 100



12 Section - Canopy
1 : 100



13 Section - Vestibule looking North
1 : 100

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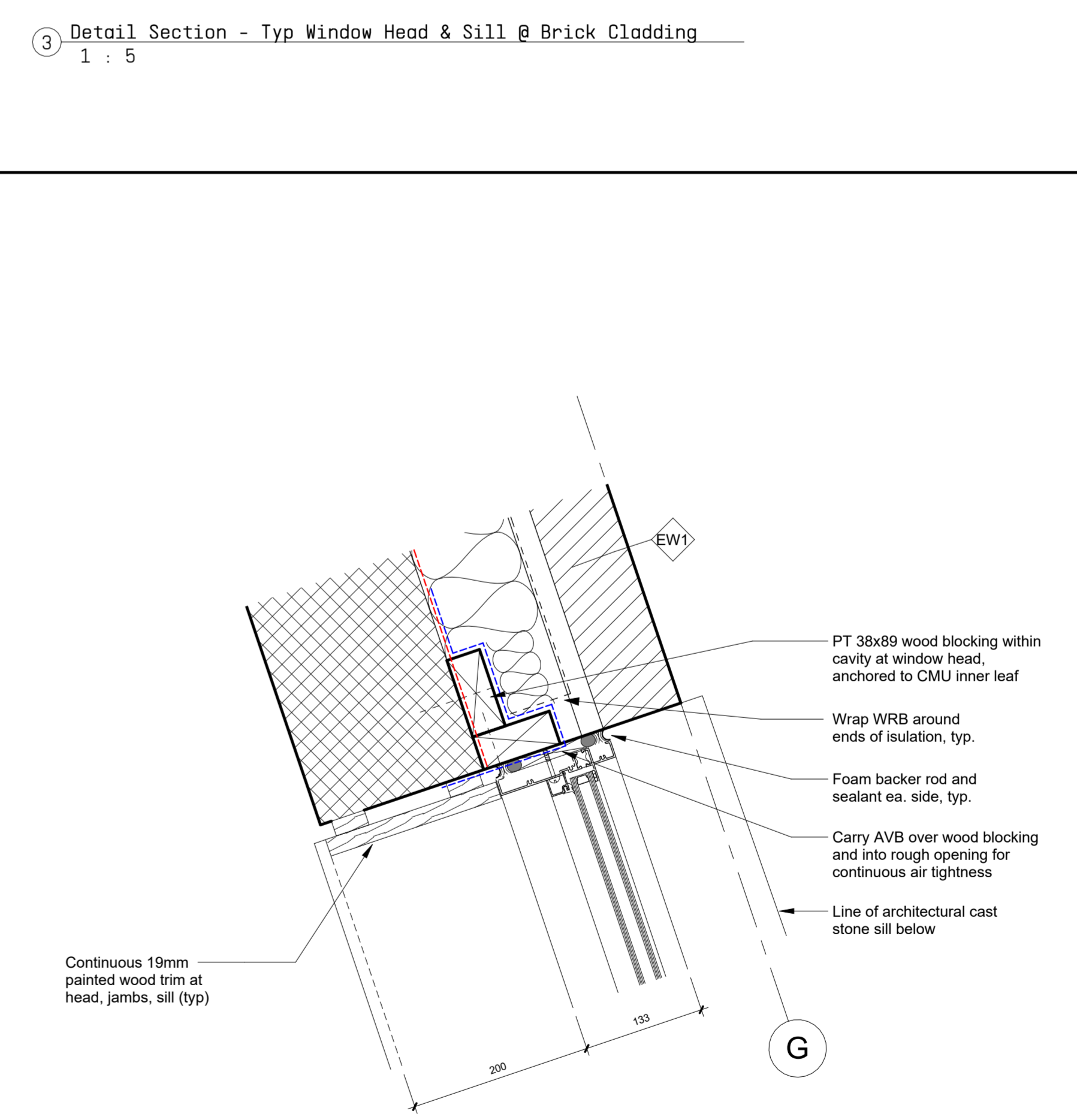
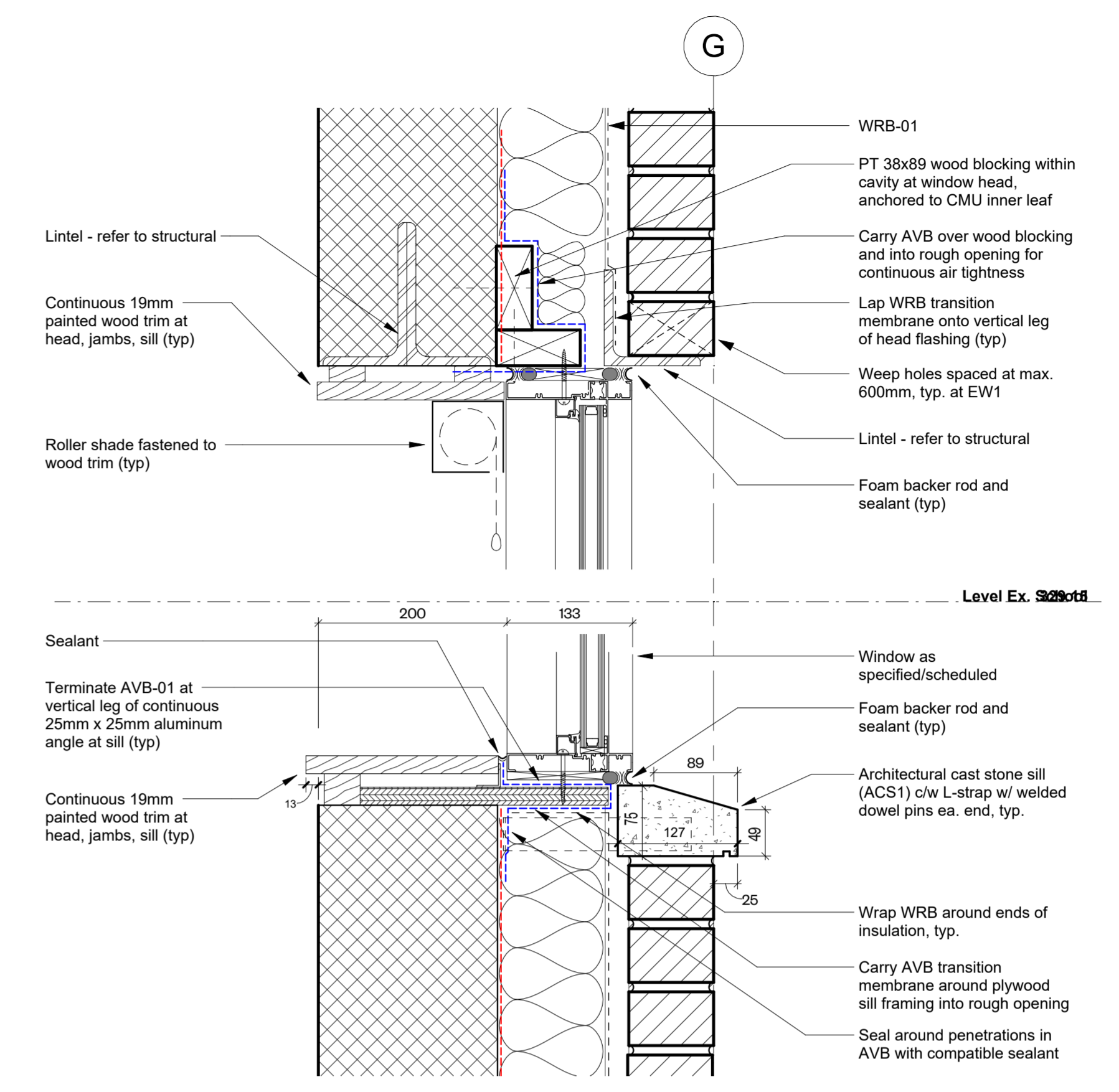
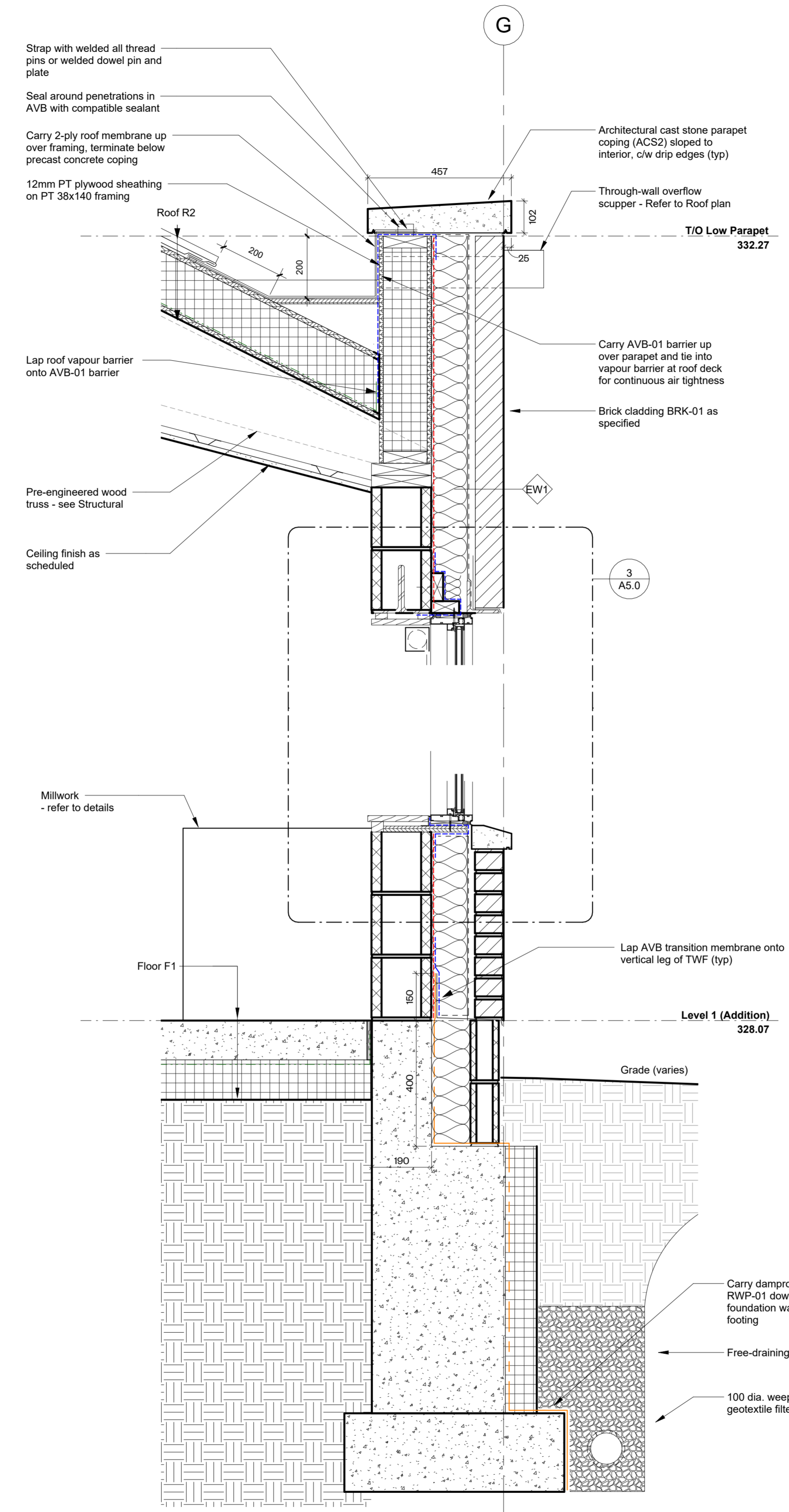
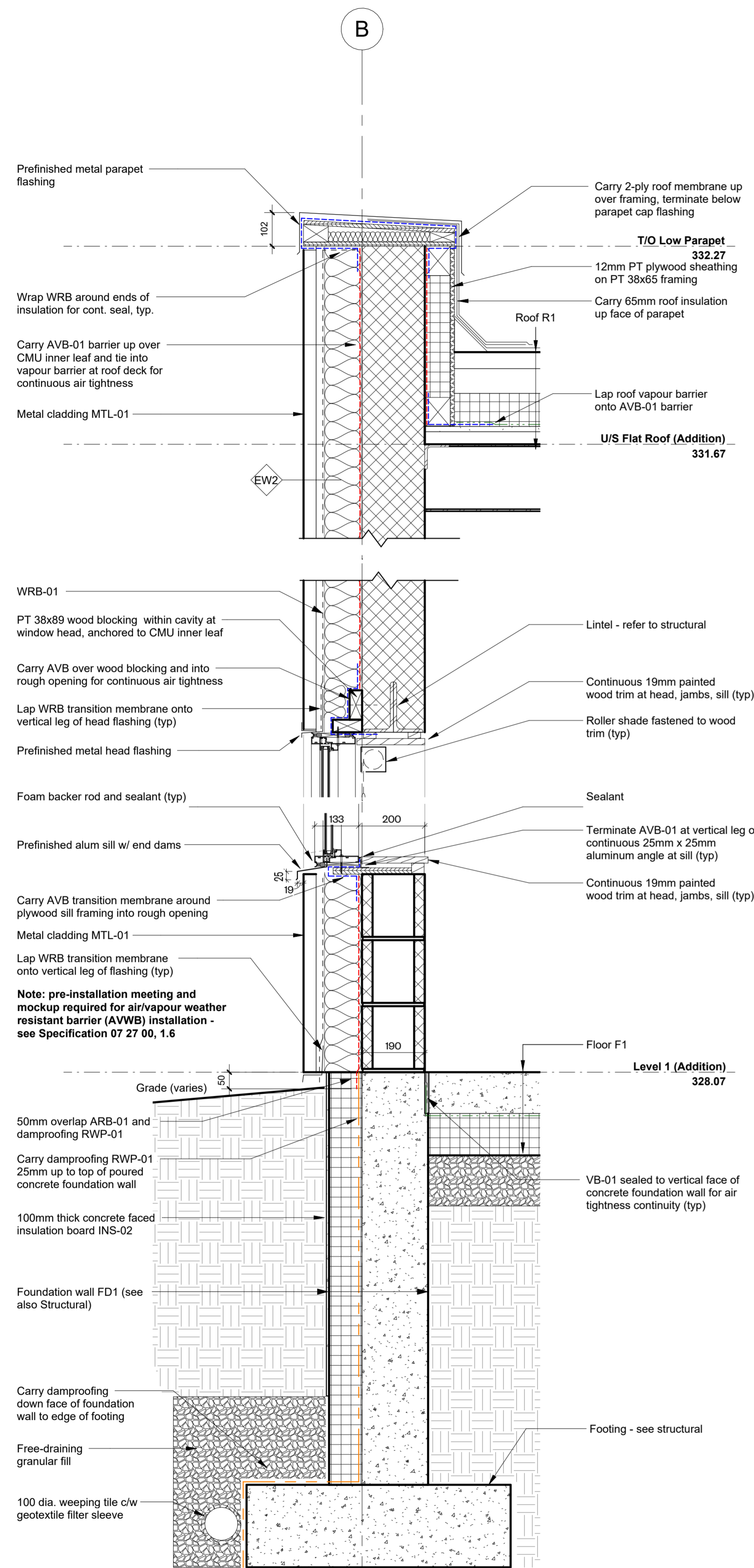
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Building Sections

drawing number

A4.0



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Rev	Description	Date
15	Issued for 90% Client Review	22 Dec 2023
16	Issued for Permit	26 Jul 2024
18	Issued for Tender	10 Oct 2024

Membrane Legend	
	AVB-01 - Vapour permeable air/weather barrier (at above-grade walls)
	AVB-02 - Transition membrane (at openings/transitions)
	VB-01 - Vapour barrier (at slab-on-grade)
	VB-02 - Vapour barrier (at roof)
	WRB-01 - Weather resistant barrier (at rainscreen cladding)
	WRB-02 - Weather resistant roofing underlayment
	RWP-01 - Fluid Applied Damproofing (exterior below-grade walls)

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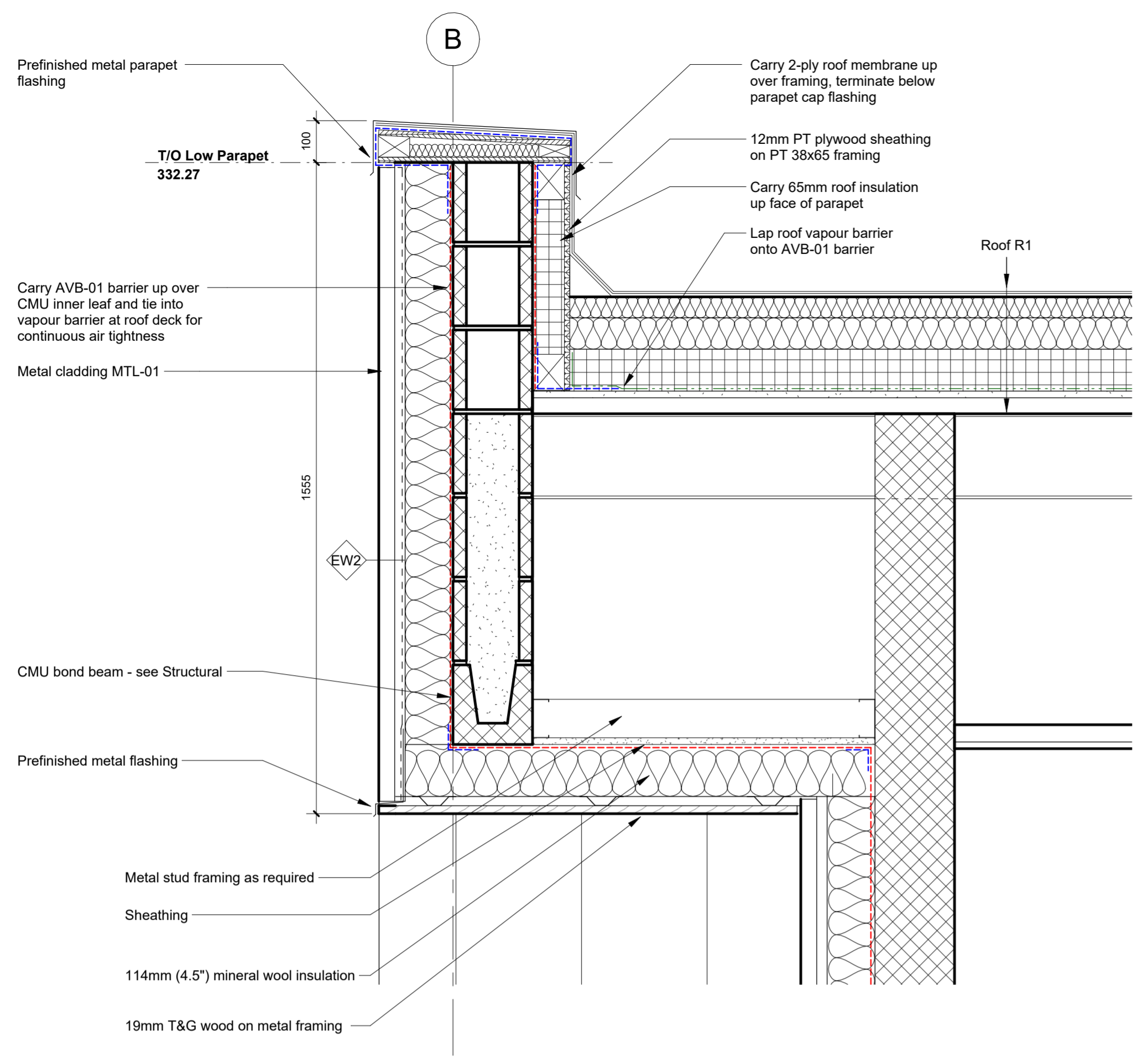
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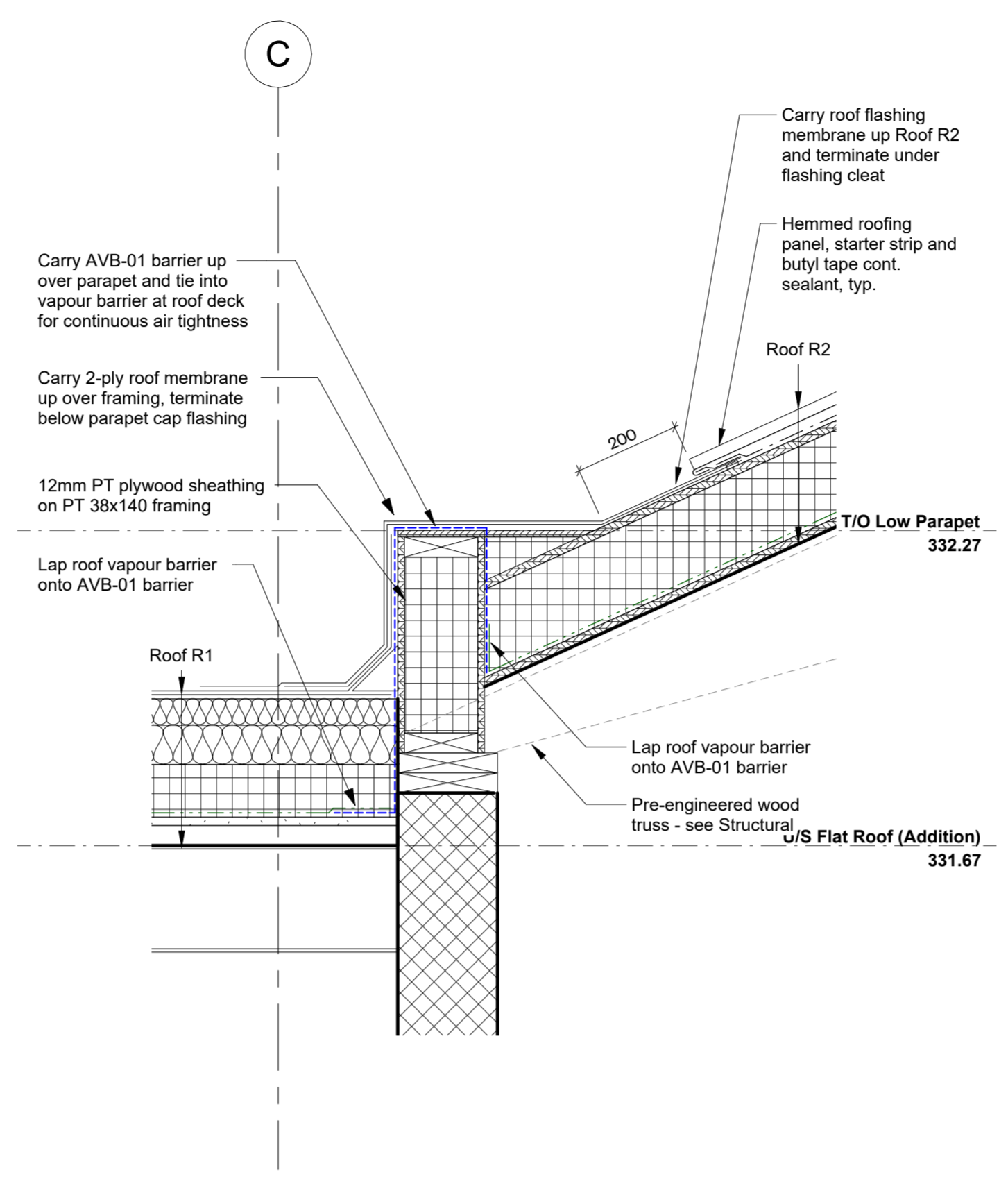
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Wall Sections & Details

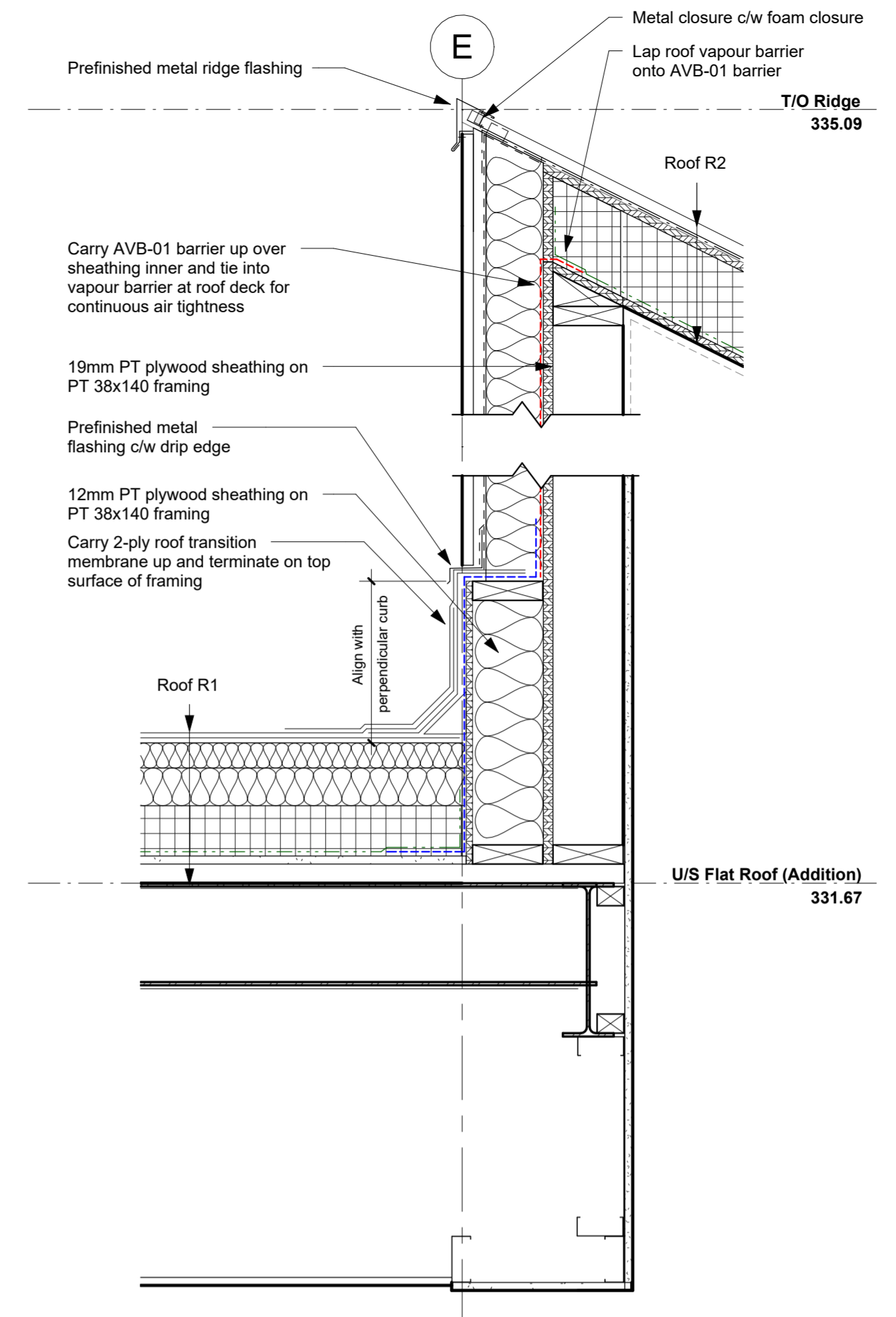
drawing number
A5.0



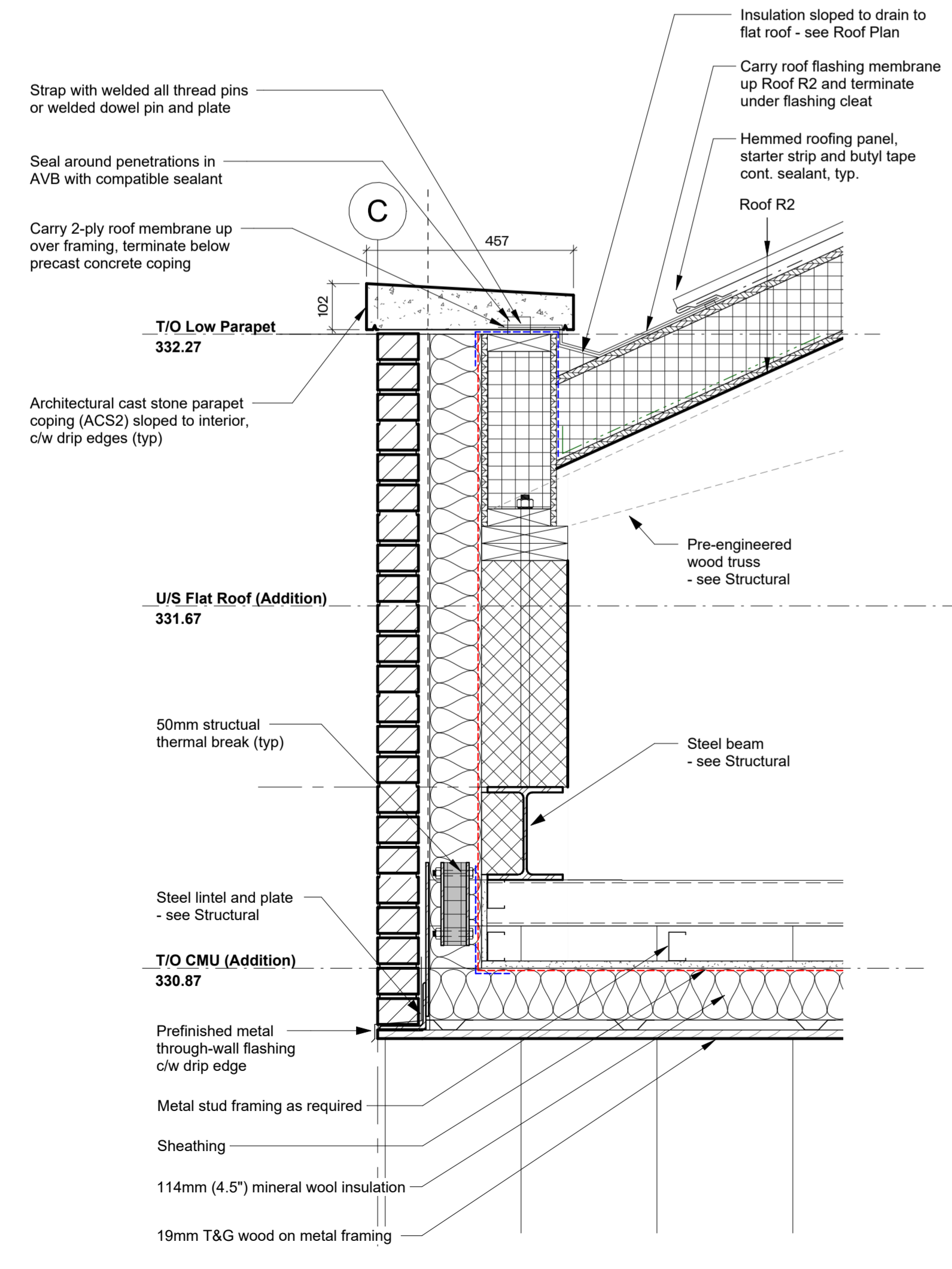
1 Section - Door 112b
1 : 10



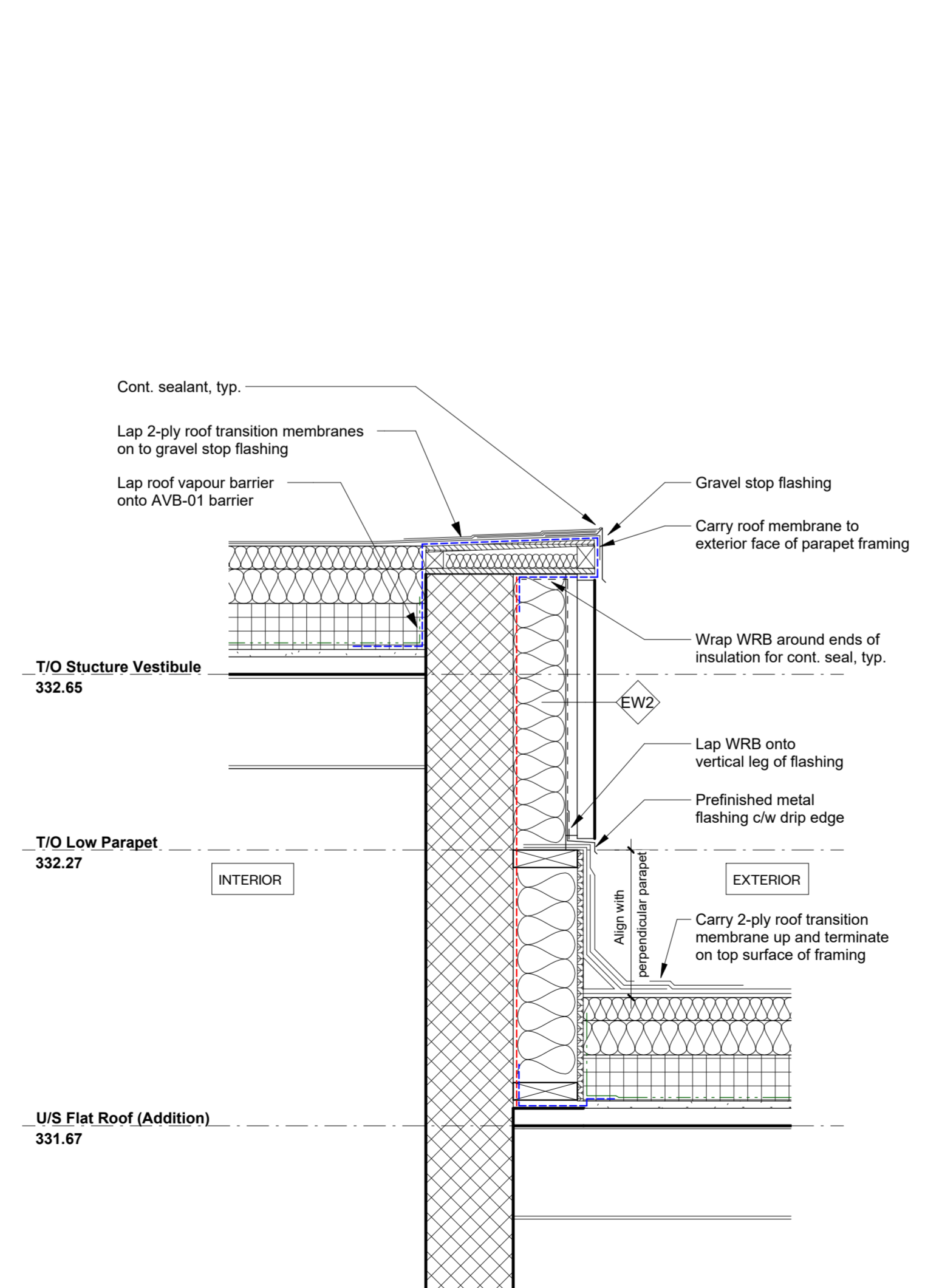
4 Section - Flat to Sloped Roof
1 : 10



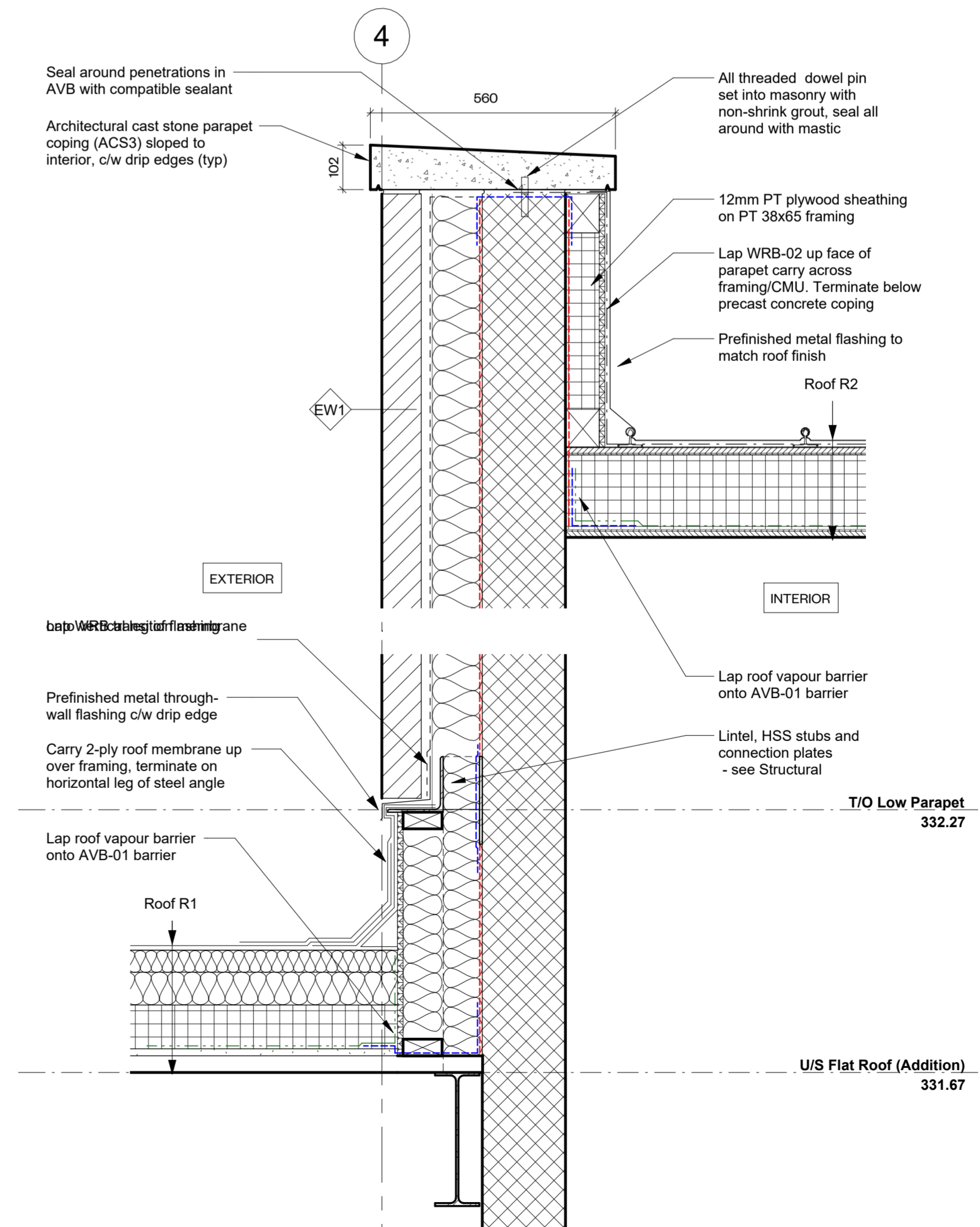
6 Section - RTU Cove
1 : 10



2 Section - South Overhang Looking North
1 : 10



3 Section - High to Low Flat Roof
1 : 10



7 Section - Gable End
1 : 10

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	WRB-01 - Weather resistant barrier (at rainscreen cladding)
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	RWP-01 - Fluid Applied Damproofing (exterior below-grade walls)

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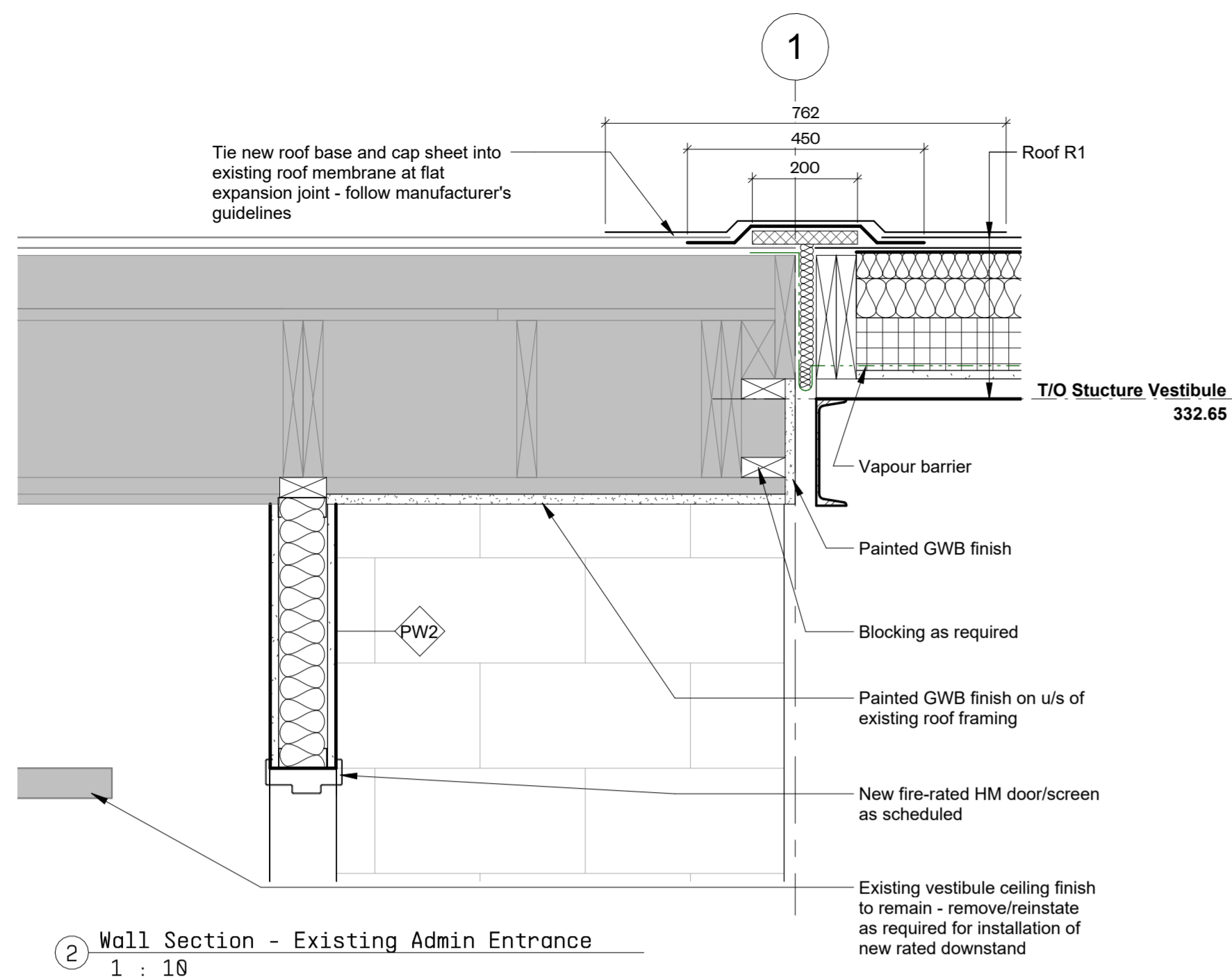
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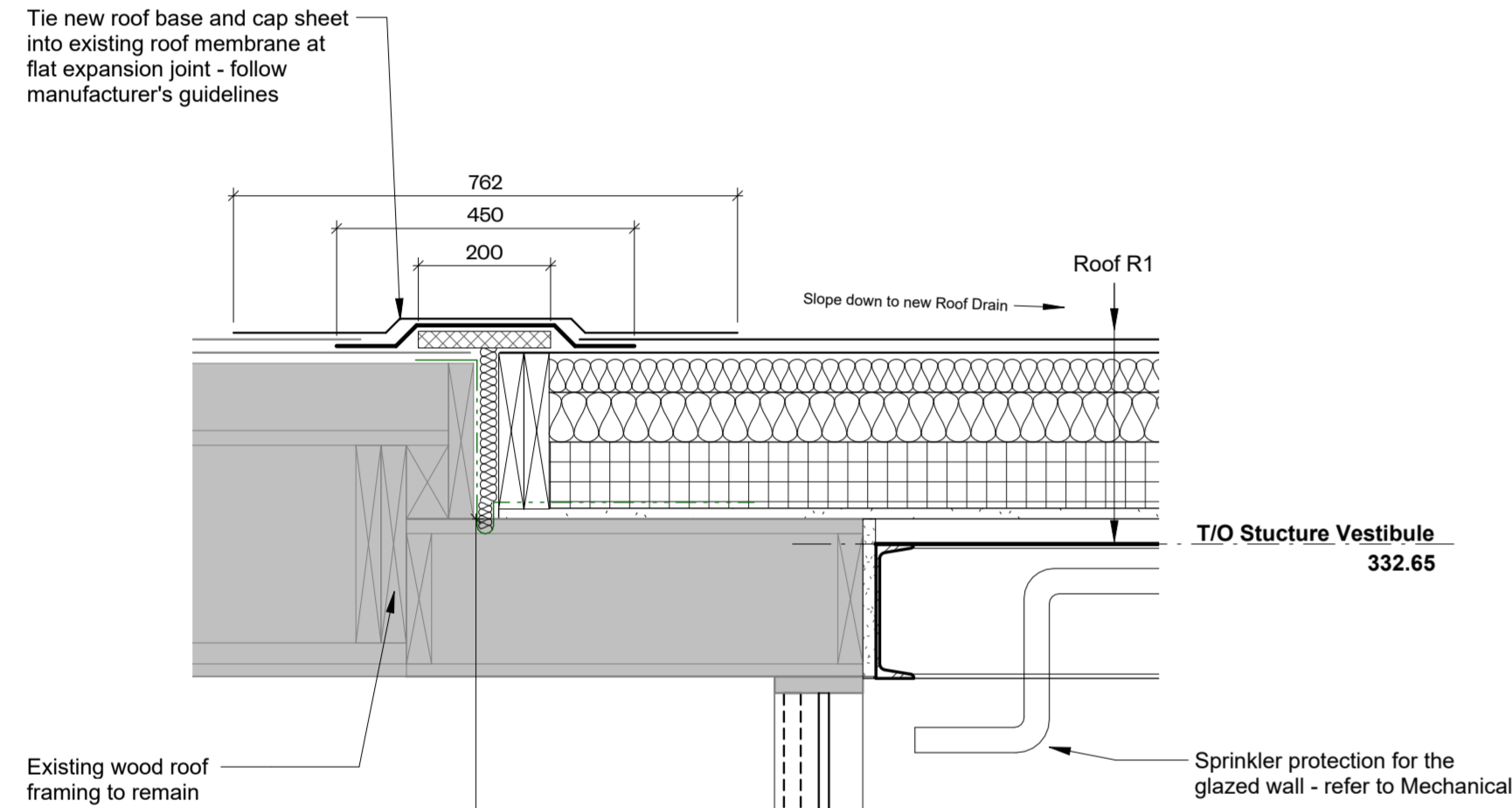
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DATE:	STATUS:
10 October 2024	Issued for Tender

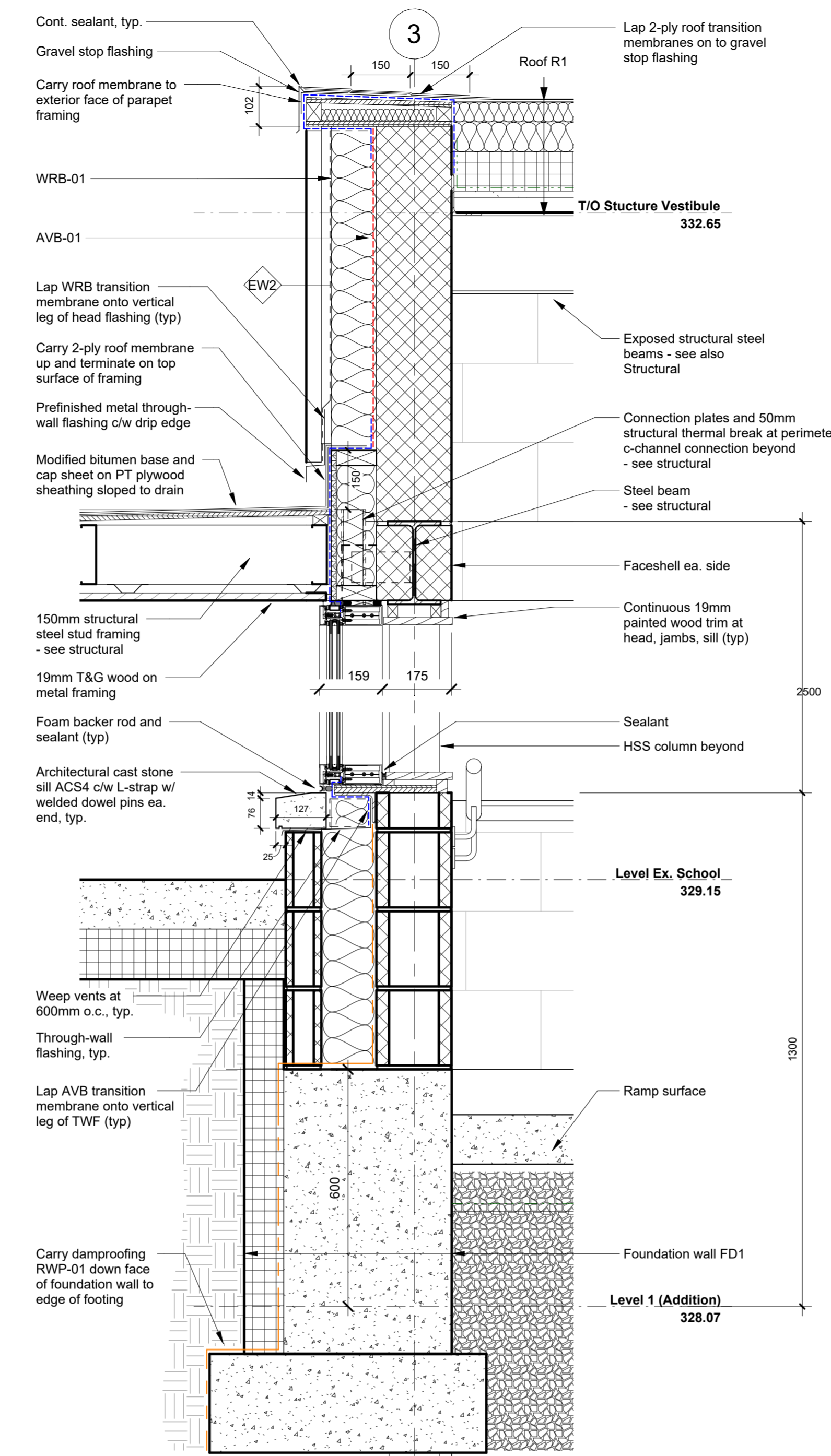
Wall Sections & Details



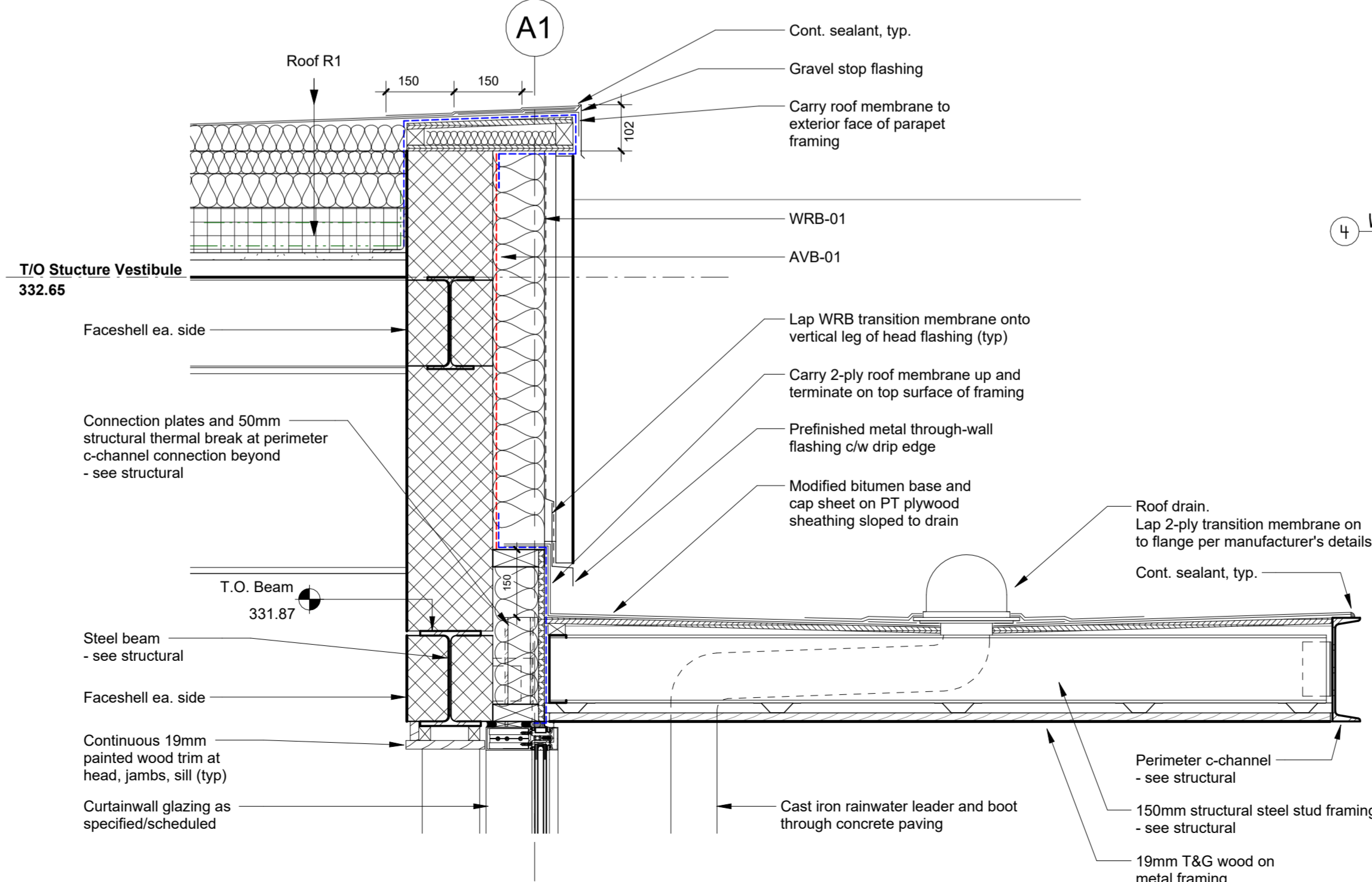
1 Wall Section - Existing Admin Entrance
1 : 10



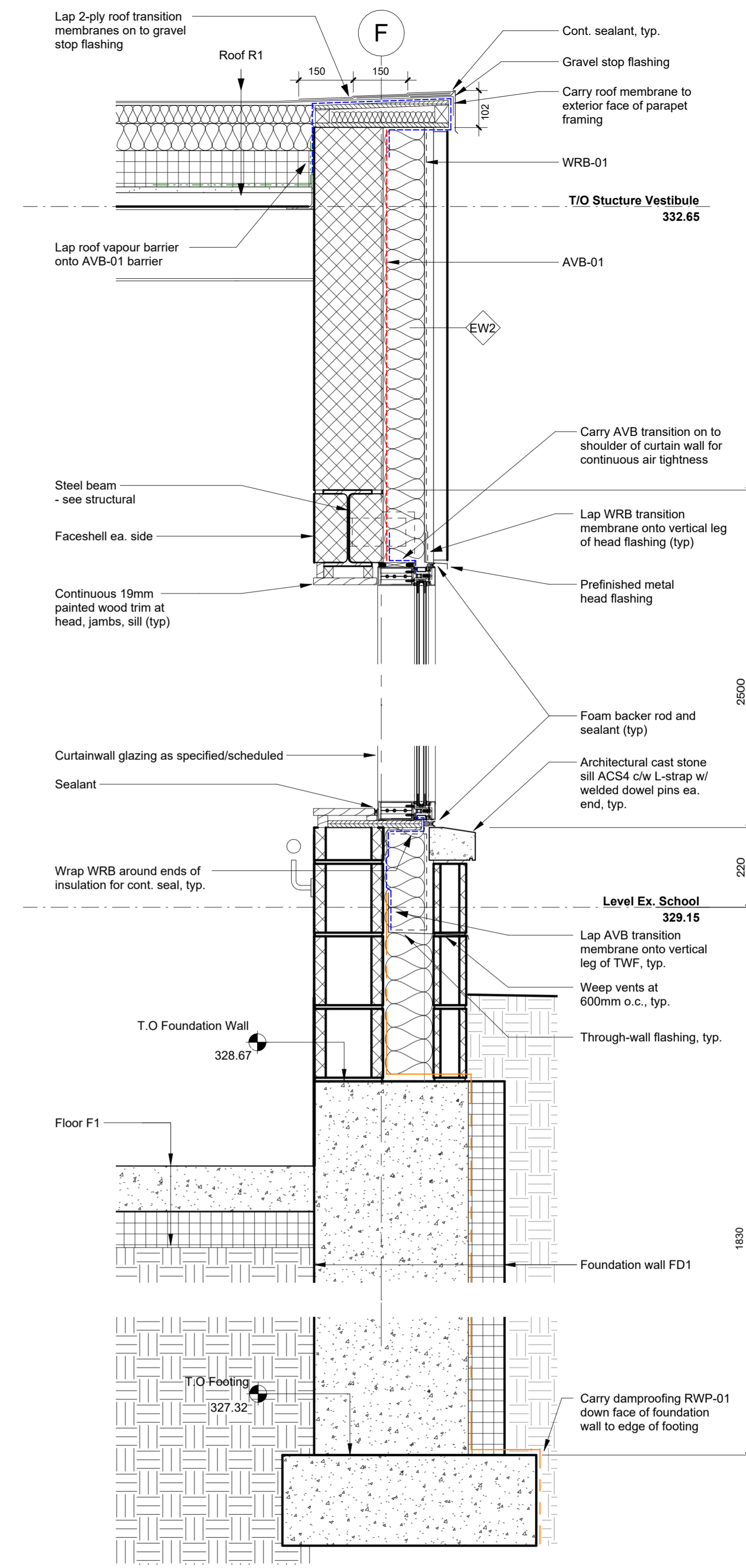
1 Wall Section - Existing Admin Window
1 : 10



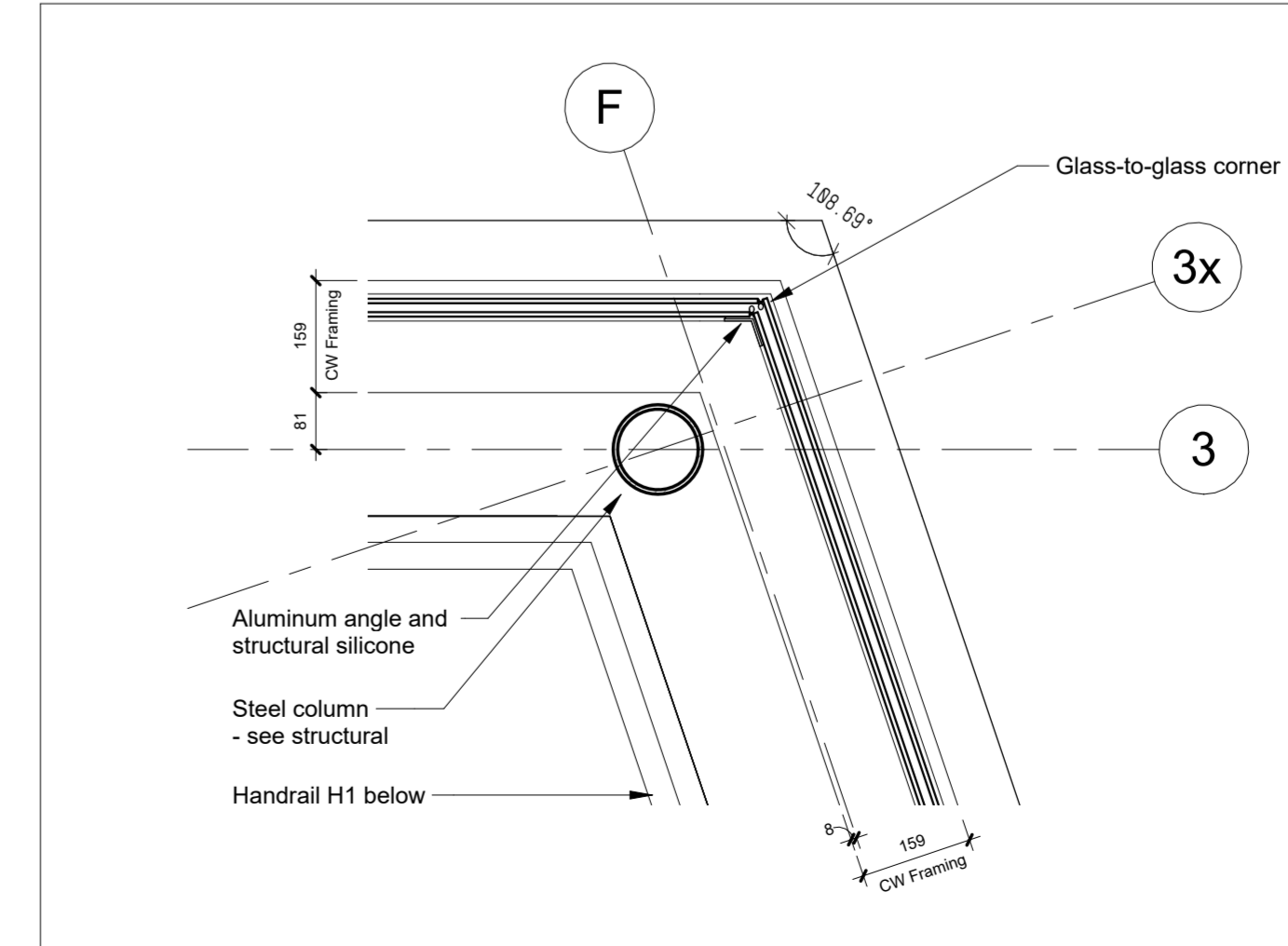
3 Wall Section @ Curtain Wall 1
1 : 10



5 Section Through Canopy
1 : 10



4 Wall Section @ Curtain Wall 2
1 : 10



6 Plan Detail - Curtainwall Corner
1 : 10

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Rev	Description	Date
15	Issued for 90% Client Review	22 Dec 2023
16	Issued for Permit	26 Jul 2024
18	Issued for Tender	10 Oct 2024

Membrane Legend	
	AVB-01 - Vapour permeable air/weather barrier (at above-grade walls)
	AVB-02 - Transition membrane (at openings/transitions)
	VB-01 - Vapour barrier (at slab-on-grade)
	VB-02 - Vapour barrier (at roof)
	WRB-01 - Weather resistant barrier (at rainscreen cladding)
	WRB-02 - Weather resistant roofing underlayment
	RWP-01 - Fluid Applied Damproofing (exterior below-grade walls)

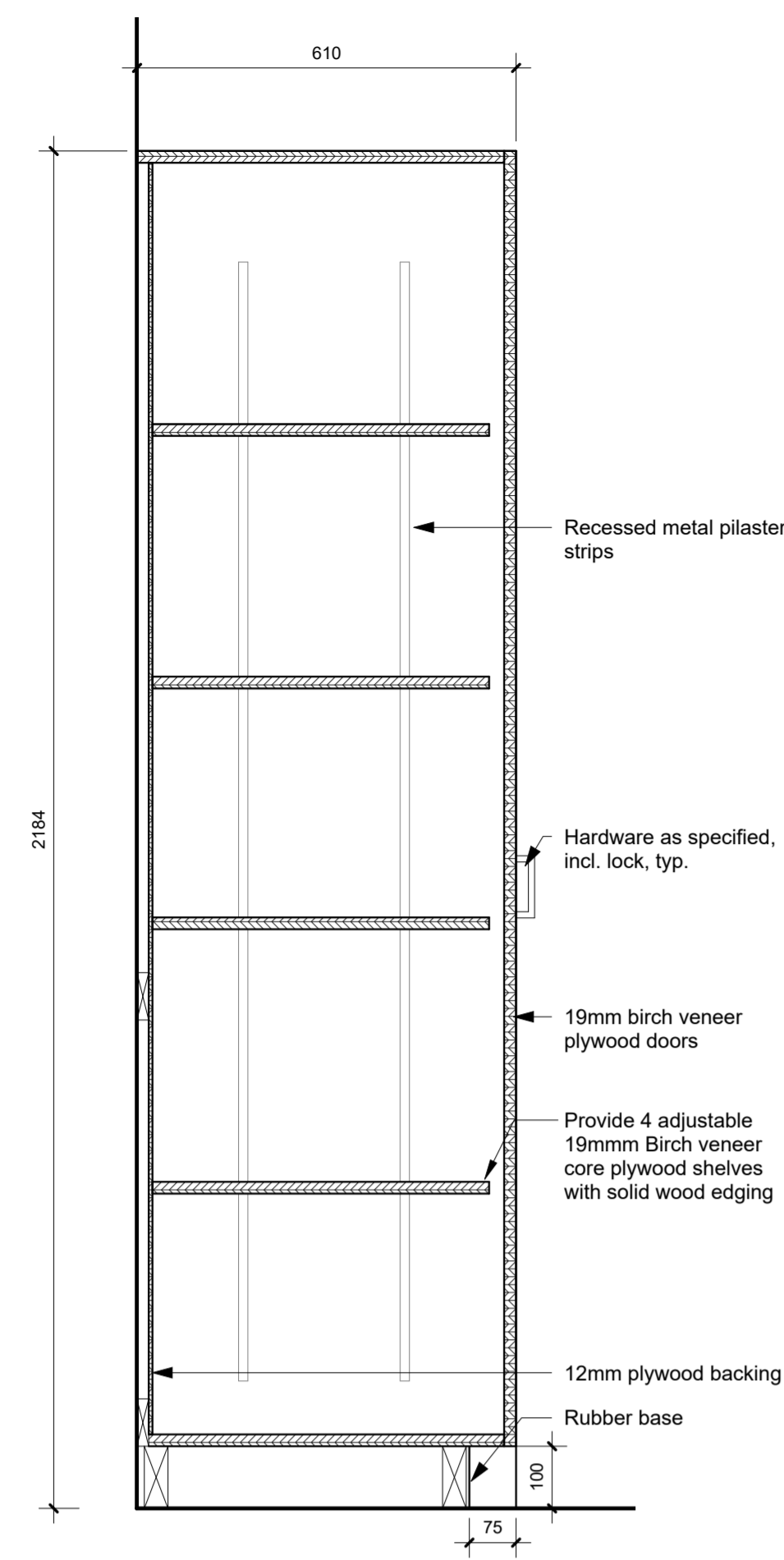
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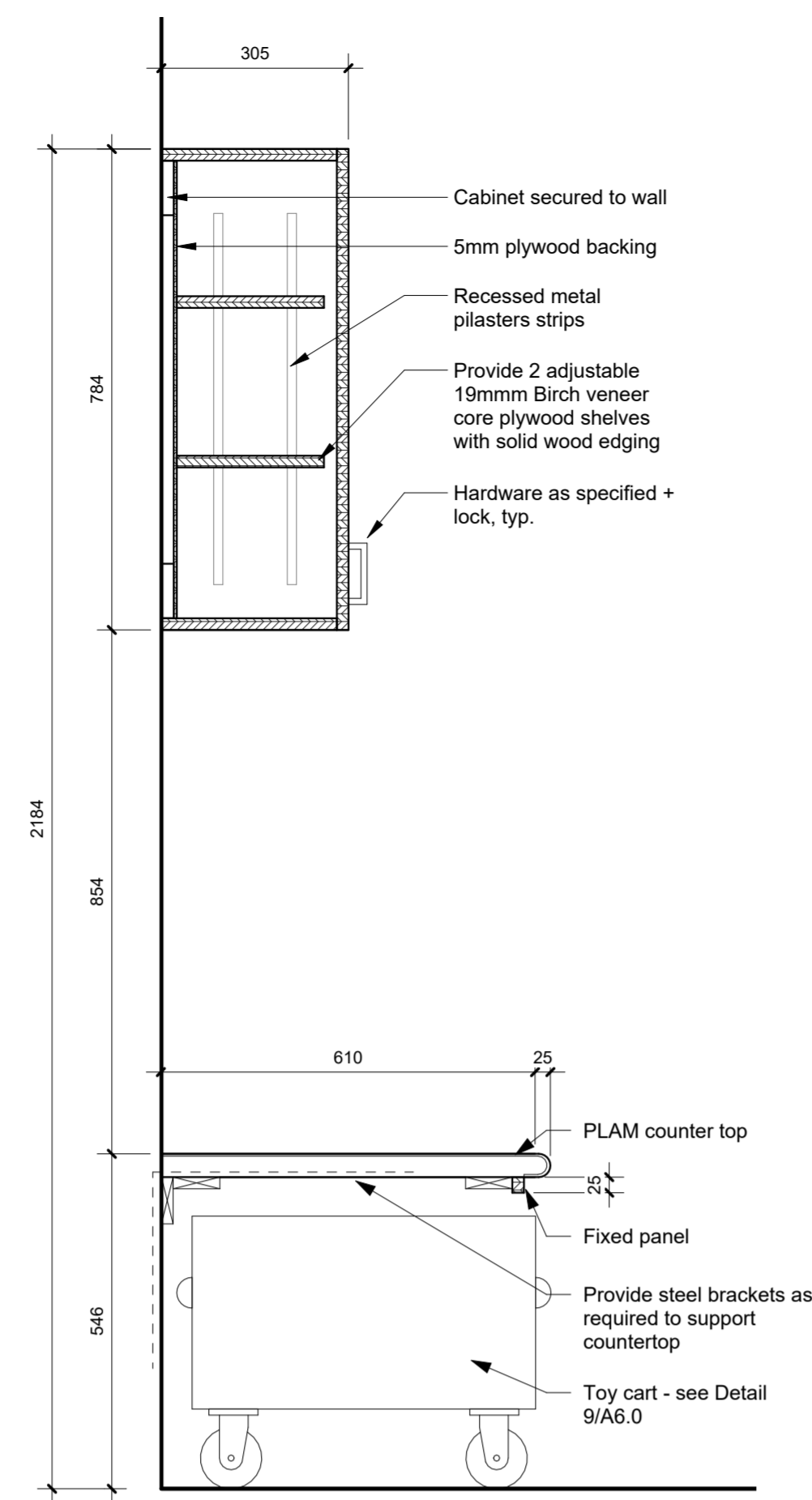
CSV L'Harmonie Daycare Addition
158 Bridgeport Road East
Waterloo

PROJECT CODE: 2207
SCALE: As indicated
DATE: 10 October 2024
STATUS: Issued for Tender

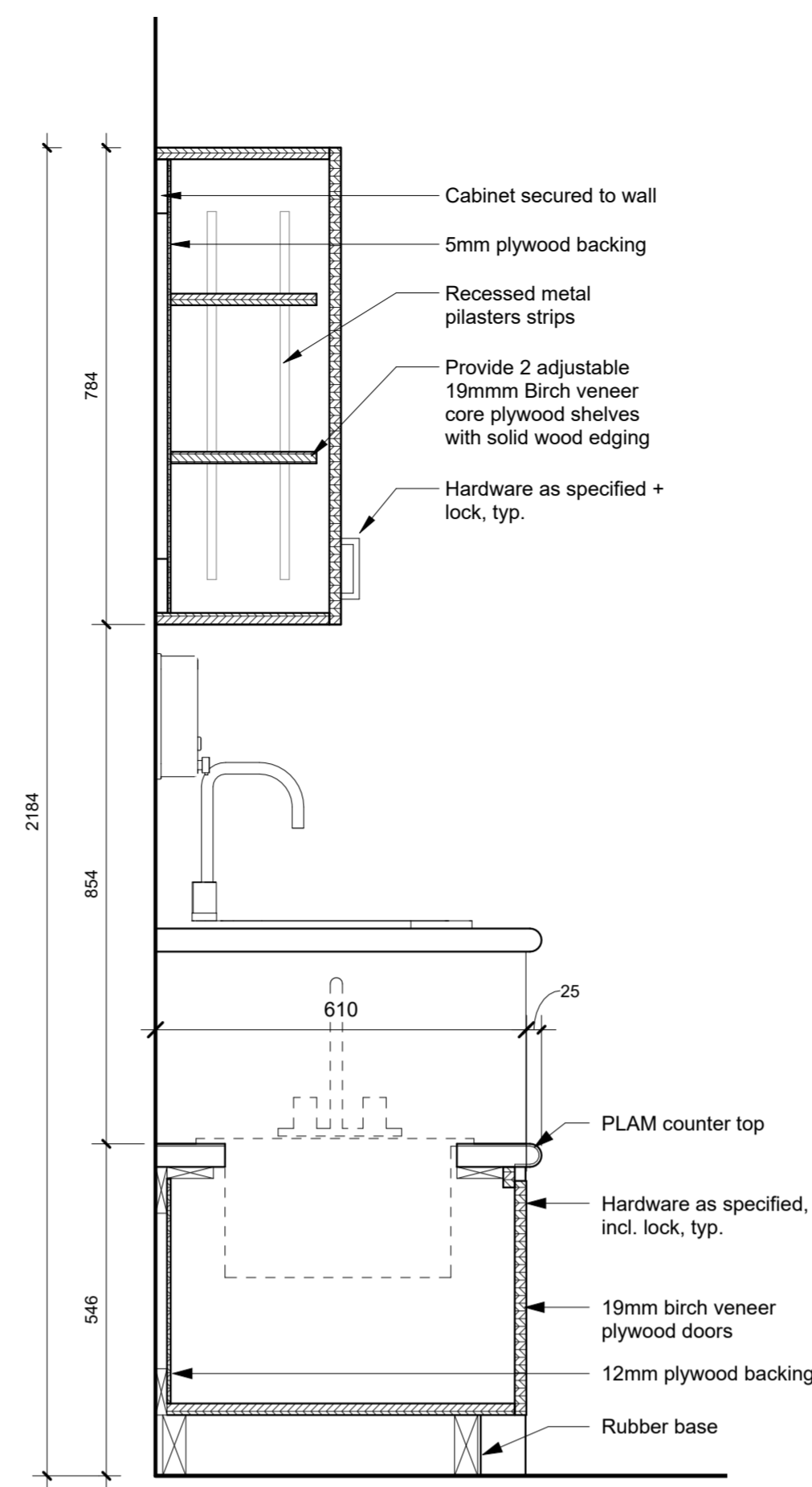
Wall Sections @ Shared Vestibule



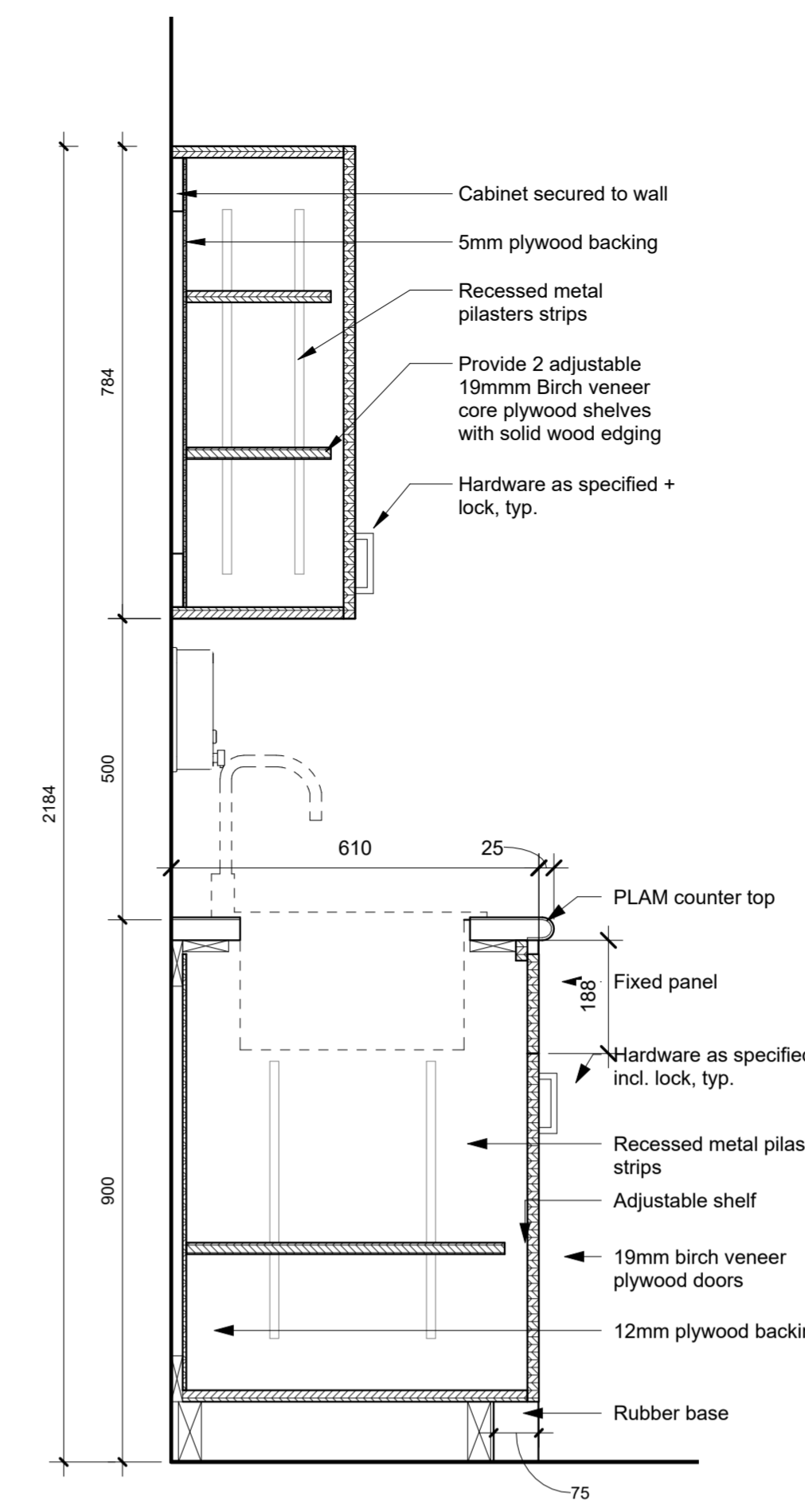
1 MW3 - Section through Full-Height Cabinet
1 : 10



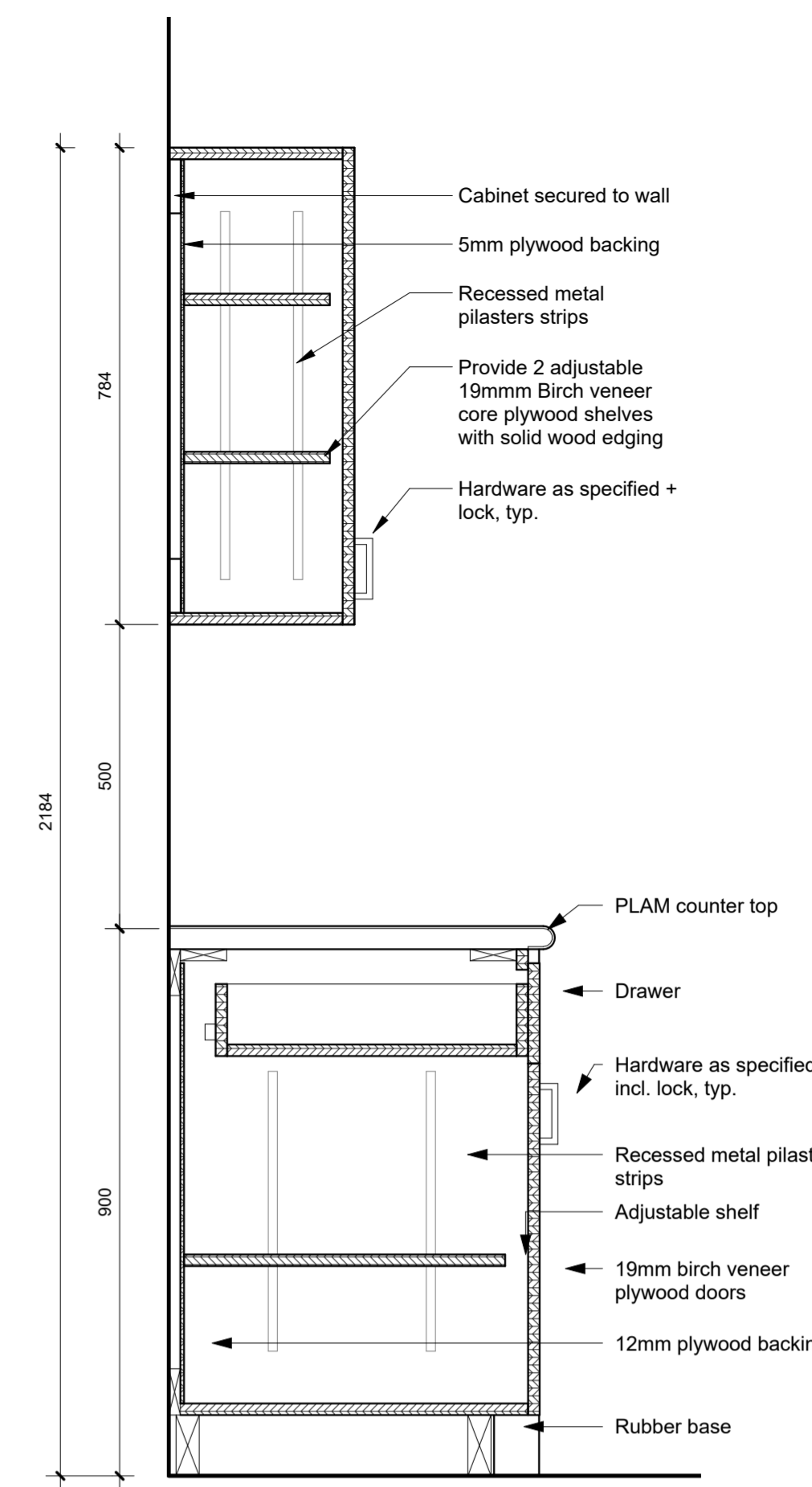
2 MW3 - Section through open below counter
1 : 10



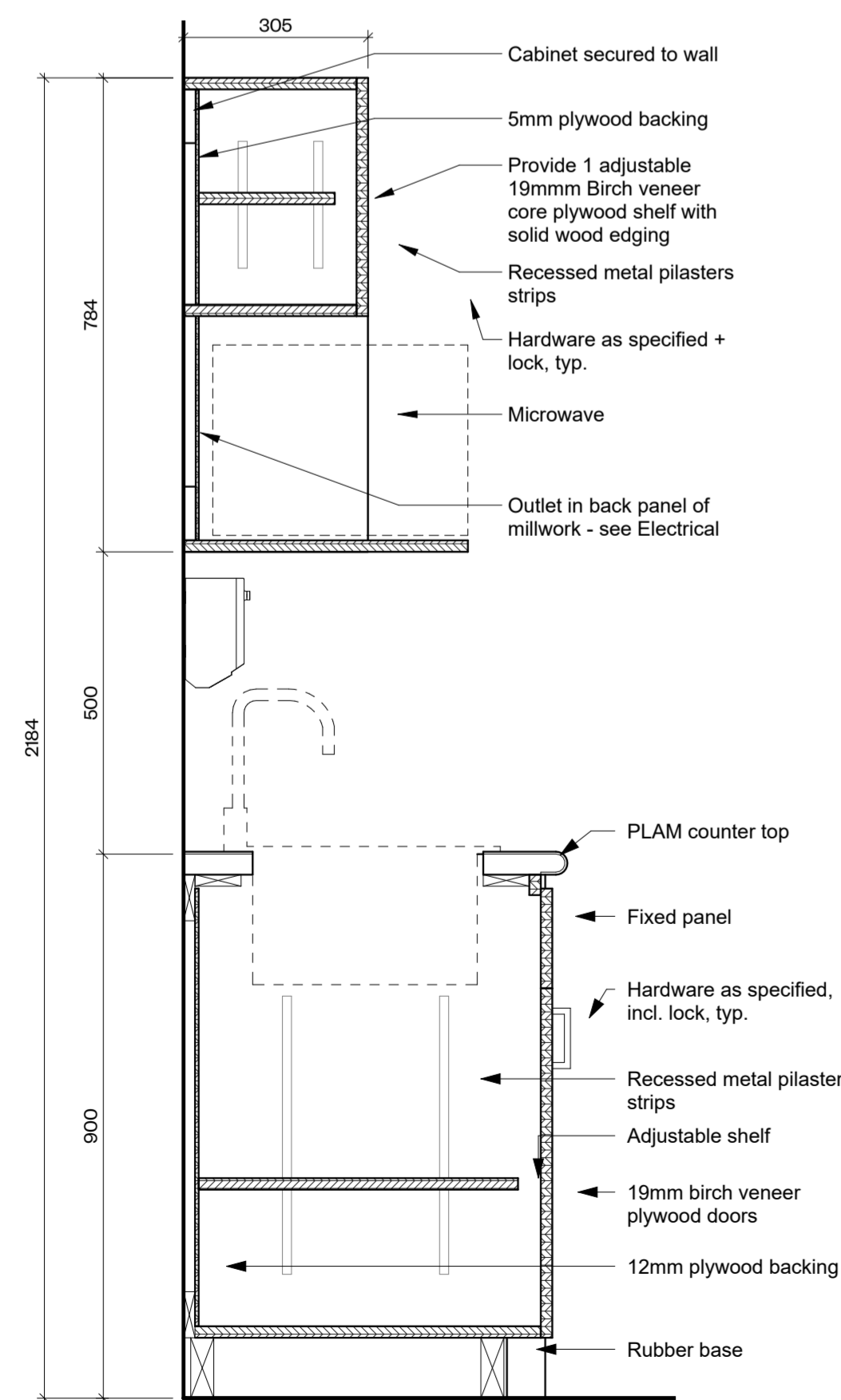
3 MW3 - Section through Child Sink
1 : 10



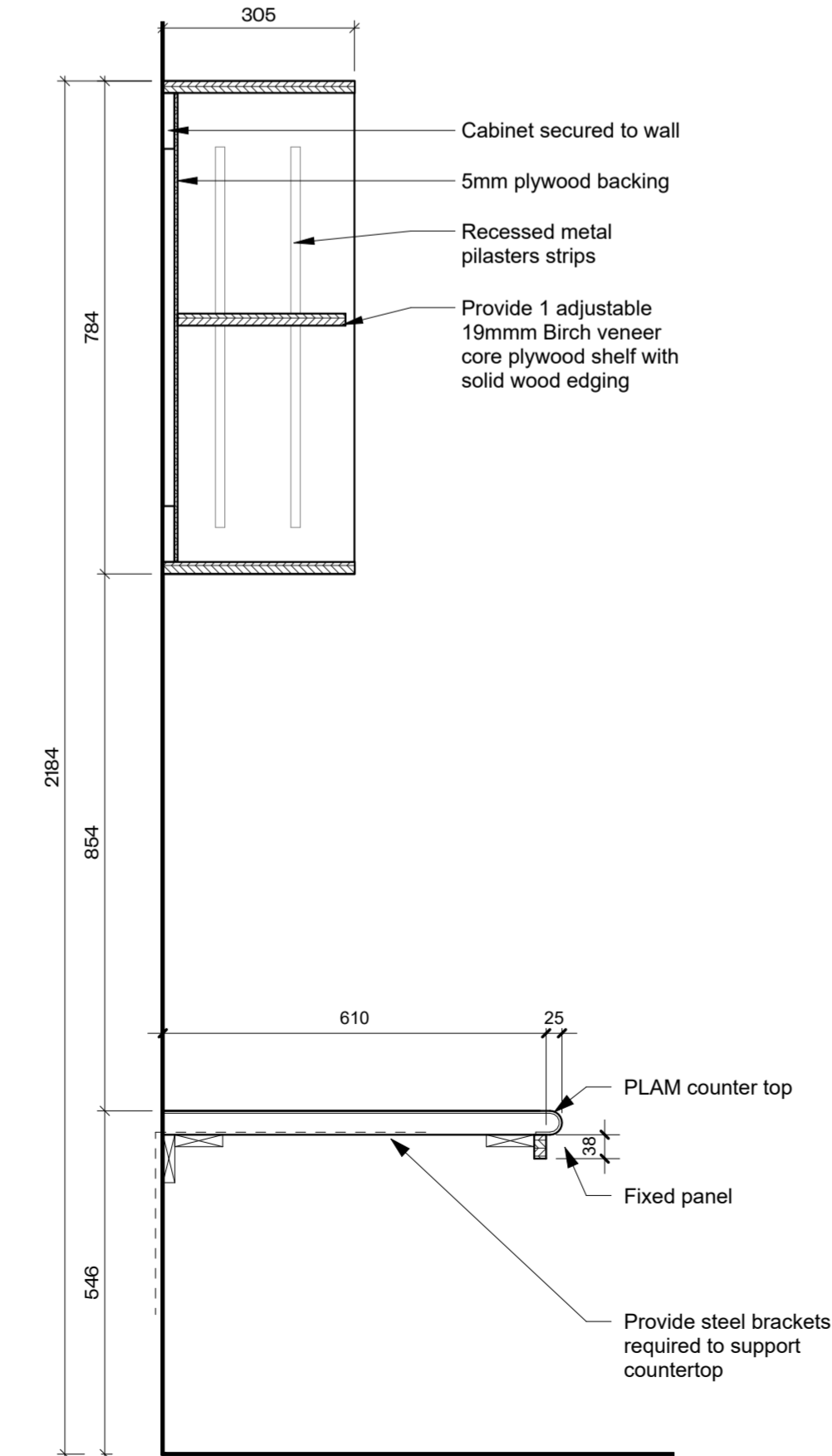
4 MW3 - Section through Adult Sink
1 : 10



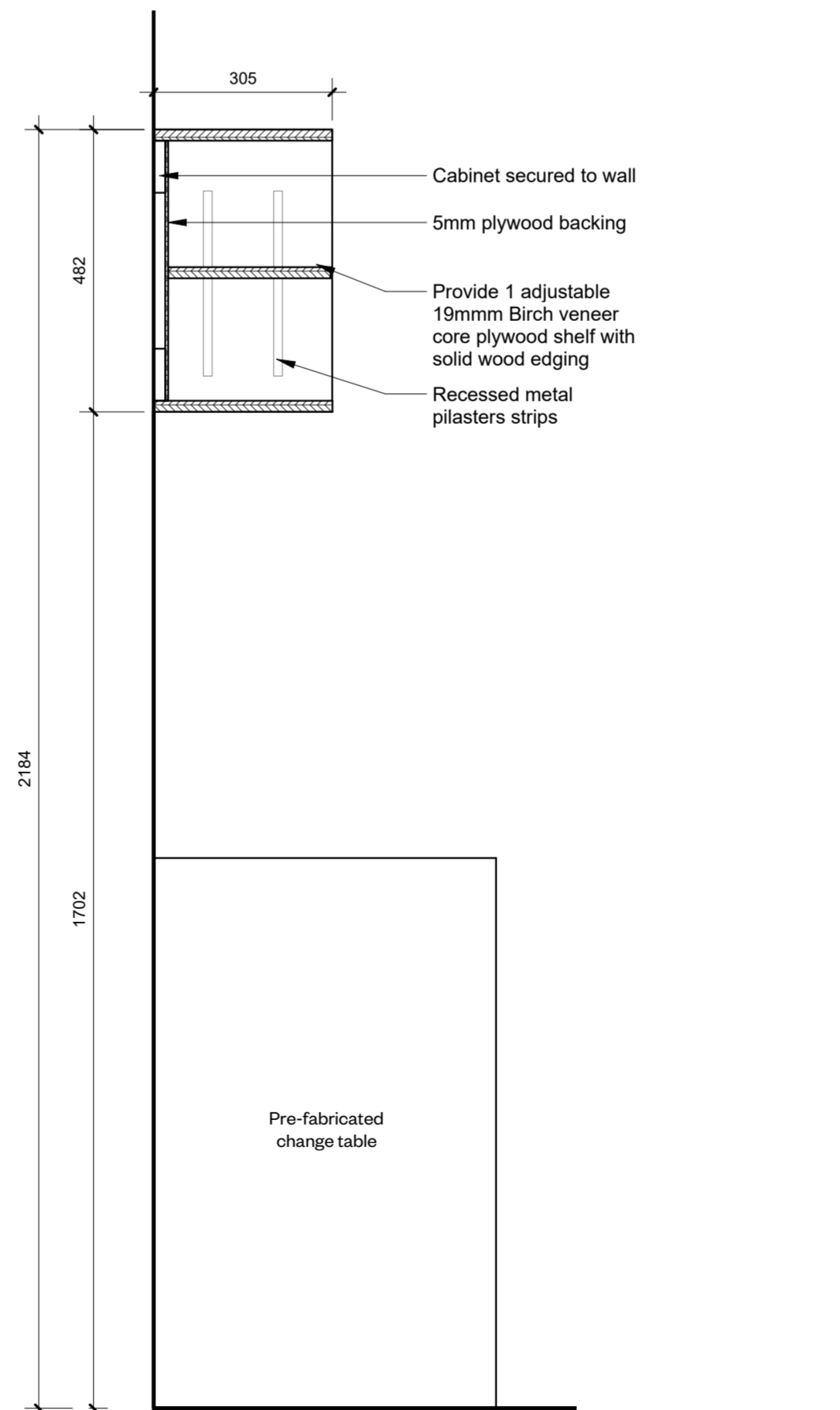
5 MW3 - Section through drawer
1 : 10



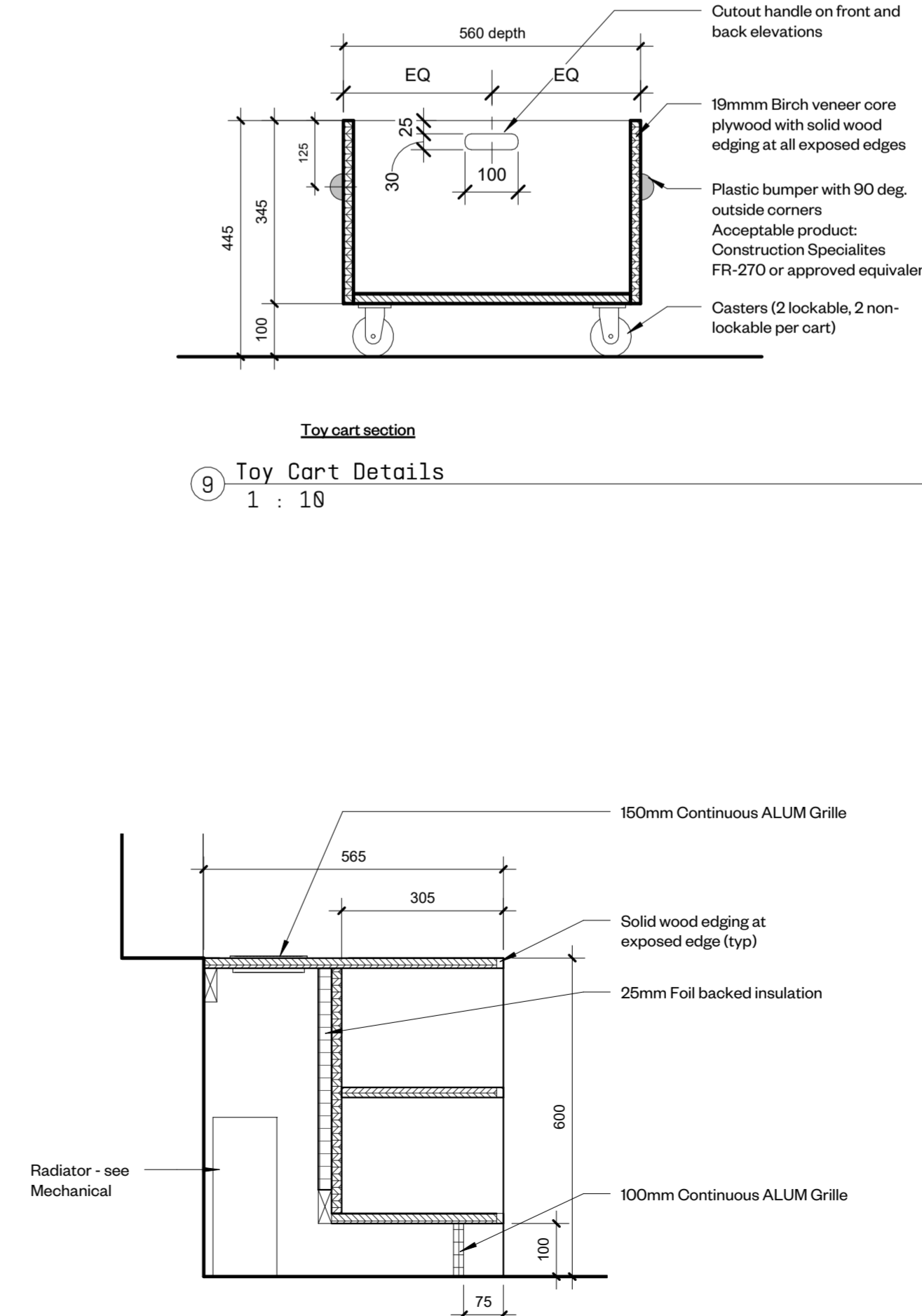
6 MW - Section through Microwave Shelf
1 : 10



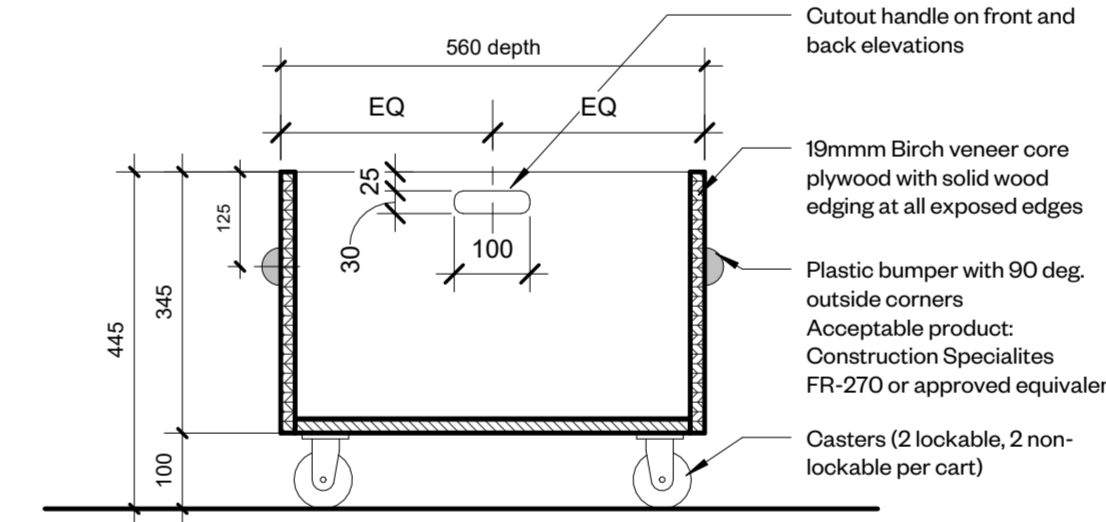
7 MW7 - Section through open Upper Shelves
1 : 10



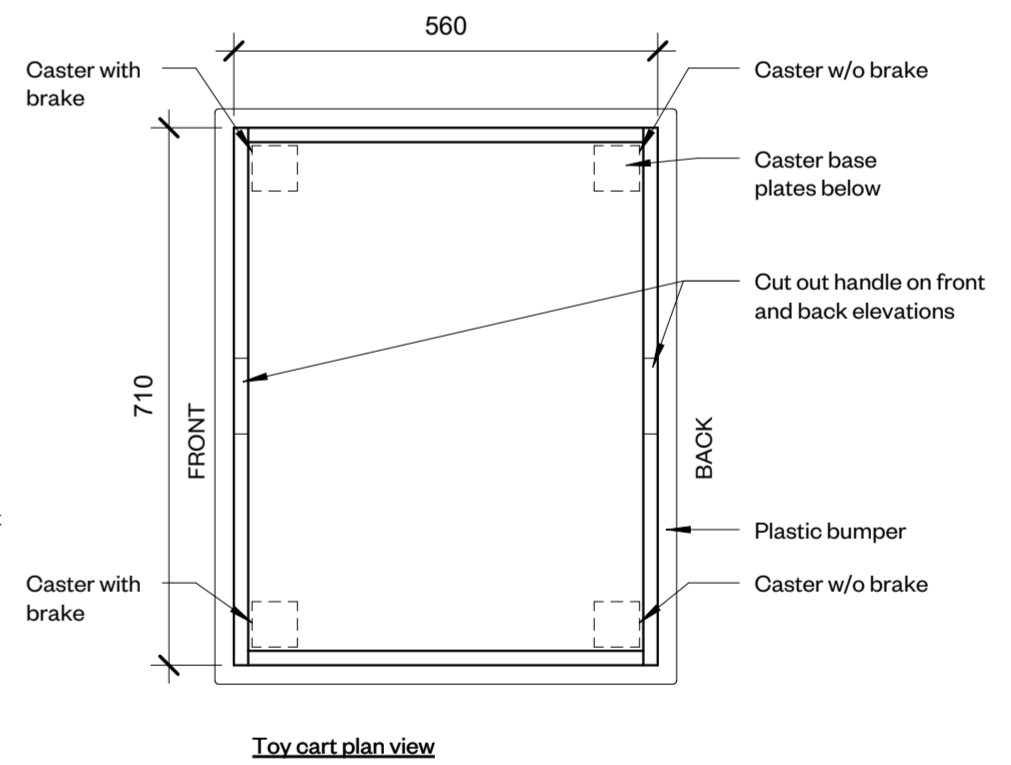
8 MW Section - Open shelves above Change Tables
1 : 10



10 MW Section - Radiator Enclosure
1 : 10



9 Toy Cart Details
1 : 10



Toy cart plan view

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Rev	Description	Date
9	Issued for 80% Cost Estimate and Review	23 Dec 2022
16	Issued for Permit	26 Jul 2024
18	Issued for Tender	10 Oct 2024

Materials Legend

ACT	Acoustic Ceiling Tile
ALUM	Aluminum
BRK	Brick
CER	Ceramic Tile
CMU	Concrete Masonry Unit
EXIST	Existing
EXP	Exposed
FGL	Fire-Rated Glass
GF	Glazing Fim
GLB	Glazed CMU
GWB	Gypsum Wallboard
PLY	Fire Rated Plywood
POR	Porcelain Tile
PLAM	Plastic Laminate
PT	Paint Finish
RB	Rubber Base
RES	Resilient Sheet Flooring
SCON	Sealed Concrete
SS	Stainless Steel
TGL	Tempered Glass
WD	Solid Wood
WV	Wood Veneer

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Millwork Hardware Legend

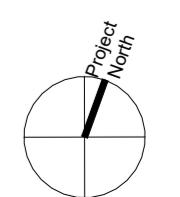
- Bumpers (2 each per door): Richelieu 3M (Peel & Stick)
- Cabinet/Drawer Pulls: Richelieu Catalogue 6211 (BP6211128195)
- Cam lock for all cabinet doors & drawers: National NCL-C8060-4GKA413A (keyed alike except as noted)
- Coat Hook (cubbies): Canadian Builders Hardware Model No. CBH-61, stainless steel
- Concealed hinges: Blum Blumaton 110 degrees
- Concealed shelf support brackets: Richelieu 1621712G
- Recessed metal pilaster strips: Richelieu Heavy Duty Metal Pilaster 2332G - length to suit, flush installation
- Steel Roller Glides at 150mm drawers: Accuride #2037 Full Extension
- Steel Roller Glides at 233mm drawers: Accuride #3641 Full Extension
- Soft close mechanism at all drawers: Richelieu BP97309910
- Casters at Toy Carts: Gray Thermoplastic Rubber Casters for General Use
Richelieu F24787 (Swivel with Brake): 2 per cart
Richelieu F24786 (Swivel without Brake): 2 per cart

CSV L'Harmonie Daycare Addition

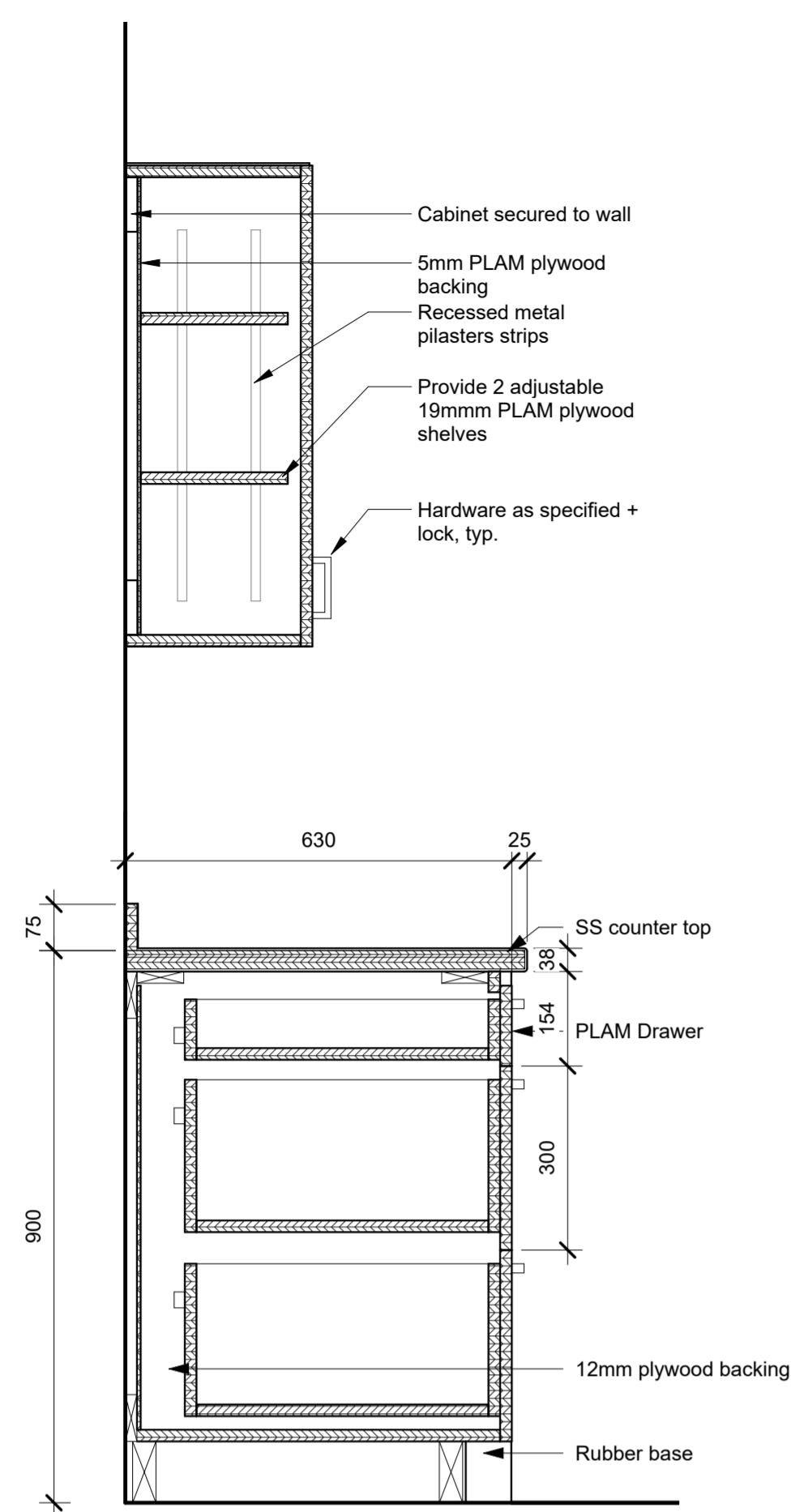
158 Bridgeport Road East
Waterloo

PROJECT CODE:	SCALE:
2207	As indicated
DATE:	STATUS:
10 October 2024	Issued for Tender

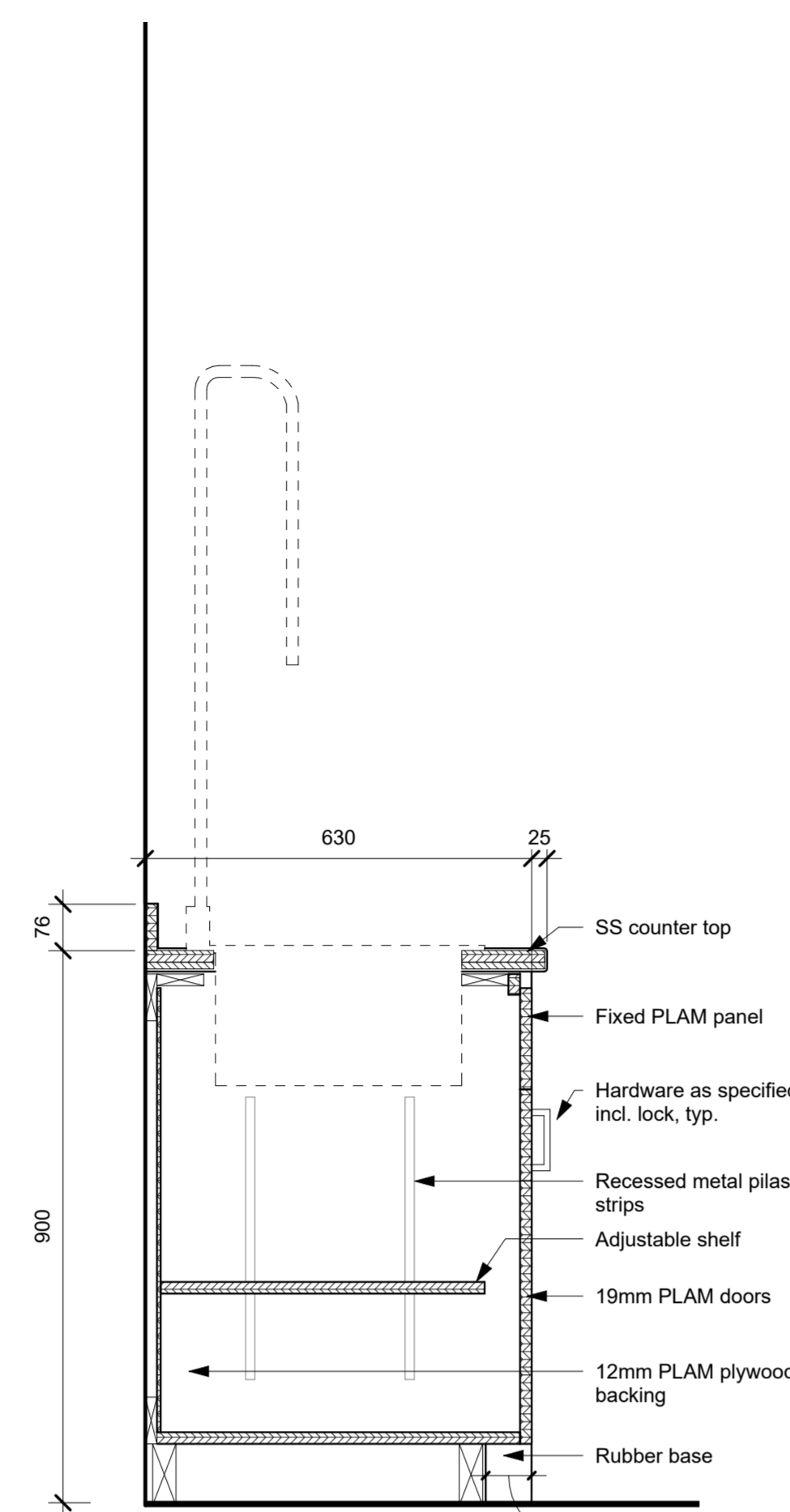
Millwork



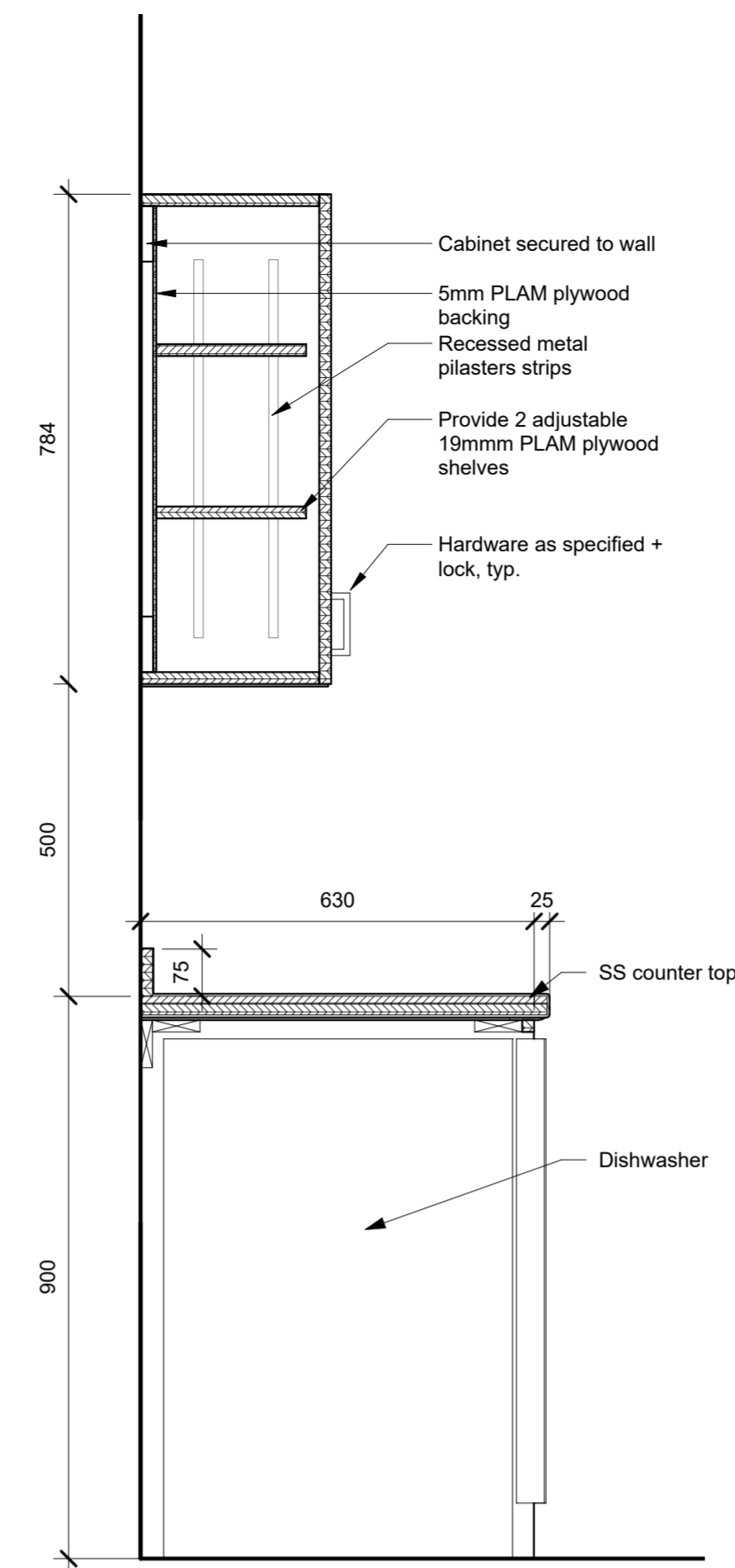
drawing number
A6.0



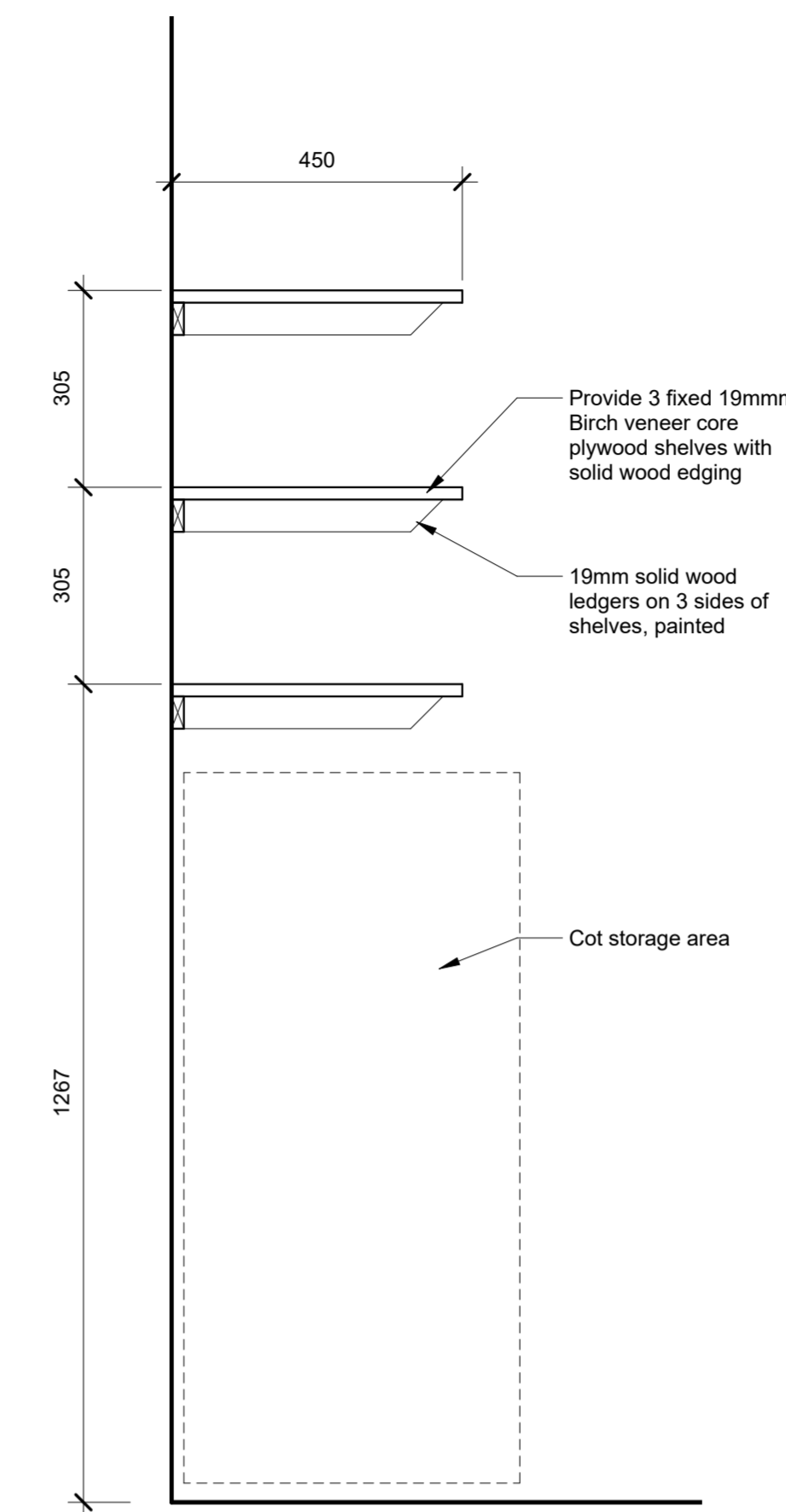
① MW2 - Section Through Drawers
1 : 10



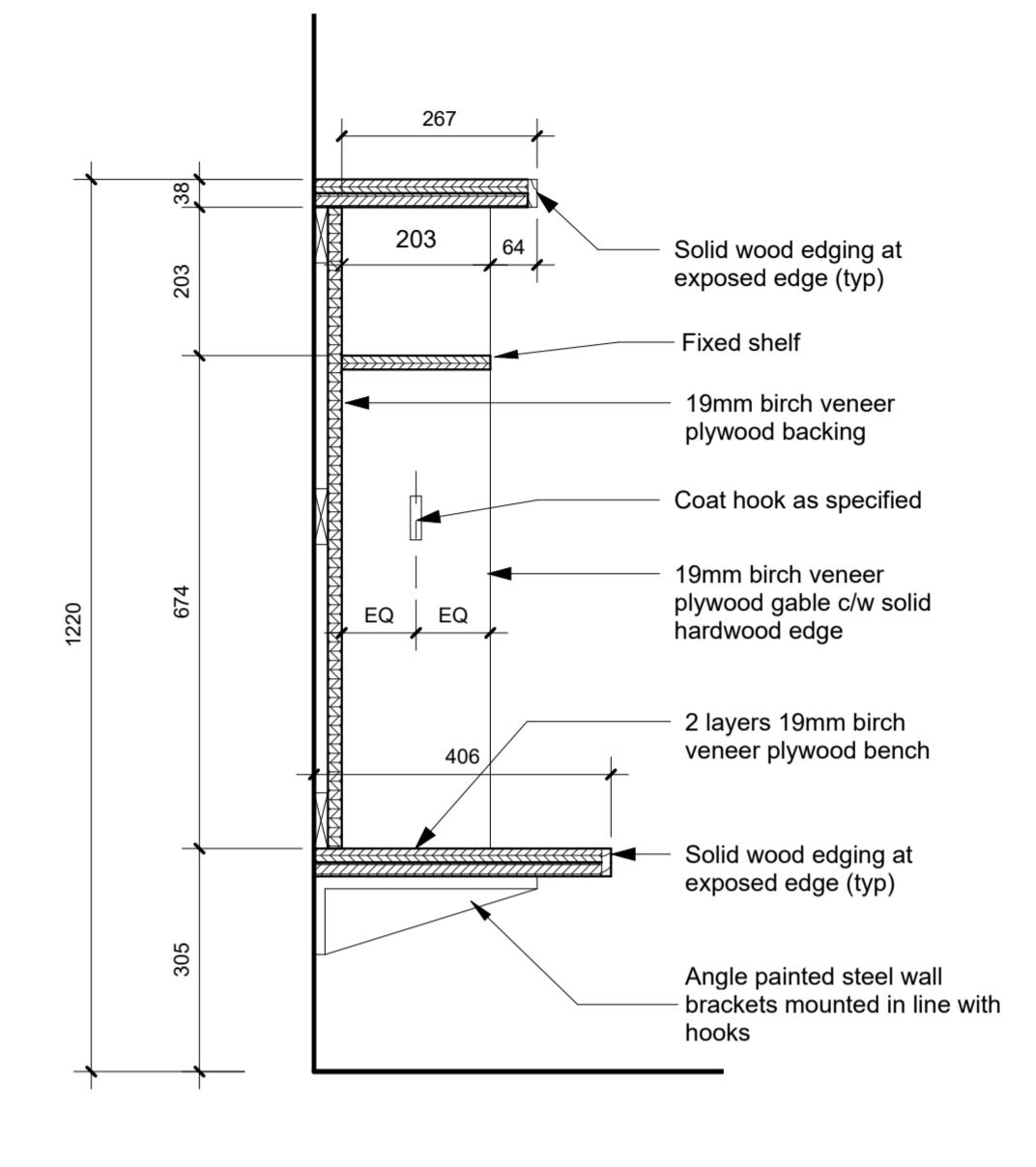
② MW2 - Section Through Dishwash Sink
1 : 10



③ MW2 - Section Through Dishwasher
1 : 10



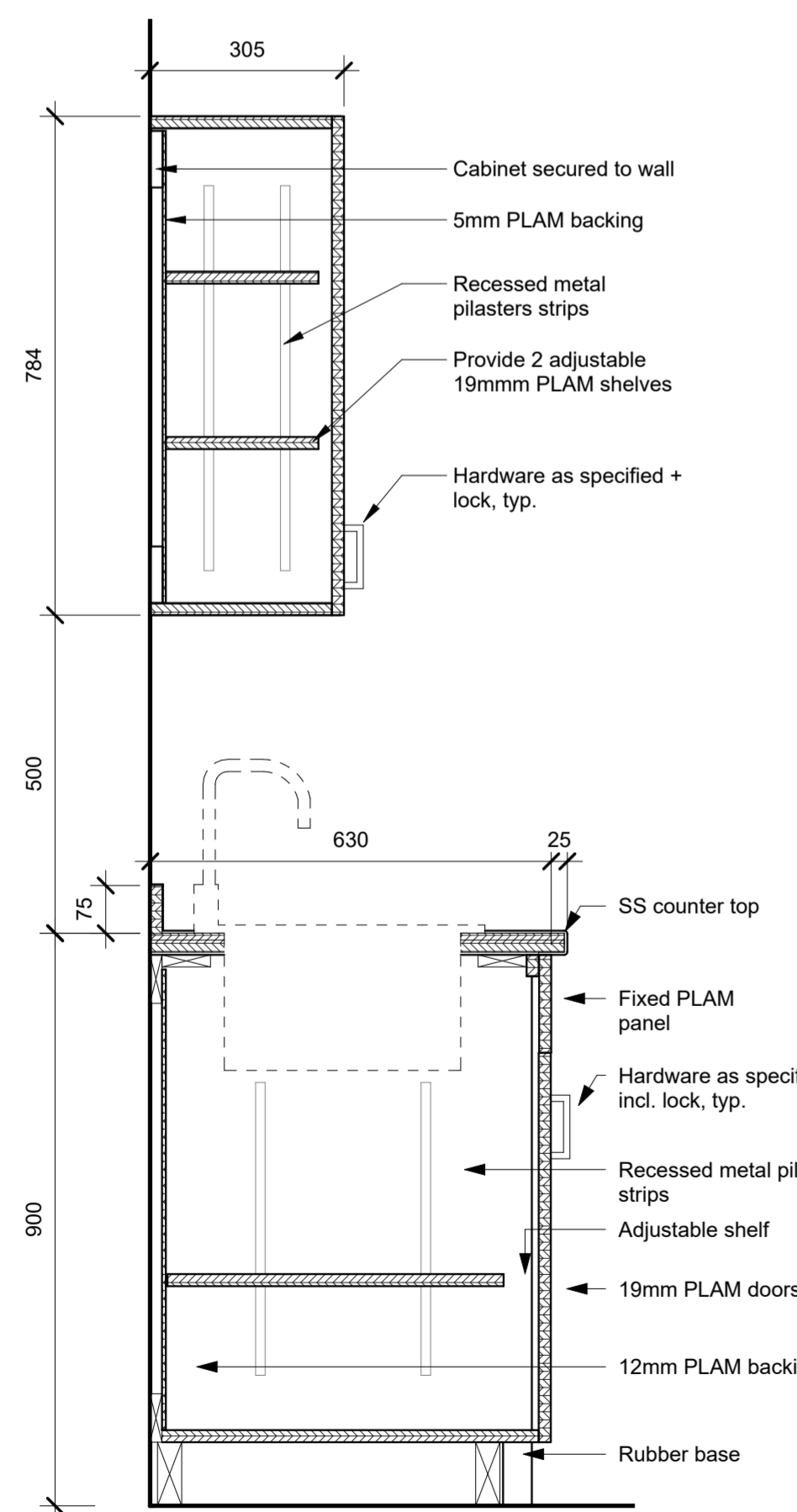
④ Section Through Closet Shelves
1 : 10



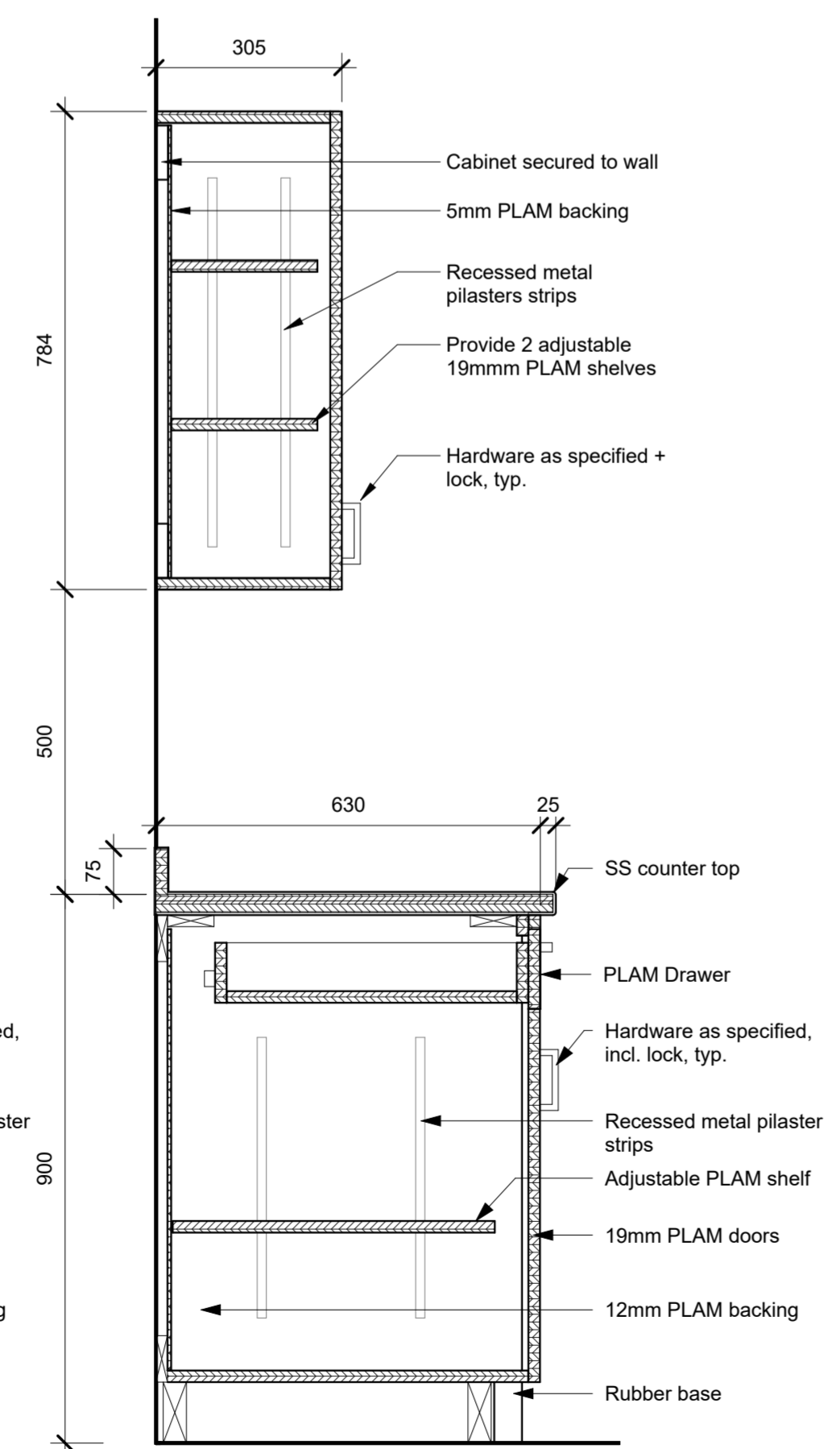
⑤ Typ. Section through Cubby
1 : 10

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Rev	Description	Date
16	Issued for Permit	26 Jul 2024
18	Issued for Tender	10 Oct 2024



⑥ MW1 Section 1 - Through Food Prep Sink
1 : 10



⑦ MW1 Section 2
1 : 10

Millwork Hardware Legend

Bumpers (2 each per door): Richelieu 3M (Peel & Stick)

Cabinet/Drawer Pulls: Richelieu Catalogue 6211 (BP621128195)

Cam lock for all cabinet doors & drawers: National NCL-C8060-4GKA413A (keyed alike except as noted)

Coat Hook (cubbies): Canadian Builders Hardware Model No. CBH-61, stainless steel

Concealed hinges: Blum Blumotion 110 degrees

Concealed shelf support brackets: Richelieu 1621712G

Recessed metal pilaster strips: Richelieu Heavy Duty Metal Pilaster 2332G - length to suit, flush installation

Steel Roller Glides at 150mm drawers: Accuride #2037 Full Extension

Steel Roller Glides at 233mm drawers: Accuride #3641 Full Extension

Soft close mechanism at all drawers: Richelieu BP97309910

Casters at Toy Carts: Gray Thermoplastic Rubber Casters for General Use
Richelieu F24787 (Swivel with Brake): 2 per cart
Richelieu F24786 (Swivel without Brake): 2 per cart

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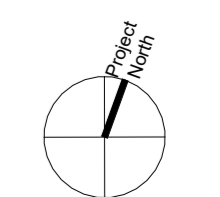
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CSV L'Harmonie Daycare Addition

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PROJECT CODE:	SCALE:
2207	As indicated
DATE:	STATUS:
10 October 2024	Issued for Tender

Millwork



drawing number
A6.1

CIVIL DRAWING LIST

- C1.0 GENERAL NOTES
- C1.1 TYPICAL DETAILS 1
- C1.2 TYPICAL DETAILS 2
- C2.0 SITE DEMOLITION PLAN
- C3.0 SITE SERVICING PLAN
- C4.0 SITE GRADING PLAN
- C5.0 SEDIMENT AND EROSION CONTROL PLAN

GENERAL NOTES:

- EXISTING UNDERGROUND SERVICE INFORMATION IS DERIVED FROM EXISTING DRAWINGS AND HAVE NOT BEEN LOCATED BY THE UTILITY COMPANIES. MP ASSUMES NO RESPONSIBILITY AS TO THE ACCURACY, CORRECTNESS AND COMPLETENESS OF THE UNDERGROUND SERVICE INFORMATION SHOWN ON THIS PLAN.
- CONSTRUCTION OF SEWERS, AND RELATED APPURTENANCES SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE REGION OF WATERLOO AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).
- RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE CONSTRUCTED AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR CONSTRUCTION.
- ALL EXCAVATIONS TO BE BACKFILLED WITH SELECT NATIVE MATERIAL, APPROVED BY THE ENGINEER, TO 95% SPD.
- THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING SILT CONTROL DEVICES AS SHOWN ON THE DRAWINGS AND AS DIRECTED BY THE ENGINEER.
- CONTRACTOR SHALL CHECK EXISTING SERVICES, EXACT LOCATION AND INVERTS BEFORE PROCEEDING WITH WORK. THE CONTRACTOR SHALL SATISFY THEMSELVES AS TO THE ACTUAL LOCATION AND DEPTH OF ANY UTILITIES AND SHALL BE LIABLE FOR ALL OR ANY DAMAGE FOR ANY DISCREPANCY. CONTACT THE ENGINEER.
- CONTRACTOR IS RESPONSIBLE FOR RESTORATION OF ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE LIMIT OF MUNICIPAL RIGHT-OF-WAY TO CITY OF WATERLOO STANDARDS.
- ALL WORK AND MATERIALS SHALL BE IN COMPLIANCE WITH ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS, CURRENT PROVINCIAL BUILDING CODE, AS WELL AS ALL APPLICABLE HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
- EXISTING ELEVATIONS AND LOCATION OF EXISTING SERVICES ARE NOT GUARANTEED. CONTRACTOR TO NOTIFY ENGINEER OF ANY DISCREPANCIES MINIMUM 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK. ALL EXISTING UTILITIES SHOWN ON THE DRAWINGS ARE FOR REFERENCE PURPOSES ONLY. THE CONTRACTOR SHALL CONTACT THE UTILITY COMPANIES FOR UTILITY STAKEOUT. IF REQUESTED BY THE CITY, MINISTRY OF TRANSPORTATION AND/OR ENGINEER, THE CONTRACTOR TO EXPOSE EXISTING SERVICES TO VERIFY EXACT LOCATION, PRIOR TO STARTING CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED TO THE EXISTING UTILITIES DURING CONSTRUCTION, OR DUE TO ITS' CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL WORK ON SITE WITH OTHER CONTRACTORS TO PREVENT CONFLICTS.
- ALL AREAS ON PLAN INCLUDING THE EXISTING CONCRETE SIDEWALK WHICH ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER. GRASSED AREAS SHALL BE RESTORED WITH SOD ON MINIMUM 150mm OF TOPSOIL.
- POSITIVE DRAINAGE SHALL BE PROVIDED THROUGHOUT THE SITE AT ALL TIMES DURING CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVALS AND SHALL ENSURE THEIR OFFSITE DISPOSAL.
- THE GENERAL NOTES MUST BE READ IN CONJUNCTION WITH THE DESIGN DRAWINGS AND SPECIFICATIONS OF ENGINEERING AND LANDSCAPE ARCHITECTURAL DISCIPLINES WHICH FORM PART OF THIS CONTRACT. THIS INCLUDES DRAWING SPECIFICATIONS AND SKETCHES. SHOULD THERE BE CONTRADICTORY INFORMATION BETWEEN DRAWINGS, SKETCHES AND SPECIFICATIONS, THE ONE WHICH IS MOST STRINGENT TAKES PRECEDENCE.
- REVIEW OF SHOP DRAWINGS BY STRUCTURAL CONSULTANT IS ONLY TO ASSES THAT SUBMITTED SHOP DRAWINGS REFLECT THE INTENT OF THE STRUCTURAL DESIGN.
- THE CONTRACTOR IS TO FAMILIARIZE THEMSELVES WITH THE REGIONAL STANDARD DETAILS. TYPICAL STANDARD DETAILS SHALL BE USED WHERE SPECIFIC DRAWING DETAILS ARE NOT CALLED OUT.
- ALL WORK REQUIRED, INCLUDING ANY DEMOLITION, SHALL BE CARRIED OUT IN A MANNER THAT WILL PREVENT OR MINIMIZE DAMAGE TO THE EXISTING SITE OR STRUCTURES TO THE BEST OF THE CONTRACTOR'S ABILITIES. ANY DAMAGE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
- THE GENERAL CONTRACTOR IS RESPONSIBLE TO COORDINATE WORK OF ALL SUBCONTRACTORS.
- THE GENERAL CONTRACTOR MUST REVIEW ALL DIMENSIONS PRIOR TO THE COMMENCEMENT OF ALL WORK AND MUST REPORT ALL DISCREPANCIES TO THE ENGINEER/LANDSCAPE ARCHITECT.
- THE FOLLOWING ITEMS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION. SUBMIT FOUR COPIES UNLESS NOTED OTHERWISE.

ITEMS	REQ'D SUBMITTAL?	ENGINEER'S STAMP REQ'D?	NOTES
CONC. MIX DESIGNS	YES		

SITE GRADING

- NATIVE BACKFILL MATERIAL SHOULD BE COMPACTED TO 98% STANDARD PROCTOR DENSITY. GRANULAR BACKFILL MATERIAL SHALL BE PLACED IN LAYERS 150mm IN DEPTH AND COMPACTED TO 98% STANDARD PROCTOR DENSITY.
- ACCORDING TO THE GEOTECHNICAL REPORT (FILE 315520) PREPARED BY PINCHIN DATED JANUARY 09, 2023, PAVEMENT SHALL BE:

PAVEMENT COMPONENT	COMPACTION REQUIREMENTS	PARKING AREA
SURFACE COURSE ASPHALTIC CONCRETE HL-4 (OPSS 1150)	92% MRD AS PER OPSS 310	35mm
BINDER COURSE ASPHALTIC CONCRETE HL-8 (OPSS 1150)	92% MRD AS PER OPSS 310	55mm
BASE COURSE GRANULAR "A" (OPSS 1010)	100% STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM-D498)	150mm
SUBBASE COURSE GRANULAR "B" TYPE 1 (OPSS 1010)	100% STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM-D498)	350mm
- SUBMIT ASPHALT MIX DESIGN AND TRIAL MIX TEST RESULTS TO CONSULTANT FOR APPROVAL.
- PROOF ROLLING OF SUBGRADE SHALL BE INSPECTED BY THE GEOTECHNICAL CONSULTANT.
- PLACE GRANULAR BASE TO COMPACTED THICKNESS AS INDICATED. DO NOT PLACE FROZEN MATERIAL.
- ASPHALT MATERIALS SHALL BE ROLLED AND COMPACTED TO A MINIMUM OF 97% MRD.
- PROOF ROLLING OF ASPHALT SHALL BE INSPECTED BY THE GEOTECHNICAL CONSULTANT.
- IF PAVEMENT CONSTRUCTION OCCURS IN WET, INCLEMENT WEATHER THE CONTRACTOR SHALL DISCUSS ADDITIONAL SUBGRADE SUPPORT WITH THE GEOTECHNICAL CONSULTANT AND PROVIDE ADDITIONAL GRANULAR SUB-BASE BASED ON THE GEOTECHNICAL CONSULTANT'S RECOMMENDATIONS.
- BACKFILL MATERIAL AND COMPACTION SHOULD BE IN CONFORMANCE WITH THE GEOTECHNICAL REPORT.

TESTING AND INSPECTION

- THE FOLLOWING ITEMS REQUIRE TESTING OR INSPECTION BY A CERTIFIED INDEPENDENT TESTING OR INSPECTION AGENCY PAID BY OWNER. THE AGENCY SHALL SEND COPIES OF ALL STRUCTURAL TESTING AND INSPECTION REPORTS TO THE ENGINEER FOR REVIEW.

ITEMS	REQ'D?	COMMENTS
SOIL BEARING CAPACITY	YES	BY SOILS ENGINEER
SOIL COMPACTION	YES	BY SOILS ENGINEER
CONC. COMPRESSIVE TESTS	YES	MIN. 2 SETS PER 50m ³
CONC. SLUMP	YES	
WELDED CONNECTIONS	YES	INSPECT ALL FIELD WELDS

CONCRETE AND REINFORCING

- CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION, TESTING AND STANDARD PRACTICES FOR CONCRETE SHALL BE IN ACCORDANCE WITH CSA STANDARD A23.1/A23.2 (LATEST EDITION).
- CONCRETE DESIGN SHALL BE IN THE DESIGN OF CONCRETE STRUCTURES CSA STANDARD A23.3 (LATEST EDITION).
- SUPPLY AND PLACE CONCRETE IN ACCORDANCE TO TABLE 1

TABLE 1					
LOCATION	MIN. COMPRESSIVE STRENGTH (f'c) AT 28 DAYS (MPa) (PSI)	SLUMP (mm)	EXPOSURE CLASS	AIR CONTENT (%)	
SIDEWALK/CURBS PAVING SLABS, EXTERIOR CONC.	35 [5000]	40 ± 20 (1 1/2 ± 1)	C-2	S-8	

PAVEMENT COMPONENT	THICKNESS (mm)
CONCRETE PAVERS:	
CONCRETE SLAB	150
GRANULAR "A" BASE	150
GRANULAR "B" SUBBASE	200 (OR AS PER GRADING)

- GRANULAR BASE LAYERS SHALL BE COMPACTED TO MIN. 98% STANDARD PROCTOR DENSITY.
- THE COMPRESSIVE STRENGTH OF THE CONCRETE IS BASED ON THE FOLLOWING CONDITIONS:
 - TYPE GU NORMAL PORTLAND CEMENT UNLESS OTHERWISE NOTED OR APPROVED
 - MAXIMUM SIZE OF AGGREGATE 20mm (3/4") WASHED IRREGULAR CUT CLEAR STONE. EXCEPT FOR CONCRETE TOPPING WHICH SHALL HAVE MAXIMUM SIZE OF AGGREGATE 10mm (3/8") WASHED IRREGULAR CUT CLEAR STONE.
 - SLUMP SHOWN ON THE TABLE IS SLUMP WITHOUT SLUMP AID ADMIXTURE. WHERE THE USE OF AN ADMIXTURE IS REFERRED TO INCREASE THE SLUMP, THE SUPERPLASTICIZED CONCRETE SLUMP MUST REMAIN BELOW THE POINT AT WHICH SEGREGATION WILL OCCUR

CONC. CURBS, SIDEWALKS

- REFER TO TABLE 1 FOR CONCRETE PROPERTIES FOR CURBS AND SIDEWALK
- EXPANSION JOINTS SHALL BE LOCATED AT A MAXIMUM 4.5m ON CENTRE AND WHERE CONCRETE MEETS OTHER HARD SURFACES AND STRUCTURES. (COORDINATE WITH LANDSCAPE DRAWINGS)
- CONSTRUCTION JOINTS WITH DOUBLE EDGER IN FRESH CONCRETE THEN SAWCUT TO A DEPTH OF 30mm. JOINTS SHALL BE SPACED AT MAXIMUM 1.5 METRES ON CENTRE. (COORDINATE WITH LANDSCAPE DRAWINGS)
- ALL BARRIER CURB WITHIN SITE TO BE OPSS 600.110. ALL CURB DEPRESSIONS ACROSS ENTRANCE DRIVEWAYS TO BE AS PER CITY STANDARD DRAWING OR MUNICIPAL STANDARDS.
- CURBS AT ALL PEDESTRIAN CONNECTIONS ARE TO BE DROP CURB.

EROSION CONTROL NOTES

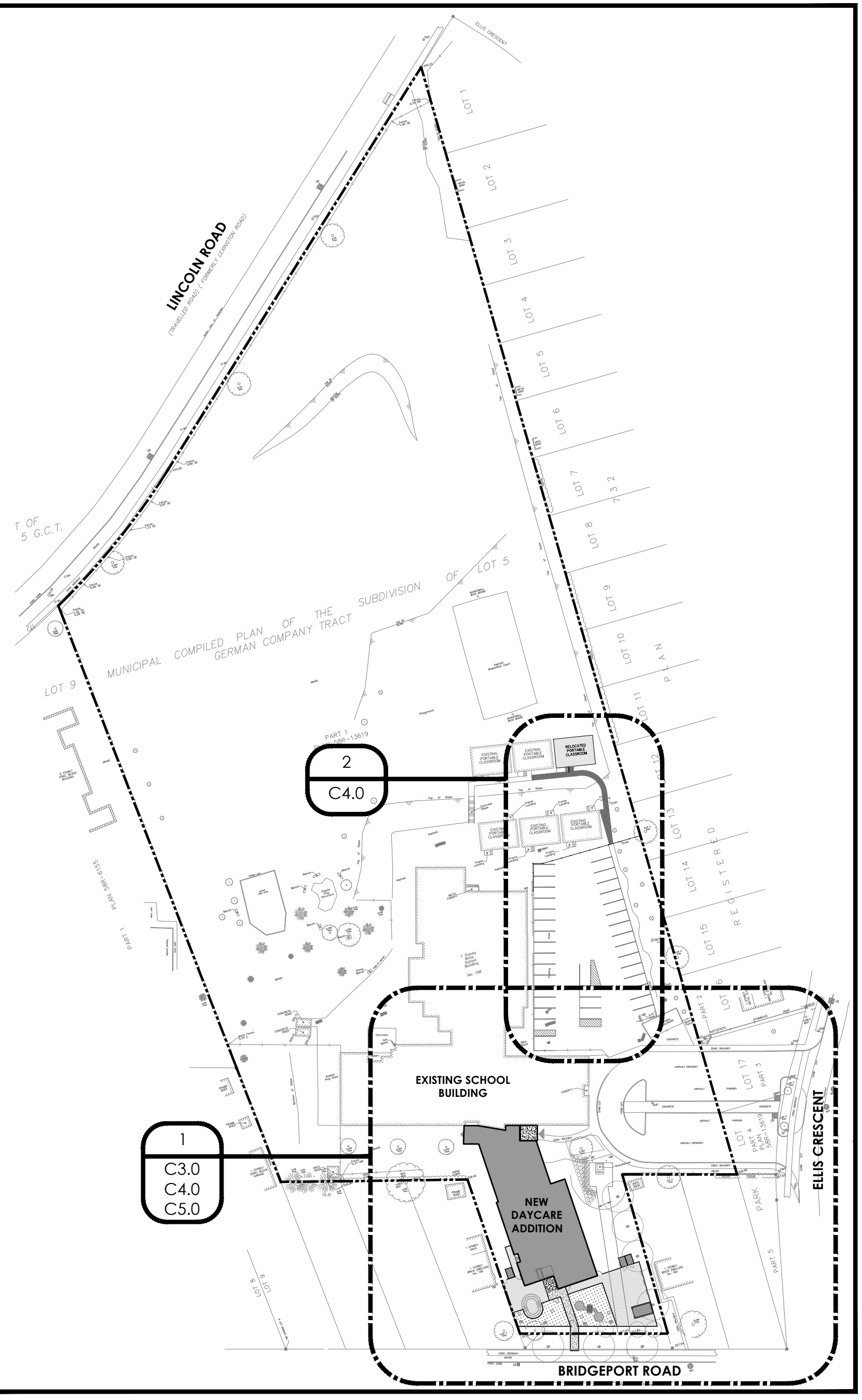
- ALL SILT FENCING TO BE INSTALLED PRIOR TO COMMENCEMENT OF ANY AREA GRADING, EXCAVATING, OR DEMOLITION.
- PROTECT ALL DISTURBED AND EXPOSED AREAS AS A RESULT OF CONSTRUCTION. STORM WATER MEASURES DURING CONSTRUCTION TO BE UTILIZED TO ENSURE SUITABLE DRAINAGE WHILE MINIMIZING EROSION. STOCKPILES ARE TO BE SEEDED OR COVERED WITH VEGETATIVE GROWTH FOR THE DURATION OF CONSTRUCTION.
- PROTECT ALL MANHOLES, AND PIPE ENDS (EXISTING AND NEW) FROM SEDIMENT INTRUSION WITH GEOTEXTILE CLOTH (TERRAFIX 270). ALL CATCHBASINS TO HAVE SILTSACK AS PER THE ATTACHED DETAILS.
- PREVENT WIND-BLOWN DUST TO THE BEST OF THE CONTRACTORS ABILITY. KEEP SOIL DAMP DURING DRY WHETHER OR BY OTHER MEANS NECESSARY TO COMPLETE THE WORK.
- ALL SILTATION CONTROL MEASURES SHALL BE CLEANED AND MAINTAINED AFTER EACH RAINFALL AS DIRECTED AND TO THE SATISFACTION OF THE CITY OF THE CITY OF WATERLOO.
- ADDITIONAL SILT CONTROL LOCATIONS MAY BE REQUIRED AS DETERMINED BY THE ENGINEER. THE CITY OF WATERLOO CONTRACTOR TO PROVIDE ALL ADDITIONAL EROSION CONTROL STRUCTURES.
- EROSION CONTROL STRUCTURES TO BE MONITORED REGULARLY BY CONTRACTOR AND ANY DAMAGE REPAIRED IMMEDIATELY. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF ONE THIRD (1/3) THE HEIGHT OF THE SILT FENCE.
- ALL EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RE-STABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE GROUND COVER.
- THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SEDIMENTS FROM THE MUNICIPAL ROADWAY AND SIDEWALKS AT THE END OF EACH WORK DAY.
- MUD MATS OF 50 CRUSHER RUN LIMESTONE OR 75 ASPHALT ON MINIMUM DEPTH OF CRUSHER RUN LIMESTONE, 120 METRES LONG, 10 METRES WIDE, 450MM DEEP SHALL BE PROVIDED ON SITE CONSTRUCTION ENTRANCES. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE ITS EFFECTIVENESS AT ALL TIMES. REFERENCE SHOULD BE DRAWN TO LOCATIONS ON DRAWING.
- CONSULTANT TO MONITOR THE SITE DEVELOPMENT TO ENSURE ALL EROSION CONTROLS ARE INSTALLED AND MAINTAINED TO CITY REQUIREMENTS.
- ALL GRADES WITHIN THE REGULATORY FLOOD PLAN TO BE MAINTAINED OR MATCHED.
- ALL ACTIVITIES INCLUDING MAINTENANCE PROCEDURE WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER

WATER SERVICE

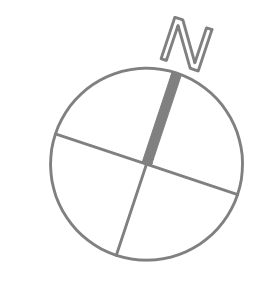
- ALL SERVICES TO BE INSTALLED AS PER CITY STANDARDS AND SPECIFICATIONS MANUAL.
- EXISTING HYDRANTS SHALL BE PROTECTED DURING THE CONSTRUCTION.
- COPPER SERVICE PIPE FOR SERVICES 50mm AND SMALLER SHALL BE TYPE 'K' SOFT COPPER AND SHALL CONFORM TO ASTM B88.
- THE CLEAR SEPARATION BETWEEN WATERMANS AND SEWERS SHALL BE 2.5M CLEAR SEPARATION AS PER MOECC REQUIREMENTS "WATERMAIN DESIGN CRITERIA FOR FUTURE ALTERATIONS AUTHORIZED UNDER A DRINKING WATER WORKS PERMIT.
- CONCRETE THRUST BLOCKS (SSMS E2-01) TO BE INSTALLED ON ALL WATERMAIN BENDS, VALVES, JOINTS, TEES AND PLUGS.
- ALL WATERMAIN TO BE BACTERIOLOGICAL AND HYDROSTATICALLY TESTED AS PER CITY OF WATERLOO AND ONTARIO PROVINCIAL STANDARDS.
- THE DEPTH OF COVER FROM FINISHED GRADE TO THE TOP OF PIPE SHALL NOT BE LESS THAN 2m FOR 300mm DIAMETER AND SMALLER, AND NOT LESS THAN 1.8m FOR 450mm DIAMETER AND LARGER.
- MINIMUM BEDDING REQUIREMENTS FOR WATERMAIN AND ALL RELATED CONNECTIONS SHALL BE CLASS 'B' BEDDING AS PER THE REGION OF WATERLOO STANDARD DRAWING SSMS E1-01.
- INSPECTION AND TESTING OF WATER SERVICE AND WATERMANS TO BE TO THE SATISFACTION OF THE CITY OF WATERLOO IN ACCORDANCE WITH FORM 400 OF THE SPECIFICATIONS MANUAL AND MOE GUIDELINES
- JOINTS SHALL BE BELL AND SPOGOT WITH RUBBER GASKETS. IF GASKETS ARE SUPPLIED SEPARATELY, THEY SHALL BE INSERTED IN THE GROOVE OF THE BELL END OF THE PIPE.
- PIPE JOINT DEFLECTIONS ARE NOT ALLOWED.
- A #8 GAUGE TWU SOLID COPPER PLASTIC COATED COATER WIRE SHALL BE ATTACHED TO EVERY NON-METALLIC WATER SERVICE PIPE.
- SERVICES 100mm AND LARGER INCLUDING VALVES, JOINTS AND BENDS, REGARDLESS OF SIZE SHALL BE FULLY RESTRAINED FROM THE WATERMAIN TO THE PROPERTY LINE.

SEWER SERVICE

- ALL SERVICES TO BE INSTALLED AS PER THE LATEST CITY STANDARDS AND SPECIFICATIONS MANUAL.
- MINIMUM AND MAXIMUM FLOW VELOCITIES SHALL BE IN ACCORDANCE WITH MOECC DESIGN GUIDELINES.
- MINIMUM BEDDING REQUIREMENTS FOR ALL SINGLE STORM AND SANITARY SEWER MAINS AND ALL RELATED CONNECTIONS SHALL BE CLASS 'B' BEDDING AS PER THE REGION OF WATERLOO STANDARD DRAWING SSMS E1-01.
- THE TRENCH ABOVE THE SPECIFIED BEDDING SHALL BE BACKFILLED WITH APPROVED NATIVE MATERIAL EXCAVATED FROM THE TRENCH OR OBTAINED ELSEWHERE ON THE PROJECT, AND SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm, AND SHALL BE COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.
- ALL MANHOLE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL WITHIN 300mm OF THE STRUCTURE AND COMPACTED TO 98% STANDARD PROCTOR DENSITY.
- SEWER BEDDING, COVER AND BACKFILL SHALL BE WITH GRANULAR A COMPACTED TO 100% SPMD AND IN ACCORDANCE WITH THE REGION OF WATERLOO GUIDELINES.
- STORM AND SANITARY TO BE INSTALLED WITH A MINIMUM 2.75m COVER AT THE PROPERTY LINE BELOW THE FINAL ROAD GRADE OR AT SUCH HIGHER ELEVATION ONLY AS MAY BE NECESSITATED BY THE LEVEL OF THE MAIN SEWER. ON PRIVATE PROPERTY, THE MINIMUM COVER IS NOT TO BE LESS THAN 1.2m.
- CONNECTIONS TO MANHOLES SHALL BE IN ACCORDANCE WITH OPSS 407.07 CONSTRUCTION SPECIFICATION FOR NEW MAINTENANCE HOLE, CATCH BASIN, DITCH INLET, AND VALVE CHAMBER INSTALLATION - SECTION 407.07.13 INSTALLATION OF INLET AND OUTLET PIPES INTO CONCRETE STRUCTURES C) RESILIENT CONNECTOR
- MAINTENANCE HOLE FRAMES AND LIDS SHALL BE ADJUSTED SO THAT WHEN TESTED WITH A 3 m STRAIGHT EDGE IN ANY DIRECTION OF THE SURFACE, THE GAP SHALL NOT EXCEED 7 mm BETWEEN THE BOTTOM OF THE STRAIGHT EDGE AND THE SURFACE OF THE ASPHALT OR FRAME AND APPURTENANCE.
- ALL NEW MAINTENANCE HOLES SHALL BE FITTED WITH SELF-ADJUSTING MANHOLE FRAME AND COVER FROM EAST JORDAN IRON WORKS (PRODUCT NO. 00302201), BIBBY-SIE-CROIX (AUTO STABLE C-50M-ONT) OR STAR PIPE PRODUCTS MH2451 OR APPROVED EQUIVALENT ON REGION OF WATERLOO. ALL SELF-LEVERS TO BE SUPPLIED WITH RUBBER GASKETS.
- FOR MAINTENANCE HOLE DEPTHS BETWEEN 5.0 AND 10.0 M, A SAFETY GRATE MUST BE INSTALLED AT THE MID-POINT. FOR MAINTENANCE HOLE DEPTHS BETWEEN 10.0 AND 15.0 M, A SAFETY GRATE MUST BE INSTALLED AT THE THIRD POINTS. REFER TO OPSS 404.02.
- STORM SEWERS SHALL BE PVC. BEL, SPOGOT JOINTS, RUBBER GASKET, LUBRICANT AND ALL OTHER NECESSARY APPURTENANCES SHALL BE MANUFACTURED IN CONFORMANCE WITH OPSS 1841 AND SHALL BE CERTIFIED TO CSA B 182.2 FOR PVC SEWER PIPE AND FITTINGS OR CSA B 182.4 FOR PROFILE PVC SEWER PIPE AND FITTINGS. PVC PIPE SHALL HAVE A MINIMUM PIPE STIFFNESS OF 320 KPA.
- ALL PVC STORM PIPES TO BE SDR-35 FOR 200MM DIAMETER AND COVER, AND SDR-28 FOR 150MM AND SMALLER TO CSA SPECIFICATIONS B182.2. PVC SANITARY PIPES TO BE SDR-35 FOR 200MM DIAMETER AND COVER, AND SDR-28 FOR 150MM AND SMALLER TO CSA SPECIFICATIONS B182.2.
- WHERE SANITARY OR STORM CROSSING OCCURS WITH EXISTING OR PROPOSED WATERMAIN, ENSURE A MINIMUM OF 2.5m HORIZONTAL SEPARATION AND 0.5m VERTICAL SEPARATION BY INSTALLING A VERTICAL BEND IN WATERMAIN IF REQUIRED. WATERMAIN TO CROSS BELOW OTHER SERVICES AT BENDS TO BE PREVENTED. A MINIMUM SEPARATION OF 0.1m BETWEEN SANITARY AND STORM SEWER PIPES TO BE REQUIRED WHERE ONE SEWER PIPE CROSSES OVER THE OTHER.
- ANY CHANGES IN GRADES AND CATCH BASINS REQUIRE THE APPROVAL OF THE DIRECTOR, DEVELOPMENT DIVISION, PLANNING AND DEVELOPMENT DEPARTMENT.
- EXISTING CAPACITY TO BE KEPT IN GOOD WORKING CONDITION AND OF ADEQUATE CAPACITY TO MEET THE REQUIREMENTS OF THE SITE. THE APPLICANT/OWNER OR THEIR CONTRACTOR IS RESPONSIBLE FOR HAVING THE SEWER TO BE REUSED VIDEO INSPECTED WHILE THE CITY OF HAMILTON SEWER INSPECTOR IS PRESENT. CONTACT PLANNING AND ECONOMIC DEVELOPMENT DEPARTMENT, FROWTH MANAGEMENT DIVISION, DEVELOPMENT ENGINEERING CONSTRUCTION SECTION AT (905) 546-2424 X 7860 TO ARRANGE FOR AN INSPECTION.
- ALL SEWERS TO BE VIDEO INSPECTED.
- ALL SEWERS TO BE FLUSHED PRIOR TO VIDEO INSPECTION.
- ALL PVC SEWERS (SANITARY AND STORM) ARE TO BE TESTED FOR DEFLECTION (MANDREL PASSAGE) AFTER INSTALLATION, PRIOR TO ASSUMPTION BY THE CITY. PIPE DEFLECTION TESTING SHALL BE REPEATED.



KEY PLAN SCALE: 1:1000



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5.	ISSUED FOR PERMIT	2023-12-22	Y.T.
4.	ISSUED FOR COORDINATION	2023-12-08	Y.T.
3.	ISSUED FOR SPA	2023-06-21	Y.T.
2.	ISSUED FOR 80% REVIEW	2022-12-23	Y.T.
1.	ISSUED FOR 60% COORDINATION	2022-11-23	Y.T.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

**158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO**

DRAWING TITLE:
**KEY PLAN
GENERAL NOTES**

SP-12-08

DRAWN BY:
A.A.

SCALE:
AS NOTED

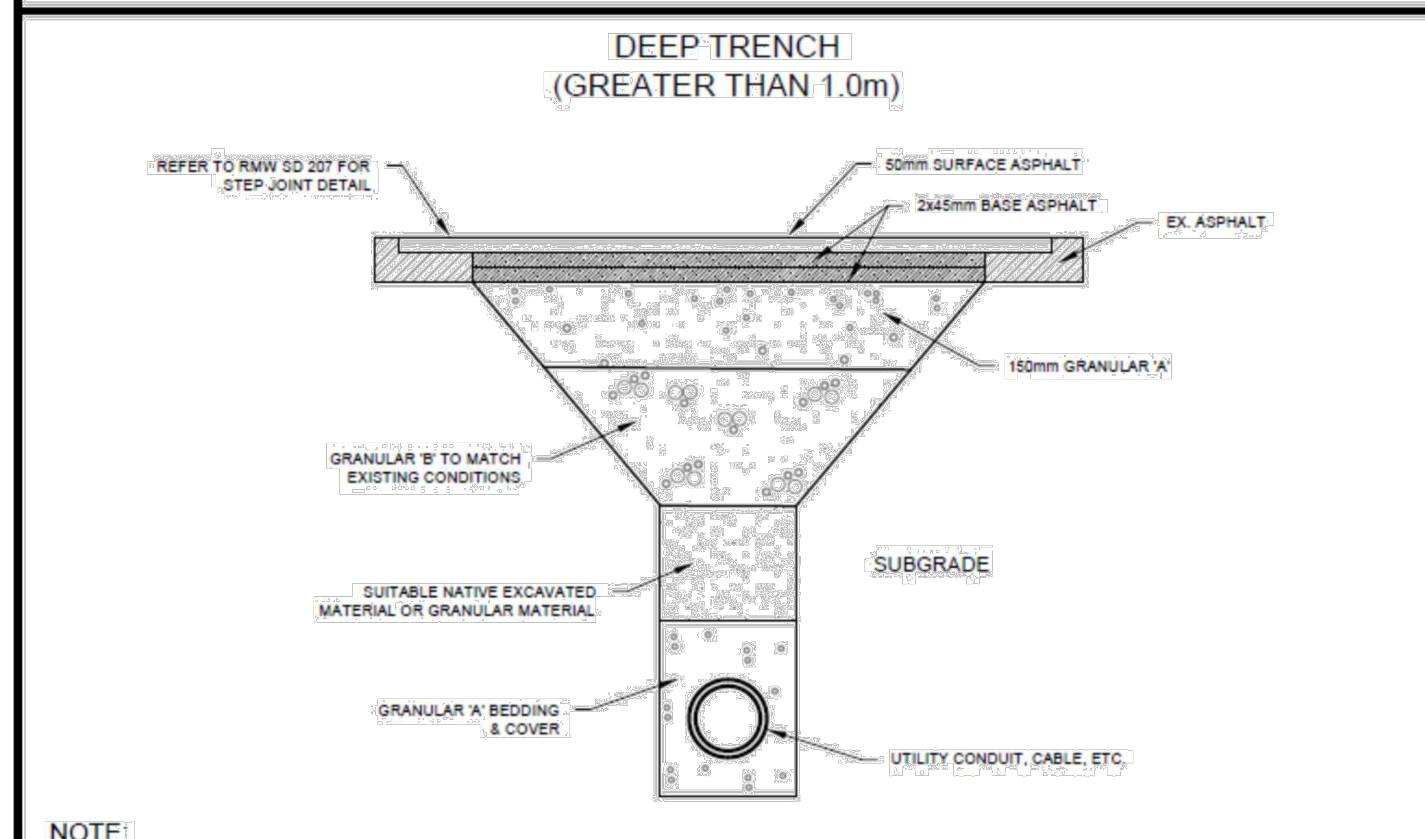
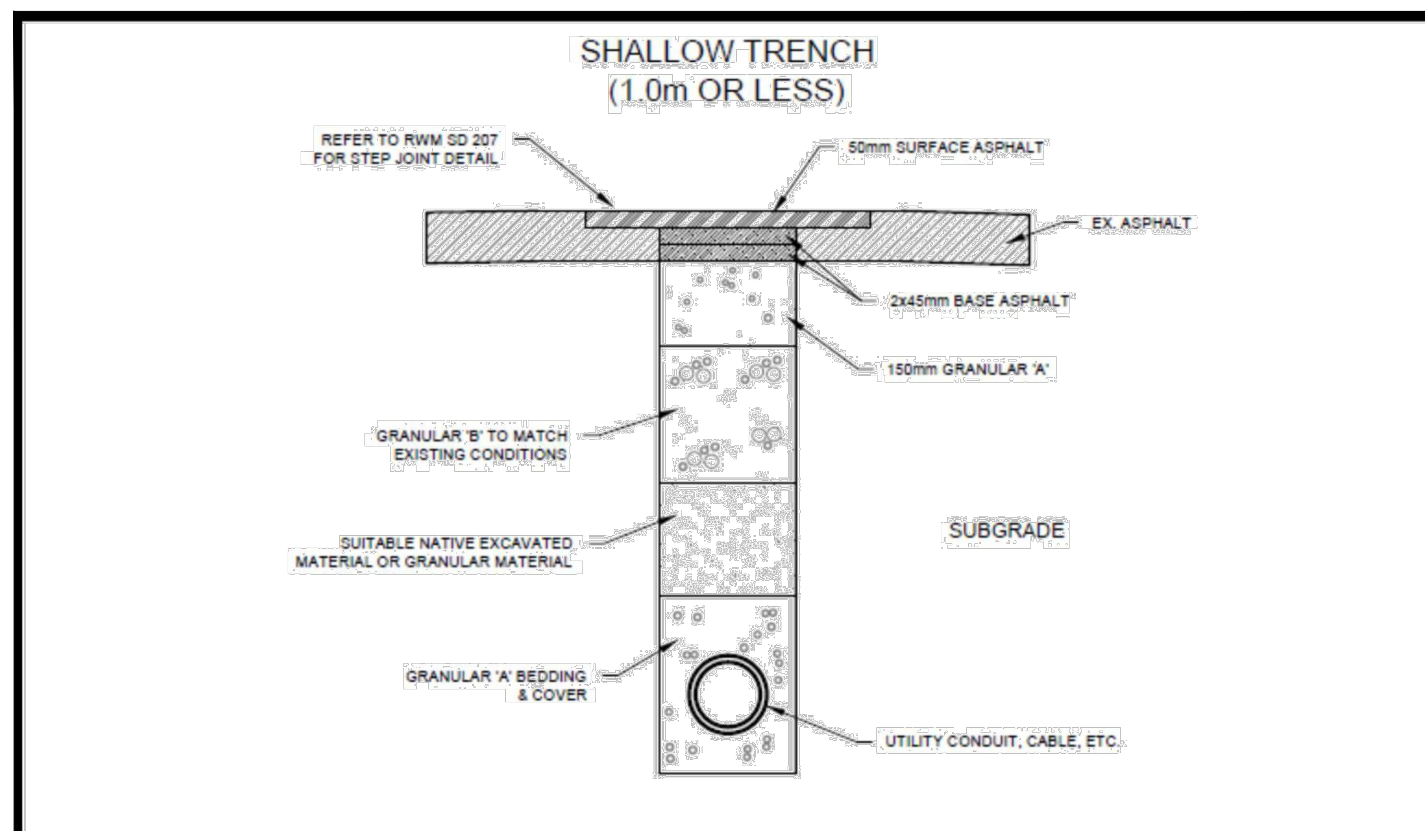
CHECKED BY:
T.Y.

DRAWING NUMBER:

DATE:
NOV 2022

C1.0

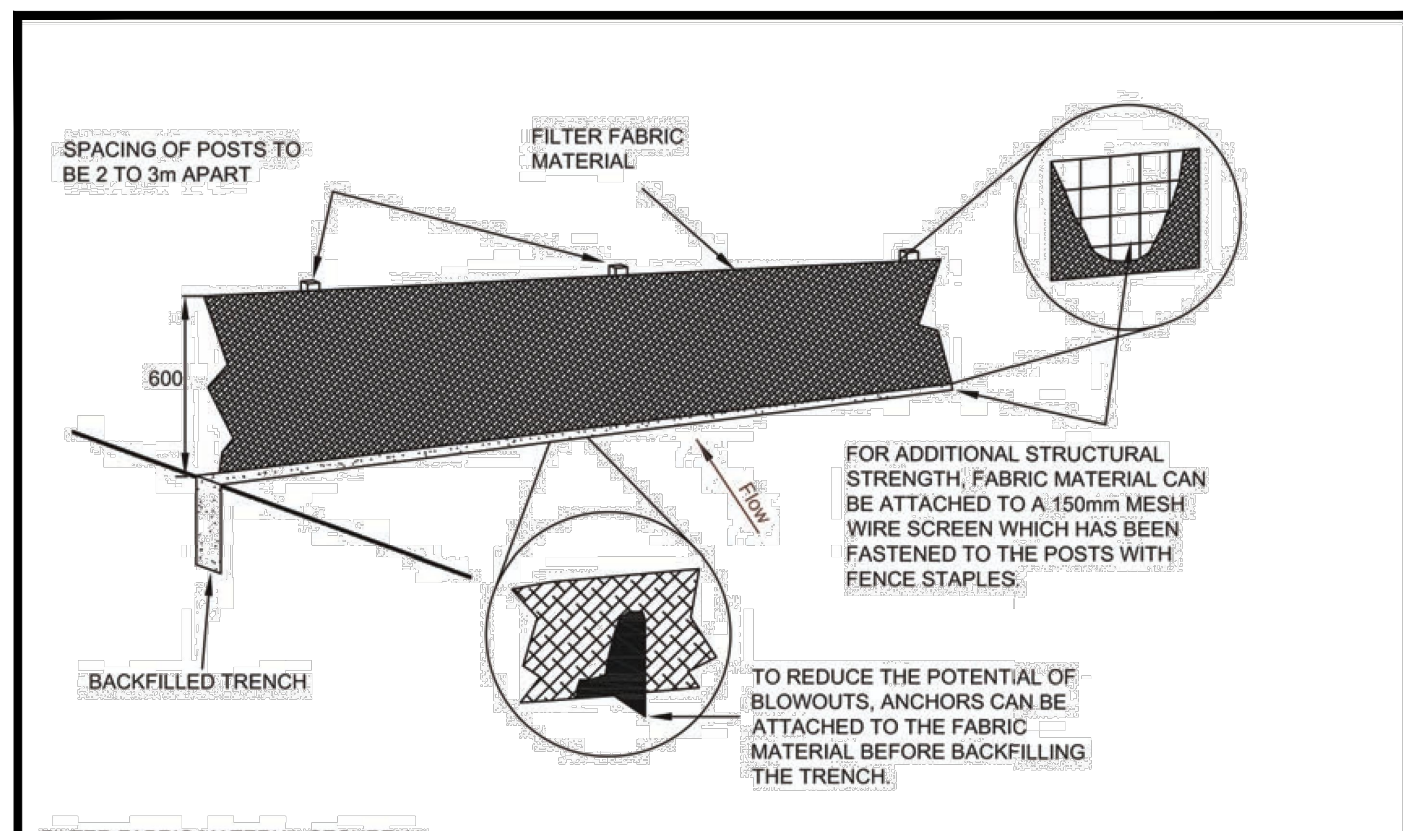
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22-058



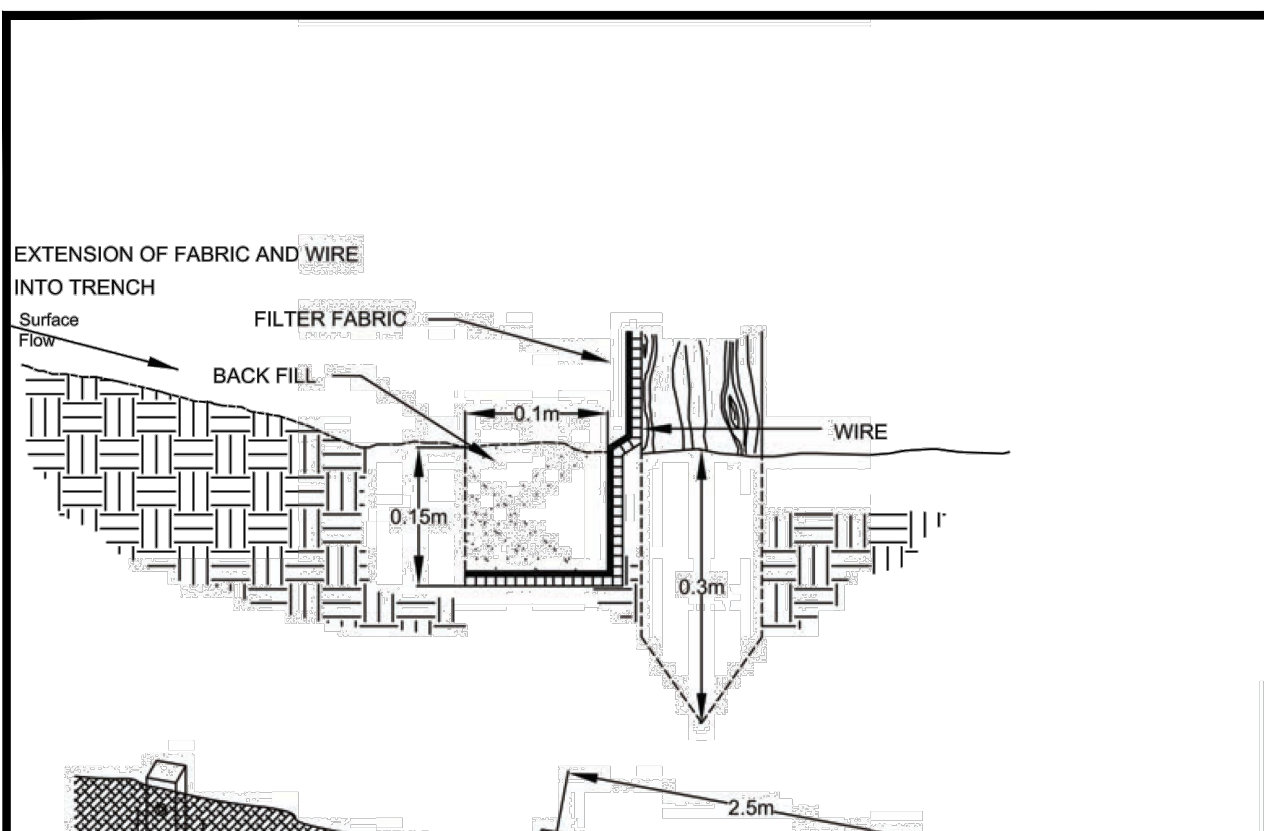
NOTE:
 1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
 2. THIS STANDARD TO BE READ IN CONJUNCTION WITH RWSS 10 AND RWSSP 507.01.
 3. GRANULAR 'B' THICKNESS TO MATCH EXISTING CONDITIONS.
 4. TRENCH WALLS PER EXISTING SOIL CONDITIONS.

EXCAVATION, CUT OR TRENCH RESTORATION DETAIL

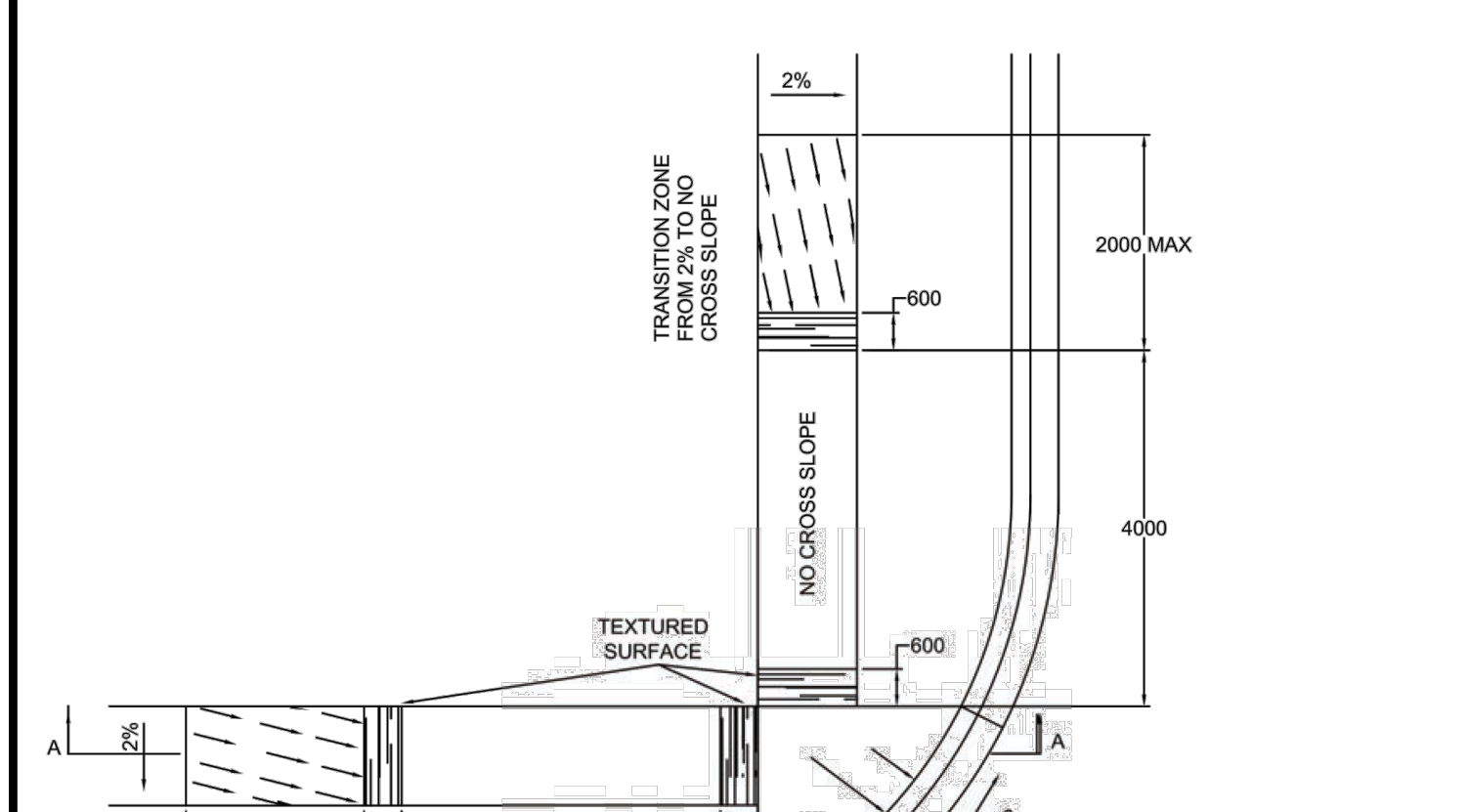
Region of Waterloo
 DATE: JAN 2009
 SCALE: NTS
 RMW STANDARD DRAWING
216



STANDARD DRAWING
SILT FENCE INSTALLATION
 REVISED: FEB 2008
 THE CITY OF **Waterloo**
W-401

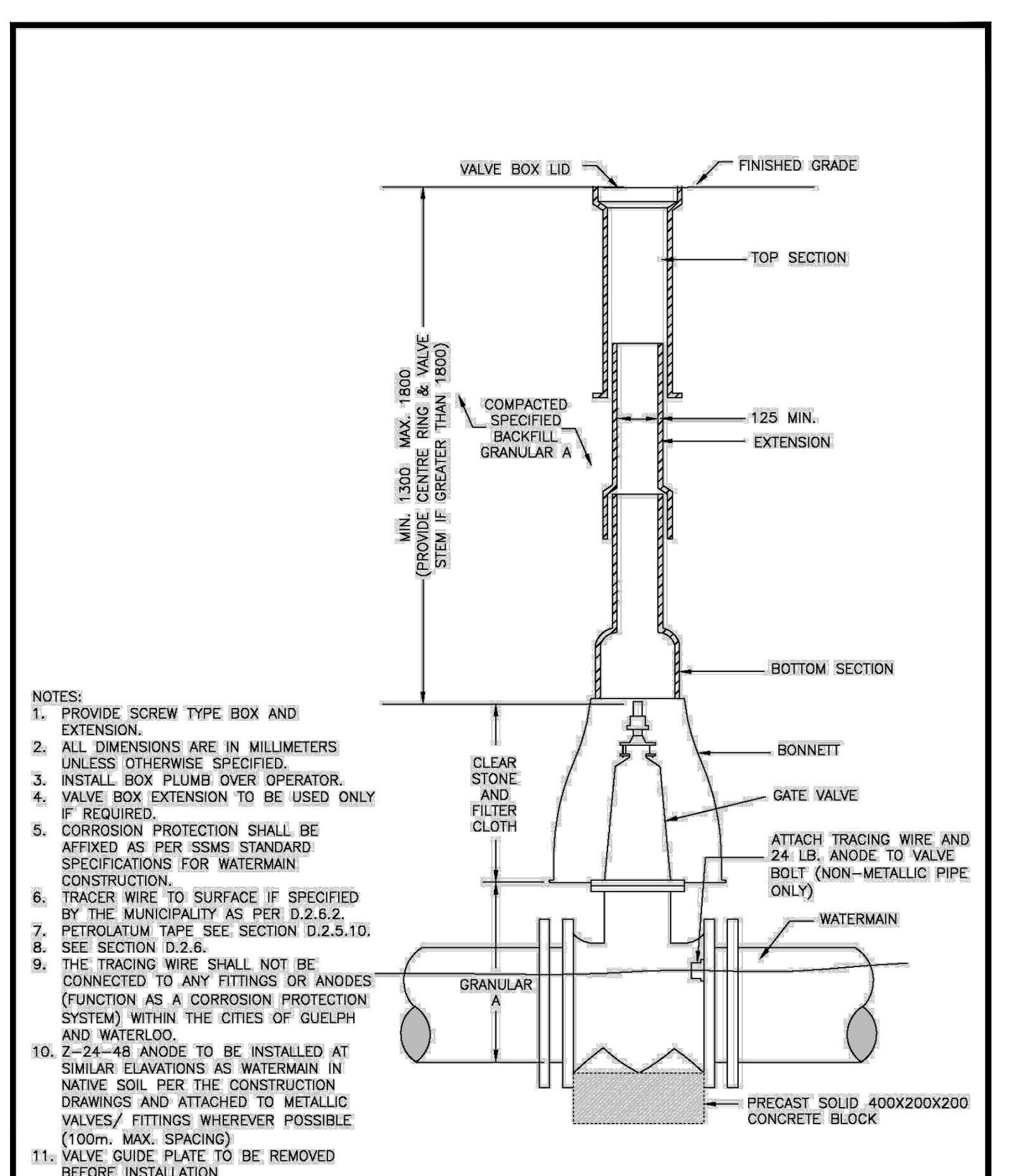


STANDARD DRAWING
SILT FENCE DETAILS
 REVISED: FEB 2008
 THE CITY OF **Waterloo**
W-402

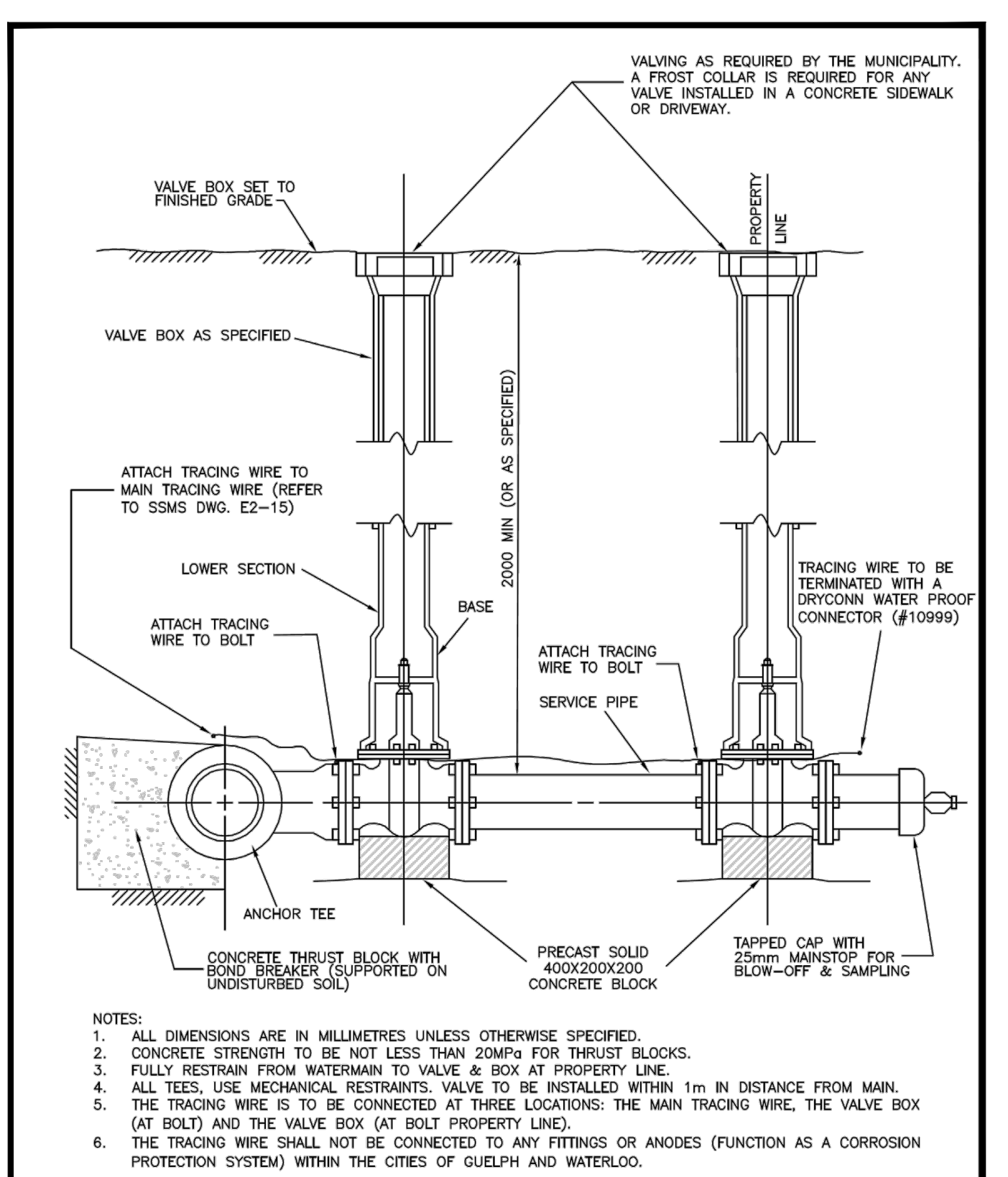


STANDARD DRAWING
CONSTRUCTION DETAILS OF SIDEWALK CURB AND GUTTERS
 REVISED: FEB 2003
 THE CITY OF **Waterloo**
W-240

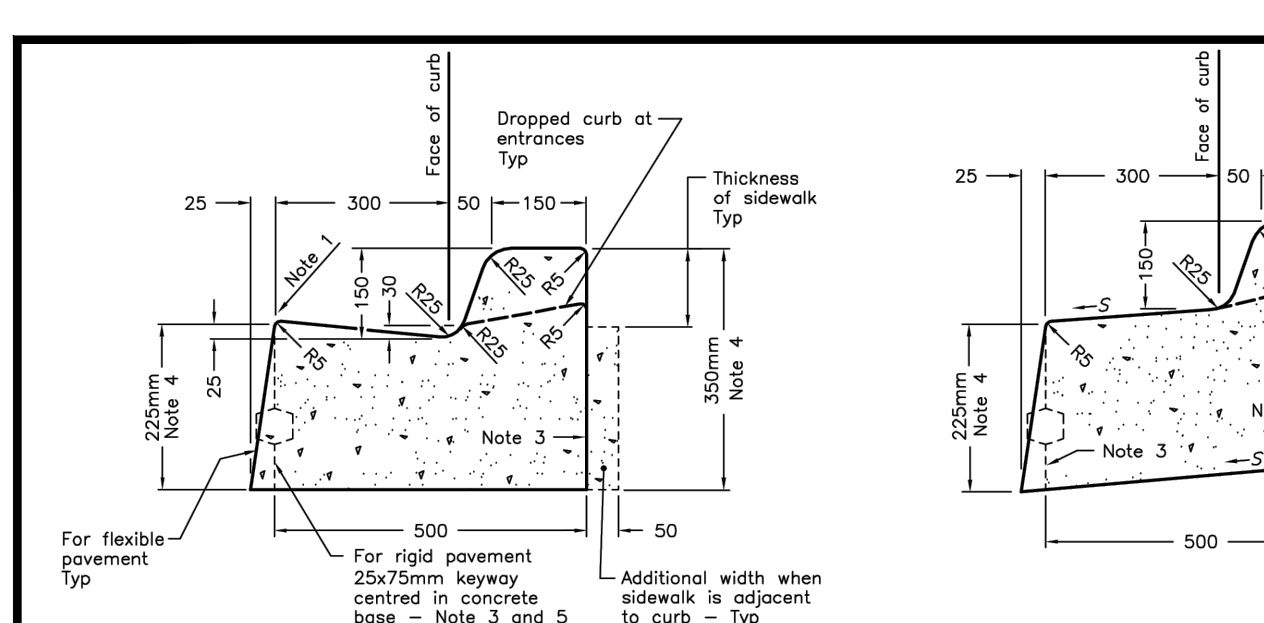
NOTES:
 1. ELIMINATE CROSS-SLOPE IN 2000mm TRANSITION ZONE.
 2. CONCRETE AS PER OPSD 310.10 28 DAY STRENGTH 32MP.
 3. TEXTURED SURFACE IS A COARSE BROOM FINISH WITH DEPTH VARIATIONS TO, BUT NOT EXCEEDING 6 mm.
 4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.



REGION OF WATERLOO AND AREA MUNICIPALITIES STANDARD DRAWINGS
VALVE AND BOX INSTALLATION DETAIL (UP TO 300mm DIAMETER)
 SSMS
 E2 - 02



REGION OF WATERLOO AND AREA MUNICIPALITIES STANDARD DRAWINGS
NON-METALLIC WATER SERVICE CONNECTION DETAIL 100mm OR LARGER
 SSMS
 E2 - 07



ONTARIO PROVINCIAL STANDARD DRAWING
CONCRETE BARRIER CURB WITH STANDARD GUTTER
 Nov 2012 Rev 2
 OPSD 600.040



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3.	ISSUED FOR SPA	2023-06-21	Y.T.
2.	ISSUED FOR 80% REVIEW	2022-12-23	Y.T.
1.	ISSUED FOR 40% COORDINATION	2022-11-23	Y.T.

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1.	ISSUED FOR 40% COORDINATION	2022-11-23	Y.T.

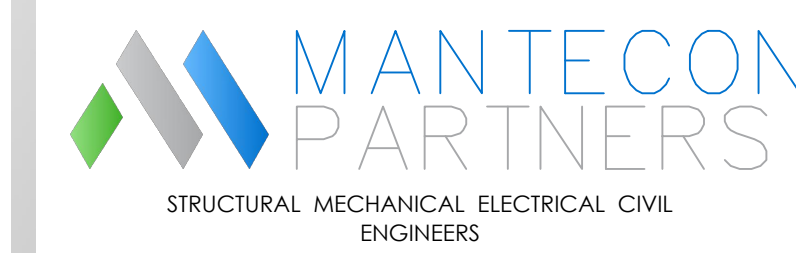
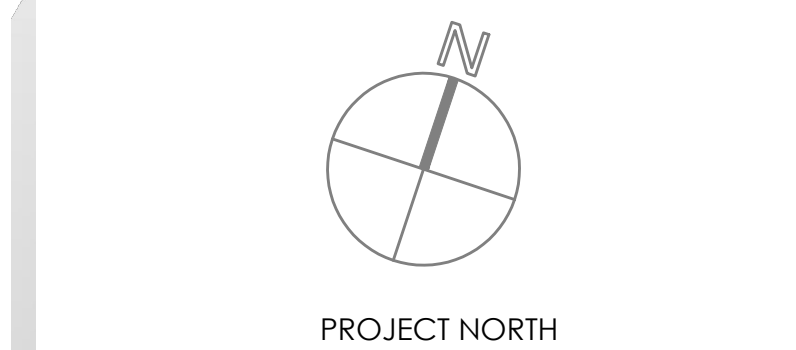
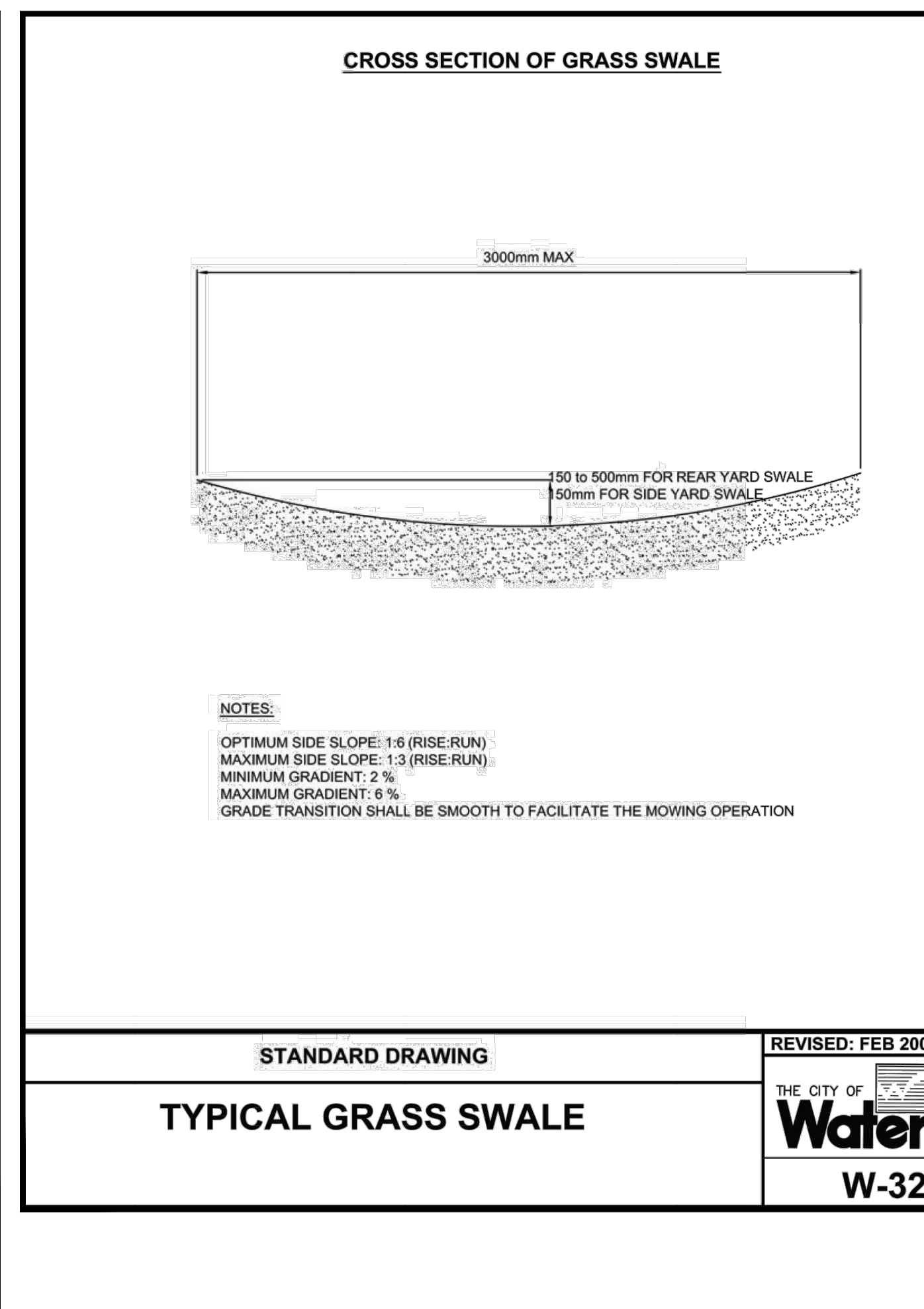
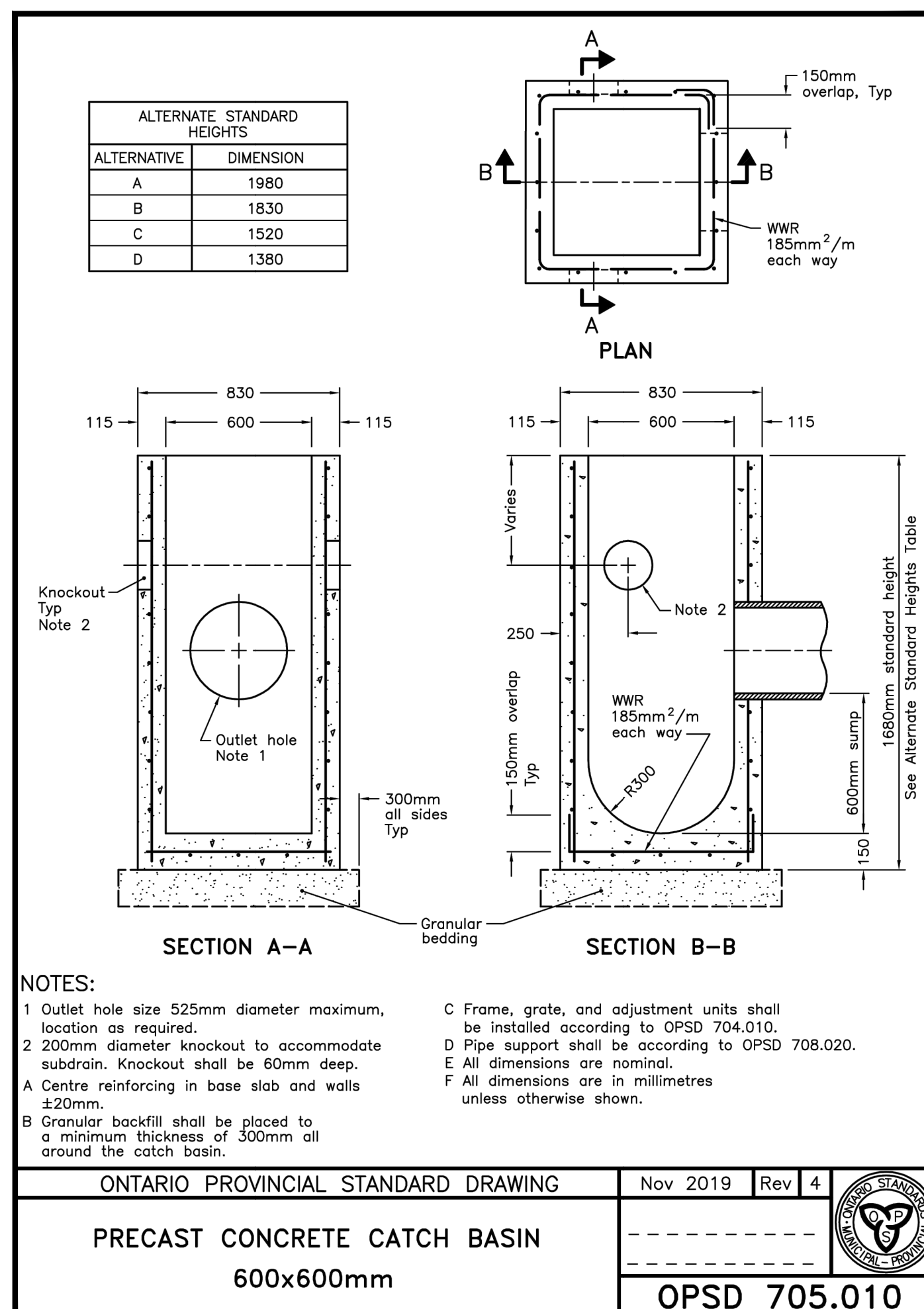
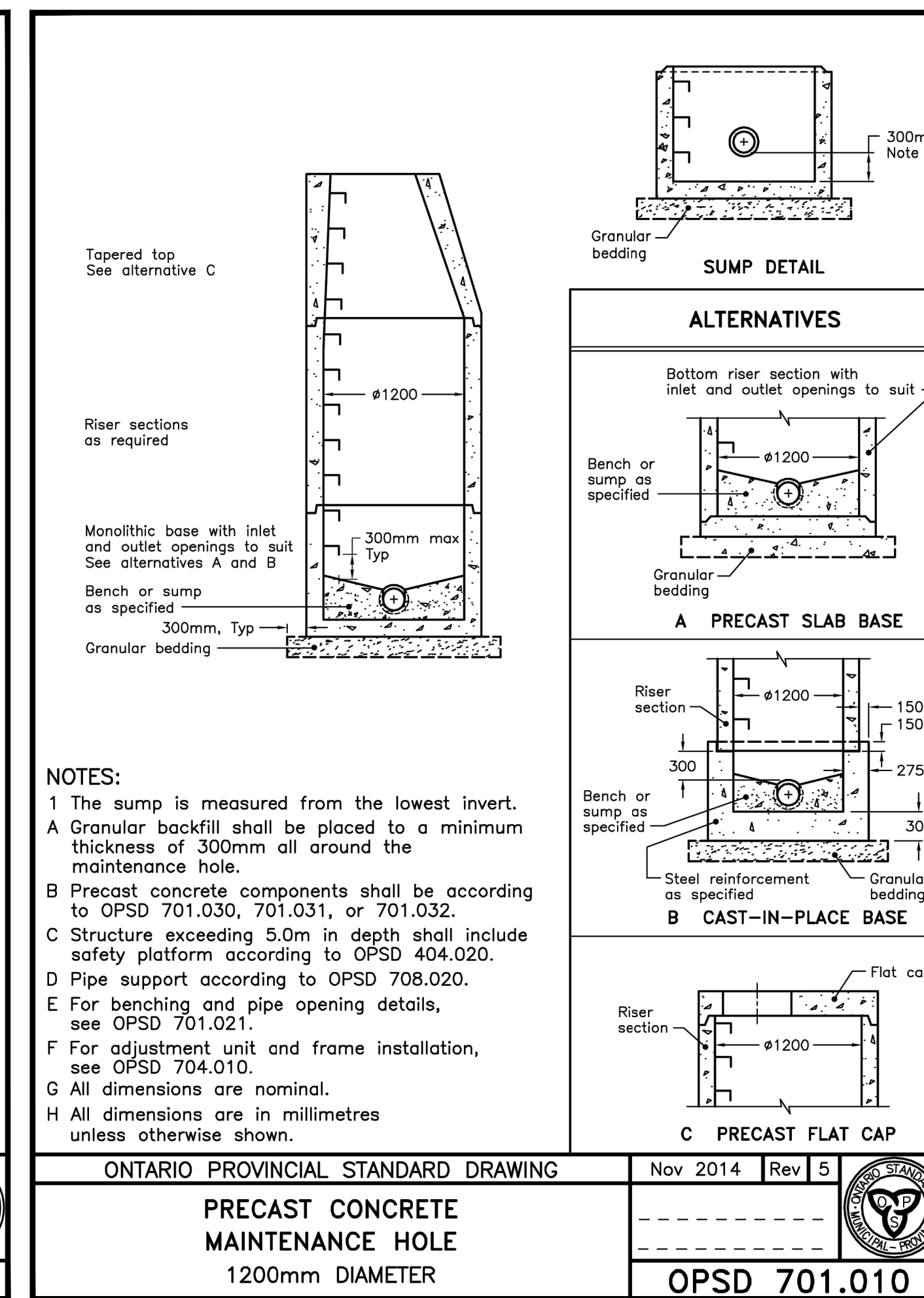
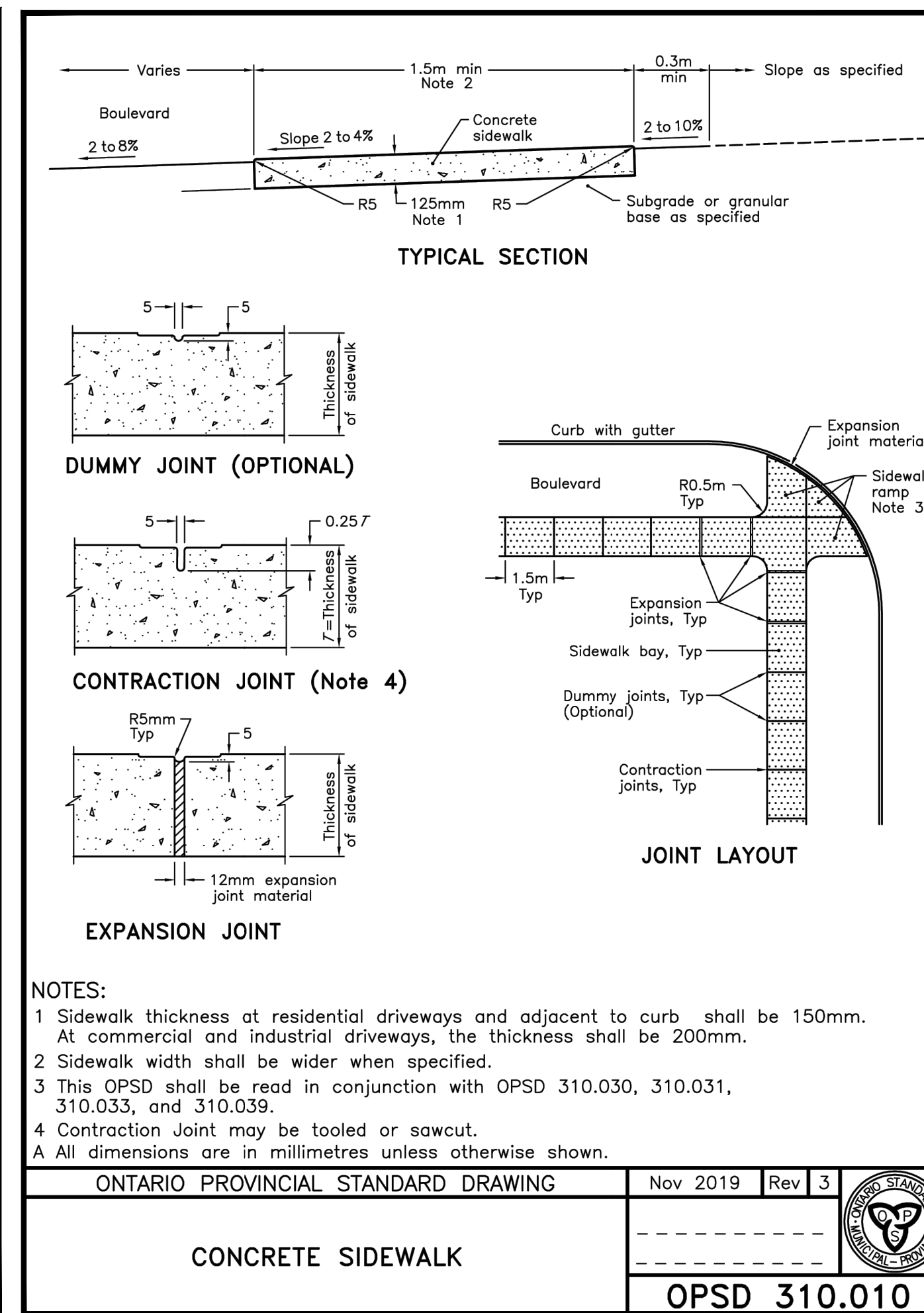
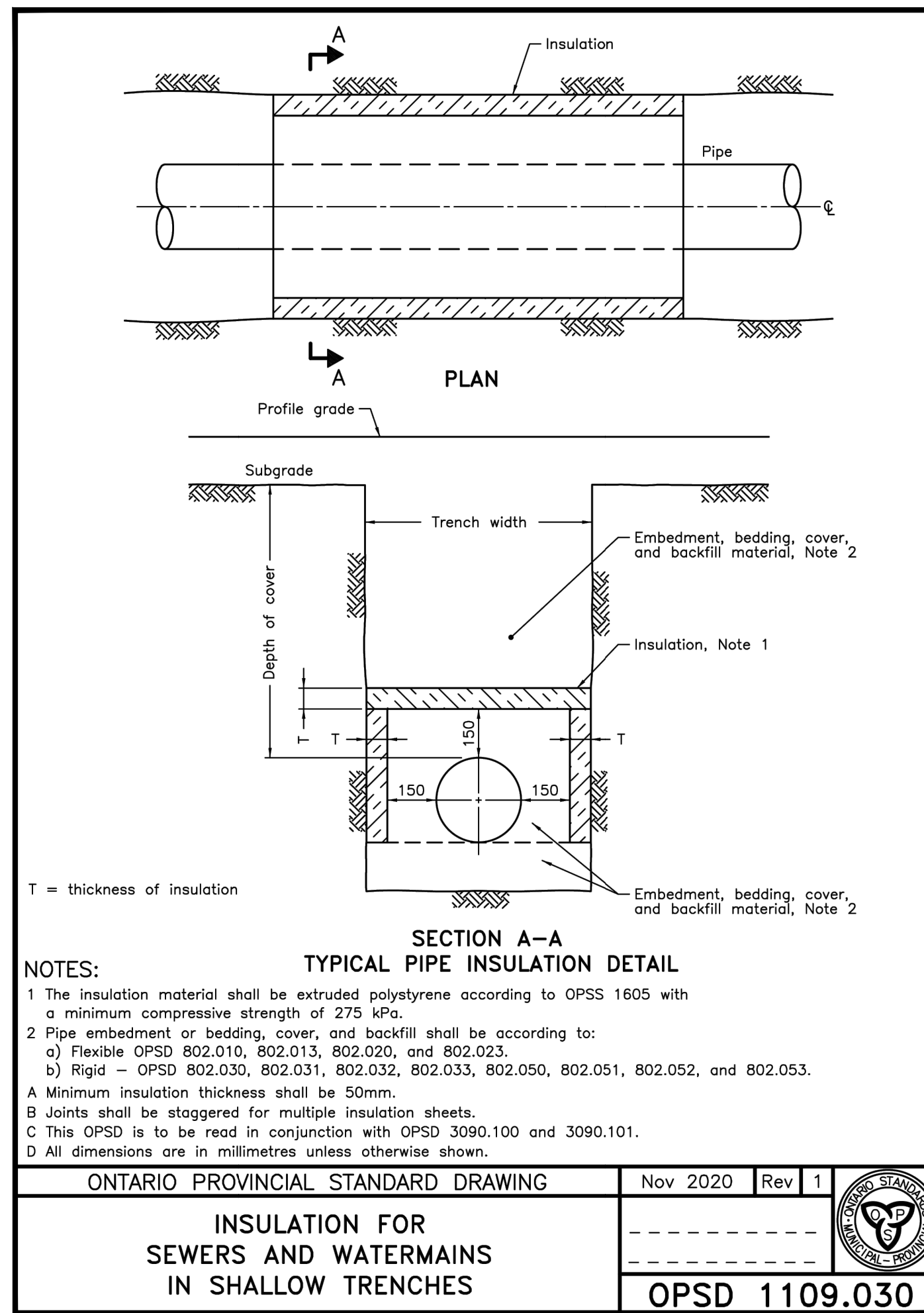
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
 158 BRIDGEPORT ROAD EAST
 WATERLOO, ONTARIO

DRAWING TITLE:
TYPICAL DETAILS 1

SP-12-08
 DRAWN BY:
A.A.
 CHECKED BY:
Y.T.
 DATE:
NOV 2022
 PROJECT NUMBER:
22-058

SCALE:
AS NOTED
 DRAWING NUMBER:
C1.1



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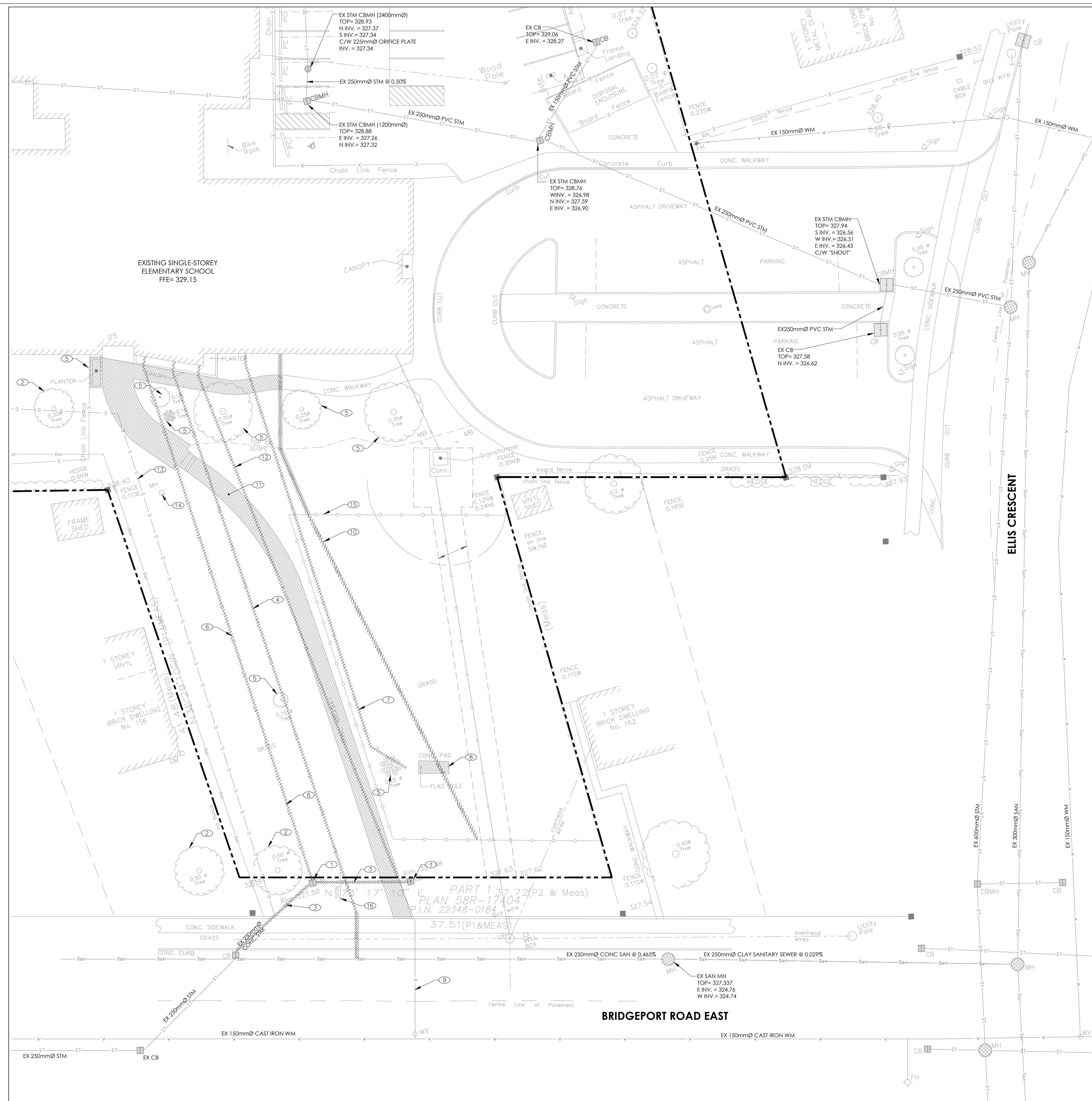
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2.	ISSUED FOR 80% REVIEW	2022-12-23	Y.T.
1.	ISSUED FOR 40% COORDINATION	2022-11-23	Y.T.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
 158 BRIDGEPORT ROAD EAST
 WATERLOO, ONTARIO

DRAWING TITLE:
TYPICAL DETAILS 2

SP-12-08
 DRAWN BY: A.A. SCALE: AS NOTED
 CHECKED BY: Y.T. DRAWING NUMBER:
 DATE: NOV 2022
 PROJECT NUMBER: 22-058
C1.2



LEGEND

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD GENERIC LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

REFER	DESCRIPTION
---	PROPERTY LINE
▭	EX BUILDING
W	EX WATER SERVICE
ST	EX STORM SEWER
San	EX SANITARY SEWER
G	EX GAS MAIN/LINE
H	EX ELECTRICAL SERVICE
Bell	EX BELL SERVICE
Com	EX COMMUNICATION SERVICE
---	EX PIPING TO BE REMOVED
---	EX ITEMS TO BE REMOVED

METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

- DEMOLITION NOTES**
- EXISTING CATCHBASIN TO BE REMOVED AND DISPOSED OF AS PER CITY'S STANDARDS
 - EXISTING TREE TO BE PROTECTED DURING CONSTRUCTION. REFER TO LANDSCAPE DRAWINGS FOR DETAILS.
 - EXISTING 250mm CONCRETE STORM SEWER TO BE REMOVED AND DISPOSED OF
 - EXISTING 150mm SANITARY SEWER TO BE REMOVED AND DISPOSED OFF.
 - EXISTING TREE/PLANTING TO BE REMOVED DISPOSED OF.
 - EXISTING 200mm CONCRETE STORM SEWER TO BE REMOVED AND DISPOSED OF.
 - EXISTING ELECTRICAL SERVICE TO BE REMOVED AND DISPOSED OFF.
 - EXISTING CONCRETE PAD AND FLAG POLE TO BE REMOVED AND DISPOSED OF.
 - EXISTING 64mm WATER SERVICE TO BE ABANDONED AS PER CITY'S STANDARDS.
 - EXISTING COMMUNICATION SERVICE TO BE REMOVED AND RELOCATED.
 - EXISTING CONCRETE SIDEWALK AND CONCRETE STEPS TO BE REMOVED AND DISPOSED OF.
 - EXISTING 64mm WATER SERVICE TO BE REMOVED AND DISPOSED OF.
 - EXISTING GAS SERVICE TO REMAIN. EXCAVATION IN THE VICINITY OF EXISTING GAS SERVICE SHALL BE CAREFULLY PERFORMED. NOTIFY ENGINEER UPON FINDINGS.
 - EXISTING ABANDONED ELECTRICAL MANHOLE TO BE REMOVED AND DISPOSED OF.
 - EXISTING FENCE AND GATE TO BE REMOVED AND DISPOSED OF.
 - EXISTING SIGN TO BE REMOVED AND RELOCATED AS PER ARCHITECTURAL SITE PLAN.

PROJECT NORTH

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4.	ISSUED FOR COORDINATION	2023-12-08	Y.T.
3.	RE-ISSUED FOR SPA	2023-06-21	Y.T.
2.	ISSUED FOR SPA SUBMISSION	2022-12-23	Y.T.
1.	ISSUED FOR SPA & 80% REVIEW	2022-12-23	Y.T.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

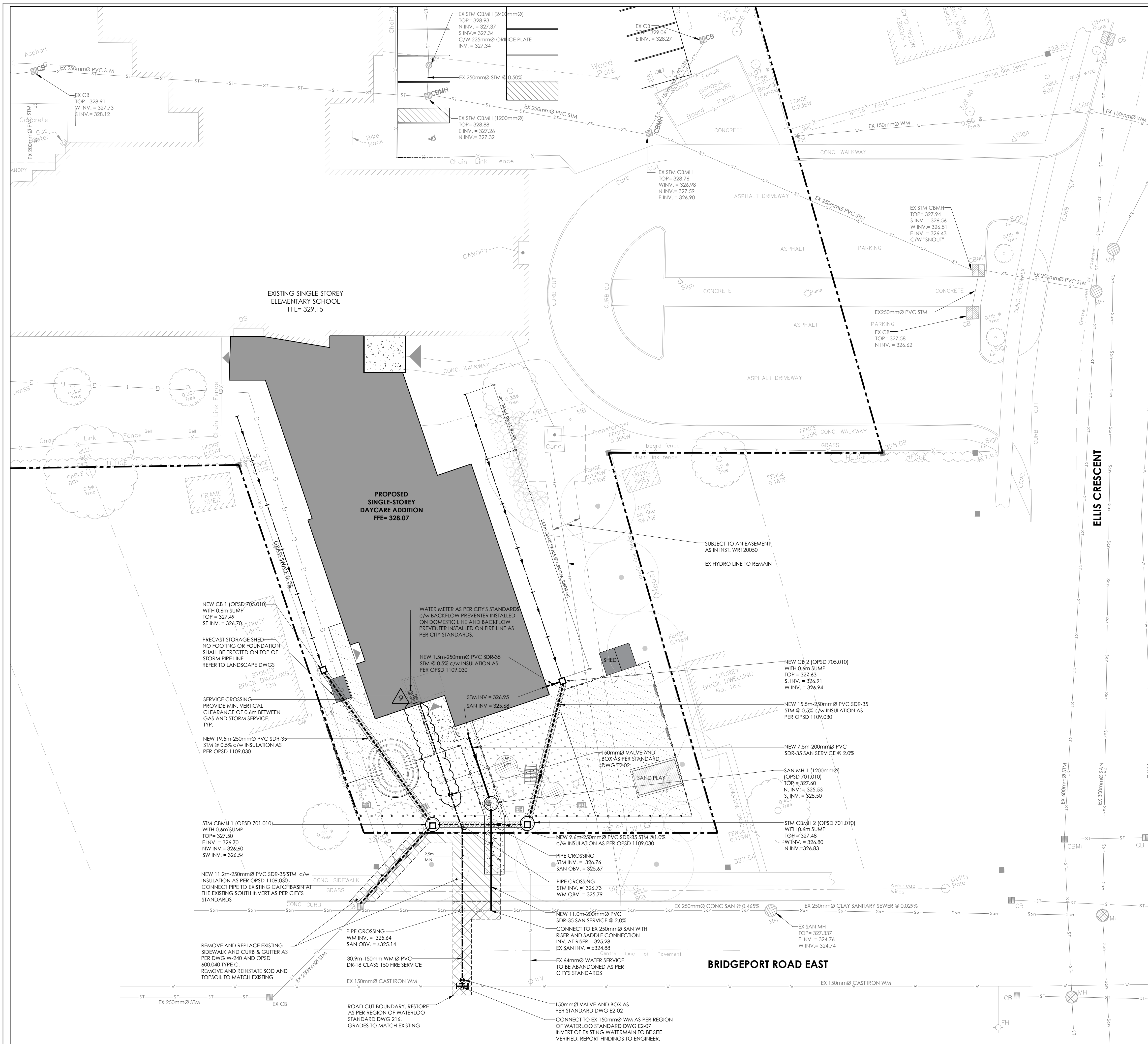
158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
SITE DEMOLITION PLAN

SP-12-08

DRAWN BY: A.A.	SCALE: AS NOTED
CHECKED BY: Y.T.	DRAWING NUMBER: C2.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

1 SITE DEMOLITION PLAN
SCALE: 1:200



LEGEND

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD/GENERIC LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

REFER	DESCRIPTION
---	PROPERTY LINE
▨	EX BUILDING
▨	NEW BUILDING
▨	NEW CONCRETE
▨	NEW ARTIFICIAL TURF
▨	NEW ASPHALT PAVEMENT
▨	NEW COLOURED ASPHALT
W	EX WATER SERVICE
ST	EX STORM SEWER
San	EX SANITARY SEWER
G	EX GAS MAIN/LINE
H	EX ELECTRICAL SERVICE
Bell	EX BELL SERVICE
---	EX PIPING TO BE REMOVED
---	EX ITEMS TO BE REMOVED
---	NEW WATER MAIN/LINE
---	NEW STORM SEWER
---	NEW SANITARY SEWER
CB	NEW CATCH BASIN
MH	NEW SEWER MANHOLE
CBMH	NEW CATCHBASIN MANHOLE
BP	NEW BACKFLOW PREVENTER
M	NEW WATER METER
VB	NEW VALVE BOX
TB	NEW THRUST BLOCK

METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

- DRAWING NOTES**
- WHEN WORKING IN THE ROAD ALLOWANCE A WORK PERMIT WILL BE REQUIRED. THE CONTRACTOR MUST CONTACT HELGA BOWMAN AT HELGA.BOWMAN@WATERLOO.CA OR 519 886 2310 X30270 FOR FURTHER INFORMATION ON THE WORK PERMIT.
 - RESTORATION WORK WITHIN THE RIGHT OF WAY, IF REQUIRED, MUST BE COMPLETED BY THE PERFORMING CONTRACTOR AT THE OWNER'S EXPENSE.
 - WORK IN THE RIGHT OF WAY WILL BE SUBJECT TO INSPECTION BY THE CITY UTILITY SERVICES DIVISION. CONTRACTOR SHALL CONTACT THE INSPECTOR FOR ALL SERVICE INSTALLATIONS PRIOR TO BACKFILLING SERVICES. PLEASE CONTACT INSPECTOR, LUKE MARTIN AT 519-886-1550 X78247 OR LUKE.MARTIN@WATERLOO.CA.
 - THE CONTRACTOR MUST SUBMIT THROUGH THE OWNER, AND UPON THE INSTALLATION OF THE WORKS, AS-RECORDED DRAWINGS AND A CERTIFICATE INDICATING THE WORKS (GRADING AND SERVICING) ARE IN ACCORDANCE WITH ACCEPTED DRAWINGS, CONTRACT DOCUMENTS, GOOD ENGINEERING PRACTICE AND ARE SUBSTANTIALLY COMPLETED AS DEFINED IN THE CONSTRUCTION LIEN ACT.
 - TRACER WIRE ON WATER SERVICE TO BE INSTALLED AS PER THE CONSTRUCTION SPECIFICATION FOR TRACER WIRE INSTALLATION IN THE CITY OF WATERLOO AND ASSOCIATED STANDARD DRAWINGS (100-104).
 - SERVICING INSTALLATIONS WITHIN THE MUNICIPAL RIGHT OF WAY TO BE COMPLETED AS PER REGION OF WATERLOO DGSSMS.
 - ANY UTILITIES IN THE RIGHT OF WAY THAT MAY NEED TO BE RELOCATED WILL BE AT THE COST OF THE DEVELOPER.

PROJECT NORTH

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SEAL

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4	RE-ISSUED FOR SPA SUBMISSION	2023-06-21	Y.T.
3	ISSUED FOR SPA SUBMISSION	2022-12-23	Y.T.
2	ISSUED FOR 80% REVIEW	2022-12-23	Y.T.
1	ISSUED FOR 60% COORDINATION	2022-11-23	Y.T.

CLIENT

WORKSHOP ARCHITECTURE

PROJECT:

CSV L'HARMONIE DAYCARE ADDITION

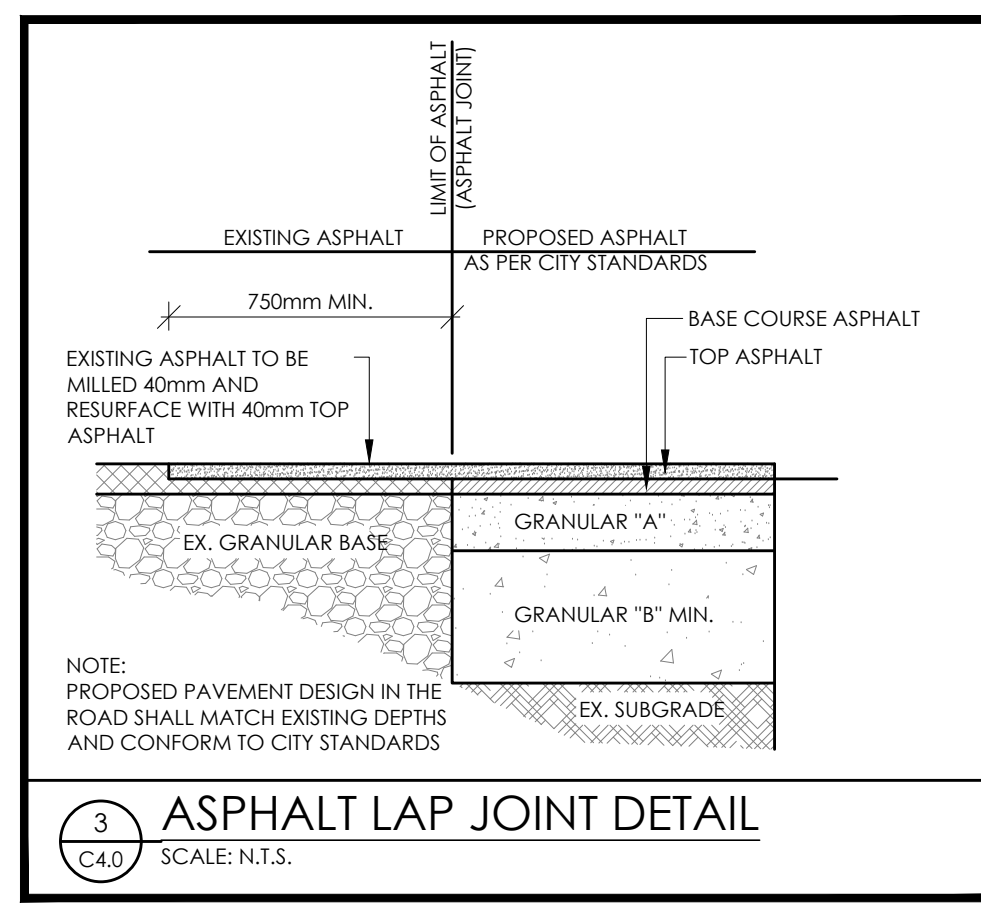
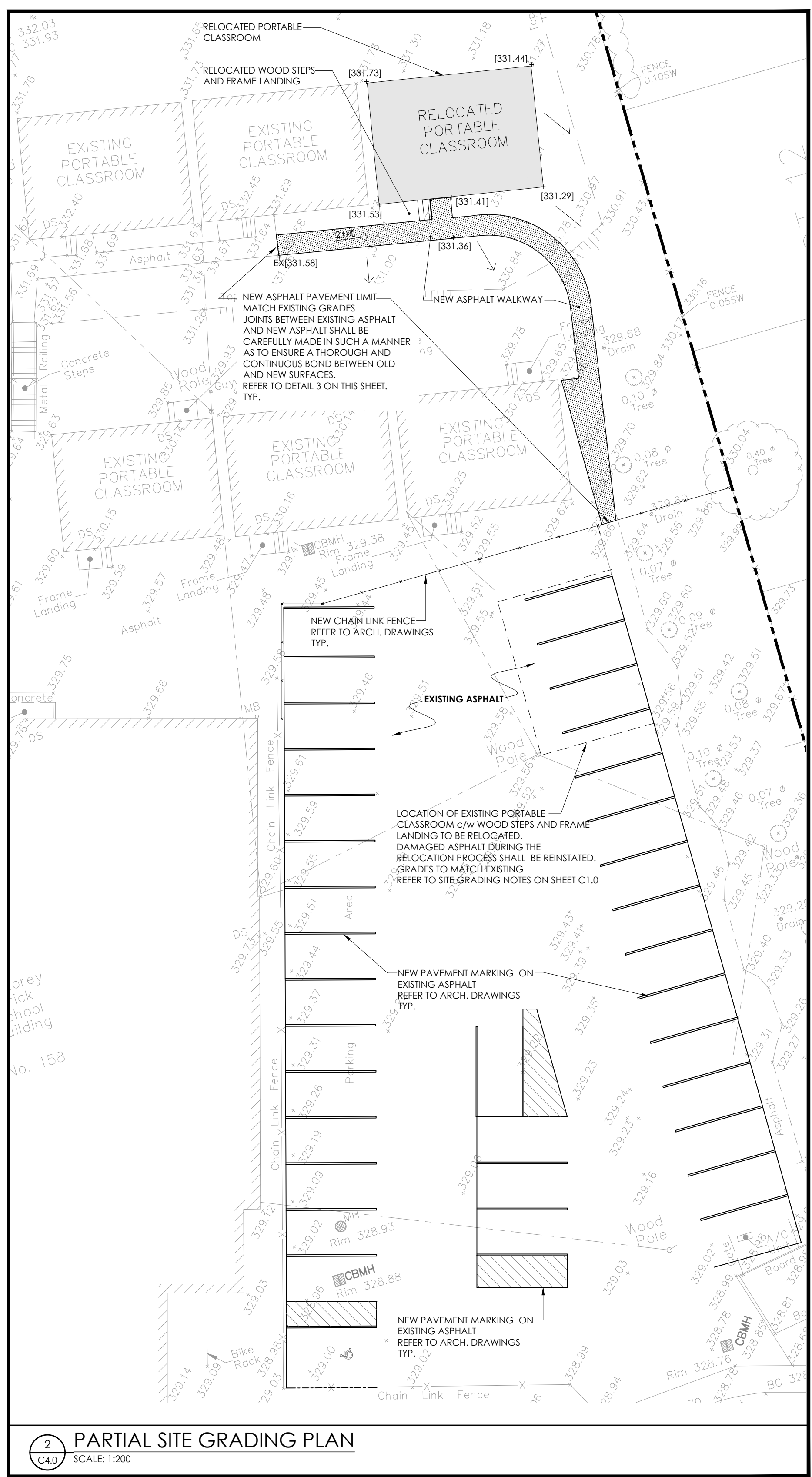
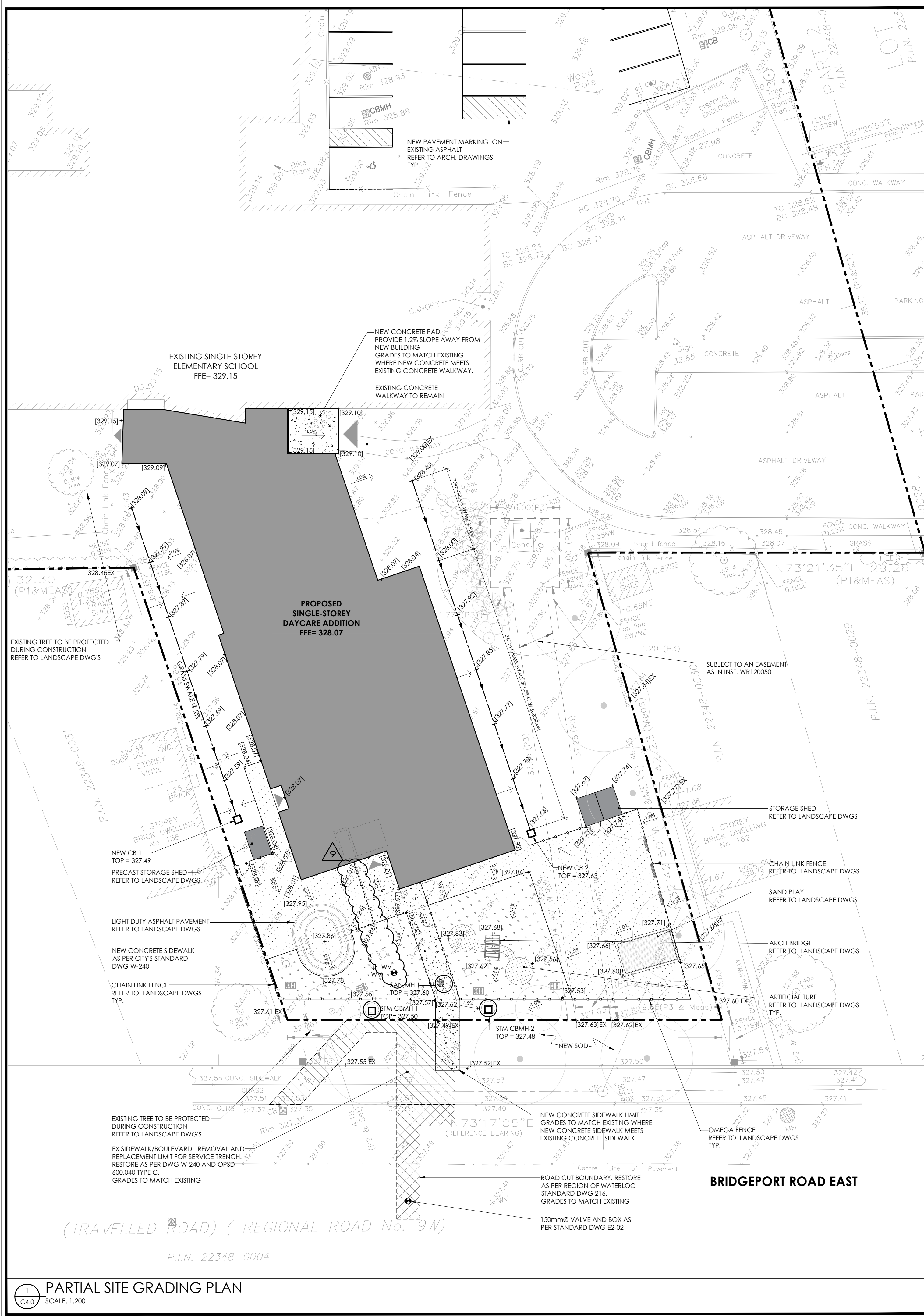
158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:

SITE SERVICING PLAN

SP-12-08

DRAWN BY: A.A.	SCALE: AS NOTED
CHECKED BY: Y.T.	DRAWING NUMBER:
DATE: NOV 2022	C3.0
PROJECT NUMBER: 22-058	



REFER	DESCRIPTION
---	PROPERTY LINE
[Hatched]	EX BUILDING
[Hatched]	NEW BUILDING
[Hatched]	NEW CONCRETE
[Hatched]	NEW ARTIFICIAL TURF
[Hatched]	NEW ASPHALT PAVEMENT
[Hatched]	NEW COLOURED ASPHALT
+XXX.XX	EX ELEVATION
+ [XXX.XX]	NEW ELEVATION
CB	NEW CATCH BASIN
MH	NEW SEWER MANHOLE
CBMH	NEW CATCHBASIN MANHOLE
V	NEW VALVE BOX

METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SITE PLAN

PLAN OF TOPOGRAPHICAL SURVEY OF PART OF LOT 9 MUNICIPAL COMPILED PLAN OF THE SUBDIVISION OF LOT 5 GERMAN COMPANY TRACT AND PART OF LOT 5 GERMAN COMPANY TRACT CITY OF WATERLOO REGIONAL MUNICIPALITY OF WATERLOO

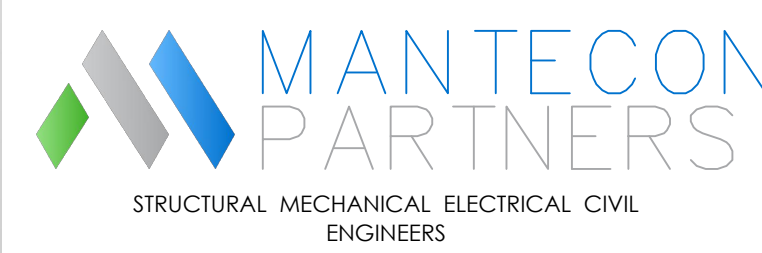
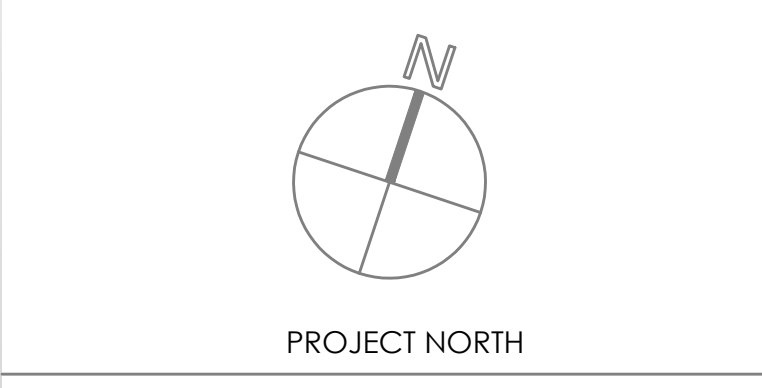
INFORMATION ON THIS SITE PLAN TAKEN FROM SURVEY / TOPOGRAPHY PREPARED BY:
LAND SURVEY GROUP
ONTARIO LAND SURVEYORS
777 THE QUEENSWAY, UNIT 1, TORONTO, ON, M8Z 1N4
Tel: 416-252-2511 416-467-8023 Fax: 416-252-1301
THE SURVEY WAS COMPLETED ON MARCH 23, 2020

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE NORTHERLY LIMIT OF BRIDGEPORT ROAD HAVING A BEARING OF N 73° 17' 05" E AS SHOWN ON PLAN 58R-13619.

BENCHMARK

ELEVATIONS SHOWN HEREON ARE GEODETIC AND IN METERS AND ARE RELATED TO CITY OF WATERLOO BENCHMARK N° 081948085 HAVING A PUBLISHED ELEVATION OF 319951 METERS (CGVD-1928-PRE-1978).



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4.	RE-ISSUED FOR SPA SUBMISSION	2023-06-21	Y.T.
3.	ISSUED FOR SPA SUBMISSION	2022-12-23	Y.T.
2.	ISSUED FOR 80% REVIEW	2022-12-23	Y.T.
1.	ISSUED FOR 60% COORDINATION	2022-11-23	Y.T.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
SITE GRADING PLAN

SP-12-08

DRAWN BY: A.A.	SCALE: AS NOTED
CHECKED BY: Y.T.	DRAWING NUMBER: C4.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

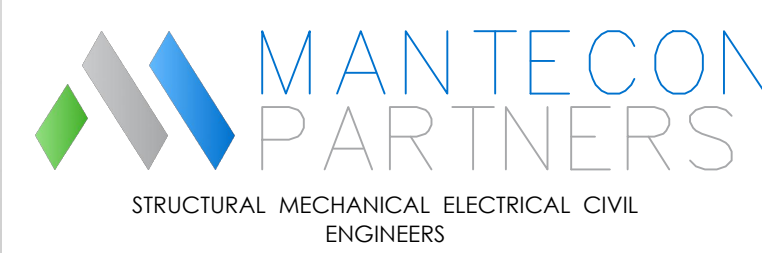
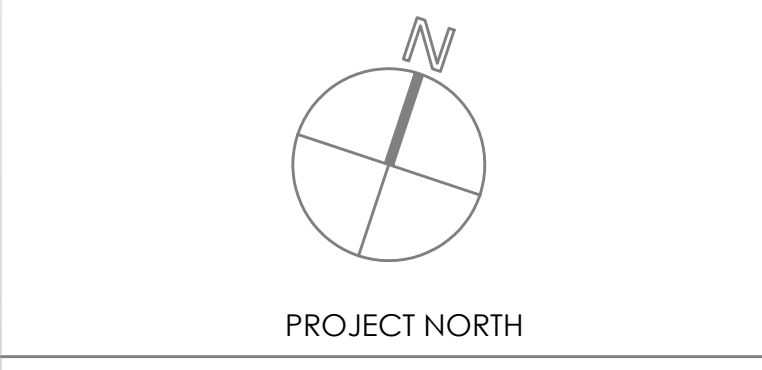
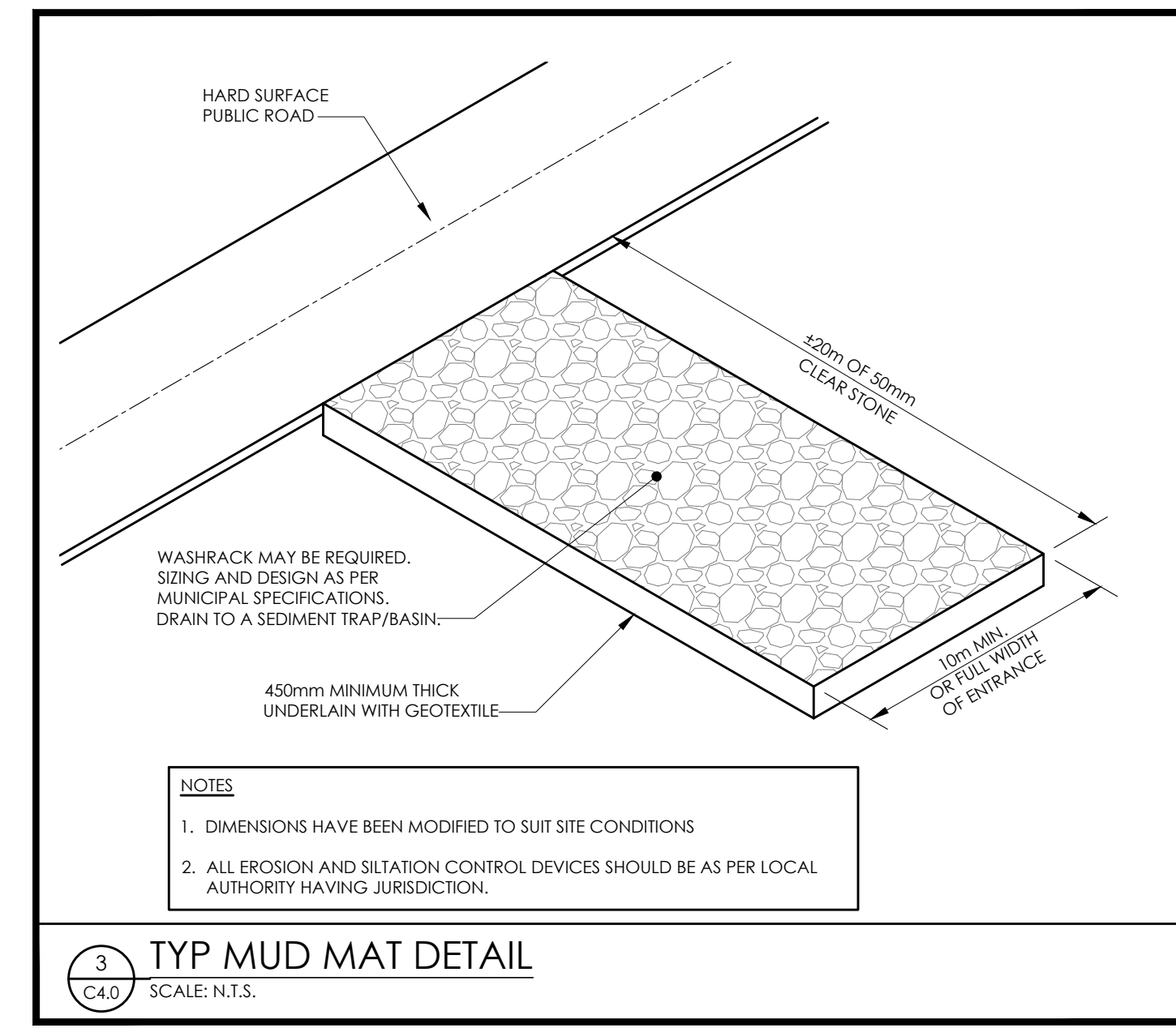
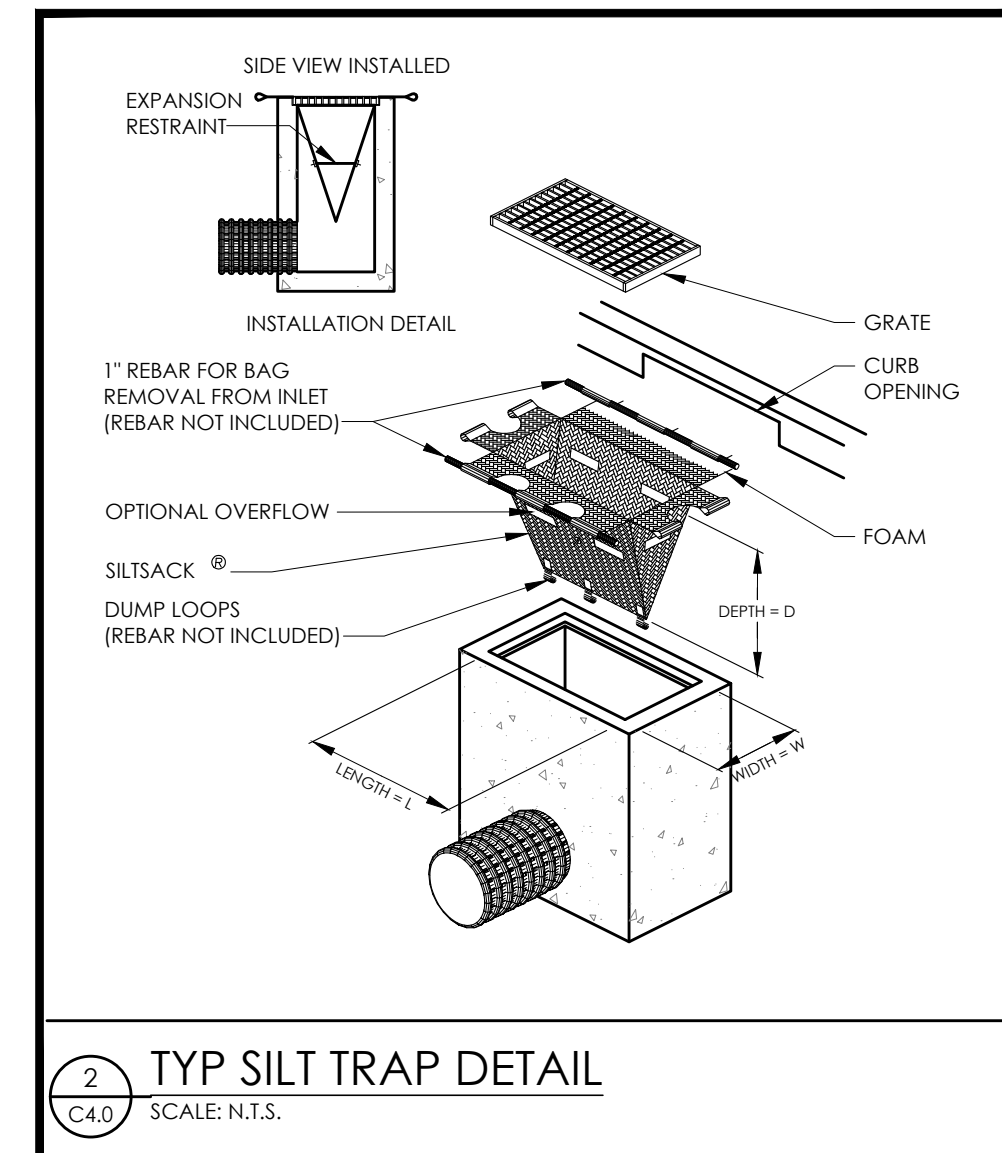


LEGEND

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD/GENERIC LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

REFER	DESCRIPTION
---	PROPERTY LINE
[Hatched Box]	EX BUILDING
[Solid Grey Box]	NEW BUILDING
[Dotted Box]	NEW CONCRETE
[Cross-hatched Box]	NEW ARTIFICIAL TURF
[Diagonal Lines]	NEW ASPHALT PAVEMENT
[Horizontal Lines]	NEW COLOURED ASPHALT
+XXX.XX	EX ELEVATION
+ [XXX.XX]	NEW ELEVATION
-X	PROPOSED SILT FENCE
[Sack Symbol]	PROPOSED SILTATION CONTROL SACK
[CB Symbol]	NEW CATCH BASIN
[MH Symbol]	NEW SEWER MANHOLE
[CBMH Symbol]	NEW CATCHBASIN MANHOLE
[Valve Symbol]	NEW VALVE BOX

METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048



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CLIENT
WORKSHOP ARCHITECTURE

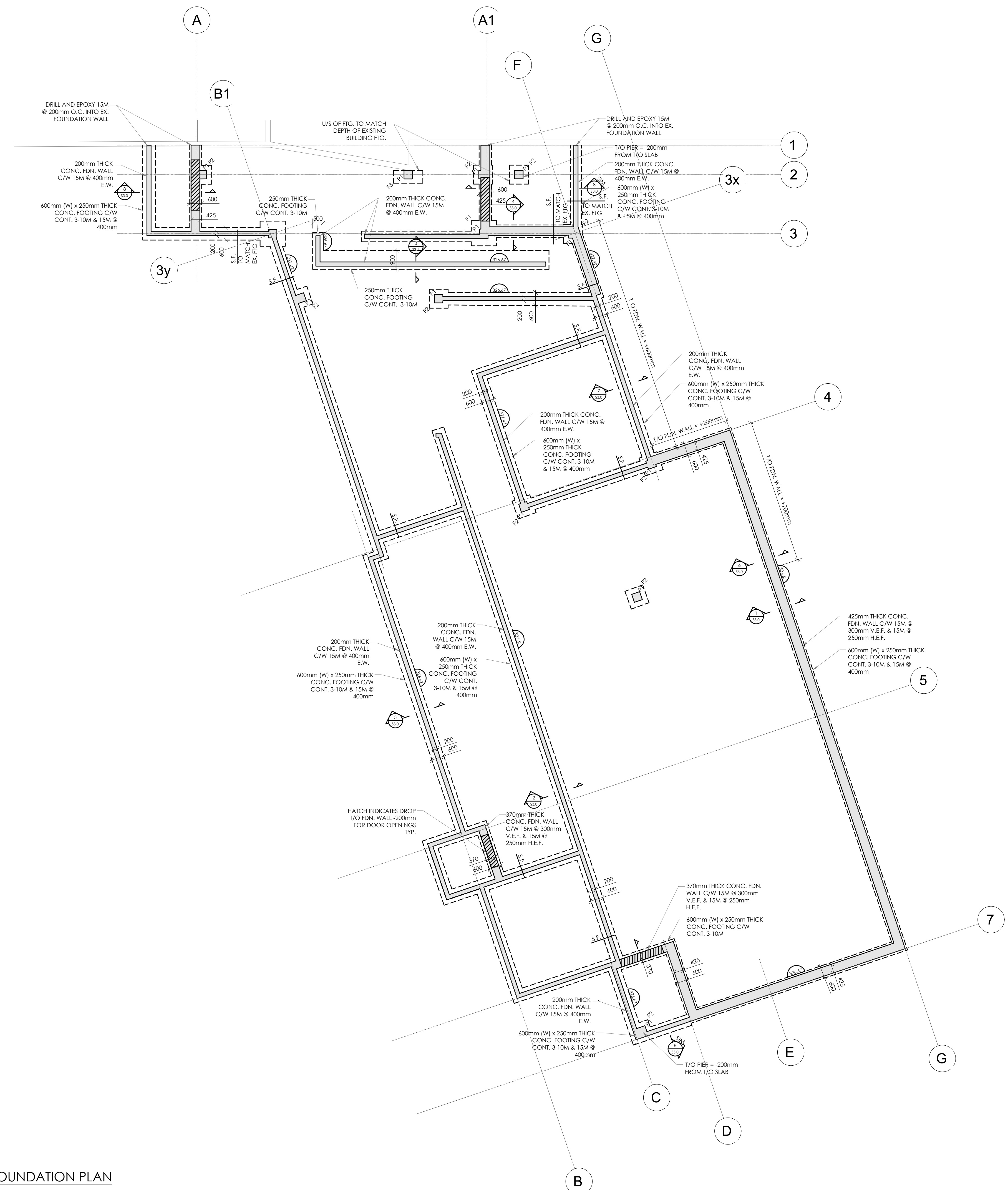
PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
SEDIMENT & EROSION CONTROL PLAN

SP-12-08

DRAWN BY: A.A.	SCALE: AS NOTED
CHECKED BY: Y.T.	DRAWING NUMBER: C5.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	



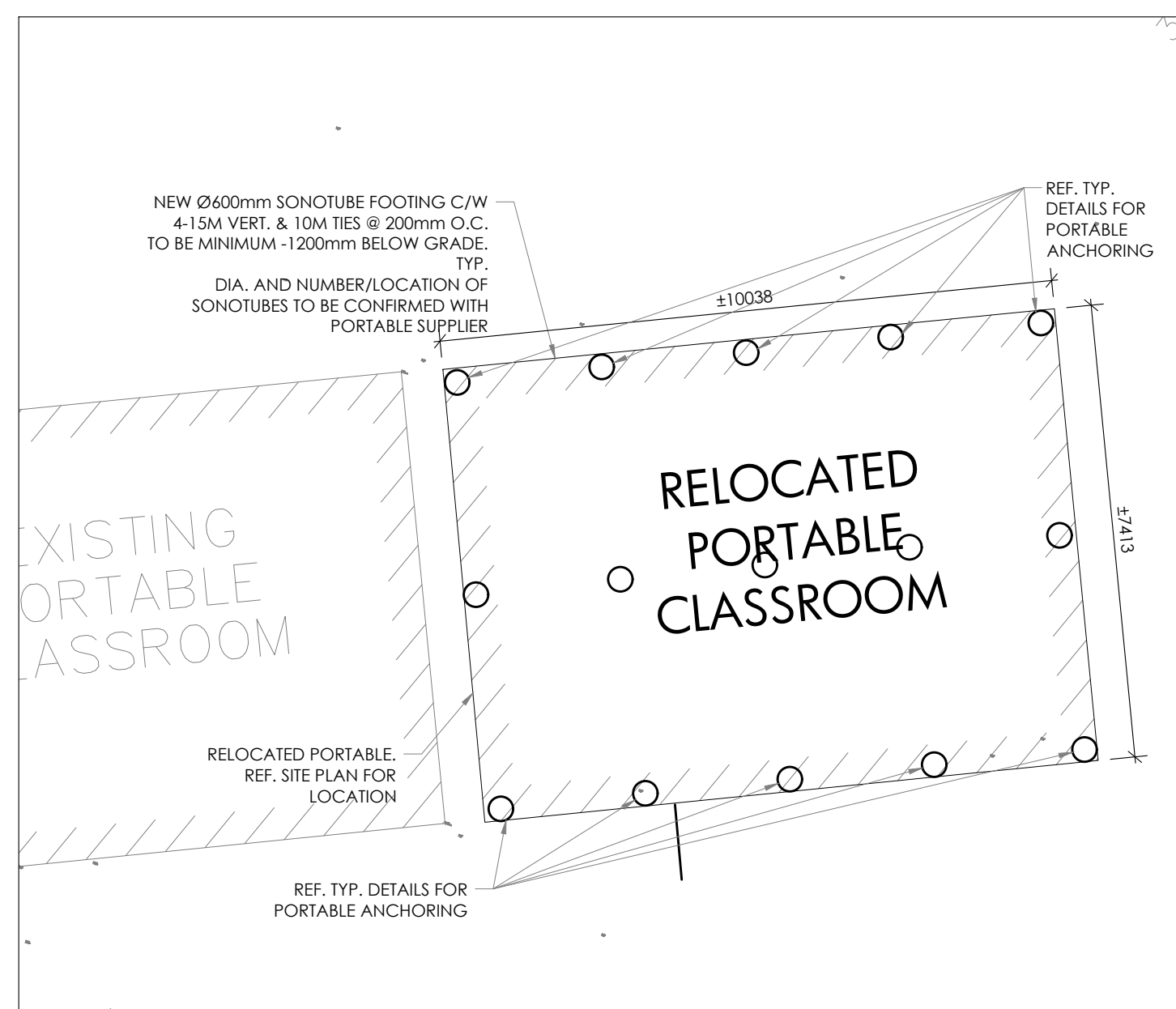
- ### FOUNDATION NOTES
- TOP OF CONCRETE FOOTINGS ELEVATIONS NOTED ON PLAN AS SUCH -XXX
 - UNDERSIDE OF ALL FOOTINGS AT EXTERIOR OF BUILDING SHALL BE A MINIMUM OF 1200mm BELOW FINISHED GRADE ELEVATION UNLESS NOTED OTHERWISE.
 - FOOTINGS HAVE BEEN DESIGNED FOR AN ALLOWABLE SAFE BEARING PRESSURE ON UNDISTURBED NATIVE SOIL OR ENGINEERED FILL. SEE SPECIFICATION AND SOILS REPORT FOR ADDITIONAL INFORMATION. IN THE EVENT OF POORER BEARING CAPACITY AT ELEVATIONS SHOWN, CONTACT ENGINEER FOR REDESIGN OF FOUNDATIONS AS REQUIRED.
 - ALL FOOTINGS SHALL BE CENTERED UNDER WALLS UNLESS NOTED.
 - SUBGRADE SOIL SHALL BE PROOF-ROLLED PRIOR TO PLACING GRANULAR BASE COURSE.
 - SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS, WALL THICKNESS FLOOR SLOPES AND FLOOR FINISHES NOT SHOWN.
 - FOUNDATION CONTRACTOR TO CO-ORDINATE WITH ALL TRADES THE LOCATION OF ALL PIPE SLEEVES PASSING THROUGH FOUNDATION WALLS. PIPING IS NOT TO RUN THROUGH OR BELOW FOOTINGS. FOOTINGS TO BE STEPPED DOWN TO SUIT. FOR LOCATION AND DEPTH OF EXISTING AND NEW UNDERGROUND SERVICES NOT SHOWN, REFER TO CIVIL, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS.
 - DROP PIERS DOWN AS INDICATED ON DRAWINGS AND EXTEND CONCRETE FLOOR SLAB OVER.
 - DEPRESS TOP OF FOUNDATION WALL 8" TO ALL EXTERIOR AND INTERIOR DOOR OPENINGS. AT EXTERIOR OPENINGS, HOOK TOP BARS DOWN 800mm EACH SIDE OF OPENING. PROVIDE MATCHING HORIZONTAL BARS BELOW DOOR OPENING, EXTENDING BARS 800mm BEYOND EDGE OF DOOR OPENING EACH SIDE. PROVIDE SLAB ON GRADE CONTROL JOINT AT ALL INTERIOR DOORS.
 - ELEVATION FOR TOP OF FOUNDATION WALL SHALL BE EQUAL TO TOP OF ADJACENT FINISHED FLOOR, UNLESS NOTED OTHERWISE.
 - DRILL AND EPOXY 15M @ 200mm O.C. INTO EX. FOUNDATION WALL WHERE NEW FOUNDATIONS MEET EXISTING.

FOOTING SCHEDULE

FOOTING MARK	SIZE	THICKNESS (T)	REINFORCEMENT		REMARKS
			BOTTOM	TOP	
F1	1200x1200	250mm	4-15M E/W		
F2	900x900	250mm	3-15M E/W		
F3	1400x600	250mm	2-15M B/L 4-15M B/L		

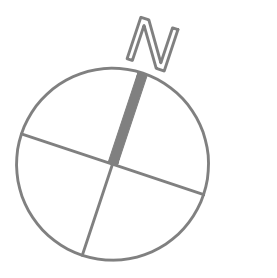
PIER SCHEDULE

PIER MARK	SIZE	REINFORCEMENT	REMARKS
P1	400x400	4-15M VERT. 10M TIES @ 300	T/O PIER = -200mm FROM FFE OR FINAL GRADE

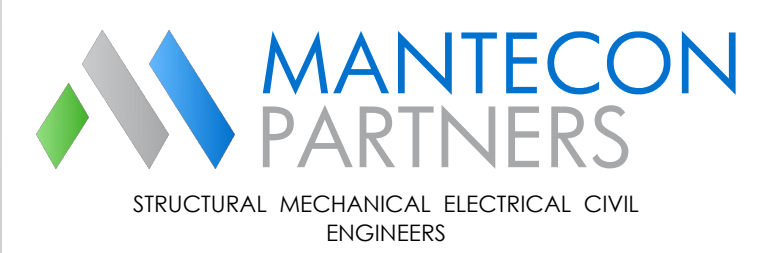


2 PARTIAL FOUNDATION PLAN - RELOCATED PORTABLE
SCALE: 1:100

1 PROPOSED FOUNDATION PLAN
SCALE: 1:100



PROJECT NORTH



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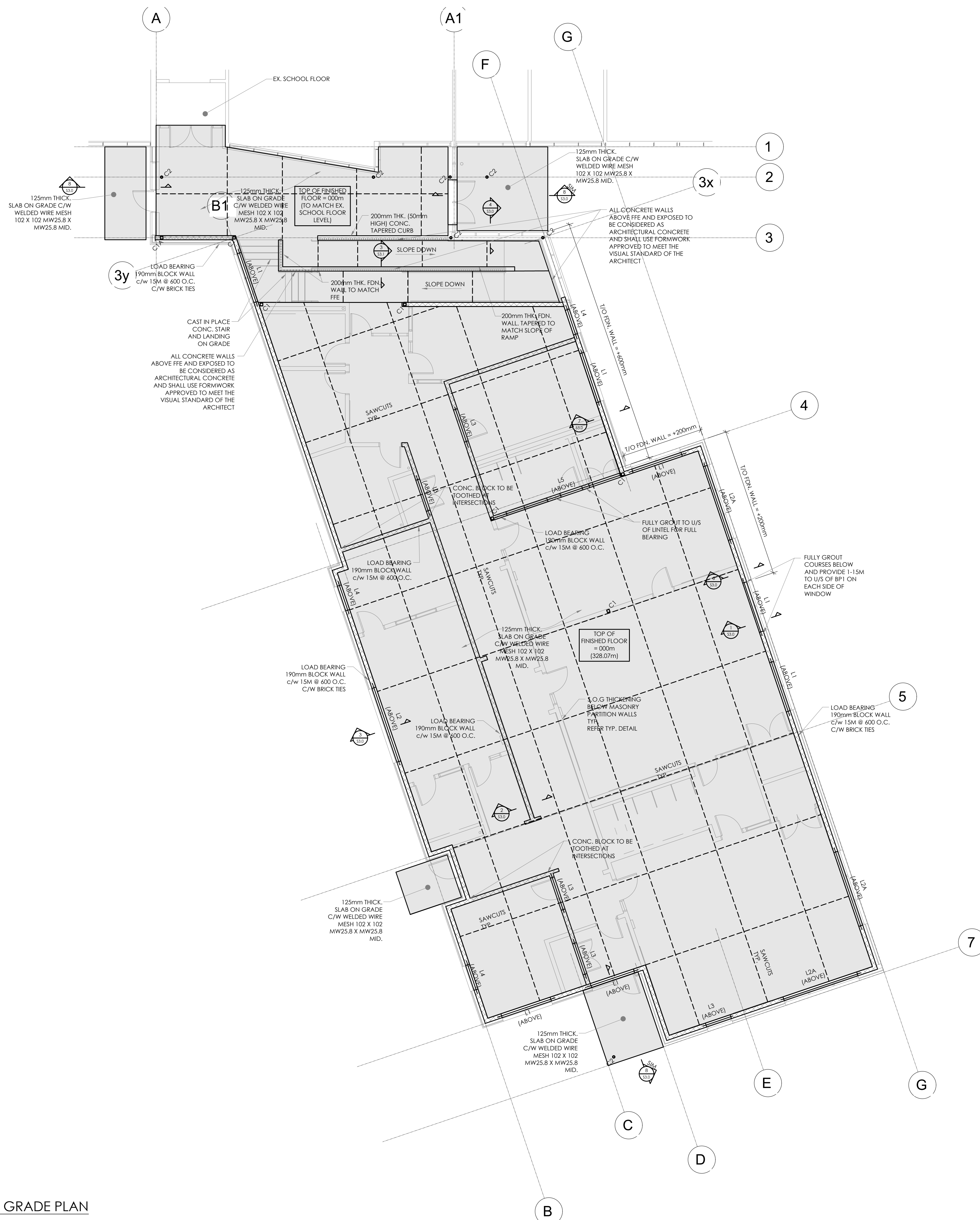
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
PROPOSED FOUNDATION PLAN

DRAWN BY: A.B.	SCALE: AS NOTED
CHECKED BY: S.M.	DRAWING NUMBER: S1.0
DATE: NOV 2022	PROJECT NUMBER: 22-058



- ### SLAB ON GRADE NOTES
1. TOP OF FINISHED CONCRETE SLAB ON GRADE ELEVATION AS NOTED ON PLAN.
 2. SLAB ON GRADE TO BE FOUNDED ON MIN. 300mm (12") LAYER OF GRANULAR A (OPSS 1010), COMPACTED TO 100% SPMD ON NATIVE UNDISTURBED SOIL APPROVED BY GEOTECH. ENGINEER.
 3. SAWCUTS @ MAX. 4000mm (13'-0") O.C., SEE PLAN FOR SAWCUT/CONTROL JOINTS LOCATIONS. CO-ORDINATE LOCATION OF FLOOR CONTROL JOINTS AND/OR CONSTRUCTION JOINTS WITH ARCHITECTURAL FLOOR FINISHES.
 4. SEE ARCHITECTURAL DRAWINGS FOR ALL DIMENSIONS, WALL THICKNESS FLOOR SLOPES AND FLOOR FINISHES NOT SHOWN.
 5. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR LOCATION AND SIZE OF ALL PITS, INSERTS, DRAINS AND HOUSEKEEPING PADS.
 6. ALL ISOLATION JOINTS AROUND COLUMNS AND FLOOR DRAINS ARE TO BE FORMED NOT SAWCUT.
 7. PROVIDE SLAB THICKENING/ISOLATED FOOTING BELOW ALL INTERIOR CONCRETE BLOCK PARTITION WALLS UNLESS NOTED OTHERWISE.
 8. DEPRESS AND MAINTAIN SPECIFIED SLAB ON GRADE THICKNESS AT MAT SINKAGES AND OTHER FLOOR DEPRESSIONS. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS.
 9. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ALL FLOOR AND WALL PENETRATIONS.
 10. REFER TO DRAWING S.O.0 FOR DOOR/MECH. OPENING LINTELS IN NON-LOAD BEARING CONC. BLOCK WALLS.

LINTEL SCHEDULE

MARK	SIZE	DETAIL	NOTES
L1	W200x42 C/W 175x6.4mm CONT. TOP & BOT. PLATE		MIN. 200mm BEARING E/S ON BLOCK WALL. FULLY GROUT COURSES BELOW LINTEL C/W BP1
L2	W410x39 C/W 175x6.4mm CONT. TOP PLATE & 1/4" GUSSET PLATES @ 800mm O/C & CONT. 370x9.5mm BOT. PLATE		MIN. 200mm BEARING E/S ON BLOCK WALL. FULLY GROUT COURSES BELOW LINTEL C/W BP1
L3	W200x19 C/W 175x6.4mm CONT. TOP & BOT. PLATE		MIN. 200mm BEARING E/S ON BLOCK WALL. FULLY GROUT COURSES BELOW LINTEL C/W BP1
L4	2L-102x89x7.9 (LLV)		MIN. 200mm BEARING E/S ON BLOCK WALL. FULLY GROUT COURSES BELOW LINTEL
L5	2L-127x89x7.9 (LLV)		MIN. 200mm BEARING E/S ON BLOCK WALL. FULLY GROUT COURSES BELOW LINTEL

FOR ALL NON-LOAD BEARING WALL LINTELS, REFER TO GENERAL NOTES

BEARING PLATE & WALL PLATE SCHEDULE

MARK	SIZE	NOTES
BP1	175x12x175mm	C/W 2-Ø19mm x 200mm LG. NELSON STUDS
BP2	175x12x400mm	C/W 2-Ø19mm x 200mm LG. NELSON STUDS
BP3	200x12x175mm	C/W 2-Ø19mm x 200mm LG. NELSON STUDS
WP1	300x12x250mm	C/W 4-Ø16mm x 85mm EMBED. HILTI KH-EZ SCREW ANCHOR

NOTE: LAST DIMENSION PARALLEL TO BEAM WEB

STEEL COLUMN SCHEDULE

MARK	SIZE	BASEPLATE	NOTES
C1	HSS 127x127x6.4	280x16x280 C/W 4-Ø19mm A307 ANCHOR RODS (HOKED) & 50mm THK. GROUT	
C2	HSS 127x6.4	280x16x280 C/W 4-Ø19mm A307 ANCHOR RODS (HOKED) & 50mm THK. GROUT	EXTERIOR COL. HOT DIPPED GALVANIZED
C1A	HSS 127x127x6.4	175x16x280 C/W 2-Ø19mm A307 ANCHOR RODS (HOKED) & 50mm THK. GROUT	

1 PROPOSED SLAB ON GRADE PLAN
SCALE: 1:100

PROJECT NORTH

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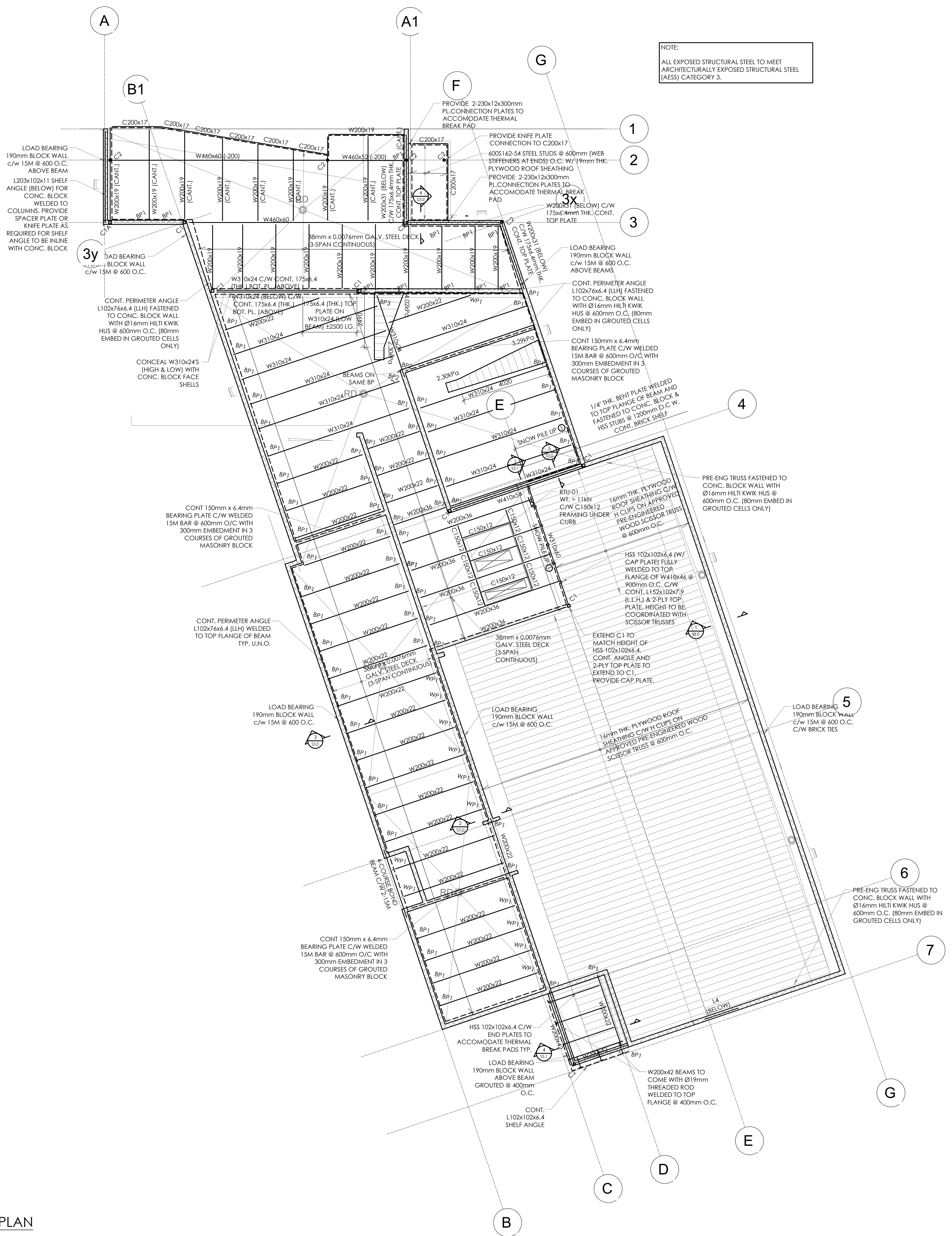
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CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO
DRAWING TITLE:
PROPOSED SLAB ON GRADE PLAN

DRAWN BY: A.B.	SCALE: AS NOTED
CHECKED BY: S.M.	DRAWING NUMBER: S2.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

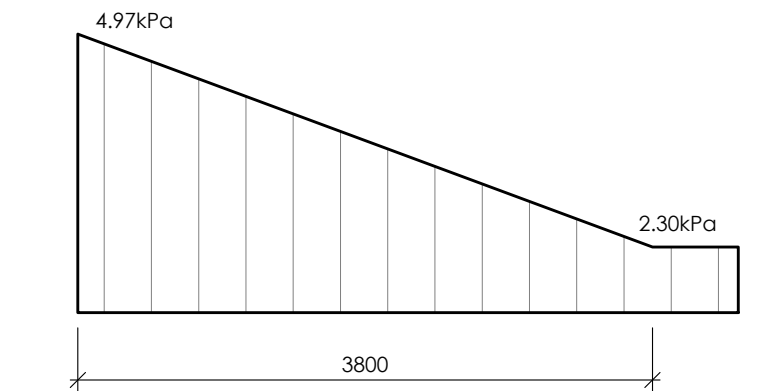


NOTE:
ALL EXPOSED STRUCTURAL STEEL TO MEET ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS) CATEGORY 3.

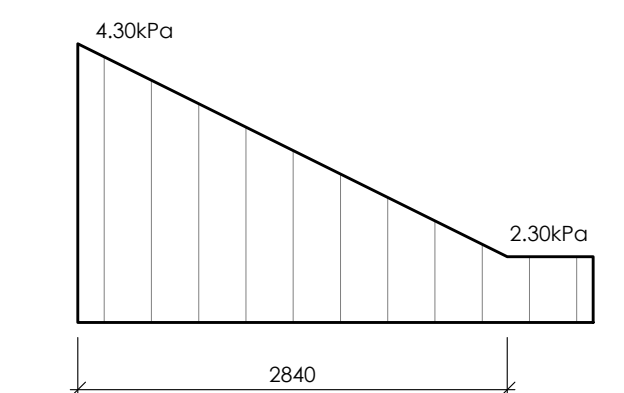
BEARING PLATE & WALL PLATE SCHEDULE		
MARK	SIZE	NOTES
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BP2	175x12x400mm	C/W 2-Ø19mm x 200mm LG. NELSON STUDS
BP3	200x12x175mm	C/W 2-Ø19mm x 200mm LG. NELSON STUDS
WP1	300x12x250mm	C/W 4-Ø16mm x 85mm EMBED. HILTI KH-EZ SCREW ANCHOR

NOTE: LAST DIMENSION PARALLEL TO BEAM WEB

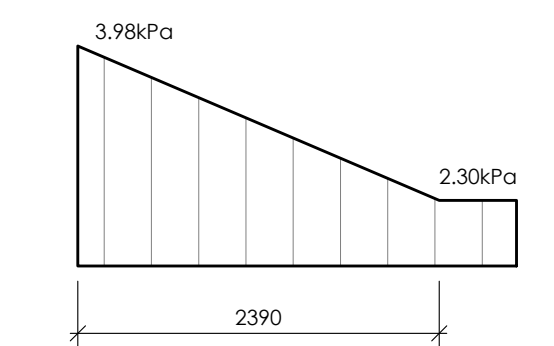
STEEL COLUMN SCHEDULE			
MARK	SIZE	BASEPLATE	NOTES
C1	HSS 127x127x6.4	280x16x280 C/W 4-Ø19mm A307 ANCHOR RODS (HOOKED) & 50mm THK. GROUT	
C2	HSS 127x6.4	280x16x280 C/W 4-Ø19mm A307 ANCHOR RODS (HOOKED) & 50mm THK. GROUT	EXTERIOR COL. HOT DIPPED GALVANIZED
C1A	HSS 127x127x6.4	175x16x280 C/W 2-Ø19mm A307 ANCHOR RODS (HOOKED) & 50mm THK. GROUT	



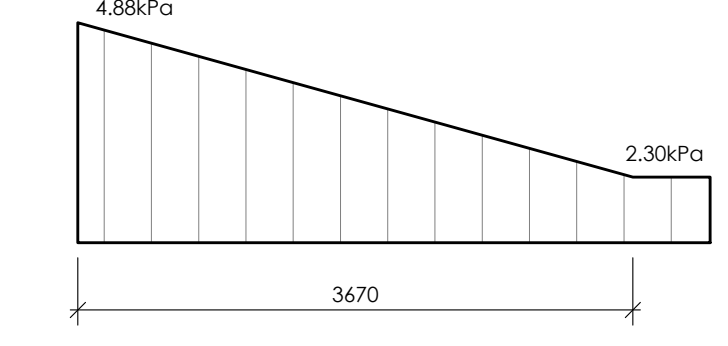
① SNOW PILE UP ON FLAT ROOF AT RTU



② SNOW PILE UP AROUND RTU-01

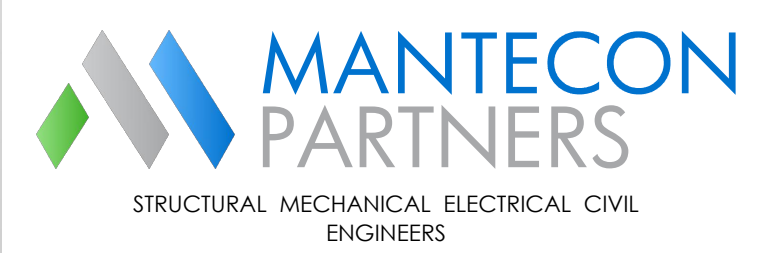
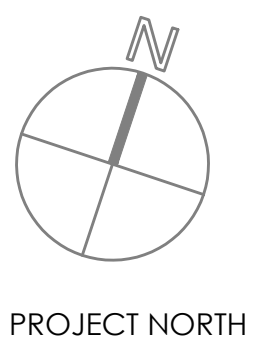


③ SNOW PILE AT CANOPY B/W GR A1/F & 1/3



④ SNOW PILE AT RTU SCREEN

1 PROPOSED ROOF FRAMING PLAN
SCALE: 1:100



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1	ISSUED FOR 60% REVIEW	2022/11/24	A.B.

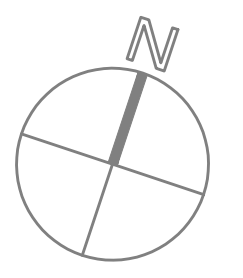
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

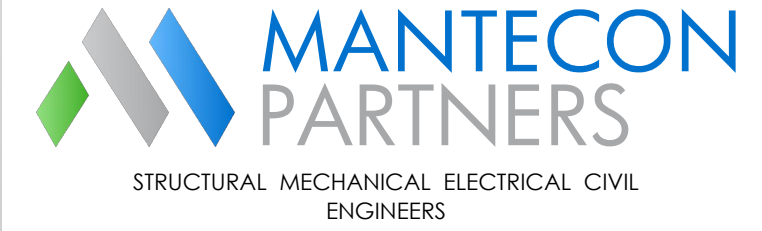
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
PROPOSED ROOF FRAMING PLAN

DRAWN BY: A.B.	SCALE: AS NOTED
CHECKED BY: S.M.	DRAWING NUMBER: S2.1
DATE: NOV 2022	
PROJECT NUMBER: 22-058	



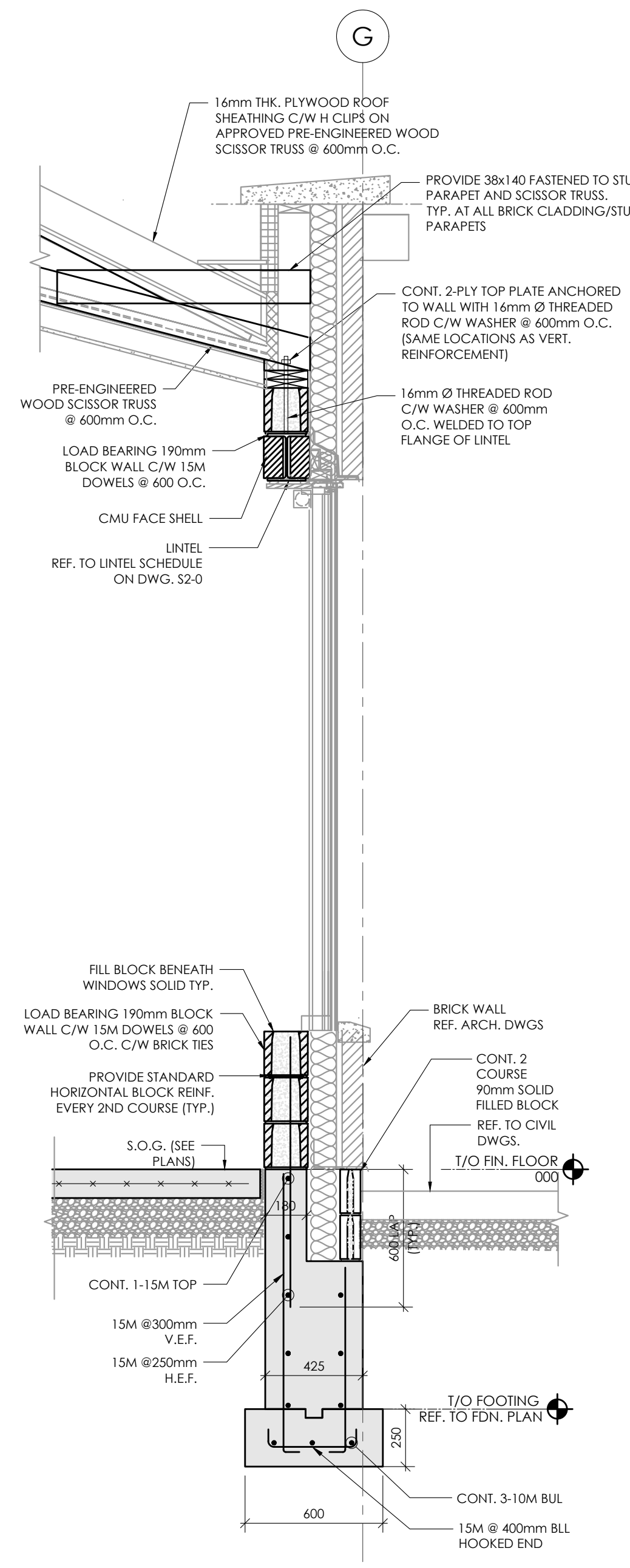
PROJECT NORTH



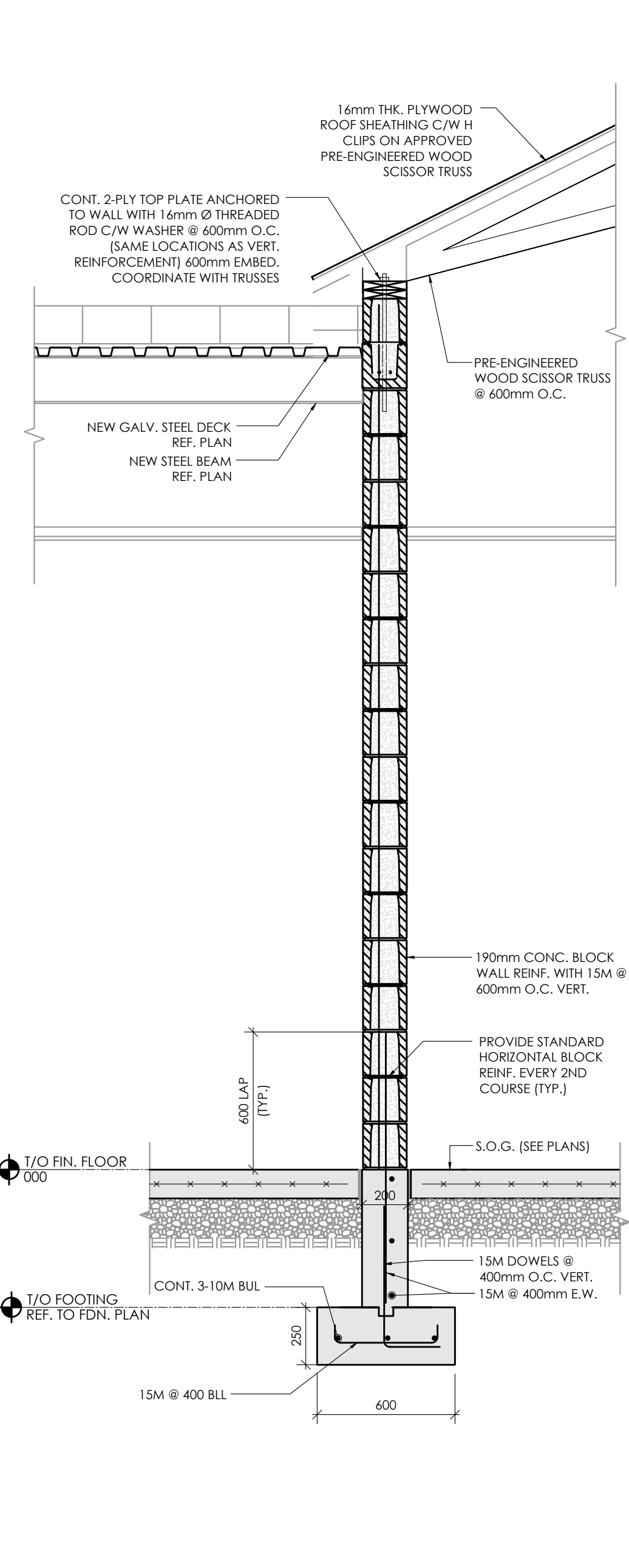
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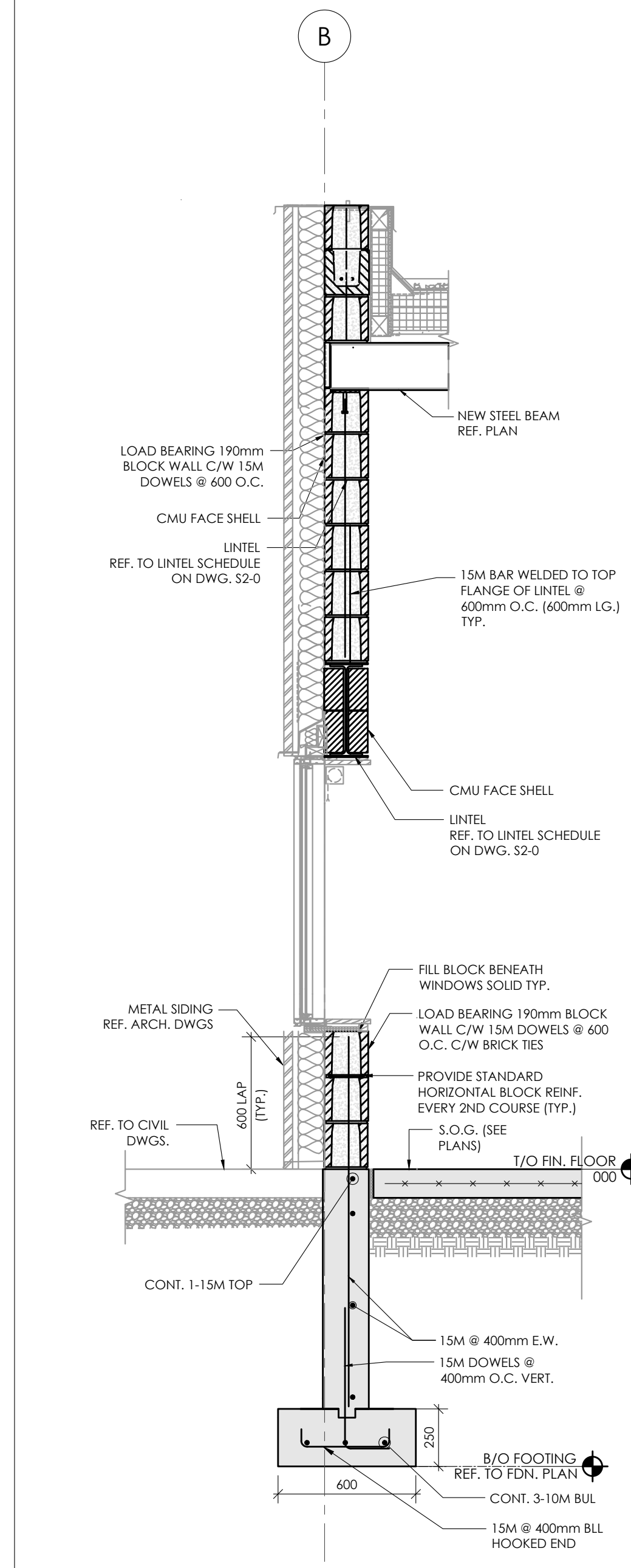
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1	ISSUED FOR 80% REVIEW	2022/12/23	A.B.
	ISSUED		



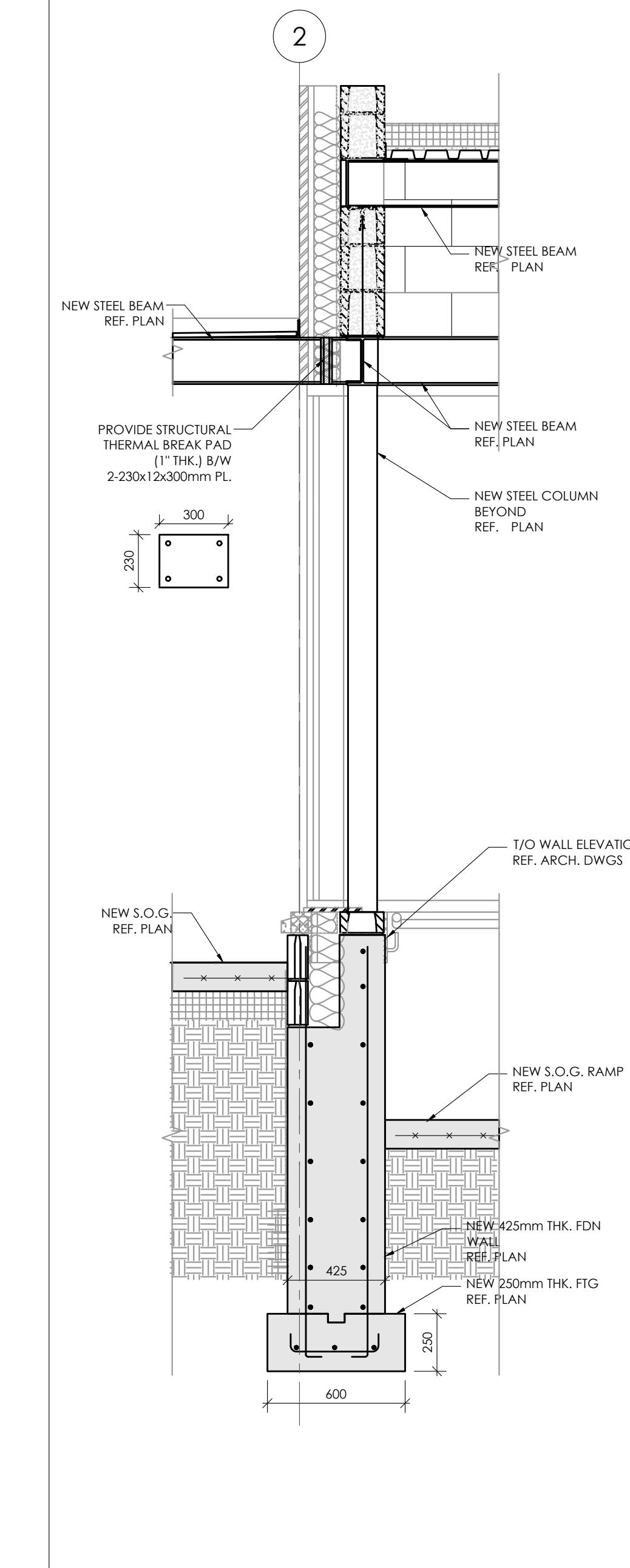
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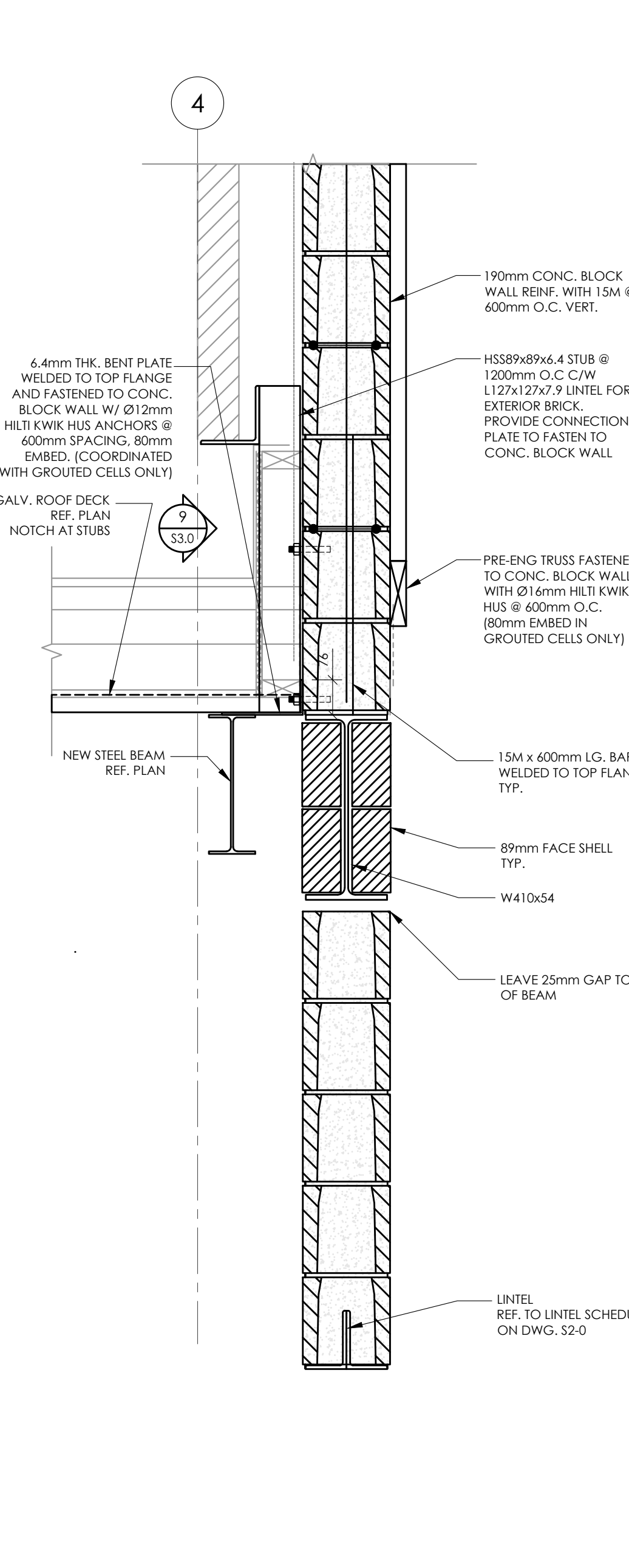
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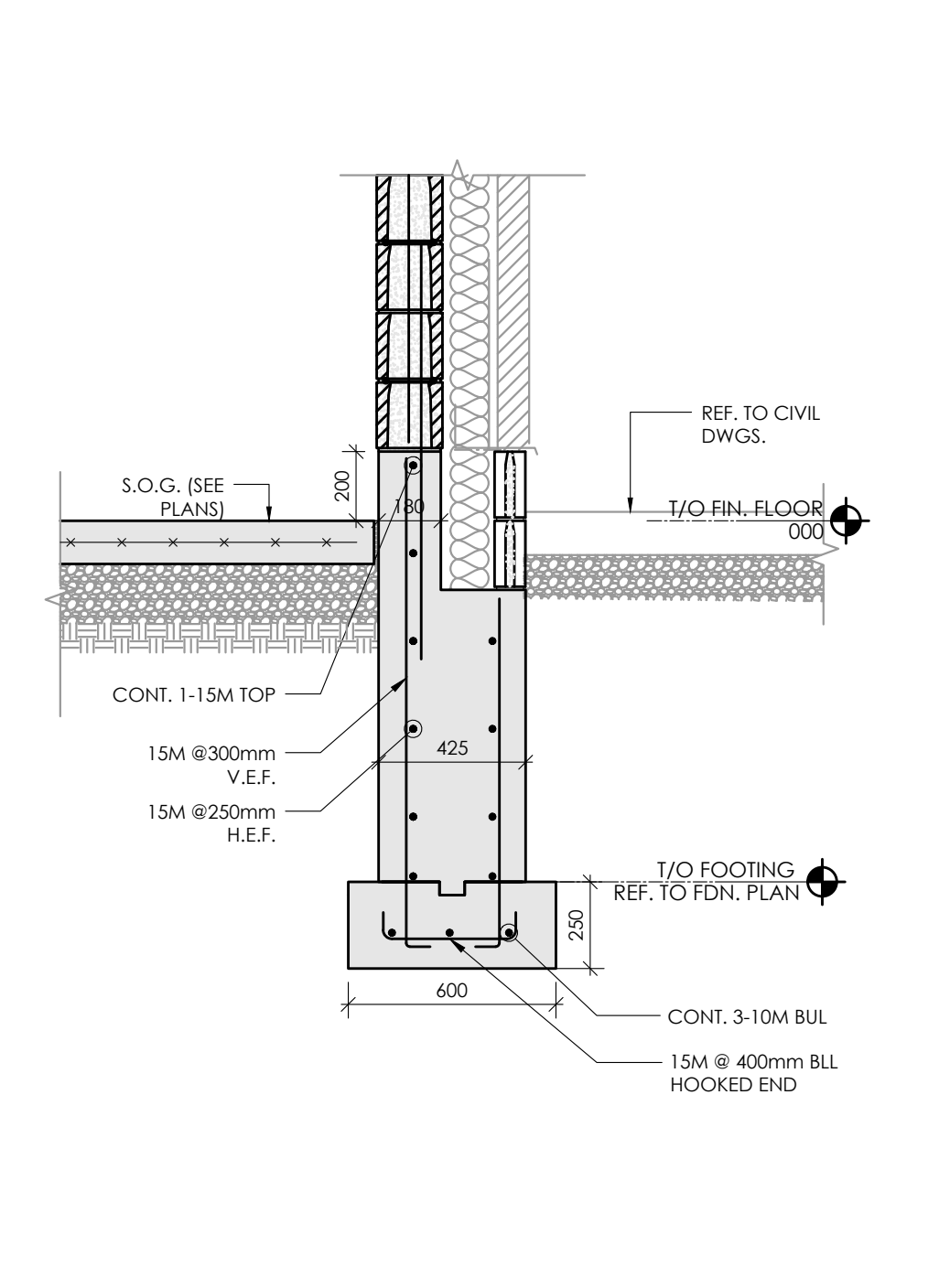
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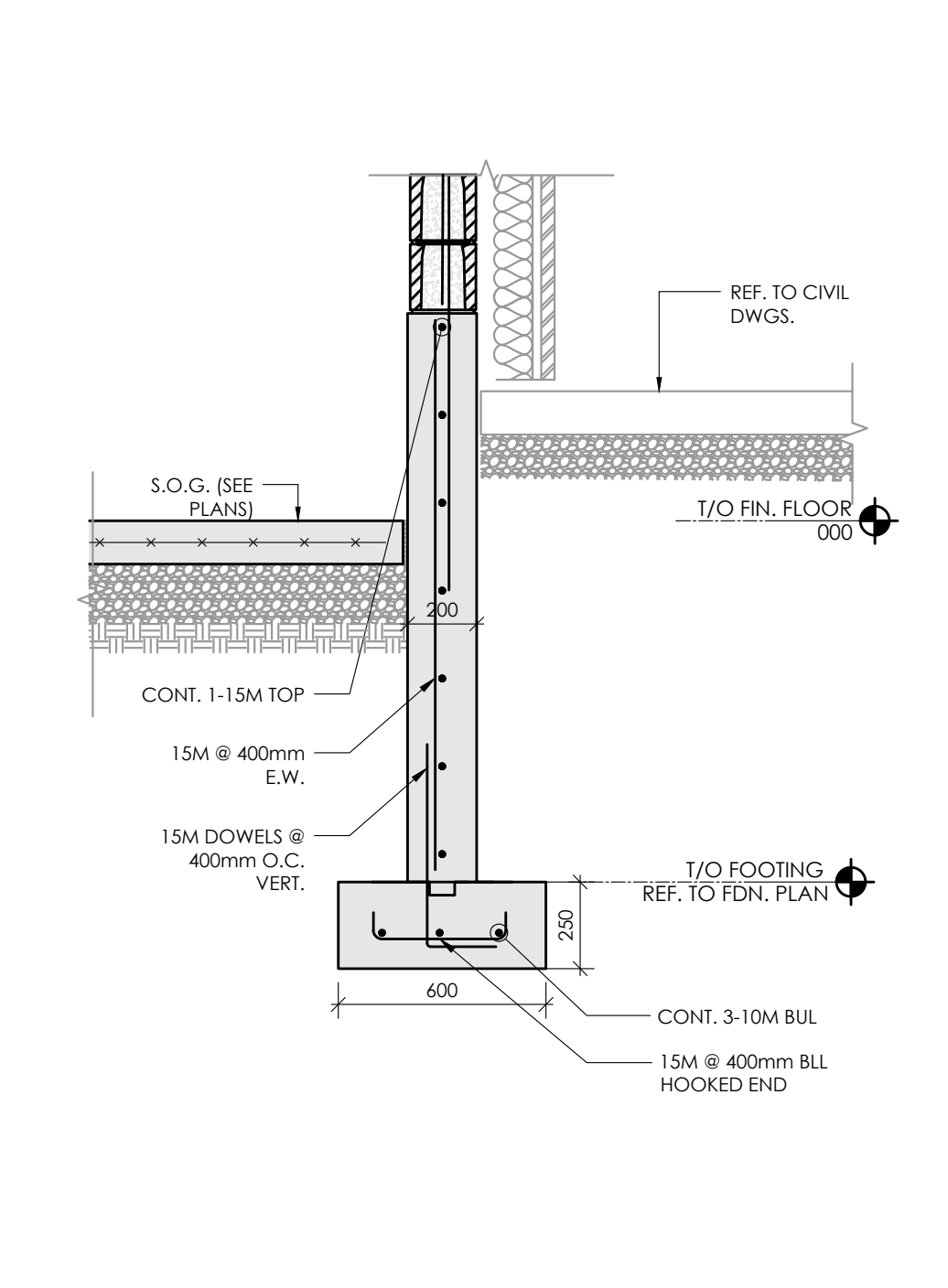
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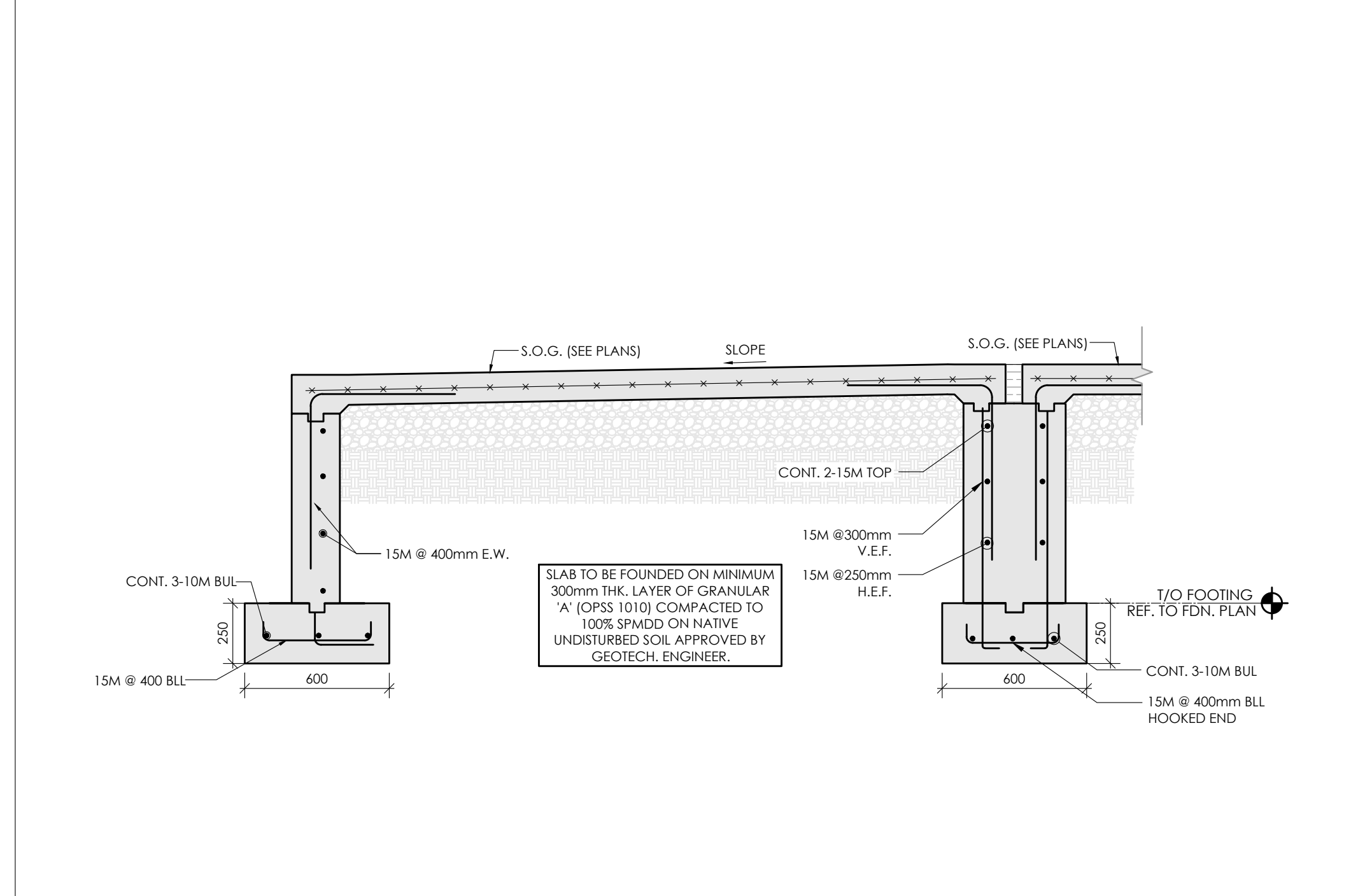
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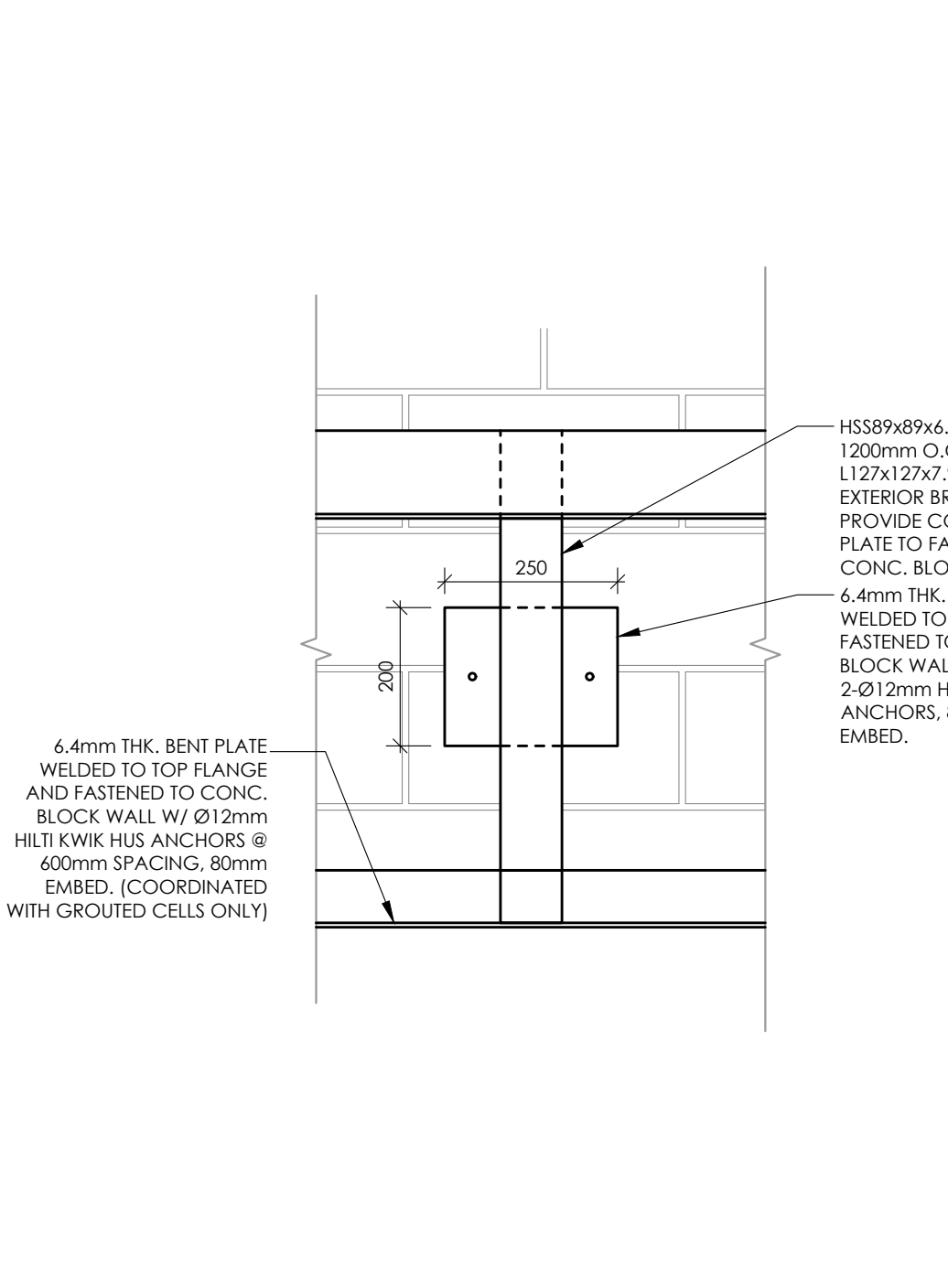
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7 SECTION
SCALE: 1:20



8 SECTION
SCALE: 1:20



9 BRICK LINTEL ELEVATION
SCALE: 1:10

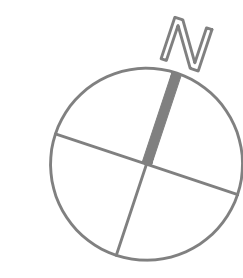
CLIENT
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PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

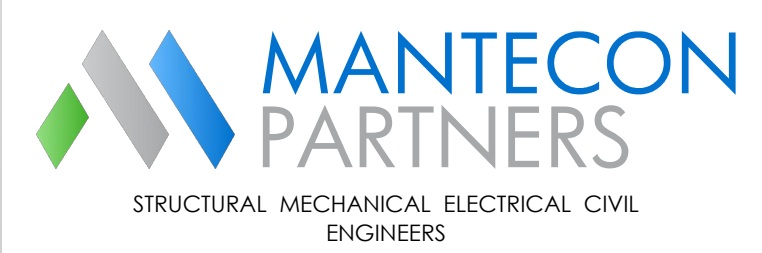
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
SECTIONS

DRAWN BY: A.B.	SCALE: AS NOTED
CHECKED BY: S.M.	DRAWING NUMBER: S3.0
DATE: NOV 2022	PROJECT NUMBER: 22-058



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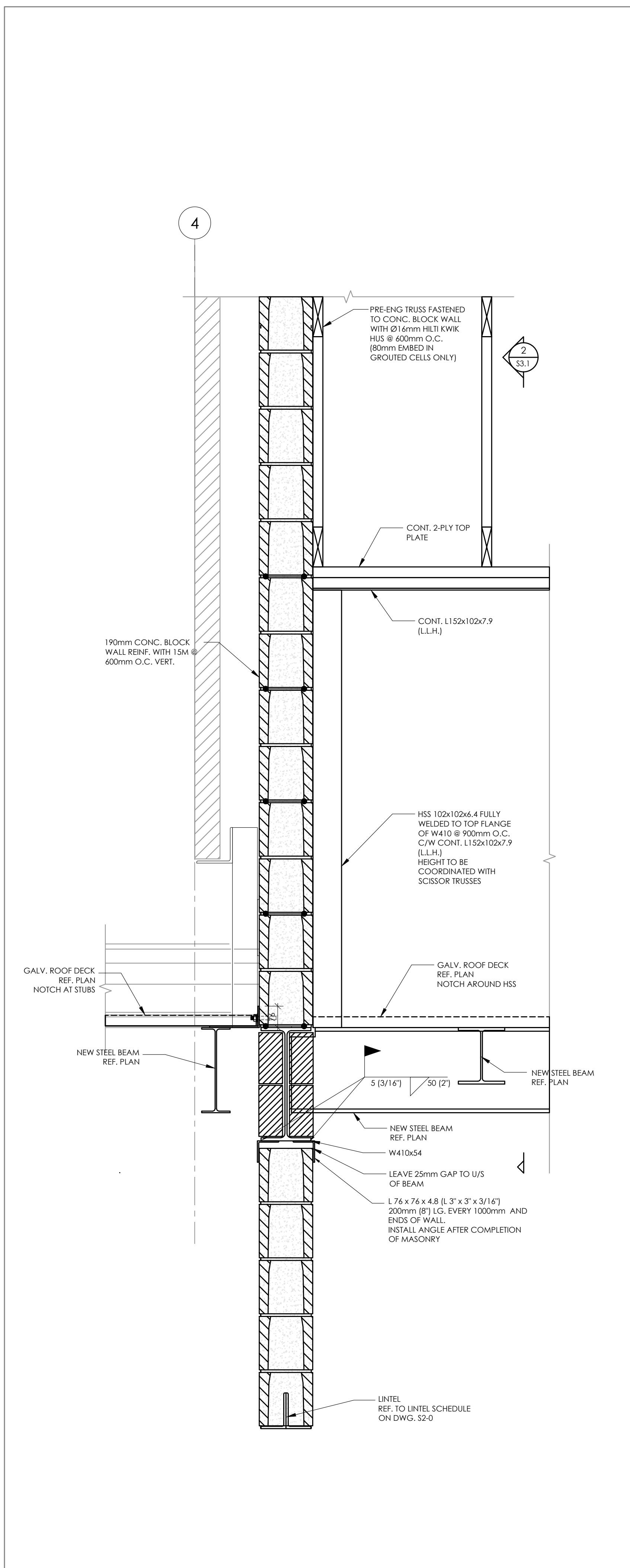
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PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

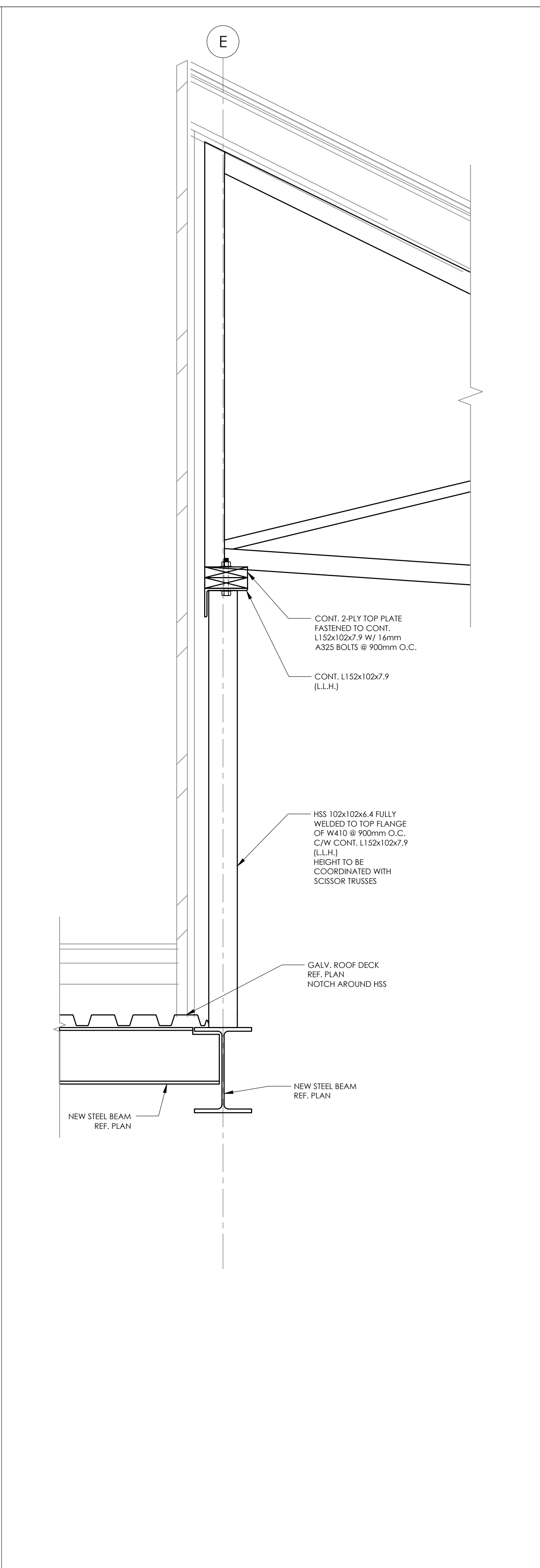
**158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO**

DRAWING TITLE:
SECTIONS

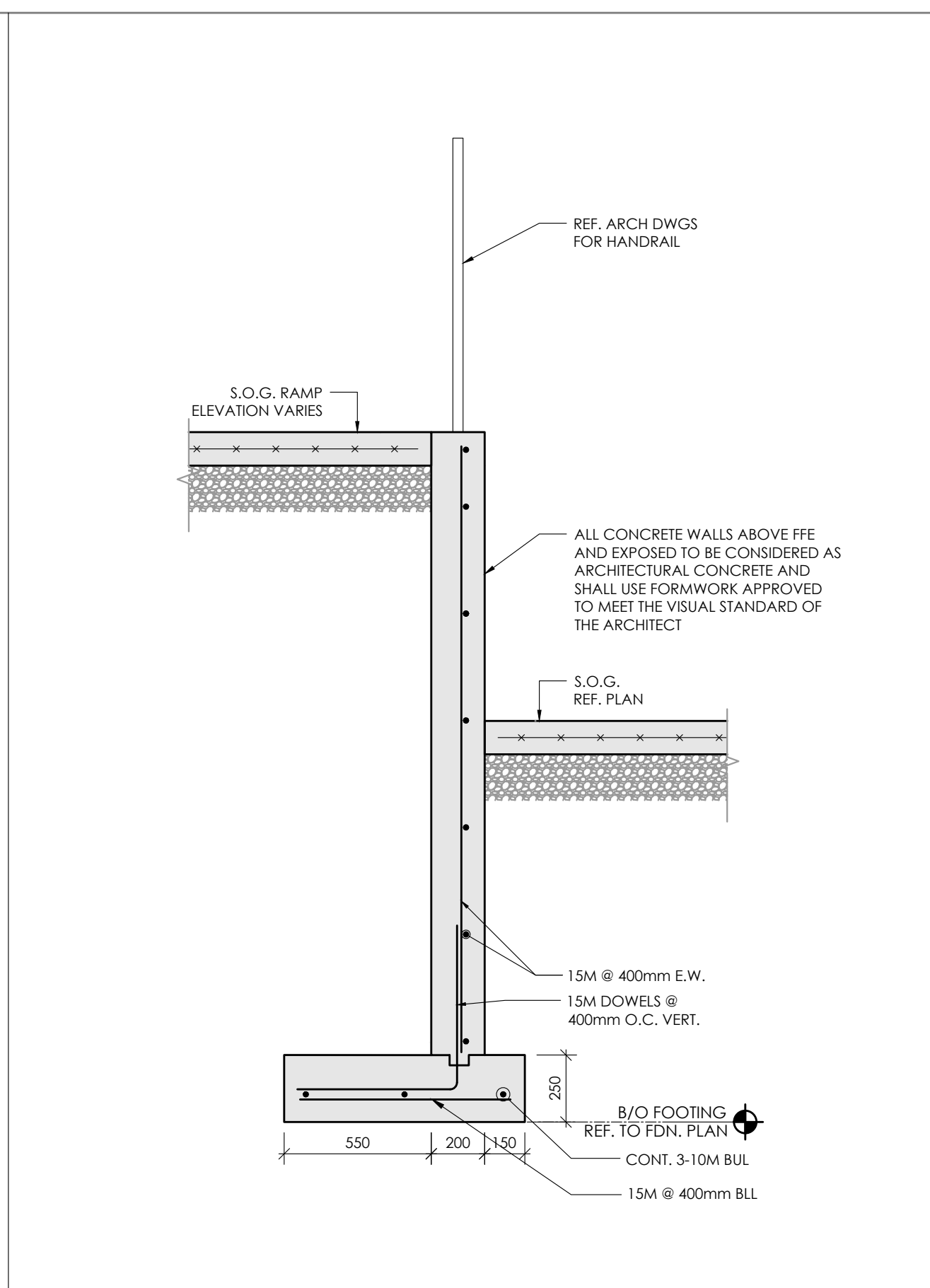
DRAWN BY: A.B.	SCALE: AS NOTED
CHECKED BY: S.M.	DRAWING NUMBER: S3.1
DATE: NOV 2022	
PROJECT NUMBER: 22-058	



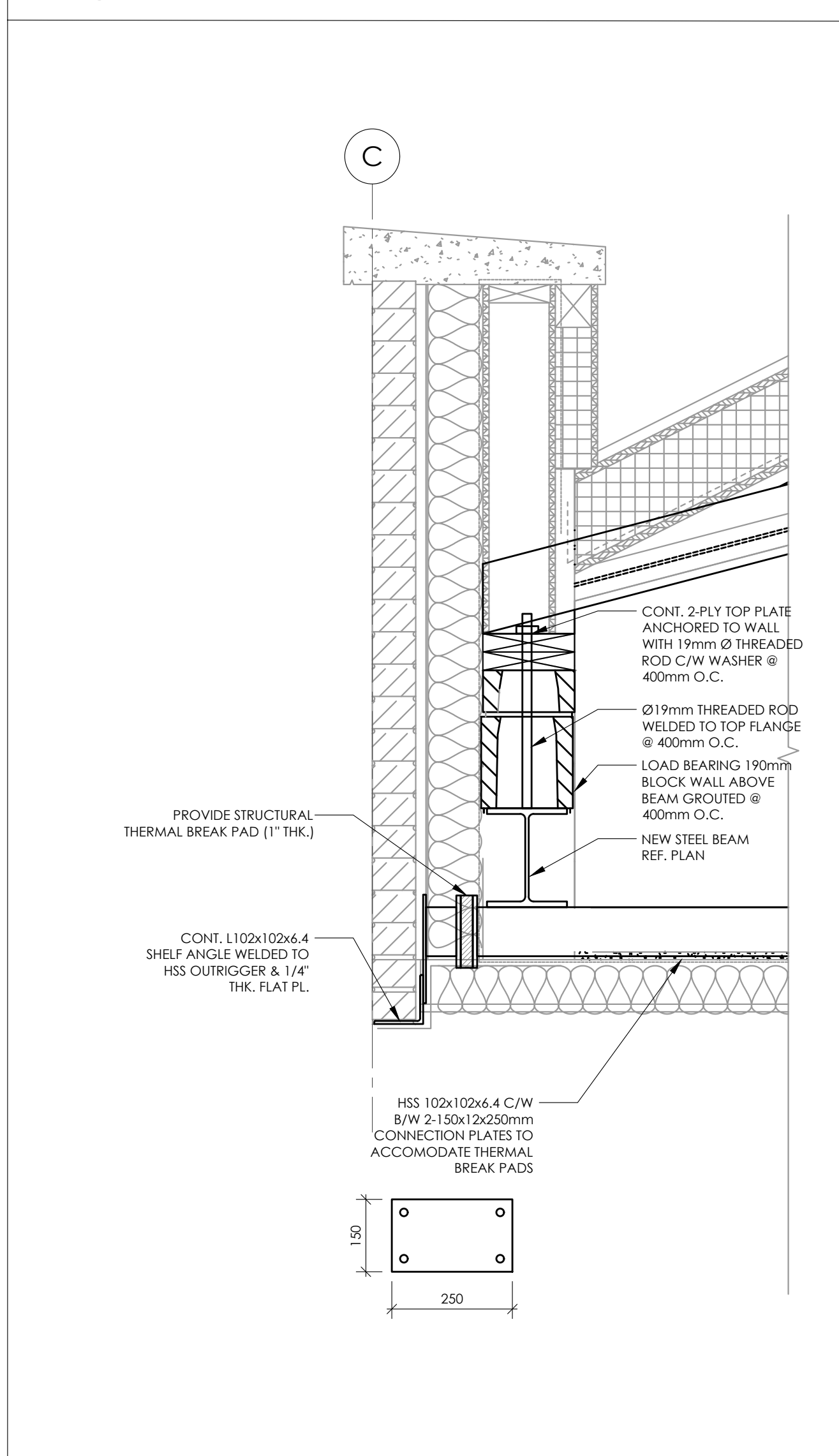
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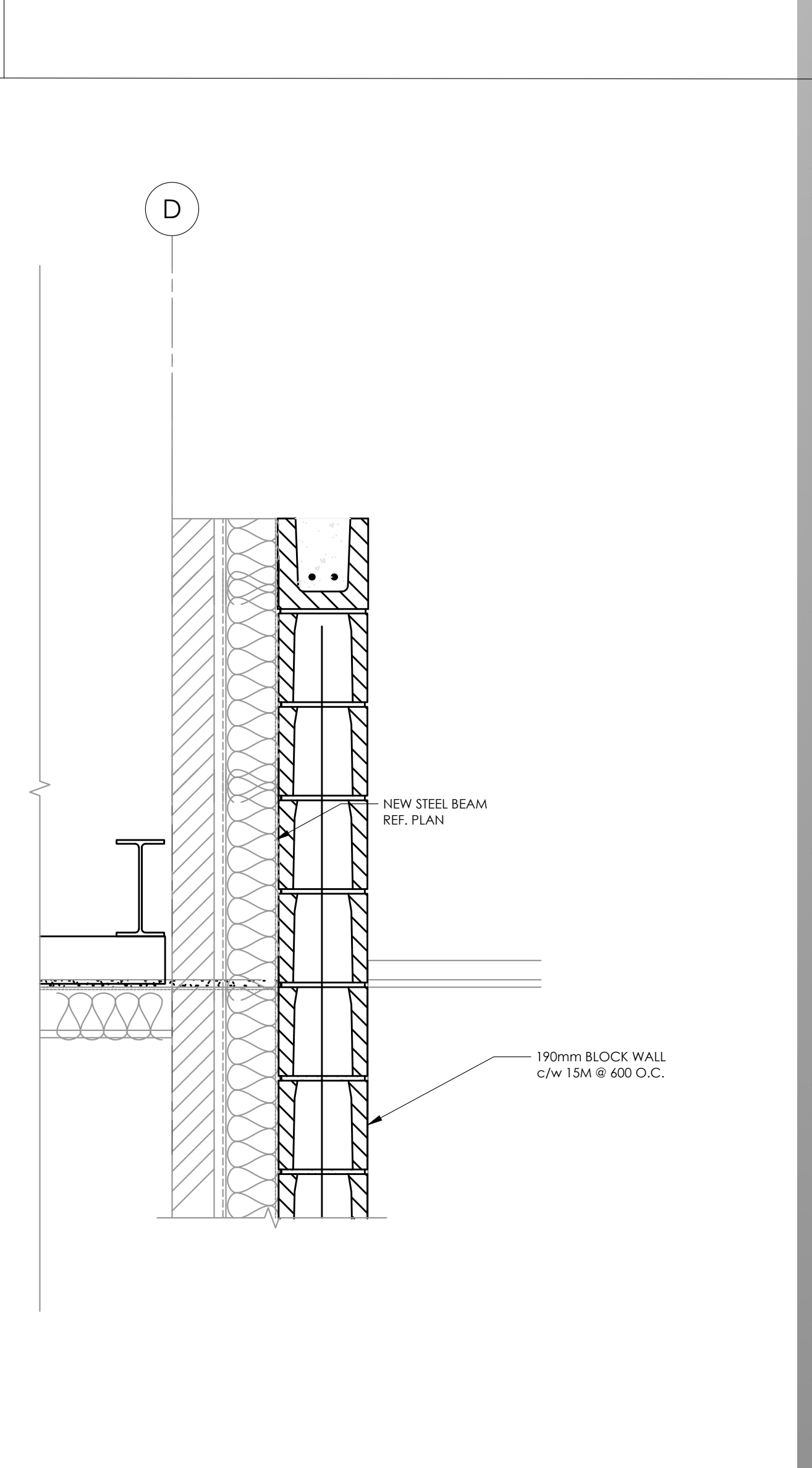
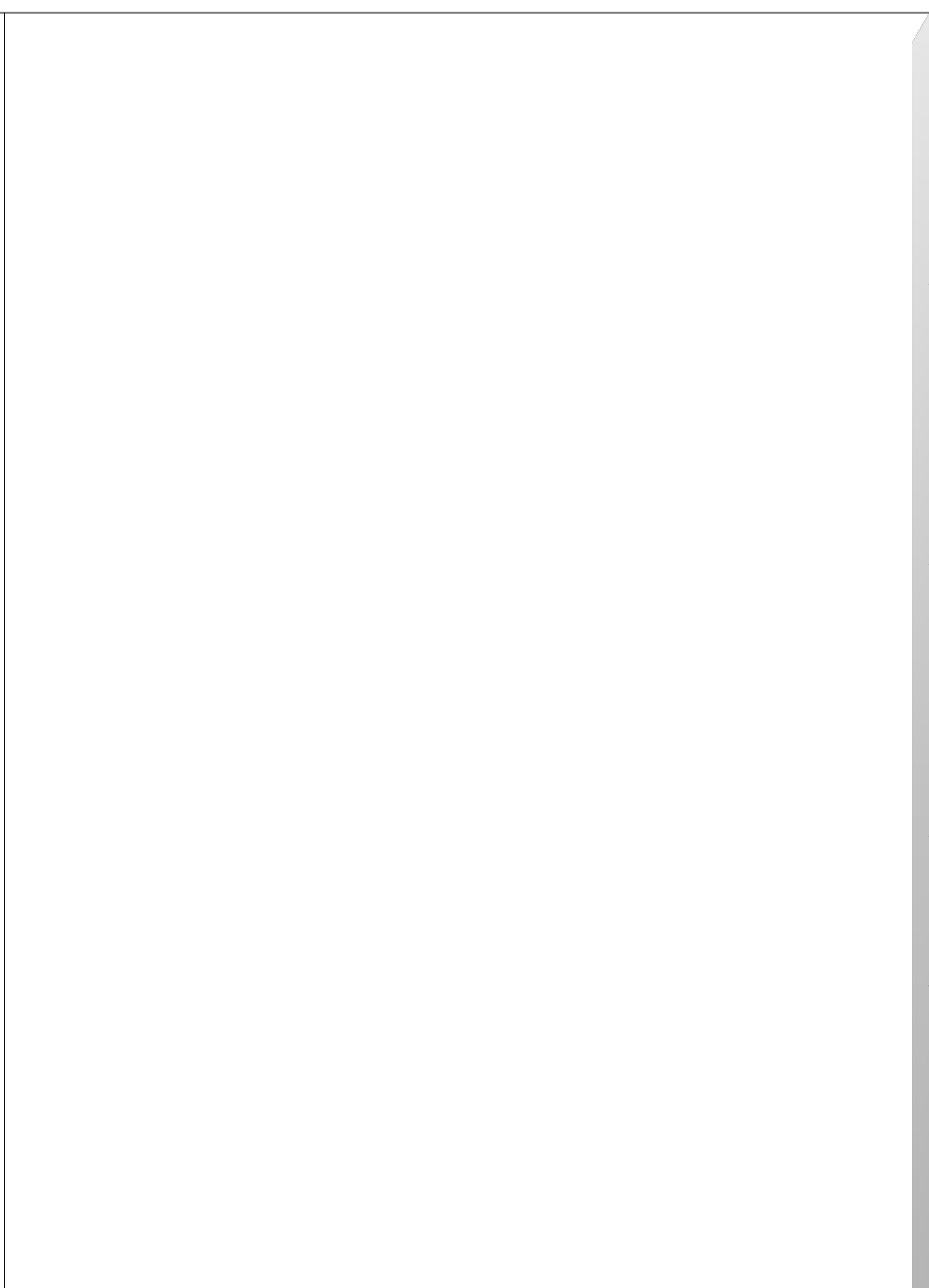
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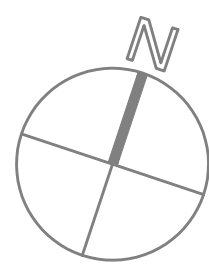


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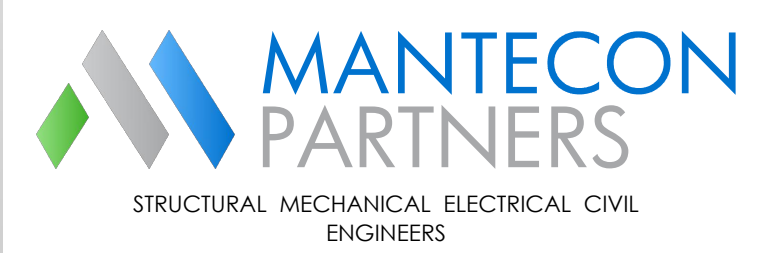


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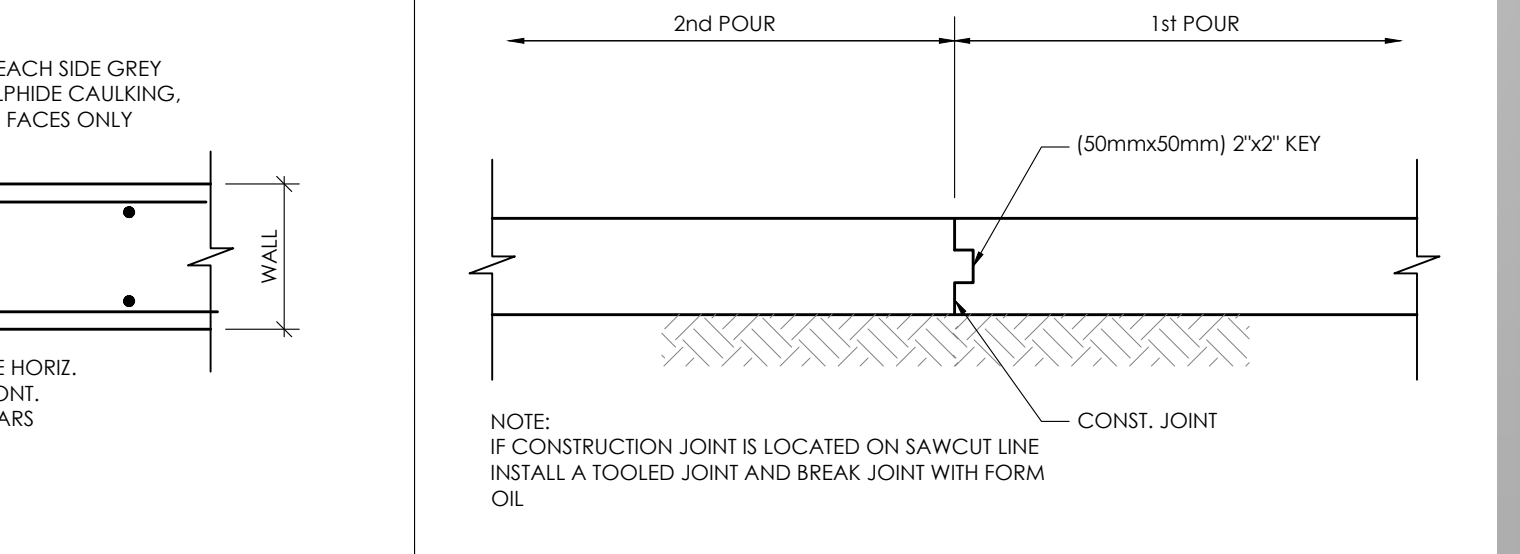
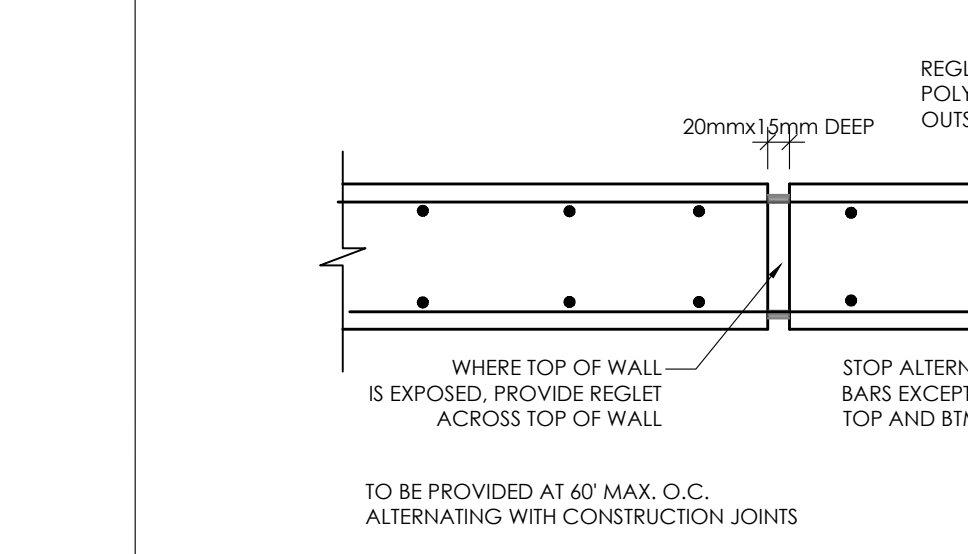
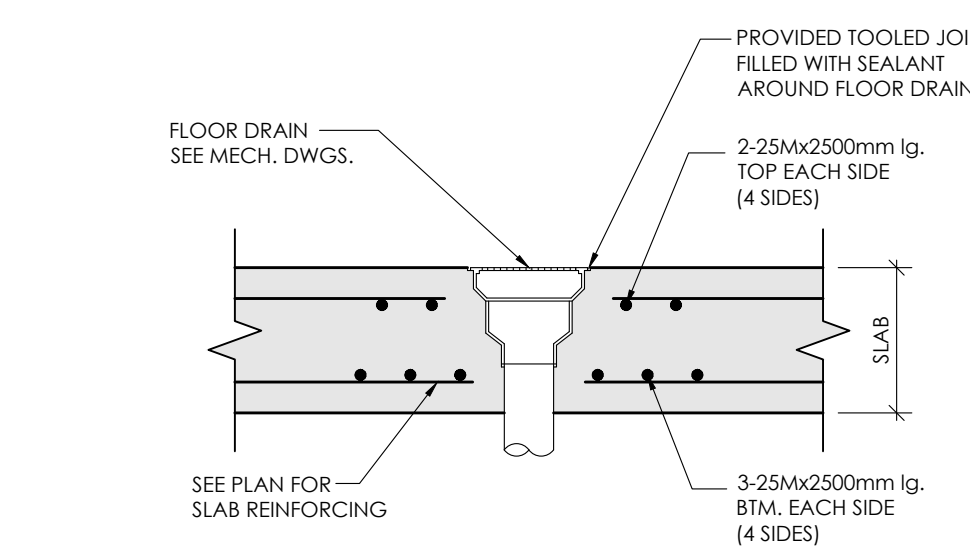
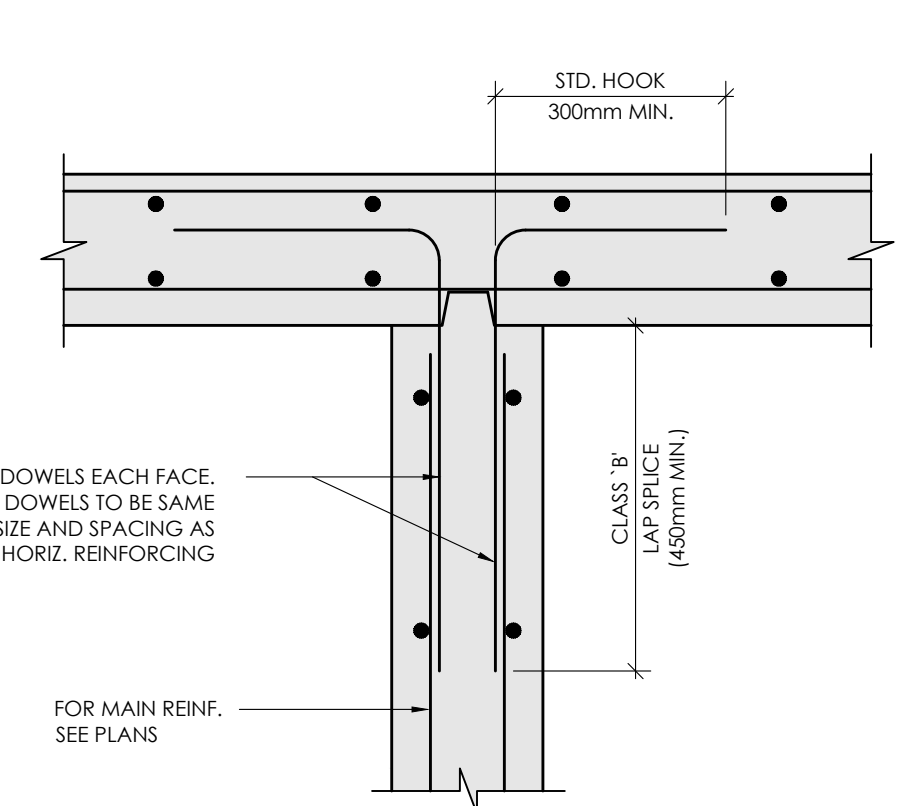
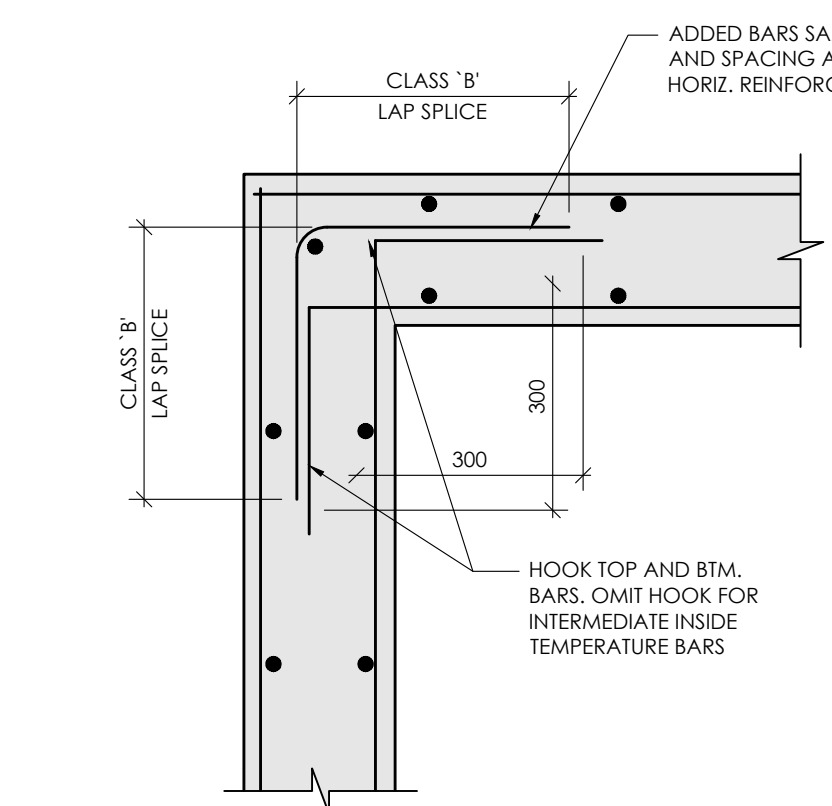
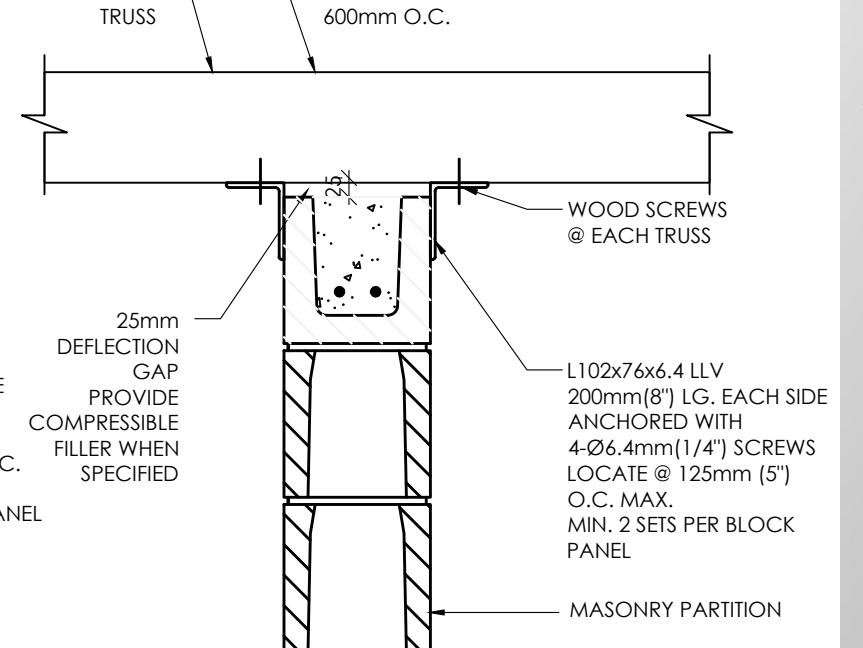
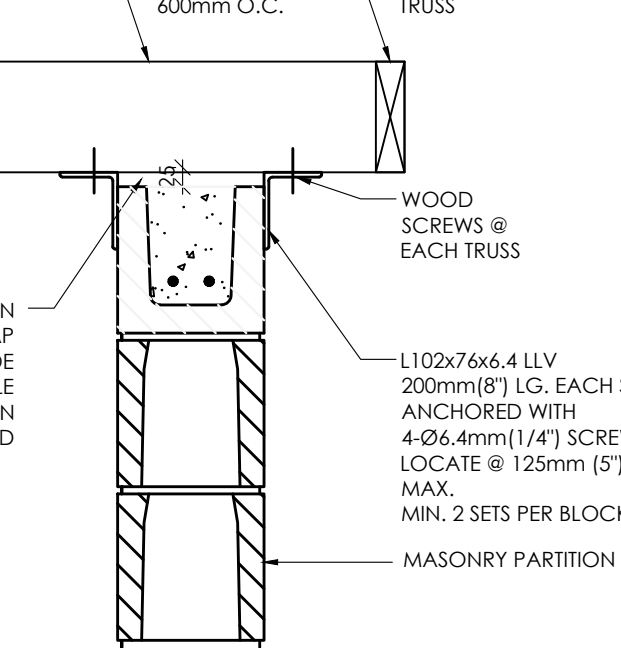
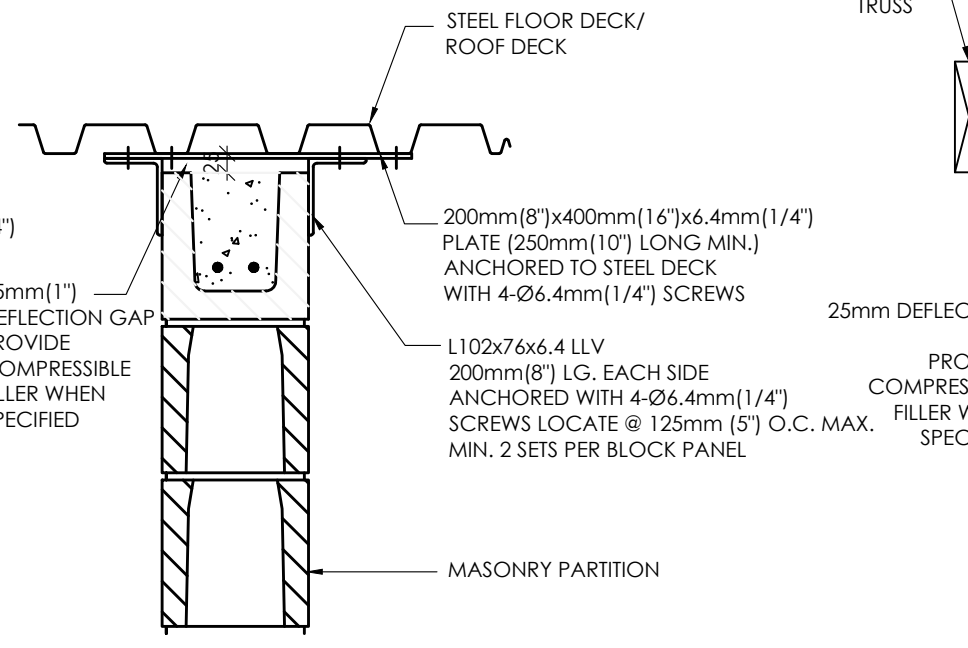
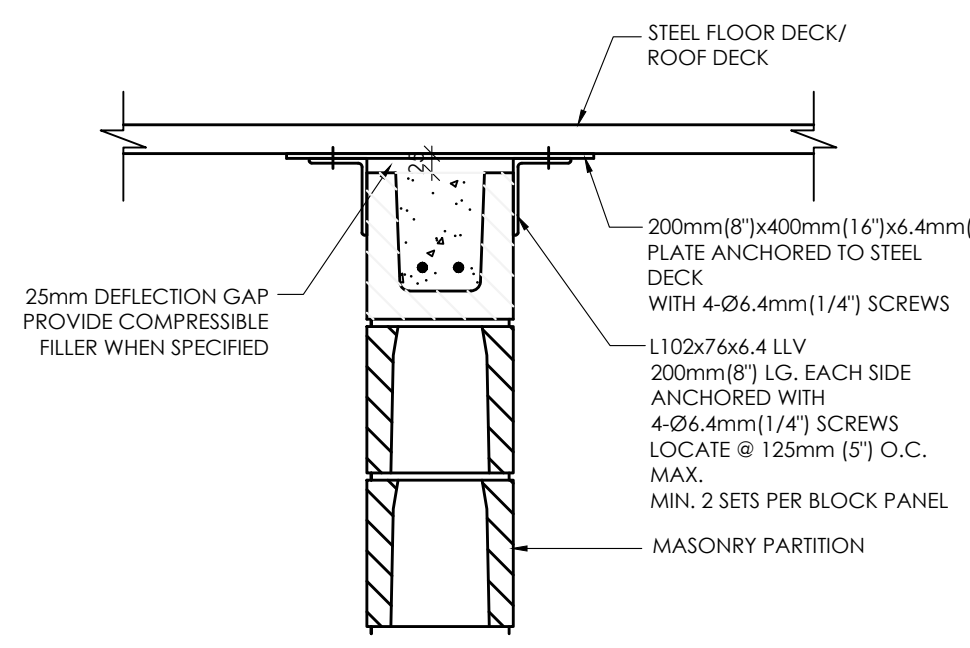
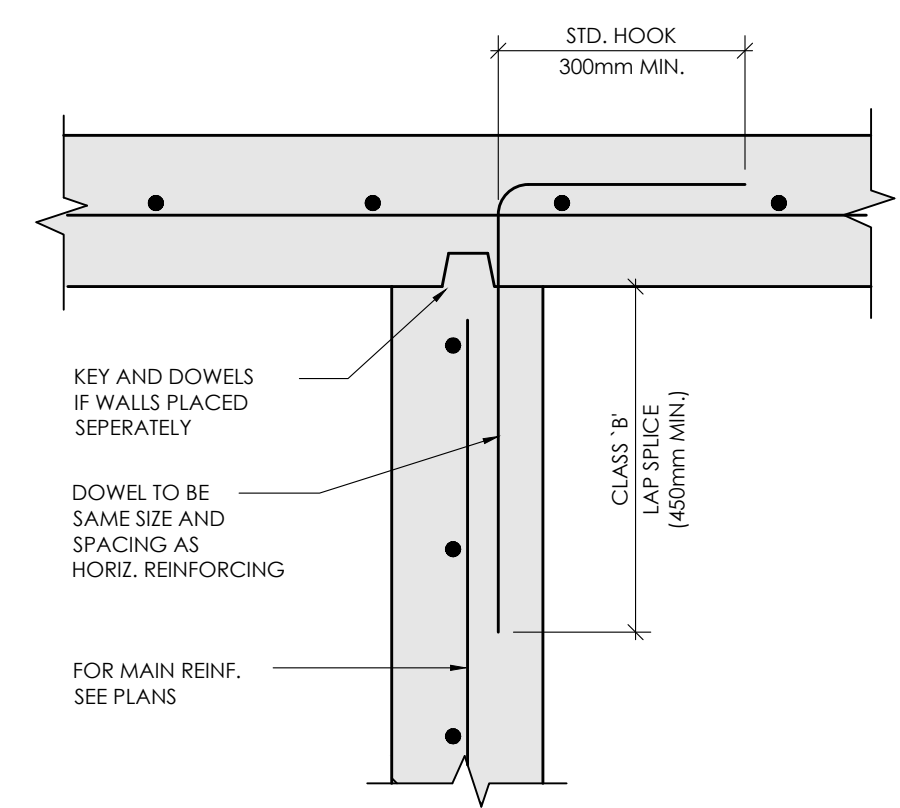
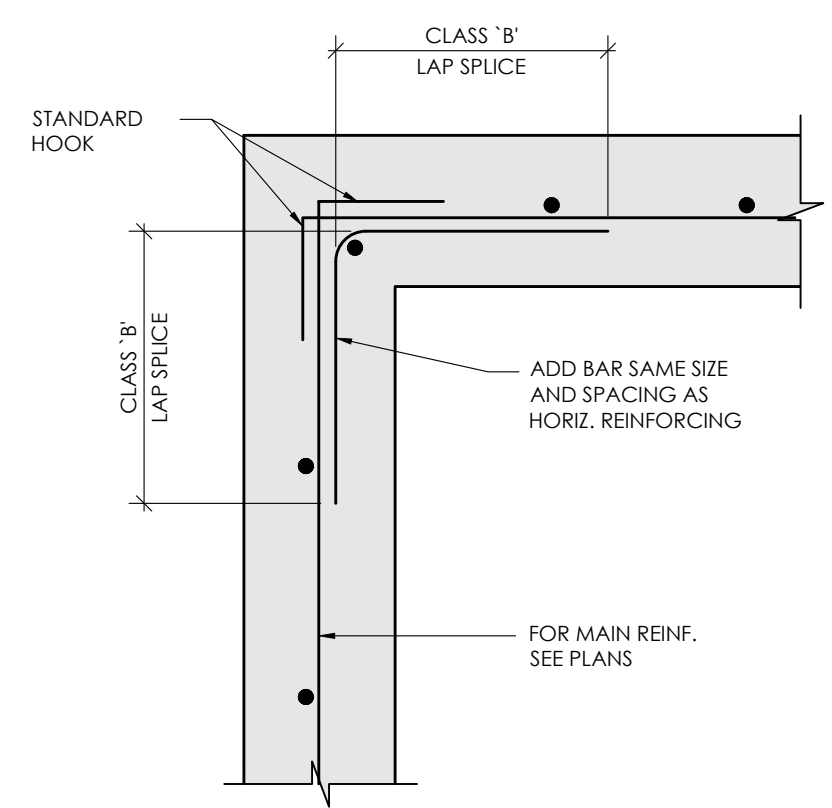
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2	ISSUED FOR COORDINATION	2023/12/11	A.B.
1	ISSUED FOR 80% REVIEW	2022/12/23	A.B.



1 TYP. HORIZ. CORNER REINFORCING FOR WALLS
SCALE: 1:10

2 TYP. WALL RESTRAINT CLIP DETAIL
SCALE: 1:10

3 TYP. FLOOR DRAIN
SCALE: 1:10

4 TYP. CONTROL JOINT IN WALL
SCALE: 1:10

5 TYP. CONSTRUCTION JOINT IN S.O.B.
SCALE: 1:10

6 TYP. SLAB THICKENING
SCALE: 1:10

7 TYP. MASONRY DETAILS
SCALE: 1:20

8 TYP. MASONRY TIES DETAILS
SCALE: 1:20

9 TYP. STEPPED FOOTING
SCALE: 1:20

CLIENT
WORKSHOP
ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE
ADDITION

158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
TYPICAL DETAILS

DRAWN BY:
A.B.

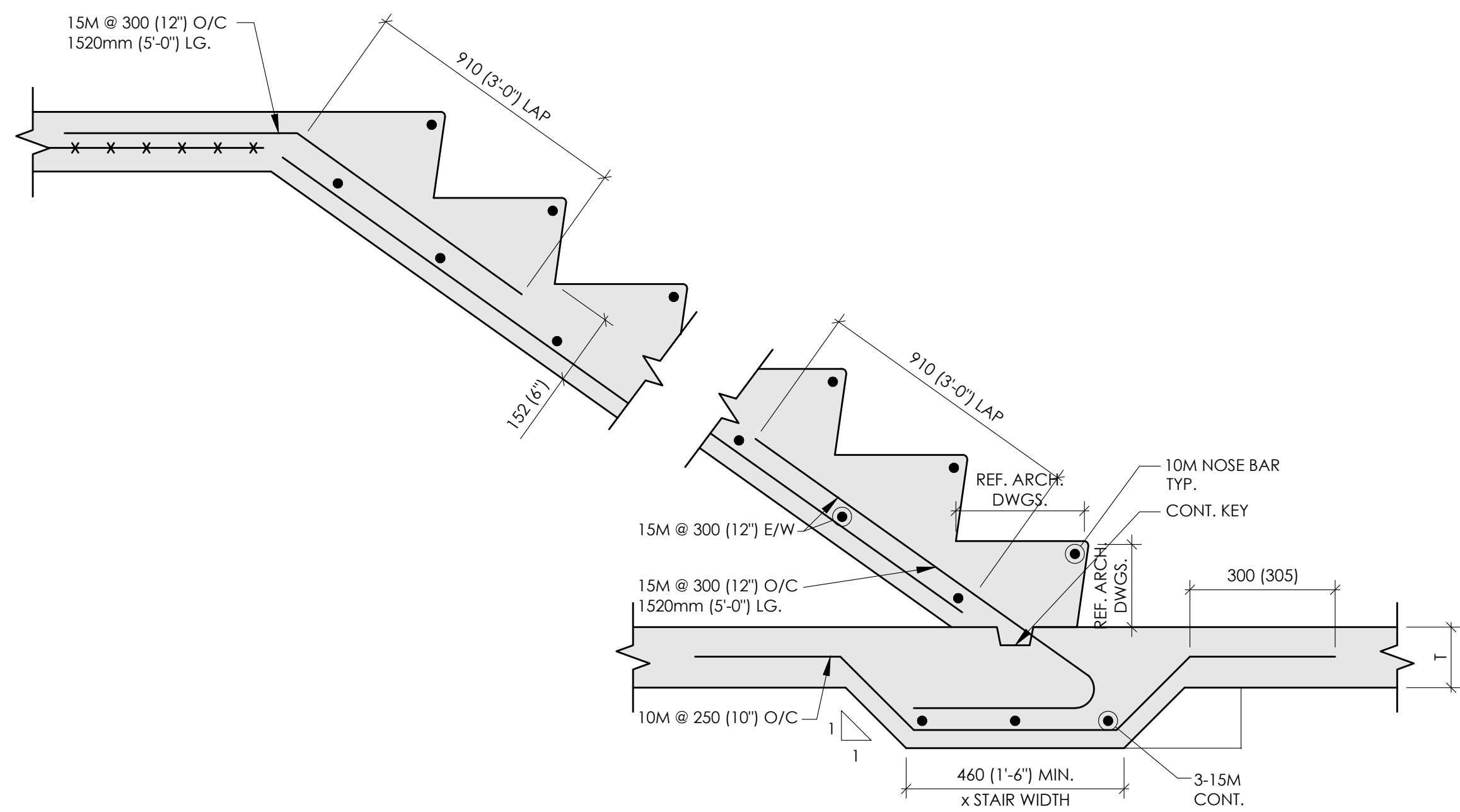
CHECKED BY:
S.M.

DATE:
NOV 2022

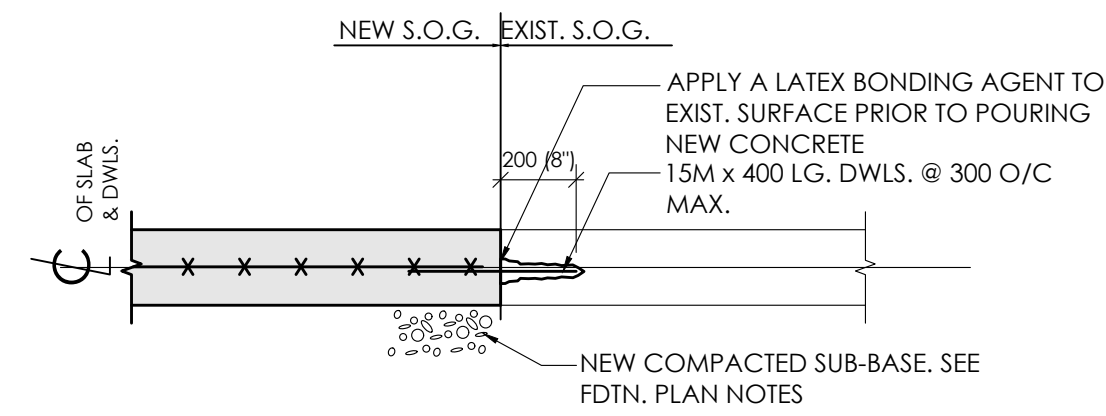
PROJECT NUMBER:
22-058

SCALE:
AS NOTED

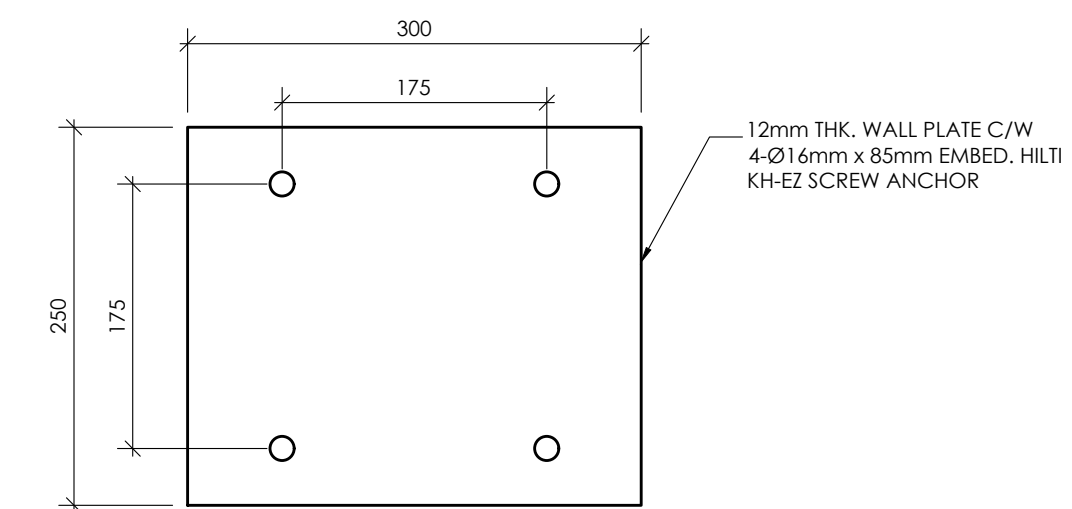
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S4.0



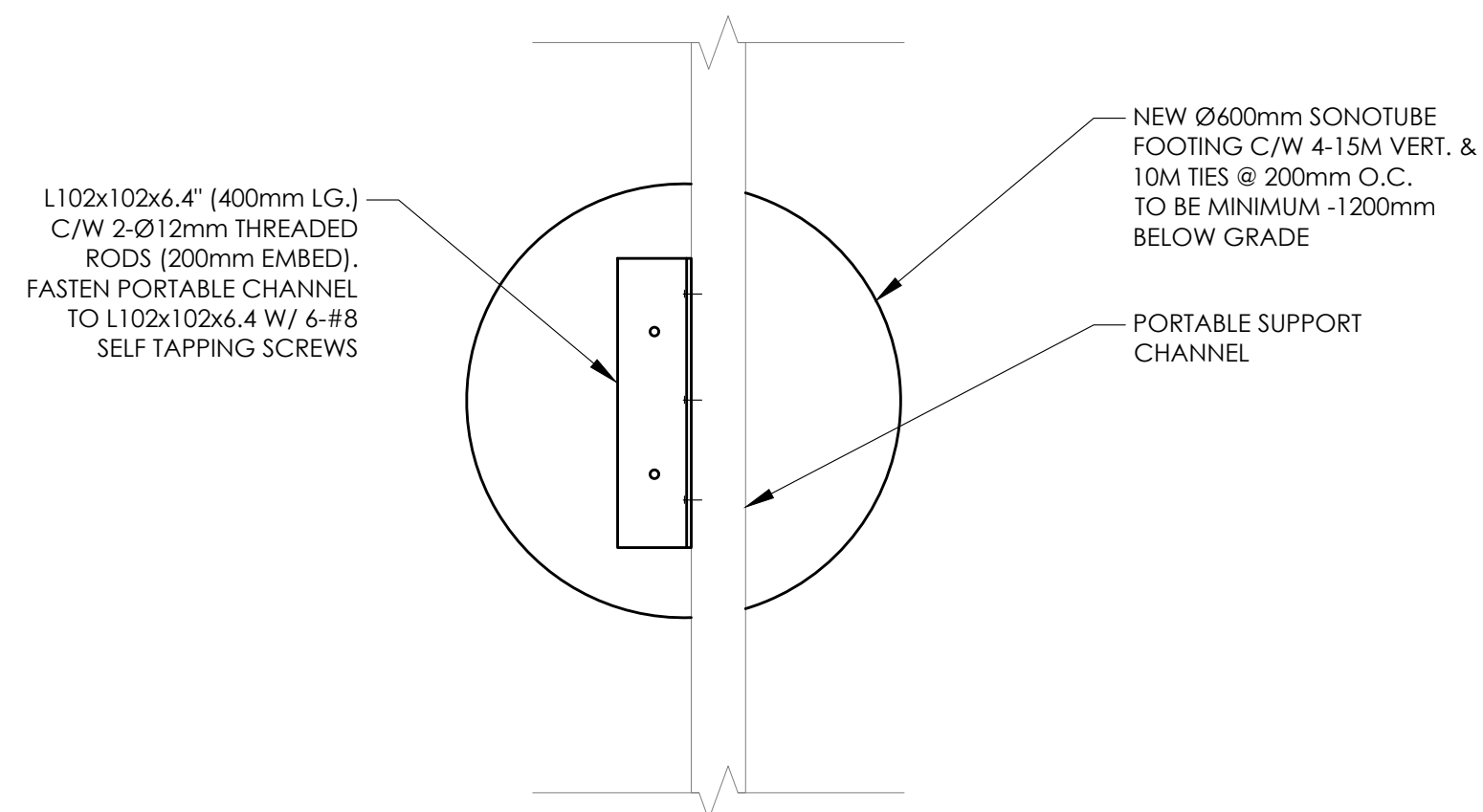
1 STAIR ON GRADE DETAIL
SCALE: 1:10



2 EXISTING SLAB TO NEW SLAB JOINT DETAIL
SCALE: 1:20



3 WP1
SCALE: 1:5



4 PORTABLE ANCHOR DETAIL
SCALE: 1:10



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WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
TYPICAL DETAILS

DRAWN BY: A.B.	SCALE: AS NOTED
CHECKED BY: S.M.	DRAWING NUMBER: S4.1
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

MECHANICAL DRAWING LIST

M0.0	LEAD SHEET (GENERAL NOTES, DRAWING LIST & LEGEND)
M0.1	SPECIFICATIONS
M0.2	SPECIFICATIONS
M0.3	SPECIFICATIONS
M0.4	SPECIFICATIONS
M0.5	SPECIFICATIONS
M1.0	GROUND FLOOR PROPOSED DRAINAGE PLAN
M2.0	GROUND FLOOR PROPOSED PLUMBING PLAN
M3.0	GROUND FLOOR PROPOSED FIRE PROTECTION PLAN
M4.0	GROUND FLOOR PROPOSED HVAC PLAN
M4.1	ROOF LEVEL PROPOSED HVAC PLAN
M4.5	GROUND FLOOR PROPOSED HYDRONIC PLAN
M5.0	MECHANICAL DETAILS
M5.1	MECHANICAL DETAILS
M5.2	CONTROL SCHEMATIC
M5.3	CONTROL SCHEMATIC
M5.4	CONTROL SCHEMATIC
M6.0	MECHANICAL SCHEDULES
MD2.0	GROUND FLOOR PLUMBING DEMO

GENERAL NOTES

- REFER TO SITE AND OWNER INSTRUCTIONS FOR PHASING AND STAGING.
- THE CONTRACTOR SHALL CO-ORDINATE WITH THE STRUCTURAL TO PROVIDE OPENINGS AND SLEEVES THROUGH STRUCTURAL ELEMENTS WHERE REQUIRED.
- PENETRATIONS OF CONCRETE SHALL BE SAW-CUT OR CORE BORED-IMPACT HAMMERS ARE NOT ALLOWED, SEAL ALL DUCTWORK & SLEEVES TO PREVENT LEAKAGE THRU FLOOR.
- DO NOT SCALE DRAWINGS FOR INSTALLATION PURPOSES. OBTAIN ALL DIMENSIONS FROM ARCHITECTURAL PLANS, MANUFACTURER'S SHOP DRAWINGS, AND ON SITE INSPECTIONS.
- MECHANICAL DIV. 2.1.4 AND ELECTRICAL TRADES SHALL WORK IN CONJUNCTION WITH ONE ANOTHER SO AS TO AVOID INTERFERENCE BETWEEN PIPING, DUCTWORK, CONDUIT, LIGHTING FIXTURES, ETC.
- WORK SHALL BE CO-ORDINATED THROUGH THE GENERAL CONTRACTOR PRIOR TO INSTALLATION OF ANY EQUIPMENT, DUCTWORK AND CONTROLS. CO-ORDINATE WITH ARCHITECTURAL ELEVATIONS FOR ARCHITECTURAL, MECHANICAL, AND ELECTRICAL SPACE ALLOCATIONS.
- PROPERLY SUPPORT CEILING MOUNTED EQUIPMENT AND ANY OTHER EQUIPMENT INDEPENDENT OF CEILING SUPPORT SYSTEM, REFER TO ARCHITECTURAL DETAILS AND CO-ORDINATE WITH STRUCTURAL TRADE.
- REFER TO ARCHITECTURAL FOR OWNER SUPPLIED EQUIPMENT, CONFIRM ALL MECHANICAL REQUIREMENTS AND PROVIDE TO SUIT.
- REVIEW ARCHITECTURAL, ELECTRICAL, AND STRUCTURAL DRAWINGS AND PROVIDE ON SITE INSPECTIONS TO DETERMINE FULL EXTENT OF PROJECT PRIOR TO SUBMITTING BID.
- CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL MECHANICAL SERVICES TO THE OCCUPIED AREA THROUGHOUT THE PHASING OF THE WORK. PROVIDE CONSTRUCTION VALVES, TEMPORARY DUCTWORK AND PIPING AS REQUIRED TO LIMIT THE SHUT DOWN OF SERVICES TO ONE TIME.
- EXISTING MECHANICAL SERVICES SHOWN ON THESE DRAWINGS WERE TAKEN FROM THE ORIGINAL CONTRACT DRAWINGS AS LISTED BELOW, THE CONTRACTOR SHALL VERIFY EXACT SIZE AND LOCATION OF ALL EXISTING SERVICES ON SITE AND SHALL REMOVE ALL REDUNDANT SERVICES IN THE AREAS OF CONSTRUCTION.
- ALL DRAWINGS ARE INTEGRATED WITH THE SPECIFICATIONS WHICH ACCOMPANY THEM, NEITHER IS TO BE USED ALONE. ANY ITEM OR SUBJECT OMITTED FROM ONE BUT IMPLIED IN THE OTHER IS FULLY AND PROPERLY REQUIRED, WHEREVER DIFFERENCE OCCURS, THE MOST ONEROUS CONDITION GOVERNS.
- PENETRATIONS OF EITHER FIRE OR SMOKE BARRIER RESISTANT WALLS SHALL BE SLEEVED & SEALED AGAINST THE PASSAGE OF FLAME OR SMOKE W/ SUITABLE NON-COMBUSTIBLE MATERIALS EQUAL TO THE CONSTRUCTION TO BE PENETRATED.
- AVOID ANY DIRECT CONTACT BETWEEN ANY PIPING, DUCTING AND ELECTRICAL CONDUIT SYSTEMS TO PREVENT SOUND TRANSMISSION.
- IF ANY AREAS ARE AFFECTED BY THE NEW SCOPE OF WORK, CONTRACTOR TO CARRY COSTS FOR THE REMOVAL AND INSTALLATION OF THE EXISTING CEILING TILES. REFER TO ARCHITECTURAL NEW REFLECTED CEILING PLAN FOR SCOPE OF NEW CEILING.
- INSTALLATION SHALL BE COMPLETE AND FULLY FUNCTIONAL. PROVIDE ALL LABOR, MATERIALS, TOOLS, SERVICES, EQUIPMENT, ETC. AS REQUIRED.
- PROVIDE ACCESS FOR SERVICING EQUIPMENT AS INDICATED, AS REQUIRED BY CODE AND AS RECOMMENDED BY THE MANUFACTURER.
- PROVIDE ACCESS DOORS AS NECESSARY FOR ACCESS TO VALVES, DAMPERS, AND OTHER COMPONENTS REQUIRING MONITORING, INSPECTION, AND MAINTENANCE.
- INSTALL EQUIPMENT, DUCTS, AND PIPES PARALLEL TO OR PERPENDICULAR TO BUILDING LINES. PROVIDE SPACE, UNIONS AND FLANGES FOR DISASSEMBLY, SERVICING AND REMOVAL OF EQUIPMENT.
- THE CONTRACTOR SHALL, WITH APPROVAL OF THE OWNER AND AT NO ADDITIONAL CONTRACT COST, REMOVE, REARRANGE AND/OR RELOCATE ANY OBSTRUCTIONS WHICH INTERFERE WITH INSTALLATION OF NEW WORK.
- ALL SHUTDOWN OF ANY PORTION OF EXISTING BUILDING SYSTEMS SHALL BE PERFORMED WITH THE OWNER'S CONSENT. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER FOR TIME AND DURATION OF SERVICE INTERRUPTIONS. INCLUDE COST OF PREMIUM TIME IN THE CONTRACT PRICE FOR WORK PERFORMED DURING NIGHTS, WEEK-ENDS OR OTHER TIME OUTSIDE NORMAL WORKING HOURS AS NECESSARY TO MAINTAIN MECHANICAL SERVICES IN OPERATION.
- WHEN A CONFLICT OCCURS BETWEEN INSTALLATION DETAILS, DIAGRAMS, ETC. INDICATED IN THE CONTRACT DOCUMENTS AND MANUFACTURER'S INSTALLATION INSTRUCTIONS, THE MANUFACTURER'S INSTRUCTIONS SHALL GOVERN AND SHALL BE FOLLOWED.
- ALL INSTALLATIONS SHALL BE IN ACCORDANCE WITH CODES, APPLICABLE STANDARDS, BULLETINS ETC., AND REQUIREMENTS OF ALL INSPECTION AUTHORITIES FOR THE CITY OF WATERLOO.
- DUE TO INCONSISTENT RECORD OF EXISTING SERVICES NOT ALL SERVICES MAY BE SHOWN, OR IF SHOWN MAY NOT BE ACCURATE. IT IS CONTRACTORS RESPONSIBILITY TO FIELD CONFIRM ALL SERVICES.
- CONTRACTOR IS TO VERIFY CONNECTION POINTS TO EXISTING SERVICES ON SITE.
- CHECK AND VERIFY LOCATION OF ALL PIPES, DUCTS AND EQUIPMENT WITH ALL OTHER TRADES TO PREVENT INTERFERENCE. REMOVAL OR RELOCATION OF ANY SUCH WORK INTERFERING WITH WORK OF OTHER TRADES IS THE RESPONSIBILITY OF THE MECHANICAL TRADE CONCERNED UNLESS OTHERWISE APPROVED IN WRITING.
- PROVIDE ACCESS DOOR FOR ALL VALVES LOCATED ABOVE DRY WALL CEILING.
- IN ALL INSTANCES THE NEED FOR ACCESS DOOR IN GWB CEILINGS SHOULD BE AVOIDED IF POSSIBLE WHERE INSTALLATION OF COMPONENTS WHICH REQUIRE ACCESS CANNOT BE AVOIDED. SUBMIT (DIMENSIONED) LAYOUT ON ARCHITECTURAL REFLECTED CEILING PLANS TO CONSULTANTS FOR APPROVAL PRIOR TO INSTALLATION OF COMPONENT.
- BEFORE CUTTING ANY HOLES THROUGH THE EXISTING SLAB REFER TO STRUCTURAL DRAWINGS FOR GENERAL REQUIREMENTS.
- PROVIDE SIGN IDENTIFYING LOCATION OF ALL VALVES INSTALLED IN CEILING SPACE.

PLUMBING NOTES

- CONTRACTOR IS TO CLEAR EXISTING DUCTWORK WHEN INSTALLING NEW PIPING. CLEARANCES TO BE VERIFIED ON-SITE.
- PROVIDE A CLEANOUT AT THE BOTTOM OF EVERY SOIL AND WASTE STACK THAT CONNECTS TO A HORIZONTAL DRAINAGE PIPE.
- PROVIDE A CLEANOUT FROM EACH PLUMBING FIXTURE WHERE REQUIRED BY ONTARIO BUILDING CODE, PART 7 - PLUMBING.
- ALL PLUMBING FIXTURES INCLUDING FLOOR DRAINS (HUB, FUNNEL FLOOR DRAINS) TO BE TRAPPED AND VENTED AS REQUIRED BY ONTARIO BUILDING CODE, PART 7 - PLUMBING.
- FOR MOUNTING HEIGHT OF ALL PLUMBING FIXTURES REFER TO ARCHITECTURAL DRAWINGS.
- PROVIDE ACCESS DOOR FOR ALL CLEANOUTS LOCATED ABOVE DRY WALL CEILING.
- CONTRACTOR IS TO REMOVE ALL OBSOLETE PIPING WHEREVER POSSIBLE.
- CONTRACTOR IS TO ENSURE THAT ALL EXISTING PIPING SERVING EXISTING AREAS REMAIN IN SERVICE UNTIL THESE AREAS ARE RECONNECTED TO NEW SERVICES, ONLY THEN OBSOLETE PIPING IS TO BE REMOVED AS SHOWN.
- RECONNECT VENTS FROM EXISTING EQUIPMENT AND PLUMBING FIXTURES WHICH ARE TO REMAIN TO NEW VENTS AS REQUIRED.
- WHENEVER COLD AND HOT WATER DISTRIBUTION TO LAVATORIES IS TO RUN UNDER COUNTER, PIPING DISTRIBUTION IS TO BE INSTALLED AS TIGHT TO UNDER SIDE OF THE COUNTER AS POSSIBLE.
- ALL WATER, SANITARY, SEWER AND VENT COPPER PIPING WITH SOLDER JOINTS SHALL BE LEAD FREE. DO NOT INSTALL WATER LINES IN OUTSIDE WALL WHERE THEY MAY FREEZE, UNLESS BOTH THE WALL AND THE PIPES ARE PROPERLY INSULATED.
- INSTALL SHUT-OFF VALVES AT EACH PLUMBING FIXTURE.
- DEMOLITION AND REMOVAL OF PLUMBING AND DRAINAGE PIPING SHALL BE TAKEN BACK TO THE NEAREST WORKING MAIN AND BE CAPPED AS CLOSE TO THE WORKING MAIN AS POSSIBLE TO AVOID DEAD LEG LENGTHS OF PIPING. REFER TO CSA CODE 2317, SPECIAL REQUIREMENTS FOR PLUMBING INSTALLATIONS IN HEALTH CARE FACILITIES 6.4.1.3

LEGEND - PLUMBING

REFER	DESCRIPTION
— E —	EXISTING PIPING
— A —	ABANDONED PIPING
— C —	DOMESTIC COLD WATER PIPING
— H —	DOMESTIC HOT WATER PIPING
— SP —	SPRINKLER PIPING
— DF —	DRY STANDPIPE PIPING
— DSP —	DRY SPRINKLER PIPING
— F-DC —	STANDPIPE FIRE DEPARTMENT CONNECTION PIPING
— SP-FDC —	SPRINKLER FIRE DEPARTMENT CONNECTION PIPING
— ESV —	ELECTRICALLY SUPERVISED VENT PIPING
— D/T —	DRAIN/TEST VALVE
— FS —	FLOOR SANITARY PIPING ABOVE FLOOR
— FH —	FLOOR STORM PIPING ABOVE FLOOR
— S —	FLOOR COLD SOFT WATER PIPING
— V —	VENT PIPING
— AV —	ACID WASTE PIPING
— AV —	ACID VENT PIPING
— CS —	COMBINED SEWER PIPING
— C —	CONDENSATE PIPING
— PC —	PUMPED CONDENSATE PIPING
— PD —	PUMPED DISCHARGE PIPING
— FM —	FORCEMAIN PIPING
— G —	GAS PIPING
— CA —	COMPRESSED AIR PIPING
— NP —	NON PORTABLE PIPING FOR IRRIGATION SYSTEM
— E —	PIPING TO BE REMOVED
— E —	HEAT TRACED PIPING
— E —	CONNECTION OF NEW AND EXISTING PIPING
— FD —	FLOOR DRAIN
— FFD —	FUNNEL FLOOR DRAIN
— AD —	AREA DRAIN
— FS —	FLOOR SINK DRAIN
— RD —	ROOF DRAIN
— CO —	CLEANOUT IN FLOOR
— CO —	CLEANOUT IN LINE OR STACK
— M —	WATER METER
— M —	GAS METER
— NFVH —	NON-FREEZE WALL HYDRANT c/w VACUUM BREAKER
— HB —	HOSE BIBB c/w VACUUM BREAKER
— X —	ISOLATION VALVE
— Z —	THROTTLING VALVE
— Z —	CHECK VALVE
— Z —	CHECK VALVE c/w BALL DRIP VALVE
— Z —	STRAINER
— Z —	GAS VALVE
— Z —	REDUCED PRESSURE BACKFLOW PREVENTER
— Z —	DUAL CHECK W/ ATMOSPHERIC PORT BACKFLOW PREVENTER
— Z —	VACUUM BREAKER - PRESSURE TYPE
— Z —	PRESSURE REDUCING VALVE [WATER]
— Z —	VENT THROUGH ROOF
— Z —	3-WAY VALVE
— Z —	TEMPERATURE & PRESSURE RELIEF VALVE
— Z —	CONTROL VALVE
— Z —	UNION
— Z —	PRESSURE GAUGE
— Z —	THERMOMETER
— Z —	PUMP
— Z —	PIPE DOWN
— Z —	PIPE UP
— Z —	PIPE UP & DOWN
— Z —	PIPE TEE

FIRE PROTECTION NOTES

- SPRINKLER CONTRACTOR IS RESPONSIBLE FOR DESIGN OF SPRINKLER SYSTEM IN STRICT ACCORDANCE WITH THE ONTARIO BUILDING CODE, ALL APPLICABLE NFPA STANDARDS, THE REQUIREMENTS OF THE OWNER'S INSURANCE UNDERWRITERS ENGINEERING AUTHORITY (O.I.U.E.A.) AND AUTHORITIES HAVING JURISDICTION.
- THE CONTRACTOR SHALL COORDINATE THE INSTALLATION WITH THE WORK OF OTHER TRADES. PROVIDE HORIZONTAL AND/OR VERTICAL OFFSETS AS REQUIRED TO SUIT THIS COORDINATION.
- PROVIDE ADDITIONAL SPRINKLER HEADS AS REQUIRED TO SUIT OBSTRUCTIONS GREATER THAN 1200mm (48") (I.E.: DUCTWORK, BULKHEADS, ETC.).
- CONTRACTOR SHALL PAY ALL FEES, CHARGES AND COSTS REQUIRED FOR REVIEWS, INSPECTIONS, TESTS OR COMMENTS IN REGARDS TO THIS PROJECT.
- THE SPRINKLER LAYOUT SHOWN ON THESE DRAWINGS SERVE AS A GENERAL SCOPE OF WORK. THE SPRINKLER CONTRACTOR SHALL MAKE ALL MODIFICATIONS TO THE DESIGN TO COMPLY WITH AUTHORITIES REQUIREMENTS AND TO THE ARCHITECT'S APPROVAL. SPRINKLER HEADS MAY BE ADDED OR DELETED TO PROVIDE ADEQUATE COVERAGE AS DETERMINED BY THE SPRINKLER CONTRACTOR AT NO EXTRA OR CREDIT TO THE CONTRACT, PROVIDED ALL APPROVALS ARE MET IN FULL COORDINATION MECHANICAL, ELECTRICAL, STRUCTURAL AND ARCHITECTURAL ELEMENTS OF THE BUILDINGS.
- FOR FINAL COORDINATION OF SPRINKLER LAYOUT REFER TO ARCHITECTURAL REFLECTED CEILING PLAN.
- SPRINKLER CONTRACTOR IS TO SUBMIT LAYOUT OF SPRINKLER HEAD LOCATIONS TO ARCHITECT AND CONSULTANTS FOR REVIEW.
- "IN" T BAR CEILING LOCATE SPRINKLERS CENTERED LENGTHWISE WITH TILE, AT LEAST 6" FROM "T".
- PROVIDE WIRE GUARDS ON ALL SPRINKLERS IN MECHANICAL AND ELECTRICAL ROOMS.
- PROVIDE STAMPED SPRINKLER SHOP DRAWINGS FOR REVIEW PRIOR TO COMMENCING ANY WORK.
- APPLY FOR & PAY FOR A SPRINKLER PERMIT.
- PROVIDE A ULC APPROVED FIRE STOP SEALANT AT ALL PIPE & DUCTWORK PENETRATIONS. REFER TO ARCHITECTURAL DRAWINGS FOR FIRE RATING REQUIREMENTS.

LEGEND - FIRE PROTECTION

REFER	DESCRIPTION
— E —	EXISTING PIPING
— F —	STANDPIPE PIPING
— SP —	SPRINKLER PIPING
— DF —	DRY STANDPIPE PIPING
— DSP —	DRY SPRINKLER PIPING
— F-DC —	STANDPIPE FIRE DEPARTMENT CONNECTION PIPING
— SP-FDC —	SPRINKLER FIRE DEPARTMENT CONNECTION PIPING
— ESV —	ELECTRICALLY SUPERVISED VENT PIPING
— D/T —	DRAIN/TEST VALVE
— FS —	FLOOR SANITARY PIPING ABOVE FLOOR
— FH —	FLOOR STORM PIPING ABOVE FLOOR
— S —	FLOOR COLD SOFT WATER PIPING
— V —	VENT PIPING
— AV —	ACID WASTE PIPING
— AV —	ACID VENT PIPING
— CS —	COMBINED SEWER PIPING
— C —	CONDENSATE PIPING
— PC —	PUMPED CONDENSATE PIPING
— PD —	PUMPED DISCHARGE PIPING
— FM —	FORCEMAIN PIPING
— G —	GAS PIPING
— CA —	COMPRESSED AIR PIPING
— NP —	NON PORTABLE PIPING FOR IRRIGATION SYSTEM
— E —	PIPING TO BE REMOVED
— E —	HEAT TRACED PIPING
— E —	CONNECTION OF NEW AND EXISTING PIPING
— FD —	FLOOR DRAIN
— FFD —	FUNNEL FLOOR DRAIN
— AD —	AREA DRAIN
— FS —	FLOOR SINK DRAIN
— RD —	ROOF DRAIN
— CO —	CLEANOUT IN FLOOR
— CO —	CLEANOUT IN LINE OR STACK
— M —	WATER METER
— M —	GAS METER
— NFVH —	NON-FREEZE WALL HYDRANT c/w VACUUM BREAKER
— HB —	HOSE BIBB c/w VACUUM BREAKER
— X —	ISOLATION VALVE
— Z —	THROTTLING VALVE
— Z —	CHECK VALVE
— Z —	CHECK VALVE c/w BALL DRIP VALVE
— Z —	STRAINER
— Z —	GAS VALVE
— Z —	REDUCED PRESSURE BACKFLOW PREVENTER
— Z —	DUAL CHECK W/ ATMOSPHERIC PORT BACKFLOW PREVENTER
— Z —	VACUUM BREAKER - PRESSURE TYPE
— Z —	PRESSURE REDUCING VALVE [WATER]
— Z —	VENT THROUGH ROOF
— Z —	3-WAY VALVE
— Z —	TEMPERATURE & PRESSURE RELIEF VALVE
— Z —	CONTROL VALVE
— Z —	UNION
— Z —	PRESSURE GAUGE
— Z —	THERMOMETER
— Z —	PUMP
— Z —	PIPE DOWN
— Z —	PIPE UP
— Z —	PIPE UP & DOWN
— Z —	PIPE TEE

DRAWING NOTES

- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL BUILDING CODE, NFPA STANDARDS NO. 3, 10, 13, & 14 AND TO THE LOCAL AUTHORITIES REQUIREMENTS.
- THE CONTRACTOR SHALL COORDINATE THE INSTALLATION WITH THE WORK OF OTHER TRADES. PROVIDE HORIZONTAL AND/OR VERTICAL OFFSETS AS REQUIRED TO SUIT THIS COORDINATION.
- PROVIDE ADDITIONAL SPRINKLER HEADS AS REQUIRED TO SUIT OBSTRUCTIONS GREATER THAN 1200mm (48") (I.E.: DUCTWORK, BULKHEADS, ETC.).

GENERAL DEMOLITION NOTES

- CONTRACTOR IS TO ENSURE THAT ALL EXISTING PIPING SERVING EXISTING AREAS REMAIN IN SERVICE UNTIL THESE AREAS ARE RECONNECTED TO NEW SERVICES, ONLY THEN OBSOLETE PIPING IS TO BE REMOVED AS SHOWN.
- ALL DISTURBED SURFACES AFTER PIPE REMOVAL OR REROUTING TO BE FILLED-IN WITH APPROPRIATE MATERIAL TO MAINTAIN FIRE SEPARATION AND PATCHED TO MATCH EXISTING OR NEW.
- CONTRACTOR IS TO ENSURE THAT ALL EXISTING REMOVED FIXTURES AND EQUIPMENT REMAIN THE PROPERTY OF THE OWNER.
- AFTER PIPE/DUCT REMOVAL ALL EXISTING OPENINGS IN FIRE SEPARATION ARE TO BE FILLED-IN TO MAINTAIN INTEGRITY OF THAT FIRE SEPARATION.

GENERAL SITE SERVICE NOTES

- CONTRACTOR IS TO VERIFY LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- ALL EXISTING UTILITIES AND SERVICES ARE TO BE MAINTAINED AND SUPPORTED BY THE CONTRACTOR TO THE SATISFACTION OF THE OWNER OF THE UTILITY.

HVAC NOTES

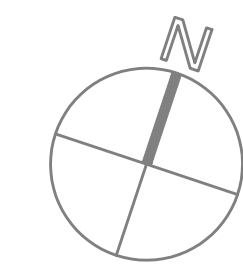
- REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR CO-ORDINATION OF GRILLES, DIFFUSERS AND OTHER ELEMENTS.
- CONTRACTORS SHALL COORDINATE ALL CEILING FINISHES WITH OWNER AND MATCH EXISTING. CONTRACTOR SHALL REVIEW MECHANICAL DRAWINGS, ARCHITECTURAL REFLECTED CEILING PLANS AND ARCHITECTURAL ROOM FINISH SCHEDULES AS SOON AS CONTRACT DOCUMENTS ARE SIGNED. ADVISE CONSULTANT OF ANY CONFLICTS BETWEEN CEILING TYPE AND DIFFUSER/GRILLE TYPE.
- THE CONTRACTOR SHALL VERIFY ALL CEILING FINISHES WITH ARCHITECTURAL DRAWINGS. CONTRACTOR AND DIFFUSER/GRILLE SUPPLIER ARE RESPONSIBLE TO PROVIDE ALL PLASTER AND FINISHING FRAMES, MOUNTING HARDWARE AND ACCESSORIES TO SUIT ARCHITECTURAL CEILING TYPES. MECHANICAL CONTRACTOR SHALL CO-ORDINATE AND PROVIDE DETAILS OF MOUNTING REQUIREMENTS OF DIFFUSERS AND GRILLES IN DRYWALL CEILINGS TO DRYWALL TRADE AND ENSURE EDGES OF OPENINGS ARE FRAMED BY DRYWALL TRADE TO SUPPORT DIFFUSERS AND GRILLES PROPERLY. DIFFUSERS AND GRILLES MUST NOT BE SUPPORTED SOLELY BY HANGER WIRES.
- CONTRACTOR TO CARRY FOR ADDITIONAL DUCTS AND DUCT FITTING REQUIRED TO CLEAR THE INTERFERENCES IN THE CEILING SPACE.
- ALL NEW DUCTWORK TO BE CLEANED.
- ALL DUCTWORK FITTINGS SHALL BE RIGID GALVANIZED IRON.
- CONTRACTOR TO TAKE ALL MEASUREMENTS NECESSARY TO DETERMINE CURRENT SYSTEMS PERFORMANCE IN AREAS THAT WILL CONTINUE TO BE SERVED BY EXISTING AIR HANDLING EQUIPMENT AND SHALL REPORT ALL MEASUREMENTS MADE PRIOR TO START OF DEMOLITION.
- ON COMPLETION OF DUCT ALTERATIONS, AIR BALANCE TECHNICIAN SHALL REBALANCE ALL EXISTING SYSTEMS TO DELIVER PRE-CONSTRUCTION FLOWS.
- WHERE MODIFICATIONS HAVE BEEN DONE TO THE HEATING WATER CIRCUITS CONTRACTOR MUST REBALANCE THE AFFECTED PARTS.

LEGEND - HVAC - AIR DISTRIBUTION

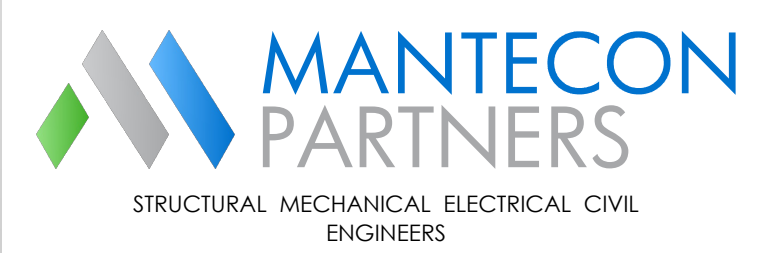
REFER	DESCRIPTION
— P —	POSITIVE PRESSURE (SUPPLY) DUCT UP
— P —	POSITIVE PRESSURE (SUPPLY) DUCT DOWN
— N —	NEGATIVE PRESSURE (RETURN) DUCT UP
— N —	NEGATIVE PRESSURE (RETURN) DUCT DOWN
— E —	EXISTING DUCTWORK TO BE REMOVED
— E —	EXISTING DUCTWORK TO REMAIN
— D —	DUCTWORK APPROVAL REQ. FOR USE
— D —	DOUBLE WALL INSULATED DUCTWORK
— D —	DUCT IN FIREPROOF ENCLOSURE
— D —	CROSSHATCHING ON DUCTWORK INDICATES 1"(25mm) DUCT LINING AS SPECIFIED
— D —	DUCTWORK WITH SUPPLY AIR DIFFUSER (SQUARE)
— D —	SUPPLY AIR DIFFUSER (LAMINAR FLOW)
— D —	SHADING INDICATES DIFFUSER TO HAVE A BLANK OFF PANEL
— D —	LINER OR SLOT DIFFUSER WITH PLENUM
— D —	SUPPLY AIR DIFFUSER (ROUND)
— D —	SIDEWALL GRILLE
— D —	RETURN EXHAUST GRILLE
— D —	FULL RADIUS DUCT CONNECTION
— D —	TAP-IN DUCT CONNECTION
— D —	ROUND DUCT CONNECTION
— D —	TURNING YANKEE
— D —	FIRE DAMPER
— D —	REMOVE FIRE DAMPER
— D —	REMOVE FIRE DAMPER/SMOKE DAMPER
— D —	CENTRIFUGAL DAMPER
— D —	MOTORIZED DAMPER
— D —	EXISTING MOTORIZED DAMPER
— D —	VALVE DAMPER
— D —	BD BALANCING DAMPER
— D —	OPPOSED BLADE BALANCING DAMPER
— D —	OED DAMPER OPEN ENDED DUCT
— D —	ERC EXISTING ELECTRIC REHEAT COIL
— D —	N.I.C. NOT IN CONTRACT
— D —	THERMOSTAT
— D —	REVERSE ACTING THERMOSTAT
— D —	THERMOSTAT c/w TAMPERPROOF COVER
— D —	HUMIDISTAT
— D —	SPEED CONTROLLER
— D —	OCCUPIED/UNOCCUPIED SWITCH
— D —	UC UNDERCUT
— D —	CAP
— D —	HOT WATER CEILING PANEL RADIATION
— D —	HOT WATER PANEL RADIATION
— D —	HOT WATER REHEAT COIL
— D —	OPENING ABOVE CEILING
— D —	CROSS TALK SILENCER
— D —	SILENCER
— D —	INDICATES EXISTING SUPPLY AIR OUTLET
— D —	INDICATES EXISTING RETURN AIR OUTLET
— D —	INDICATES EXISTING VAV BOX
— D —	INDICATES NEW SUPPLY AIR OUTLET
— D —	INDICATES NEW RETURN AIR OUTLET
— D —	INDICATES EXISTING SUPPLY/RETURN AIR OUTLET TO BE RE-BALANCED TO AIR FLOW INDICATED
— D —	INDICATES NEW VAV BOX

LEGEND - HVAC - PIPING

REFER	DESCRIPTION
— E —	EXISTING PIPING SHOWN HATCHED TO BE REMOVED
— E —	EXISTING PIPING TO REMAIN
— E —	EXISTING PIPING TO BE ABANDONED
— P —	LOW PRESSURE STEAM
— P —	HIGH PRESSURE STEAM
— P —	LOW PRESSURE CONDENSATE RETURN [GRAVITY FLOWS]
— P —	HIGH PRESSURE CONDENSATE RETURN
— PC —	PUMPED CONDENSATE RETURN
— HWS —	HOT WATER HEATING SUPPLY
— HWR —	HOT WATER HEATING RETURN
— LTHW —	LOW TEMPERATURE HOT WATER SUPPLY
— LTHW —	LOW TEMPERATURE HOT WATER RETURN
— MTHW —	MEDIUM TEMPERATURE HOT WATER SUPPLY
— MTHW —	MEDIUM TEMPERATURE HOT WATER RETURN
— HTHW —	HIGH TEMPERATURE HOT WATER SUPPLY
— HTHW —	HIGH TEMPERATURE HOT WATER RETURN
— CHWS —	CHILLED WATER SUPPLY
— CHWR —	CHILLED WATER RETURN
— COND —	CONDENSER WATER SUPPLY
— COND —	CONDENSER WATER RETURN
— GLYS —	GLYCOL SUPPLY
— GLYS —	GLYCOL RETURN
— RS —	REFRIGERANT LIQUID
— RL —	REFRIGERANT SUCTION
— FOD —	FUEL OIL DISCHARGE
— FOS —	FUEL OIL SUCTION
— FOR —	FUEL OIL RETURN
— FOV —	FUEL OIL TANK VENT
— HPWS —	HEAT PUMP WATER SUPPLY
— HPWR —	HEAT PUMP WATER RETURN
— P —	PIPING RISER UP
— P —	PIPING RISER UP & DOWN
— T —	TEE
— E —	ELBOW - 90°
— E —	ELBOW - 45°
— W —	WYE
— R —	REDUCER
— U —	UNION
— F —	FLANGE
— F —	FLEXIBLE CONNECTOR
— F —	EXPANSION LOOP
— F —	EXPANSION JOINT
— X —	ANCHOR
— G —	PIPE GUIDES
— M —	STEAM FLOW METER
— P —	PUMP
— P —	VERTICAL INLINE PUMP
— P —	VERTICAL INLINE PUMP
— S —	STRAINER
— V —	3-WAY CONTROL VALVE
— V —	2-WAY CONTROL VALVE
— V —	ISOLATING [SHUT-OFF] VALVE
— V —	THROTTLING [BALANCING] VALVE
— V —	CIRCUIT BALANCING VALVE
— V —	CHECK VALVE
— V —	PRESSURE REDUCING VALVE [STEAM]
— V —	SAFETY [S] OR RELIEF [R] VALVE
— V —	DRAIN COCK
— V —	SOLENOID ELECTRIC VALVE
— V —	VACUUM BREAKER
— V —	BACKFLOW PREVENTER
— V —	THERMOMETER
— V —	PRESSURE GAUGE
— V —	AIR SEPARATOR
— V —	MANUAL AIR VENT
— V —	AUTOMATIC AIR VENT
— V —	F&T
— V —	STEAM TRAP
— V —	CHEMICAL POT FEEDER
— V —	SUCTION DIFFUSER
— V —	TRIPLE DUTY AIR VENT
— V —	PURGER
— V —	CHILLER WATER PUMP
— V —	FLEXIBLE CONNECTION



PROJECT NORTH



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REVIEW ALL DRAWINGS AND VERIFY ALL DIMENSIONS AT THE SITE. DO NOT SCALE THE DRAWINGS. REPORT ALL DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH ANY CONSTRUCTION OR SHOP FABRICATION. ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF MANTECON PARTNERS AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR WHOLE IS FORBIDDEN WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

NO.	ISSUED FOR	DATE	BY
9	ISSUED FOR TENDER	2024-10-09	J.S.
8	ISSUED FOR PERMIT COMMENTS	2024-09-26	J.S.
7	ISSUED FOR TENDER	2024-07-26	J.S.
6	ISSUED FOR PERMIT	2024-07-26	J.S.
5	ISSUED FOR COORDINATION	2024-07-08	J.S.
4	ISSUED FOR PERMIT	2023-12-22	R.S.
3	ISSUED FOR COORDINATION	2023-12-11	A.C.
2	ISSUED FOR 80% REVIEW	2022-12-23	J.L.
1	ISSUED FOR 60% REVIEW	2022-11-23	J.L.

NO.	ISSUED	DATE	BY

MECHANICAL SPECIFICATIONS - GENERAL 22-058

ABBREVIATED SPECIFICATION DESCRIBES SOME EQUIPMENT AND MATERIALS TO BE INCLUDED IN THE WORK. ONLY FIRST-CLASS WORKMANSHIP, MATERIALS AND PRACTICES WILL BE ACCEPTED. THE STANDARDS TO BE MET ARE FULLY DESCRIBED IN THE MASTER SPECIFICATIONS OF MANTECON PARTNERS INC. AND ARE AVAILABLE FOR REFERENCE AT THEIR MAIN OFFICE.

1. GENERAL REQUIREMENTS

- 1.1. READ AND CONFORM TO:
 - 1.1.1. THE CONTRACT CCCC 2. STIPULATED PRICE CONTRACT AS AMENDED.
 - 1.1.2. DIVISION 1 REQUIREMENTS AND DOCUMENTS REFERRED TO HEREIN.
- 1.2. THE SPECIFICATIONS ARE INTEGRAL WITH THE DRAWINGS WHICH ACCOMPANY THEM. DO NOT USE EITHER ALONE. ANY ITEM OR SUBJECT OMITTED FROM ONE BUT IMPLIED IN THE OTHER IS FULLY AND PROPERLY REQUIRED.
- 1.3. WHEREVER DIFFERENCES OCCUR IN THE TENDER DOCUMENTS, THE MOST ONEROUS CONDITION GOVERNES. BASE THE BID ON THE COSTLIEST ARRANGEMENT.
- 1.4. ENSURE SUB-CONTRACTORS UNDERTAKING THE WORK PROVIDE A 50% PERFORMANCE BOND AND A 50% LABOUR AND MATERIALS PAYMENT BOND. IN ADDITION, ENSURE SUB-CONTRACTORS EMPLOYED TO UNDERTAKE ANY PART OF THE WORK THAT IS \$50,000.00 OR GREATER IN CONTRACT VALUE PROVIDE A 50% PERFORMANCE BOND AND A 50% LABOUR AND MATERIALS BOND TO THE PARTY THEY ARE IN CONTRACT WITH.
- 1.5. CONFORM TO THE LATEST EDITION OF ONTARIO BUILDING CODE (CSA STANDARDS), ONTARIO FIRE CODE, LOCAL BUILDING BYLAWS, REGULATIONS, & PUBLISHED ENGINEERING STANDARDS.
- 1.6. NOTIFY CONSULTANT UPON DISCOVERY OF CONDITIONS WHICH ADVERSELY AFFECT WORK OF THIS DIVISION. NO ALLOWANCE WILL BE MADE AFTER LETTING OF CONTRACT FOR ANY EXPENSES INCURRED THROUGH FAILURE TO DO SO.
- 1.7. ARRANGE AND PAY FOR PERMITS AND INSPECTIONS BY AUTHORITIES HAVING JURISDICTION, REQUIRED IN THE UNDERTAKING OF THIS DIVISION. MAKE MODIFICATIONS REQUIRED BY AUTHORITIES.
- 1.8. REQUIRE TRADESMEN EMPLOYED ON THE PROJECT SHALL HOLD VALID TRADE CERTIFICATES/LICENSES AND HAVE A COPY AVAILABLE FOR REVIEW BY THE CONSULTANT AND/OR OWNER WHEN REQUESTED
2. SCOPE OF WORK
 - 2.1. PROVIDE PRODUCTS AND METHODS MENTIONED OR SHOWN IN THE CONTRACT DOCUMENTS COMPLETE WITH INCIDENTALS NECESSARY FOR A COMPLETE OPERATING INSTALLATION. PROVIDE TOOLS, EQUIPMENT AND SERVICES REQUIRED TO DO THE WORK.
 - 2.2. EXAMINE EXISTING SITE CONDITIONS WHICH MAY AFFECT WORK OF THIS DIVISION. EXAMINE CONTRACT DOCUMENTS IN CONJUNCTION WITH SITE EXAMINATION TO ENSURE THAT WORK OF THIS DIVISION MAY BE SATISFACTORILY COMPLETED.
 - 2.3. INCLUDE DISCONNECTION AND REMOVAL OF VARIOUS MECHANICAL EQUIPMENT IN AREAS TO BE TURNED OVER TO THE OWNER.
 - 2.4. INCLUDE DISCONNECTION AND MAKING SAFE OF VARIOUS MECHANICAL SYSTEMS AND EQUIPMENT IN AREAS TO BE DEMOLISHED AND/OR RENOVATED.
 - 2.5. ISOLATE AND DRAIN (OR PUMP FREEZE IF DRAINING IS NOT FEASIBLE) SYSTEMS AS REQUIRED TO EFFECT DEMOLITION, REPAIRS, MODIFICATIONS AND/OR REPAIRS. RECONNECT, CAP AND MAKE SAFE MECHANICAL SERVICES TO THE BUILDING INCLUDING, BUT NOT LIMITED TO: SANITARY SEWER(S), STORM SEWER(S), WATER SERVICE, NATURAL GAS SERVICES, STEAM SERVICE, CONDENSATE RETURN, WATER SUPPLY STANDPIPE AND SPRINKLER SYSTEMS, FIRE SUPPRESSION SYSTEMS, HOT WATER HEATING SYSTEMS, STEAM AND CONDENSATE SYSTEMS.
 - 2.6. ON COMPLETION OF RENOVATIONS, MODIFICATIONS AND/OR REPAIRS, TEST ENTIRE SYSTEM AS IF NEW. REPORT REPAIRS OR REPLACEMENTS REQUIRED OF EXISTING EQUIPMENT, PIPING, FITTINGS, OR DEVICES THAT ARE NOT INCLUDED IN CONTRACT TO CONSULTANT AND OWNER FOR INSTALLATION, FLUSH, CLEAN AND REFILL RENOVATED SYSTEMS AS SPECIFIED FOR NEW.
 - 2.7. BE RESPONSIBLE FOR THE EXCAVATION & BACKFILL NECESSARY FOR INSTALLATION OF UNDERGROUND WORK. EXCAVATE WITH SUITABLE MACHINERY OR BY HAND AS NECESSARY.
 - 2.8. INCLUDE CUTTING AND PATCHING OF NEW OR EXISTING WORK.
 - 2.9. INCLUDE IDENTIFICATION OF EQUIPMENT, PIPING, DUCTWORK, VALVES AND CONTROLLERS AS PER DRAWING DETAILS. APPLY EXISTING SYSTEMS TO NEW WORK, CONFORM TO CSA B149, NFPA 13, NFPA 14, AND CAN/CSS 243 FOR PIPING SYSTEMS. SUBMIT IDENTIFICATION DETAILS TO CONSULTANT FOR APPROVAL.
 - 2.10. PERFORM START-UP AND COMMISSION EQUIPMENT AND SYSTEMS INSTALLED AND/OR MODIFIED UNDER THIS CONTRACT. COMPLETE COMMISSIONING WORK TO THE SATISFACTION OF THE CONSULTANT PRIOR TO ACCEPTANCE OF THE WORK OR ANY PART THEREOF.
 - 2.11. APPLY FOR & OBTAIN PERMITS INCLUDING BUILDING PERMITS, & TSSA APPLICATIONS, LICENSES, OR CERTIFICATES NECESSARY FOR THE PERFORMANCE OF THE WORK. COORDINATE WORK WITH BUILDING OFFICIALS & AUTHORITIES HAVING JURISDICTION.
 - 2.12. TAKE SUCH MEASURES AND INCLUDE IN BID PRICE FOR THE PROPER PROTECTION OF THE EXISTING BUILDING AND ITS FINISHES DURING ALTERATIONS AND CONSTRUCTION OF THE NEW ADDITION. COORDINATE THIS PROTECTIVE WORK WITH OTHER TRADES.
 - 2.13. VERIFY THE CORRECT OPERATION OF EACH EQUIPMENT ITEM PROVIDED AND/OR ALTERED AND EACH SYSTEM IN TOTAL AND OBTAIN THE OWNER'S APPROVAL PRIOR TO STARTING AND/OR RETURNING TO OPERATION.
3. SUBMITTALS
 - 3.1. SHOP DRAWINGS: PREPARE AND SUBMIT TWO (2) COPIES OF SHOP DRAWINGS OF EQUIPMENT ITEMS TO THE CONSULTANT FOR REVIEW. THE CONSULTANT WILL RETURN ONE COPY, MARKED WITH COMMENTS AND REVIEW STAMP AS DEEMED APPROPRIATE.
 - 3.2. CLEARLY INDICATE MANUFACTURERS' AND SUPPLIER'S NAMES, MODEL NUMBERS, DETAILS OF CONSTRUCTION, ACCURATE DIMENSIONS, CAPACITIES AND PERFORMANCE. PRIOR TO SUBMISSION CHECK AND CERTIFY AS CORRECT. SHOP DRAWINGS AND DATA SHEETS, DO NOT ORDER EQUIPMENT UNTIL A COPY OF THE SHOP DRAWINGS, REVIEWED BY CONSULTANT, HAS BEEN RETURNED.
 - 3.3. THE CONSULTANT WILL NOT REVIEW SHOP DRAWINGS THAT FAIL TO BEAR THE CONTRACTOR'S STAMP OF APPROVAL OR CERTIFICATION.
 - 3.4. AS-BUILT RECORDS: BEFORE FINAL PAYMENT, SUBMIT TWO SETS OF AS-BUILT DRAWINGS IN AUTOCAD FORMAT SHOWING ALL CHANGES & CORRECTED SERVICES DIMENSIONS. DRAWINGS SHALL BE PROVIDED TO THE CONTRACTOR BY MANTECON PARTNERS INC. AT A FEE OF \$500.00 UPON REQUEST.
 - 3.5. REQUESTS FOR SHUT-DOWN: OBTAIN PERMISSION FOR SYSTEMS SHUT-DOWN AND/OR SERVICE INTERRUPTION FROM THE OWNER PRIOR TO DISRUPTION OF ANY SYSTEM OR SERVICE IN USE BY THE OWNER. EMPLOY THE OWNER'S STANDARD FORM OF REQUEST WHERE AVAILABLE.
 - 3.6. REQUESTS FOR START-UP: OBTAIN PERMISSION FROM THE OWNER TO START-UP OR TO RETURN TO SERVICE ANY ITEM OF EQUIPMENT, SYSTEM OR SERVICE INSTALLED NEW OR PREVIOUSLY SHUT DOWN.
 - 3.7. WARRANTY: PROVIDE WRITTEN GUARANTEE FOR ALL NEW EQUIPMENT & WORKMANSHIP FOR ONE (1) YEAR FROM DATE OF SUBSTANTIAL COMPLETION. FIVE (5) YEARS FOR COMPRESSOR & HEAT EXCHANGER. DEFECTIVE PARTS REPAIRED OR REPLACED WITHOUT CHARGE.
4. COMMON WORK RESULTS
 - 4.1. NAMEPLATES
 - 4.1.1. PROVIDE LAMINATED PLASTIC PLATES WITH BLACK FACE AND WHITE CENTRE OF MINIMUM SIZE 3-1/2" X 1-1/4" (90 X 40 X 2 MM) NOMINAL THICKNESS. ENGRAVED WITH 1/4" (6 MM) HIGH LETTERING. USE 1" (25 MM) LETTERING FOR MAJOR EQUIPMENT.
 - 4.1.2. FASTEN NAMEPLATES SECURELY IN CONSPICUOUS PLACE, WHERE NAMEPLATES CANNOT BE MOUNTED ON COOL SURFACE. PROVIDE STANDOFFS.
 - 4.1.3. IDENTIFY EQUIPMENT TYPE AND NUMBER AND SERVICE OR AREAS OR ZONE OF BUILDING SERVED.
 - 4.1.4. FOR EACH ITEM OF EQUIPMENT WHICH MAY BE STARTED AUTOMATICALLY OR REMOTELY, ADD A RED LAMACOID PLATE: 2-1/2" X 9" (65 X 230 MM), READING "WARNING, THIS EQUIPMENT IS AUTOMATICALLY CONTROLLED AND MAY START AT ANY TIME."
 - 4.2. PRESSURE GAUGES
 - 4.2.1. APPROVED MANUFACTURER: TRIERICE MODEL 600C OR EQUAL BY WESS, WINTER, MORRISON, OR TAYLOR.
 - 4.2.2. GAUGE: 4-1/2" (115MM) DIAMETER BLACK CAST ALUMINUM, PHOSPHOR BRONZE BOURDON TUBE, ROTARY BRASS MOVEMENT, BRASS SOCKET, WITH FRONT RECALIBRATION ADJUSTMENT, BLACK SCALE ON WHITE BACKGROUND, MID-SCALE ACCURACY: 1%, SCALE: PSI AND KPA
 - 4.2.3. GAUGE COCK: TEE OR LEVER HANDLE, BRASS FOR MAXIMUM 150 PSI (1034 KPA).
 - 4.2.4. NEEDLE VALVE: BRASS, 1/4" (6 MM) NPT FOR MINIMUM 150 PSI (1034 KPA).
 - 4.2.5. PULSATION DAMPER: PRESSURE SHUNNER, BRASS WITH 1/4" (6 MM) CONNECTIONS.
 - 4.2.6. SYNPHON: STEEL, SCHEDULE 40, 1/4" (6 MM) ANGLE OR STRAIGHT PATTERN.
 - 4.3. STEM TYPE THERMOMETERS
 - 4.3.1. APPROVED MANUFACTURER: TRIERICE MODEL 891403-1/2 OR WESS MODEL 9V53-1/2, OR EQUAL BY WINTER, MORRISON, TAYLOR.
 - 4.3.2. THERMOMETER: 9" (230MM) SCALE. RED APPEARING THERMAL FLUID WITH BLACK FIGURES ON WHITE SCALE. CALIBRATED IN BOTH DEGREES F AND DEGREES C. ACCURACY TO ASTM E77 OF 2%, CLEAR GLASS LENS FRONT TUBE, CAST ALUMINUM CASE WITH ENAMEL FINISH. CAST ALUMINUM ADJUSTABLE JOINT WITH POSITIVE LOCKING DEVICE. 3/4" (20MM) NPT BRASS STEM.
 - 4.3.3. INCLUDE SEPARABLE WELL WITH THERMOMETERS.
 - 4.3.4. SOCKET: BRASS SEPARABLE SOCKETS FOR THERMOMETER STEMS WITH OR WITHOUT EXTENSIONS AS REQUIRED, AND WITH CAP AND CHAIN.
 - 4.3.5. FLANGE: 3" (75 MM) OUTSIDE DIAMETER REVERSIBLE FLANGE, DESIGNED TO FASTEN TO SHEET METAL AIR DUCTS, WITH BRASS PERFORATED STEM.
 - 4.4. FINISHES: MINIMUM SCHEDULE 20 GALVANIZED STEEL OR CAST IRON.
 - 4.5. FLASHINGS AND COUNTER FLASHINGS: THALER OR EQUIVALENT MECHANICAL/ELECTRICAL FLASHINGS AS RECOMMENDED FOR SPECIFIC PURPOSE. STAINLESS STEEL FLASHING SLEEVE, INTEGRAL DECK FLANGE AND EPDM SEAL.
 - 4.6. PENETRATION SEALS
 - 4.6.1. APPROVED MANUFACTURER: LINK-SEAL OR EQUAL.
 - 4.6.2. MODULAR MECHANICAL TYPE, CONSISTING OF INTERLOCKING SYNTHETIC RUBBER LINKS SHAPED TO CONTINUOUSLY FILL THE ANNULAR SPACE BETWEEN THE PIPE AND WALL OPENINGS. LINKS SHALL BE LOOSELY ASSEMBLED WITH BOLTS TO FORM A CONTINUOUS RUBBER BELT AROUND THE PIPE WITH

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A PRESSURE PLATE UNDER EACH BOLT HEAD AND NUT.

4.7. ACCESS DOORS

- 4.7.1. MANUFACTURERS: ACUDOR/ACORN, CEB, MIFAB, CENDRES/CONTOUR
- 4.7.2. STANDARD UNIVERSAL FLUSH - MATERIAL: UPTO TO 16" X 16" (400X400) 14 GAUGE MOUNTING FRAME, OVER 16" X 16" (400X400) 14 GAUGE DOOR, 16 GAUGE MOUNTING FRAME, HINGE: CONTINUOUS, CONCEALED, LATCH: STAINLESS STEEL, SCREWDRIVER OPERATED. CAM LATCH FINISH: STEEL: 5-STAGE IRON PHOSPHATE PREPARATION WITH PRIME COAT OF WHITE, ALKYO BAKING ENAMEL, OR STAINLESS-STEEL TYPE 304, NO. 4 SATIN POLISH.
- 4.7.3. RECESSED - MATERIAL: STEEL OR STAINLESS STEEL, 22 GAUGE DOOR, 22 GAUGE MOUNTING FRAME, DOOR RECESSED 5/8" HINGE: CONTINUOUS, CONCEALED, LATCH: STAINLESS STEEL, SCREWDRIVER OPERATED. CAM LATCH FINISH: STEEL: 5-STAGE IRON PHOSPHATE PREPARATION WITH PRIME COAT OF WHITE, ALKYO BAKING ENAMEL, OR STAINLESS-STEEL TYPE 304, NO. 4 SATIN POLISH.
- 4.7.4. FIRE RATED - ULC LABELED. REFER TO ARCHITECTURAL DRAWINGS FOR RATINGS OF FIRE SEPARATIONS AND ASSEMBLIES. MINIMUM 12 GAUGE, HINGE: CONTINUOUS, CONCEALED, LATCH: STAINLESS STEEL, SCREWDRIVER OPERATED. CAM LATCH FINISH: STEEL: 5-STAGE IRON PHOSPHATE PREPARATION WITH PRIME COAT OF WHITE, ALKYO BAKING ENAMEL, OR STAINLESS-STEEL TYPE 304, NO. 4 SATIN POLISH.

4.8. PIPE HANGERS AND SUPPORTS

- 4.8.1. APPROVED MANUFACTURERS: ANVIL, NAYAT, HUN
- 4.8.2. STANDPIPE & FIRE HOSE
 - 4.8.2.1. CONFORM TO NFPA 14.
 - 4.8.2.2. HANGERS FOR PIPE SIZES 1/2" TO 1-1/2" (15 TO 40 MM): CARBON STEEL, ADJUSTABLE SWIVEL, SPLIT RING.
 - 4.8.2.3. HANGERS FOR PIPE SIZES 2" (50 MM) AND OVER: CARBON STEEL, ADJUSTABLE, CLEVIS.
 - 4.8.2.4. MULTIPLE OR TRAPEZOID HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
 - 4.8.2.5. WALL SUPPORT FOR PIPE SIZES TO 3-1/4" (80 MM): CAST IRON HOOK.
 - 4.8.2.6. WALL SUPPORT FOR PIPE SIZES 4" (100 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
 - 4.8.2.7. VERTICAL SUPPORT: STEEL RISER CLAMP.
 - 4.8.2.8. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.

4.8.3. SPRINKLER PIPING

- 4.8.3.1. CONFORM TO NFPA 13.
- 4.8.3.2. HANGERS FOR PIPE SIZES 1/2" TO 1-1/2" (15 TO 40 MM): CARBON STEEL, ADJUSTABLE SWIVEL, SPLIT RING.
- 4.8.3.3. HANGERS FOR PIPE SIZES 2" (50 MM) AND OVER: CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.3.4. MULTIPLE OR TRAPEZOID HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
- 4.8.3.5. WALL SUPPORT FOR PIPE SIZES TO 3-1/4" (80 MM): CAST IRON HOOK.
- 4.8.3.6. WALL SUPPORT FOR PIPE SIZES 4" (100 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
- 4.8.3.7. VERTICAL SUPPORT: STEEL RISER CLAMP.
- 4.8.3.8. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.

4.8.4. PLUMBING PIPING - DRAIN, WASTE, AND VENT;

- 4.8.4.1. CONFORM TO ASME B31.9.
- 4.8.4.2. HANGERS FOR PIPE SIZES 1/2" TO 1-1/2" (15 TO 40 MM): MALLEABLE IRON, ADJUSTABLE SWIVEL, SPLIT RING.
- 4.8.4.3. HANGERS FOR PIPE SIZES 2" (50 MM) AND OVER: CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.4.4. MULTIPLE OR TRAPEZOID HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
- 4.8.4.5. WALL SUPPORT FOR PIPE SIZES TO 3-1/4" (80 MM): CAST IRON HOOK.
- 4.8.4.6. WALL SUPPORT FOR PIPE SIZES 4" (100 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
- 4.8.4.7. VERTICAL SUPPORT: STEEL RISER CLAMP.
- 4.8.4.8. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.4.9. COPPER PIPE SUPPORT: CARBON STEEL RING, ADJUSTABLE, COPPER PLATED.

4.8.5. PLUMBING PIPING - WATER;

- 4.8.5.1. CONFORM TO ASME B31.9.
- 4.8.5.2. HANGERS FOR PIPE SIZES 1/2" TO 1-1/2" (15 TO 40 MM): MALLEABLE IRON, ADJUSTABLE SWIVEL, SPLIT RING.
- 4.8.5.3. HANGERS FOR COLD PIPE SIZES 2" (50 MM) AND OVER: CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.5.4. HANGERS FOR HOT PIPE SIZES 2" TO 4" (50 TO 100 MM): CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.5.5. HANGERS FOR HOT PIPE SIZES 6" (150 MM) AND OVER: ADJUSTABLE STEEL YOKE, CAST IRON PIPE ROLL, DOUBLE HANGER.
- 4.8.5.6. MULTIPLE OR TRAPEZOID HANGERS: STEEL CHANNELS WITH WELDED SUPPORTS OR SPACERS AND HANGER RODS.
- 4.8.5.7. MULTIPLE OR TRAPEZOID HANGERS FOR HOT PIPE SIZES 6" (150 MM) AND OVER: STEEL CHANNELS WITH WELDED SUPPORTS OR SPACERS AND HANGER RODS. CAST IRON ROLL.
- 4.8.5.8. WALL SUPPORT FOR PIPE SIZES TO 3-1/4" (80 MM): CAST IRON HOOK.
- 4.8.5.9. WALL SUPPORT FOR PIPE SIZES 4" (100 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
- 4.8.5.10. WALL SUPPORT FOR HOT PIPE SIZES 6" (150 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP WITH ADJUSTABLE STEEL YOKE AND CAST IRON PIPE ROLL.
- 4.8.5.11. VERTICAL SUPPORT: STEEL RISER CLAMP.
- 4.8.5.12. FLOOR SUPPORT FOR COLD PIPE: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.5.13. FLOOR SUPPORT FOR HOT PIPE SIZES TO 4" (100 MM): CAST IRON ADJUSTABLE PIPE SADDLE, LOCKNUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.5.14. FLOOR SUPPORT FOR HOT PIPE SIZES 6" (150 MM) AND OVER: ADJUSTABLE CAST IRON PIPE ROLL AND STAND, STEEL SCREWS, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.5.15. COPPER PIPE SUPPORT: CARBON STEEL RING, ADJUSTABLE, COPPER PLATED.

4.8.6. FUEL GAS PIPING

- 4.8.6.1. CONFORM TO NFPA 31.
- 4.8.6.2. HANGERS FOR PIPE SIZES 1" - 1-1/2" (15 TO 40 MM): MALLEABLE IRON, ADJUSTABLE SWIVEL, SPLIT RING.
- 4.8.6.3. HANGERS FOR PIPE SIZES 2" (50 MM) AND OVER: CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.6.4. MULTIPLE OR TRAPEZOID HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
- 4.8.6.5. WALL SUPPORT FOR PIPE SIZES TO 3-1/4" (80 MM): CAST IRON HOOK.
- 4.8.6.6. VERTICAL SUPPORT: STEEL RISER CLAMP.
- 4.8.6.7. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.6.8. ROOF SUPPORT: REFER TO SECTION 151.40 AND CSA B149.1
- 4.8.6.9. COPPER PIPE SUPPORT: CARBON STEEL RING, ADJUSTABLE, COPPER PLATED.

4.8.7. HYDRONIC PIPING;

- 4.8.7.1. CONFORM TO CSA B-51 AND ASME B31.9.
- 4.8.7.2. HANGERS FOR PIPE SIZES 1/2" TO 1-1/2" (15 TO 38 MM): CARBON STEEL, ADJUSTABLE SWIVEL, SPLIT RING.
- 4.8.7.3. HANGERS FOR COLD PIPE SIZES 2" (50 MM) AND OVER: CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.7.4. HANGERS FOR HOT PIPE SIZES 2" TO 4" (50 TO 100 MM): CARBON STEEL, ADJUSTABLE, CLEVIS.
- 4.8.7.5. HANGERS FOR HOT PIPE SIZES 6" (150 MM) AND OVER: ADJUSTABLE STEEL YOKE, CAST IRON ROLL, DOUBLE HANGER.
- 4.8.7.6. MULTIPLE OR TRAPEZOID HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
- 4.8.7.7. MULTIPLE OR TRAPEZOID HANGERS FOR HOT PIPE SIZES 6" (150 MM) AND OVER: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS. CAST IRON ROLL.
- 4.8.7.8. WALL SUPPORT FOR PIPE SIZES TO 3" (76 MM): CAST IRON HOOK.
- 4.8.7.9. WALL SUPPORT FOR PIPE SIZES 4" (100 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
- 4.8.7.10. WALL SUPPORT FOR HOT PIPE SIZES 6" (150 MM) AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP WITH ADJUSTABLE STEEL YOKE AND CAST IRON ROLL.
- 4.8.7.11. VERTICAL SUPPORT: STEEL RISER CLAMP.
- 4.8.7.12. FLOOR SUPPORT FOR COLD PIPE: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.7.13. FLOOR SUPPORT FOR HOT PIPE SIZES TO 4" (100 MM): CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.7.14. FLOOR SUPPORT FOR HOT PIPE SIZES 6" (150 MM) AND OVER: ADJUSTABLE CAST IRON ROLL AND STAND, STEEL SCREWS, AND CONCRETE PIER OR STEEL SUPPORT.
- 4.8.7.15. COPPER PIPE SUPPORT: CARBON STEEL RING, ADJUSTABLE, COPPER PLATED.

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4.8.8. ACCESSORIES

- 4.8.8.1. HANGER RODS: GALVANIZED, CARBON STEEL, CONTINUOUSLY THREADED.
 - 4.8.8.2. THREADS: MALLEABLE IRON CASE OF GALVANIZED STEEL, SHELL AND EXPANDER PLUG FOR THROUGH CONNECTION WITH LATERAL ADJUSTMENT. TOP SLOT FOR IMPROVING RODS, LUGS FOR ATTACHING TO FORMS. SIZE INSERTS TO SUIT THREADED HANGER ROD.
- 4.9. EQUIPMENT FLOOR CURBS
- 4.9.1. FABRICATION: WELDED 0.05" (1.2 MM) GALVANIZED STEEL SHELL AND BASE, MIREED 3" (75 MM) CANT. VARIABLE STEP TO MATCH ROOF INSULATION. FACTORY INSTALLED WOOD HALLER.
- 4.10. ROOFTOP PIPE/DUCT SUPPORTS
- 4.10.1. PROVIDE MANUFACTURERS: PORTABLE PIPE HANGERS, INC. UNISTRUT
 - 4.10.2. PROVIDE PRE-ENGINEERED PIPE/DUCT SUPPORT SYSTEM.
 - 4.10.3. BASES: WEATHER RESISTANT AND UV RADIATION RESISTANT WITH SEISMIC ATTACHMENTS
 - 4.10.4. FRAMING: 1-5/8" (41.3MM) STRUT OR 1-7/8" (47.6MM) STRUT, FABRICATED OF STEEL TO ASTM A570, GRADE 33, ROLL FORMED OF 12-GAUGE (2.7MM THICK) STEEL INTO 3-SIDED OR TUBULAR SHAPE.
 - 4.10.5. PIPE SUPPORTS AND HANGERS: CONFORM TO MSS SP-58 AND MSS SP-49. FABRICATED OF CARBON STEEL, SINGLE ROLLER SUPPORTS FOR PIPING SUBJECT TO EXPANSION AND CONTRACTION.
 - 4.10.6. PROVIDE PLASTICS AS MOULDED WITH UV RADIATION PROTECTION.
 - 4.10.7. PROVIDE METAL SURFACES HOT DIP GALVANIZED FREE OF ROUGHNESS, WHISKERS, UNSIGHTLY SPALLS, CICLES, RUST, BARBS, SACS, DROPLETS AND OTHER SURFACE BLEMISHES. GALVANIZING SHALL CONFORM TO ASTM A123 FOR TUBING AND TO ASTM A153 FOR HARDWARE AND ACCESSORIES.

4.11. PIPE HANGER SPACING:

PIPE SIZE (IN)	ROD DIA. (IN)	STEEL PIPE SPACING (FT)	COPPER TUBE SPACING (FT)
1/2	3/8	7	6
3/4	3/8	7	6
1	3/8	7	6
1-1/4	3/8	7	6
2	3/8	9	8
2-1/2	3/8	10	9
3	3/8	12	10
4	5/8	14	12
5	7/8	17	15
6	7/8	19	17
8	1	23	21
10	1	25	23
12	1	28	26
14	1	28	26
16	1	27	25
18	1	28	26

4.12. FUEL GAS PIPE HANGER SPACING:

PIPE SIZE (IN)	SUPPORT SPACING (FT)
1/2	6
3/4 TO 1	8
1-1/4 TO 2-1/2	10
3 TO 4	15
5 TO 6	20
10 OR LARGER	25
ALL VERTICAL TUBING (ALL SIZES)	AT EVERY FLOOR
	6

4.13. DUCT HANGER SPACING:

DUCT SIZES (LARGEST SIDE) (IN)	ANGLE SIZE (IN)	ROD DIAMETER (IN)	SPACING (FT)
UP TO 30	1 X 1 X 1/8	1/4	10
31 TO 42	1-1/2 X 1-1/2 X 1/8	1/4	10
43 TO 60	1-1/2 X 1-1/2 X 1/2	3/8	10
61 TO 84	2 X 2 X 1/8	3/8	8

FIRE PROTECTION SPECIFICATIONS 22-058

1. GENERAL

- 1.1. PROVIDE MATERIALS AND EQUIPMENT AND PERFORM LABOUR REQUIRED TO INSTALL COMPLETE AND OPERABLE FIRE PROTECTION SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND IN COMPLIANCE WITH THE STANDARDS OF THE NATIONAL FIRE PROTECTION ASSOCIATION, INDUSTRIAL RISK INSURERS, FACTORY MUTUAL AND PROVINCIAL AND LOCAL REGULATIONS.
- 1.2. COOPERATE WITH OTHER TRADES WHOSE WORK AFFECTS OR IS AFFECTED BY WORK OF THIS DIVISION TO ENSURE SATISFACTORY INSTALLATION AND TO AVOID DELAYS. PROVIDE ALL MATERIALS TO BE BUILT-IN SUCH AS SLEEVES, ANCHORS, ETC., TOGETHER WITH ACCURATE DIMENSIONS OR TEMPLATS, PROMPTLY.
- 1.3. INSTALL PIPING, WHEREVER POSSIBLE, IN PARTITIONS AND ABOVE CEILING. DO NOT INSTALL PIPING IN OUTSIDE WALLS UNLESS SO SHOWN ON DRAWINGS. WRAP UNSULATED PIPING IN MASONRY WALLS WITH BUILDING PAPER.
- 1.4. WHERE PIPING PASSES THROUGH CONCRETE FLOORS, OR WALLS, SLEEVES SHALL BE SIZED TO PERMIT THE PIPE TO EXPAND FREELY WITHOUT BINDING OR CRUSHING PIPE INSULATION.
- 1.5. USE DIELECTRIC COUPLINGS WHERE PIPING OF DISSIMILAR METALS CONNECT.
- 1.6. FLUSH WATER MARKS IN ACCORDANCE WITH PROCEDURES ESTABLISHED BY NFPA 24. REMOVE, CLEAN AND REPLACE ALL STRAINERS IN SYSTEMS AFTER FLUSHING. THOROUGHLY CLEAN AND LUBRICATE ALL EQUIPMENT AND LEAVE ALL ITEMS IN PERFECT ORDER READY FOR OPERATION.
- 1.7. PROVIDE FIRE EXTINGUISHERS WHERE INDICATED AND IN CONFORMANCE WITH THE ONTARIO FIRE CODE AND NFPA 10.
- 1.8. PERFORM STANDPIPE WORK TO REQUIREMENTS OF ONTARIO FIRE CODE AND NFPA 13.
- 1.9. PERFORM STANDPIPE WORK TO REQUIREMENTS OF ONTARIO FIRE CODE AND NFPA 14.
2. PROVIDE 10 LB. (4.54 KG) MULTI-PURPOSE EXTINGUISHERS IN EACH FIRE HOSE CABINET AND IN MECHANICAL ROOMS.
- 2.1. PROVIDE 10 LB. (4.54 KG) CARBON DIOXIDE EXTINGUISHERS IN ELECTRICAL ROOMS, COMMUNICATIONS ROOMS AND DATA CENTRES
- 2.2. PROVIDE 10 LB. (4.54 KG) A RATE EXTINGUISHER IN ALL KITCHENS.
- 2.3. PROVIDE 10 LB. (4.54 KG) A RATE EXTINGUISHER IN ALL KITCHENS.
- 2.4. ACCEPTABLE MANUFACTURERS: NATIONAL FIRE EQUIPMENT, FLAG, KENT, PYRENE CANADA, CFH, SAFETY SUPPLY CHUBB.
- 2.5. MULTI-PURPOSE (ABC) TYPE, DRY CHEMICAL, 10 LB. (4.54 KG) MINIMUM, 4A:60BC.
- 2.6. PRESSURIZED WATER: 2-1/2 GALLON (9.5 LITRE), MINIMUM 2A, CONFORM TO CAN/CSA 557.
- 2.7. CARBON DIOXIDE: 10 LB. (4.54 KG), MINIMUM 5BC.
- 2.8. PURPLE K (POTASSIUM BICARBONATE) POWDER TYPE, DRY CHEMICAL: 10 LB. (4.54 KG), MINIMUM 60BC.
- 2.9. CLEAN AGENT, PRESSURIZED WATER TYPE: 2-1/2 GALLON (9.5 LITRE), MINIMUM 2A, CONFORM TO CAN/CSA 557.
3. FIX CABINETS:
 - 3.1. FULLY RECESSED: 18 GA. (1.3 MM) STEEL TUB WITH WHITE PRIME PAINTED FINISH TUB 14 GAUGE (2.1 MM) STAINLESS STEEL DOOR & TRIM, BRUSHED FINISH OR STEEL TUB WITH PRIME PAINTED FINISH, 'LEXAN' GLASS PANEL, SIZE TO ACCOMMODATE SPECIFIED EXTINGUISHER.
 - 3.2. SEMI-RECESSED: 18 GA. (1.3 MM) STEEL TUB WITH WHITE PRIME PAINTED FINISH TUB, 14 GAUGE (2.1 MM) STEEL DOOR AND TRIM WITH PRIME PAINTED FINISH, FOR SEMI-RECESSED MOUNTING WITH 1/2" (15 MM) SPACER. SHATTER PROOF TRANSPARENT CANOPY, TO ACCOMMODATE SPECIFIED EXTINGUISHER.
- 4.1. PERFORM WORK TO NFPA 14 AND CBC.
- 4.2. ABOVE GROUND PIPING, STEEL, ASTM A53; THREADED OR JT. JOINED BY WELDING OR BY ROLL GROOVED PIPE AND FITTINGS, SCHEDULE 40 IF SCHEDULE 40 CUT GROOVED FITTINGS, SCHEDULE 40 FOR 6" OR LARGER IN ANY CASE.
- 4.3. STEEL FITTINGS: ASME B16.9, WROUGHT STEEL, BUTTWELDED.
- 4.4. CAST IRON FITTINGS: ASME B16.1, FLANGES AND FLANGED FITTINGS.
- 4.5. MALLEABLE IRON FITTINGS: ASME B16.3, THREADED FITTINGS.
- 4.6. MECHANICAL GROOVED COUPLINGS: MALLEABLE IRON HOUSING CLAMPS TO ENGAGE AND LOCK, "C" SHAPED ELASTOMERIC SEALING GASKET, STEEL BOLTS, NUTS, AND WASHERS; GALVANIZED FOR GALVANIZED PIPE.
- 4.7. MECHANICAL FORMED FITTINGS: CARBON STEEL HOUSING WITH INTEGRAL PIPE STOP AND O-RING POCKET AND O-RING UNIFORMLY COMPRESSED INTO PERMANENT MECHANICAL ENGAGEMENT ONTO PIPE.
- 4.8. FIRE DEPARTMENT CONNECTION: FLUSH MOUNTED WALL TYPE WITH BRASS FINISH, TWO WAY OUTLETS WITH THREAD SIZE TO SUIT FIRE DEPARTMENT HARDWARE. CUT THREADED DUST CAP AND CHAIR OF MATCHING MATERIAL AND FINISH, 3/4" (20 MM) AUTOMATIC DRIP, OUTSIDE DRAIN, "STANDPIPE" FIRE DEPARTMENT CONNECTION LABEL.

5. VALVES - GENERAL

- 5.1. PROVIDE SHUTOFF VALVES IN SPRINKLER, STANDPIPE, AND COMBINED SYSTEMS OF APPROVED, INDICATING TYPE.
- 5.2. CUL OR ULC AND FM APPROVED, LISTED AND LABELLED.
- 5.3. PROVIDE LISTED INDICATING VALVES FOR CONTROLLING CONNECTIONS TO WATER SUPPLIES.
- 5.4. CONFORM TO REQUIREMENTS OF ANSI, ASTM, ASME, AND APPLICABLE MSS STANDARDS.
- 5.5. MANUFACTURERS NAME AND PRESSURE RATING CLEARLY MARKED ON BODY TO MSS-SP-25.
- 5.6. PROVIDE VALVES WITH A CURRENT AND VALID CANADIAN REGISTRATION NUMBER FOR THE PROVINCE OF ONTARIO WITH TSSA. SUPPLIERS SHALL PROVIDE A COPY OF THE STATUTORY DECLARATION FOR VALVES, STAMPED, SIGNED AND DATED BY TSSA AS VALIDATION OF THE CAN REGISTRATION, INCLUDE WITH THE SHOP DRAWING SUBMITTAL PACKAGE.

5.7. MATERIALS:

- 5.7.1. BRONZE: ASTM B62 OR B61 AS APPLICABLE
- 5.7.2. BRASS: ASTM B383 C370
- 5.7.3. CAST IRON: ASTM A126 CLASS B

5.8. END CONNECTIONS:

- 5.8.1. THREADED ENDS: ANSI B1.20.1
- 5.8.2. FLANGED ENDS: ANSI B16.1 (CLASS 125), ANSI B16.5

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1. HVAC GENERAL
- 1.1. CERTAIN ITEMS SUCH AS RISERS AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC. ARE INDICATED FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT. DO NOT INTERPRET AS THE COMPLETE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS.
- 1.2. CO-ORDINATE DIFFUSERS, REGISTERS, AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING AND OTHER CEILING ITEMS. MAKE MINOR DUCT MODIFICATIONS TO FIT.
- 1.3. ARRANGE AND ASSEMBLE RELECTED AND FACTORY ASSEMBLED AIR HANDLING UNIT COILS FOR REMOVAL FROM UPSTREAM SIDE WITHOUT DISMANTLING SUPPORTS. PROVIDE GALVANIZED STEEL SUPPORTS FOR COILS IN BANKS OVER TWO COILS HIGH TO PERMIT INDEPENDENT REMOVAL OF INDIVIDUAL COILS.
- 1.4. ENSURE AIR HANDLING UNITS OPERATE WITHOUT MOISTURE CARRY-OVER.
- 1.5. LOCATE MECHANICAL EQUIPMENT SUCH AS SINGLE-DUCT, DUAL-DUCT, VARIABLE VOLUME, CONSTANT VOLUME AND FAN-POWERED BOXES, FAN COILS, CABINET HEATERS, UNIT VENTILATORS, COILS, HUMIDIFIERS, ETC. FOR UNOBSTRUCTED ACCESS TO ACCESS PANELS, CONTROLS AND VALVING.
- 1.6. PROVIDE WALL-TO-WALL FINNED-TUBE RADIATION ENCLOSURES UNLESS OTHERWISE INDICATED.
- 1.7. PROVIDE FLEXIBLE CONNECTIONS IN DUCTWORK CONNECTIONS TO AIR-HANDLERS, FANS AND OTHER EQUIPMENT THAT REQUIRES VIBRATION ISOLATION.
2. HVAC HYDRONIC PIPING
- 2.1. KEEP OPEN ENDS OF PIPE FREE FROM SCALE AND DIRT. PROTECT OPEN ENDS WITH TEMPORARY FLUGS OR CAPS, AFTER COMPLETION, FILL, CLEAN, AND TREAT SYSTEMS.
- 2.2. PROVIDE NON-CONDUCTING DIELECTRIC CONNECTIONS WHENEVER JOINING DISSIMILAR METALS IN OPEN SYSTEMS.
- 2.3. PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS LOCATED IN CRAWL SPACES, PIPE SHAFTS, AND SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.
- 2.4. SELECT AIR VENTS TO SUIT THE SYSTEM OPERATING PRESSURES. PROVIDE AUTOMATIC AIR VENTS COMPLETE WITH ISOLATING VALVES. PROVIDE AIR VENTS AT HIGH POINTS OF EACH DROP IN THE HEATING/HOT WATER, CHILLING AND OTHER COOLED WATER PIPING SYSTEMS. GRADE PIPING TO LOW POINTS. PROVIDE HOSE-END DRAIN VALVES AT THE BOTTOM OF RISERS AND AT LOW POINTS.
- 2.5. INSTALL VALVES SO THE VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON THE EQUIPMENT SIDE IS REMOVED.
- 2.6. PIPE DISCHARGE FROM TEMPERATURE & PRESSURE SAFETY RELIEF VALVES TO A POINT OF SAFE DISCHARGE DIRECTLY INTO A FLOOR DRAIN, HUB DRAIN OR SAFE OUTDOOR LOCATION.
- 2.7. PROVIDE AUTOMATIC FEED VALVE ON THE COLD-WATER MAKE-UP LINE TO EACH NEW HOT WATER HEATING SYSTEM.
- 2.8. TEST LIQUID HEAT TRANSFER PIPING HYDROSTATICALLY AT NOT LESS THAN 150% OF OPERATING PRESSURE OR NOT LESS THAN 125 PSIG (860 KPA) WHICHEVER IS THE GREATER. TEST PERIOD SHALL BE NOT LESS THAN SIX (6) HOURS DURATION DURING WHICH TIME EACH JOINT SHALL BE INSPECTED, GIVEN A SHARP TAP WITH A HAMMER AND CHECKED FOR LEAKS.
- 2.9. PROVIDE BALANCING VALVES AND BUTTERFLY VALVES WITH POSITION INDICATORS AND MAXIMUM ADJUSTABLE STOPS (MEMORY STOPS).
- 3.0. PROVIDE CHAINWHEEL OPERATORS FOR VALVES IN EQUIPMENT ROOMS MOUNTED GREATER THAN 7 ABOVE FLOOR LEVEL.
- 3.1. PROVIDE DISASSEMBLY AND/OR FLANGES AT EQUIPMENT, IN BYPASSES, AND LONG PIPING RUNS (>100') TO PERMIT UNIFORMITY FOR ALTERATION AND REPAIRS.
- 3.2. INSTALL PIPING WITHOUT FORCING OR SPRINGING.
- 3.3. CO-ORDINATE PIPING WITH OTHER TRADES. PROVIDE OFFSETS AROUND OBSTRUCTIONS.
- 3.4. ADJUST VALVES FOR SMOOTH AND EASY OPERATION.
- 3.5. PROVIDE FLEXIBLE CONNECTIONS IN PIPING CONNECTED TO PUMPS, CHILLERS, COOLING TOWERS, AND OTHER EQUIPMENT WHICH REQUIRES VIBRATION ISOLATION EXCEPT WATER COILS. PROVIDE FLEXIBLE CONNECTIONS AS CLOSE AS POSSIBLE TO EQUIPMENT.
3. VALVES - GENERAL
- 3.1. CONFORM TO REQUIREMENTS OF ANSI, ASTM, ASME, AND APPLICABLE MSS STANDARDS.
- 3.2. MANUFACTURERS NAME AND PRESSURE RATING CLEARLY MARKED ON BODY TO MSS-SP-25.
- 3.3. VALID CRN (CANADIAN REGISTRATION NUMBER) REQUIRED FOR EACH VALVE.
- 3.4. VALVES - MATERIALS
- 3.4.1. BRONZE: ASTM B62 OR B61 AS APPLICABLE
- 3.4.2. BRASS: ASTM B283 C3770
- 3.4.3. CAST IRON: ASTM A126 CLASS B
- 3.5. VALVES - END CONNECTIONS:
- 3.5.1. THREADED ENDS: ANSI B1.20.1
- 3.5.2. FLANGED ENDS: ANSI B1.6.1 (CLASS 125), ANSI B1.6.5
- 3.5.3. FACE-TO-FACE DIMENSIONS: ANSI B1.6.10
- 3.6. VALVES - DESIGN AND TESTING:
- 3.6.1. BRONZE GATE & CHECK VALVES: MSS-SP-80
- 3.6.2. BALL VALVES: MSS-SP-110
- 3.6.3. CAST IRON GATE VALVES: MSS-SP-70
- 3.6.4. CAST IRON GLOBE VALVES: MSS-SP-85
- 3.6.5. CAST IRON CHECK: MSS-SP-71
- 3.6.6. BUTTERFLY VALVES: MSS-SP-67
- 3.7. VALVES - ACCEPTABLE MANUFACTURERS:
- 3.7.1. KITZ, CRANE, JENKINS, CONBRACO, NIBCO
4. HYDRONIC SYSTEMS TO 150 PSIG, ABOVE GROUND
- 4.1. NOMINAL OPERATING PRESSURE 125 PSIG
- 4.2. DESIGN PRESSURE 150 PSIG
- 4.3. TEST PRESSURE 225 PSIG
- 4.4. DESIGN TEMPERATURE 350°F
- 4.5. CORROSION ALLOWANCE 0.0625 IN.
- 4.6. STEEL PIPE: ASTM A53 GR. B ERW OR ASTM A106 GR. B, SCH 40, SMLS 40
- 4.7. JOINTS, 2" AND SMALLER SCREWED
- 4.8. SCREWED FITTINGS 1/8 LB. MALLEABLE IRON
- 4.9. UNIONS: CL 150, ASTM A-47 MALLEABLE IRON, ASTM A-133 GALVANIZED, ANSI B2.1 THREADS.
- 4.10. JOINTS 2-1/2" AND LARGER: WELDED, WITH FLANGES AT CONNECTIONS TO EQUIPMENT.
- 4.11. BUTT WELD FITTINGS: B1.6.9 ASTM A234 GR. WPB
- 4.12. FLANGES ASTM A105, CLASS 150, RAISED FACE, WELD NECK OR SLIP END
- 4.13. BOLTS: ASTM A307 C.S. BOLTS, SQ. HEAD; ASTM A563 NUTS, HEX HEAD
- 4.14. GASKETS: 1/16" (1.6 MM) THICK PREFORMED NON-ASBESTOS, GRAPHITE FIBRE.
- 4.15. COPPER TUBING: 2" AND SMALLER ASTM 888, TYPE L, HARD DRAWN.
- 4.16. COPPER JOINTS: SOLDER, LEAD FREE, ASTM B32, 95-S-TIN-ANTIMONY, OR TIN AND SILVER, WITH MELTING RANGE 220°C TO 280°C.
- 4.17. COPPER FITTINGS: ASME B1.6.18, CAST BRASS, OR ASME B1.6.22, SOLDER WROUGHT COPPER.
- 4.18. DIELECTRIC UNIONS: UNION WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END, WATER IMPERVIOUS ISOLATION BARRIER.
- 4.19. VALVES, 2" AND SMALLER: ASTM A105
- 4.19.1. GATE VALVES (ISOLATING) 300 PSIG NON-SHOCK WOG, ASTM B62 BRONZE BODY, SOLID WEDGE DISC, RISING STEM, BRONZE TRIM, THREADED ENDS, KITZ #75
- 4.19.2. GLOBE VALVES (THROTTLING) 300 PSIG NON-SHOCK WOG, ASTM B62 BRONZE BODY, COMPOSITION (TEFLON) DISC, RISING STEM, BRONZE TRIM, THREADED ENDS, KITZ #09
- 4.19.3. CHECK VALVES (BACKFLOW) 300 PSIG NON-SHOCK WOG, ASTM B62 BRONZE BODY, Y-PATTERN HORIZONTAL SWING TYPE DISC, THREADED ENDS, KITZ #29
- 4.19.4. BALL VALVES (DRAIN) 600 PSIG NON-SHOCK WOG, FORGED BRASS, 2-PIECE, CHROME BALL AND STEM, FULL PORT, BLOW-OUT PROOF FIRE SEATS & STEM, LEVER HANDLE, THREADED ENDS, KITZ #84C.
- 4.20. VALVES, 2-1/2" AND LARGER: ASTM A216
- 4.20.1. GATE VALVES (ISOLATING) 200 PSIG NON-SHOCK WOG, ASTM A126 CLASS B CAST IRON BODY, BOLTED BONNET, BRONZE MOUNTED, BEVELLED WEDGE DISC, OS&Y, NON-ASBESTOS PACKING, FLANGED ENDS, KITZ #76
- 4.20.2. GLOBE VALVES (THROTTLING) 200 PSIG NON-SHOCK WOG, ASTM A126 CLASS B CAST IRON BODY, BOLTED BONNET, BRONZE MOUNTED, BEVELLED WEDGE DISC, OS&Y, NON-ASBESTOS PACKING, FLANGED ENDS, KITZ #76
- 4.20.3. CHECK (BACKFLOW) 200 PSIG NON-SHOCK WOG, ASTM 126 CLASS B CAST IRON BODY, BOLTED COVER, BRONZE MOUNTED, SWING TYPE DISC, FLANGED ENDS, KITZ #78
- 4.20.4. PROVIDE STEM EXTENSIONS FOR INSULATED PIPING.
- 4.20.5. PROVIDE GEAR OPERATOR AND CHAIN ON VALVES INSTALLED ABOVE 10-FT AFF.
- 4.21. STRAINERS, 2" AND SMALLER CLASS 250, 400 PSIG WOG, CAST IRON BODY, Y-PATTERN, SCREWED CAP AND STEM, A167 304 STAINLESS STEEL SCREEN WITH 1/32" PERFORATIONS, MUELLER STEAM 11M.
- 4.22. STRAINERS, 2-1/2" AND LARGER CLASS 250 PSIG NON-SHOCK WOG, CAST IRON, Y-PATTERN, BOLTED FLANGE COVER BLOW-OUT PROOF, A167 304 STAINLESS STEEL SCREEN WITH 1/32" PERFORATIONS, FLANGED ENDS, MUELLER STEAM 752
5. GROOVED PIPING SYSTEMS TO 150 PSIG, ABOVE GROUND

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- 5.1. ACCEPTABLE MANUFACTURERS: VICTUALIX COMPANY, ANVIL INTERNATIONAL, GRUVLOK
- 5.1.1. PERMITTED APPLICATIONS: GROOVED JOINTS ARE PERMITTED IN HVAC PIPING SYSTEMS WHERE OPERATING TEMPERATURES DO NOT EXCEED 140°F, INCLUDING: CHILLED WATER, CONDENSER WATER, OPEN; CONDENSER WATER, COOLER; HEAT PUMP WATER;
- 5.2. NOMINAL OPERATING PRESSURE 125 PSIG
- 5.3. DESIGN PRESSURE 150 PSIG
- 5.4. TEST PRESSURE 225 PSIG
- 5.5. DESIGN TEMPERATURE 350°F
- 5.6. CORROSION ALLOWANCE 0.0625 IN.
- 5.7. PIPE: ASTM A53 GR. B OR ASTM A106 GR. B, SCHEDULE 40, BLACK
- 5.8. FITTINGS: ROLL GROOVED, MALLEABLE IRON TO ASTM A47/A47M
- 5.9. JOINTS, 2-1/2" AND LARGER: ROLL GROOVED TO CSA B242, IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND RECOMMENDATIONS, WITH FLANGES AT CONNECTIONS TO EQUIPMENT.
- 5.10. GASKETS: EPDM
6. EQUIPMENT DRAINS AND OVERFLOWS
- 6.1. COPPER TUBING: ASTM 888, TYPE M AND DWV, HARD DRAWN.
- 6.2. FITTINGS: SEATS/SEALS: PTFE (TEFLON/T), (2) EPDM O-RINGS.
- 6.3. JOINTS: SOLDER, LEAD FREE, ASTM B32, 95-S-TIN-ANTIMONY, OR TIN AND SILVER, WITH MELTING RANGE 428°F TO 535°F (220°C TO 280°C).
7. CIRCUIT BALANCING VALVES
- 7.1. VALVES SHALL PROVIDE THE FOLLOWING FUNCTIONS:
- 7.1.1. PRECISE FLOW MEASUREMENT.
- 7.1.2. PRECISION FLOW BALANCING.
- 7.1.3. POSITIVE SHUT OFF WITH NO DRIP SEAT AND TEFLO N DISC.
- 7.2. CIRCUIT BALANCING VALVES: 2" (50 MM) AND SMALLER
- 7.2.1. SCREWED CONNECTION, GLOBE STYLE DESIGN, NONFERROUS, PRESSURE DIE-CAST, NONPOROUS ANNEAL COPPER ALLOY, EACH VALVE SHALL BE SUCH THAT WHEN INSTALLED IN ANY DIRECTION, IT WILL NOT AFFECT FLOW MEASUREMENT.
- 7.2.2. VALVES SHALL HAVE FOUR 360° ADJUSTMENT TURNS OF HANDWHEEL FOR MAXIMUM 'VERNIER' TYPE SETTING WITH 'HIDDEN MEMORY' FEATURE TO PROGRAM THE VALVE WITH PRECISION TAMPER-PROOF BALANCING SETTINGS.
- 7.2.3. VALVES SHALL BE SHIPPED IN A 4.5 X FACTOR POLYURETHANE CONTAINER THAT SHALL BE USED AS INSULATION AFTER VALVE IS INSTALLED.
- 7.2.4. PROVIDE VALVES SUITABLE FOR MAXIMUM WORKING PRESSURE OF 250 PSIG (1720 KPA) AND MAXIMUM OPERATING TEMPERATURE OF 250°F (121°C).
- 7.2.5. ACCEPTABLE PRODUCTS: S.A. ARMSTRONG CRV I INDICATED OR TOUR & ANDERSON STA-D OR NEWMAN HATTERSELY.
- 7.3. CIRCUIT BALANCING VALVES 2-1/2" (65 MM) AND LARGER
- 7.3.1. FLANGED, LINE SIZE CONNECTION, GLOBE STYLE DESIGN, NONFERROUS, PRESSURE DIE-CAST, NONPOROUS ANNEAL COPPER ALLOY.
- 7.3.2. VALVES SHALL HAVE TWELVE 360° ADJUSTMENT TURNS OF HANDWHEEL FOR MAXIMUM 'VERNIER' TYPE SETTING WITH 'HIDDEN MEMORY' FEATURE TO PROGRAM THE VALVE WITH PRECISION TAMPER-PROOF BALANCING SETTINGS.
- 7.3.3. VALVES SHALL BE SUITABLE FOR MAXIMUM WORKING PRESSURE OF 250 PSIG (1720 KPA) AND MAXIMUM OPERATING TEMPERATURE OF 250°F (120°C).
- 7.3.4. ACCEPTABLE PRODUCTS: S.A. ARMSTRONG CBV II INDICATED OR TOUR & ANDERSON STA-F OR NEWMAN HATTERSELY.
- 7.4. VICTUALIX SERIES 799/79V KOIL-KIT™ COIL PACK
- 7.5. INSTALL SERIES 786, 787, OR 78K TOUR & ANDERSON BALANCING VALVE, VICTUALIX SERIES 78U UNION PORT FITTING, SERIES 78X STRAINER/BALL VALVE OR SERIES 78T UNION/BALL VALVE COMBINATION, AND TWO STAINLESS STEEL, FLEXIBLE HOSES TO COMPLETE TERMINAL HOOKUP AT COIL OUTLET. VICTUALIX SERIES 799 OR SERIES 79V WITH KITC VALVE.
8. HVAC PIPING INSULATION
- 8.1. GLASS FIBRE
- 8.1.1. APPROVED MANUFACTURERS: JOHNSMANVILLE MICRO-LOK, OTHERS ACCEPTABLE MANUFACTURERS OFFERING EQUIVALENT PRODUCTS; OWENS CORNING FIBERGLASS, CERTAINTED CRIMPWRAP.
- 8.1.2. INSULATION : ASTM C547; ASTM C411, ASTM C356 CAN/ULC-S102, ASTM E84, ASTM D774, NFPA 259.
- 8.1.2.1. 'K'²¹ VALUE: 0.23 BTU·in²·Hr·Sq Ft·F /175°F
- 8.1.2.2. MINIMUM SERVICE TEMPERATURE: 0°F (-18°C).
- 8.1.2.3. MAXIMUM SERVICE TEMPERATURE: 800°F (454°C).
- 8.1.2.4. MAXIMUM MOISTURE ABSORPTION: <5% BY WEIGHT.
- 8.1.3. VAPOUR BARRIER JACKET: ASTM C136 TYPE L, WHITE KRAFT PAPER REINFORCED WITH GLASS FIBRE YARN AND BONDED TO ALUMINUMZED FILM, MOISTURE VAPOUR TRANSMISSION: ASTM E96, 102 FIRM, SECURE WITH SELF SEALING CONDUCTIVE LAPS AND BUTT STRIPS, SECURE WITH OUTWARD CLINCH EXPANDING STAPLES AND VAPOUR BARRIER MASTIC.
- 8.1.4. TIE WIRE: 1/3 MM STAINLESS STEEL WITH TWISTED ENDS ON MAXIMUM 12" (300 MM) CENTRES
- 8.1.5. VAPOUR BARRIER LAP ADHESIVE: COMPATIBLE WITH INSULATION.
- 8.1.6. INSULATING CEMENT/MASTIC: ASTM C195; HYDRAULIC SETTING ON MINERAL WOOL, VOC CONTENT NOT TO EXCEED 80 G/L.
- 8.1.7. FIBROUS GLASS FABRIC, CLOTH: UNTREATED; 9 OZ/SQ YD (305 G/MSQ M) WEIGHT, BLANKET: 1.0 LB/CU FT (16 KG/CU M) DENSITY.
- 8.1.8. INDOOR VAPOUR BARRIER FINISH: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION, WHITE COLOUR, VOC CONTENT NOT TO EXCEED 250 G/L.
- 8.1.9. OUTDOOR VAPOUR BARRIER MASTIC: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION, WHITE COLOUR.
- 8.1.10. INSULATING CEMENT: ASTM C449, VOC CONTENT NOT TO EXCEED 80 G/L.
- 8.2. JACKETS - PVC PLASTIC
- 8.2.1. JACKET: ONE PIECE MOULDED TYPE FITTING COVERS AND SHEET MATERIAL, CAN/ULC-S102, ASTM E84, ASTM D1784, UL C102-M88.
- 8.2.2. MAXIMUM SERVICE TEMPERATURE: 151°F (64°C).
- 8.2.3. FINISH: GLOSS.
- 8.2.4. MAXIMUM FLAME SPREAD: CAN/ULC-S102, ASTM E84: 25 OR LESS.
- 8.2.5. MAXIMUM SMOKE DEVELOPED: CAN/ULC-S102, ASTM E84: 50 OR LESS.
- 8.2.6. THICKNESS: 20 MIL (0.4 MM) MINIMUM, 30 MIL (0.8 MM) MINIMUM FOR OUTDOOR USE.
- 8.2.7. COLOUR: STANDARD OFF-WHITE
- 8.2.8. COVERING ADHESIVE: MASTIC COMPATIBLE WITH INSULATION, MAXIMUM VOC CONTENT OF 50 G/L.
- 8.2.9. APPROVED MANUFACTURER: CEEL-CCO 300 SERIES, ZESTON PIP.
- 8.3. JACKETS - ALUMINIUM
- 8.3.1. CAN/ULC-S102, ASTM E84, (APPLY TO ALL EXTERIOR PIPING ONLY)
- 8.3.2. THICKNESS: ASTM C1279 REQUIREMENTS FOR RIGID AND NON-RIGID INSULATION FINISH.
- 8.3.3. FINISH: SMOOTH PLAIN R1 FINISH.
- 8.3.4. JOINING: LONGITUDINAL SLIP JOINTS AND 2" (50 MM) LAPS.
- 8.3.5. FITTINGS: 0.02" (0.40 MM) THICK DIE SHAPED FITTING COVERS WITH FACTORY ATTACHED PROTECTIVE LINER.
- 8.3.6. METAL JACKET BACKS: 3/8" (10 MM) WIDE, 0.01" (0.38 MM) THICK ALUMINIUM.
- 8.4. PIPE INSULATION
- 8.4.1. INSULATE NEW OR ALTERED PIPING WITH RIGID PIPE INSULATION AND RE-INSULATE EXISTING PIPING WITH INSULATION WITH PROTECTIVE LINER.
- | TEMPERATURE SERVICE | OPERATING TEMP. [°F] | ROD DIAMETER (IN) | SPACING (FT) |
|---------------------|----------------------|-------------------|--------------|
| HOT WATER | 105 - 140 | 1-1/4 & SMALLER | 1-1/2 |
| HOT WATER | 141 - 200 | 1-1/4 & SMALLER | 1-1/2 |
| HOT WATER | 141 - 200 | 1-1/2 | 2 |
| HOT WATER | 201 - 250 | 3 & SMALLER | 2 1/2 |
| HOT WATER | 201 - 250 | 4" | 3 |
- 8.4.2. ON CHILLED WATER OR REFRIGERANT PIPING PROVIDE VAPOUR BARRIER LOCATED OUTSIDE THE INSULATION, SEAL JOINTS AND PENETRATIONS.
- 8.4.3. PROTECT INSULATION EXPOSED TO WEATHER WITH ALUMINIUM JACKETING.
- 8.4.4. PROVIDE PVC JACKETING ON EXPOSED INSULATED PIPING, FITTINGS AND VALVES INSIDE OF BUILDING.
9. HYDRONIC SPECIALTIES
- 9.1. AIR VENTS
- 9.1.1. MANUAL TYPE: SHORT VERTICAL SECTIONS OF 2" (50 MM) DIAMETER PIPE TO FORM AIR CHAMBER, WITH 3 MM BRASS NEEDLE VALVE AT TOP OF CHAMBER
- 9.1.2. FLOAT TYPE: MANUFACTURERS: ARMSTRONG, AMTROL, TACO, BRASS OR SEMI-STEEL BODY, COPPER, POLYPROPYLENE, OR SOLID NON-METALLIC FLOAT, STAINLESS STEEL VALVE AND VALVE SEAT; SUITABLE FOR SYSTEM OPERATING TEMPERATURE AND PRESSURE, WITH ISOLATING VALVE.
- 9.2. STRAINERS

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- 9.2.1. SIZE 2" (50 MM) AND UNDER: MANUFACTURERS: SARCO SB, CRANE, ARMSTRONG, COLTON SCREWED BRASS OR IRON BODY FOR 175 PSIG (1200 KPA) WORKING PRESSURE, Y PATTERN WITH 0.8 MM STAINLESS STEEL PERFORATED SCREEN.
- 9.2.2. SIZE 2-1/2" TO 4" (65 MM TO 100 MM): FLANGED IRON BODY FOR 175 PSIG (1200 KPA) WORKING PRESSURE, Y PATTERN WITH 1.2 MM STAINLESS STEEL PERFORATED SCREEN.
- 9.2.3. SIZE 6" (150 MM) AND LARGER: FLANGED IRON BODY FOR 175 PSIG (1200 KPA) WORKING PRESSURE, BALL PATTERN WITH 3" (3 mm) STAINLESS STEEL PERFORATED SCREEN.
- 9.3. RELIEF VALVES
- 9.3.1. MANUFACTURERS: SARCO, WATTS, BELL & GOSSETT, CONBRACO
- 9.3.2. BRONZE BODY, TEFLO N SEAT, STAINLESS STEEL STEM AND SPRINGS, AUTOMATIC, DIRECT PRESSURE ACTUATED, CAPACITIES ASME CERTIFIED AND LABELED
- 9.4. BALL-STYLE ZONE CONTROL VALVES
- 10.1. PROVIDE BELLOWS VALVES AND ACTUATORS.
- 10.2. 2-WAY BALL VALVE WITH CHARACTERIZING DISC
- 10.2.1. BODY: NPS 2 (DN 50) AND SMALLER: NICKEL PLATED (FORGED) BRASS; NPS 2-1/2 (DN 65) THROUGH NPS 6 (DN 150): CAST IRON GG25.
- 10.2.2. BALL: STAINLESS STEEL.
- 10.2.3. SEATS/SEALS: PTFE (TEFLON/T), (2) EPDM O-RINGS.
- 10.2.4. STEM/EXTENSION/SEALS: STAINLESS STEEL.
- 10.2.5. LUBRICATED EPDM O-RINGS (2)
- 10.2.6. CHARACTERIZING DISC: NPS 2 (DN 50) AND SMALLER: PTFE (TEFLON/T); NPS 2-1/2 (DN 65) THROUGH NPS 6 (DN 150): STAINLESS STEEL.
- 10.2.7. PIPING CONNECTIONS: NPS 2 (DN 50) AND SMALLER: (2) FEMALE NPT, NPS 2-1/2 (DN 65) THROUGH NPS 6 (DN 150); (2) FLANGED, [ANSI CLASS 1258] OR [ANSI CLASS 250]
- 10.2.8. MEDIA: WATER [MAXIMUM 40% AQUEOUS PROPYLENE GLYCOL SOLUTION].
- 10.2.9. PERFORMANCE:
- 10.2.9.1. MEDIA TEMPERATURE: NPS 2 (DN 150) AND SMALLER: 0°F TO 250°F (-18°C TO 120°C); NPS 2-1/2 (DN 65) THROUGH NPS 6 (DN 150): 0°F TO 250°F (-18°C TO 120°C).
- 10.2.9.2. PRESSURE: BODY: NPS 1/2, 1, 1-1/4 (DN 15 TO DN 32): 400 PSIG (4137 KPA); NPS 1-1/4, 1-1/2, 2 (DN 32 TO DN 50): 400 PSIG (2758 KPA).
- 10.2.9.3. MAXIMUM OPERATING DIFFERENTIAL: 50 PSIG (345 KPA)
- 10.2.9.4. CLOSE-OFF (VALVE AND ACTUATION ASSEMBLY): NPS 1/2 THROUGH NPS 2 (DN 15 TO DN 50): 200 PSIG (1379 KPA); NPS 2-1/2 THROUGH NPS 6: ANSI CLASS 1258: 175 PSIG (1206 KPA); ANSI CLASS 250: 310 PSIG (2137 KPA).
- 10.2.9.5. LEAKAGE (A-B): 0%.
- 10.3. 3-WAY BALL VALVE WITH CHARACTERIZING DISC
- 10.3.1. BODY: FORGED BRASS WITH NICKEL PLATING.
- 10.3.2. BALL: STAINLESS STEEL.
- 10.3.3. STEM/EXTENSION/SEALS: STAINLESS STEEL TO MATCH BALL.
- 10.3.4. LUBRICATED EPDM O-RINGS.
- 10.3.5. SEAT/SEALS: PTFE (TEFLON/T), EPDM O-RINGS.
- 10.3.6. CHARACTERIZING DISC: ETFE (FEZTEL/M).
- 10.3.7. PIPING CONNECTIONS: NPS 1/2 (DN 15) THROUGH NPS 2 (DN 50): (3) FEMALE NPT.
- 10.3.8. MEDIA: WATER [MAXIMUM 40% AQUEOUS PROPYLENE GLYCOL SOLUTION].
- 10.3.9. PERFORMANCE:
- 10.3.9.1. INHERENT FLOW CHARACTERISTICS: CONTROL PORT (A): EQUAL PERCENTAGE;
- 10.3.9.2. PRESSURE: BODY: NPS 1/2, 1, 1-1/4 (DN 15 TO DN 32): 400 PSIG (4137 KPA); NPS 1-1/4, 1-1/2, 2 (DN 32 TO DN 50): 400 PSIG (2758 KPA).
- 10.3.9.3. MAXIMUM OPERATING DIFFERENTIAL: 50 PSIG (345 KPA)
- 10.3.9.4. CLOSE-OFF (VALVE AND ACTUATION ASSEMBLY): 200 PSIG (1379 KPA).
- 10.3.9.5. LEAKAGE: A-B: 0% B-A: 2% OF MAXIMUM RATED VALVE CV.
- 10.4. 2-WAY AND 3-WAY REDUCED PORT BALL VALVE
- 10.4.1. BODY: FORGED BRASS
- 10.4.2. BALL: CHROME PLATED BRASS
- 10.4.3. SEATS/SEALS: PTFE (TEFLON/T), EPDM O-RINGS
- 10.4.4. STEM/EXTENSION/SEALS: BRASS, LUBRICATED EPDM O-RINGS (2)
- 10.4.5. PIPING CONNECTIONS: NPS 1 (DN 25) AND SMALLER: FEMALE NPT.
- 10.4.6. MEDIA: WATER [MAXIMUM 40% AQUEOUS PROPYLENE GLYCOL SOLUTION].
- 10.4.7. PERFORMANCE:
- 10.4.7.1. INHERENT FLOW CHARACTERISTICS: 2-WAY: EQUAL PERCENTAGE; 3-WAY DIVERTING: LINEAR.
- 10.4.7.2. MEDIA TEMPERATURE: 0°F TO 212°F (-18°C TO 100°C).
- 10.4.7.3. PRESSURE: BODY: 200 PSIG (2482 KPA);
- 10.4.7.4. MAXIMUM OPERATING DIFFERENTIAL: 40 PSIG (276 KPA);
- 10.4.7.5. CLOSE-OFF (VALVE AND ACTUATION ASSEMBLY): 2-WAY: 75 PSIG (517 KPA); 3-WAY: 40 PSIG (276 KPA).
- 10.4.7.6. LEAKAGE: 0%.
- 10.5. ACTUATORS
- 10.5.1. THE VALVE ASSEMBLY (CONTROL VALVE AND ACTUATOR) SHALL BE PROVIDED AND DELIVERED FROM A SINGLE MANUFACTURER. THE MANUFACTURER SHALL WARRANT ALL COMPONENTS FOR A PERIOD OF 5 YEARS FROM THE DATE OF PRODUCTION WITH THE FIRST TWO YEARS UNCONDITIONAL.
- 10.5.2. TYPE: MOTOR OPERATED, WITH GEARS, ELECTRIC AND ELECTRONIC ACTUATORS FOR HYDRONIC PRESURE AND MINIMUM & DEGREE C SUPERHEAT. SELECT TO AVOID BEING UNDERSIZED AT FULL LOAD AND EXCESSIVELY OVERSIZED AT PART LOAD.
- 10.5.3. VOLTAGE: SEE DRAWINGS
- 10.5.4. TWO-POSITION ACTUATORS: SINGLE DIRECTION; SPRING RETURN OR REVERSING TYPE.
- 10.5.5. FAIL-SAFE: MECHANICAL SPRING RETURN MECHANISM TO DRIVE CONTROLLED DEVICE TO AN END POSITION (OPEN OR CLOSED) ON LOSS OF POWER.
- 10.5.6. INTEGRAL OVERLOAD PROTECTION: PROVIDE ELECTRIC OVERLOAD PROTECTION THROUGHOUT THE ENTIRE OPERATING RANGE IN BOTH DIRECTIONS.
- 10.5.7. ENCLOSURE: SUITABLE FOR AMBIENT CONDITIONS ENCOUNTERED BY APPLICATION.
- 10.5.7.1. NEMA TYPE 1 FOR INDOOR INSTALLATION IN AN EQUIPMENT ENCLOSURE.
- 10.5.7.2. NEMA TYPE 2 FOR INDOOR AND PROTECTED APPLICATIONS.
- 10.5.7.3. NEMA TYPE 4 OR TYPE 4X FOR OUTDOOR AND UNPROTECTED APPLICATIONS.
- 10.5.7.4. PROVIDE ACTUATOR ENCLOSURE WITH A HEATER AND CONTROLLER WHERE REQUIRED BY APPLICATION.
- 10.5.8. STROKE TIME: SELECT OPERATING SPEED TO BE COMPATIBLE WITH EQUIPMENT AND SYSTEM OPERATION
11. HYDRONIC PIPE TESTING
- 11.1. AFTER PIPES HAVE BEEN PLACED IN POSITION, TEST THE TIGHTNESS OF JOINTS AND THE SOUNDNESS OF PIPES.
- 11.2. TEST WATER PIPING WITH COLD WATER AT A PRESSURE OF 1.5 TIMES THE WORKING PRESSURE, BUT NOT LESS THAN 1.035 KPA (150 PSIG), FOR A PERIOD OF NOT LESS THAN FOUR (4) HOURS, WITHOUT ANY DIRT DROP IN PRESSURE.
- 11.3. MAKE BRIGHT LEAKS WHERE JOINTS UNDER PRESSURE. IF THIS IS NOT POSSIBLE, REMOVE, REFIT, AND RETEST PIPING. DO NOT CAULK THESE JOINTS.
12. REFRIGERANT PIPING & SPECIALTIES
- 12.1. SUEZE REFRIGERANT PIPING 1 PERCENTIES
- 12.2. INSTALL HORIZONTAL HOT GAS DISCHARGE PIPING 1/4" (10mm) DOWNWARD SLOPE AWAY FROM COMPRESSOR.
- 12.3. INSTALL HORIZONTAL SUCTION LINES 1/4" PER 10' DOWNWARD SLOPE TO THE COMPRESSOR WITH NO LONG TRAPS OR DEAD ENDS THAT MAY CAUSE Oil SEPARATION FROM SUCTION GAS.
- 12.4. PROVIDE LINE SIZE LIQUID INDICATORS IN MAIN LIQUID LINES LEAVING THE COMPRESSOR OR RECEIVER. INSTALL MOISTURE LIQUID INDICATORS IN LIQUID LINES BETWEEN FILTER DRYERS AND THERMOSTATIC EXPANSION VALVES, AND IN LIQUID LINES TO RECEIVER.
- 12.5. PROVIDE LINE SIZED STRAINER UPSTREAM OF EACH AUTOMATIC VALVE, PROVIDE SHUTOFF VALVE ON EACH SIDE OF THE STRAINER.
- 12.6. PROVIDE PERMANENT FILTER DRYERS IN LOW TEMPERATURE SYSTEMS AND SYSTEMS USING HERMETIC COMPRESSORS.
- 12.7. PROVIDE REPLACEABLE CARTRIDGE FILTER DRYERS WITH A THREE-VALVE BYPASS ASSEMBLY FOR SOLENOID VALVES ADJACENT TO RECEIVERS.
- 12.8. PROVIDE REFRIGERANT CHARGING VALVE CONNECTIONS TO THE LIQUID LINE BETWEEN THE RECEIVER SHUTOFF VALVE AND THE EXPANSION VALVE.
- 12.9. PIPING
- 12.9.1. COPPER TUBING: ASTM B280, TYPE ACB HARD DRAWN OR ANNEALED, FITTINGS: ASME B16.22 WROUGHT COPPER, JOINTS: BRAZE, AWS A5.8 BCUP SILVER/PHOSPHORUS/COPPER ALLOY WITH

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- MELTING RANGE 640 TO 805 DEGREES C.
- 12.9.2. COPPER TUBING TO 22 MM OD; ASTM 888, TYPE K, ANNEALED, FITTINGS: ASME B16.26 CAST COPPER, JOINTS: FLARED.
- 12.10. REFRIGERANT PIPING INSULATION: CLOSED-CELL ELASTOMERIC
- 12.10.1. MANUFACTURER: ARMACEAL AP ARMAFLEX
- 12.10.2. COMPLIANCE: ASTM C534, CAN/ULC-S102, ASTM E84, ULCC-S102, NFPA 90A, ASTM D1056
- 12.10.3. THERMAL CONDUCTIVITY: 0.235 BTU·in²·Hr·Sq Ft·F / AT 50 F (0.036 W/m·K AT 10 C)
- 12.10.4. PERMEABILITY: 0.05 PERM-IN.
- 12.10.5. MAXIMUM FLAME SPREAD INDEX: 25. MAXIMUM SMOKE DEVELOPMENT INDEX: 50
- 12.10.6. WATER ABSORPTION: 0.2% BY VOLUME
- 12.10.7. MAXIMUM SERVICE TEMPERATURE: 220 F [105 C]
- 12.10.8. MINIMUM SERVICE TEMPERATURE: -297 F (-183 C)
- 12.10.9. ON OUTDOOR REFRIGERANT PIPING: PROVIDE VAPOUR BARRIER LOCATED OUTSIDE THE INSULATION SEAL, JOINTS AND PENETRATIONS.
- 12.10.10. PROTECT INSULATION EXPOSED TO WEATHER WITH ALUMINIUM, SHEET METAL, OR PLASTIC JACKETING.
- 12.10.11. INSULATE ALL REFRIGERANT SUCTION AND HOT GAS PIPING AND FITTINGS. INSULATE LIQUID LINES WHERE EXPOSED TO EXTERIOR CONDITIONS. INSULATION SHALL FIT TIGHT. THICKNESS SHALL AS FOLLOWS: 1/2" (13 MM) THICK FOR PIPE 1" (25 MM) O.D. AND SMALLER; 3/4" (20 MM) THICK FOR PIPE 1-1/8" (28 MM) TO 2" (50 MM) O.D.; 1" (25 MM) THICK FOR PIPES 2-1/8" (54 MM) O.D. AND LARGER
- 12.10.12. SLIP INSULATION ON TO TUBING BEFORE TUBING SECTIONS AND FITTINGS ARE ASSEMBLED. KEEP SURFACES OF INSULATION TO A VERY MINIMUM. SEAL ALL JOINTS IN THE INSULATION WITH ARMAFLEX 520 BLT. INSULATE FLEXIBLE PIPE CONNECTORS.
- 12.11. MOISTURE AND LIQUID INDICATORS: SINGLE PORT TYPE, UL LISTED, WITH COPPER OR BRASS BODY, FLARED OR SOLDER ENDS, SIGHT GLASS, COLOUR CODED PAPER MOISTURE INDICATOR WITH REMOVABLE ELEMENT CARTRIDGE AND PLASTIC CAP; FOR MAXIMUM WORKING PRESSURE OF 3450 KPA, AND MAXIMUM TEMPERATURE OF 93 DEGREES C.
- 12.12. VALVES
- 12.12.1. BALL VALVES: TWO PIECE BOLTED FORGED BRASS BODY WITH TEFLO N BALL SEALS AND COPPER TUBE EXTENSIONS, BRASS BONNET AND SEAL CAP, CHROME PLATED BALL, STEM WITH NEOPRENE TUBE SEALS; FOR MAXIMUM WORKING PRESSURE OF 3450 KPA AND MAXIMUM TEMPERATURE OF 149 DEGREES C.
- 12.12.2. SERVICE VALVES: FORGED BRASS BODY WITH COPPER STUBS, BRASS CAPS, REMOVABLE VALVE CORE, INTEGRAL BALL CHECK VALVE, FLARED OR SOLDER ENDS, FOR MAXIMUM PRESSURE OF 3450 KPA.
- 12.13. STRAINERS
- 12.13.1. STRAIGHT LINE OR ANGLE LINE TYPE: BRASS OR STEEL SHELL, STEEL CAP AND FLANGE, AND REPLACEABLE CARTRIDGE, WITH SCREEN OF STAINLESS STEEL WIRE OR MONEL REINFORCED WITH BRASS; FOR MAXIMUM WORKING PRESSURE OF 2960 KPA.
- 12.13.2. STRAIGHT LINE, NON-CLEANABLE TYPE: STEEL SHELL, COPPER PLATED FITTINGS, STAINLESS STEEL WIRE SCREEN, FOR MAXIMUM WORKING PRESSURE TO SUIT APPLICATION.
- 12.14. CHECK VALVES
- 12.14.1. GLOBE TYPE: CAST BRONZE OR FORGED BRASS BODY, FORGED BRASS CAP WITH NEOPRENE SEAL, BRASS GUIDE AND DISC HOLDER, PHOSPHOR BRONZE OR STAINLESS STEEL SPRING, TEFLO N SEAT DISC; FOR MAXIMUM WORKING PRESSURE OF 2950 KPA AND MAXIMUM TEMPERATURE OF 149 DEGREES C.
- 12.14.2. STRAIGHT THROUGH TYPE: BRASS BODY AND DISC, PHOSPHOR BRONZE OR STAINLESS STEEL SPRING, NEOPRENE SEAT; FOR MAXIMUM WORKING PRESSURE OF 3450 KPA AND MAXIMUM TEMPERATURE OF 93 DEGREES C.
- 12.14.3. PRESSURE REGULATORS: BRASS BODY, STAINLESS STEEL, DIAPHRAGM, DIRECT ACTING, ADJUSTABLE OVER TO 550 KPA RANGE, FOR MAXIMUM WORKING PRESSURE OF 3100 KPA.
- 12.14.6. PRESSURE RELIEF VALVES: STRAIGHT THROUGH OR ANGLE TYPE: BRASS BODY AND DISC, NEOPRENE SEAT, FACTORY SEALED AND STAMPED WITH ASME UR AND NATIONAL BOARD CERTIFICATION INK; FOR STANDARD 1/620 KPA SETTING; SELECTED TO ASSURE 1.5.
- 12.17. FILTER-DRERS
- 12.17.1. REPLACEABLE CARTRIDGE ANGLE TYPE:
- 12.17.1.1. SHELL: ARI 710, UL LISTED, BRASS, REMOVABLE CAP, FOR MAXIMUM WORKING PRESSURE OF 2410 KPA.
- 12.17.1.2. FILTER/CARTRIDGE: PLEATED MEDIA WITH INTEGRAL END RINGS, STAINLESS STEEL SUPPORT.
- 12.17.1.3. FILTER/DRYER CARTRIDGE: PLEATED MEDIA WITH SOLID CORE SIEVE WITH ACTIVATED ALUMINA.
- 12.17.1.4. WAX REMOVAL CARTRIDGE: MOULDED BONDED CORE OF ACTIVATED CHARCOAL WITH INTEGRAL GASKETS.
- 12.17.2. PERMANENT STRAIGHT THROUGH TYPE:
- 12.17.2.1. ARI 710, UL LISTED, STEEL SHELL WITH MOULDED DESICCANT FILTER CORE FOR MAXIMUM WORKING PRESSURE OF 2410 KPA.
- 12.18. SOLENOID VALVES
- 12.18.1. VALVE: ARI 760, PILOT OPERATED, COPPER OR BRASS OR STEEL BODY AND INTERNAL PARTS, SYNTHETIC SEAL, STAINLESS STEEL STEM AND FLUNGER ASSEMBLY, INTEGRAL STRAINER, WITH FLARED, SOLDER OR THERMATIC ENDS; FOR MAXIMUM WORKING PRESSURE OF 3450 KPA, STEM FOR TYPICAL MANUAL OPERATION IN CASE OF COIL FAILURE.
- 12.18.2. COIL ASSEMBLY: UL 429, UL LISTED, REPLACEABLE WITH MOULDED ELECTROMAGNETIC COIL, MOISTURE AND FUNGUS PROOF

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- 1.1.1. MAXIMUM SERVICE TEMPERATURE: 180 F (82 C), MINIMUM SERVICE TEMPERATURE: -30 F (34 C)
1.2. ALUMINUM JACKETING (APPLY TO OUTDOOR DUCTWORK)
1.2.1. MANUFACTURER: JOHNS MANVILLE ALUMINUM ROLL AND SHEET
1.2.2. COMPLIANCE: ASTM C1729, CAN/ULC-S102, ASTM E84
1.2.3. FINISH:SMOOTH PLAIN MILL FINISH
1.2.4. EMISSIONS: ASTM C1371
1.2.5. MAXIMUM FLAME SPREAD INDEX: 0
1.2.6. MAXIMUM SMOKE DEVELOPMENT INDEX: 5
1.3. DUCT INSULATION THICKNESS
1.3.1. INSULATE NEW OR ALTERED DUCTWORK AND REINSULATE EXISTING DUCTWORK WHERE INSULATION HAS BEEN REMOVED OR DAMAGED AS FOLLOWS:

SERVICE	INSULATION TYPE	THICKNESS (IN)
AIR SUPPLY - RECTANGULAR	RIGID	SEE BELOW
AIR SUPPLY - ROUND	FLEXIBLE	SEE BELOW
EXHAUST WITH IN OR OUTSIDE - RECTANGULAR	RIGID	SEE BELOW (EXTERIOR)
EXHAUST WITH IN OR OUTSIDE - ROUND	FLEXIBLE	SEE BELOW (EXTERIOR)
FRESH AIR INTAKE - RECTANGULAR	RIGID	SEE BELOW (EXTERIOR)
FRESH AIR INTAKE - ROUND	FLEXIBLE	SEE BELOW (EXTERIOR)
EXHAUST AIR PLenums	RIGID	SEE BELOW (EXTERIOR)
SUPPLY RUNOUTS TO TERMINAL UNITS - RECTANGULAR	RIGID	SEE BELOW
SUPPLY RUNOUTS TO TERMINAL UNITS - ROUND	FLEXIBLE	SEE BELOW
DUCT MOUNTED COILS	RIGID	(UNCONDITIONED SPACE)

DUCT LOCATION	HEATING ONLY DUCTS	COOLING ONLY DUCTS	COOLING ONLY DUCTS	COOLING ONLY DUCTS
EXTERIOR	R-12	R-12	R-12	R-12
VENTILATED ATTIC	R-6	R-6	R-6	R-6
UNVENTILATED ATTIC ABOVE INSULATED CEILING	R-12	R-12	R-12	R-12
UNVENTILATED ATTIC WITH ROOF OR GABLE END	NONE	R-12	NONE	R-12
UNCONDITIONED SPACE	R-12	R-12	R-12	R-12
INDIRECTLY CONDITIONED SPACE	NONE	NONE	NONE	NONE
BURIED	R-6	NONE	NONE	R-6

- 1.4. INDIRECTLY CONDITIONED SPACES IN TABLE ABOVE INCLUDES RETURN AIR PLENUMS WITH OR WITHOUT EXPOSED ROOF ABOVE, UNCONDITIONED SPACES AND/OR CRAWLSPACES BOTH VENTILATED AND UNVENTILATED.
1.5. INSULATE RIGID DUCT SLEEVES IN THE SAME MANNER AS DUCTWORK.
1.6. ON COOLING DUCTS OUTSIDE UNCONDITIONED SPACE PROVIDE VAPOUR BARRIER LOCATED OUTSIDE THE INSULATION, SEAL JOINTS AND PENETRATIONS.
1.7. PROTECT INSULATION EXPOSED TO WEATHER WITH ALUMINUM JACKETING.
2. DUCT ACCESSORIES
2.1. AIR TURNING DEVICES / EXTRACTORS
2.1.1. TURNING VANES IN RECTANGULAR DUCT ELBOWS SHALL BE DOUBLE WAFFLED, MULTI-BLADE VANES WITH BLADES ALIGNED IN SHORT DIMENSION; STEEL CONSTRUCTION, WITH INDIVIDUALLY ADJUSTABLE BLADES, MOUNTING STRAPS, ACCEPTABLE PRODUCTS: DURO-DYNE 'DURO VANE RAIL', HART & COCKLEY 'DUCTURN', DYN-AIR OR TURTLE AND BALY.
2.1.2. VOLUME EXTRACTORS: GANG OPERATED CURVED BLADES, ADJUSTABLE FROM FULL OPEN TO FULL CLOSED POSITIONS. UNITS SHALL BE FACTORY ASSEMBLED, FABRICATED FROM 1/4 GA. AND 22 GA. (2 AND 9 MM) STEEL, WITH BLADES ON 1" (25 MM) SQUARE, AND NO. 2 OR NO. 3 OPERATORS TO SUIT APPLICATION.
2.1.3. ACCEPTABLE MANUFACTURERS: EH PRICE MODEL AE1 INDICATED, KRUEGER MODEL EX-8, DURO-DYNE, DYN-AIR.
2.2. BACKDRAFT DAMPERS
2.2.1. GRAVITY BACKDRAFT DAMPERS: SIZE 18" X 18" (450 X 450 MM) OR SMALLER, PROVIDED WITH AIR MOVING EQUIPMENT; AIR MOVING EQUIPMENT MANUFACTURERS STANDARD CONSTRUCTION.
2.2.2. MULTI-BLADE PARALLEL ACTION GRAVITY BALANCED BACKDRAFT DAMPERS: 1/16" (1.5 MM) THICK GALVANIZED STEEL, OR, WITH CENTRE PIVOTED BLADES OF MAXIMUM 6" (150 MM) WIDTH, WITH FELT OR FLEXIBLE WIPER SEALED EDGES, LINKED TOGETHER IN BUTTLE-FREE MANNER WITH 90 DEGREE STOP, STEEL BALL BEARINGS, AND FLATED STEEL PIVOT PIN; ADJUSTMENT DEVICE TO PERMIT SETTING, FOR VARYING DIFFERENTIAL STATIC PRESSURE.
2.2.3. PROVIDE MAXIMUM AIR LEAKAGE OF 4 CFM/50, FT AT 1.0" W.C. DIFFERENTIAL PRESSURE.
2.2.4. ACCEPTABLE MANUFACTURERS: EH PRICE.
2.3. VOLUME CONTROL DAMPERS
2.3.1. FABRICATE TO SMA2CA HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE, AND AS INDICATED.
2.3.2. PROVIDE MAXIMUM AIR LEAKAGE OF 4 CFM/50, FT AT 1.0" W.C. DIFFERENTIAL PRESSURE.
2.4. SPLITTER DAMPERS:
2.4.1. MATERIAL: SAME GAUGE AS DUCT TO 24" (600 MM) SIZE IN EITHER DIRECTION, AND TWO GAUGES HEAVIER FOR SIZES OVER 24" (600 MM).
2.4.2. BLADE: FABRICATE OF SINGLE THICKNESS SHEET METAL TO STREAMLINE SHAPE, SECURED WITH CONTINUOUS HINGE OR ROD.
2.4.3. OPERATOR: MINIMUM 24" (600 MM) DIAMETER ROD IN SELF ALIGNING, UNIVERSAL JOINT ACTION, FLANGED BUSHING WITH SET SCREW.
2.5. SINGLE LEAF DAMPERS: FABRICATED FROM MINIMUM 20 GAUGE (1.0 MM) GALVANIZED STEEL, SUITABLY REINFORCED TO PREVENT VIBRATION AND FITTED WITH INDICATING REGULATOR, DURO-DYNE, LAWSON & TAYLOR, DYN-AIR.
2.6. MULTI-BLADE OPPOSED ACTION DAMPERS: FABRICATED FROM 16 GAUGE (1.6 MM) GALVANIZED STEEL, MOUNTED IN SEPARATE CHANNEL FRAMES, REINFORCED TO PREVENT VIBRATION, AND FITTED WITH OPPOSED ACTION LINKAGE HARDWARE, DURO-DYNE 'OPAK' BLADE KIT, LAWSON & TAYLOR, DYN-AIR.
2.7. END BEARINGS: EXCEPT IN ROUND DUCTWORK 12" (300 MM) AND SMALLER, PROVIDE END BEARINGS, ON MULTIPLE BLADE DAMPERS, PROVIDE OIL-IMPREGNATED NYLON OR SINTERED BRONZE BEARINGS.
2.8. QUADRANTS:
2.8.1. PROVIDE LOCKING, INDICATING QUADRANT REGULATORS ON SINGLE AND MULTI-BLADE DAMPERS.
2.8.2. ON INSULATED DUCTS MOUNT QUADRANT REGULATORS ON STAND-OFF MOUNTING BRACKETS, BASES, OR ADAPTERS.
2.8.3. WHERE ROD LENGTHS EXCEED 30" (750 MM) PROVIDE REGULATOR AT BOTH ENDS.
2.8.4. ACCEPTABLE MANUFACTURERS: DURO-DYNE, DYN-AIR, PRICE, LAWSON & TAYLOR
2.9. FIRE DAMPERS
2.9.1. MANUFACTURERS: PRICE, RUSKIN, NALOR
2.9.2. PROVIDE ULC LISTED, LABELED, OR WARNICK-HERSEY LABEL, MEET REQUIREMENTS OF NFPA 90A, AND CONSTRUCTED AND RATED IN CONFORMANCE WITH:
2.9.2.1. CANA-592-M82, 'STANDARD FOR FIRE DAMPERS' WHEN USED IN A FIRE SEPARATION OF NOT MORE THAN 2 HOURS, AND WHICH IS NOT A FIREWALL.
2.9.2.2. CANA-S104-M80, 'STANDARD METHOD FOR FIRE TESTS OF DOOR ASSEMBLIES,' WHEN USED IN A FIRE SEPARATION OF MORE THAN 2 HOURS OR USE IN A FIREWALL.
2.9.2.3. CANA-592.2-M84, 'FIRE TEST OF CEILING FLOOR TO FLOOR ASSEMBLIES,' WHEN USED IN A CEILING FIRE SEPARATION.
2.9.3. PROVIDE GALVANIZED STEEL CHANNEL FRAME CURTAIN TYPE GALLOWAY-STEEL INTERLOCKING BLADES, MINIMUM 22 GAUGE (0.7 MM) GALVANIZED STEEL ENCLOSURE, AND 1/60F (11°C) FUSIBLE LINK STANDARD.
2.9.4. FOR HORIZONTAL INSTALLATION IN VERTICAL DUCTWORK PROVIDE UNITS OPERATED BY A STAINLESS-STEEL CLOSURE SPRING AND LATCH.
2.9.5. PROVIDE LOW RESISTANCE TYPE 8 WITH BLADES LOCATED OUTSIDE OF THE AIR STREAM FOR RECTANGULAR DUCTWORK, AND TYPE C FOR ROUND DUCTWORK.
2.9.6. FOR CEILINGS PROVIDE ULC LABELED, FOR FIRE RATED MEMBRANE TYPE CEILINGS, GALVANIZED STEEL CONSTRUCTION WITH HEAT RETARDANT BLANKET (NON-ASBESTOS) WITH STANDARD 1/60F (11°C) FUSIBLE LINK.
2.9.7. PROVIDE ULC LABELED CEILING BLANKET, FOR FIRE RATED MEMBRANE TYPE CEILINGS, TO COMPLETE ENHANCED CEILING FINISHING.
2.9.8. PROVIDE ALL STAINLESS-STEEL CONSTRUCTION IN STAINLESS STEEL DUCTWORK.
2.9.9. FUSIBLE LINKS: UL 33, SEPARATE AT 160F (71°C) WITH ADJUSTABLE LINK STRAPS FOR COMBINATION FIRE/BALANCING DAMPERS.
2.10. FIRE DAMPERS (DYNAMIC)
2.10.1. DYNAMIC FIRE DAMPERS TESTED, CONSTRUCTED AND LABELED IN ACCORDANCE WITH THE LATEST EDITION OF UL STANDARD 555. DAMPERS SHALL HAVE A FIRE RATING OF 1-1/2 HOURS OR 3 HOURS, MEET THE REQUIREMENTS OF THE LATEST EDITION OF NFPA90A.
2.10.2. PROVIDE DAMPERS WITH A 165F (74°C) FUSIBLE LINK LABELED FOR USE IN DYNAMIC SYSTEMS. PROVIDE DAMPERS RATED FOR DYNAMIC CLOSURE AT 200FPM (10.16M/S) AND 4 INCHES (W.G. 11 KPA) STATIC PRESSURE AND RATED TO CLOSE WITH AIRFLOW IN EITHER DIRECTION.
2.10.3. PROVIDE DYNAMIC FIRE DAMPERS WITH A STEEL SLEEVE AND MOUNTING ANGLES FURNISHED BY THE DAMPER MANUFACTURER TO ENSURE APPROPRIATE INSTALLATION. SUBMITTALS INFORMATION SHALL INCLUDE THE FIRE PROTECTION RATING, MAXIMUM VELOCITY/PRESSURE RATINGS AND THE MANUFACTURERS UL INSTALLATION INSTRUCTIONS. INSTALL DAMPERS IN ACCORDANCE WITH THE MANUFACTURERS UL INSTALLATION INSTRUCTIONS.
2.10.4. ACCEPTABLE PRODUCT: RUSKIN DIB02/DIB023, NCA, VENTEC, PRICE, CONTROLLED AIR.
2.11.COMBINATION FIRE/SMOKE DAMPERS

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- 2.11.1. MANUFACTURER: RUSKIN, GREENHECK, PRICE, NALOR
2.11.2. COMBINATION FIRE/SMOKE DAMPERS, COMPLETE WITH SLEEVES AND OPERATORS, DESIGNED AND TESTED TO MEET BOTH UL555 REQUIREMENTS FOR FIRE DAMPERS AND UL555S FOR LEAKAGE CLASS 1 RATED SMOKE DAMPERS. PROVIDE WITH END SWITCHES, CONSTRUCT FRAME FROM 1.6MM (1/16 GAUGE) GALVANIZED STEEL, CONSTRUCT SINGLE PIECE CONSTRUCTION AIR FOIL BLADES FROM 2.0MM (1/4 GAUGE) GALVANIZED STEEL, WITH STAINLESS STEEL SLEEVE BEARINGS, SQUARE PLATED STEEL AXLES AND CONCEALED LINKAGES, USE STAINLESS STEEL SPRING, DESIGN FOR OPERATOR MOUNTED OUT OF THE AIR STREAM, EQUIP WITH 120 DEGREE C, 250 DEGREE F SHARP DISC. DESIGN FOR OPERATOR MOUNTED OUT OF AIR STREAM, PROVIDE DAMPER ACTUATORS FOR COMPLETE CUL LISTED AND TESTED DAMPER ASSEMBLY.
2.11.3. USE ONLY FIRE DAMPER ASSEMBLIES TESTED IN ACCORDANCE WITH CANA 592 IN 'STANDARD METHOD OF FIRE TEST OF FIRE DAMPER ASSEMBLIES' AND LISTED IN MOST RECENT ULC 'LIST OF EQUIPMENT AND MATERIALS' OR BY ANOTHER RECOGNIZED INDEPENDENT TESTING AND CERTIFICATION AGENCY, ACCEPTANCE TO THE CONSULTANT, LABEL EACH DAMPER TO INDICATE COMPLIANCE WITH THESE REQUIREMENTS.
2.11.4. PROVIDE LINKS COMPLYING WITH ULC 5505 'STANDARD FOR FUSIBLE LINKS FOR FIRE PROTECTION SERVICE'.
2.11.5. FABRICATE DAMPERS FROM GALVANIZED STEEL EXCEPT IN COPPER, STAINLESS STEEL OR ALUMINUM DUCT SYSTEMS. IN THESE SYSTEMS, USE ALL STAINLESS-STEEL CONSTRUCTION.
2.11.6. COMPLY WITH ONTARIO BUILDING CODE REQUIREMENTS FOR FIRE RESISTANCE RATINGS OF THE FIRE SEPARATIONS THROUGH WHICH THE PROTECTED OPENINGS PASS, PROVIDE AN APPROVAL LABEL, STATING THE FIRE RATING, FROM A RECOGNIZED INDEPENDENT TESTING LABORATORY, ACCEPTABLE TO THE CONSULTANT, ON EACH ASSEMBLY.
2.11.7. PROVIDE WITH EACH DAMPER, DETAILED INSTALLATION INSTRUCTIONS, INCLUDE ILLUSTRATIONS AND ADEQUATE INFORMATION TO ATTAIN PROPER AND SAFE INSTALLATION OF THE SMOKE/FIRE DAMPER ASSEMBLY.
2.12.DUCT ACCESS DOORS
2.12.1. PROVIDE ACCESS DOORS IN DUCTWORK FOR ACCESS TO SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, VOLUME DAMPERS, HUMIDIFIERS, COILS, AND OTHER ITEMS LOCATED IN DUCTWORK REQUIRING SERVICE, OPERATION, MAINTENANCE AND/OR REPAIR.
2.12.2. FABRICATE TO SMA2CA HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE, AND AS INDICATED.
2.12.3. FABRICATION: BEIGD AND CLOSE-FITTING OF GALVANIZED STEEL WITH SEALING GASKETS AND QUICK FASTENING LOCKING DEVICES, FOR INSULATED DUCT WORK, INSTALL MINIMUM 1" (25 MM) THICK INSULATION WITH SHEET METAL COVER.
2.12.3.1. LESS THAN 12" (300 MM) SQUARE; SECURE WITH SASH LOCKS.
2.12.3.2. UP TO 18" (450 MM) SQUARE; PROVIDE TWO HINGES AND TWO SASH LOCKS.
2.12.3.3. UP TO 24" X 48" (600 X 1200 MM); THREE HINGES AND TWO COMPRESSION LATCHES WITH OUTSIDE AND INSIDE HANDLES.
2.12.4. LARGER SIZES: PROVIDE AN ADDITIONAL HINGE.
2.12.5. ACCESS DOORS WITH SHEET METAL SCREW FASTENERS ARE NOT ACCEPTABLE.
2.12.6. ACCEPTABLE MANUFACTURER: ACUDOOR, DURO-DYNE, DYN-AIR, NALOR, KRUEGER
2.13.DUCT TEST HOLES
2.13.1. PROVIDE TEST PORTS TO SUIT INTENDED APPLICATION, (IE INSULATED/UNINSULATED DUCT, ROUND/RECTANGULAR DUCT).
2.13.2. TEMPORARY TEST HOLES: CUT OR DRILL IN DUCTS AS REQUIRED. CAP WITH HEAT PATCHES, NEOPRENE PLUGS, THREEEUDS PLUGS, OR THREEEUDS WITH WOOD METAL CAPS.
2.13.3. PERMANENT TEST HOLES: FACTORY FABRICATED, AIRTIGHT FLANGED FITTINGS WITH SCREW CAP, PROVIDE EXTENDED NECK FITTINGS TO CLEAR INSULATION.
2.13.4. ACCEPTABLE MANUFACTURERS: AIR POWER CO.
2.14.FLEXIBLE DUCT CONNECTIONS
2.14.1. FABRICATE TO SMA2CA HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE, AND AS INDICATED.
2.14.2. MIL-C-20698B PARA. 4.4.3, 4.4.4 (OIL AND HYDROCARBON RESISTANCE)
2.14.3. UL CERTIFIED NFPA 701 TESTS FOR FLAME PROPAGATION OF FABRICS AND FILM.
2.14.4. 10/120 CAN/ULC-S102, ASTM E84 FLAME/SMOKE RATINGS.
2.14.5. 40F TO 250F CONTINUOUS TEMPERATURE RANGE.
2.14.6. WHITE WOVEN FIBERGLASS COLOUR
2.14.7. GALVANIZED STEEL CONFORMING TO ASTM-A-525 G 60 OR BETTER
2.14.8. ACCEPTABLE MANUFACTURERS: DURO-DYNE, DDFDC.
2.15.HANGERS AND SUPPORTS
2.15.1. FABRICATE STRAP HANGERS TO SAME MATERIAL AS DUCT, HANGER CONFIGURATION TO SMA2CA DETAILS, 20" (500 MM) IS MAXIMUM DUCT SIZE TO BE SUPPORTED BY STRAP HANGER.
2.15.2. ROD AND ANGLE HANGERS: GALVANIZED STEEL TO SMA2CA DETAILS.
2.15.3. HANGER ATTACHMENTS: MANUFACTURED CONCRETE INSERTS, EXPANSION SHIELDS AND BOLTED STEEL CLAMPS, DO NOT NAIL ROADS TO STEEL DECKS OR USE POWDER ACTUATED FASTENERS.
2.16.ACOUSTIC LINING
2.16.1. MANUFACTURER: ARMACEL, AIR-ARMATEX, SA
2.16.2. COMPLIANCE: ASTM C54, CAN/ULC-S102, ASTM E84, ULC-S102, NFPA 90A, ASTM C1534, ASTM D1034.
2.16.3. THICKNESS: 25mm (1") THICK
2.16.4. THERMAL CONDUCTIVITY: 0.245 BTU-in/hr-ft-°F @ AT 75 F [0.0353 W/mk @ 24 C]
2.16.5. PERMEABILITY: 0.05 PERM-H
2.16.6. MAXIMUM FLAME SPREAD INDEX: 25
2.16.7. MAXIMUM SMOKE DEVELOPMENT INDEX: 50
2.16.8. WATER ABSORPTION: 0.2% BY VOLUME
2.16.9. MAXIMUM SERVICE TEMPERATURE: 180 F (82 C)
2.16.10. MINIMUM SERVICE TEMPERATURE: -30 F (34 C)
2.16.11. EROSION RESISTANCE: ASTM C1071.
2.17.DUCT SEALANT
2.17.1. GENERAL: LOW VOC, WATER BASED SEALANT, NON-TOXIC, NON-COMBUSTIBLE, NON-FLAMMABLE, AND TESTED IN ACCORDANCE WITH CAN/ULC-S102, FLAME SPREAD SHALL NOT EXCEED 25 AND SMOKE DEVELOPED SHALL NOT EXCEED 50.
2.17.2. ACCEPTABLE PRODUCTS: MULTIPURPOSE DUCT SEALANT AS MANUFACTURED BY TRANS CONTINENTAL EQUIPMENT, DURO D'YNE SW6 DUCT SEALER, IRON GRIP 60 AS SUPPLIED BY ALPHA SHEET METAL CO., OR UNI-GRIP DUCT SEALER FROM UNITED MCGILL CORPORATION.
2.18.ELECTRONIC DAMPER ACTUATORS
2.18.1. MANUFACTURER, BRAND LABELED OR DISTRIBUTED BY BELIMO OR APPROVED EQUIVALENT.
2.18.2. SIZE: SIZE FOR TORQUE REQUIRED FOR DAMPER SEAL AT LOAD CONDITIONS.
2.18.3. COUPLING: V-BOLT DIAL NUT CLAMP WITH A V-SHAPED, TOOTHED CRADLE.
2.18.4. MOUNTING:ACTUATORS SHALL BE CAPABLE OF BEING MECHANICALLY AND ELECTRICALLY PARALLELED TO INCREASE TORQUE IF REQUIRED.
2.18.5. OVERLOAD PROTECTION: ELECTRONIC OVERLOAD OR DIGITAL ROTATION-SENSING CIRCUITRY WITHOUT THE USE OF END SWITCHES TO PREVENT ANY DAMAGE TO THE ACTUATOR DURING A STALL CONDITION.
2.18.6. FAIL-SAFE OPERATION: MECHANICAL, SPRING-RETURN MECHANISM.
2.18.7. POWER REQUIREMENTS (SPRING RETURN): 120 V AC, MAXIMUM 10 VA AT 24-V AC OR 8 W AT 24-V DC.
2.18.8. PROPORTIONAL ACTUATORS SHALL BE FULLY PROGRAMMABLE, CONTROL INPUT, POSITION FEEDBACK AND RUNNING TIME SHALL BE FACTORY OR FIELD PROGRAMMABLE BY USE OF EXTERNAL COMPUTER SOFTWARE. DIAGNOSTIC FEEDBACK SHALL PROVIDE INDICATIONS OF HUNTING OR OSCILLATION, MECHANICAL OVERLOAD AND MECHANICAL TRAVEL. PROGRAMMING SHALL BE THROUGH AN EEPROM WITHOUT THE USE OF ACTUATOR MOUNTED SWITCHES.
2.18.9. TEMPERATURE RATING: -22 TO +122F [-30 TO +50°C]
2.18.10. HOUSING: MINIMUM REQUIREMENT NEMA TYPE 2 MOUNTED IN ANY ORIENTATION.
2.18.11. AGENCY LISTING: ISO 9001, CULUS, AND CSA C22.2 NO. 24-93.
2.18.12. THE MANUFACTURER SHALL WARRANT ALL COMPONENTS FOR A PERIOD OF 5 YEARS FROM THE DATE OF PRODUCTION, WITH THE FIRST TWO YEARS UNCONDITIONAL.

- 3. TESTING, ADJUSTING, BALANCING
3.1. PREPARATION
3.1.1. PROVIDE INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS, MAKE INSTRUMENTS AVAILABLE TO CONSULTANT TO FACILITATE SPOT CHECKS DURING TESTING.
3.1.2. PROVIDE ADDITIONAL BALANCING DEVICES AS REQUIRED.
3.2. INSTALLATION TOLERANCES
3.2.1. AIR HANDLING UNITS: COOLING, HEATING CAPACITIES, AND EFFICIENCIES ARE AHRF CERTIFIED WITH SCOPE OF AHRF STANDARD (F) AND AHSZ121.47 AND 10 CFR PART 431 PERTAINING TO COMMERCIAL WARM AIR FURNACES.
3.2.2. AIR OUTLETS AND INLETS: ADJUST TOTAL TO WITHIN PLUS 5 PERCENT AND MINUS 5 PERCENT OF DESIGN TO SPACE. ADJUST OUTLETS AND INLETS IN SPACE TO WITHIN PLUS OR MINUS 5 PERCENT OF DESIGN.
3.2.3. HYDRONIC SYSTEMS: ADJUST TO WITHIN PLUS OR MINUS 10 PERCENT OF DESIGN.
3.2.4. ROOM PRESSURIZATION: ADJUST TO WITHIN PLUS 20 PERCENT AND MINUS 0 PERCENT OF DESIGN FOR ROOMS UNDER POSITIVE PRESSURE AND WITHIN PLUS 0 PERCENT AND MINUS 20 PERCENT OF DESIGN FOR ROOMS UNDER NEGATIVE PRESSURE.

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- 3.3. ADJUSTING
3.3.1. ENSURE RECORDED DATA REPRESENTS ACTUAL MEASURED OR OBSERVED CONDITIONS.
3.3.2. PERMANENTLY MARK SETTINGS OF VALVES, DAMPERS, AND OTHER ADJUSTMENT DEVICES ALLOWING SETTINGS TO BE RESTORED, SET AND LOCK MEMORY STOPS.
3.3.3. AFTER ADJUSTMENT, TAKE MEASUREMENTS TO VERIFY BALANCE HAS NOT BEEN DISRUPTED OR THAT SUCH DISRUPTION HAS BEEN RECTIFIED.
3.3.4. LEAVE SYSTEMS IN PROPER WORKING ORDER, REPLACING BELT GUARDS, CLOSING ACCESS DOORS, CLOSING DOORS TO ELECTRICAL SWITCH BOXES, AND RESTORING THERMOSTATS TO SPECIFIED SETTINGS.
3.3.5. AT FINAL INSPECTION, RECHECK RANDOM SELECTIONS OF DATA RECORDED IN REPORT. RECHECK POINTS OR AREAS AS SELECTED AND WITNESSED BY THE OWNER.
3.3.6. CHECK AND ADJUST SYSTEMS APPROXIMATELY SIX MONTHS AFTER FINAL ACCEPTANCE AND SUBMIT REPORT.
3.4. AIR SYSTEM PROCEDURE

- 4.1. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO PROVIDE REQUIRED OR DESIGN SUPPLY, RETURN, AND EXHAUST AIR QUANTITIES AT SITE ALTITUDE.
4.2. MAKE AIR QUANTITY MEASUREMENTS IN DUCTS BY PILOT TUBE TRAVERSE OF ENTIRE CROSS-SECTIONAL AREA OF DUCT.
4.3. MEASURE AIR QUANTITIES AT AIR INLETS AND OUTLETS.
4.4. ADJUST DISTRIBUTION SYSTEM TO OBTAIN UNIFORM SPACE TEMPERATURES FREE FROM OBJECTIONABLE DRAFTS AND NOISE.
4.5. USE BRANCH VOLUME CONTROL DAMPERS AND SPLITTERS TO REGULATE AIR QUANTITIES. DEVICES AT AIR OUTLETS MAY BE USED ONLY TO THE EXTENT THAT ADJUSTMENTS DO NOT CREATE OBJECTIONABLE AIR MOTION OR SOUND LEVELS.
4.6. VARY TOTAL SYSTEM AIR QUANTITIES BY ADJUSTMENT OF FAN SPEEDS, ADJUST AIRFLOW TO DESIGN QUANTITY, PROVIDE DRIVE CHANGES AS REQUIRED, MAKE ALLOWANCES FOR LOADING OF FILTERS TO 50% OF MANUFACTURERS' RECOMMENDATIONS FOR FINAL PRESSURE AT FANS WITH FIXED SPEED DRIVES AND TO 100% OF MANUFACTURERS' RECOMMENDATIONS FOR FINAL PRESSURE AT FANS WITH VARIABLE SPEED DRIVES.
4.7. PROVIDE SYSTEM SCHEMATIC WITH REQUIRED AND ACTUAL AIR QUANTITIES RECORDED AT EACH OUTLET OR INLET.
4.8. MEASURE STATIC AIR PRESSURE CONDITIONS ON AIR SUPPLY UNITS, INCLUDING FILTERED AND COIL PRESSURE DROPS, AND TOTAL PRESSURE ACROSS THE FAN.
4.9. ADJUST SYSTEM AIR AUTOMATIC DAMPERS, OUTSIDE AIR, RETURN AIR, AND EXHAUST DAMPERS FOR DESIGN CONDITION. HANGERS CAN BE MADE TO IDENTIFY SITUATIONS WHERE FAILT/FERORS OCCUR.
4.10. MEASURE TEMPERATURE CONDITIONS ACROSS OUTSIDE AIR, RETURN AIR, AND EXHAUST DAMPERS TO CHECK LEAKAGE.
4.11. WHERE MODULATING DAMPERS ARE PROVIDED, TAKE MEASUREMENTS AND BALANCE AT EXTREME CONDITIONS. BALANCE VARIABLE VOLUME SYSTEMS AT MAXIMUM AIR FLOW RATE, FULL COOLING, AND AT MINIMUM AIR FLOW RATE, FULL HEATING.
4.12. MEASURE BUILDING STATIC PRESSURE AND ADJUST SUPPLY, RETURN, AND EXHAUST AIR SYSTEMS TO PROVIDE REQUIRED RELATIONSHIP BETWEEN EACH TO MAINTAIN APPROXIMATELY 0.05 IN.W.G. (0.5 PA) POSITIVE STATIC PRESSURE NEAR THE BUILDING ENTRIES.
4.13. CHECK MULTI-ZONE UNITS FOR MOTORIZED DAMPER LEAKAGE, ADJUST AIR QUANTITIES WITH MIXING DAMPERS SET FIRST FOR COOLING, THEN HEATING, THEN MODULATING.
4.14. FOR VARIABLE AIR VOLUME SYSTEM POWERED UNITS SET VOLUME CONTROLLER TO AIR FLOW SETTING INDICATED. CONFIRM CONNECTIONS THROUGHOUT THE SYSTEM AND CONFIRM PROPER OPERATION FOR AUTOMATIC VARIABLE AIR VOLUME TEMPERATURE CONTROL.
4.15. ON FAN POWERED VAV BOXES, ADJUST AIR FLOW SWITCHES FOR PROPER OPERATION.
3.5. WATER SYSTEM PROCEDURE
3.5.1. ADJUST WATER SYSTEMS TO PROVIDE REQUIRED OR DESIGN QUANTITIES.
3.5.2. USE CALIBRATED VENTURI TUBES, ORIFICES, OR OTHER METERED FITTINGS AND PRESSURE GAUGES TO DETERMINE FLOW RATES FOR SYSTEM BALANCE, WHERE FLOW METERING DEVICES ARE NOT INSTALLED. BALANCE FLOW BALANCE ON TEMPERATURE DIFFERENCE ACROSS VARIOUS HEAT TRANSFER ELEMENTS IN THE SYSTEM.
3.5.3. ADJUST SYSTEMS TO PROVIDE SPECIFIED PRESSURE DROPS AND FLOWS THROUGH HEAT TRANSFER ELEMENTS PRIOR TO THERMAL TESTING. PERFORM BALANCING BY MEASUREMENT OF TEMPERATURE DIFFERENTIAL IN CONJUNCTION WITH AIR BALANCING.
3.5.4. EFFECT SYSTEM BALANCE WITH AUTOMATIC CONTROL VALVES FULLY OPEN TO HEAT TRANSFER ELEMENTS.
3.5.5. EFFECT ADJUSTMENT OF WATER DISTRIBUTION SYSTEMS BY MEANS OF BALANCING COCKS, VALVES, AND FITTINGS, DO NOT USE SERVICE OR SHUT-OFF VALVES FOR BALANCING UNLESS INDEXED FOR BALANCE POINT.
3.5.6. WHERE AVAILABLE PUMP CAPACITY IS LESS THAN TOTAL FLOW REQUIREMENTS OR INDIVIDUAL FLOW PARTS, FULL FLOW IN ONE PART MAY BE SIMULATED BY TEMPORARY RESTRICTION OF FLOW TO OTHER PARTS.
4. HVAC FANS
4.1. DIRECT DRIVE PREMIUM CEILING MOUNTED CENTRIFUGAL EXHAUST FANS
4.1.1. GENERAL DESCRIPTION: BASE FAN PERFORMANCE AT STANDARD CONDITIONS [DENSITY 0.075 LB/FT³], MAXIMUM OPERATING TEMPERATURES IS 130 FAHRENHEIT (54.4 CELSIUS), ULC LISTED FOR ABOVE BATHUB EXHAUST, ULC/UL LISTED 507, CEILING FANS, EACH FAN SHALL BEAR A PERMANENTLY AFFIXED MANUFACTURERS NAMEPLATE CONTAINING THE MODEL NUMBER AND INDIVIDUAL SERIAL NUMBER.
4.1.2. WHEEL: FORWARD CURVED CENTRIFUGAL WHEEL CONSTRUCTED OF GALVANIZED STEEL OR CALCIUM CARBONATE FILLED POLYPROPYLENE STATICALLY AND DYNAMICALLY BALANCED IN ACCORDANCE TO IANCA STANDARD 204-05.
4.1.3. MOTORS: MOTOR ENCLOSURES SHALL BE OPEN DRIPPROOF (ODP), OPENING IN THE FRAME BODY AND OR END BRACKETS, MOTORS ARE PERMANENTLY LUBRICATED SLEEVE BEARING TYPE TO MATCH WITH THE FAN LOAD AND FURNISHED AT THE SPECIFIC VOLTAGE AND PHASE. MOTOR SHALL BE MOUNTED ON VIBRATION ISOLATORS AND BE ACCESSIBLE FOR MAINTENANCE C/W THERMAL OVERLOAD PROTECTION.
4.1.4. HOUSING: CONSTRUCTED OF HEAVY GAUGE GALVANIZED STEEL, INTERIOR SHALL BE LINED WITH 4.0 INCHES OF ACOUSTICAL INSULATION C/W SPRING LOADED ALUMINUM BACKDRAFT DAMPER.
4.1.5. OUTLET: TYPE OF OUTLET: [SQUARE] [ROUND], FIELD ROTATABL FROM HORIZONTAL TO VERTICAL DISCHARGE, DUCT COLLAR SHALL INCLUDE AN ALUMINUM BACKDRAFT DAMPER.
4.1.6. GRILLE: TYPES: [DESIGNE] [DECORATIVE] [ALUMINUM] [STAINLESS STEEL] CONSTRUCTED OF HIGH IMPACT POLYESTER OR FOR SIZES 50 THROUGH 390, PLASTIC SHALL BE FACTORY STANDARD ON UNIT UNDER 390 CONSTRUCTED OF ALUMINUM NON-YELLOWING FOR UNIT OVER 1550, ALUMINUM SHALL BE FACTORY STANDARD ON UNITS OVER 410.
4.1.7. EXTERNAL ELECTRICAL ACCESS THAT ELIMINATES REMOVING THE MOTOR PACK WHICH SAVES TIME ON INSTALLATION.
4.1.8. MOUNTING BRACKETS: FULLY ADJUSTABLE FOR MULTIPLE INSTALLATION CONDITIONS
4.1.9. OPTIONS/ACCESSORIES:
4.1.9.1. CEILING RADIATION DAMPER: UL CLASSIFIED AND SHALL BE RATED FOR THREE TO FOUR HOURS FIRE RESISTANCE, MOUNTED DIRECTLY BEHATH THE FAN, NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), STANDARD 90A, REQUIRES THE OPENING IN FIRE RATED CEILING/FLOORS MUST BE PROTECTED BY RATED CRO'S
4.1.9.2. DISCONNECT SWITCHES: NEMA RATED; [1] [MS-146] POSITIVE ELECTRICAL SHUT-OFF, WIRED FROM FAN MOTOR TO JUNCTION BOX INSTALLED WITHIN MOTOR COMPARTMENT. ACCESS FOR WIRING SHALL BE EXTERNAL.
4.1.9.3. GRILLE FILTER: WASHABLE ALUMINUM MESH FILTER THAT GOES BETWEEN FAN AND GRILLE, REDUCES SOUND LEVELS, TRAPS DIRT BEFORE ENTERING THE FAN.
4.1.9.4. LIGHTS: [ENS TYPE: [PRISMATIC] (SPROT), LAMP TYPE: [COMPACT FLUORESCENT] [INCANDESCENT].
4.1.9.5. MOTION DETECTORS: MOUNTED LOCATION: [WALL] [CEILING], INFRARED MOTION DETECTOR SHALL AUTOMATICALLY TURN ON THE FAN WHEN THERE IS A CHANGE IN TEMPERATURE, VIEWING AREA OF 180 DEGREES, ADJUSTABLE TIME DELAY SHUTOFF SETTING OF 1 TO 20 MINUTES.
4.1.9.6. SPEED CONTROLS: CONTROLS THE FANS OUTPUT, FAN CAN BE ADJUSTED TO 40 PERCENT OF FULL SPEED, CAN BE USED TO OPERATE MORE THAN ON FAN AT A TIME.
4.1.9.7. TIME DELAY SWITCH: SAVE ENERGY BY AUTOMATICALLY TURNING OFF THE FAN, ON A DELAY OF 1 TO 60 MINUTES AFTER THE LIGHT ON FAN HAS BEEN TURNED OFF.
4.1.9.8. TEMPERATURE RATING: [-120] [-4.3] [14.5] [18.6], AVAILABLE FOR APPLICATIONS REQUIRING VOLTAGE REDUCTION, SHIPPED LOOSE.
4.1.9.9. WALL DISCHARGE: [ROUND CONNECTION, HOODED WALL CAP MODEL WC] [SQUARE/RECTANGULAR CONNECTION, HOODED WALL CAP MODEL WC] [WALL LOUVERED DISCHARGE, MODEL WL] [BACK VENT, MODEL BE] [ROUND DUCT CONNECTION, MODEL RDC] [TRANSITION DUCT REDUCER, MODEL TR 6X4]
4.1.9.10. ROOF DISCHARGE: [PITCHED ROOF CAP, MODEL RJ] [ELOW DISCHARGE WITH GRILLE, MODEL E]
4.1.9.11. FLAT ROOF CAPS: [MODEL RCC-7] [MODEL GRS] [MODEL RFC-7] [MODEL GFS]
4.1.9.12. VIBRATION KIT: INCLUDES PREPUNCHED HOLE FOR EASE OF INSTALLATION AND SHALL HAVE ALL HARDWARE TO MOUNT ONE UNIT.
3. PACKAGED ROOFTOP UNIT (GAS-FIRED HEAT) [TRAINE]

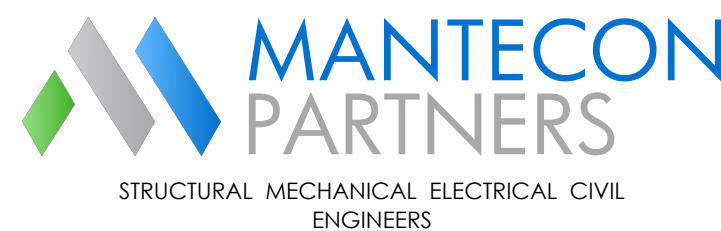
- 5.1. PACKAGED ROOFTOP UNITS: COOLING, HEATING CAPACITIES, AND EFFICIENCIES ARE AHRF CERTIFIED WITH SCOPE OF AHRF STANDARD (F) AND AHSZ121.47 AND 10 CFR PART 431 PERTAINING TO COMMERCIAL WARM AIR FURNACES.
5.2. FACTORY ASSEMBLED, INTERNALLY WELDED, FULLY CHARGED WITH R-410A, AND 100 PERCENT RIN TESTED TO CHECK COOLING OPERATION, FAN AND BLOWER ROTATION, AND CONTROL SEQUENCE BEFORE LEAVING THE FACTORY.
5.3. CASING:ZINC COATED, HEAVY GAUGE, GALVANIZED STEEL, WEATHER-RESISTANT BLACK ENAMEL FINISH ON PHOSPHATED EXTERIOR SURFACES MEETS ASTM B117, 672-INCH SHUT SPRAY TEST, REMOVABLE SINGLE SIDE UNDER POSITIVE PRESSURE AND WITHIN PLUS 0 PERCENT AND MINUS 20 PERCENT OF DESIGN FOR ROOMS UNDER NEGATIVE PRESSURE.

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- WATER AND AIRTIGHT SEAL EXPOSED VERTICAL PANELS AND TOP COVERS IN THE INDOOR AIR SECTION SHALL BE INSULATED WITH A 1/2-INCH, 1-POUND DENSITY FOIL-FACED, FIRE-RESISTANT, PERMANENT, ODORLESS, GLASS FIBER MATERIAL. BASE OF UNIT SHALL BE INSULATED WITH 1/2-INCH, 1-POUND DENSITY, FOIL-FACED, GLASS FIBER MATERIAL. BASE PAN SHALL HAVE NO PENETRATIONS WITHIN THE PERIMETER OF THE CURB OTHER THAN THE RASSED 1 7/8-INCH HIGH DOWNFLOW SUPPLY/RETURN OPENINGS TO PROVIDE AN ADDED WATER INTEGRITY PROTECTION. IF THE CONDENSATE DRAIN BACKS UP, DOWNFLOW UNITS BASE PAN SHALL HAVE NO PENETRATIONS WITHIN THE PERIMETER OF THE CURB OTHER THAN THE RASSED 1 7/8-INCH HIGH SUPPLY/RETURN OPENINGS TO PROVIDE AN ADDED WATER INTEGRITY PROTECTION. IF THE CONDENSATE DRAIN BACKS UP, BASE OF UNIT SHALL HAVE PROVISIONS FOR FORKLIFT AND CRANE LIFTING.
5.4. COMPRESSORS: DIRECT-DRIVE, HERMETIC, SCROLL TYPE COMPRESSORS WITH CENTRIFUGAL TYPE OIL PUMPS, C/W SUCTION GAS-COOLED MOTOR WITH VOLTAGE UTILIZATION RANGE OF PLUS OR MINUS 10 PERCENT OF UNIT NAMEPLATE VOLTAGE. INTERNAL OVERLOADS STANDARD WITH SCROLL TYPE COMPRESSORS. ALL MODELS HAVE PHASE MONITORS AND LOW- AND HIGH-PRESSURE CONTROLS AS STANDARD.
5.5. DISCHARGE LINE THERMOSTAT: A BI-METAL ELEMENT DISCHARGE LINE THERMOSTAT IS INSTALLED AS A STANDARD OPTION ON THE DISCHARGE LINE OF EACH SYSTEM AND PROVIDES EXTRA PROTECTION TO THE COMPRESSORS AGAINST HIGH DISCHARGE TEMPERATURES IN CASE OF LOSS OF CHARGE. EXTREMELY HIGH AMBIENT AND OTHER CONDITIONS WHICH COULD DRIVE THE DISCHARGE TEMPERATURE HIGHER, WIRED IN SERIES WITH HIGH PRESSURE CONTROL. WHEN DISCHARGE TEMPERATURE RISES ABOVE THE PROTECTION LIMIT, THE BI-METAL DISC IN THE THERMOSTAT SWITCHES TO THE OFF POSITION, OPENING THE 24 VAC CIRCUIT WHEN TEMPERATURE ON THE DISCHARGE LINE COOLS DOWN, THE BI-METAL DISC CLOSES THE CONTACTOR CIRCUIT, PROVIDING POWER TO THE COMPRESSOR.
5.6. EVAPORATOR AND CONDENSER COILS: MICROCHANNEL COILS BUILT TEST BY MANUFACTURER, MICROCHANNEL CONDENSER COILS STANDARD ON ALL UNITS, COILS LEAK TESTED TO ENSURE THE PRESSURE INTEGRITY, EVAPORATOR COIL AND CONDENSER COIL LEAK TESTED TO 225 PSIG AND PRESSURE TESTED TO 450 PSIG. SLOPED CONDENSATE DRAIN PANS ARE STANDARD.
5.7. FILTERS: 2" STANDARD FACTORY SUPPLIED.
5.8. GAS HEAT SECTION: PROGRESSIVE TUBULAR HEAT EXCHANGER, STAINLESS STEEL BURNERS AND CORROSION RESISTANT STEEL, INDUCED DRAFT COMBUSTION BLOWER SHALL BE USED TO PULL THE COMBUSTION PRODUCTS THROUGH THE FIRING TUBES, DIRECT SPARK IGNITION (DSI) SYSTEM, ON INITIAL CALL FOR HEAT, THE COMBUSTION BLOWER SHALL PURGE THE HEAT EXCHANGER FOR 20 SECONDS BEFORE IGNITION, AFTER SUCCESSFUL IGNITION ATTEMPTS, ENTIRE HEATING SYSTEM SHALL BE LOCKED OUT UNTIL MANUALLY RESET AT THE THERMOSTAT/ZONE SENSOR, SUITABLE FOR USE WITH NATURAL GAS OR PROPANE (FIELD-INSTALLED KIT).
5.9. INDOOR FAN: BELT DRIVEN, FC CENTRIFUGAL FANS WITH ADJUSTABLE MOTOR SHEAVES, MOTORS THERMALLY PROTECTED, AVAILABLE FOR HIGH STATIC APPLICATION, INDOOR FAN MOTORS MEET THE U.S. ENERGY POLICY ACT OF 1992 (EPA/C1).
5.10. LOCKING SAFETY DEVICE: PRESSURE SWITCH MONITORING ALLOWS FOR LOCKOUT IN A SITUATION WHERE THE SWITCH IS OPENED, BY MONITORING THE Y INPUT AS WELL AS THE PRESSURE SWITCHES. FOR DESIGN CONDITION HANGERS CAN BE MADE TO IDENTIFY SITUATIONS WHERE FAILT/FERORS OCCUR.
5.11. OUTDOOR FANS: EXTERNALLY DRIVE, STATICALLY AND DYNAMICALLY BALANCED, DRAIN-THROUGH IN THE VERTICAL DISCHARGE POSITION. FAN MOTOR(S) SHALL BE PERMANENTLY LUBRICATED AND SHALL HAVE CURRENT OVERLOAD PROTECTION.
5.12. REFRIGERANT CIRCUITS: EACH REFRIGERANT CIRCUIT SHALL HAVE A FIXED ORIFICE, SERVICE PRESSURE POINTS, AND REFRIGERANT LINE FILTER DREGS FACTORY INSTALLED AS STANDARD, AN AREA SHALL BE PROVIDED FOR REPLACEMENT SUCION LINE DREGS.
5.13. REFRIGERANT PRESSURE CONTROL: HIGH- AND LOW-PRESSURE CUTOUTS AS STANDARD.
5.14. UNIT TOP: DOUBLE HEMMED AND GASKET SEALED TO PREVENT WATER LEAKAGE.
5.15. MULTI-SPEED FAN SYSTEM: INCORPORATES A MULTI-SPEED FAN CONTROL TO CHANGE THE SPEED OF THE FAN TO 70% OF FULL FLOW BASED OFF OF COMPRESSOR STAGES.
5.16. CONDENSATE OVERFLO SWITCH: THIS OPTION SHALL SHUT THE UNIT DOWN IN THE EVENT THAT A CLOGGED CONDENSATE DRAIN LINE PREVENTS PROPER CONDENSATE REMOVAL FROM THE UNIT.
5.17. [DEMAND CONTROL VENTILATION WITH CO2 SENSOR: CO2 SENSOR SHALL HAVE THE ABILITY TO MONITOR THE CONCENTRATION (PARTS PER MILLION, PPM) OF CO2 (CARBON DIOXIDE) IN THE ROOM. IF CONCENTRATION CHANGES, THE OUTDOOR AIR DAMPER MODULATES TO MEET THE CURRENT VENTILATION NEEDS OF THE ZONE].
5.18. [ECONOMIZER (STANDARD) - DOWNFLOW: ASSEMBLY INCLUDES FULLY MODULATING 0-100% MOTOR AND DAMPERS, BAROMETRIC RELIEF, MINIMUM POSITION SETTING, PRESET LEAKAGE, WIRING HARNESS WITH FUSED, FUSED DRY BULB AND SPRING RETURN ACTUATOR, BAROMETRIC RELIEF DAMPER SHALL PROVIDE A PRESSURE OPERATED DAMPER THAT SHALL BE GRAVITY CLOSING AND SHALL PROHIBIT ENTRANCE OF OUTSIDE AIR DURING THE EQUIPMENT "OFF" CYCLE].
5.19. [ELECTRIC HEATERS: ELECTRIC HEAT MODULES SHALL BE AVAILABLE FOR INSTALLATION WITHIN THE BASIC UNIT, ELEMENTS CONSTRUCTED OF HEAVY-DUTY NICKEL CHROMIUM ELEMENTS INTERNALLY DELTA CONNECTED FOR 240-VOLT, WYE CONNECTED FOR VOLT, POWER ASSEMBLIES SHALL PROVIDE SINGLE POINT CONNECTION. ELECTRIC HEAT MODULES SHALL BE UL LISTED OR CSA CERTIFIED, IF ORDERING THE THROUGH THE BASE ELECTRICAL OPTION WITH AN ELECTRIC HEATER, THE HEATER MUST BE FACTORY INSTALLED].
5.20. HAIL GUARDS: TOOL-LESS, HAIL PROTECTION QUALITY COIL GUARDS ARE AVAILABLE FOR CONDENSER COIL PROTECTION.
5.21. [LOW LEAK ECONOMIZER WITH FAULT DETECTION & DIAGNOSTICS - DOWNFLOW: CONTROLLER SHALL HAVE THE CAPABILITY TO PROVIDE THE VALUE OF EACH SENSOR USED IN CONTROLLING THE ECONOMIZER OPERATION, SYSTEM STATUS IS ALSO INDICATED FOR THE FOLLOWING CONDITIONS: FREE COOLING AVAILABLE, ECONOMIZER ENABLED, COMPRESSOR ENABLED, HEATING ENABLED, MIXED AIR, LOW LIMIT CYCLE ACTIVE, FAULT DETECTION AND DIAGNOSTIC SYSTEM DETECTS THE FOLLOWING FAULTS: AIR TEMPERATURE SENSOR FAILURE/FAULT, NOT ECONOMIZING WHEN CONDITIONS INDICATE SYSTEM SHOULD NOT BE ECONOMIZING, DAMPERS ARE NOT MODULATING, EXCESSIVE AMOUNTS OF OUTSIDE AIR ARE BEING INTRODUCED THROUGH THE ECONOMIZER, FAULT DETECTION AND DIAGNOSTIC SYSTEM IS CERTIFIED BY THE CALIFORNIA ENERGY COMMISSION AS MEETING REQUIREMENTS OF CALIFORNIA TITLE 24 (2020)]
5.22. MOTORIZED OUTSIDE AIR DAMPER: MANUALLY SET OUTDOOR AIR DAMPERS SHALL PROVIDE UP TO 50% OUTSIDE AIR, OUTDOOR AIR DAMPERS SHALL OPEN TO SET POSITION WHEN INDOOR FAN STARTS, DAMPER SHALL CLOSE TO THE FULL CLOSED POSITION WHEN INDOOR FAN SHUTS DOWN.
5.23. OVERSIZED MOTORS SHALL BE AVAILABLE FOR HIGH STATIC APPLICATIONS.
5.24. POWERED EXHAUST: PROVIDE EXHAUST OF RETURN AIR, WHEN USING AN ECONOMIZER, TO MAINTAIN BETTER BUILDING PRESSURIZATION.
5.25. [REFERENCE OR COMPARATIVE ENTHALPY: USED TO MEASURE AND COMMUNICATE OUTDOOR HUMIDITY, UNIT RECEIVES AND USES THIS INFORMATION TO PROVIDE IMPROVED COMFORT COOLING WHILE USING THE ECONOMIZER, COMPARATIVE ENTHALPY MEASURES AND COMMUNICATES HUMIDITY FOR BOTH OUTDOOR AND RETURN AIR CONDITIONS, AND RETURN AIR TEMPERATURE. UNIT RECEIVES AND USES THIS INFORMATION TO MAXIMIZE USE OF ECONOMIZER COOLING, AND TO PROVIDE MAXIMUM OCCUPANT COMFORT CONTROL, REFERENCE OR COMPARATIVE ENTHALPY OPTION SHALL BE AVAILABLE WHEN A FACTORY OR FIELD INSTALLED DOWNFLOW ECONOMIZER IS ORDERED].
5.26. THROUGH THE BASE GAS PIPING: UNIT



PROJECT NORTH



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SCALE

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NO.	ISSUED	DATE	BY
1	ISSUED FOR TENDER	2024-10-09	J.S.
2	ISSUED FOR PERMIT	2024-09-26	J.C.
3	ISSUED FOR PERMIT	2024-07-26	J.S.
4	ISSUED FOR PERMIT	2024-07-26	J.S.
5	ISSUED FOR PERMIT	2024-07-26	J.S.
6	ISSUED FOR PERMIT	2024-07-26	J.S.
7	ISSUED FOR PERMIT	2024-07-26	J.S.
8	ISSUED FOR PERMIT	2024-07-26	J.S.
9	ISSUED FOR PERMIT	2024-07-26	J.S.
10	ISSUED FOR PERMIT	2024-07-26	J.S.
11	ISSUED FOR PERMIT	2024-07-26	J.S.
12	ISSUED FOR PERMIT	2024-07-26	J.S.
13	ISSUED FOR PERMIT	2024-07-26	J.S.
14	ISSUED FOR PERMIT	2024-07-26	J.S.
15	ISSUED FOR PERMIT	2024-07-26	J.S.
16	ISSUED FOR PERMIT	2024-07-26	J.S.
17	ISSUED FOR PERMIT	2024-07-26	J.S.
18	ISSUED FOR PERMIT	2024-07-26	J.S.
19	ISSUED FOR PERMIT	2024-07-26	J.S.
20	ISSUED FOR PERMIT	2024-07-26	J.S.
21	ISSUED FOR PERMIT	2024-07-26	J.S.
22	ISSUED FOR PERMIT	2024-07-26	J.S.
23	ISSUED FOR PERMIT	2024-07-26	J.S.
24	ISSUED FOR PERMIT	2024-07-26	J.S.
25	ISSUED FOR PERMIT	2024-07-26	J.S.
26	ISSUED FOR PERMIT	2024-07-26	J.S.
27	ISSUED FOR PERMIT	2024-07-26	J.S.
28	ISSUED FOR PERMIT	2024-07-26	J.S.
29	ISSUED FOR PERMIT	2024-07-26	J.S.
30	ISSUED FOR PERMIT	2024-07-26	J.S.

WORKSHOP ARCHITECTURE

CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE: SPECIFICATIONS

DRAWN BY:
J.S.

CHECKED BY:
J.L.

DATE:
NOV 2022

PROJECT NUMBER:
22-058

SCALE:
AS NOTED

DRAWING NUMBER:

MO.4

PLUMBING SPECIFICATIONS 22-058

- PLUMBING PIPING - GENERAL:
 - VERIFY THAT EXCAVATIONS ARE TO REQUIRED GRADE, DRY, AND NOT OVER EXCAVATED.
 - REAM PIPE AND TUBE ENDS, REMOVE BURRS, REFLUY PLAN END FERROUS PIPE, REMOVE SCALE AND DIRT, ON INSIDE AND OUTSIDE, BEFORE ASSEMBLY. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES OR UNIONS.
 - PROVIDE NON-CONDUCTING DIELECTRIC CONNECTIONS WHEREVER JOINTING DISSIMILAR METALS.
 - PROVIDE ACCESS WHERE VALVES AND FITTINGS ARE NOT EXPOSED. COORDINATE SIZE AND LOCATION OF ACCESS DOORS WITH GENERAL TRADES.
 - INSTALL VENT PIPING PENETRATING ROOFED AREAS TO MAINTAIN INTEGRITY OF ROOF ASSEMBLY
 - SUPPORT VERTICAL PIPING AT EVERY OTHER FLOOR. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING
 - PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS LOCATED IN CRAWL SPACES, PIPE SHAFTS, AND SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.
 - SUPPORT CAST IRON DRAINAGE PIPING AT EVERY JOINT.
 - DO HYDROSTATIC TESTING PRIOR TO BACKFLUSHING OVER JOINTS
 - 1.10. INSPECT NEW AND ALTERED WATER DISTRIBUTION PIPING.
 - 1.11. VERIFY THAT PIPING SYSTEM IS COMPLETE AND HAS BEEN FLUSHED, CLEANED, INSPECTED, AND PRESSURE TESTED.
 - ISOLATE EXISTING PIPING TO FULL EXTENT POSSIBLE. ENSURE THAT FIXTURES, EXISTING AND NEW THAT ARE SERVED FROM PIPING BEING DISINFECTED, ARE TAKEN OUT OF SERVICE AND SIGNS ARE PLACED AT EACH FIXTURE PROHIBITING USE DURING THE DISINFECTION PERIOD.
 - 1.13. INSURE PH OF WATER TO BE TREATED IS BETWEEN 7.4 AND 7.6 BY ADDING ALKALI (CALCULIC SODA OR SODA ASH) OR ACID (HYDROCHLORIC). INJECT DISINFECTANT, FREE CHLORINE IN LIQUID, POWDER, TABLET OR GAS FORM, THROUGHOUT SYSTEM TO OBTAIN 50 TO 80 MG/L RESIDUAL.
 - SANITARY SEWER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING
 - CAST IRON PIPE: ASTM A74 EXTRA HEAVY WEIGHT, FITTINGS: CAST IRON, JOINTS: HUB-AND-SPIGOT, CISPI HSN COMPRESSION TYPE WITH ASTM C564 NEOPRENE GASKETS
 - CAST IRON PIPE: CSIP 301, HUBLESS, FITTINGS: CAST IRON, JOINTS: CISPI 310, NEOPRENE GASKET AND STAINLESS STEEL CLAMP AND SHIELD ASSEMBLIES
 - COPPER TUBE: ASTM B306, DWV, FITTINGS: ASME B16.23, CAST BRONZE, OR ASME B16.29, WROUGHT COPPER, OR ASME B16.32, SOLDER, GRADE 50B.
 - ABS PIPE: ASTM D2751 OR ASTM D298, FITTINGS: ABS, JOINTS: ASTM D2235, SOLVENT WELD.
 - ABS PIPE: ASTM D2641 OR ASTM D7291, FITTINGS: ABS, JOINTS: ASTM D2235, SOLVENT WELD.
 - PVC PIPE: ASTM D2665 OR ASTM D3034, FITTINGS: PVC, JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.
 - PVC PIPE: ASTM D2665, ASTM D3034, OR ASTM F679, FITTINGS: PVC, JOINTS: ASTM F477, ELASTOMERIC GASKETS.
- SANITARY SEWER PIPING, ABOVE GRADE
 - CAST IRON PIPE: ASTM A74, SERVICE WEIGHT, FITTINGS: CAST IRON, JOINTS: ASTM C564, NEOPRENE GASKET SYSTEM
 - CAST IRON PIPE: CSIP 301, HUBLESS, SERVICE WEIGHT, FITTINGS: CAST IRON, JOINTS: CISPI 310, NEOPRENE GASKETS AND STAINLESS STEEL CLAMP AND SHIELD ASSEMBLIES
 - COPPER TUBE: ASTM B306, DWV, FITTINGS: ASME B16.23, CAST BRONZE, OR ASME B16.29, WROUGHT COPPER, OR ASME B16.32, SOV.ENT. JOINTS: ASTM B32, SOLDER, GRADE 50B.
 - SANITARY SEWER PIPING, ABOVE GRADE (URINALS ONLY)
 - COPPER TUBING: ASTM B88M, TYPE K, HARD DRAWN FITTINGS: ASME B18.18 CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE, JOINTS: ASTM B32, SOLDER, GRADE 95TA.
 - SANITARY VENT PIPING, BURIED
 - CAST IRON PIPE: ASTM A74 EXTRA HEAVY WEIGHT, FITTINGS: CAST IRON, JOINTS: HUB-AND-SPIGOT, CISPI HSN COMPRESSION TYPE WITH ASTM C564 NEOPRENE GASKETS OR LEAD AND OAKUM.
 - CAST IRON PIPE: CSIP 301, HUBLESS, FITTINGS: CAST IRON, JOINTS: CISPI 310, NEOPRENE GASKET AND STAINLESS STEEL CLAMP AND SHIELD ASSEMBLIES
 - COPPER TUBE: ASTM B306, DWV, FITTINGS: ASME B16.23, CAST BRONZE, OR ASME B16.29, WROUGHT COPPER, JOINTS: ASTM B32, SOLDER, GRADE 50B.
 - SANITARY VENT PIPING, ABOVE GRADE
 - CAST IRON PIPE: ASTM A74, SERVICE WEIGHT, FITTINGS: CAST IRON, JOINTS: ASTM C564, NEOPRENE GASKET SYSTEM
 - CAST IRON PIPE: CSIP 301, HUBLESS, SERVICE WEIGHT, FITTINGS: CAST IRON, JOINTS: CISPI 310, NEOPRENE GASKETS AND STAINLESS STEEL CLAMP-AND-SHIELD ASSEMBLIES
 - COPPER TUBE: ASTM B306, DWV, FITTINGS: ASME B16.23, CAST BRONZE, OR ASME B16.29, WROUGHT COPPER, OR ASME B16.32, SOV.ENT. JOINTS: ASTM B32, SOLDER, GRADE 50B.
 - WATER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING
 - DUCTILE IRON PIPE: AWWA C151, FITTINGS: DUCTILE IRON, STANDARD THICKNESS, LINING: CEMENT, JOINTS: AWWA C111, RUBBER GASKET WITH 3/4" (19 MM) DIAMETER RIDGE
 - WATER PIPING, BURIED WITHIN BUILDING
 - DOMESTIC HOT AND COLD WATER
 - COPPER TUBING: ASTM B88M, TYPE L, SOFT ANNEALED, FITTINGS: ASME B18.18 CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE, JOINTS: ASTM B32, SOLDER, GRADE 95TA.
 - DOMESTIC HOT WATER RE-CIRCULATION.
 - COPPER TUBING: ASTM B88M, TYPE L, SOFT ANNEALED, FITTINGS: ASME B18.18 CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE, JOINTS: ASTM B32, SOLDER, GRADE 95TA.
 - DOMESTIC HOT AND COLD WATER
 - COPPER TUBING: ASTM B88M, TYPE L, HARD DRAWN, FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE, JOINTS: ASTM B32, SOLDER, GRADE 95TA.
 - DOMESTIC HOT WATER RE-CIRCULATION.
 - 2.1. COPPER TUBING: ASTM B88M, TYPE L, SOFT ANNEALED, FITTINGS: ASME B18.18 CAST COPPER ALLOY OR ASME B16.22, WROUGHT COPPER AND BRONZE, JOINTS: ASTM B32, SOLDER, GRADE 95TA.
- STORM WATER PIPING, ABOVE GRADE
 - STORM WATER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING
 - CAST IRON PIPE: ASTM A74 EXTRA HEAVY WEIGHT, FITTINGS: CAST IRON, JOINTS: ASTM C564, NEOPRENE GASKET SYSTEM
 - CAST IRON PIPE: CSIP 301, HUBLESS, SERVICE WEIGHT, FITTINGS: CAST IRON, JOINTS: NEOPRENE GASKETS AND STAINLESS-STEEL CLAMP-AND-SHIELD ASSEMBLIES.
 - ABS PIPE: ASTM D2680 OR ASTM D2751, FITTINGS: ABS, JOINTS: ASTM D2235, SOLVENT WELD, MAXIMUM VOC CONTENT OF .325 G/L.
 - PVC PIPE: ASTM D2665 OR ASTM D3034, FITTINGS: PVC, JOINTS: ASTM D2855, SOLVENT WELD WITH ASTM D2564 SOLVENT CEMENT.
 - PVC PIPE: ASTM D2665, ASTM D3034, OR ASTM F679, FITTINGS: PVC, JOINTS: ASTM F477, ELASTOMERIC GASKETS.
- STORM WATER PIPING, ABOVE GRADE
 - CAST IRON PIPE: ASTM A74 EXTRA HEAVY WEIGHT, FITTINGS: CAST IRON, JOINTS: ASTM C564, NEOPRENE GASKET SYSTEM
 - FLANGES, UNIONS, AND COUPLINGS
 - PIPE SIZE: 3-1/4" (86 MM) AND UNDER:
 - FERROUS PIPE: CLASS 150 MALLEABLE IRON THREADED UNIONS.
 - COPPER TUBE AND PIPE: CLASS 150 BRONZE UNIONS WITH SOLDERED JOINTS.
 - PIPE OVER 1" (25 MM):
 - FERROUS PIPE: CLASS 150 MALLEABLE IRON THREADED OR FORGED STEEL SLIP-ON FLANGES; PREFORMED NEOPRENE GASKETS.
 - COPPER TUBE AND PIPE: CLASS 150 SLIP-ON BRONZE FLANGES; PREFORMED NEOPRENE GASKETS.
 - GROOVED END AND SHOULDERED PIPE END COUPLINGS:
 - HOUSING: MALLEABLE IRON CLAMPS TO ENGAGE AND LOCK. DESIGNED TO PERMIT SOME ANGULAR DEFLECTION, CONTRACTION AND EXPANSION; STEEL BOLTS, NUTS, AND WASHERS; GALVANIZED FOR GALVANIZED PIPE.
 - SEALING GASKET: "C" SHAPE COMPOSITION SEALING GASKET.
 - DIELECTRIC CONNECTIONS: UNION WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END, WATER IMPERVIOUS TENSION BARRIER.
- VALVES - GENERAL (POTABLE)
 - CONFORM TO REQUIREMENTS OF ANSI, ASTM, ASME, AND APPLICABLE MSS STANDARDS.
 - MANUFACTURER'S NAME AND PRESSURE RATING CLEARLY MARKED ON BODY TO MSS SP-25.
 - VALID CRN (CANADIAN REGISTRATION NUMBER) ISSUED BY PROVINCE OF ONTARIO REQUIRED FOR EACH VALVE.
 - PROVIDE VALVES WITH NSF NO LEAD CERIFICATION FOR POTABLE SERVICE.
 - 3.5.1. BRONZE: ASTM B42 OR B61 AS APPLICABLE

PLUMBING SPECIFICATIONS 22-058

- 3.5.2. BRASS: ASTM B283 C370
- 3.5.3. CAST IRON: ASTM A126 CLASS B
- END CONNECTIONS:
 - FLANGED ENDS: ANSI B16.1 (CLASS 125), ANSI B16.5
 - FACE-TO-FACE DIMENSIONS: ANSI B16.10
- ISOLATION VALVES
 - UP TO AND INCLUDING 2" (50MM) - BALL TYPE KITZ #889 MSS SP-110, CLASS 150, 600 PSI (4140 KPA) CWIP, FORGED BRASS, TWO PIECE BODY, STAINLESS STEEL BALL AND STEM, FULL PORT, WRENCH PIPE SEATS AND STEM PACKING, BLOW-OUT PROOF STEM, LEVER HANDLE WITH BALANCING STOP, STEM EXTENSIONS FOR INSULATED PIPING, SOLDER ENDS, NSF 372 NO LEAD CERTIFICATION.
 - 2-1/2" (65 MM) AND LARGER - BUTTERFLY TYPE: KITZ #122ZL, MSS SP-47, MSS SP-25 AND API-609; LUG TYPE HAVING BI-DIRECTIONAL "DEAD END SERVICE" PRESSURE RATING OF 1380 KPA (200 PSI) WITH THE DOWNSTREAM FLANGE REMOVED; STAINLESS STEEL STEM WITH TOP AND BOTTOM BUSHINGS OF DISSIMILAR MATERIALS AND WITH POSITIVE STEM RETENTION MECHANISM. ALUMINIUM BRONZE DISC AND MOLDED OR BONDED STYLE EPDM SEAT, SUITABLE FOR BOTH CHILLED WATER AND HOT WATER OPERATION; SUPPLIED WITH 10 POSITION LOCKING LEVER HANDLE 2" EXTENDED NECK TO ALLOW FOR INSULATION, NSF 372 NO LEAD CERTIFICATION.
- THROTTLING VALVES
 - UP TO AND INCLUDING 2" (50 MM) - GLOBE TYPE: KITZ #812 MSS SP-80, 840 KPA (125PSIG) 200 WOG, BRONZE BODY TO ASTM B62, RSING STEM, UNION BONNET, INSIDE SCREW, PIPE DISK, SOLDER ENDS, NSF 372 NO LEAD CERTIFICATION.
 - 2-1/2" (65 MM) AND LARGER - BUTTERFLY TYPE: KITZ #122ZL, MSS SP-47, MSS SP-25 AND API-609; LUG TYPE HAVING BI-DIRECTIONAL "DEAD END SERVICE" PRESSURE RATING OF 1380 KPA (200 PSI) WITH THE DOWNSTREAM FLANGE REMOVED; STAINLESS STEEL STEM WITH TOP AND BOTTOM BUSHINGS OF DISSIMILAR MATERIALS AND WITH POSITIVE STEM RETENTION MECHANISM. ALUMINIUM BRONZE DISC AND MOLDED OR BONDED STYLE EPDM SEAT, SUITABLE FOR BOTH CHILLED WATER AND HOT WATER OPERATION; SUPPLIED WITH 10 POSITION LOCKING LEVER HANDLE 2" EXTENDED NECK TO ALLOW FOR INSULATION, NSF 372 NO LEAD CERTIFICATION.
- CHECK VALVES
 - UP TO AND INCLUDING 3" (75 MM) - KITZ #923 MSS SP-80, 840 KPA (125PSIG) 200 WOG, BRONZE BODY TO ASTM B62, BRONZE TRIM, SOLDER ENDS, NSF 372 NO LEAD CERTIFICATION.
 - 4" (100MM) AND LARGER: KITZ #W30-A-RD-FE, MSS SP-71, 1380 KPA CLASS 125 / 200 WOG, CAST IRON BODY TO ASTM A126 CLASS B, BRONZE TRIM, BOLTED BONNET, FLANGED ENDS, NSF 372 NO LEAD CERTIFICATION.
- DRAIN VALVES
 - UP TO 150 PSIG - BALL TYPE: KITZ #869 150 PSIG (1034 KPA), 400 WOG, BRASS BODY TO ASTM C3700, TWO PIECE BODY, FULL PORT, PIPE SEATS AND STEM PACKING OR DOUBLE O-RINGS, BLOW-OUT PROOF STEM, CHROME PLATED BALL, LEVER HANDLE WITH CAP AND CHAIN, (3/4)" 20 MM HOSE CONNECTION, NSF 372 NO LEAD CERTIFICATION.
- STRAINERS
 - UP TO AND INCLUDING 2"; MUELLER LF351 SERVICED ENDS OR LF358 SOLDER ENDS, CLASS 125 C3780 BRONZE BODY, 304 SS MESH STRAINER, METAL FILLED GRAPHITE GASKET, LEAD FREE CONSTRUCTION, C/C PLUGS, 200 PSIG RATING.
 - OVER 2"; M/A S FG W40-A-YX-FF (CLASS 125 FLANGED) OR W40-A-YX-GG (GROOVED) A536 BODY, 304 SS MESH STRAINER, LEAD FREE CONSTRUCTION, 300 PSIG RATING.
- WATER PRESSURE REDUCING VALVES
 - UP TO AND INCLUDING 2" (50 MM) - ARAMSTRONG MODEL GQ 24 OR WAITS MODEL SERIES 223 MSS SP-80, BRONZE BODY, STAINLESS STEEL AND THERMOPLASTIC INTERNAL PARTS, FABRIC REINFORCED DIAPHRAGM STRAINER, TRICATED ENDS.
 - OVER 2" (50 MM) - ARAMSTRONG MODEL GQ 200/200V OR WAITS MODEL SERIES 1223 MSS SP-85, CAST IRON BODY, BRONZE FITTED, ELASTOMERIC DIAPHRAGM AND CAST DISC, FLANGED.
- RELIEF VALVES
 - PRESSURE RELIEF: WAITS MODEL SERIES 40 AGA 221 CERTIFIED, BRONZE BODY, TEFLON SEAT, STEEL STEM AND SPINGS, AUTOMATIC, DIRECT PRESSURE ACTUATED.
- PLUMBING PIPING INSULATION
 - FINISHES:
 - EXPOSED INDOORS: [CANVAS] [ALUMINIUM] [SS] [PVC] JACKET.
 - EXPOSED IN MECHANICAL ROOMS: [CANVAS] [ALUMINIUM] [SS] [PVC] JACKET.
 - CONCEALED, INDOORS: CANVAS OR VALVES, FITTINGS, NO FURTHER FINISH.
 - VAPOR BARRIER JACKET OR TAIC CODE A-3 INSULATION COMPATIBLE WITH INSULATION.
 - OUTDOORS: WATER-PROOF [ALUMINIUM] [SS] [ABS] JACKET.
 - FINISH ATTACHMENTS: SS [SCREWS] [BANDS], AT [150] MM ON CENTRE. SEALS: [WING] [CLOSED].
 - GLASS FIBRE
 - JOHNSMANVILLE MICRO-LOK OR EQUAL BY OWENS CORNING FIBERGLASS, CERTAINTED COMPKRAF
 - INSULATION : ASTM C547; ASTM C411, ASTM C354 CANULC-5102, ASTM E84, ASTM D774, NFPA 259, 'KSI' VALUE: 0.23 BTU-in/hr-sq-ft-F AT 75°F, 0.33 W/m·C AT 24 °C, MINIMUM SERVICE TEMPERATURE: 0°f (-18°c), MAXIMUM SERVICE TEMPERATURE: 80°f (45°c), MAXIMUM MOISTURE ABSORPTION: <5% BY WEIGHT.
 - VAPOUR BARRIER JACKET: ASTM C134 TYPE 1, WHITE KRAFT PAPER REINFORCED WITH GLASS FIBRE YARN AND BONDED TO ALUMINATED FILM, MOISTURE VAPOUR TRANSMISSION: ASTM E96, 0.02 PERM, SECURE WITH SELF SEALING LONGITUDINAL LAPS AND BOLT STRIPS, SECURE WITH OUTWARD CLINCH EXPANDING STRIPES AND VAPOUR BARRIER MASTIC.
 - THE WIRE: 1.3 MM STAINLESS STEEL WITH TUSTED ENDS ON MAXIMUM 12" (300 MM) CENTRES
 - VAPOUR BARRIER LAP ADHESIVE COMPATIBLE WITH INSULATION.
 - INSULATING CEMENT/MASTIC: ASTM C195; HYDRAULIC SETTING ON MINERAL WOOL, VOC CONTENT NOT TO EXCEED 80 G/L.
 - FIBROUS GLASS FABRIC: CLOTH: UNTREATED: 9 OZ/SQ YD (305 G/50 M) WEIGHT, BLANKET: 1.0 LB/LCU FT (16 KG/CU M) DENSITY.
 - INDOOR VAPOUR BARRIER MASTIC: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION, WHITE COLOUR, VOC CONTENT NOT TO EXCEED 250 G/L.
 - OUTDOOR VAPOUR BARRIER MASTIC: VINYL EMULSION TYPE ACRYLIC, COMPATIBLE WITH INSULATION, WHITE COLOUR.
 - INSULATING CEMENT: ASTM C449, VOC CONTENT NOT TO EXCEED 80 G/L.
 - JACKETS (APPLY TO ALL INTERIOR EXPOSED PIPING ONLY)
 - PVC PLASTIC: ONE PIECE MOLDED TYPE FITTINGS COVERS AND SHEET MATERIAL, CANULC-5102, ASTM E84, ASTM D1784, UL 100 A88, MAXIMUM SERVICE TEMPERATURE: 151°f (66°c), GLOSS FINISH, MAXIMUM FLAME SPREAD: CANULC-5102, ASTM E84: 25 OR LESS, MAXIMUM SMOKE DEVELOPED: CANULC-5102, ASTM E84: 50 OR LESS, THICKNESS: 20 MIL (0.4 MM) MINIMUM, 30 MIL (0.8 MM) MINIMUM FOR OUTDOOR USE, COLOUR: STANDARD OFF-WHITE COVERING ADHESIVE MASTIC; COMPATIBLE WITH INSULATION, MAXIMUM VOC CONTENT OF 50 G/L, APPROVED MANUFACTURER: CEBL-CO 300 SERIES, ZESTON PVC
 - ALUMINIUM JACKET: CANULC-5102, ASTM E84, (APPLY TO ALL EXTERIOR PIPING ONLY) THICKNESS: ASTM C179 REQUIREMENTS FOR RIGID AND NON-RIGID INSULATION FINISH; FINISH: SMOOTH FLAM FINISH, JOINTING: LONGITUDINAL SLIP JOINTS AND 2" (50 MM) LAPS, FITTINGS: 0.02" (0.40 MM) THICK DIE SHAPED FITTING COVERS WITH FACTORY ATTACHED PROTECTIVE LINER, METAL JACKET BANDS 3/8" (10 MM) WIDE-0.01" (0.38 MM) THICK ALUMINIUM.
- PROVIDE PHENOLIC PIPE SUPPORTS BETWEEN PIPE HANGERS AND SUPPORTED PIPING TO PREVEN CRUSHING OF INSULATION BETWEEN PIPE AND PIPE HANGERS.
 - PIPE INSULATION THICKNESS
 - INSULATE NEW OR ALTERED PIPING WITH RIGID PIPE INSULATION AND RE-INSULATE EXISTING PIPING WHERE INSULATION HAS BEEN REMOVED OR DAMAGED AS FOLLOWS:

SERVICE	OPERATING TEMP. (°F)	PIPE DIA. (IN)	INSULATION THICKNESS (IN)
D/W	0 TO 105	ALL	1"
DHW & DHWR	105 TO 180	3/8 TO 1/4"	1-1/2"
DHW & DHWR	105 TO 180	1-1/2" & LARGER	1-1/2"
 - AFTER PIPES HAVE BEEN PLACED IN POSITION AND BRANCHES INSTALLED, BUT BEFORE FIXTURES HAVE BEEN SET OR CONNECTED, TEST THE JOINT TIGHTNESS AND PIPE SOUNDNESS.
 - MAKE TESTS BEFORE PIPING IS CONCEALED.
 - NOTIFY CONSULTANT AT LEAST 48 HOURS BEFORE COMMENCING TEST AND SUBMIT A WRITTEN CERTIFICATE CONFIRMING TESTS.
- STORM, SANITARY, WASTE, AND VENT PIPING: SECURELY CLOSE OPENINGS IN PIPE ENDS BY MEANS OF APPROVED PLUGS AND FILL THE PIPING SYSTEM INCLUDING STACKS, BRANCHES TO FIXTURES AND HORIZONTAL RUNS WITH WATER. TEST BY RUNNING WATER INTO PIPES, FIXTURES, TRAPS AND APPARATUS TO DETECT IMPERFECT MATERIALS OR WORKMANSHIP, WHERE IT IS IMPOSSIBLE TO TEST THE WHOLE SYSTEM AT ONCE, DIVIDE THE WATER TEST TO SECTION 7.3 OF THE OBC, PERFORM ADDITIONAL TESTS AS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
- TEST WATER LINES HYDROSTATICALLY AT 1.5 TIMES WORKING PRESSURE (NOT LESS THAN 200 PSIG) FOR A PERIOD OF NOT LESS THAN TWO HOURS WITHOUT ANY DROP IN PRESSURE. TEST PRIOR TO PIPE CONCEALMENT, DISCONNECT OR ISOLATE PRODUCTS THAT CANNOT BE SUBJECT TO TEST PRESSURE WITHOUT DAMAGE.
- CORRECT DEFECTS AND RE-TEST UNTIL RESULTS ARE ACCEPTABLE.
- DO NOT CAULK THREADED JOINTS.
- CHECK HORIZONTAL PIPE WITH AN ACCURATE LEVEL FOR ALTERNATIONS IN PITCH.
- INSPECT LATERALS, CROSSARMS AND ELIMINATE AIR POCKETS. CORRECT CASES OF WATER HAMMER.
- FLUSHING AND CLEANING.
- INSPECT SYSTEMS AND REMOVE DEBRIS, OIL AND DIRT.
- FLUSH COMPLETED SYSTEMS WITH CLEAR WATER.
- MAINTAIN ISOLATING AND CONTROL VALVES IN OPEN POSITION.

PLUMBING SPECIFICATIONS 22-058

- DOMESTIC WATER SYSTEM: FLUSH, CHLORINATE AND RE-FLUSH OUTSIDE WATER MAINS TO AWWA C651-99.
- FUEL GAS PIPING
 - BURIED PIPING
 - COPPER TUBING: ASTM B88, TYPE K, PROTECTED AGAINST PHYSICAL DAMAGE ABOVE GROUND, FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASTM B16.22 WROUGHT COPPER OR BRONZE, RATED FOR NOT LESS THAN 125 PSIG WORKING PRESSURE, JOINTS: AWS AS8 CLASSIFICATION RCUP-3 OR RCUP-4 SILVER BRAZE.
 - COPPER TUBING: ASTM B88 TYPE L OR ASTM B897 TYPE G, EXTERNALLY COATED WITH EXTRUDED POLYETHYLENE OR PVC RESIN, FITTINGS: ASME B16.26, CAST BRONZE, RATED FOR NOT LESS THAN 125 PSIG WORKING PRESSURE, JOINTS: AWS AS8 CLASSIFICATION RCUP-3 OR RCUP-4 SILVER BRAZE.
 - STEEL PIPE: ASTM A53/AS3M OR A 106, SCHEDULE 40, SEAMLESS, FITTINGS: STEEL TO ANSI/ASME B 16, RATED FOR NOT LESS THAN 125 PSIG WORKING PRESSURE, JOINTS: ANSI B31.1 WELDED, JACKET: AWWA C105 POLYETHYLENE OR DOUBLE LAYER, HALF-LAPPED 0.25 MM POLYETHYLENE TAPE.
 - ABOVE GROUND PIPING
 - COPPER TUBING: ASTM B88, TYPE K, HARD DRAWN, FITTINGS: ASME B16.18, CAST COPPER ALLOY OR ASTM B16.22 WROUGHT COPPER AND BRONZE, JOINTS: AWS AS8 CLASSIFICATION RCUP-3 OR RCUP-4 SILVER BRAZE.
 - STEEL PIPE: ASTM A53/AS3M GR. B, ERW OR A106 SMLS, SCHEDULE 40, FITTINGS: ASTM B16.3, MALLEABLE IRON CLASS 150, SCREWED OR FLANGED OR ASTM A234/A234M, WROUGHT CARBON STEEL AND ALLOY STEEL WELDING TYPE JOINTS: NFPA 30, THREADED, WROUGHT OR WELDED TO ANSI B31.1.
 - SCREWED FITTINGS: PULVERIZED LEAD PASTE.
 - WELDED FITTINGS: BUTT-WELDING FITTINGS TO CSA W47.1.
 - FLANGE GASKETS: NONMETALLIC PUT, TO ASME B16.5.
 - BOLTS: MALLEABLE IRON, BRASS TO IRON, GROUND SEAT, TO ASTM A 47/A47M.
 - UNIONS AND NUTS: TO ASME B18.2.1.
 - NIPPLES, SCHEDULE 40, TO ASTM A 53/A53M.
 - WHEREVER PIPING IS INSTALLED IN CEILING USED AS RETURN AIR PLENUMS, PROVIDE SEAMLESS PIPE AND WELDING FITTINGS.
- ISOLATION VALVES
 - 2" (50 MM) AND SMALLER: SEMI-STEEL LUBRICATED PLUG VALVES, SCREWED, WRENCH OPERATED, ROCKWELL "HORSORUM" FIG. 142, NEWMAN-MILLEN 170M.
 - 2-1/2" (65 MM) AND 3" (75 MM) - SEMI-STEEL LUBRICATED PLUG VALVES, FLANGED, WRENCH OPERATED, ROCKWELL "HORSORUM" FIG. 145, NEWMAN-MILLEN 171M.
 - PROVIDE TWO (2) STANDARD PATTERN, CAST HANDLE WRENCHES TO OPERATE VALVES.
- GAS PRESSURE REDUCING AND RELIEF VALVES: SPRING LOADED REGULATOR WITH INTERNAL RELIEF VALVE, CAST IRON BODY, ALUMINIUM DIAPHRAGM CASE AND ORIFICE, FOR CAPACITIES REFER TO DRAWINGS.
- GAS PIPE INSTALLATION & TESTING
 - INSTALL AND TEST PIPING TO LOCAL UTILITY REGULATIONS, CSA B149.1, AND LOCAL AUTHORITIES HAVING JURISDICTION.
 - TEST PIPING WITH NERT GAS TO 50 PSIG AS PER B149.1, PURGE AFTER PRESSURE TEST, AFFIX TAGS TO PIPING AT THE POINT OF PIPING ENTRY INTO BUILDING.
 - REPAIR LEAKS AND RE-TEST UNTIL SYSTEM IS ACCEPTED BY THE CONSULTANT.
 - DO NOT CAULK THREADED JOINTS.
 - SLOPE PIPING DOWN IN THE DIRECTION OF FLOW TO LOW POINTS.
 - PROVIDE ECCENTRIC REDUCERS AT PIPE SIZE CHANGES TO PROVIDE POSITIVE DRAINAGE.
 - PROVIDE GAS ISOLATION VALVES AT PIPING BRANCHES AND EQUIPMENT, INSTALL SHUT-OFF VALVES AT MAIN GAS SERVICE ENTERING BUILDING AND OUTSIDE MECHANICAL ROOMS CONTAINING GAS-FIRED EQUIPMENT.
- TD STANDARD FLOOR DRAIN
 - ZURN 415 CAST IRON FLOOR DRAIN CW/DURA COATED CAST IRON BODY WITH BOTTOM OUTFLET, COMBINATION INVERTIBLE MEMBRANE CLAMP AND ADJUSTABLE COLLAR WITH SEEPAGE SLOTS, TRAP SEAL PRIMER CONNECTION, TYPE B POLISHED NICKEL BRONZE LIGHT DUTY STRAINER|TYPE J POLISHED NICKEL BRONZE LIGHT DUTY SQUARE, FEEL-PROOF STRAINER|TYPE M POLISHED BRONZE STRAINER AND SUR-SET BUCKET|TYPE N DURACOATED CAST IRON LIGHT DUTY STRAINER WITH DEEP FLANGED GRATE|
 - ZURN FLOOR DRAIN CROWN: PROVIDE ZURN IZ27 OVAL NICKEL COATED ASSEMBLY, FINISH TO SUIT, RUN TOP CR DWISS REMOVABLE FASTENERS TO SECURE FINNLE TO STRAINER.

18.7 TRAP SEAL PRIMER (ENCLOSURE)

- ZURN 1102ZLZL-AUTOMATIC TRAP PRIMER CW ALL BRONZE BODY WITH INTEGRAL VACUUM BREAKER, NON-LIMITING INTERNAL OPERATING PISTON, STAINLESS STEEL STRAINER, REMOVABLE BRONZE SEAT WITH METERING ORIFICE, AND SEALED BRONZE COVER.

19 THERMOSTATIC MIXING VALVE

- PROVIDE THERMOSTATIC MIXING VALVES AS INDICATED IN DRAWING DETAIL ON DOMESTIC HOT WATER SUPPLY TO BUILDING.
 - WARRANTY PERIOD: 18 MONTHS FROM DATE OF SHIPMENT, OR 12 MONTHS FROM DATE OF INSTALLATION, WHICHEVER COMES FIRST.
 - PROVIDE AN ADDITIONAL 6 MONTHS OF STANDARD COVERAGE|
 - PROVIDE SINGLE STAGE, SINGLE SUCTION TYPE, VERTICAL INLINE DESIGN PUMP WITH INTEGRATED INTELLIGENT CONTROLS.
 - SEALS: SPLIT-COUPLED OR CLOSE-COUPLED SERVICEABLE WITHOUT DISTURBING THE PIPING CONNECTIONS & MOTOR FOR SPLT-COUPLED.
 - INCLUDE CASING DRAIN PLUG AND 1/4 INCH SUCTION AND DISCHARGE GAUGE PORTS.
 - ACCEPTABLE MATERIAL: ARMSTRONG, 4300 DESIGN ENVELOPE PUMP OR 4380 DESIGN ENVELOPE PUMP.
- DESIGN CRITERIA
 - DESIGN PUMP FOR VARIABLE FLOW APPLICATIONS AND SELECTED FOR HYDRAULIC DESIGN CONDITIONS AND MINIMUM SYSTEM PRESSURE WITH SENSORLESS LOAD DEMAND BASED CONTROL.
 - SELECT HYDRAULIC DESIGN CONDITIONS AND MINIMUM PRESSURE WITH SENSORLESS LOAD CONTROL.
 - FOR SENSORLESS CONTROL THE OPERATING CONTROL CURVE SHALL BE QUADRATIC WITH ADJUSTABLE MINIMUM HEAD SETTING.
 - MEET OR EXCEED ENERGY SAVING REQUIREMENTS OF ASHRAE 90.1 - 2013 BY PUMP SELECTION, BASED ON OPTIMUM PERFORMANCE AT PART LOAD, TO SAVE 70% OF DESIGN FLOW ENERGY AT 50% PART LOAD
 - DESIGN PUMPING UNITS TO UL STD 778 & CSA STD C22.2 MO.108
 - DESIGN STAINLESS STEEL TYPE 316 UNITS TO NSF/ANSI 61 & 372
- MATERIALS
 - CASING: DUCTILE IRON ASTM A536 GRADE 65-45-12, E-COATED
 - TEST CASING TO 150 % MAXIMUM WORKING PRESSURE.
 - ENSURE CASING IS RADIALLY SPLIT TO ALLOW FOR REMOVAL OF ROTATING ELEMENT WITHOUT DISTURBING PIPE CONNECTIONS.
 - CAST IRON CASING WETTED SURFACES SHALL BE E-COATED TO PREVENT SEIZING OF IMPELLER TO CASING AFTER PERIODS OF INACTIVITY.
 - DRILL AND TAP CASING FOR GAUGE PORTS ON BOTH SUCTION AND DISCHARGE CONNECTIONS.
 - DRILL AND TAP CASING AT LOWEST POINT FOR DRAIN PORT.
 - IMPELLER: TO ASTM A743 CF8M, STAINLESS STEEL TYPE 316, FULLY ENCLOSED AND DYNAMICALLY BALANCED TO ANSI G6.3 AND FITTED TO SHAFT WITH KEY, USE TWO-PLANE BALANCING WHEN INSTALLED IMPELLER DIAMETER IS LESS THAN 6 TIMES IMPELLER WIDTH.
 - PUMP SHAFTS:
 - SPLIT-COUPLED: STAINLESS STEEL TO ASTM A582/A582M, GRADE 416.
 - 4380 CLOSE-COUPLED: STEEL MOTOR SHAFT WITH SUB SHAFT: STAINLESS STEEL TO ASTM A276, TYPE 316
 - FLANGES: TO ANSI/ASME B16.5, CLASS 125.
 - FLUSH LINE: 3/8 INCH BRAIDED STAINLESS STEEL COMPLETE WITH VENT.
 - CASING O-RING: EPDM.
 - MECHANICAL SEAL: NON-POTABLE, TYPE A82 OUTSIDE BALANCED SEAL DESIGN AND RATED TO 200°F MAXIMUM
 - ROTATING FACE: RESIN BONDED CARBON
 - STATIONARY FACE: SINTERED SILICON CARBIDE
 - SEAL ROTATING HARDWARE: STAINLESS STEEL
 - SECONDARY / SHAFT SEAL ELASTOMER: VITON®
 - MECHANICAL SEAL: NON-POTABLE, TYPE 2A INSIDE SINGLE SPRING SEAL DESIGN AND RATED TO 200°F MAXIMUM
 - ROTATING FACE: RESIN BONDED CARBON
 - STATIONARY FACE: SINTERED SILICON CARBIDE
 - SEAL ROTATING HARDWARE: STAINLESS STEEL

PUMP SPECIFICATIONS 22-058

- SUMMARY OF WORK
 - THIS SECTION SPECIFIES SINGLE STAGE, SINGLE SUCTION TYPE, VERTICAL INLINE DESIGN PUMPS WITH INTEGRATED INTELLIGENT CONTROLS.
- ACTION AND INFORMATIONAL SUBMITTALS
 - PRODUCT DATA: SUBMIT PRODUCT DATA INCLUDING MANUFACTURER'S LITERATURE FOR HYDRONIC PUMP, CONTROLS, COMPONENTS AND ACCESSORIES, INDICATING COMPLIANCE WITH SPECIFIED REQUIREMENTS AND MATERIAL CHARACTERISTICS.
 - SUBMIT LIST ON PUMP MANUFACTURER'S LETTERHEAD OF MATERIALS, COMPONENTS AND ACCESSORIES TO BE INCORPORATED INTO WORK.
 - INCLUDE PUMP PERFORMANCE CURVES INDICATION WHERE OPTIMUM EFFICIENCY PUMP RANGE WITH PRE-DEFINED PERFORMANCE ENVELOPE SHOWING PROJECT SPECIFIC REGION.
 - INCLUDE PRODUCT NAMES, TYPES AND SERIES NUMBERS.
 - INCLUDE CONTACT INFORMATION FOR MANUFACTURER AND THEIR REPRESENTATIVE FOR THIS PROJECT.
 - INCLUDE INFORMATION ON COSTS FOR WIRING OF PUMP TO MOTORS, AND WIRING PUMP MOUNTED (INTERNAL/EXTERNAL) OR REMOTELY MOUNTED DIFFERENTIAL PRESSURE SENSOR(S), ALSO

CONTROLS SPECIFICATIONS 22-058

1. GENERAL
- PROVIDE DESIGN, SUPPLY, INSTALLATION, AND COMMISSIONING A COMPLETE MICROPROCESSOR BASED AUTOMATIC CONTROL SYSTEM.
 - FOR EXISTING SITES VISIT THE PREMISES PRIOR TO TENDER TO BECOME FAMILIAR WITH FIELD CONDITIONS AND EXISTING EQUIPMENT.
 - PROVIDE CONTROL SYSTEM AS AN INTEGRAL PART OF THE MECHANICAL SUB-CONTRACT. THE SYSTEM SHALL BE INSTALLED BY TRADE CERTIFIED ELECTRICIANS MECHANICALLY EMPLOYED BY THE CONTROL SUB-CONTRACTOR.
 - EXAMINE MECHANICAL AND ELECTRICAL DRAWINGS, SPECIFICATIONS, AND ADDENDA AND COORDINATE THE WORK OF OTHER CONTRACTORS AND TO MAKE A COMPLETELY COORDINATED BUILDING AUTOMATION CONTROL SYSTEM (BACS) FOR THE MECHANICAL SYSTEMS. EXAMINE THE CONTRACT DOCUMENTS FOR CONTRADICTIONS AND OVERLAP AND PROVIDE PRICING FOR THE MOST ONERIOUS CONDITIONS.
 - PROVIDE THE NECESSARY ENGINEERING, INSTALLATION, SUPERVISION, COMMISSIONING AND PROGRAMMING FOR A COMPLETE AND FULLY OPERATIONAL SYSTEM. BE MANY TRIPS TO THE JOB SITE FOR INSTALLATION, SUPERVISION, AND COMMISSIONING AS ARE NECESSARY TO COMPLETE THE PROJECT TO THE SATISFACTION OF THE CONSULTANT AND/OR BUILDING PROJECT SUPERVISOR.
 - PROVIDE OPERATOR INTERFACES, MICROPROCESSOR-BASED CONTROLLERS, SENSORS, WELLS, AUTOMATIC CONTROL VALVES, CONTROL DAMPERS, TRANSDUCERS, RELAYS, AUTOMATIC CONTROL VALVES, DAMPER ACTUATORS, ETC. AS REQUIRED.

2. SCOPE OF WORK:
- PREPARATION OF CONTROL SHOP DRAWINGS FOR REVIEW AND APPROVAL. SEE SUBMITTALS. SUPPLY AND INSTALL A NETWORK OF DIRECT DIGITAL CONTROL (DDC) PANELS AND FIELD DEVICES.
 - PROVIDE CUSTOMIZED GRAPHICS SOFTWARE TO BUILDING STANDARDS, SYSTEM SOFTWARE, AND THIRD PARTY SOFTWARE AS SPECIFIED. SEE SOFTWARE
 - INSTALL, WIRE AND LABEL ALL DDC CONTROL SYSTEM COMPONENTS.
 - CALIBRATE AND COMMISSION THE INSTALLED CONTROL SYSTEM.
 - PROVIDE MAINTENANCE MANUALS AND AS-BUILT DRAWINGS.
 - PROVIDE CUSTOMIZED TRAINING FOR BUILDING OPERATIONS, MAINTENANCE AND TECHNICAL STAFF.
 - PROVIDE A ONE-YEAR ON SITE PARTS AND LABOUR WARRANTY ON ALL COMPONENTS. SEE WARRANTY.
3. APPROVED SYSTEMS
- BIDS FOR THE BACS CONTROL WILL ONLY BE ACCEPTED FROM AUTHORIZED VENDORS/INSTALLERS OF THE FOLLOWING MANUFACTURERS:
 - DELTA
 - MANUFACTURER OF EXISTING SYSTEM

4. SYSTEM PERFORMANCE

- GRAPHIC DISPLAY: DISPLAY A GRAPHIC WITH A MINIMUM OF 20 DYNAMIC POINTS. CURRENT DATA DISPLAYED WITHIN 10 SECONDS OF THE OPERATOR'S REQUEST.
- GRAPHIC REFRESH: 10 SECONDS.
- OBJECT COMMAND: 5 SECONDS MAXIMUM. ANALOG OBJECTS SHALL START TO ADJUST WITHIN 5 SECONDS.
- OBJECT SCAN: CURRENT WITHIN THE PRIOR 10 SECONDS.
- ALARM RESPONSE TIME: 10 SECONDS.
- PROGRAM EXECUTION FREQUENCY: AS OFTEN AS ONCE EVERY 5 SECONDS. SELECT EXECUTION TIMES CONSISTENT WITH THE MECHANICAL PROCESSING SCHEDULES.
- PROGRAMMABLE CONTROLS SHALL BE ABLE TO EXECUTE DDC PID CONTROL LOOPS AT A SELECTABLE FREQUENCY FROM AT LEAST ONCE EVERY 5 SECONDS. THE CONTROLLER SHALL SCAN AND UPDATE THE PROCESS VALUE AND OUTPUT GENERATED BY THIS CALCULATION AT THIS SAME FREQUENCY.
- MULTIPLE ALARM ANNUNCIATIONS: ALL WORKSTATIONS ON THE NETWORK SHALL RECEIVE ALARMS WITHIN 5 SECONDS OF EACH OTHER.

4.8. TABLE 1: REPORTING ACCURACY

MEASURED VARIABLE	REPORTED ACCURACY
SPACE TEMPERATURE	±0.25°C [±0.45°F]
DUCTED AIR	±0.25°C [±0.45°F]
OUTSIDE AIR	±0.25°C [±0.45°F]
WATER TEMPERATURE	±0.26°C [±0.47°F]
DELTA - T	±0.2°C [±0.36°F] ± 0.6-INCH THERMISTOR
RELATIVE HUMIDITY	±3% RH
WATER FLOW	±2% OF FULL SCALE
AIR FLOW (TERMINAL)	±5% OF READING *NOTE 1
AIR FLOW (MEASURING STATIONS)	±3% OF READING
AIR PRESSURE (DUCTS)	±1% OF FULL SCALE
AIR PRESSURE (SPACE)	±1% OF FULL SCALE
WATER PRESSURE	±1% OF FULL SCALE *NOTE 2
ELECTRICAL POWER	±5% SLOPE-CORE *NOTE 3
NOTE 1: (10%-100% OF SCALE) (CANNOT READ ACCURATELY BELOW 10%)	
NOTE 2: FOR BOTH ABSOLUTE AND DIFFERENTIAL PRESSURE	
NOTE 3: NOT INCLUDING UTILITY SUPPLIED METERS	

5. SUBMITTAL REQUIREMENTS
- PROVIDE THE ENGINEER AND OWNER, ANY ADDITIONAL INFORMATION OR DATA WHICH IS DEEMED NECESSARY TO DETERMINE COMPLIANCE WITH THE SPECIFICATIONS OR WHICH IS DEEMED VALUABLE IN DOCUMENTING AND UNDERSTANDING THE SYSTEM TO BE INSTALLED.
 - SUBMIT THE FOLLOWING WITHIN 90 DAYS OF CONTRACT AWARD:
 - BILL OF MATERIALS OF EQUIPMENT TO BE USED INDICATING QUANTITIES, MANUFACTURERS AND MODEL NUMBERS.
 - SCHEDULE OF CONTROL VALVES INCLUDING THE VALVE SIZE, BODY PRESSURE DROP, MODEL NUMBER (INCLUDING PATTERN AND CONNECTIONS), FLOW, CV, AIR PRESSURE RATING, AND LOCATION.
 - SCHEDULE OF CONTROL DAMPERS INCLUDING DAMPER SIZE, PRESSURE DROP, MANUFACTURER, AND MODEL NUMBER.
 - PROVIDE MANUFACTURER'S TECHNICAL CUT SHEETS FOR MAJOR SYSTEM COMPONENTS. INCLUDE:
 - BUILDING CONTROLLERS
 - CUSTOM APPLICATION CONTROLLERS
 - APPLICATION SPECIFIC CONTROLLERS
 - OPERATOR WORKSTATIONS
 - PORTABLE OPERATOR TERMINALS
 - AUXILIARY CONTROL DEVICES
 - PROVIDE PROPOSED BUILDING AUTOMATION SYSTEM ARCHITECTURAL DIAGRAM DEPICTING VARIOUS CONTROLLER TYPES, WORKSTATIONS, DEVICE LOCATIONS, ADDRESSES, AND COMMUNICATION CABLE REQUIREMENTS.
 - PROVIDE DETAILED TERMINATION DRAWINGS SHOWING REQUIRED FIELD AND FACTORY TERMINATIONS, AS WELL AS TERMINAL TIN-TO DDC TERMINALS PROVIDED BY MECHANICAL EQUIPMENT MANUFACTURERS. CLEARLY LABEL TERMINAL NUMBERS.
 - PROVIDE POINTS LIST SHOWING SYSTEM OBJECTS AND THE PROPOSED ENGLISH LANGUAGE OBJECT NAMES.
 - PROVIDE SEQUENCE OF OPERATION FOR EACH CONTROLLED MECHANICAL SYSTEM AND TERMINAL END DEVICES.
 - PROVIDE A BACNET PROTOCOL IMPLEMENTATION CONFERENCE STATEMENT (PICS) FOR EACH BACNET SYSTEM LEVEL DEVICE (I.E. BUILDING CONTROLLER & OPERATOR WORKSTATIONS) TYPE. THIS DEFINES THE POINTS LIST FOR PROPER COORDINATION OF INTEROPERABILITY WITH OTHER BUILDING SYSTEMS IF APPLICABLE FOR THIS PROJECT.

6. WARRANTY REQUIREMENTS
- BAS SYSTEM LABOR AND MATERIALS SHALL BE WARRANTED FREE FROM DEFECTS FOR A PERIOD OF TWELVE (12) MONTHS AFTER FINAL ACCEPTANCE BY THE OWNER. BAS FAILURES DURING THE WARRANTY PERIOD SHALL BE ADJUSTED, REPAIRED, OR REPLACED AT NO CHARGE TO THE OWNER. THE BAS MANUFACTURER SHALL RESPOND TO THE OWNER'S REQUEST FOR WARRANTY SERVICE WITHIN 24 HOURS OF THE INITIATED CALL AND WILL OCCUR DURING NORMAL BUSINESS HOURS (9AM-5PM).
 - THE BAS MANUFACTURER SHALL PROVIDE A TOTAL OF (16) HOURS OF ONSITE PREVENTATIVE MAINTENANCE DURING WARRANTY PERIOD. EIGHT (8) HOURS AT SIX (6) MONTHS, AND EIGHT (8) HOURS AT TEN (10) MONTHS AFTER SUBSTANTIAL COMPLETION OF ONSITE PREVENTATIVE MAINTENANCE WITHIN THE WARRANTY PERIOD.
 - AT THE END OF THE FINAL START-UP/TESTING, IF EQUIPMENT AND SYSTEMS ARE OPERATING SATISFACTORILY TO THE CUSTOMER, THE CUSTOMER SHALL SIGN CERTIFICATES CERTIFYING THAT THE BAS IS OPERATIONAL AND HAS BEEN TESTED AND ACCEPTED IN ACCORDANCE WITH THE TERMS OF THIS SPECIFICATION. THE DATE OF CUSTOMER ACCEPTANCE SHALL BE THE START OF THE WARRANTY PERIOD.
 - OPERATOR WORKSTATION SOFTWARE, PROJECT SPECIFIC SOFTWARE, GRAPHICS, DATABASE, AND FIRMWARE UPDATES SHALL BE PROVIDED TO THE CUSTOMER AT NO CHARGE DURING THE WARRANTY PERIOD. WRITTEN AUTHORIZATION BY THE CUSTOMER MUST BE GRANTED PRIOR TO THE INSTALLATION OF THESE UPDATES.
 - THE BAS MANUFACTURER SHALL PROVIDE A WEB-ACCESSIBLE USERS NETWORK FOR THE PROPOSED SYSTEM AND GIVE THE OWNER FREE ACCESS TO QUESTION/ANSWER FORUM, USER TIPS, UPGRADES, AND TRAINING SCHEDULES FOR ONE YEAR PERIOD OF TIME CORRELATING WITH THE WARRANTY PERIOD.
 - THE PROJECT'S CONTRACTOR SHALL PROVIDE AND MAINTAIN SECURE REMOTE ACCESS TO THE FACILITY'S BUILDING AUTOMATION SYSTEM (BAS) OR OTHER BUILDING SYSTEMS UNTIL UP TO 1 YEAR AFTER SUBSTANTIAL COMPLETION. PRIOR TO TRANSITION FROM WARRANTY, THE BUILDING OWNER WILL PROVIDE AND MAINTAIN THE SECURED REMOTE ACCESS.

7. DATA MONITORING, STORING, & COLLECTION STANDARDS
- THE SYSTEM SHALL RECORD AND STORE INTERVAL DATA, 24 HOURS/DAY, 7 DAYS/WEEK, 365 DAYS/YEAR.

CONTROLS SPECIFICATIONS 22-058

- DATA TO BE COLLECTED FOR REAL-TIME CONTINUOUS MONITORING AND COLLECTION OF WHOLE-BUILDING ENERGY METERS AND SUB-METERS IF THE METERS HAVE BEEN INSTALLED AS PART OF THE WARRANTED PROJECT.
- DATA TO BE COLLECTED FROM BUILDING AUTOMATION AND CONTROL SYSTEMS SUB-METERS AND SENSORS DATA FOR EQUIPMENT STATUS, SET POINTS, AND OPERATIONAL POINTS.
- DATA SHALL BE STORED IN A CLASS 5 SECURE HOSTING LOCATION PROTECTED BY ISO 5001-COMPLIANT FIREWALL AND INTRUSION DETECTION SYSTEMS WITH SUPPORT FOR MAJOR NETWORK SECURITY PROTOCOLS SUCH AS HTTPS AND SFTP TO SECURELY ACCESS AND STORE DATA.
- DASHBOARD WEB INTERFACE: THE DASHBOARD INTERFACE SHALL ALLOW DISPLAY OF ENERGY AND BUILDINGS SYSTEM DATA IN WIDGETS, CHARTS AND TRACKING APPLICATIONS, AND BE AVAILABLE WITHOUT REQUIRING USERS TO UTILIZE EXTERNAL, THIRD PARTY TOOLS.
 - THE DASHBOARD WEB INTERFACE SHALL BE ACCESSIBLE VIA A WEB BROWSER WITHOUT REQUIRING ANY "PLUG-INS" (I.E. JAVA RUNTIME ENVIRONMENT (JRE), ADOBE FLASH).
 - THE INTERFACE SHALL SUPPORT COMMON INTERNET WEB BROWSERS AT A MINIMUM INCLUDING: INTERNET EXPLORER 10.0+, FIREFOX 4.0+, CHROME 10.0+, OPERA, SAFARI
 - THE INTERFACE SHALL SUPPORT THE FOLLOWING MOBILE WEB BROWSERS AT A MINIMUM: IOS (IPAD/PHONE) V9.1+, ANDROID (TABLET) V4.3+, ANDROID (PHONE) V2.3+.

- DASHBOARDS SHALL BE CUSTOMIZABLE FOR EACH INDIVIDUAL OR GROUP OF USERS THE TO MODIFY PERSONAL DASHBOARDS AT ANY TIME USING A LIBRARY OF WIDGETS SPECIFIC TO THE CONTROL SITE.
- DASHBOARDS SHOULD BE CAPABLE OF TRACKING & DISPLAYING SUMMARY METRICS AND STATUS OF ENERGY AND EMISSIONS GOALS AT VARIOUS LEVELS: FLOOR/AREA, BUILDING, CAMPUS, PORTFOLIO.
- EACH USER SHALL BE REQUIRED TO LOGIN TO THE SYSTEM WITH A USER NAME AND PASSWORD IN ORDER TO VIEW, EDIT, ADD, OR DELETE DATA
- USER PROFILES SHALL RESTRICT THE USER TO ONLY THE OBJECTS, APPLICATIONS, AND SYSTEM FUNCTIONS AS ASSIGNED BY THE SYSTEM ADMINISTRATOR.
- EACH USER SHALL BE ALLOWED TO CHANGE THEIR USER PASSWORD.
- THE SYSTEM ADMINISTRATOR SHALL BE ABLE TO MANAGE THE SECURITY FOR ALL OTHER USERS.
- THE SYSTEM SHALL INCLUDE PRE-DEFINED "ROLES" THAT ALLOW A SYSTEM ADMINISTRATOR TO QUICKLY ASSIGN PERMISSIONS TO A USER.

- BEANS DASHBOARD SHALL INCLUDE AN OBJECT-BASED WIDGET BUILDER FOR THE CREATION OF CUSTOM WIDGETS, AS WELL AS A LIBRARY OF OFF-THE-SHELF ENERGY WIDGETS TO UTILIZE
- USERS SHALL BE ALLOWED TO PICK AND CHOOSE WHICH WIDGETS ARE DISPLAYED, AND WHERE THEY ARE LOCATED.
- SHALL PROVIDE AN OBJECT-BASED WIDGET BUILDER FOR THE CREATION OF CUSTOM WIDGETS INCLUDING:
 - TARGET A SPECIFIC BUILDING OR SYSTEM/EQUIPMENT
 - CONFIGURE TIME PERIODS, PARAMETER VALUES (MAXIMUM/MINIMUM), UNITS OF MEASURE
 - SELECT DISPLAY COLORS
 - PREVIEW WIDGETS USING TARGET OBJECT.

- ENERGY CONSERVATION MEASURE (ECM) CREATION AND TRACKING
- THE BEMS SHALL INCLUDE EMBEDDED APPLICATION FOR THE CREATION AND TRACKING OF ENERGY CONSERVATION MEASURES (ECMs) AND OPPORTUNITIES FOR FACILITY IMPROVEMENTS INCLUDING:
 - CAPABILITY TO CREATE AND TRACK THE STATUS OF OPPORTUNITIES, ENERGY EFFICIENCY PRODUCTS AND ENERGY CONSERVATION MEASURES (ECMs), INCLUDING ATTACHING DOCUMENTATION.
 - SHALL PROVIDE EMBEDDED COST ESTIMATOR TO QUANTIFY ENERGY COST SAVINGS FOR EACH RECOMMENDED ENERGY CONSERVATION MEASURE OR SYSTEM OPTIMIZATION RECOMMENDATION.

8. OPERATOR INTERFACE
- FURNISH PC BASED OPERATOR WEB INTERFACE ABLE TO ACCESS ALL INFORMATION IN THE SYSTEM. THE BUILDING OPERATOR WEB INTERFACE SHALL RESIDE ON THE BUILDING WIDE NETWORK, WHICH IS SAME HIGH-SPEED IP COMMUNICATIONS NETWORK AS THE SYSTEM CONTROLLERS. THE BUILDING WIDE NETWORK WILL BE PROVIDED BY THE OWNER AND SUPPORTS THE INTERNET PROTOCOL (IP).
 - EACH OPERATOR INTERFACE PC SHALL INCLUDE THE FOLLOWING: (3) YEARS OF SOFTWARE SERVICE UPDATES, TRENDS DATA STORAGE, BACKUPS, PREFERRED CONNECTIVITY FOR BACKUPS IS THROUGH THE CLOUD. IF CLOUD IS NOT AVAILABLE PROVIDE AN ONSITE SERVER WITH 2 TB OF SECURE STORAGE.
 - SERVICE TOOL - LAPTOP C/W MINIMUM HARDWARE INTL CORE I5 OR BETTER, 16 GB RAM , 2 TB HARD DRIVE SPACE.
 - INTERNET BROWSER COMPATIBILITY: THE OPERATOR WEB INTERFACE SHALL BE ACCESSIBLE VIA A WEB BROWSER WITHOUT REQUIRING ANY "PLUG-INS" (I.E. JAVA RUNTIME ENVIRONMENT (JRE), ADOBE FLASH). THE OPERATOR WEB INTERFACE SHALL SUPPORT THE FOLLOWING INTERNET WEB BROWERS: INTERNET EXPLORER 11.0+, FIREFOX 47.0+, CHROME 75.0+, EDGE 13.0+
 - THE OPERATOR WEB INTERFACE SHALL SUPPORT THE FOLLOWING MOBILE WEB BROWSERS: IOS (IPAD/PHONE) V9.1+, ANDROID (TABLET) V4.3+, ANDROID (PHONE) V2.3+.
 - THE BUILDING OPERATOR WEB INTERFACE SHALL BE ACCESSIBLE VIA A WEB BROWSER WITHOUT REQUIRING ANY "PLUG-INS" (I.E. JAVA RUNTIME ENVIRONMENT (JRE), ADOBE FLASH)
8. SYSTEM SECURITY
- EACH OPERATOR SHALL BE REQUIRED TO LOGIN TO THE SYSTEM WITH A USER NAME AND PASSWORD IN ORDER TO VIEW, EDIT, ADD, OR DELETE DATA.
 - USER PROFILES SHALL RESTRICT THE USER TO ONLY THE OBJECTS, APPLICATIONS, AND SYSTEM FUNCTIONS AS ASSIGNED BY THE SYSTEM ADMINISTRATOR.
 - EACH OPERATOR SHALL BE ALLOWED TO CHANGE THEIR USER PASSWORD.
 - THE SYSTEM ADMINISTRATOR SHALL BE ABLE TO MANAGE THE SECURITY FOR ALL OTHER USERS.
 - THE SYSTEM SHALL INCLUDE PRE-DEFINED "ROLES" THAT ALLOW A SYSTEM ADMINISTRATOR TO QUICKLY ASSIGN PERMISSIONS TO A USER.
 - USER LOGON/LOGOFF ATTEMPTS SHALL BE RECORDED.
 - THE SYSTEM SHALL PROTECT ITSELF FROM UNAUTHORIZED USE BY AUTOMATICALLY LOGGING OFF FOLLOWING THE LAST LOGOFF OR NO USER ACTIVITY FOR A PRE-DEFINABLE PERIOD.
 - SYSTEM SECURITY DATA SHALL BE STORED IN AN ENCRYPTED FORMAT.

- 8.1. ON-LINE HELP AND TRAINING
- PROVIDE A CONTEXT SENSITIVE, ON-LINE HELP SYSTEM TO ASSIST THE OPERATOR IN OPERATION AND CONFIGURATION OF THE SYSTEM.
 - ON-LINE HELP SHALL BE AVAILABLE FOR SYSTEM FUNCTIONS AND SHALL PROVIDE THE RELEVANT DATA FOR EACH PARTICULAR SCREEN.

8. SYSTEM DIAGNOSTICS
- THE SYSTEM SHALL AUTOMATICALLY MONITOR THE OPERATION OF NETWORK CONNECTIONS, BUILDING MANAGEMENT PANELS, AND CONTROLLERS.
 - THE FAILURE OF ANY DEVICE SHALL BE ANNUNCIATED TO THE OPERATORS.
- 8.10. EQUIPMENT & APPLICATION PAGES
- BUILDING OPERATOR WEB INTERFACE SHALL INCLUDE STANDARD PAGES FOR ALL EQUIPMENT AND APPLICATIONS. THESE PAGES SHALL ALLOW AN OPERATOR TO OBTAIN INFORMATION RELEVANT TO THE OPERATION OF THE EQUIPMENT AND/OR APPLICATION, INCLUDING:
 - ALARMS RELEVANT TO THE EQUIPMENT OR APPLICATION WITHOUT REQUIRING A USER TO NAVIGATE TO AN ALARM PAGE AND PERFORM A FILTER.
 - HISTORICAL DATA (AS DEFINED IN DATA LOG SECTION BELOW) FOR THE EQUIPMENT OR APPLICATION WITHOUT REQUIRING A USER TO NAVIGATE TO A DATA LOG PAGE AND PERFORM A FILTER.

- 8.11. SYSTEM GRAPHICS: BUILDING OPERATOR WEB INTERFACE SHALL BE GRAPHICALLY BASED AND SHALL INCLUDE AT LEAST ONE GRAPHIC PER PIECE OF EQUIPMENT OR OCCUPIED ZONE. GRAPHICS FOR EACH CHILLED WATER AND HOT WATER SYSTEM, AND GRAPHICS THAT SUMMARIZE CONDITIONS ON EACH FLOOR OF EACH BUILDING. USED IN THIS CONCEPT FOR COMFORT OR FLOOR PLAN SUMMARY GRAPHICS USING COLORS TO REPRESENT ZONE TEMPERATURE RELATIVE TO ZONE SET POINT.
- FUNCTIONALITY: GRAPHICS SHALL ALLOW OPERATOR TO MONITOR SYSTEM STATUS, TO VIEW A SUMMARY OF THE MOST IMPORTANT DATA FOR EACH CONTROLLED ZONE OR PIECE OF EQUIPMENT, TO VIEW POINT AND CHART INDICATORS FOR EACH CONTROLLED ZONE/DEVICE AND HVAC APPLICATION.
 - TRENDS LOG SHALL MONITOR THESE PARAMETERS FOR A MINIMUM OF 7 DAYS AT 15 MINUTE INTERVALS. THE AUTOMATIC TRENDS LOGS SHALL BE USER ADJUSTABLE.
 - GRAPHIC IMAGERY - GRAPHICS SHALL USE 3D IMAGES FOR ALL STANDARD AND CUSTOM GRAPHICS. THE ONLY ALLOWABLE EXCEPTIONS WILL BE PHOTO IMAGES, MAPS, SCHEMATIC DRAWINGS, AND SELECTED FLOOR PLANS.
 - ALARM INDICATION - INDICATE AREAS OR EQUIPMENT IN AN ALARM CONDITION USING COLOR OR OTHER VISUAL INDICATOR.
- 8.12. CUSTOM GRAPHICS
- OPERATOR INTERFACE SHALL BE CAPABLE OF DISPLAYING CUSTOM GRAPHICS IN ORDER TO CONVEY THE STATUS OF THE FACILITY TO ITS OPERATORS.
 - GRAPHICAL NAVIGATION: THE BUILDING OPERATOR WEB INTERFACE SHALL PROVIDE DYNAMIC COLOR GRAPHICS OF BUILDING AREAS, SYSTEMS AND EQUIPMENT.
 - GRAPHICAL DATA VISUALIZATION: THE BUILDING OPERATOR WEB INTERFACE SHALL SUPPORT DYNAMIC POINTS INCLUDING ANALOG AND BINARY VALUES, DYNAMIC TEXT, STATIC TEXT, AND ANIMATION FILES.
- 8.13. MANUAL CONTROL AND OVERRIDE
- POINT CONTROL: PROVIDE A METHOD FOR A USER TO VIEW, OVERRIDE, AND EDIT IF APPLICABLE, THE STATUS OF ANY OBJECT AND PROPERTY IN THE SYSTEM. THE POINT STATUS SHALL BE AVAILABLE BY MENU, ON GRAPHICS OR THROUGH CUSTOM PROGRAMS.
 - TEMPERATURE OVERRIDES: THE USER SHALL BE ABLE TO PERFORM A TEMPORARY OVERRIDE WHEN AN OVERRIDE IS ALLOWED, AUTOMATICALLY REMOVING THE OVERRIDE AFTER A SPECIFIED PERIOD OF TIME.
 - OVERRIDE OWNERS: THE SYSTEM SHALL CONVEY TO THE USER THE OWNER OF EACH OVERRIDE FOR ALL PRIORITIES THAT AN OVERRIDE EXISTS.

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- PROVIDE A SPECIFIC ICON TO SHOW TIME OVERRIDE OR OPERATOR OVERRIDE, WHEN A POINT, UNIT CONTROLLER OR APPLICATION HAS BEEN OVERRIDDEN MANUALLY.
 - SCHEDULING: A USER SHALL BE ABLE TO PERFORM THE FOLLOWING TASKS UTILIZING THE BUILDING OPERATOR WEB INTERFACE:
 - CREATE A NEW SCHEDULE, DEFINING THE DEFAULT VALUES, EVENTS AND MEMBERSHIP.
 - CREATE EXCEPTIONS TO A SCHEDULE FOR ANY GIVEN DAY.
 - APPLY AN EXCEPTION THAT SPANS A SINGLE DAY OR MULTIPLE DAYS.
 - VIEW A SCHEDULE BY DAY, WEEK AND MONTH.
 - EXCEPTION SCHEDULES AND HOLIDAYS SHALL BE SHOWN CLEARLY ON THE CALENDAR.
 - MODIFY THE SCHEDULE EVENTS, MEMBERS AND EXCEPTIONS.
9. DATA LOGS
- BUILDING OPERATOR WEB INTERFACE SHALL ALLOW A USER WITH THE APPROPRIATE SECURITY PERMISSIONS TO DEFINE A DATA LOG FOR ANY DATA IN THE SYSTEM.
 - BUILDING OPERATOR WEB INTERFACE SHALL ALLOW A USER TO DEFINE ANY DATA LOG OPTIONS AS DESCRIBED IN THE APPLICATION AND CONTROL SOFTWARE SECTION.
 - DATA LOG VIEWER:
 - BUILDING OPERATOR WEB INTERFACE SHALL ALLOW DATA LOG DATA TO BE VIEWED AND PRINTED.
 - BUILDING OPERATOR WEB INTERFACE SHALL ALLOW A USER TO VIEW DATA LOG DATA IN A TEXT-BASED FORMAT (TIME - STAMP/VALUE).
 - OPERATOR SHALL BE ABLE TO VIEW THE DATA COLLECTED BY A DATA LOG IN A GRAPHICAL CHART IN THE BUILDING OPERATOR WEB INTERFACE.
 - DATA LOG VIEWING CAPABILITIES SHALL INCLUDE THE ABILITY TO SHOW A MINIMUM OF 5 POINTS ON A CHART.
 - EACH DATA POINT DATA LINE SHALL BE DISPLAYED AS A UNIQUE COLOR.
 - OPERATOR SHALL BE ABLE TO SPECIFY THE DURATION OF THE HISTORICAL DATA TO VIEW BY SCROLLING AND ZOOMING.
 - SYSTEM SHALL PROVIDE A GRAPHICAL TRACE DISPLAY OF THE ASSOCIATED TIME STAMP AND VALUE FOR AN USER SELECTED POINT ALONG THE X-AXIS.
 - EXPORT DATA LOGS.
 - BUILDING OPERATOR WEB INTERFACE SHALL ALLOW A USER TO EXPORT DATA LOG DATA IN CSV OR PDF FORMAT FOR USE BY OTHER INDUSTRY STANDARD WORD PROCESSING AND SPREADSHEET PACKAGES.

- 9.5. ALARM/EVENT NOTIFICATION
- ANY PART SHALL BE NOTIFIED OF NEW ALARMS/EVENTS AS THEY OCCUR WHILE NAVIGATING THROUGH ANY PART OF THE SYSTEM VIA AN ALARM ICON.
 - ALARM/EVENT LOG: THE OPERATOR SHALL BE ABLE TO VIEW ALL LOGGED SYSTEM ALARMS/EVENTS FROM ANY BUILDING OPERATOR WEB INTERFACE.
 - OPERATOR SHALL BE ABLE TO SORT AND FILTER ALARMS FROM EVENTS. ALARMS SHALL BE SORTED IN A MINIMUM OF 4 CATEGORIES BASED ON SEVERITY.
 - ALARM/VIEW MESSAGES SHALL USE FULL LANGUAGE, EASILY RECOGNIZED DESCRIPTORS.
 - AN OPERATOR WITH THE PROPER SECURITY LEVEL MAY ACKNOWLEDGE AND CLEAR ALARMS/EVENTS.
 - ALL ALARMS/EVENTS THAT HAVE NOT BEEN CLEARED BY THE OPERATOR SHALL BE STORED BY THE BUILDING CONTROLLER.
 - THE ALARM/EVENT LOG SHALL INCLUDE A COMMENT FIELD FOR EACH ALARM/EVENT THAT ALLOWS A USER TO ADD SPECIFIC COMMENTS ASSOCIATED WITH ANY ALARM.

- 9.6. ALARM PROCESSING
- OPERATOR SHALL BE ABLE TO CONFIGURE ANY OBJECT IN THE SYSTEM TO GENERATE AN ALARM WHEN TRANSITIONING IN AND OUT OF A NORMAL STATE.
 - OPERATOR SHALL BE ABLE TO CONFIGURE THE ALARM LIMITS, WARNING LIMITS, STATES, AND REACTIONS FOR EACH OBJECT IN THE SYSTEM.
- 9.7. REPORTS AND LOGS
- BUILDING OPERATOR WEB INTERFACE SHALL PROVIDE A REPORTING PACKAGE THAT ALLOWS THE OPERATOR TO SELECT REPORTS.
 - BUILDING OPERATOR WEB INTERFACE SHALL PROVIDE THE ABILITY TO SCHEDULE REPORTS TO RUN AT SPECIFIED INTERVALS OF TIME.
 - BUILDING OPERATOR WEB INTERFACE SHALL ALLOW A USER TO EXPORT REPORTS AND LOGS FROM THE BUILDING CONTROLLER IN A FORMAT THAT IS READILY ACCESSIBLE BY OTHER STANDARD SOFTWARE APPLICATIONS INCLUDING SPREADSHEETS AND WORD PROCESSING. ACCEPTABLE FORMATS INCLUDE: CSV, HTML, XML, PDF.
 - REPORTS AND LOGS SHALL BE READILY PRINTED TO THE SYSTEM PRINTER.
 - PROVIDE A MEANS TO LIST AND ACCESS THE LAST 10 REPORTS VIEWED BY THE USER.
 - ALL THE FOLLOWING STANDARD REPORTS SHALL BE AVAILABLE WITHOUT REQUIRING A USER TO MANUALLY CONFIGURE THE REPORT:
 - POINTS IN AN ALARM REPORT: PROVIDE AN ON-DEMAND REPORT SHOWING ALL CURRENT ALARMS.
 - ALL POINTS IN OVERRIDE REPORT: PROVIDE AN ON-DEMAND REPORT SHOWING ALL OVERRIDES IN EFFECT.
 - COMMISSIONING REPORT: PROVIDE A ONE-TIME REPORT THAT LISTS ALL EQUIPMENT WITH THE UNIT CONFIGURATION AND PRESENT OPERATION.

- 9.7.4. POINTS REPORT: PROVIDE A REPORT THAT LISTS THE CURRENT VALUE OF ALL POINTS
10. CONTROLLER SOFTWARE
- FURNISH THE FOLLOWING APPLICATIONS SOFTWARE FOR BUILDING AND ENERGY MANAGEMENT: SOFTWARE APPLICATIONS SHALL RESIDE AND RUN IN THE SYSTEM CONTROLLERS. EDITING OF APPLICATIONS SHALL OCCUR AT THE BUILDING OPERATOR INTERFACE.
 - SCHEDULING: PROVIDE THE CAPABILITY TO SCHEDULE EACH OBJECT OR GROUP OF OBJECTS IN THE SYSTEM. EACH OF THESE SCHEDULES SHALL INCLUDE THE CAPABILITY FOR START, STOP, OPTIMAL START, OPTIMAL STOP, AND NIGHT ECONOMIZER ACTIONS. EACH SCHEDULE MAY CONSIST OF UP TO 100 EVENTS WHEN A GROUP OF OBJECTS ARE SCHEDULED TOGETHER. PROVIDE THE CAPABILITY TO DEFINE ADVANCES AND DELAYS FOR EACH MEMBER. EACH SCHEDULE SHALL CONSIST OF THE FOLLOWING:
 - WEEKLY SCHEDULE: PROVIDE SEPARATE SCHEDULES FOR EACH DAY OF THE WEEK.
 - EXCEPTION SCHEDULES: PROVIDE THE ABILITY FOR THE OPERATOR TO DESIGNATE ANY DAY OF THE YEAR AS AN EXCEPTION SCHEDULE. THIS EXCEPTION SCHEDULE SHALL OVERRIDE THE STANDARD SCHEDULE FOR THAT DAY. EXCEPTION SCHEDULES MAY BE DEFINED UP TO A YEAR IN ADVANCE. ONCE AN EXCEPTION SCHEDULE IS EXECUTED IT WILL BE DISCARDED AND REPLACED BY THE STANDARD SCHEDULE FOR THAT DAY OF THE WEEK.
 - HOLIDAY SCHEDULES: PROVIDE THE CAPABILITY FOR THE OPERATOR TO DEFINE UP TO 99 SPECIAL OR HOLIDAY SCHEDULES. THESE SCHEDULES MAY BE PLACED ON THE SCHEDULING CALENDAR AND WILL BE REPEATED EACH YEAR. THE OPERATOR SHALL BE ABLE TO DEFINE THE LENGTH OF EACH HOLIDAY PERIOD.
 - OPTIMAL START: THE SCHEDULING APPLICATION OUTLINED ABOVE SHALL SUPPORT AN OPTIMAL START ALGORITHM. THIS SHALL CALCULATE THE THERMAL CHARACTERISTICS OF A ZONE AND START THE EQUIPMENT PRIOR TO OCCUPANCY TO ACHIEVE THE DESIRED SPACE TEMPERATURE AT THE SPECIFIED OCCUPANCY TIME. THE ALGORITHM SHALL CALCULATE SEPARATE SETS OF HEATING AND COOLING RATES FOR ZONES THAT HAVE BEEN UNOCCUPIED FOR LESS THEN AND GREATER THAN 24 HOURS. PROVIDE THE ABILITY TO MODIFY THE START ALGORITHM BASED ON AIR TEMPERATURE. PROVIDE AN EARLY START LIMIT IN MINUTES TO PREVENT THE SYSTEM FROM STARTING BEFORE AN OPERATOR DETERMINED TIME LIMIT.

- 10.1. TRENDS LOG APPLICATION
- TRENDS LOG DATA SHALL BE SAMPLED AND STORED ON THE SYSTEM CONTROLLER PANEL AND SHALL BE CAPABLE OF BEING ARCHIVED TO A BACNET WORKSTATION FOR LONGER TERM STORAGE.
 - TRENDS LOGS SHALL INCLUDE INTERVAL, START-TIME, AND STOP-TIME.
 - TRENDS LOG INTERVALS SHALL BE CONFIGURABLE AS FREQUENTLY AS 1 MINUTE AND AS INFREQUENTLY AS 1 YEAR.
- 10.4. TRENDS LOGS
- THE SYSTEM CONTROLLER SHALL CREATE TRENDS LOGS FOR DEFINED KEY PERFORMANCE INDICATORS (KPI) FOR EACH CONTROLLED ZONE/DEVICE AND HVAC APPLICATION.
 - TRENDS LOGS SHALL MONITOR THESE PARAMETERS FOR A MINIMUM OF 7 DAYS AT 15 MINUTE INTERVALS. THE AUTOMATIC TRENDS LOGS SHALL BE USER ADJUSTABLE.

- 10.5. ALARM/EVENT LOG
- ANY OBJECT IN THE SYSTEM SHALL BE CONFIGURABLE TO GENERATE AN ALARM WHEN TRANSITIONING IN AND OUT OF A NORMAL OR FAULT STATE.
 - ANY OBJECT IN THE SYSTEM SHALL ALLOW THE ALARM LIMITS, WARNING LIMITS, STATES, AND REACTIONS TO BE CONFIGURED FOR EACH OBJECT IN THE SYSTEM.
 - AN ALARM/EVENT SHALL BE CAPABLE OF TRIGGERING ANY OF THE FOLLOWING ACTIONS:
 - ROUTE THE ALARM/EVENT TO ONE OR MORE ALARM LOG
 - THE ALARM MESSAGE SHALL INCLUDE THE NAME OF THE ALARM LOCATION, THE DEVICE THAT GENERATED THE ALARM, AND THE ALARM MESSAGE ITSELF.
 - ROUTE AN E-MAIL MESSAGE TO AN OPERATOR(S)
 - LOG A DATA POINT(S) FOR A PERIOD OF TIME
 - RUN A CUSTOM CONTROL PROGRAM
 - POINT CONTROL: USER SHALL HAVE THE OPTION TO SET THE UPDATE INTERVAL, MINIMUM ON/OFF TIME, EVENT NOTIFICATION, CUSTOM PROGRAMMING ON CHANGE OF EVENTS.
 - TIMED OVERRIDE: A STANDARD APPLICATION SHALL BE UTILIZED TO ENABLE/DISABLE TEMPERATURE CONTROL WHEN A USER SELECTS ON/CANCEL AT THE ZONE SENSOR, BUILDING OPERATOR INTERFACE, OR THE LOCAL OPERATOR DISPLAY. THE AMOUNT OF TIME THAT THE OVERRIDE TAKES PRECEDENCE WILL BE SELECTABLE FROM THE BUILDING OPERATOR INTERFACE.
 - ANTI-SHORT CYCLING: ALL BINARY OUTPUT POINTS SHALL BE PROTECTED FROM SHORT CYCLING

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11. BUILDING CONTROLLERS
- THERE SHALL BE ONE OR MORE INDEPENDENT, STANDALONE MICROPROCESSOR BASED SYSTEM CONTROLLERS TO MANAGE THE GLOBAL STRATEGIES DESCRIBED IN APPLICATION AND CONTROL SOFTWARE SECTION.
 - THE SYSTEM CONTROLLER SHALL HAVE SUFFICIENT MEMORY TO SUPPORT ITS OPERATING SYSTEM, DATABASE, AND PROGRAMMING REQUIREMENTS.
 - THE CONTROLLER SHALL PROVIDE A USER COMMUNICATIONS PORT FOR CONNECTION TO A PC.
 - THE OPERATING SYSTEM OF THE CONTROLLER SHALL MANAGE THE INPUT AND OUTPUT COMMUNICATIONS SIGNALS TO ALLOW DISTRIBUTED CONTROLLERS TO SHARE REAL AND VIRTUAL POINT INFORMATION AND ALLOW CENTRAL MONITORING AND ALARMS.
 - SYSTEM CONTROLLERS SHALL HAVE A REAL TIME CLOCK.
 - DATA SHALL BE SHARED BETWEEN NETWORKED SYSTEM CONTROLLERS.
 - THE SYSTEM CONTROLLER SHALL CONTINUALLY CHECK THE STATUS OF ITS PROCESSOR AND MEMORY CIRCUITS. IF AN ABNORMAL OPERATION IS DETECTED, THE CONTROLLER SHALL:
 - ASSUME A PREDETERMINED FAILURE MODE.
 - GENERATE AN ALARM NOTIFICATION.
 - CREATE A RETRIEVABLE FILE OF THE STATE OF ALL APPLICABLE MEMORY LOCATIONS AT THE TIME OF THE FAILURE.
 - AUTOMATICALLY RESET THE SYSTEM CONTROLLER TO RETURN TO A NORMAL OPERATING MODE OF ENERGY AND PROGRAMMING REQUIREMENTS.
 - ENVIRONMENT: CONTROLLER HARDWARE SHALL BE SUITABLE FOR THE ANTICIPATED AMBIENT CONDITIONS. CONTROLLER USED IN UNCONDITIONED AMBIENT SHALL BE MOUNTED IN AN ENCLOSURE AND SHALL BE RATED FOR OPERATION AT -40° C TO 50° C [-40° F TO 122° F].

- CLOCK SYNCHRONIZATION.
 - SYSTEM CONTROLLERS SHALL BE ABLE TO SYNCHRONIZE WITH A NTP SERVER FOR AUTOMATIC TIME SYNCHRONIZATION.
 - SYSTEM CONTROLLERS SHALL BE ABLE TO ACCEPT A BACNET TIME SYNCHRONIZATION COMMAND FOR AUTOMATIC TIME SYNCHRONIZATION.
 - SYSTEM CONTROLLERS SHALL AUTOMATICALLY ADJUST FOR DAYLIGHT SAVINGS TIME IF APPLICABLE.
- SERVICEABILITY.
 - PROVIDE DIAGNOSTIC LEADS FOR POWER, COMMUNICATIONS, AND PROCESSOR.
 - THE SYSTEM CONTROLLER SHALL HAVE A DISPLAY ON THE MAIN BOARD THAT INDICATES THE CURRENT OPERATING MODE OF THE CONTROLLER.
 - SD CARD SHOULD BE PROVIDED AND USED FOR LOCAL BACKUP. IF LOCAL BACKUP THROUGH SD CARD OR SIMILAR DEVICE IS NOT AVAILABLE THEN PROVIDE OPERATOR WORKSTATION WITH SUFFICIENT MEMORY PROVIDE SCHEDULED BACKUPS OF THE SYSTEM. BAS SERVICE PROVIDER SHALL BE RESPONSIBLE FOR BACK UP DURING THE WARRANTY PERIOD.
 - WIRING CONNECTIONS SHALL BE MADE TO FIELD REMOVABLE, MODULAR TERMINAL CONNECTORS.
 - THE SYSTEM CONTROLLER SHALL UTILIZE STANDARD DIN MOUNTING METHODS FOR INSTALLATION AND REPLACEMENT.
 - MEMORY: THE SYSTEM CONTROLLER SHALL MAINTAIN ALL BIOS AND PROGRAMMING INFORMATION INDEPENDENTLY WITHOUT POWER TO THE SYSTEM CONTROLLER.
 - IMMUNITY TO POWER AND NOISE: CONTROLLER SHALL BE ABLE TO OPERATE AT 90% TO 110% OF NOMINAL VOLTAGE RATING AND SHALL PERFORM AN ORDERLY SHUT-DOWN BELOW 80% NOMINAL VOLTAGE.
 - BACNET TEST LABS (BTL) LISTING: EACH SYSTEM CONTROLLER SHALL BE LISTED AS A BUILDING CONTROLLER (B-BC) BY THE BACNET TEST LABS WITH A MINIMUM BACNET PROTOCOL REVISION OF 14.

12. CONTROL VALVES
- CLOSE-OFF (DIFFERENTIAL) PRESSURE RATINGS: VALVE ACTUATOR AND TRIM SHALL BE FURNISHED TO PROVIDE THE FOLLOWING MINIMUM CLOSE-OFF PRESSURE RATINGS:
 - WATER VALVES: TWO-WAY: 150% OF TOTAL SYSTEM (PUMP) HEAD. THREE-WAY: SHALL BE INSTALLED IN MIXING CONFIGURATION, 2 IN:1 OUT. IN THE MIXING CONFIGURATION, ACTUATOR SHALL BE RATED FOR 100% OF TOTAL SYSTEM (PUMP) HEAD
 - STEAM VALVES: 150% OF OPERATING (INLET) PRESSURE.
 2. BODY AND TRIM STYLE AND MATERIALS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS FOR DESIGN CONDITIONS AND SERVICE SHOWN, WITH EQUAL PERCENTAGE PORTS FOR MODULATING APPLICATIONS.
 - TWO-POSITION SERVICE: LINE SIZE.
 - TWO-WAY MODULATING SERVICE: PRESSURE DROP SHALL BE EQUAL TO TWICE THE PRESSURE DROP THROUGH HEAT EXCHANGER (LOAD), 50% OF THE PRESSURE DIFFERENCE BETWEEN SUPPLY AND RETURN MAINS, OR 34.5 kPa (5 PSI), WHICHEVER IS GREATER. VALVE SHALL NOT BE LESS THAN 1 LINE SIZE SMALLER THAN DESIGN PIPING SIZE.
 - THREE-WAY MODULATING SERVICE: PRESSURE DROP EQUAL TO TWICE THE PRESSURE DROP THROUGH THE COIL EXCHANGER (LOAD), 34.5 kPa (5 PSI) MAXIMUM. VALVE SHALL NOT BE LESS THAN 1 LINE SIZE SMALLER THAN DESIGN PIPING SIZE.
 - VALVES DN 15 (1/2 IN.) THROUGH DN 50 (2 IN.) SHALL BE BRONZE BODY OR CAST BRASS AND CLASS 250, SPRING-LOADED, PTFE PACKING, QUICK OPENING FOR TWO-POSITION SERVICE. TWO-WAY VALVES TO HAVE REPLACEABLE COMPOSITION DISC OR STAINLESS STEEL BALL.
 - VALVES DN 65 (2 1/2 IN.) AND LARGER SHALL BE CAST IRON ANSI CLASS 125 WITH GUIDED PLUG AND PTFE PACKING.
 - COMMISSIONING REPORT: PROVIDE A ONE-TIME REPORT THAT LISTS ALL EQUIPMENT WITH THE UNIT CONFIGURATION AND PRESENT OPERATION.

- 12.4. POINTS REPORT: PROVIDE A REPORT THAT LISTS THE CURRENT VALUE OF ALL POINTS
10. CONTROLLER SOFTWARE
- FURNISH THE FOLLOWING APPLICATIONS SOFTWARE FOR BUILDING AND ENERGY MANAGEMENT: SOFTWARE APPLICATIONS SHALL RESIDE AND RUN IN THE SYSTEM CONTROLLERS. EDITING OF APPLICATIONS SHALL OCCUR AT THE BUILDING OPERATOR INTERFACE.
 - SCHEDULING: PROVIDE THE CAPABILITY TO SCHEDULE EACH OBJECT OR GROUP OF OBJECTS IN THE SYSTEM. EACH OF THESE SCHEDULES SHALL INCLUDE THE CAPABILITY FOR START, STOP, OPTIMAL START, OPTIMAL STOP, AND NIGHT ECONOMIZER ACTIONS. EACH SCHEDULE MAY CONSIST OF UP TO 100 EVENTS WHEN A GROUP OF OBJECTS ARE SCHEDULED TOGETHER. PROVIDE THE CAPABILITY TO DEFINE ADVANCES AND DELAYS FOR EACH MEMBER. EACH SCHEDULE SHALL CONSIST OF THE FOLLOWING:
 - WEEKLY SCHEDULE: PROVIDE SEPARATE SCHEDULES FOR EACH DAY OF THE WEEK.
 - EXCEPTION SCHEDULES: PROVIDE THE ABILITY FOR THE OPERATOR TO DESIGNATE ANY DAY OF THE YEAR AS AN EXCEPTION SCHEDULE. THIS EXCEPTION SCHEDULE SHALL OVERRIDE THE STANDARD SCHEDULE FOR THAT DAY. EXCEPTION SCHEDULES MAY BE DEFINED UP TO A YEAR IN ADVANCE. ONCE AN EXCEPTION SCHEDULE IS EXECUTED IT WILL BE DISCARDED AND REPLACED BY THE STANDARD SCHEDULE FOR THAT DAY OF THE WEEK.
 - HOLIDAY SCHEDULES: PROVIDE THE CAPABILITY FOR THE OPERATOR TO DEFINE UP TO 99 SPECIAL OR HOLIDAY SCHEDULES. THESE SCHEDULES MAY BE PLACED ON THE SCHEDULING CALENDAR AND WILL BE REPEATED EACH YEAR. THE OPERATOR SHALL BE ABLE TO DEFINE THE LENGTH OF EACH HOLIDAY PERIOD.
 - OPTIMAL START: THE SCHEDULING APPLICATION OUTLINED ABOVE SHALL SUPPORT AN OPTIMAL START ALGORITHM. THIS SHALL CALCULATE THE THERMAL CHARACTERISTICS OF A ZONE AND START THE EQUIPMENT PRIOR TO OCCUPANCY TO ACHIEVE THE DESIRED SPACE TEMPERATURE AT THE SPECIFIED OCCUPANCY TIME. THE ALGORITHM SHALL CALCULATE SEPARATE SETS OF HEATING AND COOLING RATES FOR ZONES THAT HAVE BEEN UNOCCUPIED FOR LESS THEN AND GREATER THAN 24 HOURS. PROVIDE THE ABILITY TO MODIFY THE START ALGORITHM BASED ON AIR TEMPERATURE. PROVIDE AN EARLY START LIMIT IN MINUTES TO PREVENT THE SYSTEM FROM STARTING BEFORE AN OPERATOR DETERMINED TIME LIMIT.

- 14.1. TEMPERATURE SENSORS SHALL BE RTD OR THERMISTOR.
- TEMPERATURE SENSORS SHALL BE SINGLE POINT OR AVERAGING AS SHOWN. AVERAGING SENSORS SHALL BE A MINIMUM OF 1.5 M (5 FT) IN LENGTH PER 1 M2 (10 FT2) OF DUCT CROSS SECTION.
 - IMMERSION SENSORS SHALL BE PROVIDED WITH A SEPARABLE STAINLESS STEEL WELT. PRESSURE RATING OF WELT IS TO BE CONSISTENT WITH THE SYSTEM PRESSURE IN WHICH IT IS TO BE INSTALLED. THE WELT MUST WITHSTAND THE FLOW VELOCITIES IN THE PIPE.
 - SPACE SENSORS SHALL BE EQUIPPED WITH SETPOINT ADJUSTMENT, OVERRIDE SWITCH, DISPLAY, AND/OR COMMUNICATION PORT AS SHOWN ON PLANS.
 - PROVIDE MATCHED TEMPERATURE SENSORS FOR DIFFERENTIAL TEMPERATURE MEASUREMENT.
15. LOW LIMIT THERMOSTATS
- SAFETY LOW LIMIT THERMOSTATS SHALL BE VAPOR PRESSURE TYPE WITH AN ELEMENT 6M (20 FT) MINIMUM LENGTH. ELEMENT SHALL RESPOND TO THE LOWEST TEMPERATURE SENSIBLY BY ANY 30 CM (1 FT) MINIMUM LENGTH. THE LOW-LIMIT THERMOSTAT SHALL BE MANUAL RESET ONLY.
 - LOW LIMIT SHALL BE MANUAL RESET ONLY.

16. RELAYS
- CONTROL RELAYS SHALL BE UL LISTED PLUG-IN TYPE WITH DUST COVER AND LED "ENERGIZED" INDICATOR. CONTACT RATING, CONFIGURATION, AND COIL VOLTAGE SHALL BE SUITABLE FOR APPLICATION.
 - TIME DELAY RELAYS SHALL BE UL LISTED SUBSTATE PLUG-IN TYPE WITH ADJUSTABLE TIME DELAY. DELAY SHALL BE ADJUSTABLE ±20% (MINIMUM) FROM SETPOINT SHOWN ON PLANS. CONTACT RATINGS, CONFIGURATION, AND COIL VOLTAGE SHALL BE SUITABLE FOR APPLICATION. PROVIDE NEMA 1 ENCLOSURES WHEN NOT INSTALLED IN LOCAL CONTROL PANEL.
17. CURRENT SWITCHES
- CURRENT OPERATED SWITCHES SHALL BE SELF-POWERED, SOLID STATE WITH ADJUSTABLE TRIP CURRENT. THE SWITCHES SHALL BE SELECTED TO MATCH THE CURRENT OF THE APPLICATION AND OUTPUT REQUIREMENTS OF THE DDC SYSTEM.
 - DIFFERENTIAL PRESSURE TYPE SWITCHES (AIR OR WATER SERVICE)
- UL LISTED, SPDT SNAP-ACTION, PILOT DUTY RATED (125 VA MINIMUM), NEMA 1 ENCLOSURE, WITH SCALE RANGE AND DIFFERENTIAL SUITABLE FOR INTENDED APPLICATION OR AS SHOWN.
19. COORDINATION
- SITE
 - WHERE THE MECHANICAL WORK WILL BE INSTALLED IN CLOSE PROXIMITY TO, OR WILL INTERFERE WITH, WORK OF OTHER TRADES, THE CONTRACTOR SHALL ASSURE WORKING OUT SPACE CONDITIONS TO MAKE A SATISFACTORY ADJUSTMENT. IF THE CONTRACTOR INSTalls HIS WORK BEFORE COORDINATING WITH OTHER TRADES, SO AS TO CAUSE ANY INTERFERENCE WITH WORK OF OTHER TRADES, THE CONTRACTOR SHALL MAKE THE NECESSARY CHANGES IN HIS/HER WORK TO CORRECT THE CONDITION WITHOUT EXTRA CHARGE.
 - COORDINATE AND SCHEDULE WORK WITH ALL OTHER WORK IN THE SAME AREA, OR WITH WORK THAT IS DEPENDENT UPON OTHER WORK, TO FACILITATE MUTUAL PROGRESS.

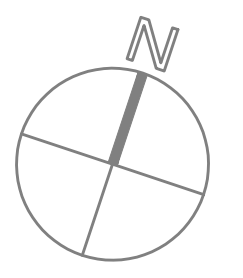
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- TEST AND BALANCE
 - FURNISH A SINGLE SET OF ALL TOOLS NECESSARY TO INTERFACE TO THE CONTROL SYSTEM FOR TEST AND BALANCE PURPOSES.
 - PROVIDE TRAINING IN THE USE OF THESE TOOLS. THIS TRAINING WILL BE PLANNED FOR A DURATION OF 4 HOURS.
 - PROVIDE A QUALIFIED TECHNICIAN TO ASSIST IN THE TEST AND BALANCE PROCESS, UNTIL THE FIRST TWO TERMINAL UNITS ARE BALANCED.
 - THE TOOLS USED DURING THE TEST AND BALANCE PROCESS SHALL BE RETURNED AT THE COMPLETION OF THE TESTING AND BALANCING.
- COORDINATION WITH CONTROLS SPECIFIED IN OTHER SECTIONS OR DIVISIONS. OTHER SECTIONS AND/OR DIVISIONS OF THIS SPECIFICATION INCLUDE CONTROLS AND CONTROL DEVICES THAT ARE TO BE PART OF OR INTERFACED TO THE CONTROL SYSTEM SPECIFIED IN THIS SECTION. INTEGRATE THESE CONTROLS INTO THE SYSTEM AND COORDINATE AS FOLLOWS:
 - COMMUNICATION MEDIA AND EQUIPMENT

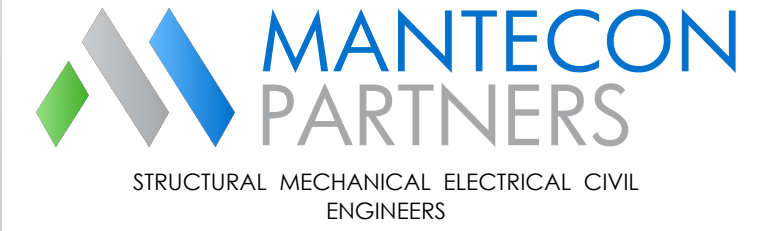


- DRAWING NOTES**
- CONNECT TO SITE SERVICE.
 - STORM WATER PIPE TO RUN AT HIGH LEVEL.
 - RAIN WATER LEADER FROM CANOPY WITH CAST IRON BASE AND CLEAN OUT (NO VISIBLE PVC).
 - FEDIMAT LOCATED AT ENTRANCE DOOR. COORDINATE SIZE AND TYPE WITH ARCHITECTS.

- GENERAL DRAWING NOTES**
- CONTRACTOR TO READ IN CONJUNCTION WITH ARCHITECTURAL, STRUCTURAL & ELECTRICAL DRAWINGS.
 - UNLESS OTHERWISE NOTED ALL FLOOR DRAIN, FUNNEL FLOOR DRAINS SHOWN ON THE DRAWING SHALL BE CONNECTED TO THE TRAP SEAL PRIMER. CONTRACTOR TO FIELD RUN ALL TUBING AS NECESSARY TO ACCOMMODATE. TUBING SIZE SHALL BE 3/8" ID MINIMUM.



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8	ISSUED FOR PERMIT COMMENTS	2024-08-27	J.S.
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2	ISSUED FOR 80% REVIEW	2022-12-23	J.L.
1	ISSUED FOR 60% REVIEW	2022-11-23	J.L.

GREASE INTERCEPTOR (GI) CALCULATION

GI-1
GREASE INTERCEPTOR CALCULATION:
OBC 7.4.4.3(8)
SERVIFY

2x SINGLE SINK: $\frac{2 \times 0.75' (45.72 \times 40.62 \times 20.32)}{60 \text{ seconds} \times 1000 \text{L/cm}^3} = 0.943 \text{L/s}$

TRIPLE SINK: $\frac{0.75' (3 \times 40.62 \times 35.56 \times 17.78)}{60 \text{ seconds} \times 1000 \text{L/cm}^3} = 0.964 \text{L/s}$

TOTAL: 1.907 L/S

SELECT A PROCEPTOR MODEL: GMC50-4 IN-SM
TOTAL LIQUID CAPACITY: 189.3L

GI-2
GREASE INTERCEPTOR CALCULATION:
OBC 7.4.4.3(8)
SERVIFY

DISHWASHER: 4GPM = 0.25 L/s (RESIDENTIAL)

TOTAL: .25 L/S

SELECT A PROCEPTOR MODEL: GMC50-4 IN-SM
TOTAL LIQUID CAPACITY: 189.3L

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

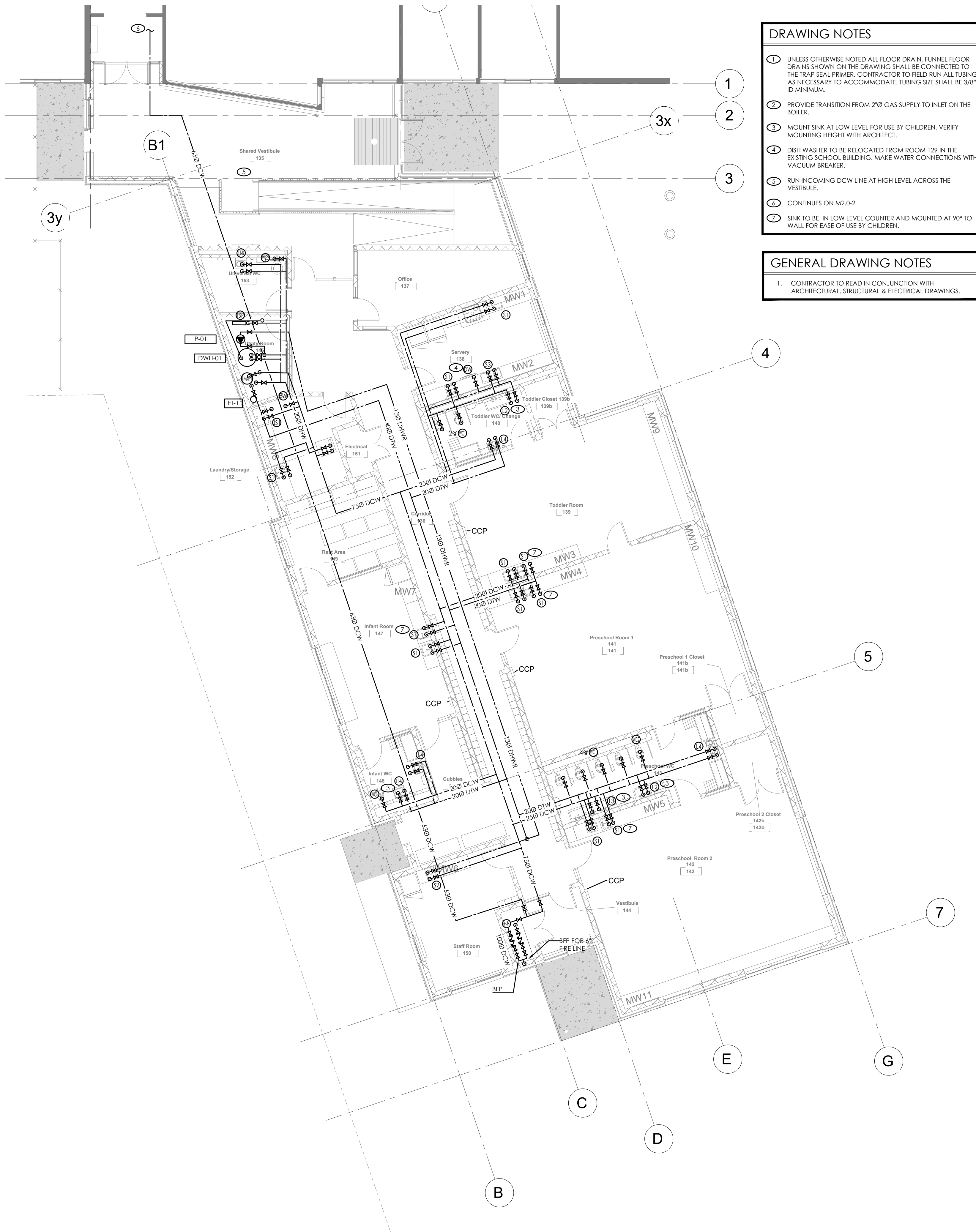
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
GROUND FLOOR PROPOSED DRAINAGE PLAN

DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M1.0
DATE: NOV 2022	PROJECT NUMBER: 22-058

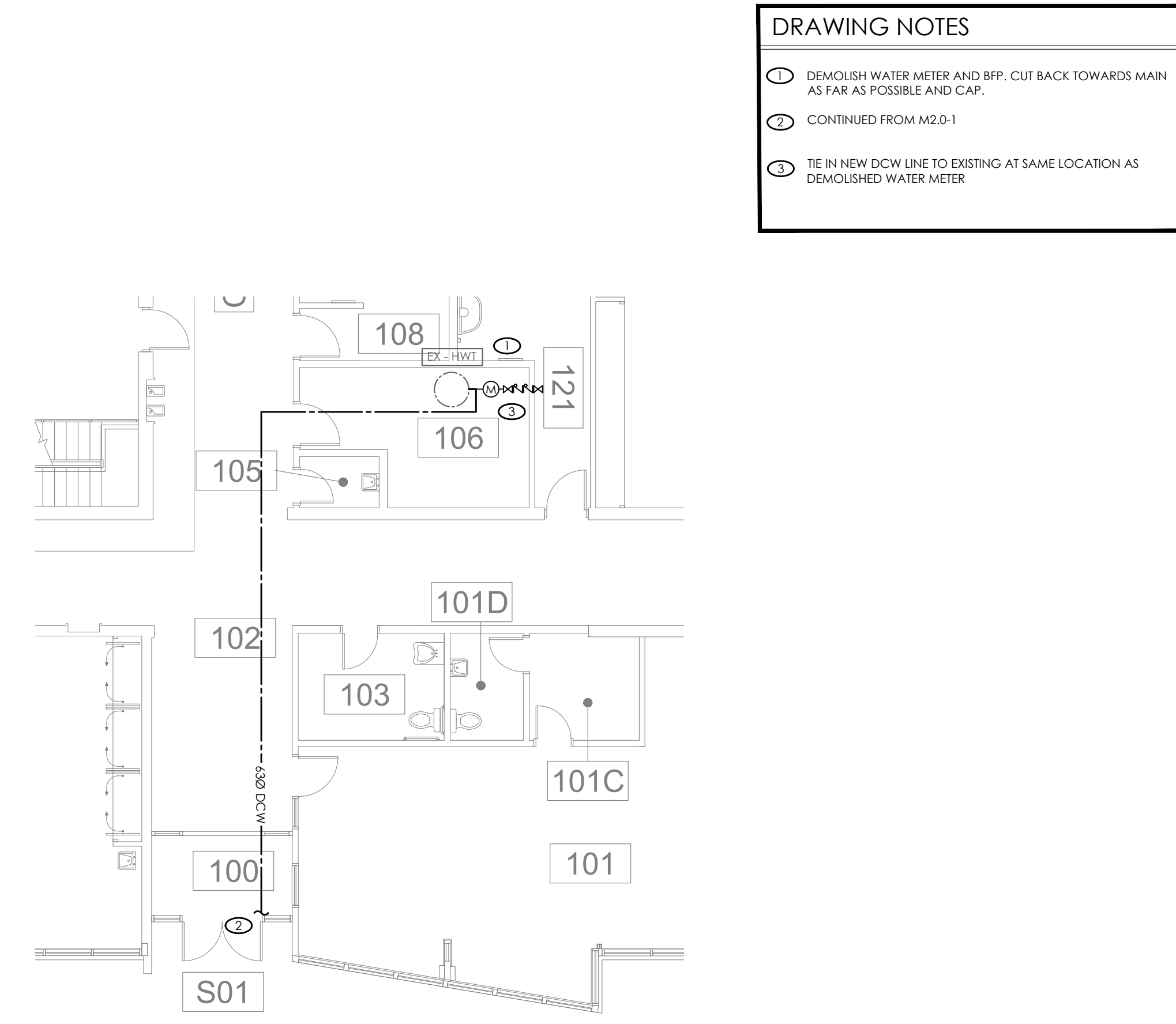
GROUND FLOOR PROPOSED DRAINAGE PLAN
SCALE: 1:100

File: J:\Drawings\22-058 - Ecole Elementaire L'Harmonie - Childcare Addition - Workshop Architecture\3 - Working Documents\M1.0_GROUND FLOOR PROPOSED DRAINAGE PLAN.dwg



- DRAWING NOTES**
- UNLESS OTHERWISE NOTED ALL FLOOR DRAIN, FUNNEL FLOOR DRAINS SHOWN ON THE DRAWING SHALL BE CONNECTED TO THE TRAP SEAL PRIMER. CONTRACTOR TO FIELD RUN ALL TUBING AS NECESSARY TO ACCOMMODATE. TUBING SIZE SHALL BE 3/8" ID MINIMUM.
 - PROVIDE TRANSITION FROM 2" Ø GAS SUPPLY TO INLET ON THE BOILER.
 - MOUNT SINK AT LOW LEVEL FOR USE BY CHILDREN. VERIFY MOUNTING HEIGHT WITH ARCHITECT.
 - DISH WASHER TO BE RELOCATED FROM ROOM 129 IN THE EXISTING SCHOOL BUILDING. MAKE WATER CONNECTIONS WITH VACUUM BREAKER.
 - RUN INCOMING DCW LINE AT HIGH LEVEL ACROSS THE VESTIBULE.
 - CONTINUES ON M2.0-2
 - SINK TO BE IN LOW LEVEL COUNTER AND MOUNTED AT 90° TO WALL FOR EASE OF USE BY CHILDREN.

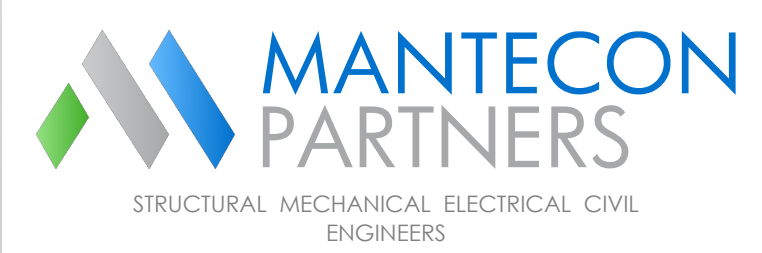
- GENERAL DRAWING NOTES**
- CONTRACTOR TO READ IN CONJUNCTION WITH ARCHITECTURAL, STRUCTURAL & ELECTRICAL DRAWINGS.



- DRAWING NOTES**
- DEMOLISH WATER METER AND BFP. CUT BACK TOWARDS MAIN AS FAR AS POSSIBLE AND CAP.
 - CONTINUED FROM M2.0-1
 - TIE IN NEW DCW LINE TO EXISTING AT SAME LOCATION AS DEMOLISHED WATER METER

2 EXISTING BUILDING DOMESTIC WATER PLAN
SCALE: 1:100

1 GROUND FLOOR PROPOSED PLUMBING PLAN
SCALE: 1:100



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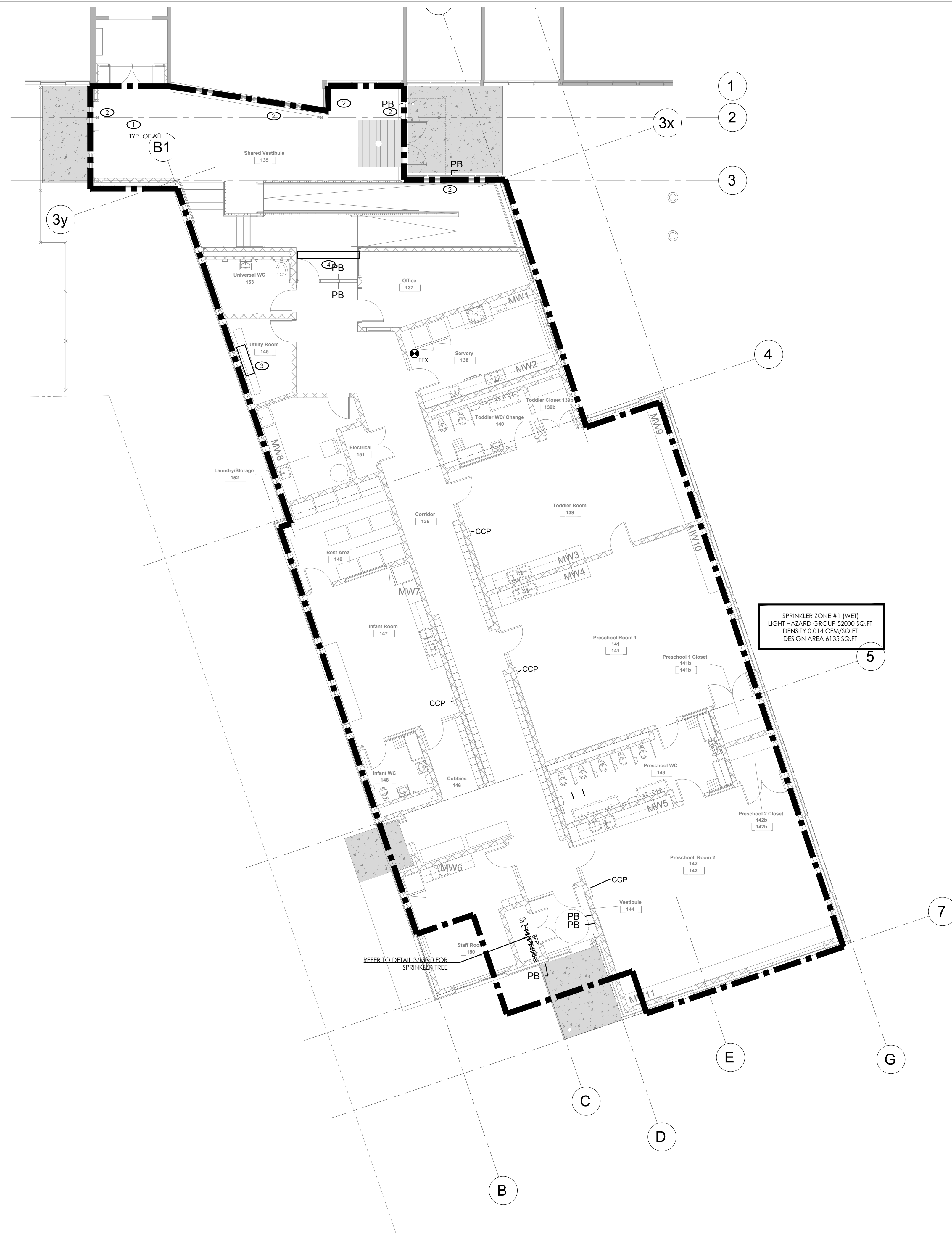
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

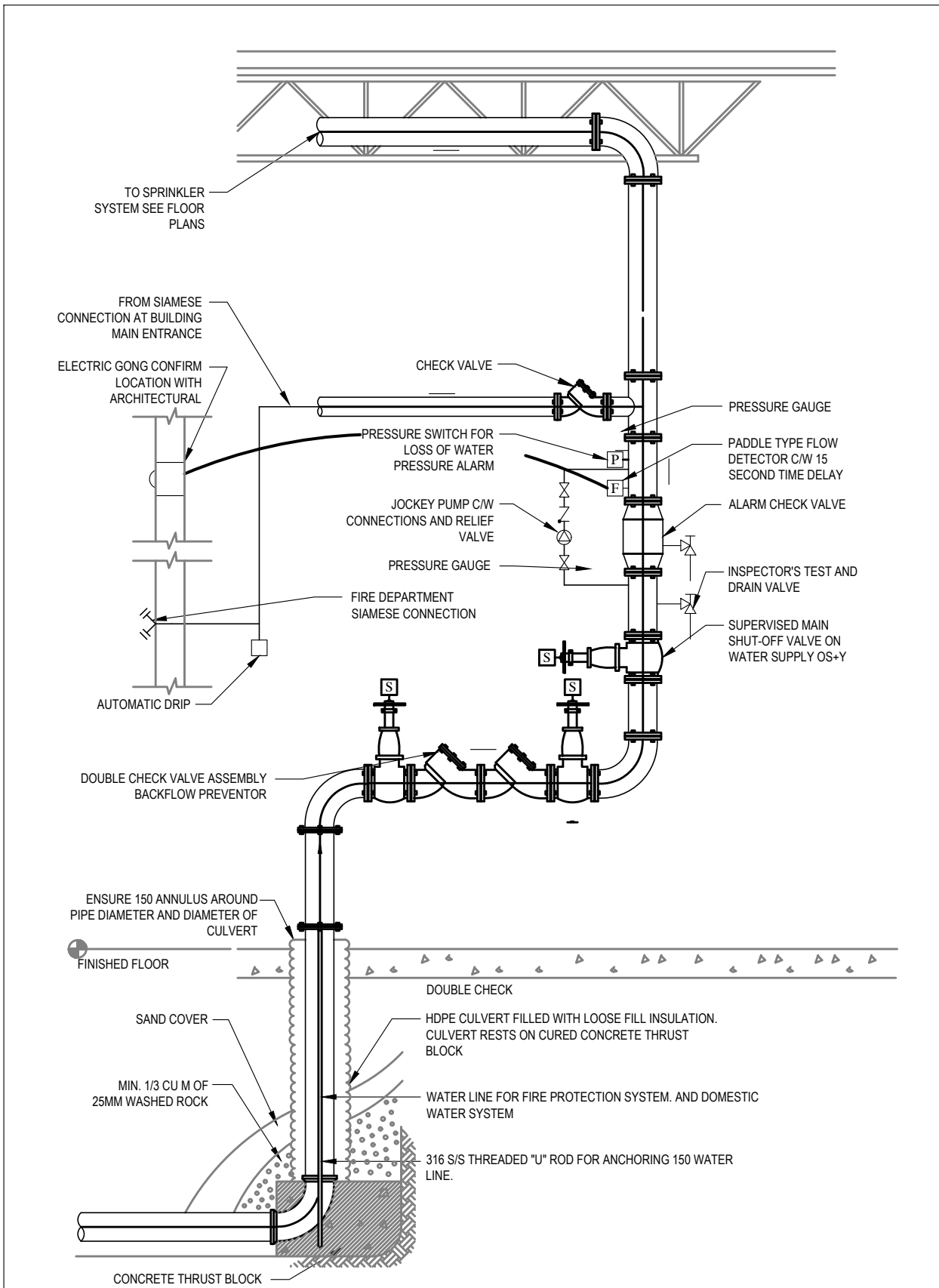
DRAWING TITLE:
GROUND FLOOR PROPOSED PLUMBING PLAN

DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M2.0
DATE: NOV 2022	PROJECT NUMBER: 22-058

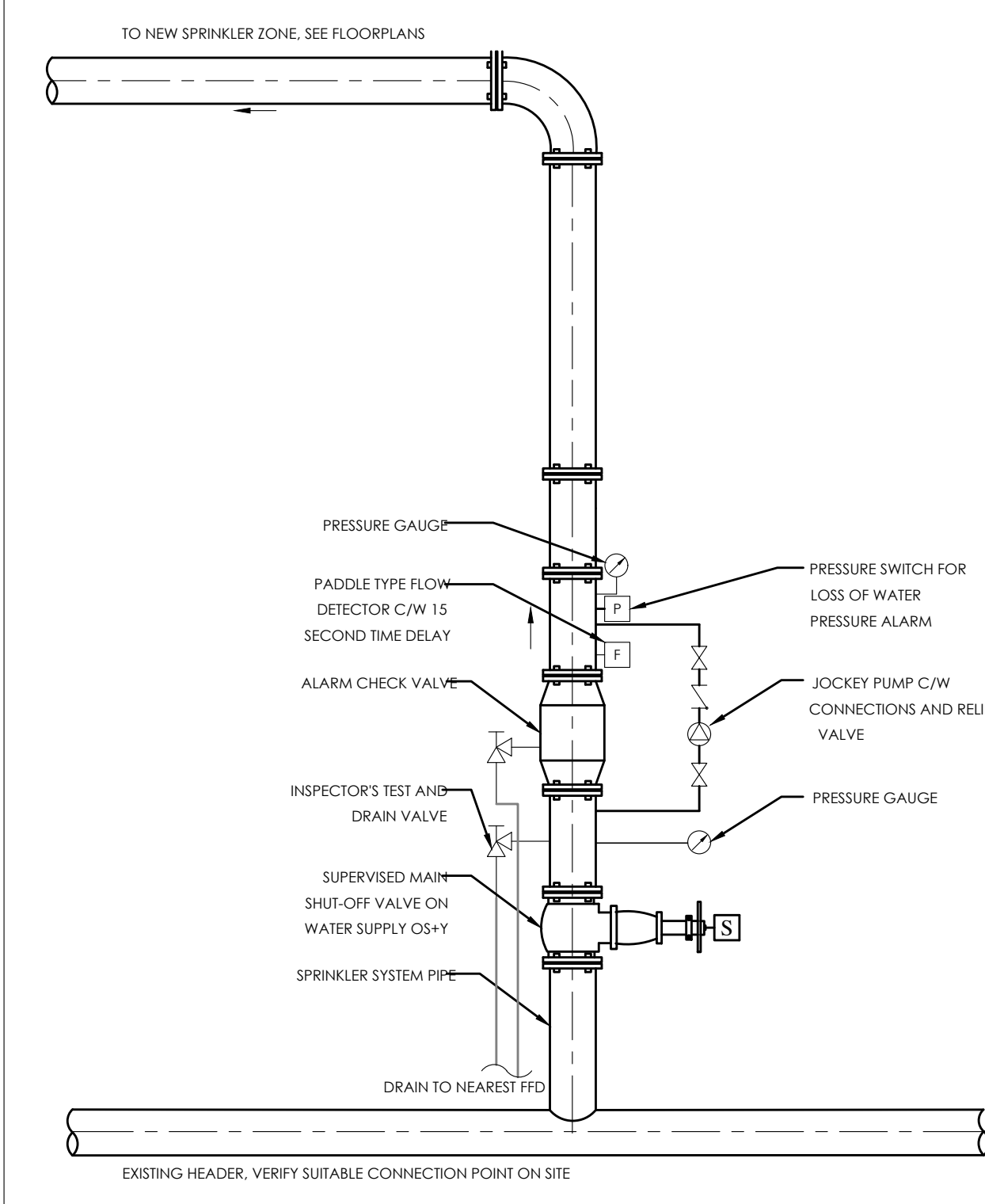


SPRINKLER ZONE #1 (WEI)
 LIGHT HAZARD GROUP 52000 SQ.FT
 DENSITY 0.014 CFWS/SQ.FT
 DESIGN AREA 6135 SQ.FT

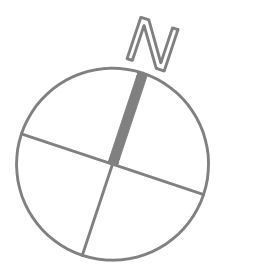
- DRAWING NOTES**
- ① INSTALL CONCEALED PENDANT TYPE SPRINKLER HEAD
 - ② PROVIDE WINDOW SPRINKLERS AT EXISTING GLAZING TO MAINTAIN 1-HR FIRE SEPARATION.
 - ③ INSTALL SPRINKLER TREE TO CONFORM WITH NFPA 13.
 - ④ INSTALL DELUGE SPRINKLERS TO CONFORM WITH NFPA 13.



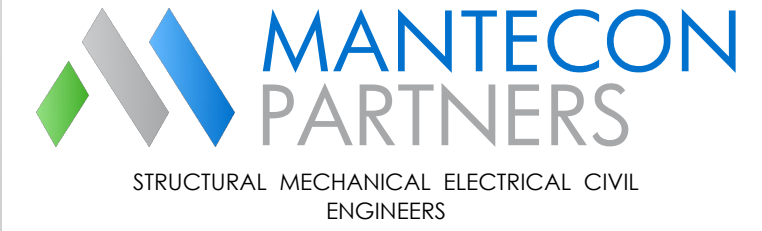
② WATER SERVICE SPRINKLER TREE DETAIL
 SCALE: N.T.S.



③ NEW ZONE SPRINKLER PIPING & ZONING DETAIL
 SCALE: N.T.S.



PROJECT NORTH



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CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
GROUND FLOOR PROPOSED FIRE PROTECTION PLAN

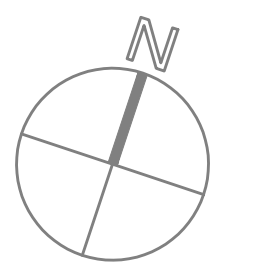
DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M3.0
DATE: NOV 2022	PROJECT NUMBER: 22-058

① GROUND FLOOR PROPOSED FIRE PROTECTION PLAN
 SCALE: 1:100

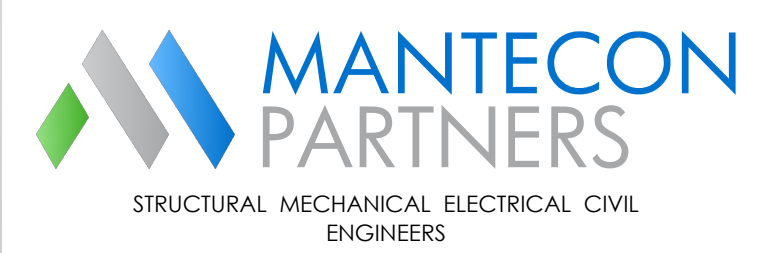


- DRAWING NOTES**
- ① PROVIDE ACCESS PANELS AT APPROX. LOCATION FOR VWT BOX IN DRYWALL CEILING. FINAL LOCATION TO BE DETERMINED ON-SITE. COORDINATE WITH ARCH.
 - ② FIRE DAMPERS TO HAVE A 1 HOUR RATING.
 - ③ PROVIDE NEW 1-1/2 HOUR FIRE WRAP AT KITCHEN EXHAUST DUCT. FIRE WRAP TO BE INSTALLED UP TO ROOF PENETRATION.
 - ④ RETURN DUCT FROM RTU IS TO BE AN OPEN ENDED DUCT INTO THE CEILING PLENUM. PROVIDE ACOUSTICAL LINED DUCTWORK FROM HORIZONTAL DISCHARGE AT THE RTU DOWN TO CEILING AND HORIZONTALLY APPROXIMATELY 10' INTO BUILDING ON ALL DUCT WORK.
 - ⑤ PROVIDE DRYER LINT TRAP IN EXHAUST LINE.

- GENERAL NOTES**
- 1. CONSTRUCTION OF KITCHEN EXHAUST HOOD MUST CONFORM TO NFPA 96.



PROJECT NORTH



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CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

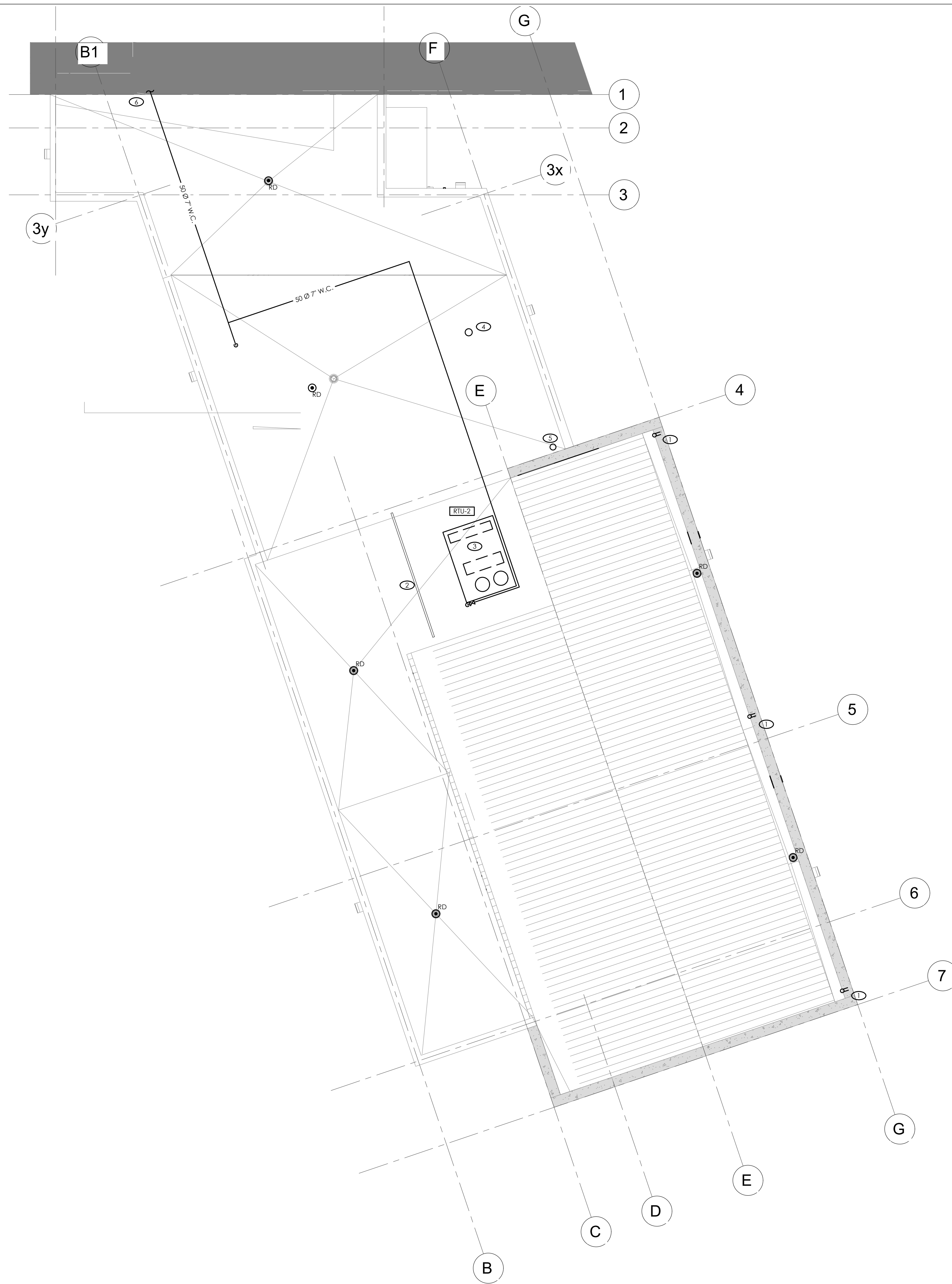
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
GROUND FLOOR PROPOSED HVAC PLAN

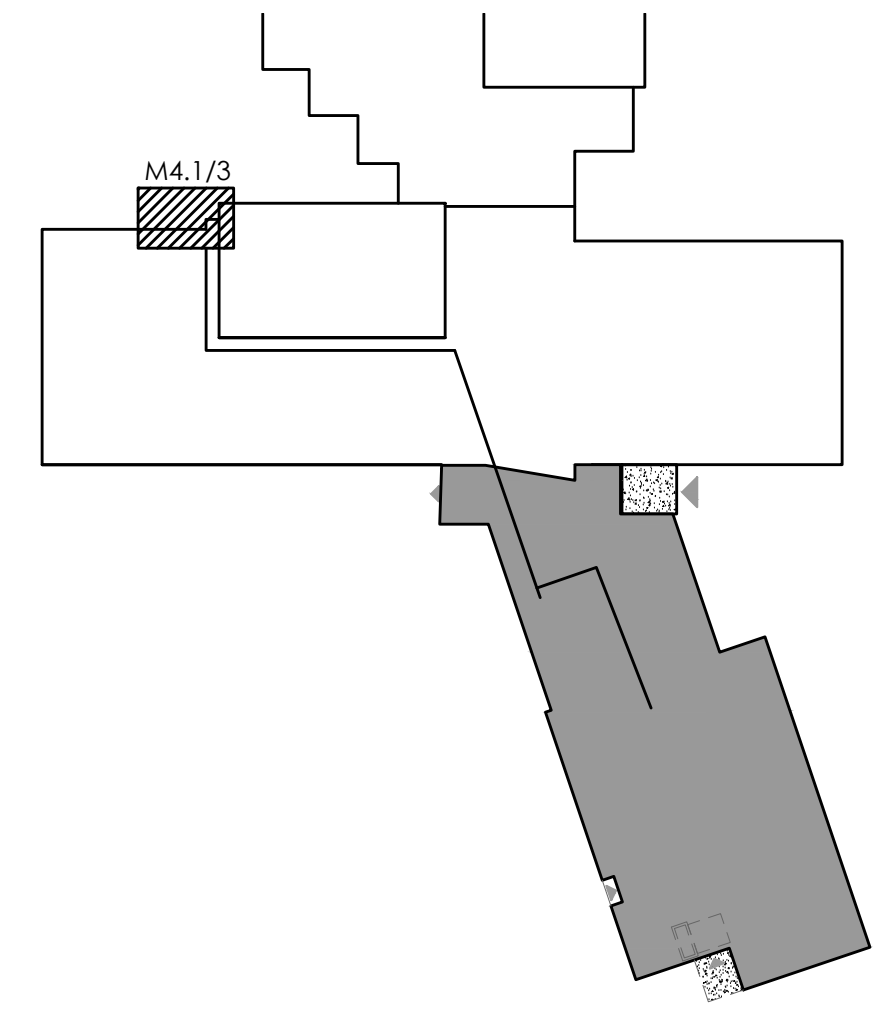
DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER:
DATE: NOV 2022	M4.0
PROJECT NUMBER: 22-058	

1 GROUND FLOOR PROPOSED HVAC PLAN
SCALE: 1:100

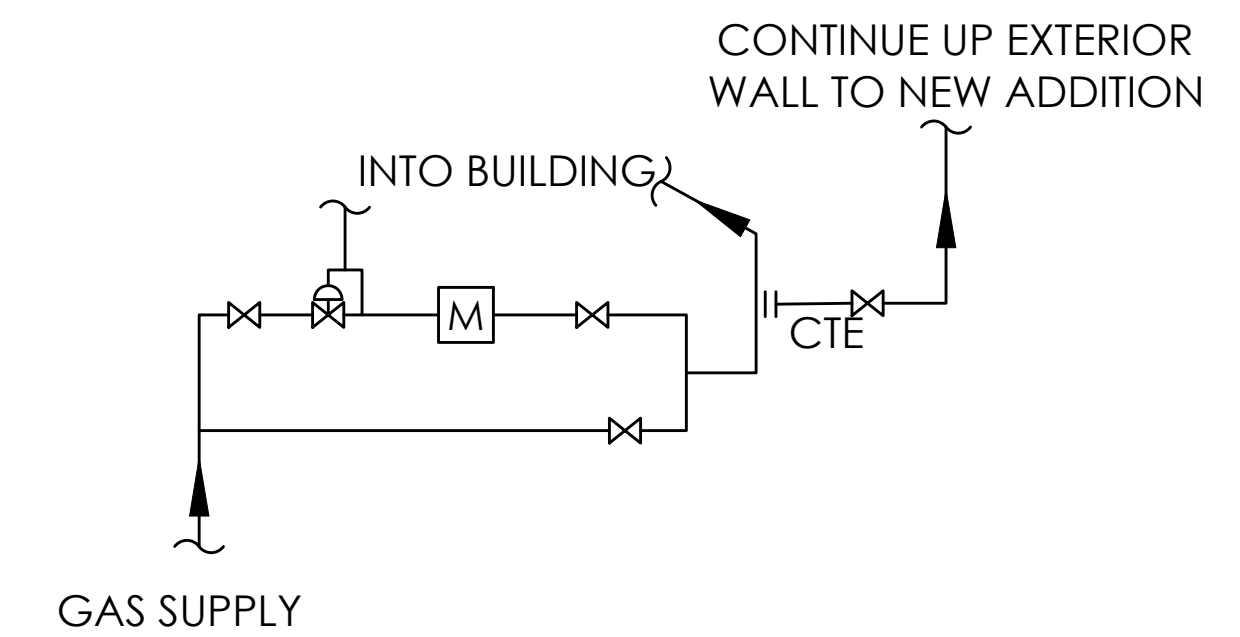
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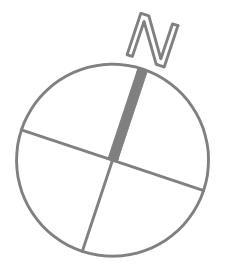
- DRAWING NOTES**
- 1 PROVIDE DOWNSPOUT FOR EAVESTROUGH BY OTHERS.
 - 2 INSTALL RTU ON MANUFACTURER'S ROOF CURB. PROVIDE INSULATION UNDER UNIT TO MATCH ROOF INSULATION THERMAL VALUES. COORDINATE INSTALLATION WITH ROOFING TRADE. PROVIDE FLASHING.
 - 3 PROVIDE NATURAL GAS TRANSITION FROM 50 Ø TO THE INLET SIZE OF RTU
 - 4 300 Ø ROOF PENETRATION FOR KITCHEN EXHAUST FAN ENSURE THE EXHAUST PENETRATION IS AT LEAST 3050MM FROM THE FRESH AIR INTAKE OF THE RTU.
 - 5 250 Ø ROOF VENT FOR WASHROOM EXHAUST SHALL BE AT LEAST 3050 MM FROM THE FRESH AIR INTAKE OF THE RTU.
 - 6 REFER TO DRAWING M4.1/2&3 FOR ROUTING OF GAS LINE AND CONNECTION AT THE EXISTING METERING STATION.



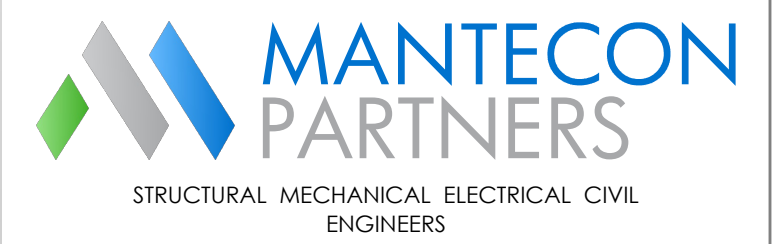
2 ROOF LEVEL GAS LINE ROUTE
SCALE: 1:800



3 GAS LINE CONNECTION
SCALE: N.T.S.



PROJECT NORTH



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CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

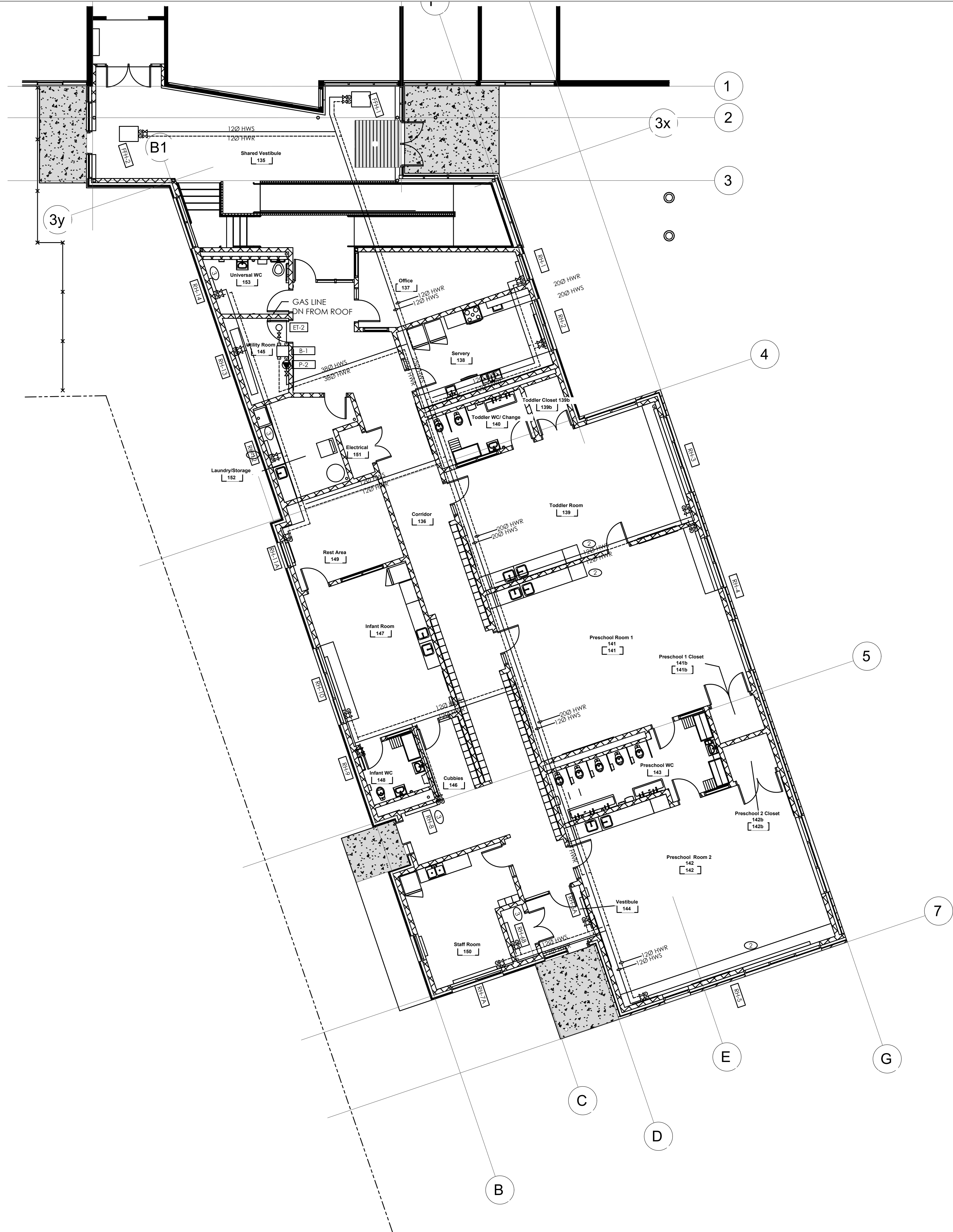
DRAWING TITLE:
ROOF LEVEL PROPOSED HVAC PLAN

DRAWN BY:
J.S. SCALE:
AS NOTED

CHECKED BY:
J.L. DRAWING NUMBER:

DATE:
NOV 2022 **M4.1**

PROJECT NUMBER:
22-058

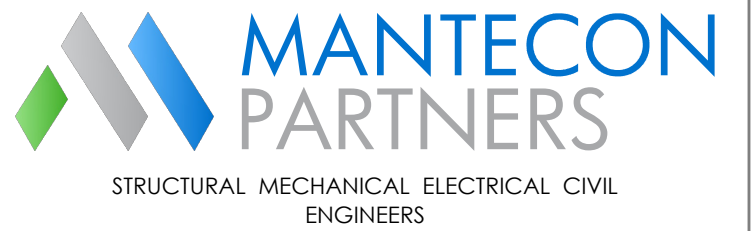


DRAWING NOTES

- 1 RUN PIPING IN CEILING FOLLOWING THE WALL OF THE CLASSROOM.
- 2 CEILING IN AREA IS SLOPED, PIPING TO FOLLOW ROOF LINE AT HIGH LEVEL.
- 3 LOCATED RADIATOR AT HIGH LEVEL.
- 4 RADIATOR TO BE ENCLOSED IN MILLWORK.



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CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
GROUND FLOOR PROPOSED HYDRONIC PLAN

DRAWN BY:
J.S.

SCALE:
AS NOTED

CHECKED BY:
J.L.

DRAWING NUMBER:

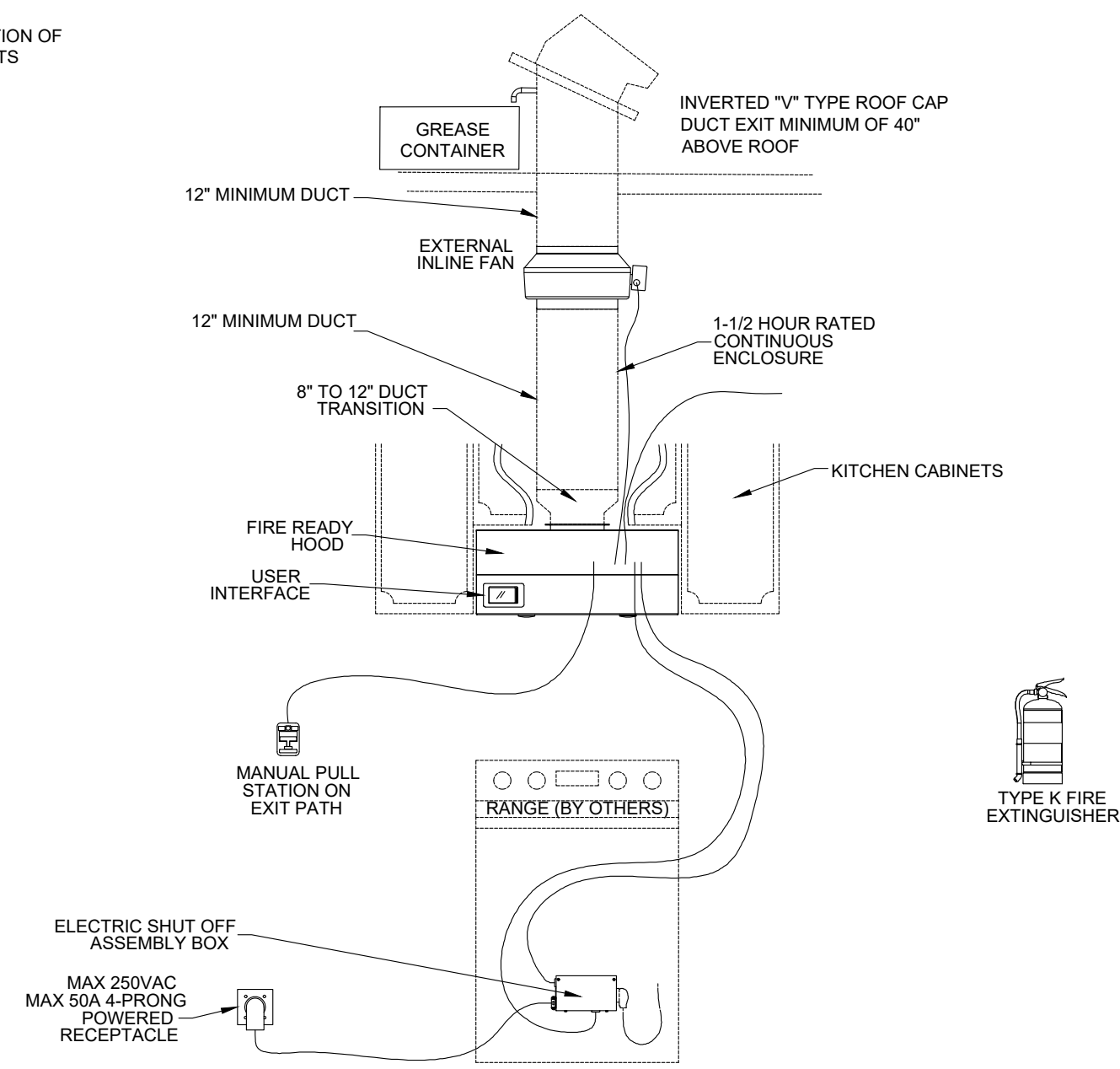
DATE:
NOV 2022

M4.5

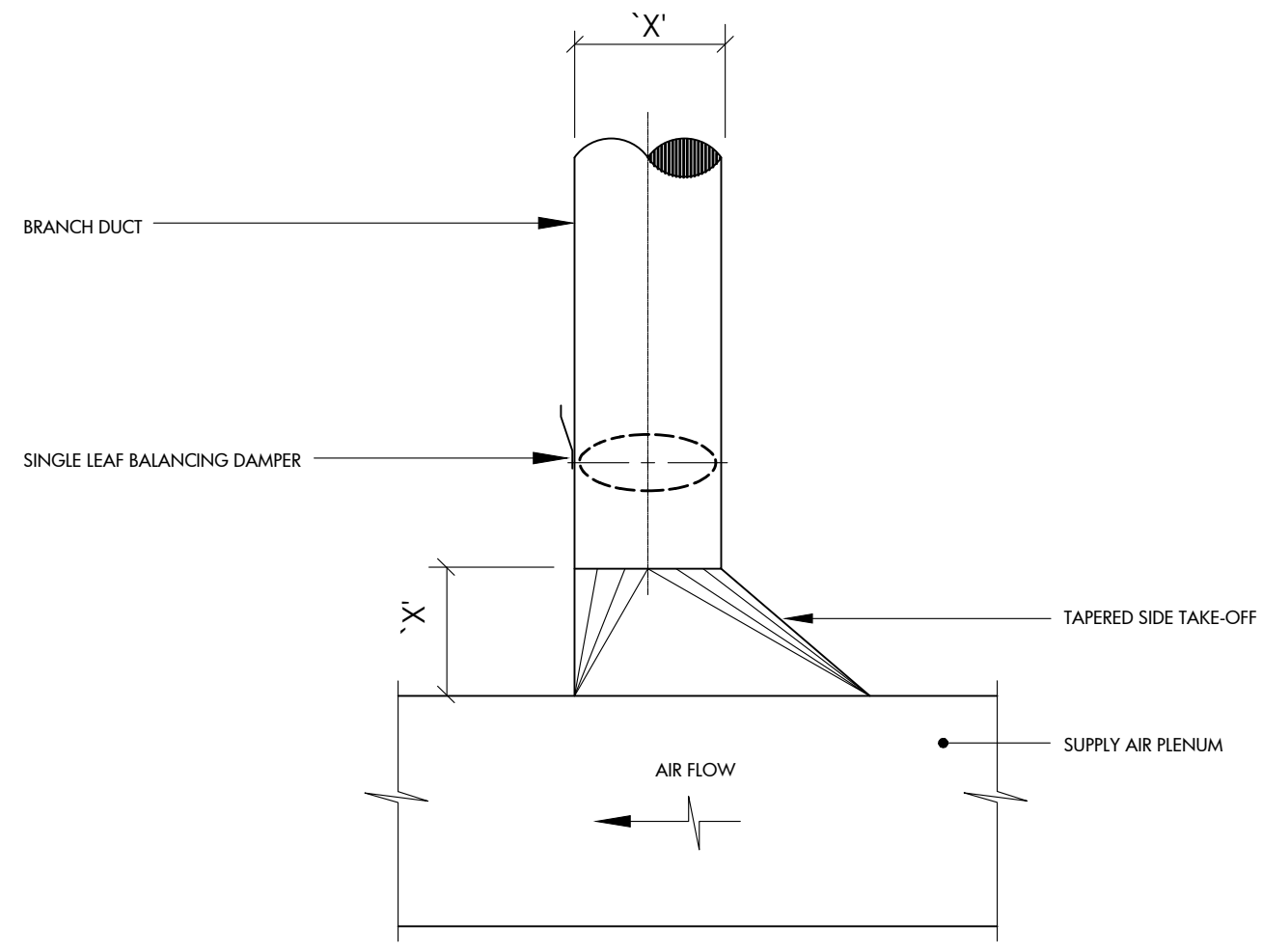
PROJECT NUMBER:
22-058

1 GROUND FLOOR PROPOSED HYDRONIC PLAN
SCALE: 1:100

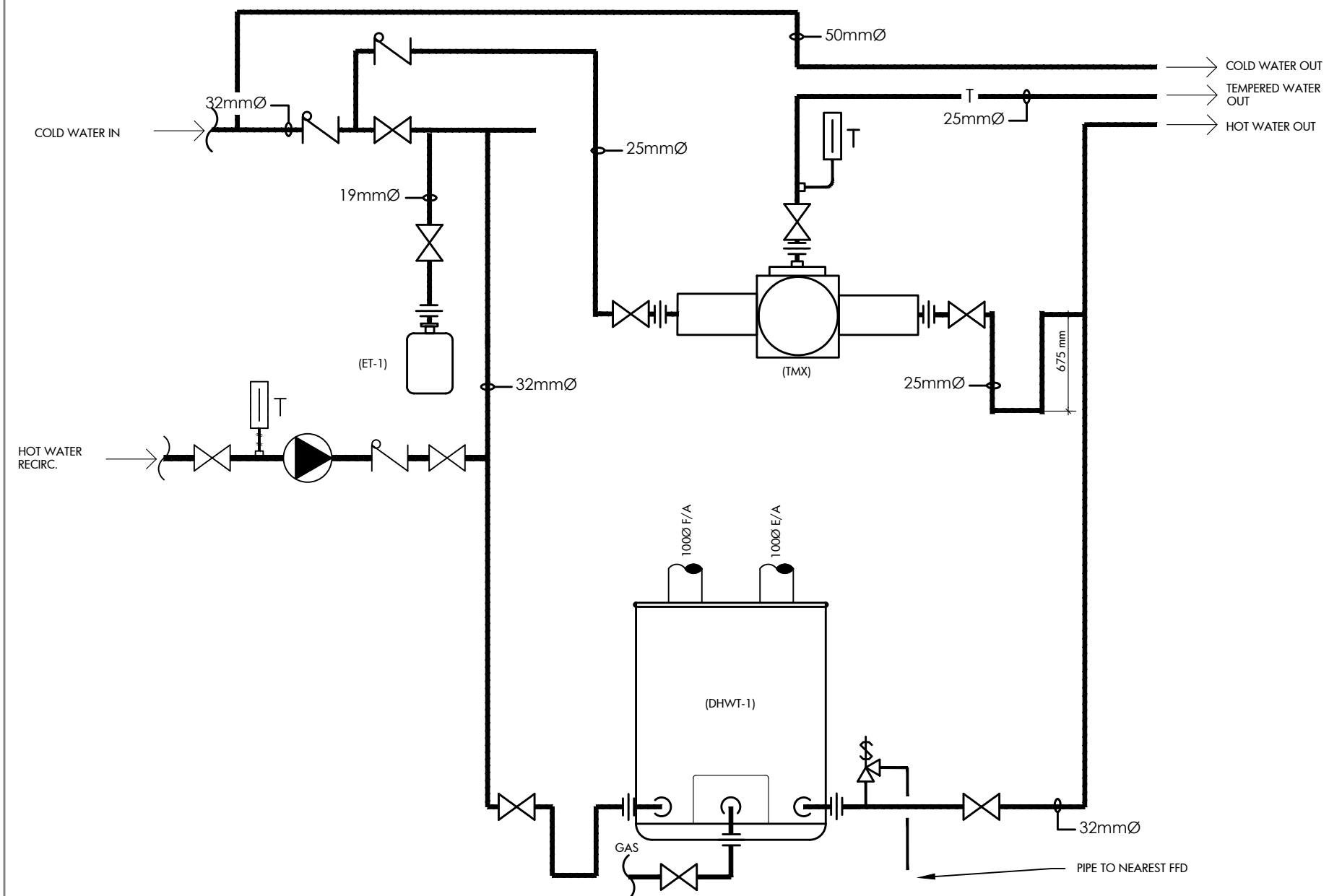
ENSURE CONSTRUCTION OF EXHAUST HOOD MEETS NFPA 96 STANDARDS



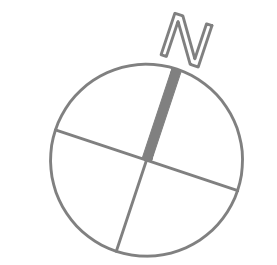
1 M5.0 N.T.S. DETAIL OF NFPA 96 EXHAUST HOOD



2 M5.0 N.T.S. DETAIL OF ROUND DUCT TAKE-OFF



3 M5.0 N.T.S. DETAIL OF GAS HOT WATER TANK C/W CENTRAL MIXING VALVE



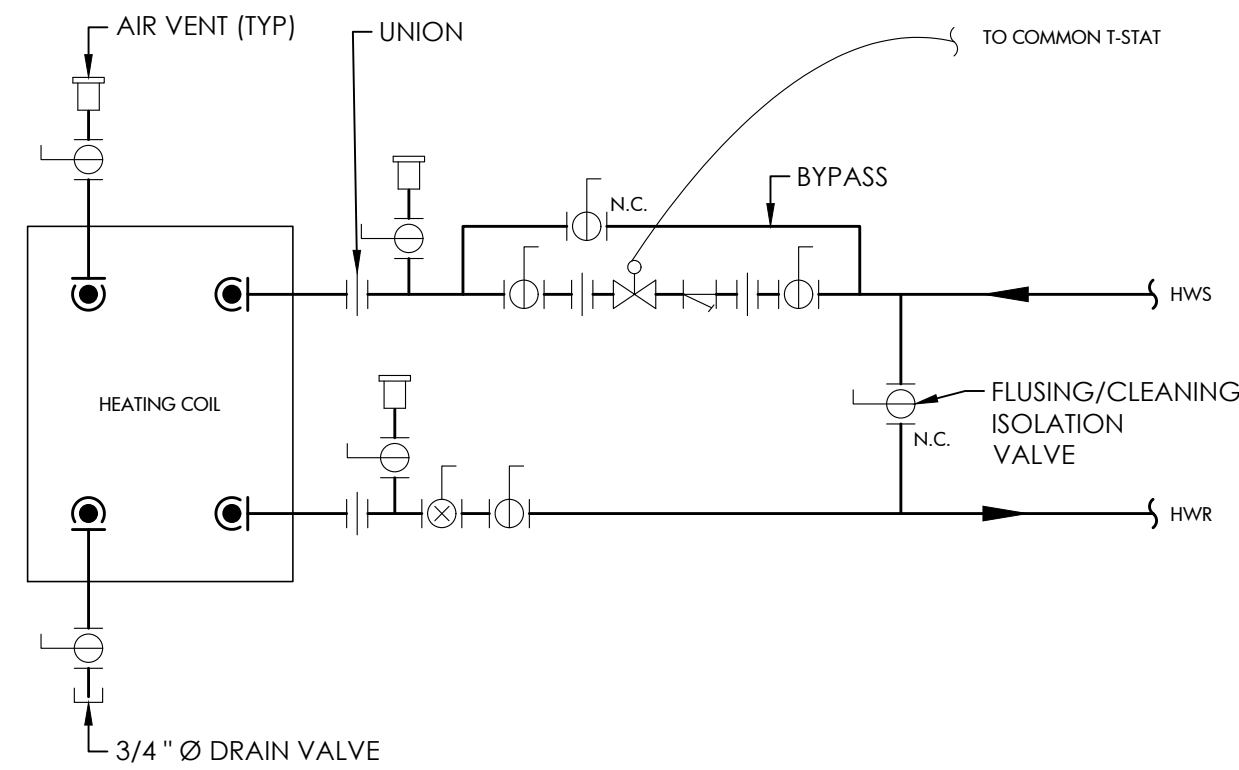
PROJECT NORTH



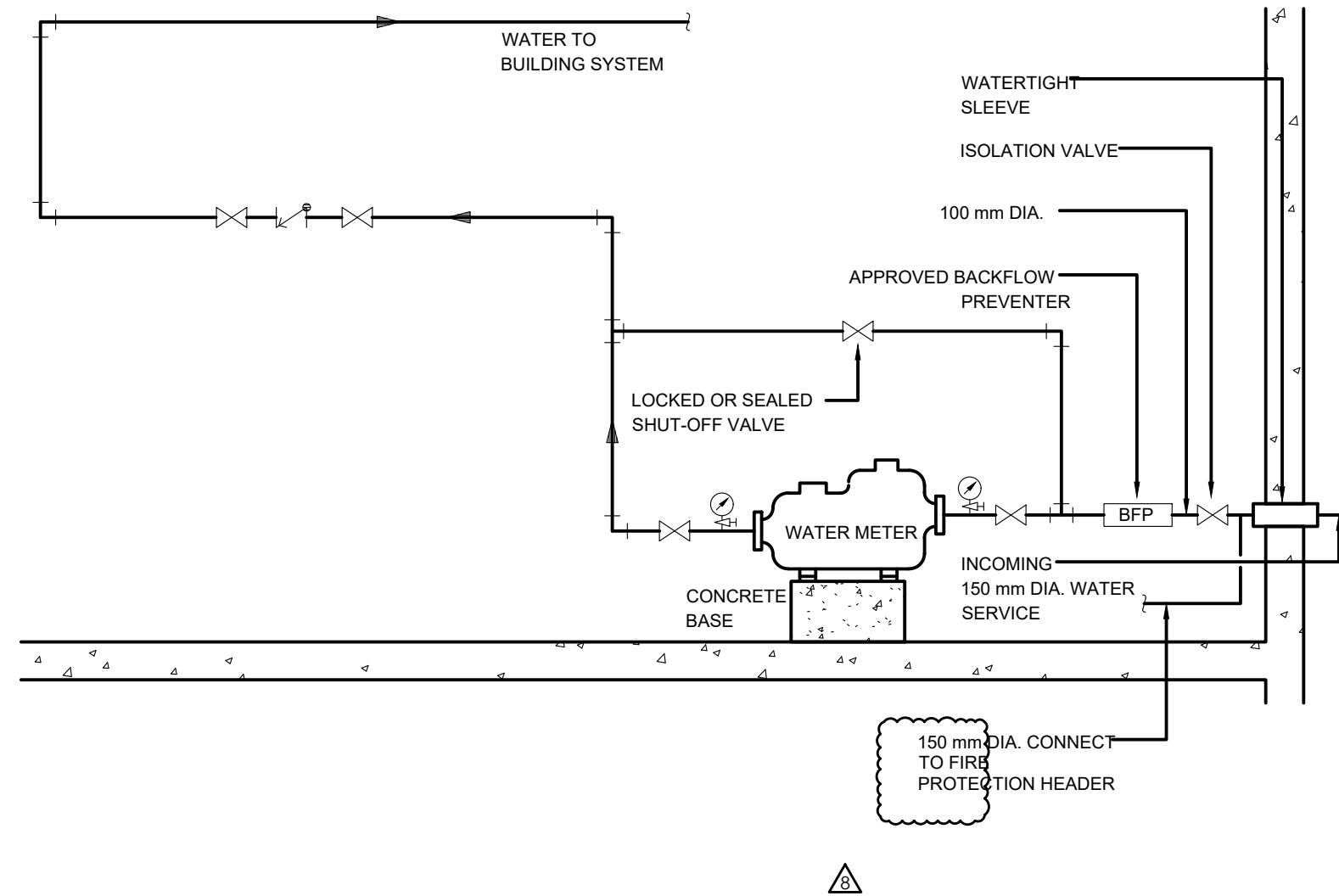
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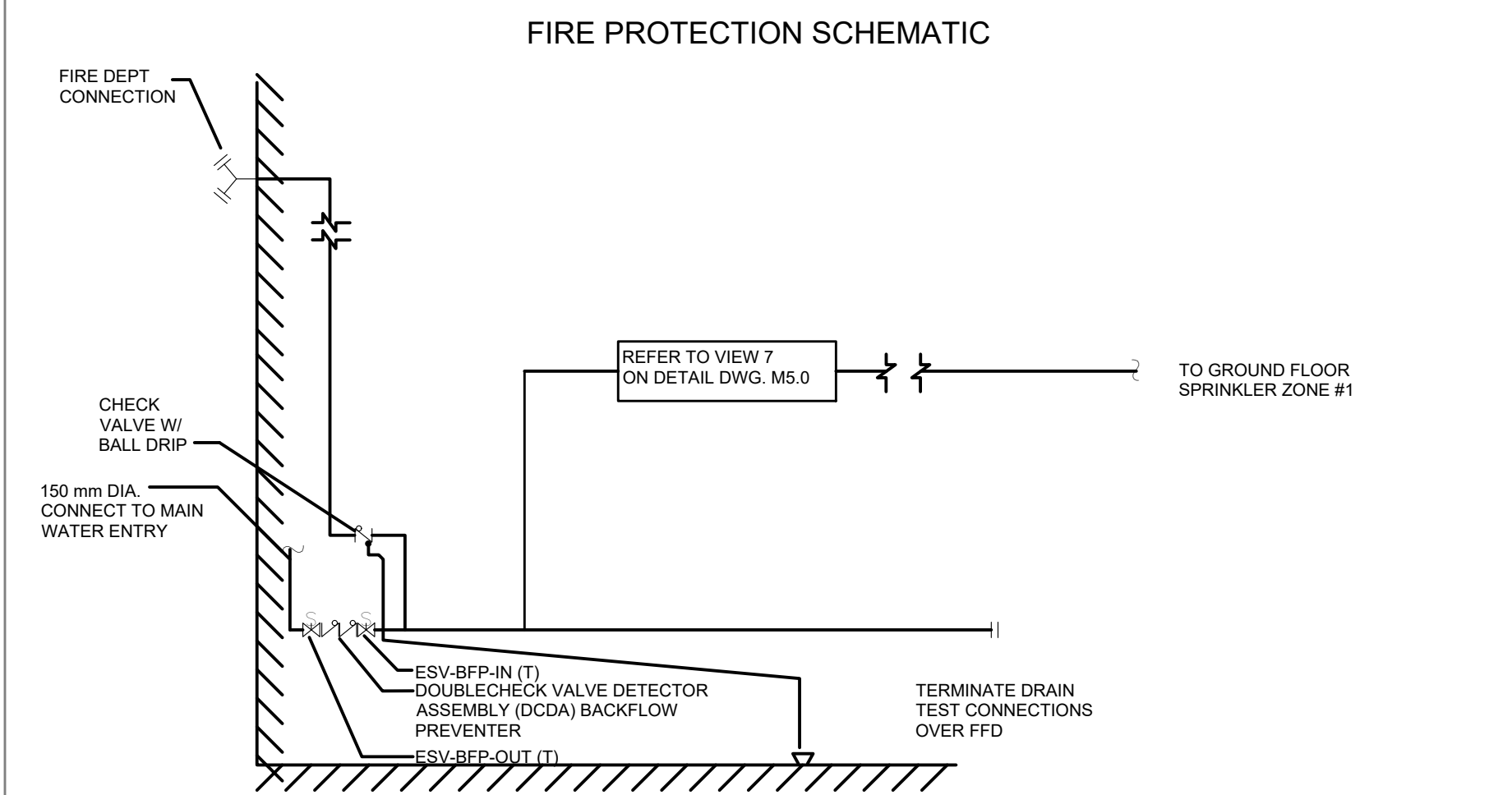
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	ISSUED		



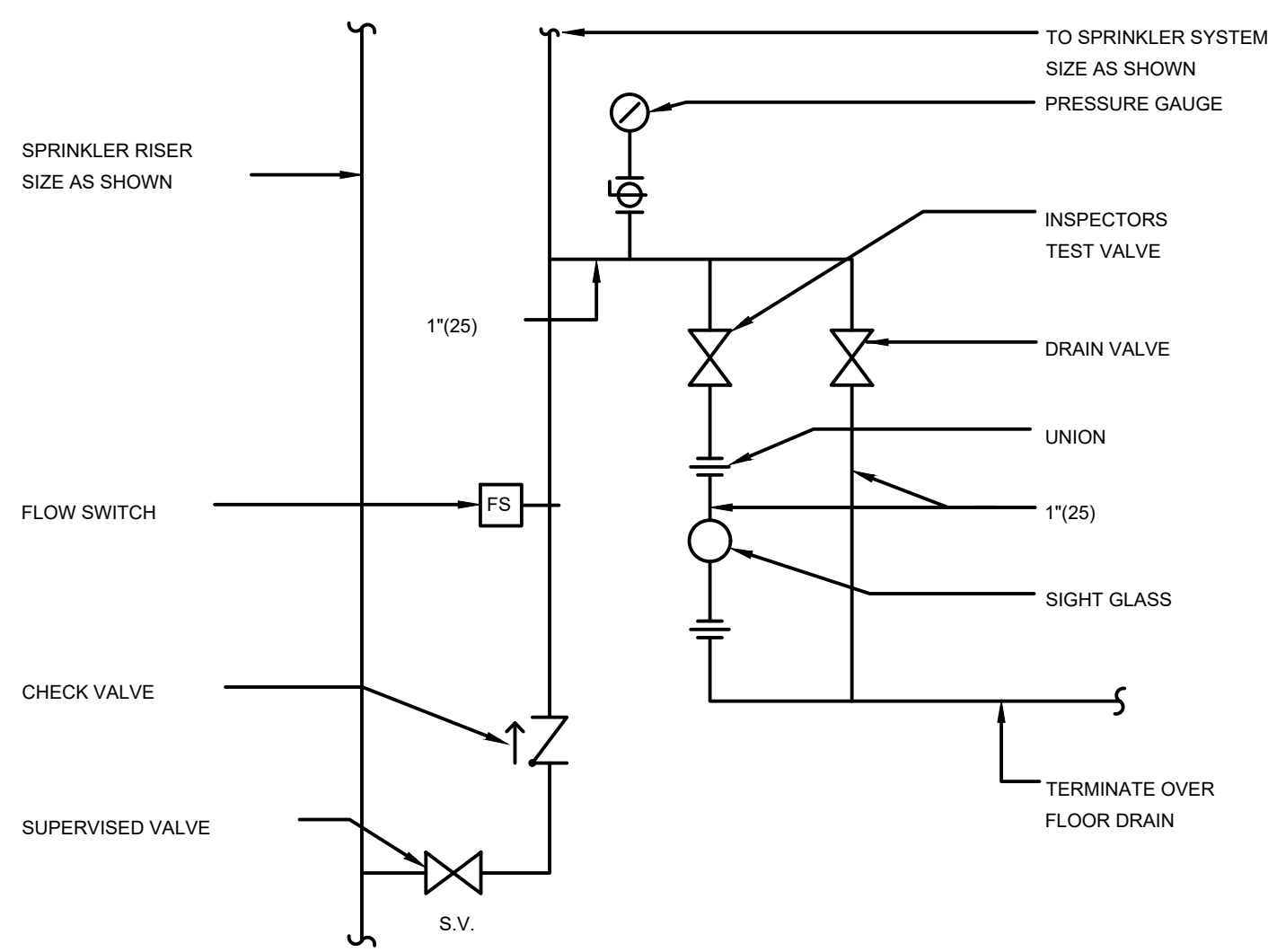
4 M5.0 N.T.S. DETAIL OF TYPICAL HEATING COIL PIPING ASSEMBLY WITH 2-WAY VALVE



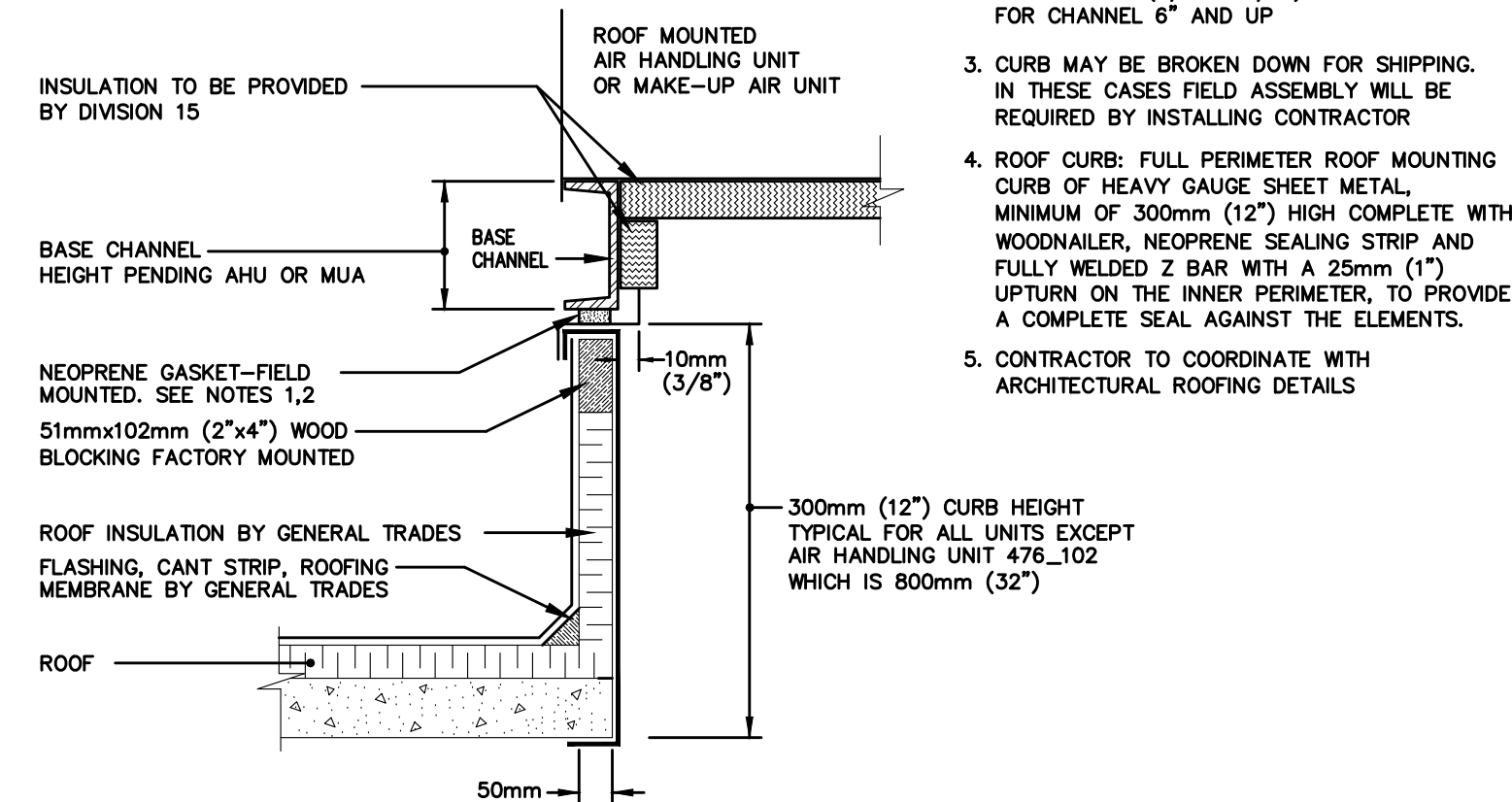
5 M5.0 N.T.S. DETAIL OF WATER ENTRY FLOW DIAGRAM



6 M5.0 N.T.S. DETAIL OF FIRE PROTECTION SCHEMATIC

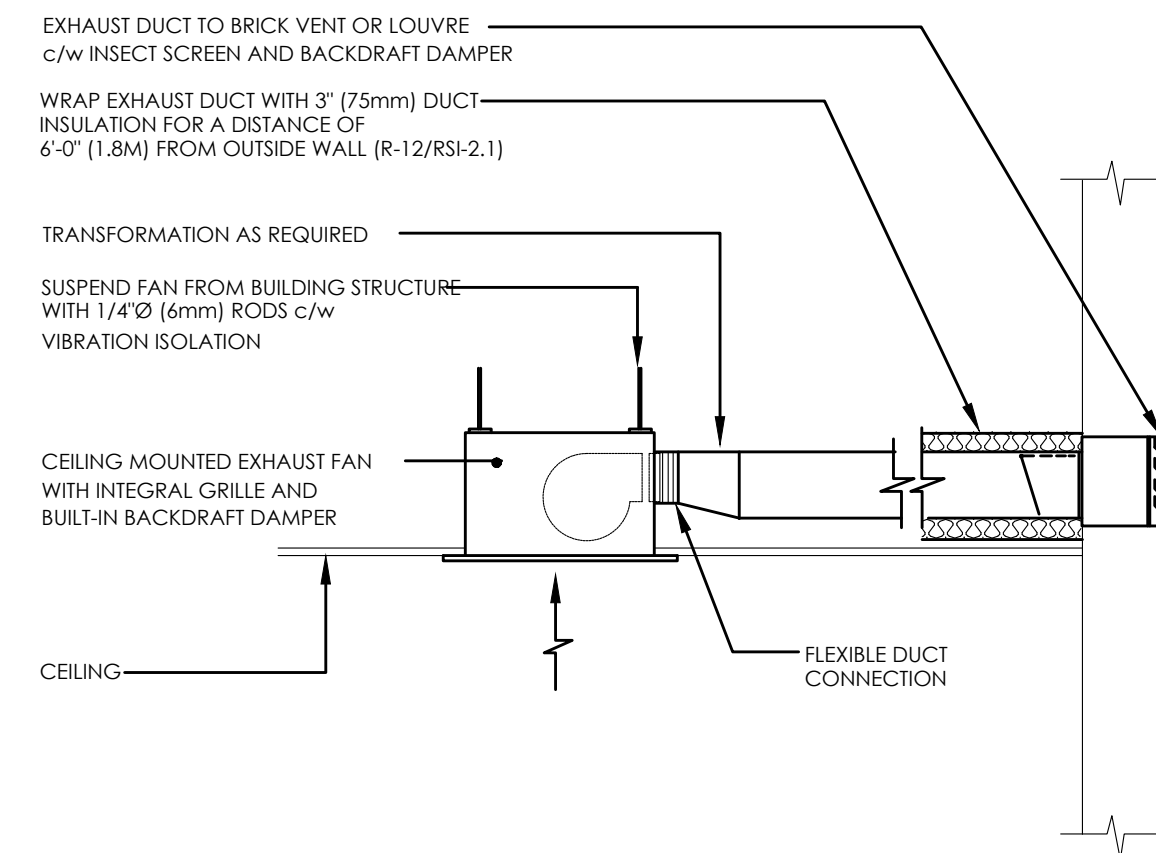


7 M5.0 N.T.S. DETAIL OF SPRINKLER ZONE VALVES



- NOTES:
- 10mmx19mm (3/8"x3/4") NEOPRENE GASKET FOR CHANNEL 50mm TO 100mm (2" TO 4") OR
 - 10mmx38mm (3/8"x1-1/2") NEOPRENE GASKET FOR CHANNEL 6" AND UP
 - CURB MAY BE BROKEN DOWN FOR SHIPPING. IN THESE CASES FIELD ASSEMBLY WILL BE REQUIRED BY INSTALLING CONTRACTOR
 - ROOF CURB: FULL PERIMETER ROOF MOUNTING CURB OF HEAVY GAUGE SHEET METAL, MINIMUM OF 300mm (12") HIGH COMPLETE WITH WOODNAILER, NEOPRENE SEALING STRIP AND FULLY WELDED Z BAR WITH A 25mm (1") UPTURN ON THE INNER PERIMETER, TO PROVIDE A COMPLETE SEAL AGAINST THE ELEMENTS.
 - CONTRACTOR TO COORDINATE WITH ARCHITECTURAL ROOFING DETAILS

8 M5.0 N.T.S. DETAIL OF ROOF CURB FOR ROOF MOUNTED AIR HANDLING UNIT



9 M5.0 N.T.S. DETAIL OF CEILING MOUNTED EXHAUST FAN

CLIENT
WORKSHOP
ARCHITECTURE

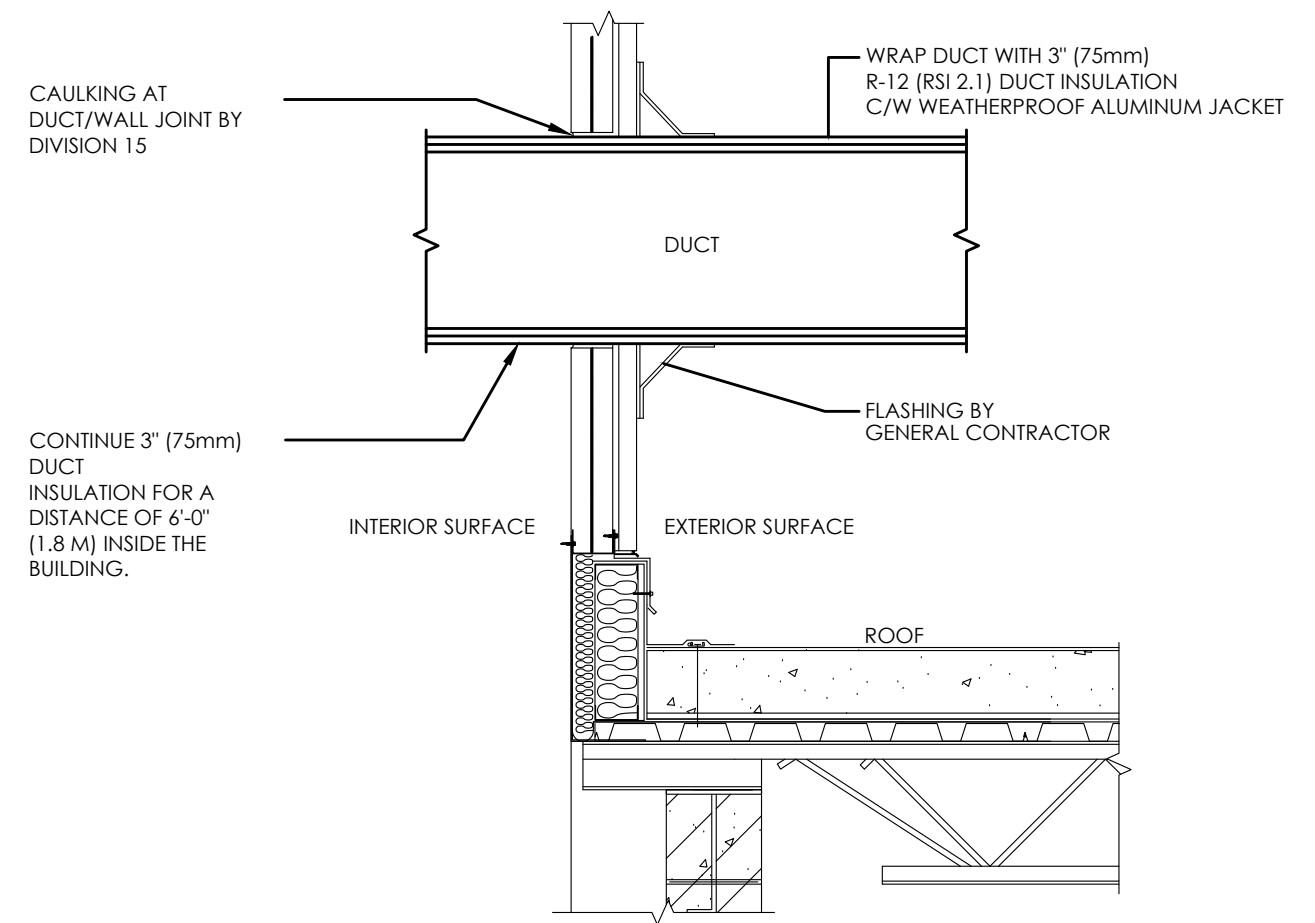
PROJECT:
CSV L'HARMONIE DAYCARE
ADDITION

158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

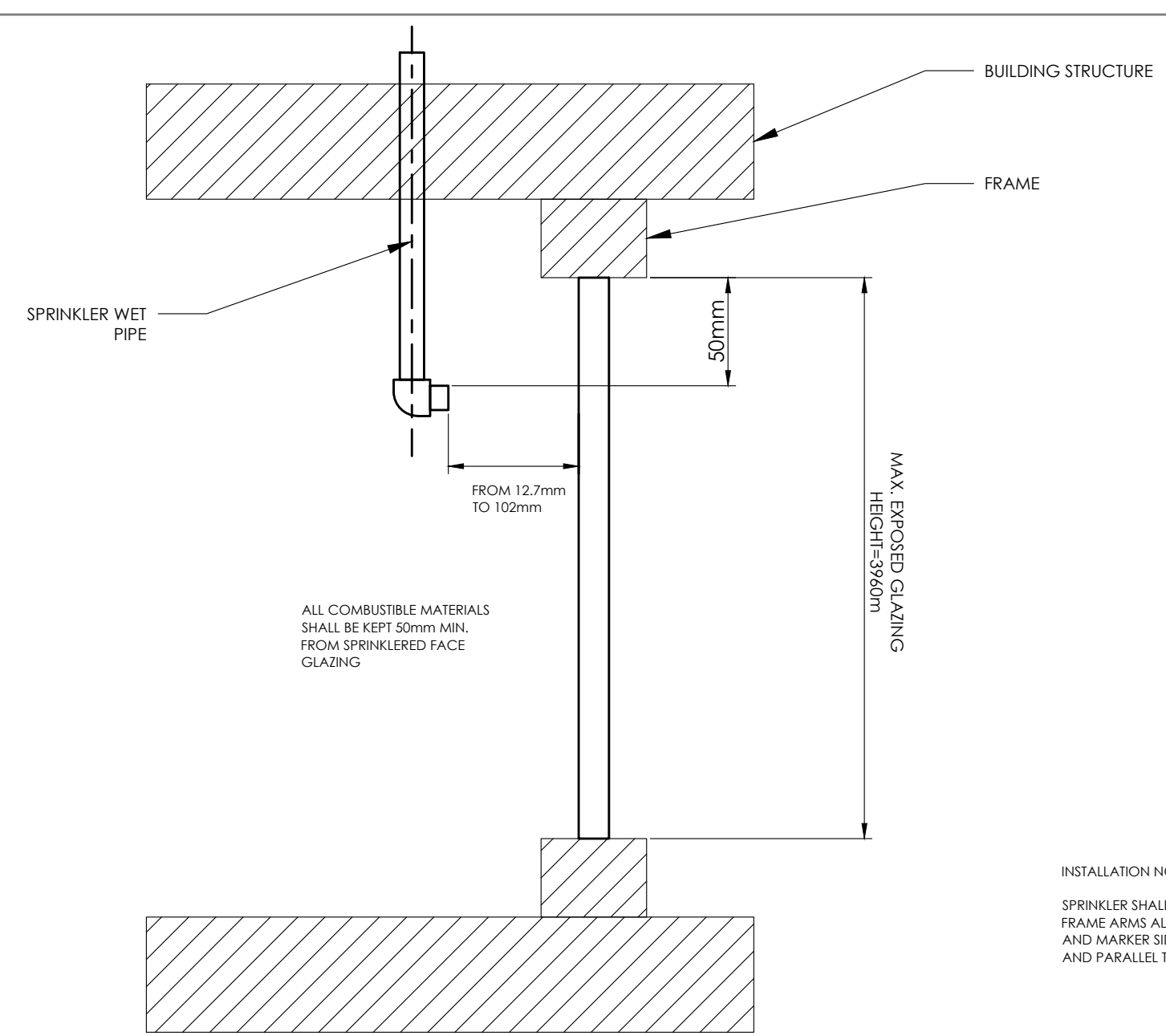
DRAWING TITLE:
MECHANICAL DETAILS

DRAWN BY:
J.S.
CHECKED BY:
J.L.
DATE:
NOV 2022
PROJECT NUMBER:
22-058

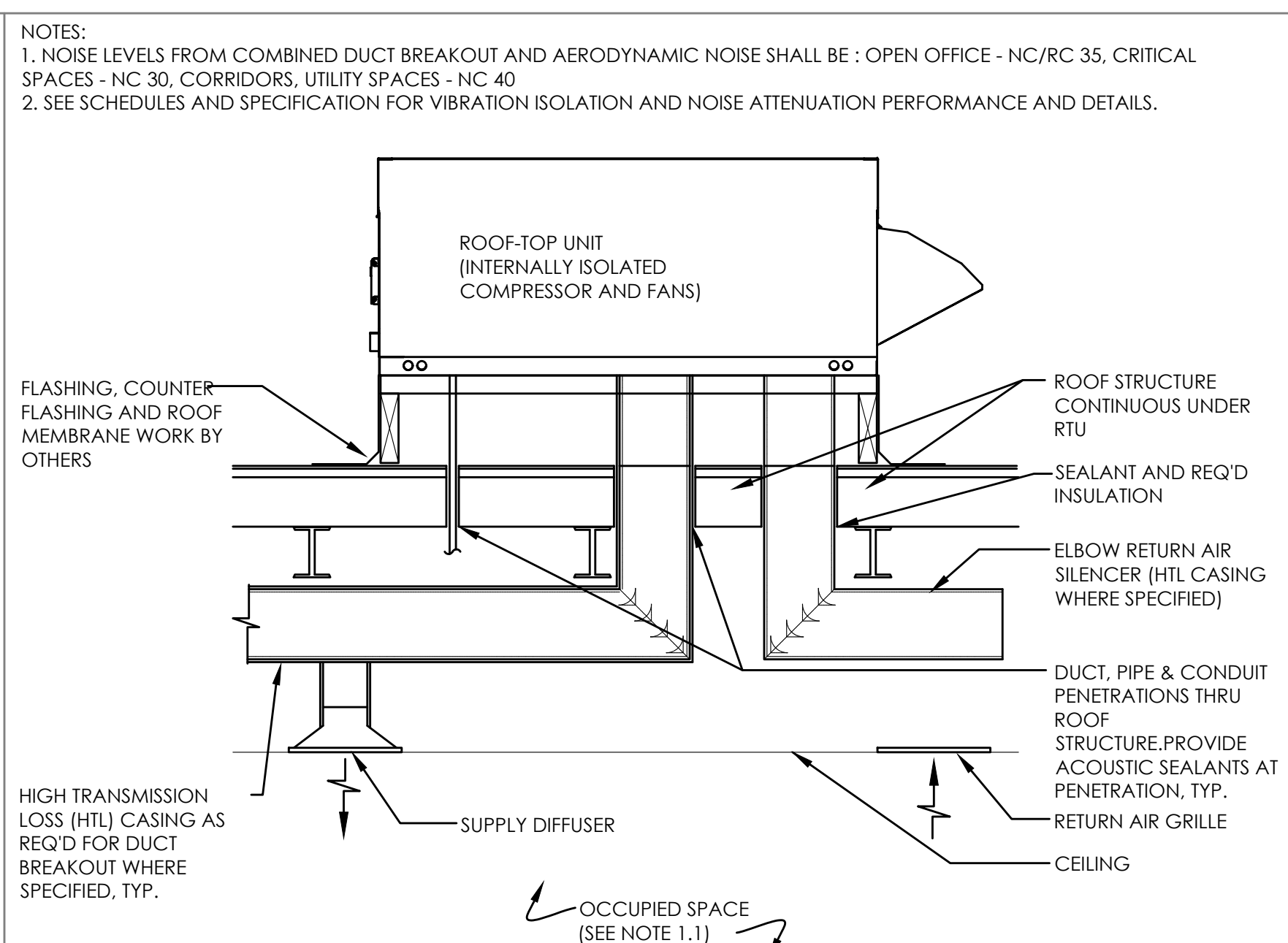
SCALE:
AS NOTED
DRAWING NUMBER:
M5.0



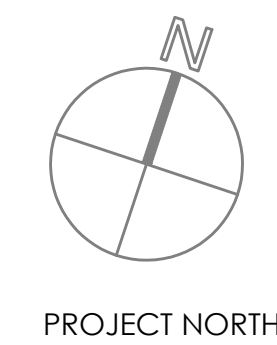
1 M5.1 N.T.S. DETAIL OF EXTERIOR WALL DUCT PENETRATION



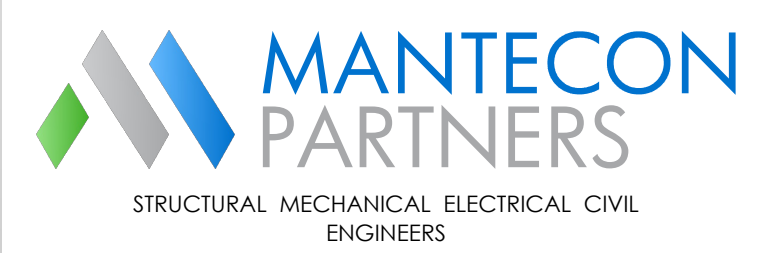
2 M5.1 N.T.S. DETAIL OF HORIZONTAL SIDEWALL SPRINKLER INSTALLATION



2 M5.1 N.T.S. DETAIL OF ROOF TOP UNIT INSTALLATION



PROJECT NORTH



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NO.	ISSUED	DATE	BY
7	ISSUED FOR TENDER	2024-10-09	J.S.
6	ISSUED FOR PERMIT	2024-07-26	J.S.
5	ISSUED FOR COORDINATION	2024-07-08	J.S.
4	ISSUED FOR PERMIT	2023-12-22	R.S.
3	ISSUED FOR COORDINATION	2023-12-11	A.C.
2	ISSUED FOR 80% REVIEW	2022-12-23	J.L.
1	ISSUED FOR 60% REVIEW	2022-11-23	J.L.

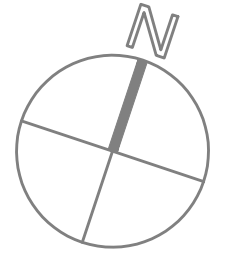
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

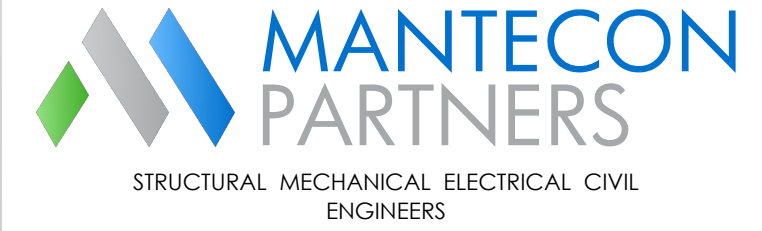
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
MECHANICAL DETAILS

DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M5.1
DATE: NOV 2022	
PROJECT NUMBER: 22-058	



PROJECT NORTH



STRUCTURAL MECHANICAL ELECTRICAL CIVIL ENGINEERS

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NO.	ISSUED	DATE	BY

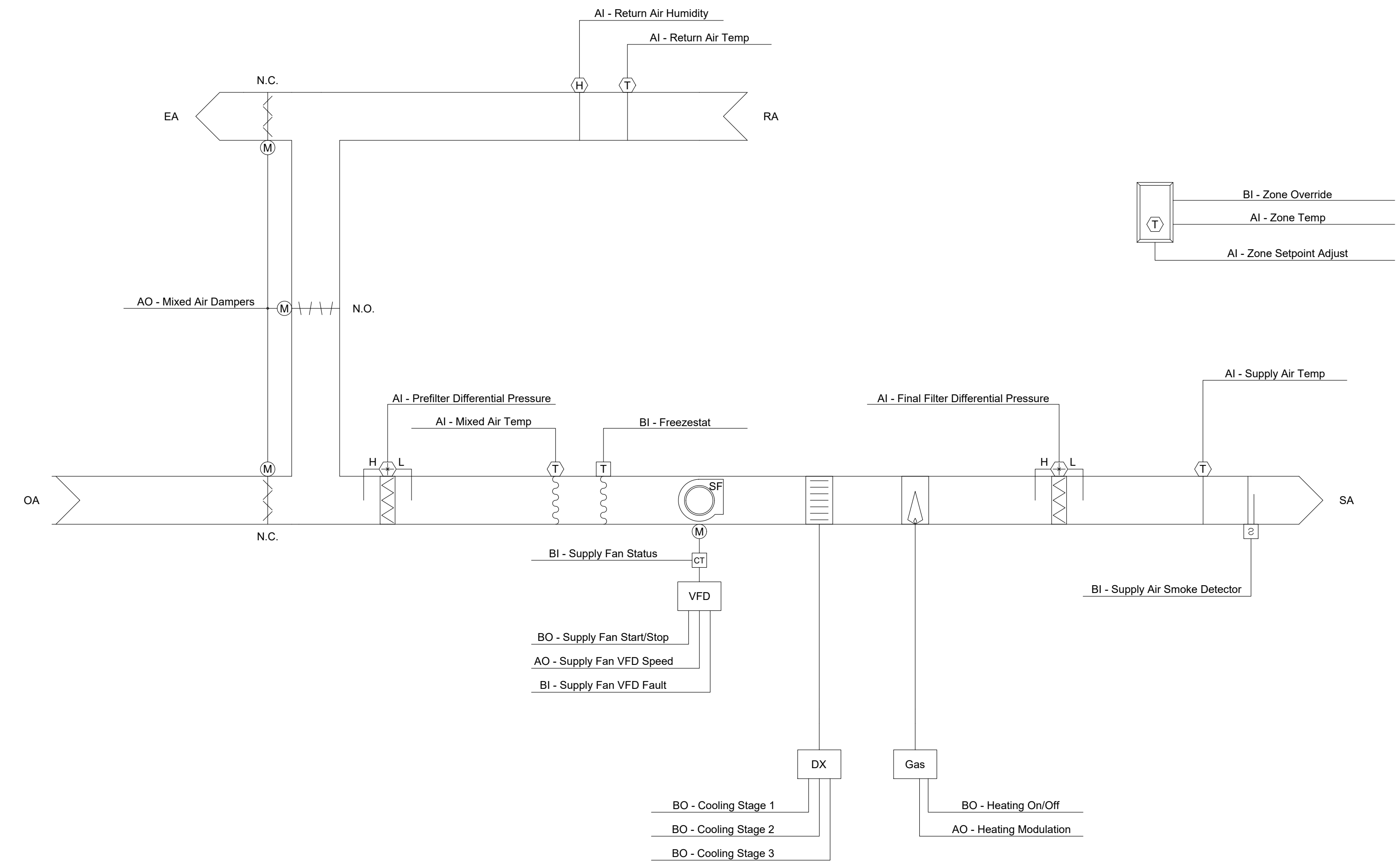
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
CONTROL SCHEMCATIC

DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M5.2
DATE: NOV 2022	PROJECT NUMBER: 22-058

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS						SHOW ON GRAPHIC	
	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM		
FINAL FILTER DIFFERENTIAL PRESSURE	X								X			
MIXED AIR TEMP	X								X			X
OUTSIDE AIR HUMIDITY	X								X			X
OUTSIDE AIR TEMP	X								X			X
PREFILTER DIFFERENTIAL PRESSURE	X								X			
RETURN AIR HUMIDITY	X								X			X
RETURN AIR TEMP	X								X			X
SUPPLY AIR TEMP	X								X			X
ZONE SETPOINT ADJUST	X											X
ZONE TEMP	X								X			X
MIXED AIR DAMPERS		X							X			X
SUPPLY FAN VFD SPEED		X							X			X
FREEZESTAT			X						X	X		X
SUPPLY AIR SMOKE DETECTOR			X						X	X		X
SUPPLY FAN STATUS			X						X			X
SUPPLY FAN VFD FAULT			X						X			X
ZONE OVERRIDE			X						X			X
COOLING STAGE 1				X					X			X
COOLING STAGE 2				X					X			X
COOLING STAGE 3				X					X			X
HEATING STAGE ON/OFF				X					X			X
HEATING MODULATION	X								X			X
SUPPLY FAN START/STOP				X					X			X
COOLING SETPOINT					X				X			X
ECONOMIZER ZONE TEMP SETPOINT						X			X			X
ENVIRONMENTAL INDEX					X				X			
HEATING SETPOINT					X				X			X
PERCENT OF TIME SATISFIED					X				X			
SCHEDULE							X					
COMPRESSOR RUNTIME EXCEEDED										X		
FINAL FILTER CHANGE REQUIRED										X		X
HIGH MIXED AIR TEMP										X		
HIGH RETURN AIR HUMIDITY										X		
HIGH RETURN AIR TEMP										X		
HIGH SUPPLY AIR TEMP										X		
HIGH ZONE TEMP										X		
LOW MIXED AIR TEMP										X		
LOW RETURN AIR HUMIDITY										X		
LOW RETURN AIR TEMP										X		
LOW SUPPLY AIR TEMP										X		
LOW ZONE TEMP										X		
PREFILTER CHANGE REQUIRED										X		X
SUPPLY FAN FAILURE										X		
SUPPLY FAN IN HAND										X		
SUPPLY FAN RUNTIME EXCEEDED										X		
TOTALS	10	3	5	5	5	0	0	1	27	18	28	
TOTAL HARDWARE (23)												TOTAL SOFTWARE (51)



SEQUENCE OF OPERATION:

1. RTU (TYPICAL OF 1)

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN
 - A 24°C (ADJ.) COOLING SETPOINT
 - A 21°C (ADJ.) HEATING SETPOINT.
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN
 - A 30°C (ADJ.) COOLING SETPOINT.
 - A 13°C (ADJ.) HEATING SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).
- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

DEMAND LIMITING - ZONE SETPOINT OPTIMIZATION:
TO LOWER POWER CONSUMPTION, THE ZONE SETPOINTS SHALL AUTOMATICALLY RELAX WHEN THE FACILITY POWER CONSUMPTION EXCEEDS DEFINABLE THRESHOLDS. THE AMOUNT OF RELAXATION SHALL BE INDIVIDUALLY CONFIGURABLE FOR EACH ZONE. THE ZONE SETPOINTS SHALL AUTOMATICALLY RETURN TO THEIR PREVIOUS SETTINGS WHEN THE FACILITY POWER CONSUMPTION DROPS BELOW THE THRESHOLDS.

ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

ZONE OPTIMAL START:
THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

ZONE UNOCCUPIED OVERRIDE:
A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.

FREEZE PROTECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A FREEZESTAT STATUS.

SUPPLY AIR SMOKE DETECTION:
THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING A SUPPLY AIR SMOKE DETECTOR STATUS.

SUPPLY FAN:
THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS

SHUTDOWN ON SAFETIES: TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- SUPPLY FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- SUPPLY FAN RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

ZONE TEMPERATURE CONTROL:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND SHALL MODULATE THE SUPPLY FAN VFD SPEED TO MAINTAIN ZONE TEMPERATURE SETPOINT. THE FAN SPEED SHALL INCREASE AS THE ZONE TEMPERATURE RISES ABOVE COOLING SETPOINT, OR AS THE ZONE TEMPERATURE DROPS BELOW HEATING SETPOINT. THE SUPPLY FAN VFD SPEED SHALL NOT DROP BELOW 30% (ADJ.).

COOLING STAGES:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND STAGE THE COOLING TO MAINTAIN ITS COOLING SETPOINT. TO PREVENT SHORT CYCLING, THERE SHALL BE A USER DEFINABLE (ADJ.) DELAY BETWEEN STAGES, AND EACH STAGE SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.

THE COOLING SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS GREATER THAN 15°C (ADJ.).
- AND THE ECONOMIZER (IF PRESENT) IS DISABLED OR FULLY OPEN.
- AND THE ZONE TEMPERATURE IS ABOVE COOLING SETPOINT.
- AND THE SUPPLY FAN STATUS IS ON.
- AND THE HEATING IS NOT ACTIVE.

GAS HEATING MODULATION:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING TO MAINTAIN ITS HEATING SETPOINT. TO PREVENT SHORT CYCLING, THERE SHALL BE A USER DEFINABLE (ADJ.) DELAY BETWEEN STARTS, AND EACH START SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.

THE HEATING SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS LESS THAN 18°C (ADJ.).
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.
- AND THE SUPPLY FAN STATUS IS ON.
- AND THE COOLING IS NOT ACTIVE.

ECONOMIZER:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE ECONOMIZER DAMPERS IN SEQUENCE TO MAINTAIN A SETPOINT 1°C LESS THAN THE ZONE COOLING SETPOINT. THE OUTSIDE AIR DAMPERS SHALL MAINTAIN A MINIMUM ADJUSTABLE POSITION OF 20% (ADJ.) OPEN WHENEVER OCCUPIED.

THE ECONOMIZER SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS LESS THAN 18°C (ADJ.).
- AND THE OUTSIDE AIR ENTHALPY IS LESS THAN 22BTU/LB (ADJ.).
- AND THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR

TEMPERATURE:

- AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY.
- AND THE SUPPLY FAN STATUS IS ON.

THE ECONOMIZER SHALL CLOSE WHENEVER:

- MIXED AIR TEMPERATURE DROPS FROM 7°C TO 4°C (ADJ.).
- OR ON LOSS OF SUPPLY FAN STATUS.
- OR FREEZESTAT (IF PRESENT) IS ON.

THE OUTSIDE AND EXHAUST AIR DAMPERS SHALL CLOSE AND THE RETURN AIR DAMPER SHALL OPEN WHEN THE UNIT IS OFF. IF OPTIMAL START UP IS AVAILABLE, THE MIXED AIR DAMPER SHALL OPERATE AS DESCRIBED IN THE OCCUPIED MODE EXCEPT THAT THE OUTSIDE AIR DAMPER SHALL MODULATE TO FULLY CLOSED.

MINIMUM OUTSIDE AIR VENTILATION - FIXED PERCENTAGE:
THE OUTSIDE AIR DAMPERS SHALL MAINTAIN A MINIMUM POSITION (ADJ.) DURING BUILDING OCCUPIED HOURS AND BE CLOSED DURING UNOCCUPIED HOURS.

PREFILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- PREFILTER CHANGE REQUIRED: PREFILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

FINAL FILTER DIFFERENTIAL PRESSURE MONITOR:
THE CONTROLLER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FINAL FILTER.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

MIXED AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE MIXED AIR TEMPERATURE AND USE AS REQUIRED FOR ECONOMIZER CONTROL (IF PRESENT) OR PREHEATING CONTROL (IF PRESENT).

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH MIXED AIR TEMP: IF THE MIXED AIR TEMPERATURE IS GREATER THAN 32°C (ADJ.).
- LOW MIXED AIR TEMP: IF THE MIXED AIR TEMPERATURE IS LESS THAN 7°C (ADJ.).

RETURN AIR HUMIDITY:
THE CONTROLLER SHALL MONITOR THE RETURN AIR HUMIDITY AND USE AS REQUIRED FOR ECONOMIZER CONTROL (IF PRESENT) OR HUMIDITY CONTROL (IF PRESENT).

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH RETURN AIR HUMIDITY: IF THE RETURN AIR HUMIDITY IS GREATER THAN 70% (ADJ.).
- LOW RETURN AIR HUMIDITY: IF THE RETURN AIR HUMIDITY IS LESS THAN 35% (ADJ.).

RETURN AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE RETURN AIR TEMPERATURE AND USE AS REQUIRED FOR ECONOMIZER CONTROL (IF PRESENT).

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS GREATER THAN 32°C (ADJ.).
- LOW RETURN AIR TEMP: IF THE RETURN AIR TEMPERATURE IS LESS THAN 7°C (ADJ.).

SUPPLY AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE SUPPLY AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 48°C (ADJ.).
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 7°C (ADJ.).

ENVIRONMENTAL INDEX:
WHEN THE ZONE IS OCCUPIED, THE CONTROLLER WILL MONITOR THE DEVIATION OF THE ZONE TEMPERATURE FROM THE HEATING OR COOLING SETPOINT. THE CONTROLLER WILL ALSO MONITOR THE RELATIVE HUMIDITY AND COMPARE IT TO COMFORT CONDITIONS. THIS DATA WILL BE USED TO CALCULATE A 0 - 100% ENVIRONMENTAL INDEX WHICH GIVES AN INDICATION OF HOW WELL THE ZONE IS MAINTAINING COMFORT. THE CONTROLLER WILL ALSO CALCULATE THE PERCENTAGE OF TIME SINCE OCCUPANCY BEGAN THAT THE ENVIRONMENTAL INDEX IS 70% OR HIGHER. OPTIONALLY, A WEIGHTING FACTOR CAN BE CONFIGURED TO ADJUST THE CONTRIBUTION OF THE ZONE TO THE ROLLUP AVERAGE INDEX BASED UPON THE FLOOR AREA OF THE ZONE, IMPORTANCE OF THE ZONE, OR OTHER STATIC CRITERIA.

THE SYSTEM IS TO BE INTERLOCKED WITH DOOR SWITCHES AS PER ASHRAE 90.1 6.5.10.

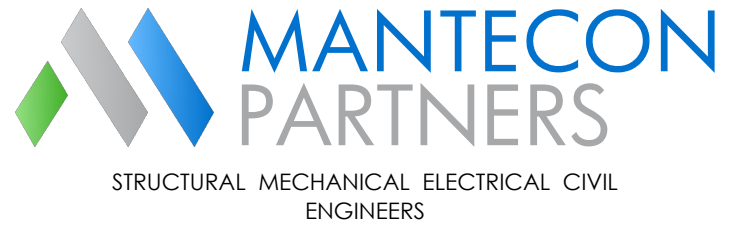
THE SYSTEM IS TO PREVENT SIMULTANEOUS HEATING AND COOLING.

THE UNIT IS TO HAVE THE CAPACITY TO HOLD SCHEDULES FOR 7 DIFFERENT DAY TYPES PER WEEK AND RETAIN THE PROGRAM IF POWER IS LOST FOR 10 HOURS. A MANUAL OVERRIDE IS TO BE INCLUDED WHICH WILL ALLOW FOR OPERATION FOR 2 HOURS.

THE BOILER AND CONVECTORS SHALL BE USED FOR PRIMARY ZONE HEATING AND THE RTU SHALL BE USED FOR SECONDARY ZONE HEATING.



PROJECT NORTH



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NO.	ISSUED	DATE	BY

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
CONTROL SCHEMCATIC

DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M5.3
DATE: NOV 2022	PROJECT NUMBER: 22-058

SEQUENCE OF OPERATION:

1. EXHAUST FAN (TYPICAL OF 2)

RUN CONDITIONS - INTERLOCKED:
THE FAN(S) EF ... SHALL BE INTERLOCKED TO RUN WHENEVER THE WASHROOM IS OCCUPIED BASED ON BUILDING OCCUPANCY UNLESS SHUTDOWN ON SAFETIES.

FAN:
THE FAN SHALL HAVE A USER DEFINABLE (ADJ.) MINIMUM RUNTIME.

FAN STATUS:
THE CONTROLLER SHALL MONITOR THE FAN STATUS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- FAN RUNTIME EXCEEDED: FAN STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT (ADJ.).

POINT NAME	HARDWARE POINTS						SOFTWARE POINTS				SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM	
FAN STATUS			X						X		X
FAN START/STOP				X					X		X
FAN FAILURE										X	
FAN IN HAND										X	
FAN RUNTIME EXCEEDED										X	
TOTALS	0	0	1	1	0	0	0	0	2	3	2
TOTAL HARDWARE (2)						TOTAL SOFTWARE (5)					

SEQUENCE OF OPERATION:

1. HEATING BOILER (TYPICAL OF 1)

BOILER - RUN CONDITIONS:
THE BOILER SHALL BE ENABLED TO RUN WHENEVER IT IS COMMANDED TO BE ENABLED BY THE BOILER MANAGER PROGRAM. THE BOILER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

BOILER SAFETIES:
THE FOLLOWING SAFETIES SHALL BE MONITORED:

- BOILER ALARM
- LOW WATER LEVEL.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- BOILER ALARM.
- LOW WATER LEVEL ALARM.

HOT WATER PUMP:
THE HOT WATER PUMP SHALL RUN ANYTIME THE BOILER IS CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HOT WATER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- HOT WATER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- HOT WATER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

BOILER ENABLE:
THE BOILER SHALL BE ENABLED WHEN THE BOILER SYSTEM IS COMMANDED ON. THE BOILER SHALL BE ENABLED AFTER PUMP STATUS IS PROVEN ON AND SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- BOILER FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- BOILER RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- BOILER RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

HOT WATER SUPPLY TEMPERATURE SETPOINT RESET:
THE HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL RESET USING A TRIM AND RESPOND ALGORITHM BASED ON HEATING REQUIREMENTS.

AS THE FACILITY'S HOT WATER VALVES OPEN BEYOND A USER DEFINABLE THRESHOLD (90% OPEN, TYP.), THE SETPOINT SHALL RESET TO A HIGHER VALUE (ADJ.). ONCE THE HOT WATER COILS ARE SATISFIED (VALVES CLOSING) THEN THE SETPOINT SHALL GRADUALLY LOWER OVER TIME TO REDUCE HEATING ENERGY USE.

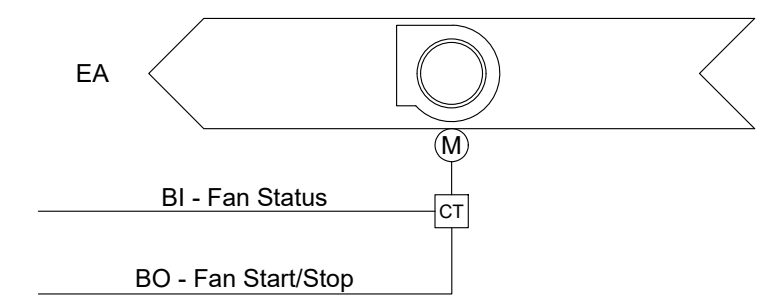
PRIMARY HOT WATER TEMPERATURE MONITORING:
THE FOLLOWING TEMPERATURES SHALL BE MONITORED:

- PRIMARY HOT WATER SUPPLY.
- PRIMARY HOT WATER RETURN.

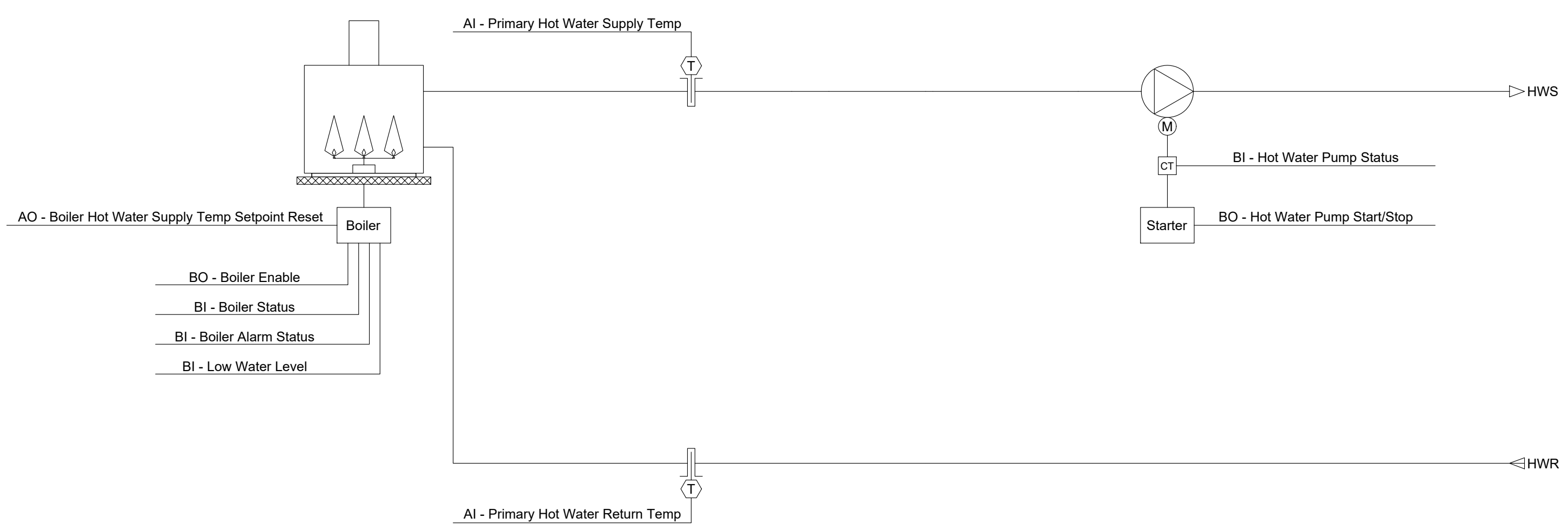
ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH PRIMARY HOT WATER SUPPLY TEMP: IF GREATER THAN 93°C (ADJ.).
- LOW PRIMARY HOT WATER SUPPLY TEMP: IF LESS THAN 38°C (ADJ.).

POINT NAME	HARDWARE POINTS						SOFTWARE POINTS				SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM	
PRIMARY HOT WATER RETURN TEMP	X								X		X
PRIMARY HOT WATER SUPPLY TEMP	X								X		X
BOILER HOT WATER SUPPLY TEMP SETPOINT RESET			X						X		X
BOILER ALARM STATUS				X					X	X	X
BOILER STATUS			X						X		X
HOT WATER PUMP STATUS			X						X		X
LOW WATER LEVEL			X						X	X	X
BOILER ENABLE				X							X
HOT WATER PUMP START/STOP				X					X		X
OUTSIDE AIR TEMP					X						X
BOILER FAILURE										X	
BOILER RUNNING IN HAND										X	
BOILER RUNTIME EXCEEDED										X	
HIGH PRIMARY HOT WATER SUPPLY TEMP										X	
HOT WATER PUMP FAILURE										X	
HOT WATER PUMP RUNNING IN HAND										X	
HOT WATER PUMP RUNTIME EXCEEDED										X	
LOW PRIMARY HOT WATER SUPPLY TEMP										X	
TOTALS	2	1	4	2	1	0	0	0	8	10	10
TOTAL HARDWARE (9)						TOTAL SOFTWARE (19)					



1 CONTROL SCHEMATIC OF EXHAUST FAN
M5.3 N.T.S.



2 CONTROL SCHEMATIC OF BOILER
M5.3 N.T.S.



PROJECT NORTH



15 Foundry Street, Dundas, ON, L9H 2V6
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REVIEW ALL DRAWINGS AND VERIFY ALL DIMENSIONS AT THE SITE. DO NOT SCALE THE DRAWINGS. REPORT ALL DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH ANY CONSTRUCTION OR SHOP FABRICATION. ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF 'MANTECON PARTNERS' AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR WHOLE IS FORBIDDEN WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

NO.	ISSUED	DATE	BY
7	ISSUED FOR TENDER	2024-10-09	J.S.
6	ISSUED FOR PERMIT	2024-07-26	J.S.
5	ISSUED FOR COORDINATION	2024-07-08	J.S.
4	ISSUED FOR PERMIT	2023-12-22	R.S.
3	ISSUED FOR COORDINATION	2023-12-11	A.C.
2	ISSUED FOR 80% REVIEW	2022-12-23	J.L.
1	ISSUED FOR 60% REVIEW	2022-11-23	J.L.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
CONTROL SCHEMATIC

DRAWN BY: J.S.	SCALE: AS NOTED
CHECKED BY: J.L.	DRAWING NUMBER: M5.4
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

SEQUENCE OF OPERATION:

1. CONVECTIVE / FIN TUBE HEATER (TYPICAL OF 14)

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 21°C (ADJ.).
- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN A HEATING SETPOINT OF 18°C (ADJ.).

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

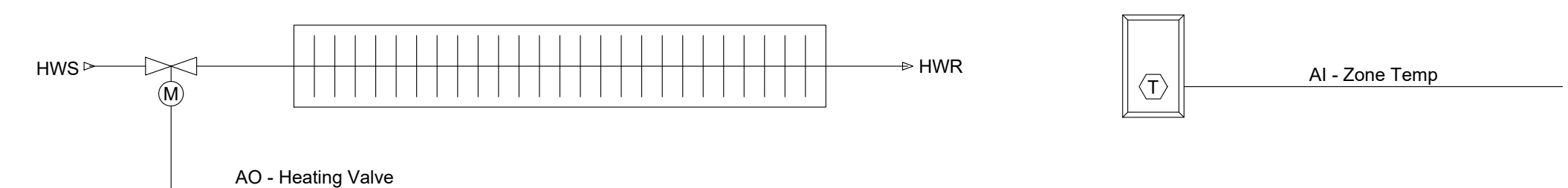
HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE HEATING COIL VALVE TO MAINTAIN ITS HEATING SETPOINT.

THE HEATING SHALL BE ENABLED WHENEVER:

- OUTSIDE AIR TEMPERATURE IS LESS THAN 18°C (ADJ.).
- AND THE ZONE TEMPERATURE IS BELOW HEATING SETPOINT.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS						SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM	
ZONE TEMP	X								X		X
HEATING VALVE		X							X		X
HEATING SETPOINT					X				X		X
SCHEDULE								X			
LOW ZONE TEMP										X	
TOTALS	1	1	0	0	1	0	0	1	3	1	3
TOTAL HARDWARE (2)					TOTAL SOFTWARE (6)						

CONTROL SCHEMATIC OF CONVECTOR



SEQUENCE OF OPERATION:

1. VARIABLE AIR VOLUME - TERMINAL UNIT (TYPICAL OF 11)

RUN CONDITIONS - SCHEDULED:
THE UNIT SHALL RUN ACCORDING TO A USER DEFINABLE TIME SCHEDULE IN THE FOLLOWING MODES:

- OCCUPIED MODE: THE UNIT SHALL MAINTAIN
 - A 24°C (ADJ.) COOLING SETPOINT
 - A 21°C (ADJ.) HEATING SETPOINT.

- UNOCCUPIED MODE (NIGHT SETBACK): THE UNIT SHALL MAINTAIN
 - A 30°C (ADJ.) COOLING SETPOINT.
 - A 13°C (ADJ.) HEATING SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).
- LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT (ADJ.).

DEMAND LIMITING - ZONE SETPOINT OPTIMIZATION:
TO LOWER POWER CONSUMPTION, THE ZONE SETPOINTS SHALL AUTOMATICALLY RELAX WHEN THE FACILITY POWER CONSUMPTION EXCEEDS DEFINABLE THRESHOLDS. THE AMOUNT OF RELAXATION SHALL BE INDIVIDUALLY CONFIGURABLE FOR EACH ZONE. THE ZONE SETPOINTS SHALL AUTOMATICALLY RETURN TO THEIR PREVIOUS SETTINGS WHEN THE FACILITY POWER CONSUMPTION DROPS BELOW THE THRESHOLDS.

ZONE SETPOINT ADJUST:
THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

ZONE OPTIMAL START:
THE UNIT SHALL USE AN OPTIMAL START ALGORITHM FOR MORNING START-UP. THIS ALGORITHM SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD.

ZONE UNOCCUPIED OVERRIDE:
A TIMED LOCAL OVERRIDE CONTROL SHALL ALLOW AN OCCUPANT TO OVERRIDE THE SCHEDULE AND PLACE THE UNIT INTO AN OCCUPIED MODE FOR AN ADJUSTABLE PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.

VARIABLE VOLUME TERMINAL UNIT - FLOW CONTROL:
THE UNIT SHALL MAINTAIN ZONE SETPOINTS BY CONTROLLING THE AIRFLOW THROUGH ONE OF THE FOLLOWING:

- OCCUPIED:
 - WHEN THE ZONE TEMPERATURE IS GREATER THAN ITS COOLING SETPOINT, THE ZONE DAMPER SHALL MODULATE BETWEEN THE MINIMUM OCCUPIED AIRFLOW (ADJ.) AND THE MAXIMUM COOLING AIRFLOW (ADJ.) UNTIL THE ZONE IS SATISFIED.
 - WHEN THE ZONE TEMPERATURE IS LESS THAN THE COOLING SETPOINT, THE ZONE DAMPER SHALL MAINTAIN THE MINIMUM REQUIRED ZONE VENTILATION (ADJ.).

- UNOCCUPIED:
 - WHEN THE ZONE IS UNOCCUPIED THE ZONE DAMPER SHALL CONTROL TO ITS MINIMUM UNOCCUPIED AIRFLOW (ADJ.).
 - WHEN THE ZONE TEMPERATURE IS GREATER THAN ITS COOLING SETPOINT, THE ZONE DAMPER SHALL MODULATE BETWEEN THE MINIMUM UNOCCUPIED AIRFLOW (ADJ.) AND THE MAXIMUM COOLING AIRFLOW (ADJ.) UNTIL THE ZONE IS SATISFIED.

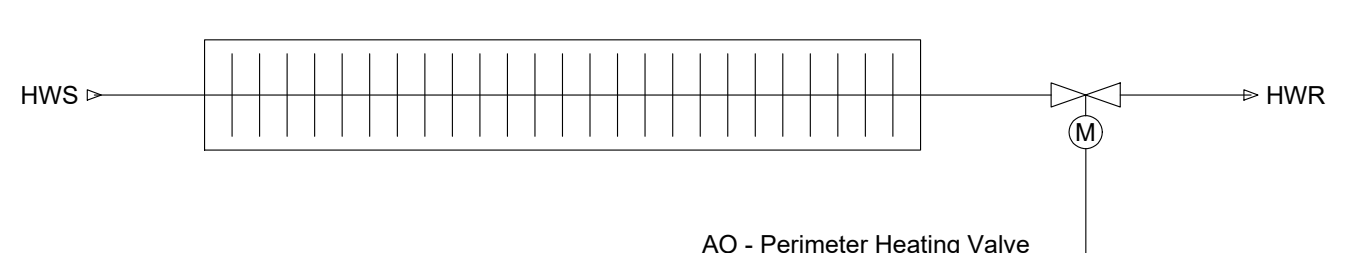
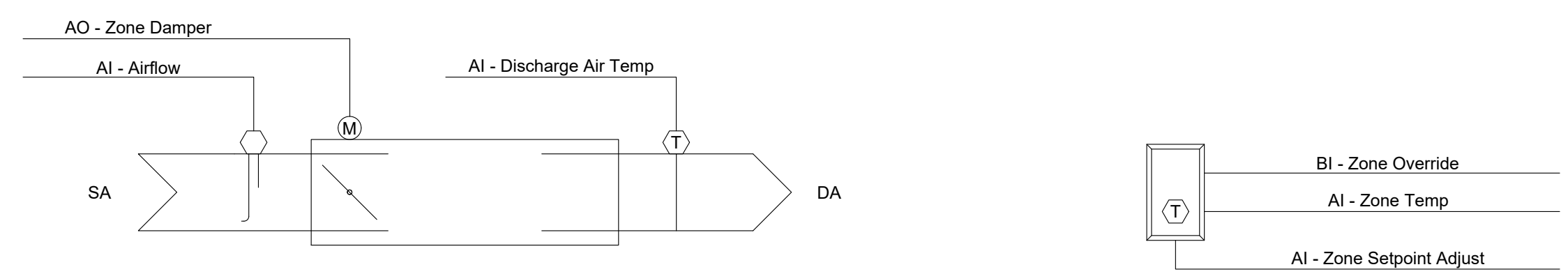
PERIMETER HEATING COIL VALVE:
THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE PERIMETER HEATING COIL VALVE OPEN ON DROPPING TEMPERATURE TO MAINTAIN ITS HEATING SETPOINT.

DISCHARGE AIR TEMPERATURE:
THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.

ALARMS SHALL BE PROVIDED AS FOLLOWS:

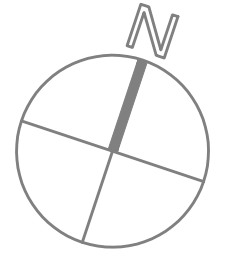
- HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 48°C (ADJ.).
- LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 4°C (ADJ.).

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS						SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	LOOP	SCHED	TREND	ALARM	
AIRFLOW	X								X		X
DISCHARGE AIR TEMP	X								X		X
ZONE SETPOINT ADJUST	X										X
ZONE TEMP	X								X		X
PERIMETER HEATING VALVE		X							X		X
ZONE DAMPER		X							X		X
ZONE OVERRIDE			X						X		X
AIRFLOW SETPOINT					X				X		X
COOLING SETPOINT					X				X		X
HEATING SETPOINT					X				X		X
SCHEDULE								X			
HIGH DISCHARGE AIR TEMP										X	
HIGH ZONE TEMP										X	
LOW DISCHARGE AIR TEMP										X	
LOW ZONE TEMP										X	
TOTALS	4	2	1	0	3	0	0	1	9	4	10
TOTAL HARDWARE (7)					TOTAL SOFTWARE (17)						



CONTROL SCHEMATIC OF VAV

ROOFTOP UNIT SCHEDULE																				
TAG	SUPPLY FAN				DUCT CONFIGURATION	COOLING COIL				GAS HEATING				ELECTRICAL (MAIN POWER)				WEIGHT KG (LBS)	MANUFACTURER AND MODEL (BASIS OF DESIGN: TRANE)	
	AIR FLOW (L/S)	E.S.P. (IN.WG.)	FRPM	HP		E.A.T. DB/WB (°C)	L.A.T. DB/WB (°C)	REFRIGERANT	TOTAL CAP. KW(MBH)	SENS. CAP. KW(MBH)	INPUT KW(MBH)	OUTPUT KW(MBH)	EFFICIENCY	TURNDOWN	MCOP	MCA	FLA			VOLTAGE
RTU-2	2723	0.750	1165	3	-	25.56 / 19.33	13.85 / 13.47	-	53.42(182.27)	37.11(126.64)	73.27(250.00)	59.35(202.50)	-	-	100.00	78.00	-	208V/3Ø/60Hz	1047.8 (2310.0)	TRANE MODEL: YS1180A3SBL**H4E0A1A10000000000000000



PROJECT NORTH

GRILLES REGISTERS DIFFUSERS						
TAG	SIZE (MM)	APPLICATION	NECK SIZE (MM)	AIR FLOW RANGE (L/S)	MANUFACTURER AND MODEL (BASIS OF DESIGN: EH PRICE)	
S-1	1500	SUPPLY AIR	250	AS INDICATED	EH PRICE MODEL: 4 SLOTS SDS LINEAR SLOT DIFFUSER WITH 1" SLOT WIDTH	
S-2	1200	SUPPLY AIR	250	AS INDICATED	EH PRICE MODEL: 4 SLOTS SDS LINEAR SLOT DIFFUSER WITH 1" SLOT WIDTH	
S-3	600x600	SUPPLY AIR	150	AS INDICATED	EH PRICE MODEL: SQUARE CONE DIFFUSER (SCD)	
S-4	600x600	SUPPLY AIR	200	AS INDICATED	EH PRICE MODEL: SQUARE CONE DIFFUSER (SCD)	
S-5	600x600	SUPPLY AIR	250	AS INDICATED	EH PRICE MODEL: SQUARE CONE DIFFUSER (SCD)	
S-6	900	SUPPLY AIR	100	AS INDICATED	EH PRICE MODEL: 1 SLOT SDS LINEAR SLOT DIFFUSER WITH 1" SLOT WIDTH	
R-1	AS INDICATED	RETURN AIR	AS INDICATED	AS INDICATED	EH PRICE MODEL: 80 SERIES, ALUMINIUM CONSTRUCTION, EGGRATE FACE RETURN, WHITE POWDER COAT FINISH.	
TE-1, E-1, S-7	AS INDICATED	EXHAUST	AS INDICATED	AS INDICATED	EH PRICE MODEL: 630 SERIES, BLADE PARALLEL TO SHORT DIMENSION, WHITE POWDER COAT FINISH.	

HOT WATER RADIATOR SCHEDULE						
SYMBOL	ACTIVE LENGTH MM (IN)	HEIGHT MM	E.W.T. °C	L.W.T. °C	CAPACITY KW	MANUFACTURER AND MODEL (BASIS OF DESIGN: GREENHECK)
RH-1	690 (27)	710 (28)	60	43	0.427	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-2	1670 (66)	710 (28)	60	43	0.742	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-3	4520 (178)	IN MILLWORK	60	43	2.247	WALL FIN ECO-LINE B C3/4-435 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, ENCLOSED IN MILLWORK
RH-4	2794 (110)	IN MILLWORK	60	43	1.380	WALL FIN ECO-LINE B C3/4-435 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, ENCLOSED IN MILLWORK
RH-5	7620 (300)	IN MILLWORK	60	43	3.783	WALL FIN ECO-LINE B C3/4-435 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, ENCLOSED IN MILLWORK
RH-6A	890 (35)	710 (28)	60	43	0.569	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-6B	890 (35)	-	60	43	0.569	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. INVERTED ENCLOSURE. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT, MOUNTED AT HIGH LEVEL
RH-7	2060 (81)	710 (28)	60	43	1.323	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-8	1500 (59)	-	60	43	0.963	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. INVERTED ENCLOSURE. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT, MOUNTED AT HIGH LEVEL
RH-9	610 (24)	710 (28)	60	43	0.393	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-10	2515 (99)	IN MILLWORK	60	43	1.250	WALL FIN ECO-LINE B C3/4-435 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, ENCLOSED IN MILLWORK
RH-11	940 (37)	710 (28)	60	43	0.604	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-12	660 (26)	-	60	43	0.420	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. INVERTED ENCLOSURE. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT, MOUNTED AT HIGH LEVEL
RH-13	610 (24)	710 (28)	60	43	0.393	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT
RH-14	610 (24)	-	60	43	0.393	WALL FIN ECO-LINE WFB-S24 C3/4-433 2-6CL. INVERTED ENCLOSURE. DOUBLE ROW FINNED TUBE RADIATOR, 610mm ENCLOSURE HEIGHT, MOUNTED AT HIGH LEVEL

ZONE DAMPER SCHEDULE							
TAG #	GENERAL DESCRIPTION AREA SERVED (ROOM NO.)	SUPPLY AIR INLET SIZE ØD MM (IN)	SUPPLY AIR OUTLET SIZE (WxH) (MM)	AIR FLOW (L/S)		MANUFACTURER & MODEL (BASIS OF DESIGN: TRANE) [APPROVAL EQUAL: EH PRICE; TIUS]	REMARKS
				MAX.	MIN.		
VAV-1	137 ADMIN OFFICE	100 (4)	-	106.2	11.8	TRANE MODEL: VCCF04 (COOLING ONLY)	
VAV-2	138 SERVERY	100 (4)	-	106.2	24.1	TRANE MODEL: VCCF04 (COOLING ONLY)	
VAV-3	139 TODDLER ROOM	200 (8)	-	424.8	171.8	TRANE MODEL: VCCF08 (COOLING ONLY)	
VAV-4	141 PRESCHOOL ROOM (1)	200 (8)	-	424.8	257.7	TRANE MODEL: VCCF08 (COOLING ONLY)	
VAV-5	142 PRESCHOOL ROOM (2)	250 (10)	-	660.8	263.9	TRANE MODEL: VCCF10 (COOLING ONLY)	
VAV-6	136 HALLWAY	200 (8)	-	424.8	41.1	TRANE MODEL: VCCF08 (COOLING ONLY)	
VAV-7	150 STAFF LOUNGE	125 (5)	-	165.2	103.4	TRANE MODEL: VCCF05 (COOLING ONLY)	
VAV-8	147 INFANT ROOM	200 (8)	-	424.8	114.8	TRANE MODEL: VCCF08 (COOLING ONLY)	
VAV-9	149 REST AREA	100 (4)	-	106.2	53.8	TRANE MODEL: VCCF04 (COOLING ONLY)	
VAV-10	145 UTILITY ROOM & 152 LAUNDRY	100 (4)	-	106.2	20.8	TRANE MODEL: VCCF04 (COOLING ONLY)	

PUMP SCHEDULE								
SYMBOL	SERVICE	FLOW RATE L/S	PRESSURE DROP KPA	FLUID TYPE	MOTOR			MANUFACTURER AND MODEL
					HP	VOLTAGE	RPM	
⊙	DOMESTIC HOT WATER RECIRCULATION	0.1	9	POTABLE WATER	-	120V/1Ø/60Hz	-	GRUNDFOS MODEL: UP 15-10 SJ7P/TLC
⊙	HHW	1.58	100	HHW	0.5	208V/3Ø/60Hz	3494	ARMSTRONG MODEL: 4380 0103-000.5

EXPANSION TANK SCHEDULE					
TAG	LOCATION	SERVICE	TYPE	TANK VOLUME L	MANUFACTURER AND MODEL (BASIS OF DESIGN: AMTROL)
ET-1	LAUNDRY ROOM	DHW	DIAPHRAGM	93.9	AMTROL MODEL: ST-12C-DD 150 PSIG ASME RATED
ET-2	UTILITY ROOM	HHW	PARTIAL BLADDER	132.5	AMTROL MODEL: 35LBC

WATER HEATER SCHEDULE								
SYMBOL	CAPACITY KW	WATER TEMP. °C		RECOVERY L/H	ELECTRICAL VOLTAGE	DIMENSIONS (HxWxD) (MM)	OPERATING WEIGHT KG	REMARKS
		ENT.	LVG.					
GWH-1	58.6	4.5	60	903	120V/1Ø/60Hz	1924x711	688	WATTS PVI CONQUEST 20L 100A GCL, C/W CONDENSATE NEUTRALIZATION KIT, CONCENTRIC TERMINATION KIT, FACTORY INSTALLED POWER CORD

BOILER SCHEDULE										
SYMBOL	CAPACITY KW(MBH)		WATER TEMP. °C		FLOW L/S	ELECTRICAL		DIMENSIONS (HxWxD) (MM)	OPERATING WEIGHT KG	REMARKS
	INPUT	OUTPUT	ENT.	LVG.		VOLTAGE	MCA			
B-1	26.27(91)	25.2(86)	43	60	1.58	120V/1Ø/60Hz	12A	1105x480x530	88	VISSMANN MODEL B2HA 88, 311

KITCHEN EXHAUST HOOD SCHEDULE										
No.	AREA SERVED	AIRFLOW L/S (CFM)	S.P. IN.WG.	ELECTRICAL	DIMENSIONS				OPERATING WEIGHT KG(LBS)	MANUFACTURER AND MODEL (BASIS OF DESIGN: GREENHECK)
					HOOD LENGTH MM(IN)	WIDTH TOP MM(IN)	WIDTH BOT. MM(IN)	HEIGHT MM(IN)		
KH-01	SERVERY	236 (90)	0.91	115V/1Ø/60Hz	900 (36)	30 (12)	596(23.5)	317(12.5)	42.2 (93)	GREENHECK GRRS-W-36-T-E-D-N

GREASE INTERCEPTOR SCHEDULE								
No.	AREA SERVED	FLOW RATE L/S (GPM)	CAPACITY KG (LBS)	DIMENSIONS			OPERATING WEIGHT KG(LBS)	MANUFACTURER AND MODEL
				LENGTH MM(IN)	WIDTH MM(IN)	HEIGHT MM(IN)		
GI	SERVERY	1.26 (40)	18.2 (40)	900 (36)	30 (12)	317(12.5)	42.2 (93)	WATTS WD-20L, PDI CERTIFIED LOW ROUGH IN GREASE INTERCEPTOR

FORCE FLOW HEATER SCHEDULE									
No.	E.W.T. °C	L.W.T. °C	CAPACITY KW (BTU/H)	ELECTRICAL (MAIN POWER)				WEIGHT KG (LBS)	MANUFACTURER AND MODEL (BASIS OF DESIGN: TRANE)
				MCOP	MCA	FLA	VOLTAGE		
FFH-1 FFH-2	60	43	3.532 (12.05)	-	-	-	115V/1Ø/60Hz	44 (97)	TRANE MODEL: FFD8030 HORIZONTAL CEILING CABINET 280CFM

EXHAUST FAN SCHEDULE										
No.	AREA SERVED	AIRFLOW L/S	S.P. IN.WG.	ELECTRICAL		DRIVE	FAN RPM	OPERATING WEIGHT KG	SONES	MANUFACTURER AND MODEL (BASIS OF DESIGN: GREENHECK)
				HP	VOLTAGE					
EF-1	UNIVERSAL/TODDLER WC	70.8	0.5	1/15	115V/1Ø/60Hz	DIRECT DRIVE	1225	-	4.9	GREENHECK MODEL: SP-A390-VG DIRECT DRIVE BATHROOM EXHAUST FAN
EF-2	WC	141.6	0.5	1/15	115V/1Ø/60Hz	DIRECT DRIVE	1362	-	2.6	GREENHECK MODEL: CSP-A390-VG DIRECT DRIVE CABINET FAN

ALL UNITS TO INCLUDE VIBRATION ISOLATION.

PLUMBING FIXTURE CONNECTION SCHEDULE						
REFER	DESCRIPTION	SANITARY	SANITARY VENT	DHWS	DCWS	MANUFACTURER AND MODEL
WC	NON - BARRIER FREE, FLOOR MOUNTED AUTOMATIC FLUSH VALVE WATERCLOSET	75Ø (3"Ø)	38Ø (1-1/2"Ø)	-	25Ø (1"Ø)	AMERICAN STANDARD 3451001.020 FLOOR MOUNTED TOILET C/W CENTOCO SEAT: 1500S1SCCFE-001 SEAT, SLOAN FLUSH VALVE: ROYAL 111 ESS-101-OR-HW AND SLOAN POWER KIT EL-154.
WC	BARRIER FREE, FLOOR MOUNTED AUTOMATIC FLUSH VALVE WATERCLOSET	75Ø (3"Ø)	38Ø (1-1/2"Ø)	-	25Ø (1"Ø)	AMERICAN STANDARD MADERA FLOOR MOUNTED TOILET C/W CENTOCO SEAT: 1500S1SCCFE-001 SEAT, SLOAN FLUSH VALVE: ROYAL 111 ESS-101-OR-HW AND SLOAN POWER KIT EL-154.
LS LS	SINGLE WIDE WALL-HUNG LAVATORY, AUTOMATIC FAUCET	32Ø (1-1/4"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	BRADLEY EXPRESS TLX-1 WALL HUNG C/W ZURN ZB6100-XL SINGLE BASIN METERING FAUCET.
LS	DOUBLE WIDE WALL-HUNG LAVATORY, AUTOMATIC FAUCET	32Ø (1-1/4"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	BRADLEY EXPRESS TLX-2 WALL HUNG C/W ZURN ZB6100-XL SINGLE BASIN METERING FAUCET.
LS	TRIPLE WIDE WALL-HUNG LAVATORY, AUTOMATIC FAUCET	32Ø (1-1/4"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	BRADLEY EXPRESS TLX-3 WALL HUNG C/W ZURN ZB6100-XL SINGLE BASIN METERING FAUCET.
LA	BARRIER FREE WALL HUNG, MANUAL FAUCET	32Ø (1-1/4"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	AMERICAN STANDARD LUCERNE WALL HUNG BARRIER FREE SINK C/W CHICAGO 420-245E2805ABCP FAUCET, MCCOURE 135A FIXTURE DRAIN, LFI16SLKNS SUPPLY AND 8872C P. TRAP.
S	SINGLE COMPARTMENT, COUNTER MOUNTED, COMMERCIAL SINK	38Ø (1-1/2"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	FRANKE: LBS4808P-1-1 SINGLE COMPARTMENT COMMERCIAL COUNTER MOUNTED SINK, C/W Chicago 430-ABCP FAUCET, LAWLER 570-86820 MIXING VALVE.
S	DOUBLE COMPARTMENT, COUNTER MOUNTED, COMMERCIAL SINK	38Ø (1-1/2"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	FRANKE: ALB8405P-1-1 DOUBLE COMPARTMENT COMMERCIAL COUNTER MOUNTED SINK, C/W Chicago 430-ABCP FAUCET, LAWLER 570-86820 MIXING VALVE.
S	TRIPLE COMPARTMENT, COUNTER MOUNTED, COMMERCIAL SINK	38Ø (1-1/2"Ø)	32Ø (1-1/4"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	FRANKE: LBT4407CB-1 TRIPLE COMPARTMENT COMMERCIAL COUNTER MOUNTED SINK, C/W T&S BRASS B.D133_ADF12_B EASYINSTALL PRE-RINSE UNIT WITH WALL BRACKET FAUCET, LAWLER 570-86820 MIXING VALVE.
S	MOP BASIN, FLOOR MOUNT	75Ø (3"Ø)	38Ø (1-1/2"Ø)	13Ø (1/2"Ø)	13Ø (1/2"Ø)	STERN WILLIAMS SB-900-T-3S-T-40-BP250 SINK C/W CHICAGO 897-RCF WALL HUNG FAUCET.
NFHB	NON-FREEZE HOSE BIBB	-	-	-	19Ø (3/4"Ø)	ZURN Z1320XL NON FREEZE, ANTI SIPHON, WALL HYDRANT.
FD	FLOOR DRAIN	75Ø (3"Ø)	38Ø (1-1/2"Ø)	13Ø (1/2"Ø)	-	WATTS FD-100NH-C-A5-1-5-7
FFD	FUNNEL FLOOR DRAIN	75Ø (3"Ø)	38Ø (1-1/2"Ø)	13Ø (1/2"Ø)	-	WATTS FD-100NH-EG-5-6-7-1
EW	EYEWASH STATION	75Ø (3"Ø)	38Ø (1-1/2"Ø)	13Ø (1/2"Ø)	-	-
MV	MIXING VALVE	-	-	-	-	WATTS/ANCON HY-300-2-V8

NOTES: THE CONTRACTOR SHALL SUPPLY AND INSTALL THE ACCESSORIES AND TRIMS ONLY FOR ALL FIXTURES SUPPLIED AND INSTALLED BY GENERAL TRADES (I.E. SOLID SURFACE, STAINLESS STEEL, ETC.)



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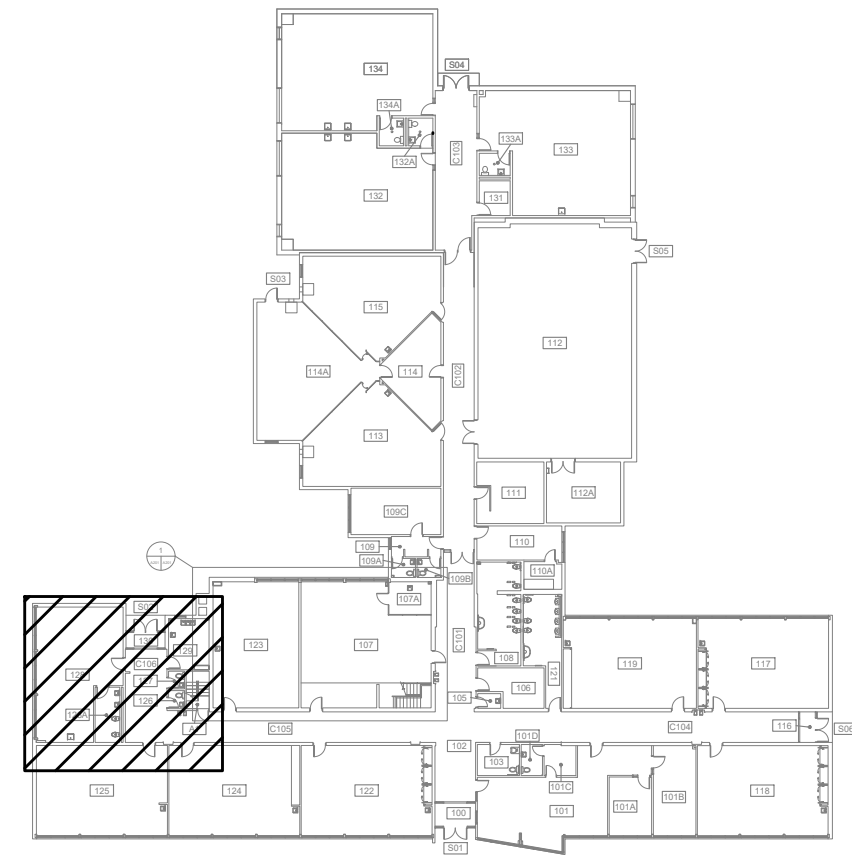
NO.	ISSUED	DATE	BY
7	ISSUED FOR TENDER	2024-10-09	J.S.
6	ISSUED FOR PERMIT	2024-07-26	J.S.
5	ISSUED FOR COORDINATION	2024-07-08	J.S.
4	ISSUED FOR PERMIT	2023-12-22	R.S.
3	ISSUED FOR COORDINATION	2023-12-11	A.C.
2	ISSUED FOR 80% REVIEW	2022-12-23	J.L.
1	ISSUED FOR 60% REVIEW	2022-11-23	J.L.

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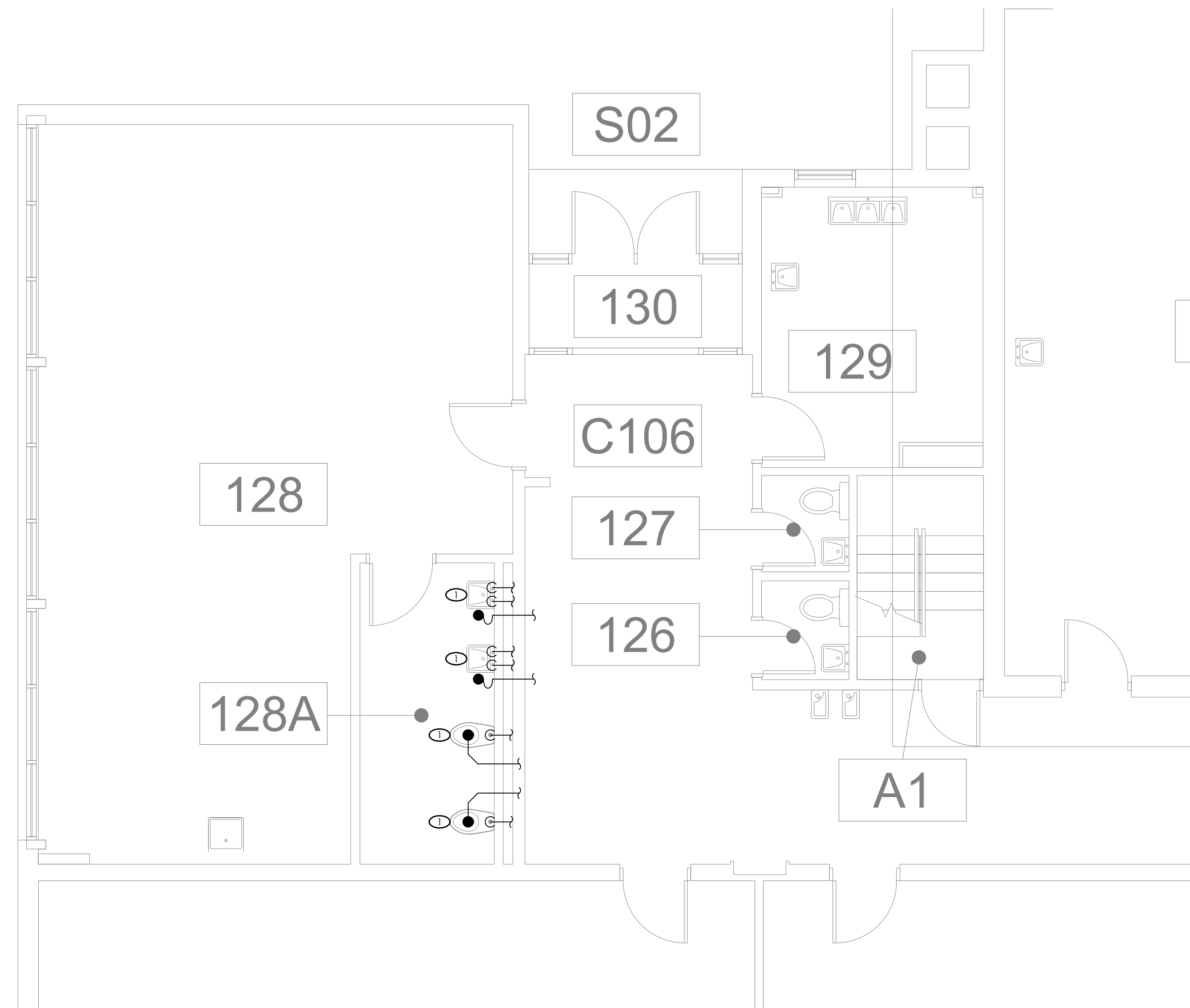
KEY PLAN
SCALE: N.T.S.

DRAWING NOTES

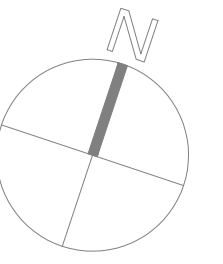
① DEMOLISH FIXTURES IN EXISTING DAYCARE WASHROOM. DISCONNECT FROM DOMESTIC WATER AND SANITARY LINES. CUT BACK AS FAR AS POSSIBLE AND CAP DECOMMISSIONED LINES.

GENERAL DRAWING NOTES

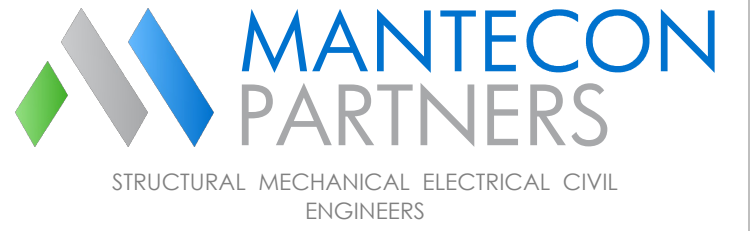
1. CONTRACTOR TO READ IN CONJUNCTION WITH ARCHITECTURAL, STRUCTURAL & ELECTRICAL DRAWINGS.



GROUND FLOOR PLUMBING DEMOLITION PLAN
SCALE: 1:100



PROJECT NORTH



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1	ISSUED FOR PERMIT	2024-07-26	J.S.

NO.	ISSUED	DATE	BY
2	ISSUED FOR TENDER	2024-10-09	J.S.
1	ISSUED FOR PERMIT	2024-07-26	J.S.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

**158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO**

DRAWING TITLE:
**GROUND FLOOR
PLUMBING DEMO**

DRAWN BY:
J.S.

CHECKED BY:
J.L.

DATE:
NOV 2022

SCALE:
AS NOTED

DRAWING NUMBER:
MD2.0

PROJECT NUMBER:
22-058

ELECTRICAL DRAWING LIST

E0.0	LEAD SHEET, GENERAL NOTES & ELECTRICAL LEGENDS
E0.1	ELECTRICAL SPECIFICATIONS (SHEET 1 OF 2)
E0.2	ELECTRICAL SPECIFICATIONS (SHEET 2 OF 2)
E0.3	DEMOLITION SITE PLAN
E1.0	PROPOSED SITE PLAN
E2.0	PROPOSED GROUND FLOOR LIGHTING AND FIRE ALARM PLAN
E2.01	PROPOSED GROUND FLOOR ELECTRICAL SYSTEMS PLAN
E2.02	PROPOSED ROOF LEVEL POWER PLAN
E3.0	SINGLE LINE DIAGRAM, ELECTRICAL SCHEDULE & DETAILS

GENERAL NOTES

- DO NOT SCALE DRAWINGS FOR INSTALLATION PURPOSES. OBTAIN ALL DIMENSIONS FROM THE ARCHITECTURAL PLANS, MANUFACTURER'S SHOP DRAWINGS, AND ON SITE INSPECTIONS.
- PRIOR TO INSTALLATION OF BOXES IN WALLS, VERIFY THAT NO INTERFERENCES EXIST. CHECK ARCHITECTURAL PLANS AND ELEVATIONS.
- MECHANICAL AND ELECTRICAL TRADES SHALL WORK IN CONJUNCTION WITH EACH OTHER SO AS TO AVOID INTERFERENCES BETWEEN PIPING, DUCTWORK, CONDUIT, LIGHTING FIXTURES, ETC.
- WORK IN CONJUNCTION WITH THE ARCHITECTURAL REFLECTED CEILING PLAN WHEN LOCATING LIGHT FIXTURES.
- REVIEW ARCHITECTURAL, MECHANICAL, AND STRUCTURAL DRAWINGS AND PROVIDE ON SITE INSPECTIONS TO DETERMINE FULL EXTENT OF PROJECT PRIOR TO SUBMITTING BID.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE ONTARIO BUILDING CODE (OBC), ONTARIO ELECTRICAL SAFETY CODE (OESC) AND THE LOCAL AUTHORITIES REQUIREMENTS.
- THE ELECTRICAL CONTRACTOR SHALL COORDINATE THE INSTALLATION WITH THE WORK OF OTHER TRADES. PROVIDE HORIZONTAL AND/OR VERTICAL OFFSETS AS REQUIRED TO SUIT THIS COORDINATION.
- REFER TO THE ARCHITECTURAL DRAWINGS FOR ALL WIRING DEVICE FINAL HEIGHT AND LOCATION.
- ALL WIRING SHALL BE A MINIMUM #12 AWG IN CONDUIT SUITABLE FOR THE APPLICATION.
- ACPD (BX) SHALL ONLY BE ALLOWED FOR SHORT RUNS OF LESS THAN 5 FEET IN LENGTH, UNLESS OTHERWISE NOTED.
- ALL MATERIALS SHALL BEAR A CSA [CANADIAN STANDARDS ASSOCIATION LABEL.
- ALL INTERIOR LIGHT SWITCHES, RECEPTACLES, AND DATA OUTLETS, INCLUDING CONDUITS SHALL BE "CONCEALED" WITHIN THE WALL STRUCTURE.
- ELECTRICAL SWITCHES, OUTLETS, PUSH-BUTTONS ETC. SHALL COMPLY WITH ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT (AODA) FOR MOUNTING HEIGHTS AND LOCATION WHERE APPLICABLE.
- EXIT SIGNS SHALL BE GREEN, EDGE-LIT, "RUNNING-MAN" PICTOGRAM C/W LED LIGHT SOURCE, ALUMINUM HOUSING, AND UNIVERSAL MOUNTING, WHERE HIGH CEILING EXIST PROVIDE A PENDANT MOUNT TYPE SUSPENDED FROM A THREADED ROD OR EMT CONDUIT AT THE HEIGHT SPECIFIED.
- BATTERY PACKS SHALL C/W 20% SPARE CAPACITY, 12VOLT, ALUMINUM HOUSING C/W TWO (2) 4-WATT, LED, MR-16, DIE CAST HEADS AND WHITE FINISH. PROVIDE MATCHING REMOTE HEADS.
- ALL UNIVERSAL WASHROOM HARDWARE DEVICES TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR C/W WIRING AND CONDUIT FOR A COMPLETE INSTALLATION, UNLESS OTHERWISE NOTED.
- ALL SECURITY DOOR ACCESS HARDWARE DEVICES SHALL BE SUPPLIED BY ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL WIRING AND CONDUIT ROUGH-IN FOR A COMPLETE INSTALLATION, UNLESS OTHERWISE NOTED.
- ALL COMMUNICATION CABBING TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR C/W CONDUIT, OUTLET JACKS, AND FACE PLATES FOR A COMPLETE INSTALLATION, UNLESS OTHERWISE NOTED. MAXIMUM LENGTH OF ETHERNET CABLES SHALL BE 300 FEET.
- ALL AUDIO/VISUAL DEVICES SHALL BE SUPPLIED "BY OTHERS". THE ELECTRICAL CONTRACTOR SHALL PROVIDE CONDUIT ROUGH-IN ONLY, UNLESS OTHERWISE NOTED.
- POWER AND CONTROL WIRING FOR MECHANICAL EQUIPMENT ON THE ROOF MUST RISE WITHIN THE CURB UNLESS OTHERWISE NOTED.
- ALL EXTERIOR OUTLET BOXES TO BE "CONCEALED" AND SHALL C/W A VAPOUR BARRIER CHAMBER TO PREVENT AIR LEAKAGE.
- THE ELECTRICAL CONTRACTOR SHALL PROVIDE BALANCED PHASING (A,B,C) FOR ALL EQUIPMENT PANEL LOADS. ADJUST BREAKER SCHEDULES AS REQUIRED.
- PROVIDE FIRE-STOP MATERIAL AS REQUIRED FOR ALL WALL AND FLOOR PENETRATIONS TO MAINTAIN THE SMOKE SEAL AND FIRE RATING. FOR RECESSED JUNCTION BOXES USE HILTI - FIRE BLOK.
- PROVIDE ALL MATERIALS AND ACCESSORIES REQUIRED FOR A COMPLETE GROUNDING SYSTEM AS REQUIRED BY THE GOVERNING AUTHORITIES. GROUND ALL EQUIPMENT AND DEVICES AS REQUIRED AND IN ACCORDANCE WITH THE OESC...
- UPON THE COMPLETION OF THE CONTRACT, ISSUE A FORMAL CERTIFICATE INDICATING THE DATE OF COMPLETION OF WORK, REPAIR OR REPLACE ANY DEFECTS WHICH MAY APPEAR IN ANY OF THE WORK WITHIN ONE (1) YEAR.

DEMOLITION NOTES

- ELECTRICAL SYSTEMS SHOWN ON DEMOLITION PLANS ARE BASED ON INFORMATION OBTAINED FROM ORIGINAL CONSTRUCTION CONTRACT/TENDER DOCUMENTS. THESE DRAWINGS ARE NOT BASED ON "AS-BUILT" RECORD OR ON EXHAUSTIVE FIELD MEASUREMENT AND ARE PROVIDED TO ASSIST THE CONTRACTOR IN DETERMINING THE EXTENT OF WORK REQUIRED. THE CONTRACTOR SHALL MAKE ALLOWANCE IN THEIR TENDER PRICE FOR THE REMOVAL OF ADDITIONAL ABANDONED SERVICES AND THE PROTECTION OF EXISTING SERVICES THAT MUST REMAIN. RECORD THE LOCATION OF ALL EXISTING SERVICES THAT REMAIN ON AS-BUILT RECORD DRAWINGS.

SEPARATE PRICES

SEPARATE PRICE #1:
PROVIDE PRICE FOR THE DEMOLITION OF EXISTING LIGHTING IN THE EXISTING DAYCARE ROOM, PROVIDING NEW LIGHTING IN THE NEW CLASSROOM, AND REWORK OF EXISTING WIRING/ CONDUIT TO NEW LIGHT FIXTURES.

LEGEND - LIGHTING SYSTEM

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	2'x2' FIXTURE
	2'x4' FIXTURE
	1'x4' FIXTURE
	4' STRIP FIXTURE
	4' STRIP FIXTURE - WALL
	POT LIGHT
	PENDANT
	WALL SCONCE
	TRACK LIGHT
	HIGH BAY
	TOGGLE SWITCH
	DUAL TOGGLE SWITCH
	TRIPLE TOGGLE SWITCH
	DIMMER SWITCH
	DUAL DIMMER SWITCH
	TRIPLE DIMMER SWITCH
	LOW VOLTAGE SWITCH
	SWITCH WITH MOTION SENSOR - WALL
	SWITCH WITH PIR MOTION SENSOR - 10 MIN DELAY - CEILING
	SWITCH WITH DUAL TECH MOTION SENSOR - 10 MIN DELAY - CEILING
	SWITCH WITH PIR + DAYLIGHT MOTION SENSOR - 15 MIN DELAY - CEILING
	POWER PACK
	TIME CLOCK
	PHOTOCCELL
	2'x2' EMERGENCY FIXTURE
	2'x4' EMERGENCY FIXTURE
	1'x4' EMERGENCY FIXTURE
	EMERGENCY POT LIGHT
	POLE MOUNTED LIGHT
	DAYLIGHT SENSOR
	CHANDELIER

LEGEND - POWER SYSTEM

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE
	GFCI RECEPTACLE
	DIRECT CONNECTION
	NON FUSED DISCONNECT SWITCH
	NON-FUSED DIRECT CONNECTION
	MOTOR CONNECTION W/ NON-FUSED DISCONNECT
	MOTOR CONNECTION
	UNDERGROUND PULL BOX
	JUNCTION BOX
	CONTRACTOR
	ELECTRICAL PANEL

LEGEND - EMERGENCY SYSTEM

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	EXIT SIGN - SINGLE FACE - CEILING
	EXIT SIGN - SINGLE FACE - WALL
	EXIT SIGN - SINGLE FACE DIRECTIONAL - CEILING
	EXIT SIGN - DOUBLE FACE DIRECTIONAL - CEILING
	SINGLE REMOTE HEAD - CEILING
	DOUBLE REMOTE HEADS - CEILING
	SINGLE REMOTE HEAD - WALL
	DOUBLE REMOTE HEADS - WALL
	BATTERY PACK W/ DOUBLE REMOTE HEADS - WALL
	BATTERY PACK - WALL
	BATTERY PACK W/ DOUBLE REMOTE HEADS - CEILING
	EXIT SIGN SELF-POWERED W/ REMOTE HEADS - WALL

LEGEND - FIRE ALARM SYSTEM

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	BELL - WALL
	BELL AND STROBE - WALL
	HORN - WALL
	STROBE - CEILING
	STROBE - WALL
	FIRE ALARM SPEAKER - CEILING
	FIRE ALARM SPEAKER AND STROBE - CEILING
	FIRE ALARM PULLSTATION
	HORN AND STROBE - CEILING
	HORN AND STROBE - WALL
	SMOKE DETECTOR - CEILING
	DUCT SMOKE DETECTOR
	SMOKE DETECTOR W/ CARBON MONOXIDE - CEILING
	HEAT DETECTOR - CEILING
	SMOKE ALARM W/ CARBON MONOXIDE & STROBE
	SMOKE ALARM - CEILING
	CARBON MONOXIDE - CEILING
	FIRE ALARM/ANNUNCIATOR PANEL

LEGEND - SECURITY SYSTEM

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	ELECTRIC STRIKE
	DOOR CONTACT
	CARD READER
	PUSH BUTTON
	SECURITY PANEL
	SECURITY KEYPAD
	SECURITY CAMERA
	SECURITY INTERCOM WITH CAMERA
	SECURITY ALARM SIREN
	PIR MOTION DETECTOR
	SECURITY INTERCOM MASTER STATION
	SECURITY INTERCOM SUB-MASTER STATION

LEGEND - COMMUNICATIONS

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	DATA OUTLET
	TELEPHONE OUTLET
	TELEPHONE AND DATA OUTLET
	PUBLIC ADDRESS SPEAKER AND CALL SWITCH
	DIGITAL CLOCK
	PUBLIC ADDRESS SYSTEM HANDSET
	WIRELESS ACCESS POINT
	INTERCOM SYSTEM SPEAKER MASTER TELEPHONE STATION W/ SCREEN

LEGEND - ABBREVIATION

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
R	REMOVE
R/R	REMOVE AND REINSTALL
ER	EXISTING TO BE RELOCATED
EX	EXISTING TO REMAIN
GI	GROUND FAULT INTERRUPT
NL	NIGHT LIGHT
WP	WEATHER-PROOF
ADO	AUTOMATIC DOOR OPENER
HD	HAND DRYER
D/W	DISHWASHER
F/R	REFRIGERATOR
M/W	MICROWAVE
WA/D	WASHER DRYER
C/W	COMPLETE WITH

LEGEND - SINGLE LINE DIAGRAM

THIS LEGEND OF SYMBOLS REPRESENTS MANTECON PARTNERS INC. STANDARD LEGEND. ALL SYMBOLS MAY NOT APPEAR ON DRAWINGS.

SYMBOL	DESCRIPTION
	BREAKER (MCCB)
	FUSED DISCONNECT SWITCH
	SWITCH
	FUSE
	DRAWOUT BREAKER
	METER SOCKET
	TRANSFORMER
	DIGITAL MULTIMETER
	BREAKER WITH LSIG PROTECTION
	SURGE PROTECTION DEVICE

LIGHTING SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	LAMPS
A	6' DOWNLIGHT 2500LM, 4000K, 80CRI, MVOLT CAT:LDN6 40/25 L06AR LSS MVOLT	LITHONIA LIGHTING	LED @ 28.3W
B	2'x4' FLAT PANEL 4000LM, 3500K, 80CRI, MVOLT CAT:CPANL 2X2 AL01 SWW7 M4	LITHONIA LIGHTING	LED @ 36W
C	4' LINEAR DIRECT FIXTURE WITH SCULPTURED END PLATE 700LMF 4000K, 80CRI, 120V CAT:EGRM4L LLP MSL4 80CRI 40K 700LMF ZT 120 SCT F2/ CD41	PEERLESS	LED @ 11.9W/FT
D	2' LINEAR DIRECT FIXTURE WITH SCULPTURED END PLATE 2000LM 4000K, 80CRI, 120V CAT:SSL24L015MVOLTSW380CRI	CSS	LED @ 14.8W
F	4' LED DOWNLIGHT 1500 LUMENS, 400K, 80 CRI CAT:HC4150D10-HW4052840-41MDH	COOPER LIGHTING	LED @ 6.1W
WI	EXTERIOR LED WALL SCONCE 1500LM, 4000K, 80CRI, MVOLT CAT:WST LED P1 40K VW MVOLT	LITHONIA LIGHTING	LED @ 11W

EMERGENCY LIGHTING SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	LAMPS
R1	MR16 SURFACE MOUNT DOUBLE REMOTE HEADS CAT:MR16-M2-12-24V-6W-LA-WH	STANPRO	LED
E1	EDGE LIT RUNNING MAN SIGN CAT:RMA-BA-UDC	STANPRO	LED
BUI	COMBINATION STEEL COMBO WITH DUAL REMOTES CAT:SLD24720-2M-6LA-WH	STANPRO	LED



PROJECT NORTH



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CLIENT
**WORKSHOP
ARCHITECTURE**

PROJECT:
**CSV L'HARMONIE DAYCARE
ADDITION**

**158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO**

DRAWING TITLE:
**LEAD SHEET
(GENERAL NOTES,
SPECIFICATION, LEGEND &
DRAWING LIST)**

DRAWN BY: F.S	SCALE: AS INDICATED
CHECKED BY: N.A	DRAWING NUMBER:
DATE: NOV 2022	E0.0
PROJECT NUMBER: 22-058	

ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

- DEFINITIONS - FOLLOWING ARE DEFINITIONS OF WORDS FOUND IN THIS SPECIFICATION AND ON ASSOCIATED DRAWINGS.
 - "CONCEALED" - HIDDEN FROM NORMAL SIGHT IN FURRED - SPACES, SHAFTS, CEILING SPACES, WALLS, UNDERFLOOR, AND PARTITIONS.
 - "EXPOSED" - ALL ELECTRICAL WORK VISIBLE TO BUILDING OCCUPANTS.
 - "PROVIDE" - (AND ALL TENSES OF "PROVIDE") SUPPLY, INSTALL, WIRE AND CONNECT COMPLETE.
 - "INSTALL" - (AND ALL TENSES OF "INSTALL") - INSTALL, WIRE AND CONNECT COMPLETE. PRODUCTS AND SERVICES SPECIFIED.
 - "SUPPLY" - SUPPLY ONLY.
 - "FINISHED AREA" - ANY AREA OR PART OF AN AREA WHICH RECEIVES A FINISH SUCH AS PAINT, OR IS FACTORY FINISHED.
 - "GOVERNING AUTHORITY" AND/OR "REGULATORY AUTHORITY" AND/OR "MUNICIPAL AUTHORITY" - ALL GOVERNMENT DEPARTMENTS, AGENCIES, STANDARDS, RULES AND REGULATIONS THAT APPLY TO AND GOVERN THE ELECTRICAL WORK AND TO WHICH THE WORK MUST ADHERE.
 - "OR APPROVED EQUAL" - MATERIAL OR EQUIPMENT PROPOSED BY CONTRACTOR, IN LIEU OF THAT SPECIFIED, AS APPROVED BY CONSULTANT.
 - "AS INDICATED" - AS SHOWN ON DRAWINGS AND/OR NOTED IN SPECIFICATIONS.
 - "CONSULTANT" - ARCHITECT OR CONSULTING ENGINEER WHO HAS PREPARED THE CONTRACT DOCUMENTS ON BEHALF OF THE OWNER.
- PROVIDE ALL WORK AND MATERIALS IN ACCORDANCE WITH THE LATEST EDITIONS OF THE ONTARIO ELECTRICAL SAFETY CODE, THE ONTARIO BUILDING CODE, APPLICABLE CSA AND ULCS STANDARDS, THE REQUIREMENTS OF ANY AUTHORITY AND ALL OTHER APPLICABLE MUNICIPAL AND PROVINCIAL CODES AND REGULATIONS. ANY MATERIALS, EQUIPMENT OR INSTALLATIONS NOT MEETING ALL REQUIREMENTS OF THE APPROPRIATE REGULATORY AGENCIES WILL NOT BE ACCEPTED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THESE REQUIREMENTS ARE MET AND PROVIDE EVIDENCE OF SUCH AS REQUESTED.
- CAREFULLY EXAMINE THE SITE AND TENDER DOCUMENTS FOR THE WORK IN ACCORDANCE WITH THE INSTRUCTIONS TO BIDDERS, VISIT THE EXISTING BUILDING AND BECOME FAMILIAR WITH EXISTING ARCHITECTURAL, STRUCTURAL AND MECHANICAL CONDITIONS, THE LOCATION OF EXISTING ELECTRICAL EQUIPMENT AND INSTALLATIONS, AND OTHER FACTORS RELATED TO THE WORK TO BE DONE. NO EXTRA CHARGE WILL BE CONSIDERED FOR ANYTHING WHICH COULD HAVE BEEN REVEALED IN THE COURSE OF SUCH EXAMINATIONS.
- THE ELECTRICAL CONTRACTOR SHALL BE HELD RESPONSIBLE FOR THE SATISFACTORY COMPLETION OF ALL WORK BEARING UPON THE ELECTRICAL TRADE. PLAN WORK WELL IN ADVANCE TO ELIMINATE DELIVERY AND INSTALLATION DIFFICULTIES. CO-ORDINATE WORK WITH OTHER TRADES TO PREVENT CONFLICTS ON SITE AND RESOLVE INTERFERENCES. PROVIDE WORK IN STAGES AND AT TIMES REQUIRED BY THE PROJECT SCHEDULE.
- ALL ELECTRICAL WORK SHALL BE COMPLETED TO BUILDING OWNER REQUIREMENTS AND BUILDING STANDARDS IN ACCORDANCE WITH THE RELEVANT SECTION, ARTICLES AND DETAILS OF THE BASE BUILDING SPECIFICATIONS AND DRAWINGS.
- OBTAIN AND PAY FOR PERMITS REQUIRED BY THE ELECTRICAL SAFETY AUTHORITY (ESA) AND LOCAL INSPECTION AUTHORITIES FOR THIS WORK. PRESENT FINAL CERTIFICATES TO CONSULTANT AND OWNER.
 - ESA INSPECTION CERTIFICATE
 - FIRE ALARM VERIFICATION REPORT (WITHOUT EXCEPTIONS)
 - FIRE ALARM AUDIBILITY REPORT (WITHOUT EXCEPTIONS)
 - EMERGENCY LIGHTING TEST REPORT
- CARRY OUT ALL WORK IN ACCORDANCE WITH ONTARIO ELECTRICAL SAFETY CODE (OESC) REGULATIONS INCLUDING BULLETINS, AND ELECTRICAL SAFETY AUTHORITY INSPECTION REQUIREMENTS.
- PAY ALL FEDERAL AND PROVINCIAL SALES TAXES APPLICABLE.
- ALL EQUIPMENT SHALL BE NEW AND CSA (OR EQUIVALENT PER OESC) APPROVED UNLESS OTHERWISE NOTED.
- MATERIALS SUPPLIED SHALL CONFORM TO MINIMUM PUBLISHED REQUIREMENTS AND RECOMMENDATIONS, OR BETTER, OF APPLICABLE STANDARDS OF:
 - CSA - CANADIAN STANDARDS ASSOCIATION
 - IFEMAC - ELECTRICAL AND ELECTRONIC MANUFACTURERS' ASSOCIATION OF CANADA
 - NEMA - NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION
 - ULC - UNDERWRITERS LABORATORIES OF CANADA LTD.
 - OESC - ONTARIO ELECTRICAL SAFETY CODE
 - ESA - ELECTRICAL SAFETY AUTHORITY
 - OBC - ONTARIO BUILDING CODE
- DRAWINGS WHICH ACCOMPANY THESE SPECIFICATIONS ARE DIAGRAMMATIC AND SHOW THE REQUIRED DISTRIBUTION, NUMBER AND LOCATIONS OF THE ELECTRICAL EQUIPMENT, FIXTURES AND OUTLETS, AND INDICATE SUGGESTED CIRCUITING. DO NOT SCALE DRAWINGS BUT USE ONLY DIMENSIONS WHICH ARE SHOWN, WHERE EXACT BUILDING DIMENSIONS AND DETAILS ARE REQUIRED, USE ONLY DIMENSIONS FROM THE ARCHITECTURAL DRAWINGS OR JOB SITE DIMENSIONS.
- KEEP A COMPLETE AND SEPARATE SET OF PRINTS ON SITE AT ALL TIMES AND NOTE THEREON CLEARLY, NEATLY, ACCURATELY AND PROMPTLY ALL ARCHITECTURAL, STRUCTURAL, MECHANICAL AND ELECTRICAL CHANGES, REVISIONS AND ADDITIONS TO THE WORK AND DEVIATIONS FROM THE CONTRACT DOCUMENTS. ACCURATE LOCATIONS, DEPTH, SIZE AND TYPE OF UNDERGROUND UTILITIES SHALL BE INCLUDED IN THESE RECORD DRAWINGS, INDICATE ALSO ON THE RECORD DRAWINGS THE LOCATION OF ACCESS PANELS OR REMOVABLE CEILING TILES WHICH COVER EQUIPMENT OR JUNCTION BOXES WHICH MAY REQUIRE FUTURE ACCESS OR WHERE CONDUIT OR WIRING FOR FUTURE USE IS LOCATED. THE FINAL AS-BUILT DRAWINGS SHALL BE SUBMITTED AT THE COMPLETION OF THE PROJECT WITH AN APPLICATION FOR A CERTIFICATE OF TOTAL PERFORMANCE. INDICATE IN RED INK ON AS-BUILT DRAWINGS ALL DEVIATIONS AND APPROVED CHANGES FROM THE CONTRACT DRAWINGS.
- SUBMIT FOR REVIEW A SINGLE (1) SET OF SHOP DRAWINGS AND DATA SHEETS IN EITHER .PDF OR HARD COPY FORMAT COVERING ALL ITEMS OR EQUIPMENT TO BE INSTALLED UNDER THE CONTRACT. SHOP DRAWINGS SHALL SHOW ALL RELEVANT PERFORMANCE AND INSTALLATION INFORMATION. EQUIPMENT WILL NOT BE ACCEPTED ON SITE UNTIL REVIEW OF SHOP DRAWINGS IS COMPLETE. SUBMIT SHOP DRAWINGS FOR LIGHTING FIXTURES, EXIT LIGHTS, EMERGENCY LIGHTS AND BATTERY UNITS, DISCONNECT SWITCHES, STARTERS, TRANSFORMERS, NEW PANELS, FIRE ALARMS, VOICE/DATA WIRING, AND OTHER SYSTEMS SPECIFIED IN THIS PROJECT TO CONSULTANT FOR REVIEW.
- ARCHITECTURAL SPECIFICATIONS AND DRAWINGS SHALL BE REVIEWED IN CONJUNCTION WITH THESE DRAWINGS AS THEY ARE PART OF THIS WORK.
- COORDINATE WITH ALL TRADES AND ARRANGE EQUIPMENT IN PROPER RELATION TO OTHER APPARATUS, DUCTS, PIPES, ETC., AND WITH BUILDING CONSTRUCTION AND ARCHITECTURAL FINISHES.
- IN GENERAL, ALL NECESSARY CUTTING AND PATCHING FOR THE ELECTRICAL WORK SHALL BE PROVIDED BY THE APPROPRIATE TRADE AT THE EXPENSE OF THE CONTRACTOR UNLESS INDICATED OTHERWISE ON THE DRAWINGS. HOLES THROUGH EXTERIOR WALLS AND ROOF ARE TO BE PROPERLY FLASHED AND MADE WEATHERPROOF. REPAIR ANY DAMAGE CAUSED BY THE ELECTRICAL TRADE TO EXISTING BUILDINGS OR EQUIPMENT, ETC., TO THE OWNER'S SATISFACTION. IN GENERAL, PAINTING OF ELECTRICAL WORK AND PATCHES AS REQUIRED WILL BE PROVIDED BY THE ELECTRICAL TRADE.
- PROVIDE ALL EXCAVATION, TRENCHING, BACKFILLING, COMPACTION AND CONCRETE REQUIRED FOR THE ELECTRICAL WORK UNLESS OTHERWISE INDICATED. ALL EXCAVATIONS SHALL BE BACKFILLED WITH CLEAN MATERIALS (SAND TO 100mm [4"] COVER ALL AROUND FOR DIRECT BURIED CONDUIT OR CABLES) AND BE POWER COMPACTED TO A MINIMUM OF 100% PROCTOR UNLESS INDICATED OTHERWISE. ALL CONCRETE SHALL BE FORMED IN PLACE, BE RATED MINIMUM 25 MPa AND BE PROVIDED AS A CONTINUOUS POUR. PROVIDE STEEL REINFORCEMENT WHERE INDICATED. CONCRETE ENCASED DUCTS SHALL BE PROVIDED WITH A MINIMUM 75 mm [3"] CONCRETE ENVELOPE. RESTORE TO ORIGINAL CONDITION ALL SURFACES, LANDSCAPING, ETC. DISTURBED BY EXCAVATION WORK.
- MATERIALS REMOVED AND NOT REUSED WILL BECOME OWNERS PROPERTY, AND SHALL BE DISPOSED OF FROM THE SITE PRIOR TO COMPLETION OF WORK AS DIRECTED BY OWNER.
- THOROUGHLY CLEAN ALL ELECTRICAL EQUIPMENT DURING CONSTRUCTION AND ON COMPLETION OF CONTRACT. REMOVE ALL ELECTRICAL DEBRIS FROM THE SITE.
- PROVIDE LEGIBLE SIGNS AND BARRIERS ON OR AROUND ALL LEVEL PANELS AND EQUIPMENT DURING CONSTRUCTION TO PREVENT INJURY OR SHOCK.
- TEST ALL EQUIPMENT AND WIRING AT ANY TIME REQUESTED BY THE OWNER AS PART OF THE CONTRACT. PROVIDE ALL METERS, MATERIALS AND LABOUR REQUIRED TO CARRY OUT THIS WORK. PRIOR TO CONNECTION OF ADDITIONAL LOADS TO EXISTING SOURCES, ENSURE THROUGH LOAD MEASUREMENT AND MONITORING THAT THE REQUIRED EXCESS CAPACITY IS AVAILABLE.
- ON COMPLETION OF THE ELECTRICAL INSTALLATIONS, TRIAL OPERATE ALL EQUIPMENT, SYSTEMS AND DEVICES TO ENSURE CORRECT FUNCTIONING, FOLLOWING SATISFACTORY TRIAL

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OPERATION, INSTRUCT THE OWNER'S REPRESENTATIVE REGARDING OPERATION AND MAINTENANCE OF THE SYSTEMS AND EQUIPMENT INSTALLED.

- PERFORM ALL WORK IN SUCH A MANNER AS TO CAUSE AS LITTLE DISTURBANCE OR INCONVENIENCE AS POSSIBLE TO THE EXISTING OPERATIONS, WHERE DEMED NECESSARY BY THE OWNER OR CONSULTANT. PROVIDE TEMPORARY MEASURES AS REQUIRED TO MAINTAIN SPECIAL SERVICES AND/OR PROVIDE WORK OUTSIDE REGULAR HOURS AT NO ADDITIONAL COST. DO NOT INTERRUPT ANY ELECTRICAL SERVICES WITHOUT PRIOR AUTHORIZATION.
- PROVIDE ALL SLEEVES, INSERTS, HANGERS AND CORE DRILLING OF SLAB REQUIRED FOR THE ELECTRICAL WORK. TREAT ALL SLEEVES OR HOLES PERFORMED ACCOUSTICAL SEPARATIONS FOR INSTALLATIONS OF THIS DIVISION TO MAINTAIN ACOUSTICAL RATING. ALL GAPS SHALL BE PACKED WITH ACOUSTICAL INSULATION AND SEALED AT BOTH ENDS WITH ACOUSTICAL CHALKING. PATCH ALL OPENINGS ABOVE INSTALLATIONS OF THIS DIVISION PERFORMING FIRE OR SMOKE SEPARATIONS WITH AN APPROVED WATERIGHT SMOKE AND FIRE STOP SEALANT.
- PROVIDE ALL ACCESS DOORS REQUIRED FOR THE ELECTRICAL INSTALLATIONS. ACCESS DOOR SIZE, TYPE AND FIRE RATING SHALL BE IN ACCORDANCE WITH THE ARCHITECTURAL SPECIFICATIONS AND CONDITIONS.
- GENERALLY, MOUNT EQUIPMENT AS CLOSE AS PRACTICAL TO THE LOCATION SHOWN ON THE DRAWINGS TAKING INTO CONSIDERATION SITE CONDITIONS. ENSURE ALL EQUIPMENT IS LOCATED IN A MANNER ALLOWING EASY ACCESS FOR MAINTENANCE, REPAIR OR ADJUSTMENT. CONFIRM ALL ARCHITECTURAL CONDITIONS SUCH AS GLAZING, DOOR SWINGS, FURNITURE AND EQUIPMENT TYPES AND LAYOUTS, ETC. ON SITE PRIOR TO INSTALLING ANY RELATED ITEM OR WIRING.
- REFER TO LIGHTING CONTROL SEQUENCE OF OPERATION FOR EACH SPACE. CONTRACTOR SHALL PROVIDE A COMPLETE SYSTEM CONSISTING OF ALL CONTROL DEVICES, WIRING, CONNECTIONS, ETC. AS REQUIRED.
- THE OWNER RESERVES THE RIGHT TO RELOCATE ANY FIXTURE, OUTLET, DEVICE, EQUIPMENT ETC. UP TO 3m [10'] PRIOR TO INSTALLATION WITHOUT INCURRING ANY EXTRA COST. CONFIRM LOCATIONS, MOUNTING HEIGHT AND ARRANGEMENT OF ALL OUTLETS ON SITE PRIOR TO INSTALLATION.
- PROVIDE SPRINKLERPROOF HOODS AND DOORS FOR ELECTRICAL EQUIPMENT INSTALLED IN SPRINKLERED AREAS.
- ARRANGE WITH COMMUNICATIONS SERVICE PROVIDER FOR INSTALLATION OF NEW PHONE/INTERNET/CATV WIRING AND RACEWAYS AS REQUIRED. RACEWAYS SHALL BE EMT IN WALLS AND CEILING SPACES; PVC BELOW FLOOR SLABS ON GRADE.
- IF ASBESTOS MATERIAL IS ENCOUNTERED, STOP WORK IN THE AFFECTED AREA IMMEDIATELY AND NOTIFY THE CONSULTANT AND OWNER.
- GUARANTEE ALL MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF COMPLETION OF WORK TO THE CONTRACTOR'S CONSULTANT. PROVIDE WRITTEN GUARANTEE.
- OWNER RESERVES RIGHT TO TRIAL AND/OR TEMPORARY USAGE PRIOR TO ACCEPTING INSTALLATION.
- ON COMPLETION OF PROJECT AND BEFORE FINAL PAYMENT, SUBMIT:
 - ONE (1) SET OF PDFS AS-BUILT DRAWINGS WITH ALL CHANGES AND BURIED SERVICES EXACT LOCATIONS NOTED THEREON. PLOT USING THE CONSULTANT CTR FILE. DRAWING SHALL HAVE ELECTRICAL CONTRACTORS LOGOS AND CONTACT INFORMATION, ISSUED FOR AS BUILT WITH THE CURRENT DATE
 - SUBMIT THREE (3) COPIES (BOTH ELECTRONIC (.CD) AND HARD COPIES) OF MAINTENANCE DATA AND OPERATING INSTRUCTIONS IN A HARD-BACK, 3 RING BINDER, EACH OF WHICH IS TO INCLUDE:
 - 1 COPY OF EACH SHOP DRAWING (REVISED AS PER THE REVIEWED DRAWINGS).
 - 1 COPY OF EQUIPMENT PART LIST.
 - 1 COPY OF RECOMMENDED LIST OF SPARE PARTS.
 - 1 COPY OF OPERATING AND MAINTENANCE INSTRUCTIONS.
 - 1 COPY OF EQUIPMENT INSTALLATION DETAILS, CONSTRUCTION AND PERFORMANCE DATA.
 - 1 LIST OF ALL MANUFACTURING AND EQUIPMENT SERVICE DEPOTS INCLUDING TELEPHONE NUMBERS.
 - 1 COPY OF THE ELECTRICAL SAFETY AUTHORITY FINAL INSPECTION CERTIFICATE.
 - 1 COPY OF THE EMERGENCY LIGHTING TEST RESULTS
 - 1 COPY OF THE FIRE ALARM VERIFICATION CERTIFICATE
 - 1 COPY OF ANY OTHER CERTIFICATES, APPROVAL LETTERS, ETC.
- WIRING AND CONDUIT SHALL BE CONCEALED IN WALLS OR ABOVE CEILINGS UNLESS OTHERWISE APPROVED.
- INSTALL, WIRE AND CONNECT ALL EQUIPMENT SHOWN, SPECIFIED OR MENTIONED.
- ARRANGE WITH SUPPLY AUTHORITY FOR INCOMING SERVICE AND PAY ALL SUPPLY AUTHORITY CHARGES.
- CONDUIT IN PUBLIC AREAS WITH EXPOSED CEILING MUST BE PAINTED EMT, PAINT COLOUR TO BE CONFIRMED BY ARCHITECT.

EMERGENCY/EXIT LIGHTING

- EXIT SIGNS SHALL BE CSA APPROVED. PICTOGRAM GREEN "RUNNING-MAN" ON WHITE BACKGROUND MADE OF DURABLE EXTRUDED ALUMINUM HOUSING C/W WHITE FINISH, WHITE LED SOURCE, ENERGY EFFICIENT, AND UNIVERSAL MOUNTING.
- REMOTE HEADS SHALL BE 4-WATT HEAD, COMPATIBLE WITH THE VOLTAGE SUPPLIED, IMPACT RESISTANT, FLAME RETARDANT THERMOPLASTIC, ROTATIONAL, SUPPLIED WITH A CANOPY C/W WHITE FINISH.
- PROVIDE COMPLETE 12V DC BATTERY POWERED EMERGENCY LIGHTING SYSTEMS FOR THE BUILDING AREAS INDICATED. SYSTEMS SHALL CONSIST OF FULLY AUTOMATIC BATTERY UNITS (SPECIFIED WATTS FOR 1/2 HOUR) WITH MOUNTING BRACKET AND REMOTE LAMP HEADS AS SHOWN ON DRAWINGS. EMERGENCY BATTERY UNITS SHALL BE C/W BATTERY DISCONNECT SWITCH (TYPE OF NORMAL VOLTAGE) AND AUTOTEST AND AUTOTEST SELF-DIAGNOSTIC CIRCUITRY COMPLYING WITH C.S.A. AND N.B.C. REQUIREMENTS.
- THE EMERGENCY BATTERIES SHALL BE LONG LIFE LEAD-ACID, CALCIUM ALLOY TYPE IN SEALED PLASTIC CONTAINERS AND BE TOTALLY MAINTENANCE FREE WITH A MINIMUM LIFE EXPECTANCY OF 10 YEARS.
- THE BATTERY CAPACITY SHALL BE SIZED TO SUPPLY THE NUMBER OF FIXTURES INDICATED ON THE DRAWINGS. PLUS HAVE AN ADDITIONAL MINIMUM 10% SPARE CAPACITY FOR FUTURE HEADS. THE BATTERIES SHALL BE CAPABLE OF PROVIDING POWER TO THE FIXTURES FOR THIRTY MINUTES WITHOUT DROPPING BELOW NINETY-ONE (91%) PERCENT OF THE RATED BATTERY VOLTAGE.
- PROVIDE GREY COLOURED CONDUCTORS IN A SEPARATE CONDUIT SYSTEM, FOR THE D.C. WIRING. WIRE SYSTEM IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS TO MAINTAIN VOLTAGE DROP TO LESS THAN .5% TO FURTHEST FIXTURE. CONNECT REMOTE LAMP HEADS AND EXIT SIGN EMERGENCY SOCKETS TO BATTERY UNIT INDICATED. INSTALL A SINGLE RECEPTACLE AND APPROVED TO BATTERY UNIT FOR CONNECTION TO BATTERY SUPPLY FROM A LOCAL LIGHTING CIRCUIT. MOUNTING PLATFORMS AND ACCESSORIES SHALL BE PROVIDED FOR A PERMANENT AND SAFE INSTALLATION OF THE BATTERY UNITS.

LIGHTING

- LED FIXTURES: MINIMUM TEMPERATURE OF 3500K FOR COMMERCIAL AND 4000K FOR EXTERIOR OR NOTED OTHERWISE. ACCEPTABLE MANUFACTURES AS PER LUMINAIRE SCHEDULE.
- PROVIDE ALL LIGHT FIXTURES AS SPECIFIED ON THE DRAWINGS COMPLETE WITH BALLASTS, DRIVERS, LENSES, LAMPS, AUXILIARY COMPONENTS, MOUNTING HARDWARE, ETC. REQUIRED FOR A COMPLETE INSTALLATION. VERIFY ALL CATALOG NUMBERS WITH DESCRIPTIONS GIVEN. CHECK ALL LIGHTING FIXTURES PRIOR TO THEIR INSTALLATION TO ENSURE THAT THEY ARE THE SPECIFIED FIXTURES FOR THE PROJECT.
- LED MONOCHROME LIGHTING FIXTURES SHALL HAVE LIGHTING WITH A MINIMUM CRI OF 85 FOR REGULARLY OCCUPIED SPACES, A MINIMUM CRI OF 70 FOR EXTERIOR, AND A MINIMUM OF 75 FOR ALL OTHER SPACES. THE FIXTURE SHALL HAVE A MINIMUM L70 OF 50,000 HOURS. ALL LIGHTINGS SHALL HAVE IESNA LM-79 AND LM-80 TESTING REPORTS AND LIFE CALCULATIONS BASED ON 100% EXTERIOR AND INTERIOR AREA LIGHTING SHALL HAVE A MINIMUM EFFICIENCY OF 80 LUMENS PER WATT.
- LED DRIVERS SHALL HAVE MINIMUM LIFESPAN EQUAL OR BETTER THAN THE LIFESPAN OF THE L70 LIFESPAN OF THE LED LAMPS IT SERVES. DRIVERS SHALL BE INTEGRATED INTO THE FIXTURE IF SERVICING ONLY THAT FIXTURE OR REMOVED IF THE DRIVER SERVES MORE THAN ONE FIXTURE. ALL DRIVERS SHALL BE DIMMABLE USING 0-10V DIMMING TECHNOLOGY UNLESS NOTED OTHERWISE. LED DRIVERS SHALL HAVE HIGH POWER FACTOR. ALL LED LIGHTING AND DRIVERS USED IN EXTERIOR OR UNHEATED APPLICATIONS SHALL PROVIDE START-UP AND OPERATION IN TEMPERATURES FROM -30°C TO 50°C.
- THE CONTRACTOR SHALL ENSURE THAT ALL LIGHT FIXTURES ARE ADEQUATELY SUPPORTED. FIXTURES MUST BE SUPPORTED DIRECTLY FROM THE BUILDING STRUCTURAL MEMBERS. CO-ORDINATE THE REQUIREMENTS OF THE LIGHT FIXTURE SUPPORTS WITH THE OTHER TRADES (WHERE APPLICABLE) PRIOR TO FIXTURE INSTALLATION. SAFETY SAFETY CHAINS OR WIRES SHALL ALSO BE PROVIDED AS REQUIRED BY REGULATORY AGENCIES.
- METHOD OF ATTACHING SUSPENSION WIRES AND SAFETY CHAINS TO FIXTURES AND BUILDING ELEMENTS SHALL BE DISCUSSED AND APPROVED BY THE CONSULTANT OR OWNER PRIOR TO INSTALLATION.
- SHOP DRAWINGS FOR LUMINAIRES INDICATING LIGHTING PERFORMANCE DETAILS, FIXTURE CONSTRUCTION DETAILS, AIR CONTROL AND DUCTWORK CONNECTION DETAILS, ETC., AND PICTURES OF EACH TYPE OF LIGHTING FIXTURE SHALL BE SUBMITTED FOR REVIEW.
- SHOP DRAWINGS SHALL BE SUBMITTED FOR LED DRIVERS FOR ALL FIXTURES TO BE INSTALLED. THESE SHALL BE SUBMITTED SEPARATELY FROM THE LIGHTING FIXTURES BEING INSTALLED AND SHOULD INDICATE EACH FIXTURE THE PRODUCT IS INSTALLED.
- FOR APPROVED EQUALS TO BASE DESIGN FIXTURES, SHOP DRAWINGS FOR EXTERIOR LIGHTING SHALL INCLUDE A COMPUTER GENERATED SITE PLAN PLOT POINT BY POINT CALCULATIONS AT NO LESS THAN 3 m [10'] SPACING FOR THE FULL EXTERIOR SPACE UP TO 2 m BEYOND THE

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ETC., REQUIRED FOR CONTROL AND CONNECTION.

FUSES

- PROVIDE 600V 200,000 RMS SYMMETRICAL INTERRUPTING RATING, HRCl TYPE J (600A OR LESS) AND HRCl TYPE L (OVER 600A). FOR MOTOR PROTECTION: TIME DELAY 200,000A RMS SYMMETRICAL RATING, HRCl TYPE J TIME DELAY (600A OR LESS) AND HRCl TYPE L TIME DELAY (OVER 60A).
- PROVIDE FUSE SIZE AND TYPE COMPATIBLE WITH VFD MANUFACTURER REQUIREMENTS.

PANELBOARDS

- PANELS SHALL BE OF THE TYPE WITH VOLTAGE AND CURRENT RATING AS SHOWN ON THE DRAWINGS. SIZED TO ACCOMMODATE BRANCH CIRCUIT BREAKERS AND SPACES AS INDICATED. BUS BRACING SHALL BE PROVIDED TO SUIT THE SHORT CIRCUIT CAPACITY RATING INDICATED ON THE DRAWINGS OR MINIMUM 10 kA AT 208 V, 3 PHASE. RESERVE DIMENSIONS SHALL BE AS SHOWN. PROVIDE LOCKING DOORS FOR ALL PANELS. ALL PANEL DOORS, IRM AND SURFACE MOUNT TUBS SHALL BE FINISHED IN LIGHT GRAY ENAMEL PAINT. TUBS FOR FLUSH MOUNT PANELS SHALL BE GALVANIZED.
- PROVIDE PANEL LABELS AND NEATLY TYPED WRITTEN PANEL DIRECTORY INSIDE DOOR IN PLASTIC SLEEVE.
- UNLESS OTHERWISE NOTED ALL BREAKERS SHALL BE RATED MINIMUM 10 KA SYMMETRICAL INTERRUPTING CAPACITY AT 208 VOLTS, 3 PHASE AS APPROPRIATE AND NOT LESS THAN THE SHORT CIRCUIT CAPACITY AS SHOWN ON THE DRAWINGS.
- PROVIDE BREAKER LOCK-ON DEVICES FOR ALL ESSENTIAL AND EQUIPMENT LOADS.
- CONNECT ALL SINGLE PHASE LOADS SUCH THAT THERE IS THE LEAST POSSIBLE IMBALANCE OF PHASES UNDER NORMAL CONDITIONS.
- PROVIDE LOCKABLE, PAINTED RED BREAKERS FOR FIRE ALARM CONTROL PANEL POWER SOURCE.
- ARRANGE AND BOXABLE.
- PROVIDE OUTLET BOXES OF ADEQUATE SIZE OF TYPE APPROVED FOR THE PARTICULAR APPLICATION AS REQUIRED FOR ALL WIRING DEVICES, LIGHT FIXTURES, ETC. OR AS SHOWN. PROVIDE JUNCTION BOXES, COMPLETE WITH BLANK COVERS AS REQUIRED OR SHOWN FOR ALL WIRING SYSTEMS. INSTALL ALL BOXES TO BE ACCESSIBLE, IF NECESSARY PROVIDE ACCESS PANELS. SECURE ALL BOXES INDEPENDENT OF THE CONDUIT/WIRING SYSTEM.
- IN ALL CASES USE ONLY CONDUIT AND RACEWAYS APPROVED FOR THE PARTICULAR APPLICATION AND OF ADEQUATE SIZE TO SUIT TYPE AND NUMBER OF CONDUCTORS BEING CARRIED THEREIN. SEPARATE GROUNDING CONDUCTOR IN ALL CONDUITS. THE CONDUIT SYSTEM SHALL NOT BE USED AS THE GROUND PATH. WHERE INDICATED, USE CONDUIT AS SPECIFIED. EVERY CONDUIT OR SECTION OF ARMoured CABLE SHALL BE ADEQUATELY SECURED USING APPROVED SUPPORTS, CLAMPS AND FASTENERS TO ENSURE A SAFE AND SOUND INSTALLATION. ALL CONDUIT OR ARMoured CABLE RUN IN FINISHED AREAS SHALL BE CONCEALED IN WALLS, CEILINGS OR FURRING UNLESS OTHERWISE INDICATED OR APPROVED BY THE OWNER. ARMoured CABLE SHALL NOT BE USED WHERE EXPOSED UNLESS OTHERWISE NOTED.
- BOXES FOR OUTDOOR USE: GALVANIZED CAST FERRALLOY COMPLETE WITH NEOPRENE GASKET
- BOXES FOR INDOOR USE: CODE GAUGE ELECTRO-GALVANIZED STEEL FOR CONCEALED MOUNTING AND GALVANIZED CAST FERRALLOY OR CAST BRUSHED ALUMINUM FOR EXPOSED USE. UNLESS OTHERWISE NOTED.
- FIXTURE BOXES: ELECTRO-GALVANIZED STEEL 100mm [4"] OCTAGON COMPLETE WITH 10mm [3/8"] FIXTURE STUD WHERE NECESSARY.
 - WHERE OUTLET BOXES ARE INSTALLED IN EXTERIOR WALLS AND/OR INSULATED CEILING HAVING ASSOCIATED VAPOUR BARRIERS ON THE WARM SIDE OF THE INSULATION AND WHERE OUTLET BOXES PERFORM THE VAPOUR BARRIER, PROVIDE ELECTRICAL BOX VAPOUR BARRIERS BEHIND AND AROUND OUTLET BOXES. VERIFY EXACT REQUIREMENTS ON SITE PRIOR TO PROCEEDING WITH INSTALLATION.
- ALL JUNCTION BOXES IN CONCEALED CEILING SPACES SHALL BE LABELED WITH PEN MARKER AS TO CIRCUITS CONTAINED THEREIN.
- SWITCHES AND RECEPTACLE BOXES SHALL BE 1104 TYPE FOR RECESSED MOUNTING.
- RIGID METAL CONDUIT SHALL BE USED WHERE INSTALLED AS AN EXTERIOR BRANCH CIRCUIT ABOVE FINISHED GRADES. ALL FITTINGS MUST BE THREADED TYPE. ALL CONDUIT TERMINATIONS SHALL HAVE BUSHINGS WITH INSULATED PLASTIC UNINGS, RIGID METAL EXPANSION JOINT - CROUSE HINDS "X" SERIES WITH BONDING STRAP OR EQUIVALENT.
- IN AREAS WITH SOLID CEILINGS, ELECTRICAL AND SYSTEMS JUNCTION BOXES ALONG WITH ASSOCIATED WIRE AND CONDUIT SHALL BE LOCATED IN AREAS WHERE CEILING ACCESS IS POSSIBLE. OR ACCESS PANELS MAY BE PROVIDED WITH THE APPROVAL OF THE OWNER OR CONSULTANT.
- EMT CONDUIT SHALL BE USED FOR WIRING AND CONCEALED WHEREVER POSSIBLE. EMT COUPLINGS AND CONNECTORS SHALL BE STEEL, SETSCREW CONCRETE TIGHT OR STEEL COMPRESSION RAIN TIGHT.
- ALL CONDUIT IN PUBLIC AREAS WITH EXPOSED CEILING MUST BE PAINTED EMT, PAINT COLOUR TO BE CONFIRMED BY ARCHITECT.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- PROVIDE LAMACOD LABELS (3-PLY) WHITE LETTERED ON BLACK BACKGROUND - 1/4" HIGH LETTERING ON ALL ELECTRICAL EQUIPMENT SUPPLIED, MOUNTED AND/OR CONNECTED BY THIS CONTRACT.
- PROVIDE BRADY LABELING ON ALL RECEPTACLE COVER PLATES INDICATING PANEL AND CIRCUITING NUMBER CONNECT BY THIS CONTRACT.

WIRE AND CABLE

- ALL WIRING SHALL BE COLOUR CODED AS PER OESC AND BE IDENTIFIED WITH BRADY OR EQUIVALENT SELF-STICKING PERMACODE WIRE MARKERS.
- IN GENERAL, ALL WIRING SHALL BE R90 XLPE INSTALLED IN CONDUIT OR RACEWAYS UNLESS OTHERWISE SPECIFIED. USE ONLY COPPER CONDUCTORS, MINIMUM SIZE NO. 12, SIZED AND COLOUR CODED ACCORDING TO THE ELECTRICAL SAFETY CODE WHERE NOT INDICATED.
- SEE ALL WIRING FOR A MAXIMUM OF 3% VOLTAGE DROP IN A FEEDER OR BRANCH CIRCUIT, AND 5% VOLTAGE DROP FROM THE SUPPLY SIDE OF THE CONSUMER SERVICE TO THE POINT OF UTILIZATION.
- 190 NYLON MAY BE USED IN LIEU OF R90 FOR INTERIOR INSTALLATIONS UP TO SIZE #10, HOWEVER, CONDUIT FILL SHALL BE BASED ON R90 RATING.
- THE USE OF FLEXIBLE CABLE (TYPE AC90 NYL) IS TO BE RESTRICTED TO INTERIOR PARTITION WALLS, ACCESSIBLE CEILING SPACES AND FLOOR CONNECTIONS TO LIGHT FIXTURES. THE FLEXIBLE CABLE SHALL BE RESTRICTED TO 3600 mm (12') IN LENGTH AND BE SUITABLY CLIPPED AND SUPPORTED EVERY 900 mm [3].
- ALL 120 V [SINGLE PHASE] BRANCH CIRCUITS SHALL BE PROVIDED WITH A SEPARATE NEUTRAL CONDUCTOR FOR EACH CIRCUIT. DIGITAL, CONNECT NEUTRAL CONDUCTORS AT ALL DEVICES.
- ALL CONDUCTORS USING APPROVED SOLDERLESS WING NUT PRESSURE CONNECTORS.
- ALL WIRING SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS, ALL REGULATORY REQUIREMENTS AND SHALL SATISFY ALL APPLICABLE CODES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CHECK AND REPLACE AS REQUIRED ANY EXISTING WIRING BEING RE-USED.
- FEEDERS AND BRANCH CIRCUITS RATED 100 AMPERS OR GREATER SHALL BE CHECKED WITH A 100% MEGGER FOR 15 SECONDS BEFORE ENERGIZATION.
- WIRE AND CONNECT MOTORS, SUPPLIED BY OTHERS, AS INDICATED.
- 8X [AC-90] CABLE IS ONLY PERMITTED TO LIGHT FIXTURES WITH A MAXIMUM LENGTH OF 1500mm.
- PROVIDE VFD CERTIFIED CABLES ON THE LOAD SIDE OF VFDs TO MOTOR TERMINAL CONNECTIONS. COORDINATE WITH EQUIPMENT AND CABLE SUPPLIER RECOMMENDATIONS TO MATCH MOTOR LOAD REQUIREMENTS.

DISCONNECT SWITCHES

- FUSED AND NON-FUSED, HEAVY DUTY, VISIBLE LABELS IN THE OFF POSITION. QUICK-MAKE, QUICK-BREAK MECHANISM, LOAD BREAK TYPE WITH DOOR/HANDLE/SWITCHING MECHANISM INTERLOCK WITH OVERRIDE, LOCK-OFF PROVISION, ARC EXTINGUISHERS, SILVER PLATED WIRE ACTION CONTACTS, AND SPRING-REINFORCED FUSE CLIPS. OF SIZES INDICATED. CSA CERTIFIED. PROVIDE DISCONNECT SWITCHES INSTEAD OF EACH PIECE OF EQUIPMENT WHERE NECESSARY TO MEET CODE REQUIREMENTS.
- FUSIBLE SWITCH UNITS INSTALLED IN EXISTING SWITCHBOARD EXTENSION SHALL HAVE QUICK MAKE-BREAK MECHANISM WITH PROVISIONS FOR LOCKING IN THE OPEN OR CLOSED POSITION, AND DOOR/HANDLE/SWITCHING MECHANISM INTERLOCK WITH OVERRIDE. ALL FUSIBLE UNITS SHALL BE MODULAR TYPE EQUIPPED FOR HRCl FUSES AND INCLUDE AUXILIARY CONTACTS OR OTHER SPECIAL FEATURES AS NOTED ON THE DRAWINGS.
- SWITCH FUSE HOLDERS SHALL HAVE REINFORCED CLIPS. FUSES SHALL BE EASILY REMOVABLE WHEN THE SWITCH IS IN THE OFF POSITION.
- ALL SWITCHES SHALL HAVE AMPLE GUTTER SPACE FOR TOP OR BOTTOM WIRING AND BE PROVIDED WITH ENCLOSURES TO SUIT THE SPECIFIC APPLICATION.

MOTOR STARTERS, CONTACTORS AND RELAYS

- PROVIDE MANUAL AND MAGNETIC MOTOR STARTERS FOR MOTORS AND EQUIPMENT AS INDICATED. STARTERS SHALL INCLUDE MANUAL RESET, ADJUSTABLE THERMAL OVERLOAD UNITS WITH INTEGRAL SINGLE PHASE PROTECTION AND BE COMPLETE WITH INTERLOCKS, AUXILIARY RELAYS, CONTROL TRANSFORMERS, TERMINALS, ETC., REQUIRED FOR PROPER OPERATION. REFER TO THE DRAWINGS FOR FURTHER DETAILS OF MECHANICAL INTERLOCK AND WIRING REQUIREMENTS.
- PROVIDE AC CONTROL RELAYS AND CONTACTORS WITH REQUIRED COIL AND CONTACT RATING AND PILOT LIGHT FOR CONTROL OF EQUIPMENT AND MISCELLANEOUS LOADS AS SHOWN. PROVIDE AUXILIARY COMPONENTS, CONTROL TRANSFORMERS, TERMINALS, SWITCHES,

ELECTRICAL SPECIFICATIONS

PROPERTY LINE INCLUDING ALL SITE LIGHTING FIXTURES, PROVIDE LIGHTING POWER DENSITY FOR ALL PARKING, DRIVEWAY AND ROADWAY AREAS.

- FIXTURES SHALL NOT BE RELEASED PRIOR TO REVIEW OF THE SHOP DRAWINGS. CANCELLATION CHARGES WILL NOT BE PAID FOR CHANGES TO FIXTURES MADE BEFORE THE FIXTURE CUTS HAVE BEEN REVIEWED.

OCCUPANCY SENSORS

- DUAL TECHNOLOGY CEILING AND WALL MOUNT SENSORS.
- SENSORS SHALL SENSE A PERSON OF AVERAGE SIZE MOVING DISTANCE OF 2' AND RETAIN LIGHTS IN "ON" STATE.
- SENSORS SHALL HAVE AN INTEGRAL BYPASS SHUNT SWITCH FOR SERVICE OR MANUAL OPERATION.
- WALL TYPE SENSORS SHALL BE WIRELED IN PARALLEL TO OBTAIN COVERAGE NOTED ON DRAWINGS.
- TIME DELAY TO "OFF" SHALL BE ADJUSTABLE FROM 5 TO 30 MINUTES AND THE SENSOR SHALL BE COMPLETE WITH WALK-THROUGH AND TEST MODES.
- SENSORS SHALL CARRY A 5 YEAR WARRANTY.
- SENSORS SHALL INTERFACE WITH POWER/RELAY PACKS AS REQUIRED BY THE SAME MANUFACTURER TO CONTROL THE LOADS NOTED ON THE DRAWINGS.
- CEILING MOUNT OCCUPANCY SENSOR TO HAVE COVERAGE OF 2000 SQUARE FEET.

WIRING DEVICES

- SWITCHES AND RECEPTACLES: PROVIDE SPECIFICATION GRADE WIRING DEVICES AS SHOWN ON THE DRAWINGS. SWITCHES SHALL BE AS MANUFACTURED BY HUBBELL (OR PROVIDED EQUALS) AS NOTED BELOW:

• 15 AMP., 120 V TOGGLE SWITCH	- 1201
• 20 AMP., 3/4" TOGGLE SWITCH	- 18220
• 15 AMP., 120 V DUPLEX RECEPTACLE	- 5252
• 20 AMP. DUPLEX RECEPTACLE (1-5/16")	- 5352
• 15 AMP. GROUND FAULT DUPLEX RECEPTACLE	- GF5252
• 20 AMP. GROUND FAULT DUPLEX RECEPTACLE	- GF5352
• WEATHERPROOF IN-USE RECEPTACLE COVER	- WP826
• DECORATOR STYLE 120 VOLT DEVICES	
• 15 AMP., 120 V ROCKER SWITCH	- DS115
• 20 AMP., 120 V ROCKER SWITCH	- DS120
• 15 AMP., 120 V DUPLEX RECEPTACLE	- DR15
• 20 AMP. DUPLEX RECEPTACLE (1-5/16")	- DR20
• 15 AMP. GROUND FAULT DUPLEX RECEPTACLE	- GF15
• 20 AMP. GROUND FAULT DUPLEX RECEPTACLE	- GF20
- PROVIDE VERTICALLY BRUSHED STAINLESS STEEL COVERPLATES, COLOURED TO MATCH DEVICE. FOR FLUSH MOUNTED DEVICES OR GALVANIZED STEEL TYPE COVERPLATES WITH ROUNDED CORNERS FOR SURFACE MOUNTED DEVICES AS APPROPRIATE FOR ALL OUTLETS. GANGED TYPE FOR ALL GROUPED OUTLETS. PROVIDE SPECIAL RECEPTACLES AND OUTLET TYPES AS IDENTIFIED ON THE DRAWINGS.
- ALL EXTERIOR RECEPTACLES SHALL BE GFCl AND COME WITH WHILE-IN-USE COVERS AS PER OESC.
- WHERE OUTLET BOXES ARE INSTALLED IN EXTERIOR WALLS AND/OR INSULATED CEILING HAVING ASSOCIATED VAPOUR BARRIERS ON THE WARM SIDE OF THE INSULATION AND WHERE OUTLET BOXES PERFORM THE VAPOUR BARRIER, PROVIDE ELECTRICAL BOX VAPOUR BARRIERS BEHIND AND AROUND OUTLET BOXES. VERIFY EXACT REQUIREMENTS ON SITE PRIOR TO PROCEEDING WITH INSTALLATION.
- ALL ELECTRICAL PANELS
- PUSH BUTTONS
- EXIT SIGNS
- FIRE ALARM PULL STATION

TIME SWITCHES & PHOTOCELLS

- PROVIDE TIME SWITCHES FOR CONTROL OF MECHANICAL AND ELECTRICAL LOADS AND SYSTEMS AS DESCRIBED BELOW AND IDENTIFIED ON THE DRAWINGS.
- PROVIDE INDIVIDUAL SINGLE CIRCUIT, 120V, 7 DAY/24 HOUR DPST DIGITAL TYPE TIME CLOCKS C/W PROGRAMMING KEYPAD, LCD DISPLAY, MANUAL OVERRIDE CONTROL, RECHARGEABLE BATTERY RESERVE POWER AND 15A, 120V RATED CONTACTS FOR CONTROL OF GENERAL LOADS AS INDICATED ON THE DRAWINGS. PROVIDE 120V, SPST, 10A, MOMENTARY CONTACT ADAPTER AS REQUIRED FOR CORRECT CONTACTOR INTERFACE.
- PROVIDE 120V, SPST, 200W W RATED ADJUSTABLE LEVEL SETTING PHOTOCELLS FOR CONTROL OF INTERIOR AND/OR EXTERIOR LIGHTING AS INDICATED ON DRAWINGS. INSTALL UNITS AND AM AS INSTRUCTED ON-SITE. CONNECT TO CONTACTORS, TIME CLOCKS, ETC., FOR DESIRED CONTROL AS SHOWN.

EMPTY CONDUIT SYSTEMS

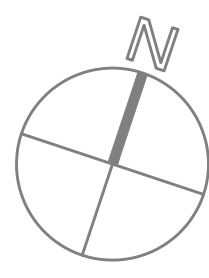
- PROVIDE EMPTY CONDUIT/OUTLET BOX SYSTEM TO ALLOW INSTALLATION OF COMMUNICATIONS AND SPECIAL SYSTEMS (TELEPHONE, SECURITY, PAGING AND COMPUTER) EQUIPMENT AND WIRING AS DETAILED BELOW AND INDICATED ON THE DRAWINGS. INSTALL PULL CORDS IN ALL EMPTY CONDUITS.
- IN GENERAL, PROVIDE 38 mm [1 1/2"] EMPTY CONDUITS FROM THE SYSTEM EQUIPMENT MOUNTING BACKBOARD TO SUITABLE AREAS OF ACCESSIBLE CEILING SPACES AS SHOWN. TO ALLOW INSTALLATION OF TELEPHONE AND COMPUTER SYSTEMS DISTRIBUTION WIRING. TERMINATE CONDUITS WITH AN APPROPRIATE INSULATED BUSHING. FOR EACH GENERAL WALL OUTLET INDICATED PROVIDE A 19 mm [3/4"] EMPTY CONDUIT FROM A STANDARD SINGLE GANG BOX WITH BLANK COVERPLATE TO AN APPROPRIATE CEILING SPACE WITHIN 3 m [10'] OF THE MAIN RACEWAY.
- TO ALLOW INSTALLATION AND CONNECTION OF PAGING SYSTEM EQUIPMENT SPEAKERS AND WIRING BY THE OWNER, PROVIDE 19 mm [3/4"] EMPTY CONDUITS FROM TELEPHONE BACKBOARD TO ACCESSIBLE CEILING SPACES AS SHOWN.
- REFER TO CONDUIT SYSTEM RISE/DRAWINGS (WHERE PROVIDED) FOR DETAILS OF DISTRIBUTION AND COMPONENT DETAILS AND TO FLOOR PLANS FOR COMPONENT AND OUTLET LOCATIONS. CONTACT OWNER'S SYSTEMS INSTALLATION CONTRACTORS TO VERIFY ALL CONDUIT SIZES, OUTLET LOCATIONS AND INSTALLATION DETAILS PRIOR TO PROCEEDING WITH INSTALLATIONS.
- PROVIDE EMPTY CONDUIT/OUTLET BOX SYSTEM AS REQUIRED TO ALLOW THE INSTALLATION OF THE MECHANICAL CONTRACTOR'S THERMOSTATS. COORDINATE INSTALLATION WITH THE MECHANICAL CONTRACTOR AND MECHANICAL DRAWINGS PRIOR TO ROUGH-IN. INSTALL PULL CORDS IN ALL EMPTY CONDUITS.

FIRE ALARM SYSTEM

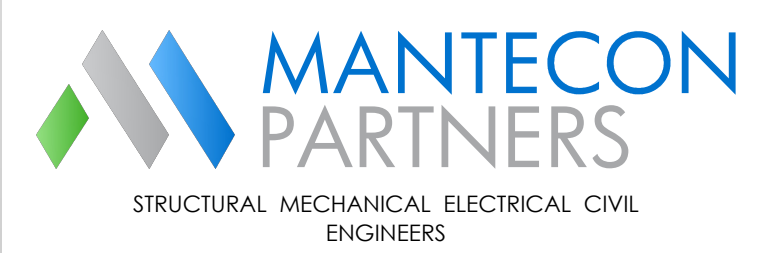
- COMPLY WITH CAN/CSA-S524 (INSTALLATION OF FIRE ALARM SYSTEMS), CAN/CSA-S527 (VERIFICATION OF FIRE ALARM SYSTEMS), AND OBC.
- SUBMIT SHOP DRAWINGS FOR FIRE ALARM CONTROL PANEL, ANNUNCIATOR, SIGNALING DEVICES, DETECTION DEVICES, AND PULL STATIONS.
- PROVIDE COMPLETE ELECTRICALLY SUPERVISED, CLOSED CIRCUIT, FIRE ALARM SYSTEM WITH ZONE COMPARTMENTS AND SIGNAL CIRCUIT COMPONENTS FOR PRESENT AND FUTURE AS INDICATED. IF FIRE ALARM IS EXISTING AND WORK DESCRIBED IS TO BE INTO EXISTING, PROVIDE DEVICES COMPATIBLE WITH EXISTING FIRE ALARM SYSTEM.
- DESIGN FIRE ALARM SYSTEM SO THAT THE OPERATION OF ANY ONE OF THE MANUAL FIRE ALARM STATIONS OR AUTOMATIC DETECTORS WILL CAUSE ALL FIRE ALARM SIGNALS TO SOUND IF THE SYSTEM IS SINGLE STAGE.
- MANUAL FIRE ALARM PULL STATIONS SHALL BE PROVIDED WITH TWELVE [12] SPARE GLASS RODS TO BE LEFT WITH OWNER.
- AUTOMATIC THERMAL DETECTORS: CONSTRUCTED AS PER CAN/ULC-S530.
 - RATED AT 58°C [135°F] FIXED TEMPERATURE NON-RESTORABLE AND 8°C DEGREES PER MINUTE RATE-OF-RISE. USE WHERE NORMAL TEMPERATURES DO NOT EXCEED 38°C [100°F].
 - RATED AT 88°C [194°F] FIXED TEMPERATURE NON-RESTORABLE AND 8°C DEGREES PER MINUTE RATE-OF-RISE. USE WHERE NORMAL TEMPERATURES FLUCTUATIONS EXIST, BUT AMBIENT TEMPERATURES EXCEED 38°C [100°F], BUT DO NOT EXCEED 66°C [150°F].
 - RATED 58°C [135°F] FIXED TEMPERATURE NON-RESTORABLE. USE WHERE VIOLENT TEMPERATURE FLUCTUATIONS EXIST, BUT NORMAL TEMPERATURES DO NOT EXCEED 38°C [100°F].
 - RATED 88°C [194°F] FIXED TEMPERATURE NON-RESTORABLE. USE WHERE VIOLENT TEMPERATURE FLUCTUATIONS EXIST, BUT NORMAL TEMPERATURES EXCEED 38°C [100°F] BUT DO EXCEED 66°C [150°F].
- SMOKE DETECTOR:
 - PROVIDE COMPLETE SMOKE DETECTOR SYSTEM AS INDICATED.
 - MOUNT DETECTORS ON CEILING AS INDICATED. AT THE HIGHEST POINT WHERE VARIATIONS IN CEILING HEIGHT EXIST. DO NOT MOUNT DETECTORS ON SIDES, UNDERSIDES, OR LESS THAN 12" (300mm) FROM WALLS, BEAMS, JOISTS AND OPEN WEB STEEL JOISTS OR ANY STRUCTURE PROJECTING BELOW ACTUAL CEILING HEIGHT, OR LESS THAN 48" (1220mm) FROM AIR HANDLING OR HEATING OUTLETS. COMPLY WITH CAN/CSA-S524.

ELECTRICAL SPECIFICATIONS

- SHOULD INTERFERENCE FROM OBSTRUCTION, LAMP POSITIONS, AIR OUTLET OR HEAT RADIATING SURFACES BE ENCOUNTERED IN LOCATING ANY DETECTOR WHERE SHOWN, LOCATE THE DETECTOR AS NEAR AS POSSIBLE TO THE INDICATED POSITION. CLEAR OF OBSTACLES TO THE SATISFACTION OF THE CONSULTANT, BUT MAINTAIN A CLEAR SPACE OF 24" (610mm), ON THE CEILING, BELOW AND AROUND PROTECTIVE WIRE GUARDS OR GLASS COVERS FOR DETECTORS IN AREAS PRONE TO DAMAGE OR TAMPER MAY EXIST.
- PHOTO ELECTRIC TYPE SMOKE DETECTORS: PROVIDE RELAY BASE WHEN DETECTORS ARE INSTALLED IN ELEVATOR LOBBIES, MACHINE ROOMS, CONTROL ROOMS, SHAFTS OR ADJACENT TO HOLD OPEN DEVICES.
- STAND-ALONE PHOTO ELECTRIC SMOKE ALARMS: EACH UNIT SHALL HAVE POWER ON INDICATOR LED, DETACHABLE MOUNTING PLATE SUITABLE FOR STANDARD 4" (102mm) OCTAGON/BOX, 85 DB AT TEN FEET PEZO ELECTRIC ALARM, AND PUSH TO TEST SENSITIVITY TEST BUTTON, INTERCONNECT DRY TYPE CONTACTS SO THAT TRIPPED UNIT SOUNDS CONTINUOUSLY AND ALL OTHER UNITS SOUND INTERMITTENTLY. CONSTRUCTED AS PER CAN/ULC-S531
- DUCT SMOKE DETECTOR: PHOTO ELECTRIC TYPE DUCT SMOKE DETECTOR AND HOUSING WITH FORM-C SHUT DOWN RELAY AND LED REMOTE INDICATOR AND SAMPLING TUBES TO SUIT DUCT DIMENSIONS. WALL MOUNT REMOTE INDICATOR MINIMUM 300 mm (1' FT) BELOW CEILING AT DETECTOR LOCATION
- PROVIDE COMBINATION CARBON MONOXIDE OPTIONS AS SPECIFIED ON THE DRAWINGS.
- PROVIDE PROTECTIVE WIRE GUARDS OR GLASS COVERS FOR DETECTORS IN AREAS PRONE TO DAMAGE OR TAMPER.
- FIRE ALARM BELLS OR STROBES: MINIMUM 15CD AND 80 db @ 3m.
- PROVIDE WIRING, CONNECTION OF SUPERVISED VALVES AND FLOW SWITCHES SPRINKLER VALVES AS INDICATED.
- LOCATE END-OF-LINE RESISTORS IN FINISHED FLOOR (CLASS A) OR IN SEPARATE BOX LOCATED NOT MORE THAN 6'-0" (1830mm) ABOVE FINISHED FLOOR BEYOND LAST MANUAL STATION. AUTOMATIC INITIATING DEVICES OR SIGNAL (CLASS B).
- PROVIDE THIRD-PARTY VERIFICATION OF FIRE ALARM EQUIPMENT DISTURBED BY THIS WORK, INCLUDING THOSE COMPONENTS NECESSARY TO DIRECT OPERATION OF SYSTEM, SUCH AS MANUAL STATIONS, THERMAL DETECTORS AND CONTROLS AS PER CAN/ULC-S537
 - ON COMPLETION OF VERIFICATION AND WHEN ALL ABOVE CONDITIONS HAVE BEEN COMPLIED WITH, MANUFACTURER SHALL ISSUE TO THE OWNER:
 - COPY OF INSPECTING TECHNICIANS REPORT SHOWING LOCATION OF EACH DEVICE AND CERTIFYING TEST RESULTS OF EACH DEVICE.
 - CERTIFICATE OF VERIFICATION CONFIRMING THAT INSPECTION HAS BEEN COMPLETED AND SHOWING CONDITIONS UPON WHICH SUCH INSPECTION AND CERTIFICATION HAVE BEEN RENDERED.
- PROOF OF LIABILITY INSURANCE FOR INSPECTION.
- PROVIDE LEGIBLE PERMANENTLY MOUNTED NOTICE AT EACH MANUAL STATION AS PER OBC-3.2.4 (7i).
- FOR REVISIONS: INFORM GENERAL TRADE/OWNER OF ANY FIRE ALARM ZONE OR DEVICE WHICH IS DISCONNECTED OR RENDERED INOPERATIVE, TO PREVENT FALSE ALARMS AT THE BEGINNING OF THE WORKDAY. RECONNECT ALL FIRE ALARM ZONES AND DEVICES AT END OF WORKDAY AND INFORM GENERAL TRADE/OWNER.



PROJECT NORTH



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NO.	ISSUED	DATE	BY
6	ISSUED FOR TENDER	2024/10/09	P.O.
5	ISSUED FOR PERMIT	2024/07/26	F.S.
4	ISSUED FOR PERMIT	2023/12/22	F.S.</

ELECTRICAL SPECIFICATIONS

PART 3 - EXECUTION

- 1. PROVIDE ALL GROUNDING REQUIRED BY THE ONTARIO ELECTRICAL SAFETY CODE OR ANY LOCAL AUTHORITIES REGARDLESS OF WHETHER IT HAS BEEN SHOWN...
2. ALL GROUNDED FEEDERS AND BRANCH CIRCUITS SHALL BE PROVIDED WITH A SEPARATE GROUND CONDUCTOR SIZED ACCORDING TO THE ELECTRICAL SAFETY CODE REGULATIONS...
3. ARRANGE GROUNDS SUCH THAT UNDER NORMAL OPERATING CONDITIONS CURRENT FLOW IN ANY GROUNDING CONDUCTOR IS NOT OBJECTIONABLE AND WILL NOT HARM PERSONNEL OR EQUIPMENT...
4. IN GENERAL, PROVIDE ALL POWER SUPPLY WIRING, LINE VOLTAGE CONTROL WIRING AND ELECTRICAL SAFETY CODE REQUIRED DISCONNECT SWITCHES FOR ANY EQUIPMENT INSTALLED BY OTHER TRADES...
5. CO-OPERATE WITH ALL OTHER TRADES ON THE JOB SUCH THAT ALL EQUIPMENT CAN BE INSTALLED WITHOUT ANY CONFLICTS OR DELAYS...
6. THE CONTRACTOR SHALL VISIT THE SITE TO DETERMINE THE EXTENT OF DEMOLITION, REMOVAL, RELOCATION, RE-ROUTING AND RECONNECTION OF EXISTING ELECTRICAL EQUIPMENT...
7. SEQUENCE OF DISCONNECTION AND REMOVAL AND/OR RELOCATION OF EXISTING EQUIPMENT AND WIRING SHALL BE CO-ORDINATED WITH THE OWNER AND OTHER TRADES AND SHALL CONFORM TO THE REQUIREMENTS AND CONDITIONS OUTLINED IN THE SPECIFICATIONS...
8. WIRING LOCATED IN AREAS BEING ALTERED BUT FEEDING OUTLETS OR EQUIPMENT IN OTHER AREAS REQUIRED TO REMAIN IN SERVICE, SHALL BE REWORKED, EXTENDED AND RE-ROUTED AS REQUIRED TO MAINTAIN THE CONTINUITY OF THESE SERVICES...
9. INSTALL ALL CONDUIT AND FEEDERS RUNNING THROUGH THE EXISTING BUILDING ALONG ROUTES APPROVED ON SITE BY THE OWNER...
10. IN SOME INSTANCES, NEW OUTLETS AND EQUIPMENT ARE SHOWN IN THE SAME LOCATION AS THE EXISTING OUTLETS...
11. UNLESS NOTED OTHERWISE, ALL EXISTING ELECTRICAL EQUIPMENT WHICH IS NOT TO BE RE-USED SHALL BECOME THE PROPERTY OF THIS CONTRACTOR...
12. IN FINISHED AREAS OF THE EXISTING BUILDING, AS MUCH WIRING AS POSSIBLE SHALL BE CONCEALED...
13. SERVICE AND DISTRIBUTION SYSTEM POWER INTERRUPTIONS SHALL BE KEPT TO A MINIMUM...
14. IN SOME SECTIONS OF THIS SPECIFICATION, MATERIALS AND EQUIPMENT ARE SPECIFICALLY DESCRIBED AND NAMED BY MANUFACTURER...
15. THE PROJECT SYSTEMS DESIGN AS PER THE DRAWINGS AND SPECIFICATIONS IS BASED ON THE SPECIFIED MANUFACTURER'S EQUIPMENT BUT IS INTENDED TO BE APPROPRIATE FOR EQUIVALENT EQUIPMENT OF ALL OTHER MANUFACTURERS...
16. PRODUCTS OF MANUFACTURERS LISTED AS "ALTERNATES" ARE SUBJECT TO SHOP DRAWING REVIEW TO ENSURE THAT THEY ARE EQUIVALENT TO THE PRODUCTS OF THE SPECIFIED MANUFACTURER...
17. THE CONTRACTOR MAY SUBMIT ALTERNATIVE PROPOSALS OF MANUFACTURERS NOT LISTED IN THE APPROVED MANUFACTURERS LIST OF PROPOSALS OR MODIFIED DESIGN WITH APPROPRIATE COSTS, DELIVERY, AND SYSTEM DESIGN ADJUSTMENTS WHICH HE FEELS MAY BE ADVANTAGEOUS CONSIDERATIONS FOR THE PROJECT.

APPROVED MANUFACTURERS LIST

DIVISION 26

DISCONNECT SWITCHES, LIGHTING AND POWER PANELS:
EATON; SIEMENS; SCHNEIDER ELECTRIC

MOTOR CONTROLS, RELAYS, CONTACTORS, ETC.:
ALLEN-BRADLEY; SIEMENS; EATON; SCHNEIDER ELECTRIC

FUSES:
GOULD; BUSSMAN

WIRING DEVICES:
HUBBELL; PASS AND SEYMOUR; LEVITON

TIME SWITCHES AND PHOTO ELECTRIC CONTROLS:
TORK; PARAGON; INTERMATIC

LIGHTING CONTROLS:
LEGRAND/WATT STOPPER; LEVITON; SENSOR SWITCH/ACCUTY; LUTRON; EATON; PHILIPS

INTERIOR LIGHT FIXTURES:
LITHONIA; EATON; HUBBELL; PHILIPS

EXTERIOR LIGHT FIXTURES:
EATON; HOLOPHANE; HUBBELL; LITHONIA; PHILIPS; CREE

EMERGENCY LIGHTING FIXTURES AND BATTERY UNITS:
THOMAS & BETTS; BEGHELLI; STANPRO; AIMLITE

EXIT SIGNS:
THOMAS & BETTS; BEGHELLI; STANPRO; AIMLITE

DIVISION 27

CLOCKS:
MATCH EXISTING SYSTEM

PA:
TELECOR

STRUCTURED CABLING:
SYSTEMAX

ELECTRICAL SPECIFICATIONS

DIVISION 28

FIRE ALARM SYSTEM:
SIMPLEX

SECURITY SYSTEM:
MONITORED BY CHUBB

INTEGRATION:
ICT

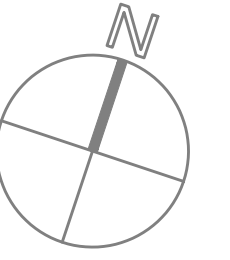
MOTION DETECTORS:
HONEYWELL

DOOR CONTACTS:
SENTROL 1076

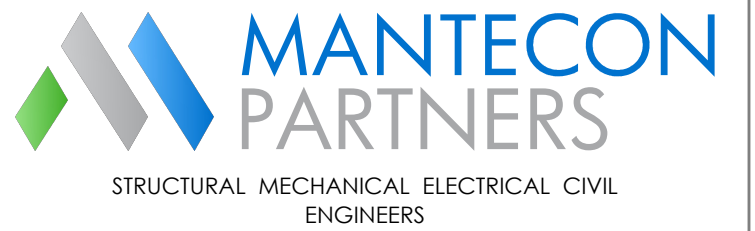
SECURITY INTERCOMS AND STATIONS:
AIPHONE

ELECTRIC STRIKE:
RUTHERFORD CONTROLS

CARD READER:
ICT COMPATIBLE



PROJECT NORTH



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SEAL

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Table with 4 columns: NO., ISSUED, DATE, BY. Contains revision history entries for tender, permit, coordination, and review stages.

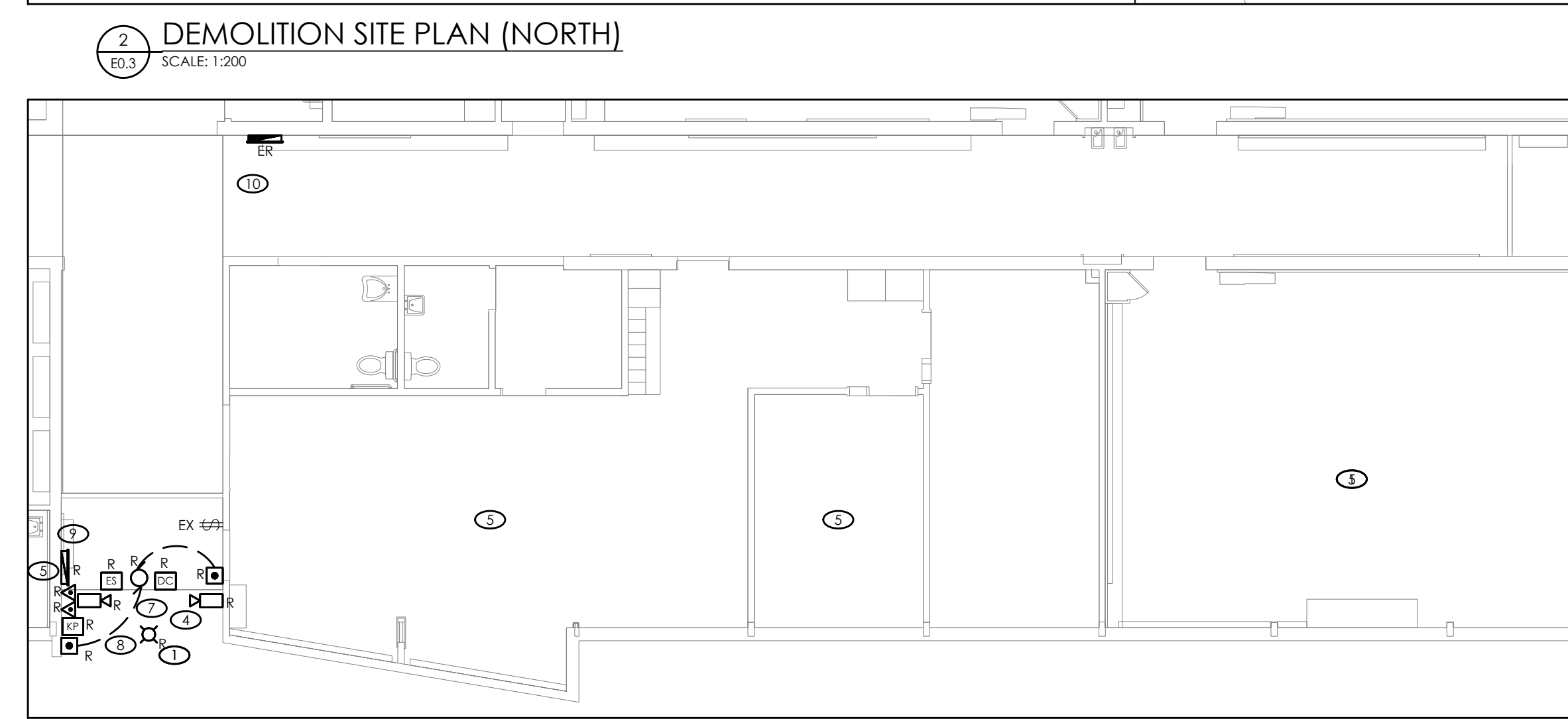
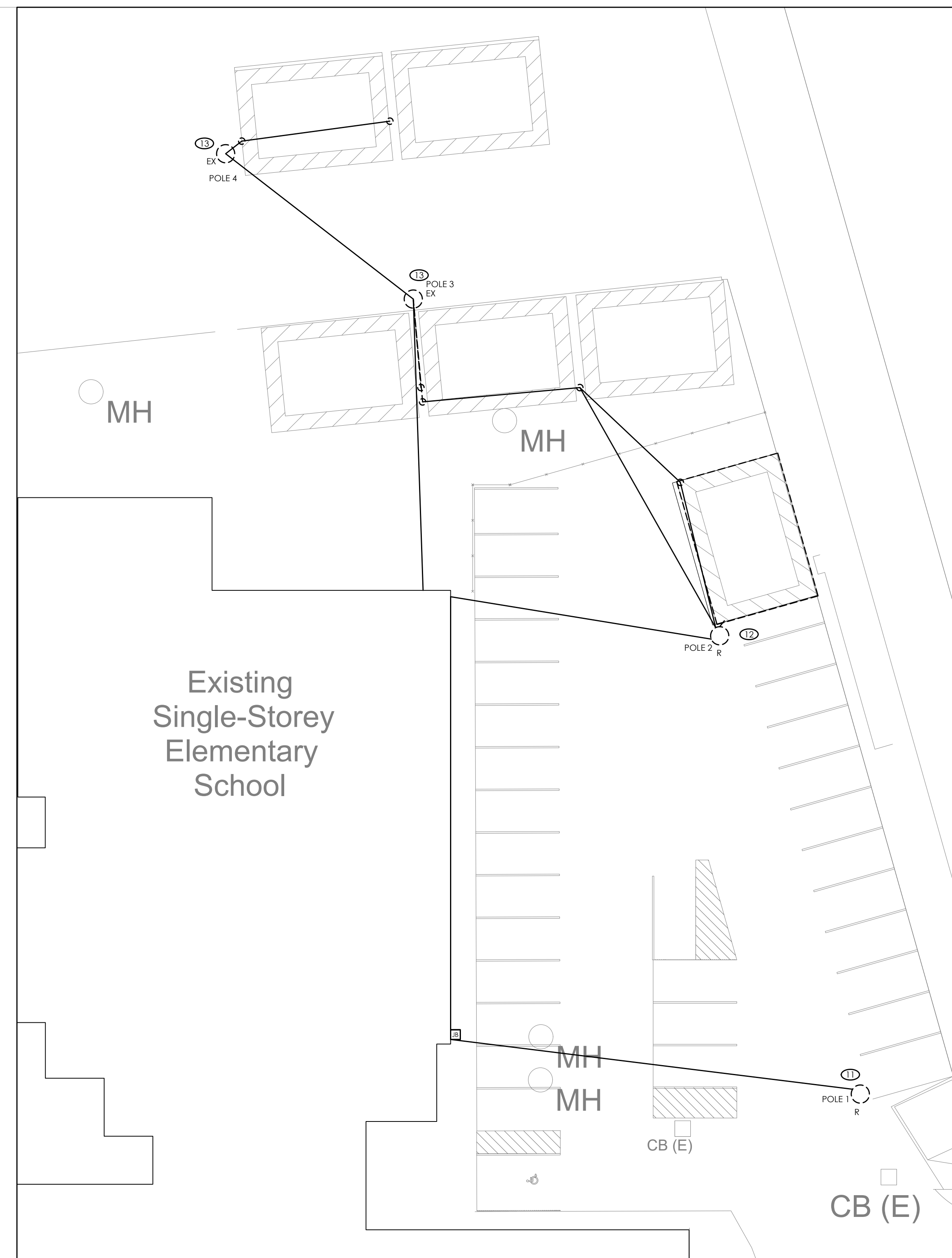
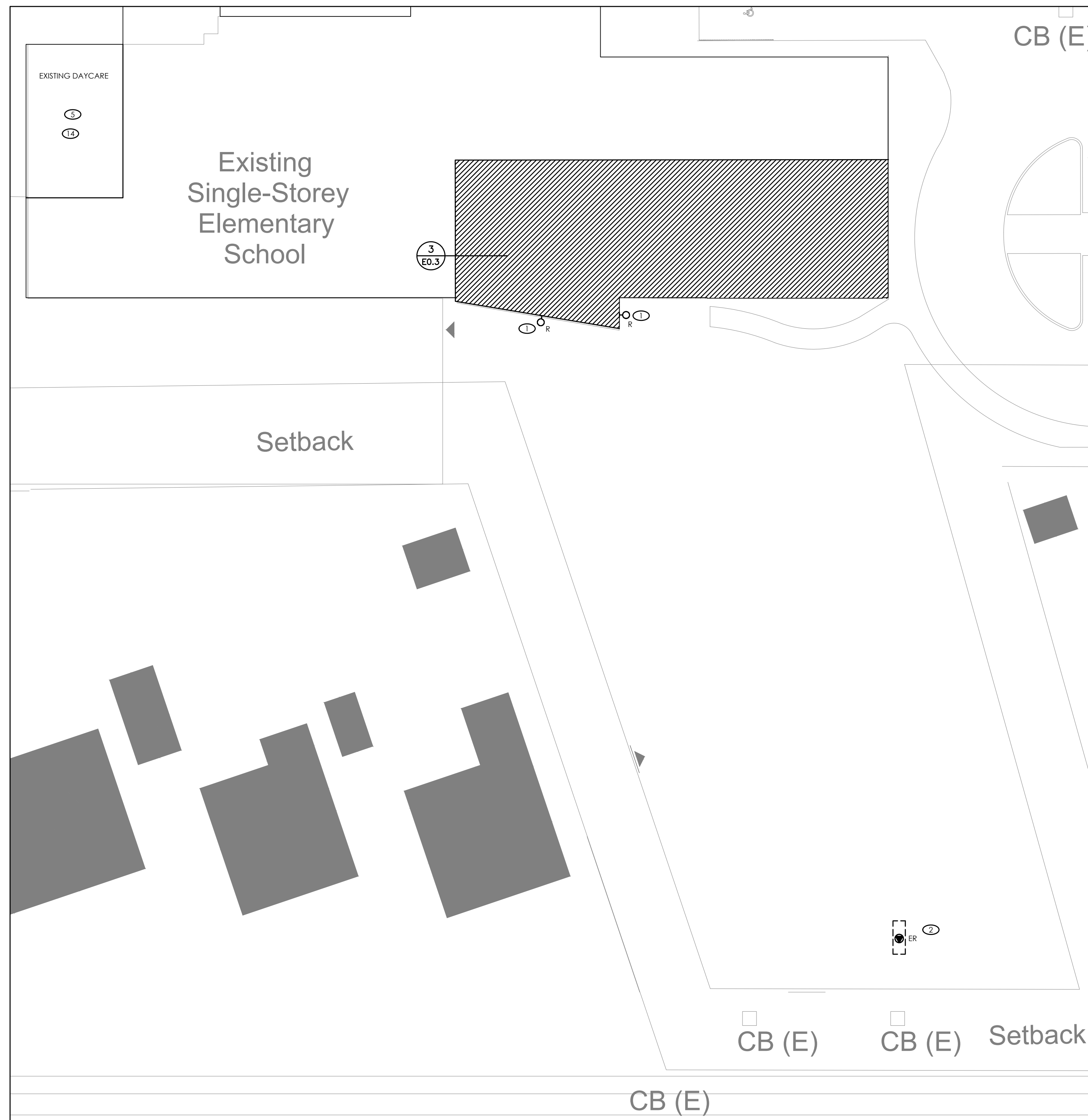
CLIENT
WORKSHOP
ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE
ADDITION

158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
LEAD SHEET
(GENERAL NOTES,
SPECIFICATION, LEGEND &
DRAWING LIST)

Table with 2 columns: DRAWN BY, SCALE, CHECKED BY, DRAWING NUMBER, DATE, PROJECT NUMBER. Includes values like F.S, AS INDICATED, N.A, NOV 2022, and E0.2.

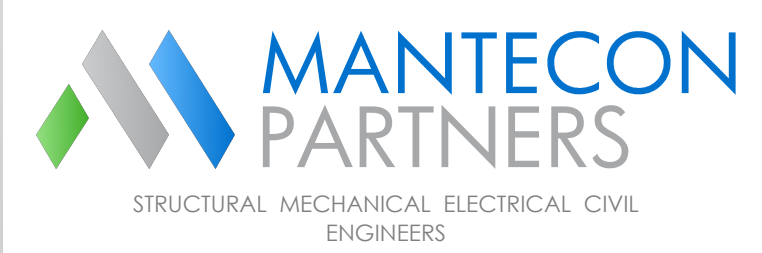


1 DEMOLITION SITE PLAN (SOUTH)
SCALE: 1:200

2 DEMOLITION SITE PLAN (NORTH)
SCALE: 1:200

3 EXISTING MAIN ENTRANCE AND OFFICE DEMOLITION PLAN
SCALE: 1:100

- DRAWING NOTES**
- 1 DISCONNECT AND REMOVE EXISTING LIGHT FIXTURE. REMOVE ASSOCIATED WIRING/ CONDUIT BACK TO NEAREST JUNCTION BOX.
 - 2 DISCONNECT POWER TO EXISTING SCHOOL SIGN AND MAKE SAFE FOR RELOCATION. PROTECT ASSOCIATED WIRING/CONDUIT. PRESERVE CIRCUIT FOR REUSE.
 - 4 REMOVE EXISTING SURVEILLANCE CAMERAS AND RETURN TO OWNER. ASSOCIATED WIRING/CONDUIT SHALL BE REMOVED BACK TO SOURCE.
 - 5 REMOVE EXISTING AIPHONE INTERCOM STATIONS IN INDICATED LOCATIONS AND RETURN TO OWNER. ASSOCIATED WIRING/CONDUIT SHALL BE REMOVED BACK TO SOURCE. EXISTING DAYCARE AND MAIN OFFICE INTERCOM STATIONS SHALL BE REMOVED.
 - 6 DEMOLISH TOGGLE SWITCH AND ASSOCIATED WIRING/CONDUIT BACK TO NEAREST JUNCTION BOX.
 - 7 DISCONNECT AND REMOVE EXISTING AUTOMATIC DOOR OPENER AND PUSHBUTTONS.
 - 8 DISCONNECT AND REMOVE EXISTING ELECTRIC STRIKE, KEYPAD, AND DOOR CONTACT. REMOVE ALL WIRING/CONDUIT BACK TO SOURCE. RETURN DEVICES TO OWNER.
 - 9 DEMOLISH EXISTING CHUBB ALARM PANEL. PRESERVE EXISTING WIRING/CONDUIT FOR REUSE.
 - 10 DISCONNECT EXISTING FIRE ALARM ANNUNCIATOR AND MAKE SAFE FOR RELOCATION. PRESERVE EXISTING WIRING/CONDUIT FOR REUSE.
 - 11 DISCONNECT ALL POWER, COMMUNICATIONS, FIRE ALARM, AND SECURITY WIRING FROM EXISTING POLE 1 AND MAKE SAFE FOR REMOVAL. WIRING SHALL BE REMOVED BACK TO SOURCE.
 - 12 DEMOLISH ALL COMMUNICATIONS WIRING FROM EXISTING PORTABLES BACK TO SOURCE. ALL POWER WIRING TO POLE 2 SHALL BE REMOVED BACK TO NEAREST JUNCTION BOX ON SCHOOL EXTERIOR. REMOVE EXISTING POWER POLE 2.
 - 13 POWER POLES 3, 4, AND ALL ASSOCIATED POWER WIRING SHALL BE PRESERVED FOR REUSE.
 - 14 (SEPARATE PRICE #1) DISCONNECT AND REMOVE LIGHT FIXTURES AND CONTROLS IN EXISTING DAYCARE ROOM. PRESERVE EXISTING CIRCUIT AND WIRING/CONDUIT FOR REUSE.



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NO.	ISSUED	DATE	BY
6	ISSUED FOR TENDER	2024/10/09	P.O.
5	ISSUED FOR PERMIT	2024/07/24	P.O.
4	ISSUED FOR PERMIT	2023/12/22	F.S.
3	ISSUED FOR COORDINATION	2023/12/08	F.S.
2	ISSUED FOR 80% REVIEW	2022/12/23	A.C.
1	ISSUED FOR 60% REVIEW	2022/11/24	A.C.

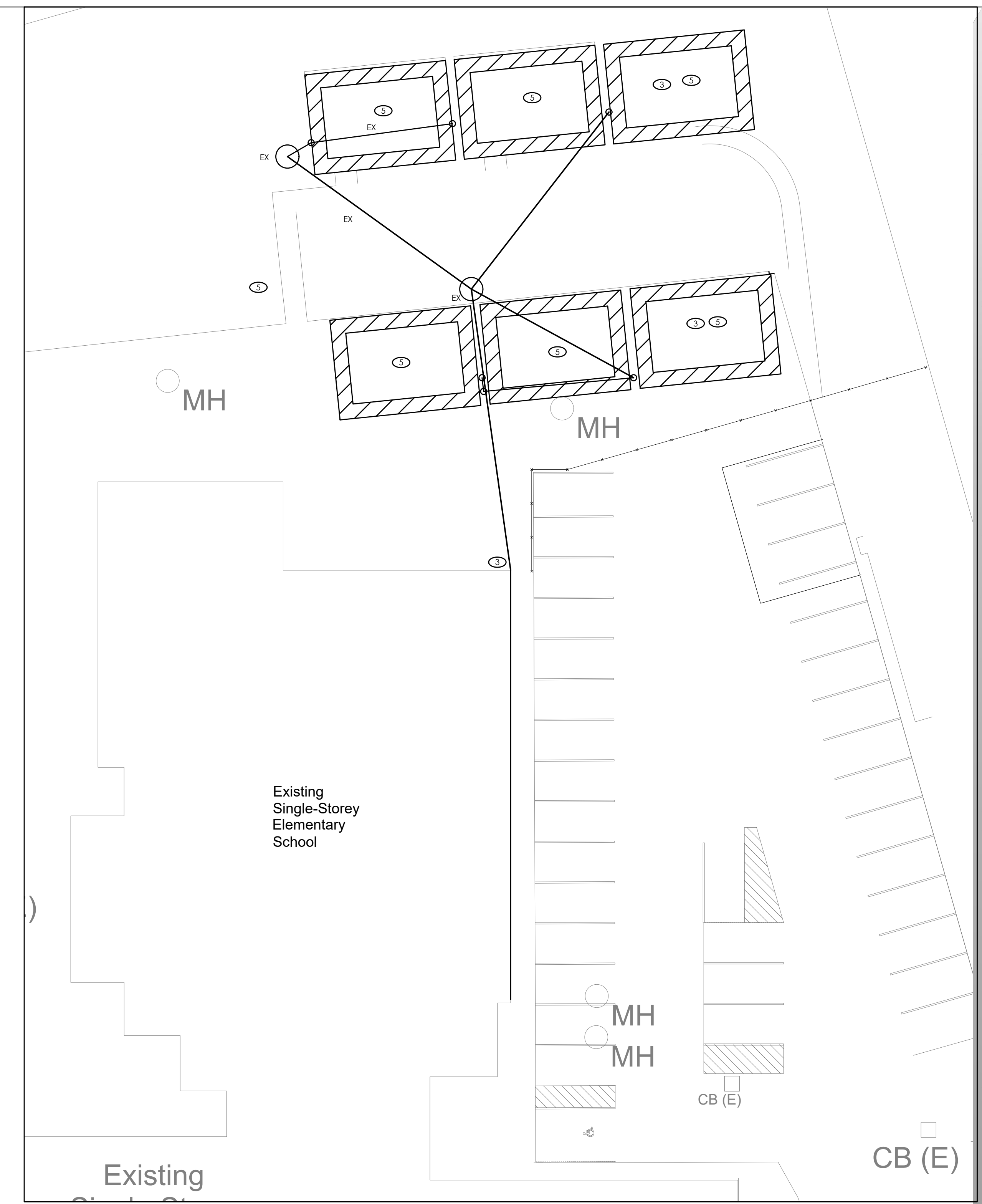
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
DEMOLITION SITE PLAN

DRAWN BY:
P.O.
CHECKED BY:
N.A.
DATE:
NOV 2022
PROJECT NUMBER:
22-058

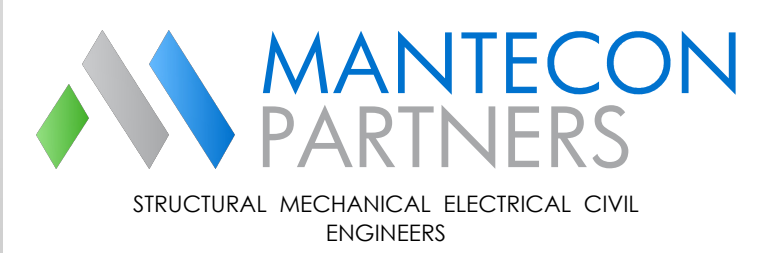
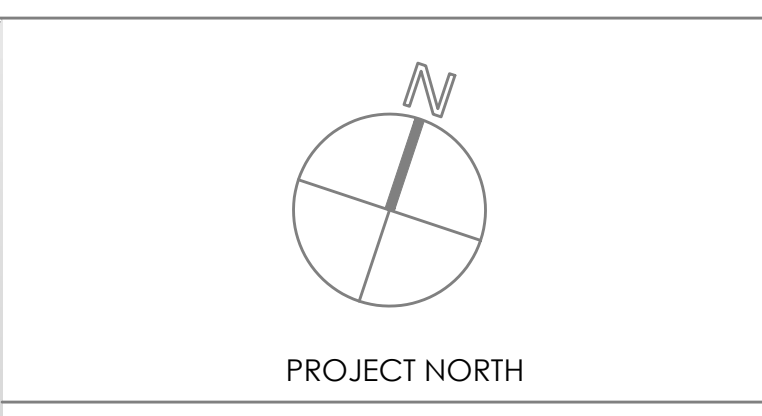
SCALE:
AS INDICATED
DRAWING NUMBER:
ED1.0



1 PROPOSED SITE PLAN (SOUTH)
SCALE: 1:200

2 PROPOSED SITE PLAN (NORTH)
SCALE: 1:200

- DRAWING NOTES**
- 1 PROVIDE PHOTOCELL LIGHTING CONTACTOR AND TIME CLOCK IN INDICATED LOCATIONS. REFER TO DETAIL 6 ON DRAWING E3.0 FOR EXTERIOR LIGHTING CONTROL SCHEMATIC.
 - 2 PROVIDE INDICATED LIGHT FIXTURE AND ASSOCIATED WIRING/CONDUIT AS REQUIRED.
 - 3 EXTEND EXISTING POWER WIRING FROM JUNCTION BOXES ON SCHOOL EXTERIOR TO PORTABLES AS REQUIRED. PROVIDE JUNCTION BOXES AND TRIPLEX WIRING AS REQUIRED. WIRING SHALL MEET ALL APPLICABLE REQUIREMENTS OF OESC SECTIONS 12 AND 75.
 - 4 PROVIDE UNDERGROUND WEATHERPROOF, SUBMERSIBLE SPLICES IN UNDERGROUND PULL BOX AND EXTEND WIRING/CONDUIT TO RELOCATED EXISTING SCHOOL SIGN. REFER TO DETAIL 4 ON DRAWING E3.0 FOR PULL BOX DETAIL AND DETAIL 5 FOR TRENCH DETAIL.
 - 5 PROVIDE SECURITY, FIRE ALARM, AND COMMUNICATIONS WIRING/CONDUIT FROM EXISTING STORAGE (106) EQUIPMENT TO PORTABLES. ALL CONDUIT ON BUILDING EXTERIOR SHALL BE RIGID METAL. WIRING SHALL BE CONNECTED TO POWER POLES AS REQUIRED.



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2	ISSUED FOR 80% REVIEW	2022/12/23	A.C.
1	ISSUED FOR 60% REVIEW	2022/11/24	A.C.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

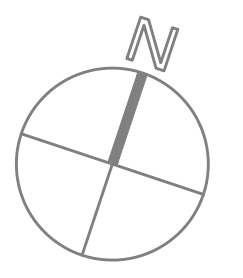
DRAWING TITLE:
PROPOSED SITE PLAN

DRAWN BY: F.S.	SCALE: AS INDICATED
CHECKED BY: N.A.	DRAWING NUMBER: E1.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

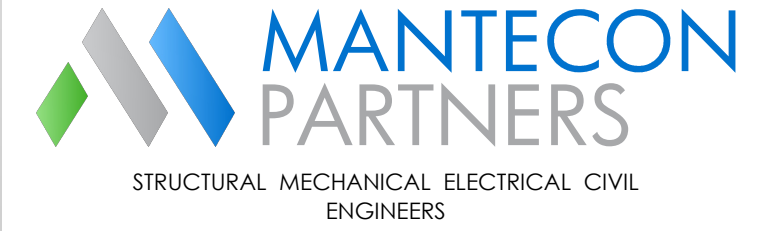


LIGHTING CONTROL NARRATIVE		
TAG	ROOM TYPE	DESCRIPTION
A1	PRESCHOOL ROOM	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 100% BRIGHTNESS. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE. INCLUDE DIMMER SWITCH TO CONTROL LIGHTING LEVELS. PROVIDE A PHOTOCELL WHICH SHALL CONTROL THE FIRST COLUMN OF LIGHT FIXTURES CLOSE TO THE WINDOWS. THE PHOTOCELL SHALL DIM THE LIGHT FIXTURES BY 30%, 60% AND 100% (OFF) BASED ON THE AMOUNT OF DAY LIGHT. OCCUPANT SHALL BE ABLE TO DIM THE LIGHTS AS REQUIRED.
A2	STAFF LOUNGE & OFFICE	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 50% BRIGHTNESS. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE. OCCUPANT SHALL BE ABLE TO DIM THE LIGHTS AS REQUIRED.
A3	WASHROOM	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 100% BRIGHTNESS. LIGHTS TO BE CONTROLLED OFF MANUALLY. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE. OCCUPANT SHALL BE ABLE TO DIM THE LIGHTS AS REQUIRED.
A4	REST AREA	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 100% BRIGHTNESS. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE. LIGHTS IN REST AREA SHALL BE CONTROLLED MANUALLY USING TOGGLE SWITCH. OCCUPANT SHALL BE ABLE TO DIM THE LIGHTS AS REQUIRED.
A5	TODDLER & INFANT ROOM	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 100% BRIGHTNESS. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE. OCCUPANT SHALL BE ABLE TO DIM THE LIGHTS AS REQUIRED.
A6	LAUNDRY/STORAGE	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 50% BRIGHTNESS. LIGHTS SHALL BE MANUALLY CONTROLLED USING LOW VOLTAGE DIMMER SWITCH. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE.
A7	ELECTRICAL ROOM	LIGHTS SHALL BE MANUALLY CONTROLLED USING TOGGLE SWITCH.
A8	CORRIDOR	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 100% BRIGHTNESS. LIGHTS SHALL BE AUTOMATICALLY REDUCED BY 50% AFTER 20 MINS OF ALL OCCUPANTS LEAVING THE SPACE. LIGHTS SHALL TURN OFF 20 MINS AFTER SCHOOL HOURS. LIGHTS SHALL TURN PARTIALLY-ON (50%) 20MINS BEFORE SCHOOL OPENING TIME.
A9	SERVERY	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 50% BRIGHTNESS. PROVIDE LOW VOLTAGE DIMMER SWITCH TO CONTROL LIGHT LEVELS. LIGHTS SHALL BE MANUALLY CONTROLLED USING LOW VOLTAGE SWITCH. PROVIDE A PHOTOCELL WHICH SHALL CONTROL THE FIRST COLUMN OF LIGHT FIXTURES CLOSE TO THE WINDOWS. THE PHOTOCELL SHALL DIM THE LIGHT FIXTURES BY 30%, 60% AND 100% (OFF) BASED ON THE AMOUNT OF DAY LIGHT. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE.
A10	NEW CLASSROOM (SEPARATE PRICE #1)	WHEN OCCUPANCY IS DETECTED, LIGHTS SHALL COME ON TO 50% BRIGHTNESS. LIGHTS SHALL TURN OFF AFTER 20MINS OF ALL OCCUPANTS LEAVING THE SPACE. INCLUDE DIMMER SWITCH TO CONTROL LIGHTING LEVELS. OCCUPANT SHALL BE ABLE TO DIM THE LIGHTS AS REQUIRED.

- GENERAL NOTES**
- PROVIDE NEW FIRE ALARM DEVICES (ULC APPROVED) AS SHOWN IN THE DRAWING. DETAILS, SPECIFICATIONS, AND FINAL LOCATION TO BE DETERMINED. FIRE ALARM DEVICES SHALL BE CONNECTED TO EXISTING FIRE ALARM CONTROL PANEL.
 - LIGHTS AND EXHAUST FANS WITHIN ALARM ZONES SHALL TURN ON WHEN ZONE IS DISARMED. PROVIDE RELAYS AND CONTROL WIRING/CONDUIT AS REQUIRED.
 - (SEPARATE PRICE #1) PROVIDE LIGHTING FIXTURES AND CONTROLS IN NEW CLASSROOM AS INDICATED. FIXTURES AND CONTROLS SHALL BE FED FROM REWORKED EXISTING LIGHTING CIRCUIT. PROVIDE WIRING/CONDUIT AS REQUIRED.



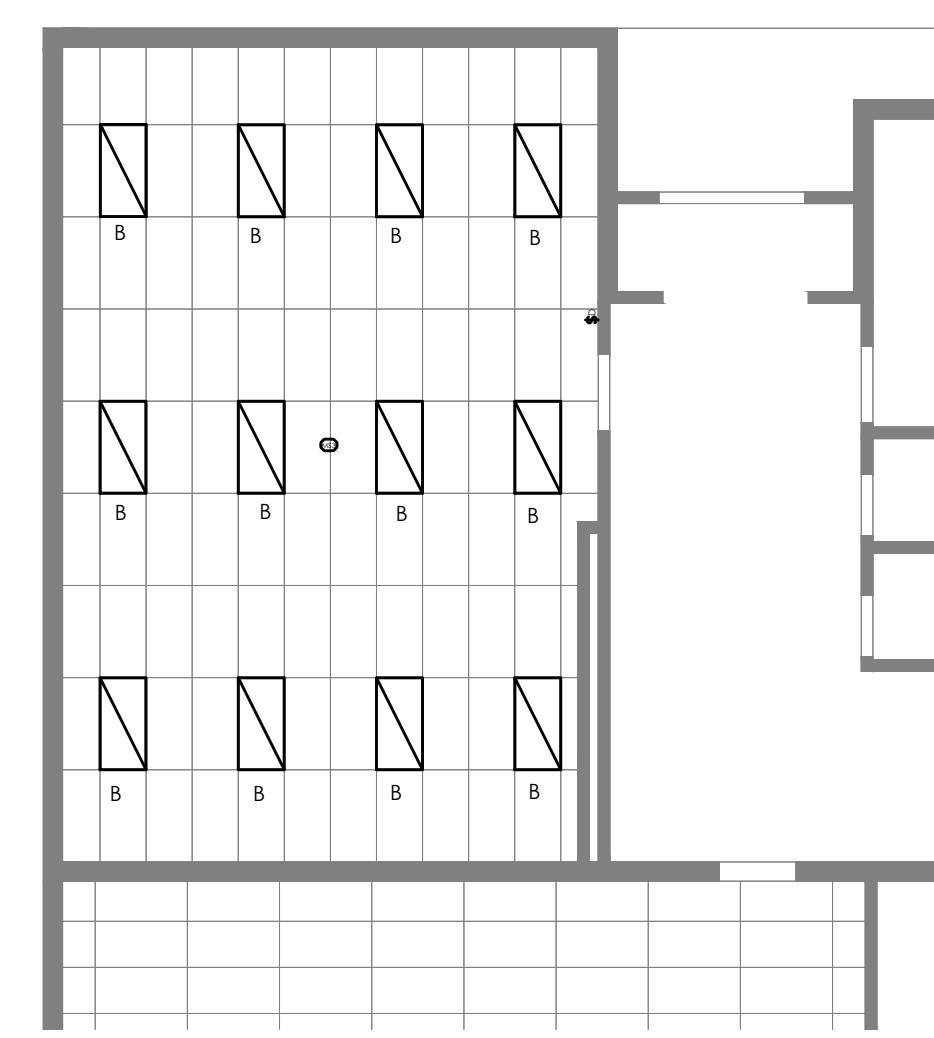
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(2) (SEPARATE PRICE #1) NEW CLASSROOM PROPOSED LIGHTING PLAN
E2.0 SCALE: 1:100

(1) GROUND FLOOR PROPOSED LIGHTING PLAN
E2.0 SCALE: 1:100

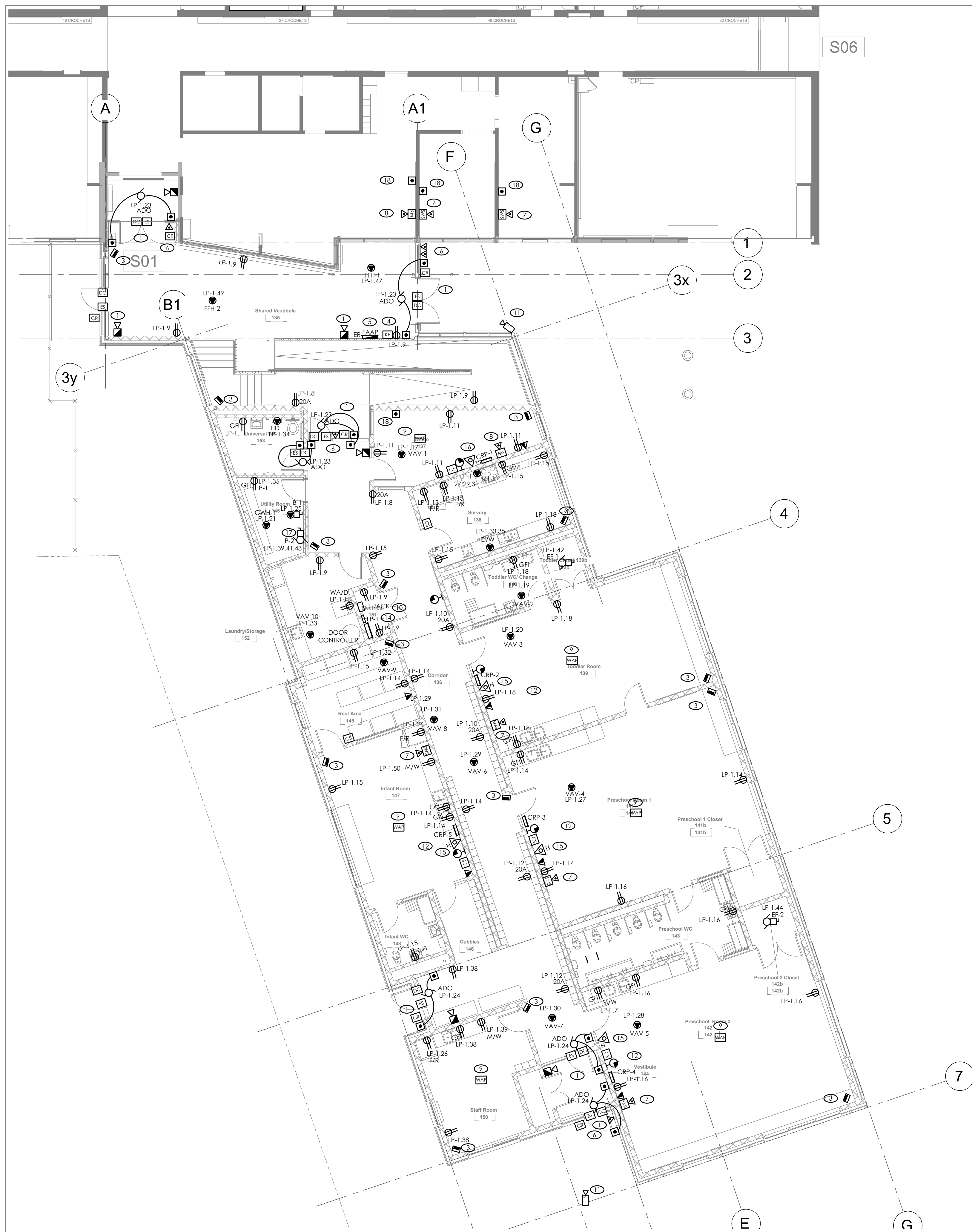
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
GROUND FLOOR LIGHTING & FIRE ALARM PROPOSED PLAN

DRAWN BY: F.S	SCALE: AS INDICATED
CHECKED BY: N.A	DRAWING NUMBER: E2.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

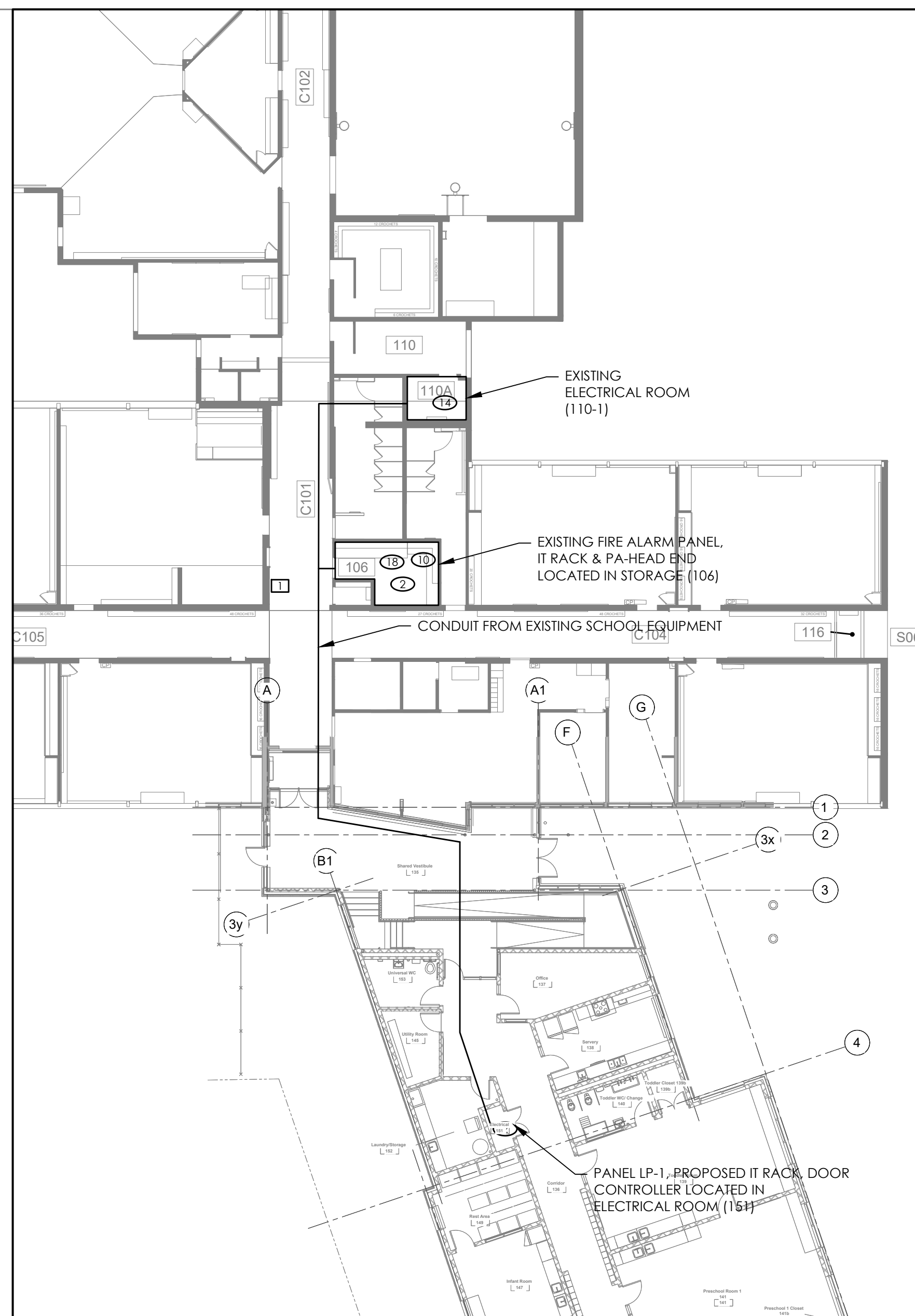


GENERAL NOTES

- EACH ROOM SHALL CONTAIN AT LEAST 1 GFI RECEPTACLE AT ADULT-HEIGHT COUNTERS.
- ALL RECEPTACLES SHALL BE TAMPER-PROOF AND LABELLED AS PER OESC REQUIREMENTS.
- PROVIDE DESK STAND AND ALL ASSOCIATED MOUNTING HARDWARE FOR AIPHONE STATIONS LOCATED IN THE EXISTING SCHOOL OFFICE AND PROPOSED DAYCARE OFFICE. PROVIDE 4 OF SPARE CABLE AT DEVICE LOCATIONS.

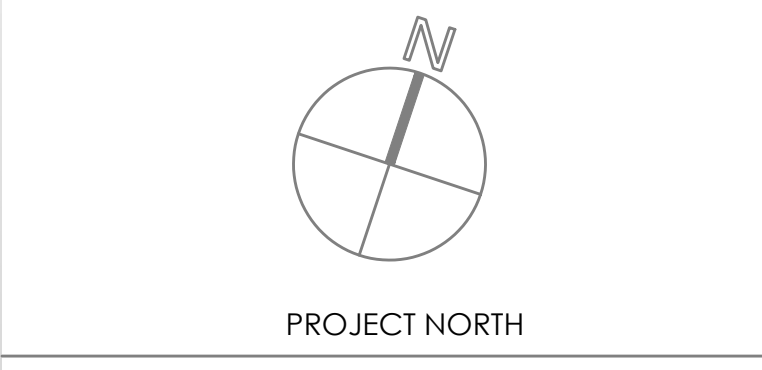
DRAWING NOTES

- PROVIDE ELECTRIC STRIKE, DOOR CONTACT, ALARM SIREN, CARD READER, ANY ASSOCIATED DOOR HARDWARE. LOCAL ALARM SIREN SHALL SOUND UPON DETECTION OF INTRUSION. PROVIDE WIRING/CONDUIT AS REQUIRED. ACCESS CONTROL HARDWARE SHALL BE CONNECTED TO PROPOSED DOOR CONTROLLERS AS REQUIRED.
- PROVIDE DOOR CONTROLLER UNITS AS REQUIRED IN CHILDCARE ELECTRICAL ROOM AND STORAGE (106). DOOR CONTROLLERS SHALL BE CONNECTED TO EXISTING SECURITY EQUIPMENT IN STORAGE (106) AS REQUIRED.
- PROVIDE MOTION DETECTORS AND WIRING/CONDUIT AS REQUIRED WHERE INDICATED. MOTION DETECTORS SHALL BE CONNECTED TO ALARM SYSTEM.
- PROVIDE ALARM KEYPAD. EXTEND EXISTING SECURITY EQUIPMENT CONNECTIONS TO NEW LOCATION. PROVIDE WIRING/CONDUIT AS REQUIRED.
- RELOCATE EXISTING ANNUNCIATOR PANEL TO INDICATED LOCATION. EXTEND EXISTING CONNECTION TO FIRE ALARM CONTROL PANEL IN STORAGE (106). PROVIDE WIRING/CONDUIT AND PULLBOXES AS REQUIRED. PANEL SHALL BE FED FROM BENEATH SLAB. REFER TO DETAIL 3 ON DRAWING E3.0 FOR SPECIFIC INSTRUCTIONS. PROPOSED CHILDCARE ADDITION SHALL BE A NEW ZONE. PROVIDE UPDATED PASSIVE GRAPHIC MOUNTED NEXT TO ANNUNCIATOR PANEL.
- PROVIDE AIPHONE VIDEO INTERCOM DOOR STATION. DOORS TO PROPOSED CHILDCARE SHALL BE RELEASED FROM MASTER OR SUB-MASTER STATIONS LOCATED IN PROPOSED CHILDCARE. DOORS TO EXISTING SCHOOL SHALL BE RELEASED FROM MASTER OR SUB-MASTER STATIONS IN EXISTING SCHOOL. DOORS TO SHARED VESTIBULE SHALL BE RELEASED FROM ANY MASTER OR SUB-MASTER STATION.
- PROVIDE AIPHONE SUB-MASTER STATION. PROVIDE WIRING/CONDUIT AS REQUIRED.
- PROVIDE AIPHONE MASTER STATION. PROVIDE WIRING/CONDUIT AS REQUIRED.
- WIRELESS ACCESS POINTS SHALL BE PROVIDED BY OWNER. PROVIDE POWER OVER ETHERNET CONNECTION TO WIRELESS ACCESS POINT LOCATION FROM PROPOSED IT RACK IN ELECTRICAL ROOM.
- PROVIDE PATCH PANELS AND NETWORK SWITCHES AS REQUIRED IN PROPOSED IT RACK. PROVIDE FIBRE CONNECTION FROM PROPOSED RACK IN ELECTRICAL ROOM TO EXISTING IT RACK IN STORAGE (106).
- PROVIDE SECURITY CAMERAS AND WIRING/CONDUIT AS REQUIRED.
- PROVIDE EQUIPMENT INDICATED IN DETAIL 3 ON SHEET E3.0 IN MODULAR CONTROL PANEL. PROVIDE WIRING/CONDUIT AS REQUIRED.
- PROVIDE P.A. CALL SWITCH AND SPEAKER TO BE CONNECTED TO EXISTING P.A. SYSTEM IN STORAGE (106).
- PROVIDE PANEL IN PROPOSED ELECTRICAL ROOM. PANEL SHALL BE FED FROM MAIN SWITCHBOARD IN EXISTING ELECTRICAL ROOM.
- PROVIDE P.A./TELEPHONE HANDSET. PROVIDE WIRING/CONDUIT AS REQUIRED. REFER TO DETAIL 3 ON SHEET E3.0.
- PROVIDE P.A./TELEPHONE MASTER STATION. PROVIDE WIRING/CONDUIT AS REQUIRED. ALL VOICE RECEPTACLES SHALL BE FED FROM EXISTING TELEPHONE LINE.
- PROVIDE A 208V RATED, 3P, 30A NON-FUSED DISCONNECT FOR PUMP P-2.
- PROVIDE BLUE LOCKDOWN BUTTONS IN INDICATED LOCATIONS. BUTTONS SHALL BE TIED TO EXISTING P.A. SYSTEM IN STORAGE (106).



2 OVERALL SITE PLAN
SCALE: 1:250

1 PROPOSED GROUND FLOOR POWER, COMMUNICATIONS, SECURITY SYSTEM, FIRE ALARM ANNUNCIATOR PANEL AND PA PLAN
SCALE: 1:100



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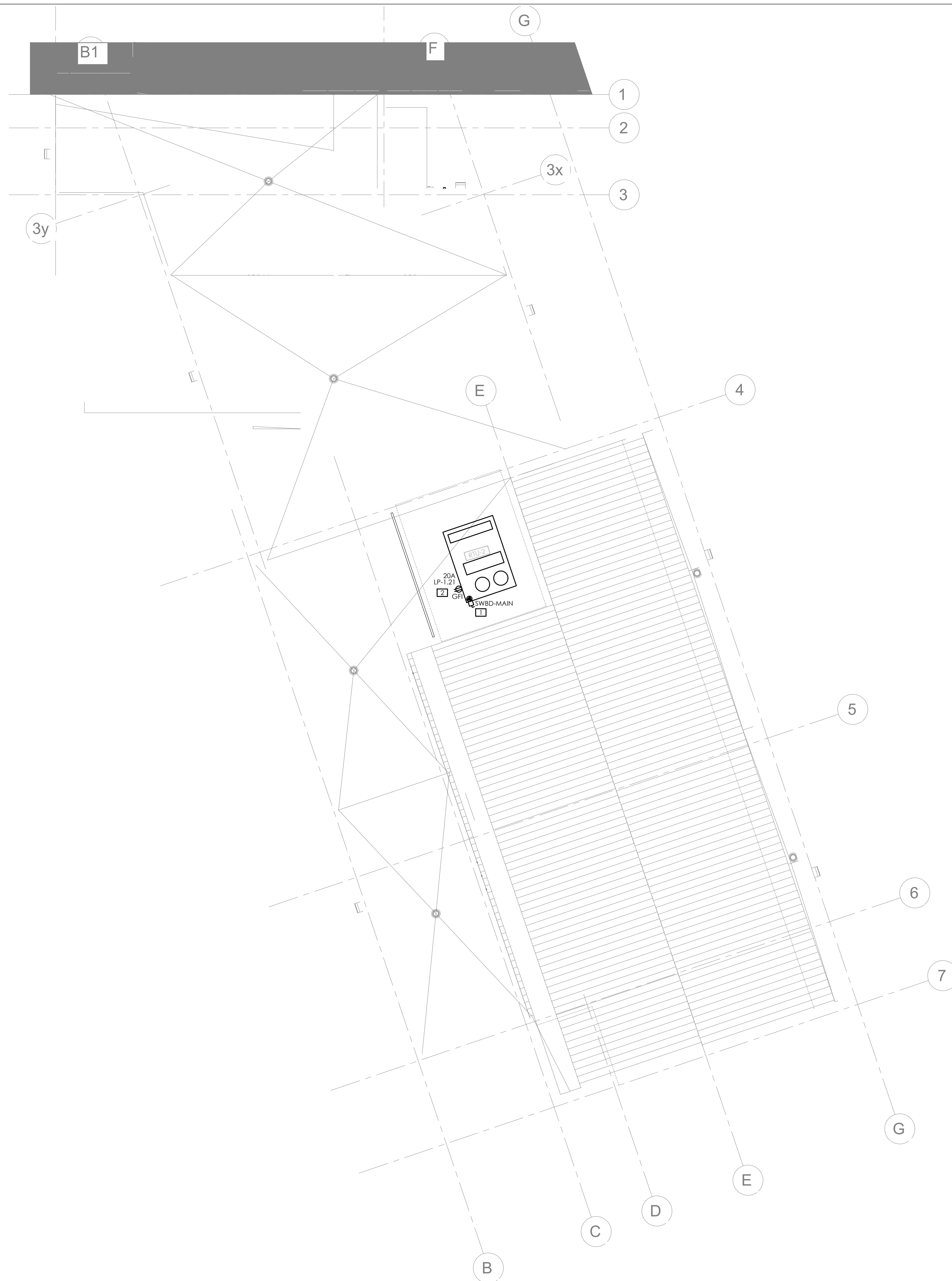
CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
PROPOSED GROUND FLOOR ELECTRICAL SYSTEMS PLAN

DRAWN BY: F.S	SCALE: AS INDICATED
CHECKED BY: N.A.	DRAWING NUMBER: E2.01
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

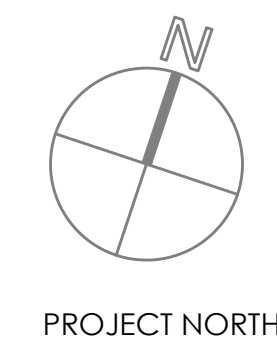
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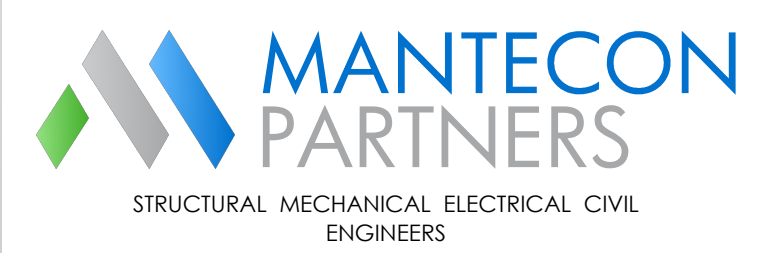
DRAWING NOTES

[1] DISCONNECT PROVIDED BY MECHANICAL MOUNTED ON EQUIPMENT. COORDINATE WITH MECHANICAL FOR EXACT DISCONNECT LOCATION. PROVIDE CONDUIT AND WIRING FROM MAIN SWITCHBOARD TO NEW RTU-2. PROVIDE NEW BREAKER IN MAIN SWITCHBOARD. NEW BREAKER SHORT CIRCUIT RATING SHALL MATCH EXISTING BREAKERS. REFER TO DETAIL 2 ON DRAWING E3.0 FOR FEED INFORMATION.

[2] PROVIDE WIRING/ CONDUIT TO NEW SERVICE RECEPTACLE PROVIDED WITH NEW RTU-2. COORDINATE WITH MECHANICAL FOR EXACT LOCATION OF RECEPTACLE. REFER TO DETAIL 1 ON DRAWING E3.0 FOR PANEL SCHEDULE.



PROJECT NORTH



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CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION

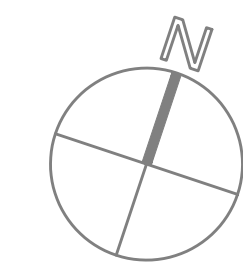
158 BRIDGEPORT ROAD EAST WATERLOO, ONTARIO

DRAWING TITLE:
ROOF LEVEL PROPOSED POWER PLAN

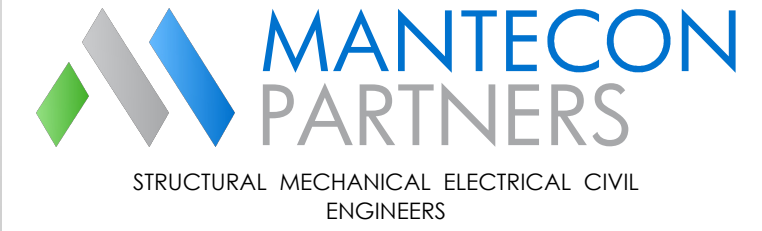
DRAWN BY: F.S	SCALE: AS INDICATED
CHECKED BY: N.A.	DRAWING NUMBER: E2.02
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

1 ROOF LEVEL PROPOSED POWER PLAN
E2.2 SCALE: 1:100

File: J:\Drawings\22-058 - Ecole Elementaire L'Harmonie - Childcare Addition - Workshop Architecture\3-Working Documents\E2.02.03_ROOF_LEVEL_PROPOSED_POWER_PLAN.dwg



PROJECT NORTH



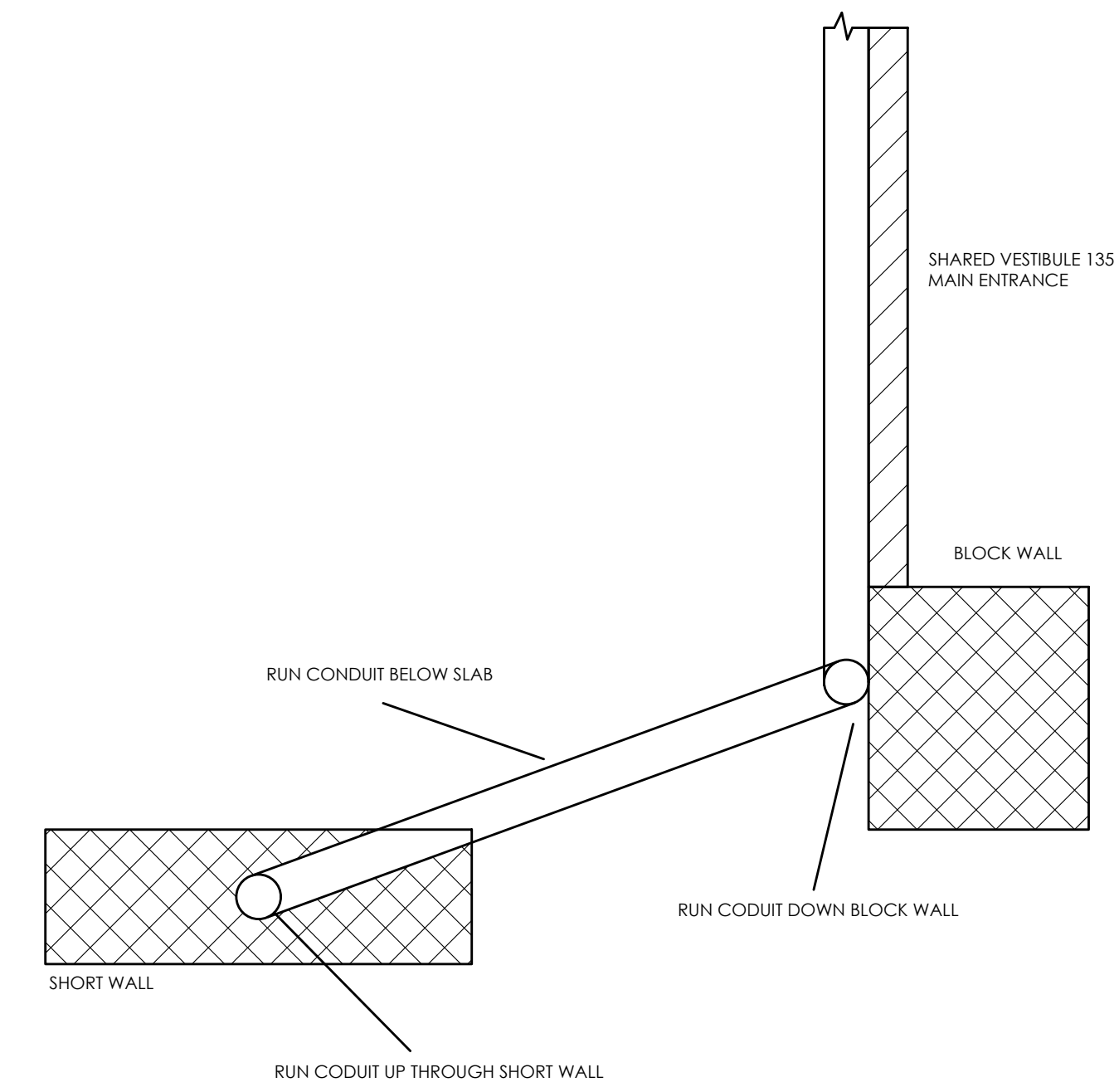
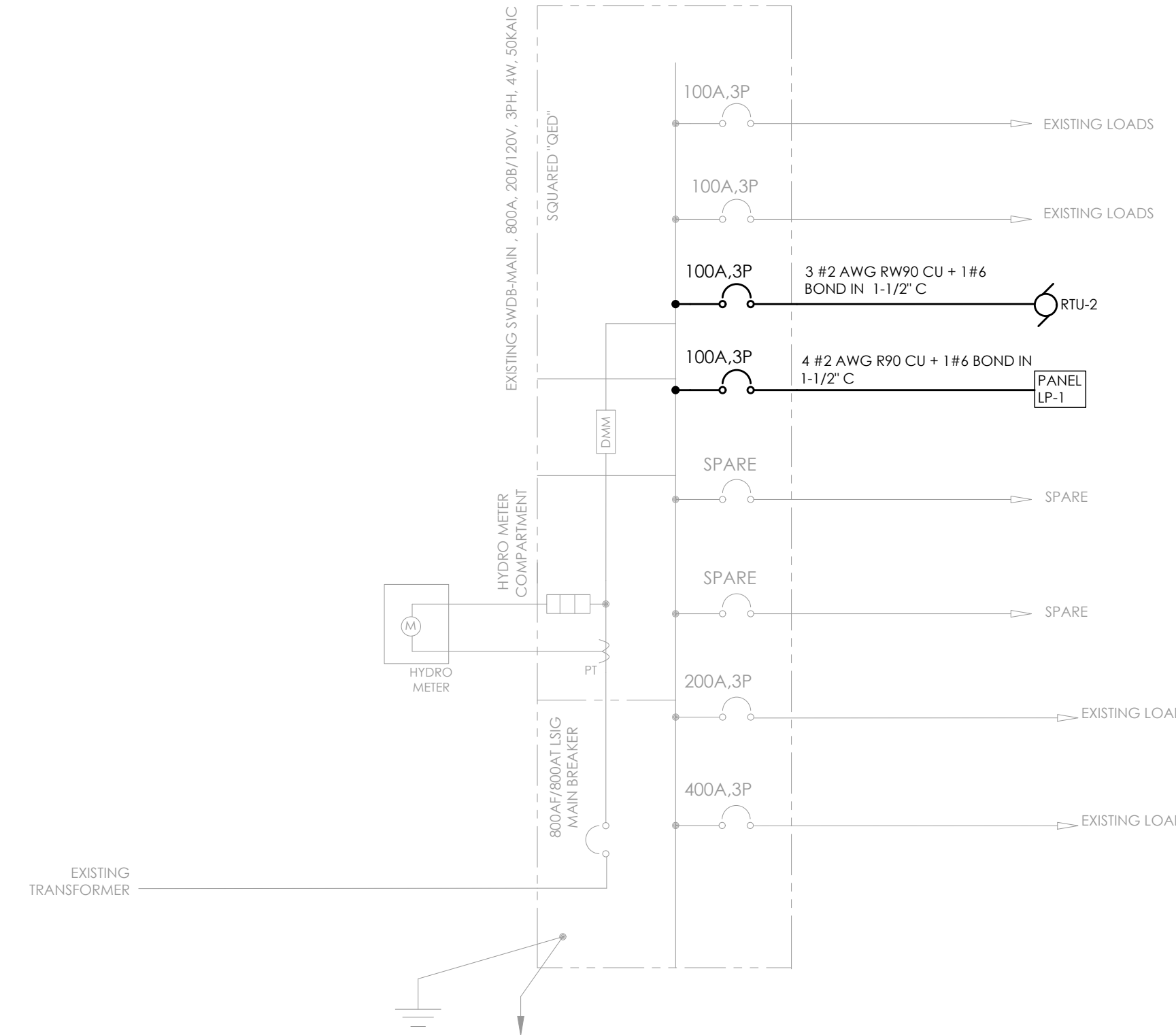
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NO.	ISSUED	DATE	BY

PANEL : LP-1		NOTE:	
VOLTAGE: 120/208V, 3PH/4W	PANEL LOCATION: ELECTRICAL ROOM (151)	LOAD (KW):	RECESSED
AMPERAGE: 100A	FED FROM: MAIN SWITCH BOARD	LOAD (A):	SPRING PROOF
WATERPROOFING: 25KAC	MARK: 100A/3P MAIN BREAKER		MAIN BREAKER
			FED IN/OUTS
			GROUNDING

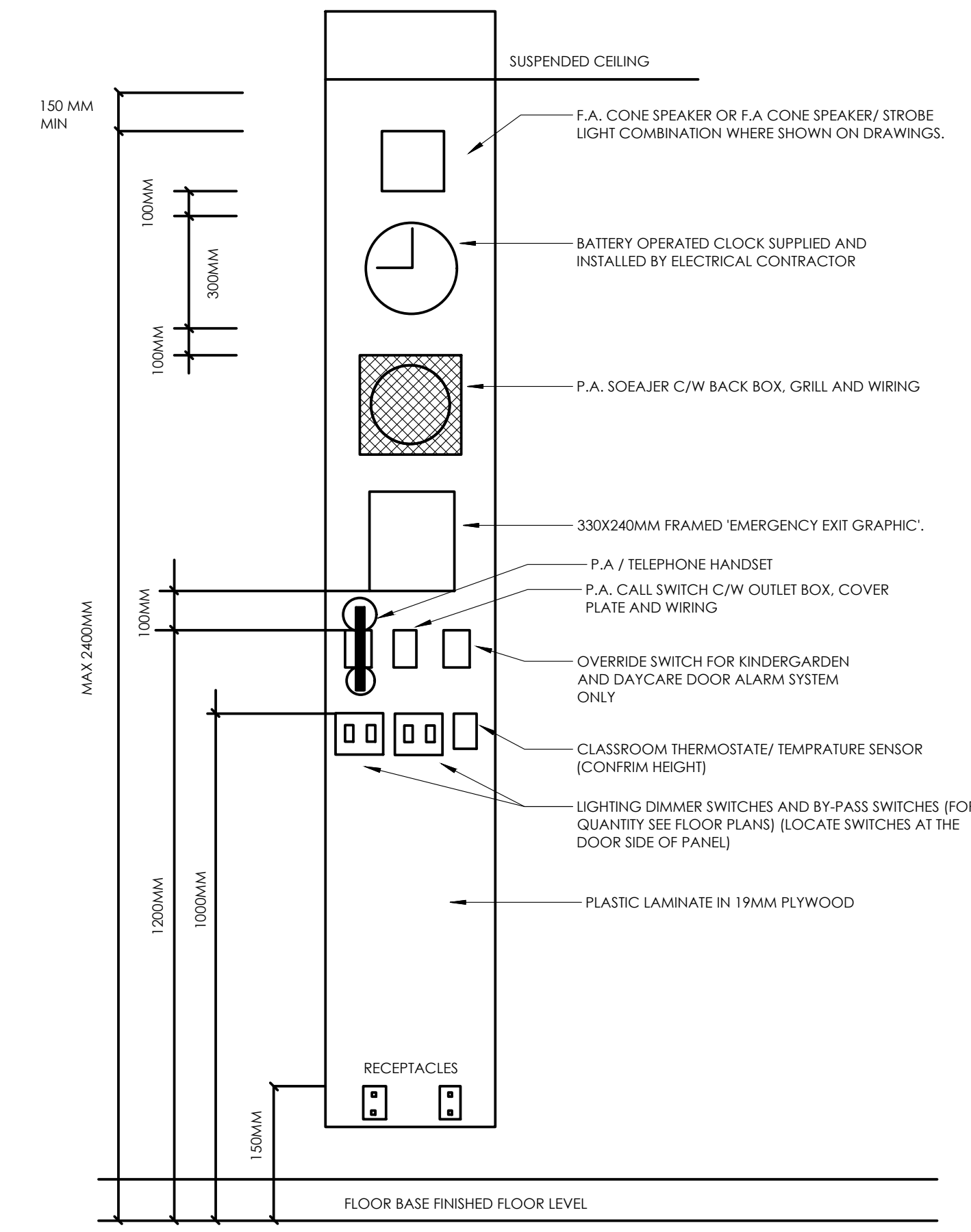
WATTS	DESCRIPTION	BRK	CCT	PH	CCT	BRK	DESCRIPTION	WATTS
-	EMERGENCY LIGHTING	15	1	A	2	15	LIGHTING	800
800	LIGHTING	15	3	B	4	15	LIGHTING	800
800	LIGHTING	15	5	C	6	15	LIGHTING	800
1000	MICROWAVE RECEPTACLE [142]	15	7	A	8	20	SERVICE RECEPTACLES (HALLS)	1900
1000	RECEPTACLES	15	9	B	10	20	SERVICE RECEPTACLES (HALLS)	1900
1000	RECEPTACLES	15	11	C	12	20	SERVICE RECEPTACLES (HALLS)	1900
1000	DEDICATED FRIDGE RECEPTACLES	15	13	A	14	15	RECEPTACLES	1000
1000	RECEPTACLES	15	15	B	16	15	RECEPTACLES	1000
600	VAV-1	15	17	C	18	15	DEDICATED WA/D RECEPTACLE	1000
600	VAV-2	15	19	A	20	15	VAV-3	600
1400	SERVICE RECEPTACLE RTU-2	20	21	B	22	15	GW-1	1000
1000	ADO	15	23	C	24	15	ADO	800
200	B-1 (BOILER)	12	25	A	26	15	DEDICATED FRIDGE RECEPTACLES	120
600	VAV-4	15	27	B	28	15	VAV-5	600
600	VAV-6	15	29	C	30	15	VAV-7	600
600	VAV-8	15	31	A	32	15	VAV-9	600
600	VAV-10	15	33	B	34	20	HAND DRIER [153]	600
120	P-1 DEDICATED RECEPTACLE	15	35	C	36	15	EXTERIOR LIGHTS	88
5750	KH-1 (EXHAUST HOOD)	15	37	A	38	15	RECEPTACLES	
	P-2	15	39	B	40	15	MICROWAVE RECEPTACLE [150]	
		15	41	C	42	15	EXHAUST FAN (EF-1)	29
		15	43	A	44	15	EXHAUST FAN (EF-2)	29
51	FEH-1	15	45	B	46	40	DISHWASHER	5700
51	FEH-2	15	49	A	50	15	MICROWAVE RECEPTACLE [147]	
	SPARE	15	51	B	52	15	SPARE	
	SPARE	15	53	C	54	15	SPARE	
			55	A	56			
			57	B	58			
			59	C	60			
			61	A	62			
			63	B	64			
			65	C	66			
			67	A	68			
			69	B	70			
			71	C	72			



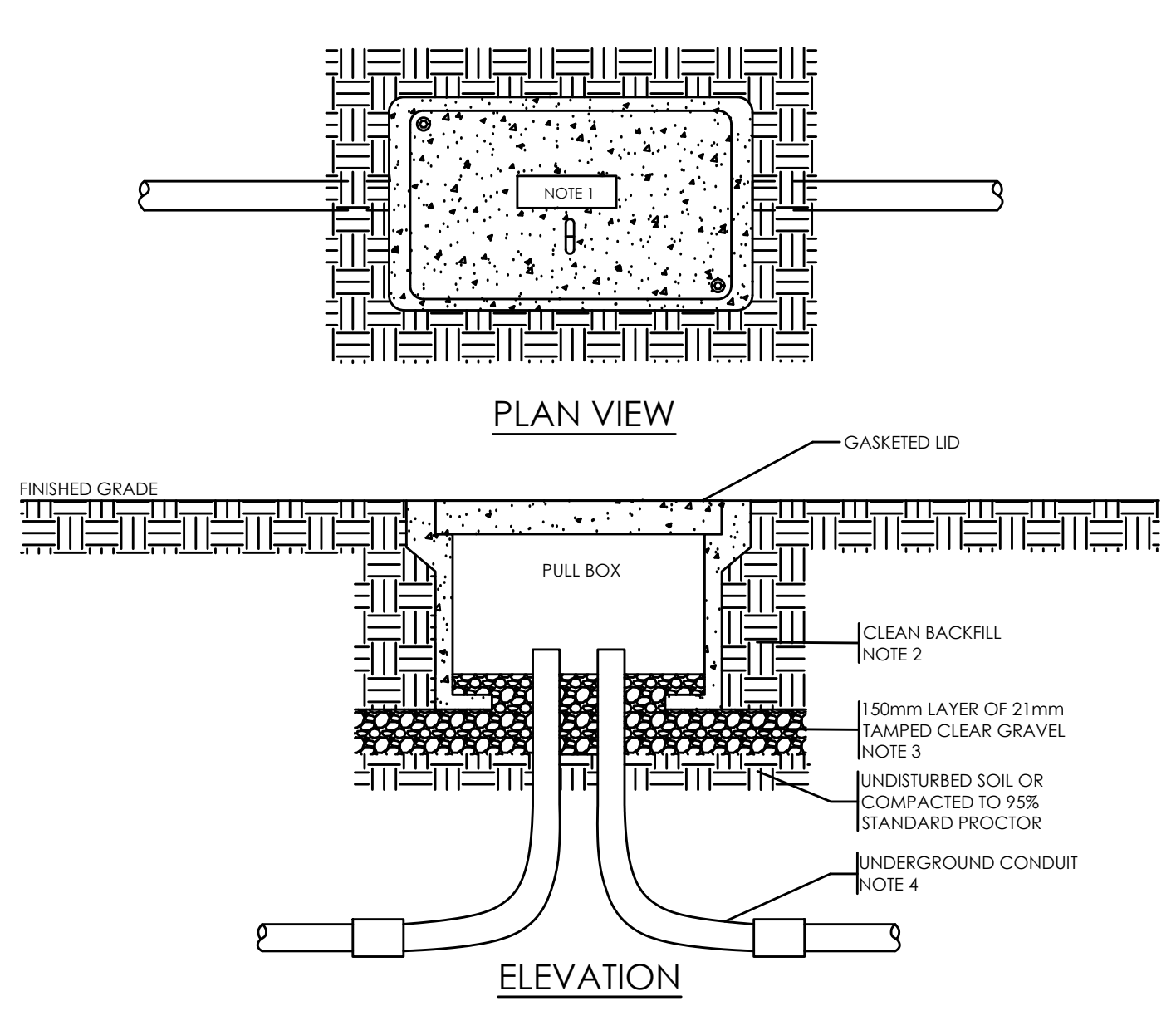
1 PANEL SCHEDULE
E3.0 N.T.S.

2 SINGLELINE DIAGRAM
E3.0 N.T.S.

3 SLAB CONDUIT TRANSITION
E3.0 N.T.S.

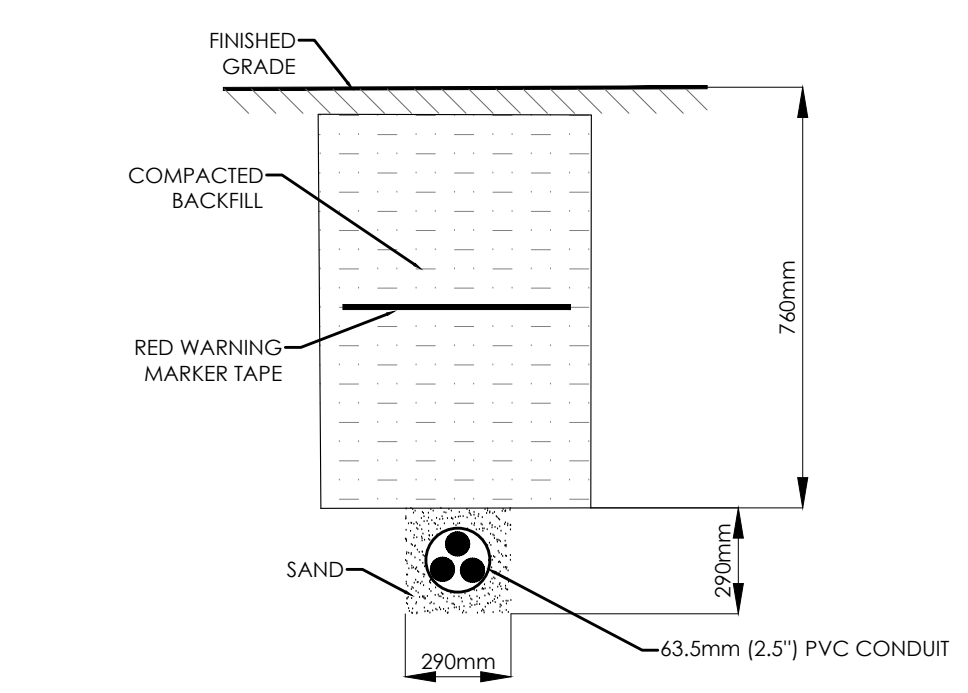


4 CONTROL PANEL
E3.0 N.T.S.



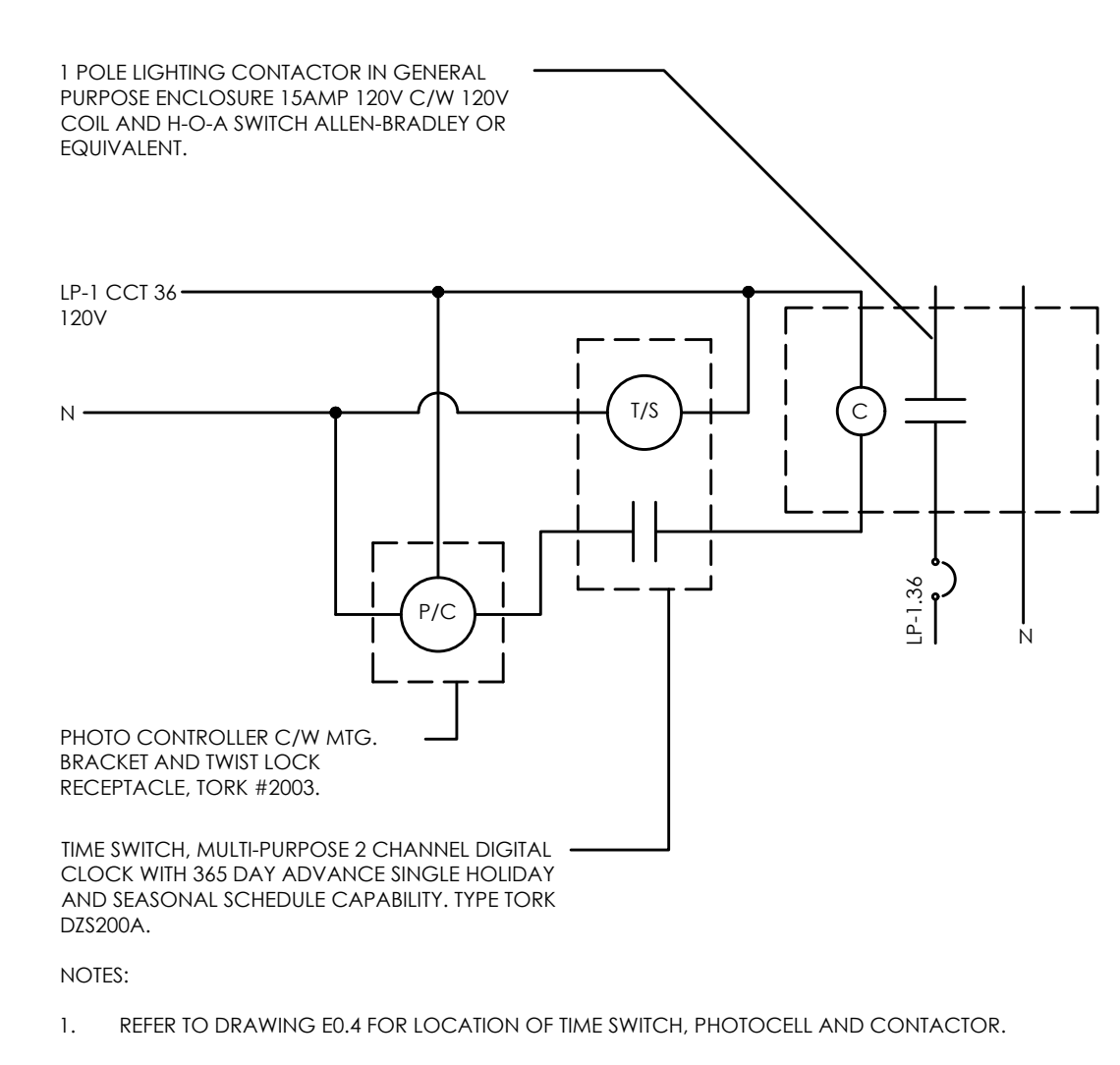
- NOTE:**
- PROVIDE LABEL IDENTIFYING ELECTRICAL POWER SYSTEM SOURCE PANEL AND CIRCUIT.
 - PLACE BACKFILL IN THOROUGHLY COMPACTED LAYERS.
 - GRAVEL BEDDING AND FOUNDATION INSTALLATION ARE ALL SUBJECT TO ENGINEER INSPECTION. FILL GROUND BOX WITH GRAVEL ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
 - CONDUIT SIZE AND QUANTITIES TO MATCH EXISTING. PROVIDE PULL BOX SIZE AS REQUIRED.
 - ALL WIRING, SPICES AND TERMINATIONS SHALL BE SUITABLE FOR SUBMERSIBLE LOCATIONS.

5 SMALL IN-GRADE PULL BOX
E3.0 N.T.S.



- NOTES:**
- MOLDED PLASTIC INTERLOCKING DUCT SPACERS @ 1500MM INTERVALS ALONG ENTIRE LENGTH OF CONDUIT BURIAL.

6 TRENCH
E3.0 N.T.S.



- NOTES:**
- REFER TO DRAWING E0.4 FOR LOCATION OF TIME SWITCH, PHOTOCELL AND CONTACTOR.

7 EXTERIOR LIGHTING CONTROL
E3.0 N.T.S.

CLIENT
WORKSHOP ARCHITECTURE

PROJECT:
CSV L'HARMONIE DAYCARE ADDITION
158 BRIDGEPORT ROAD EAST
WATERLOO, ONTARIO

DRAWING TITLE:
SINGLELINE DIAGRAM, ELECTRICAL SCHEDULE & CONTROL PANEL

DRAWN BY: F.S	SCALE: AS INDICATED
CHECKED BY: N.A	DRAWING NUMBER: E3.0
DATE: NOV 2022	
PROJECT NUMBER: 22-058	

REFER TO TREE PROTECTION PLAN DATED NOVEMBER 24, 2022 BY DAVEY RESOURCE GROUP FOR TREE PROTECTION FENCE DETAILS AND LOCATIONS. REFER TO CIVIL DWGS FOR SILT FENCE DETAILS AND LOCATIONS.

L1.1 PLANT LIST

KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	TYPE	REMARKS
TREES						
AF	3	Acer x freemannii 'Jeffersred'	Autumn Blaze Maple	70mm Caliper	Wire Basket	8m Min. On Centre Spacing
AR	1	Acer rubrum 'Karpick'	Karpick Red Maple	70mm Caliper	Wire Basket	8m Min. On Centre Spacing
AM	3	Amelanchier canadensis	Serviceberry	70mm Caliper	Wire Basket	3m Min. On Centre Spacing
TA	3	Tilia americana 'Redmond'	Redmond Linden	70mm Caliper	Wire Basket	8m Min. On Centre Spacing
10 Total Trees						
SHRUBS						
DI	25	Diervilla lonicera	Bush Honeysuckle	60cm Height	Potted	1.0m Min. On Centre Spacing
Jc	10	Juniperus chinensis 'Mint Julep'	Mint Julep Juniper	60cm Height	Potted	1.2m Min. On Centre Spacing
35 Total Shrubs						



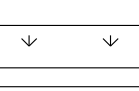
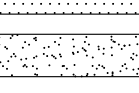
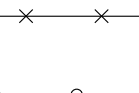
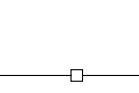
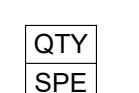


STREETBOND 150 ASPHALT COATING BY HUB SURFACE SYSTEMS (OR APPROVED EQUIVALENT) COLOUR PALETTE:

- SR SAFETY BLUE
- PAPIRIKA
- CL SHAMMOCK GREN
- MARI GOLD

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LEGEND:

-  EXISTING TREE
-  PROPOSED DECIDUOUS TREES
-  PROPOSED ARTIFICIAL TURF
-  PROPOSED SAND PLAY
-  PROPOSED ASPHALT SURFACE
-  PROPOSED 1524mm HEIGHT CHAIN LINK FENCE
-  PROPOSED 1800mm HEIGHT WOOD FENCE
-  PROPOSED 1552mm HEIGHT OMEGA II ARCHITECTURAL FENCE
-  PLANT KEY

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CSV L'Harmonie Daycare Addition

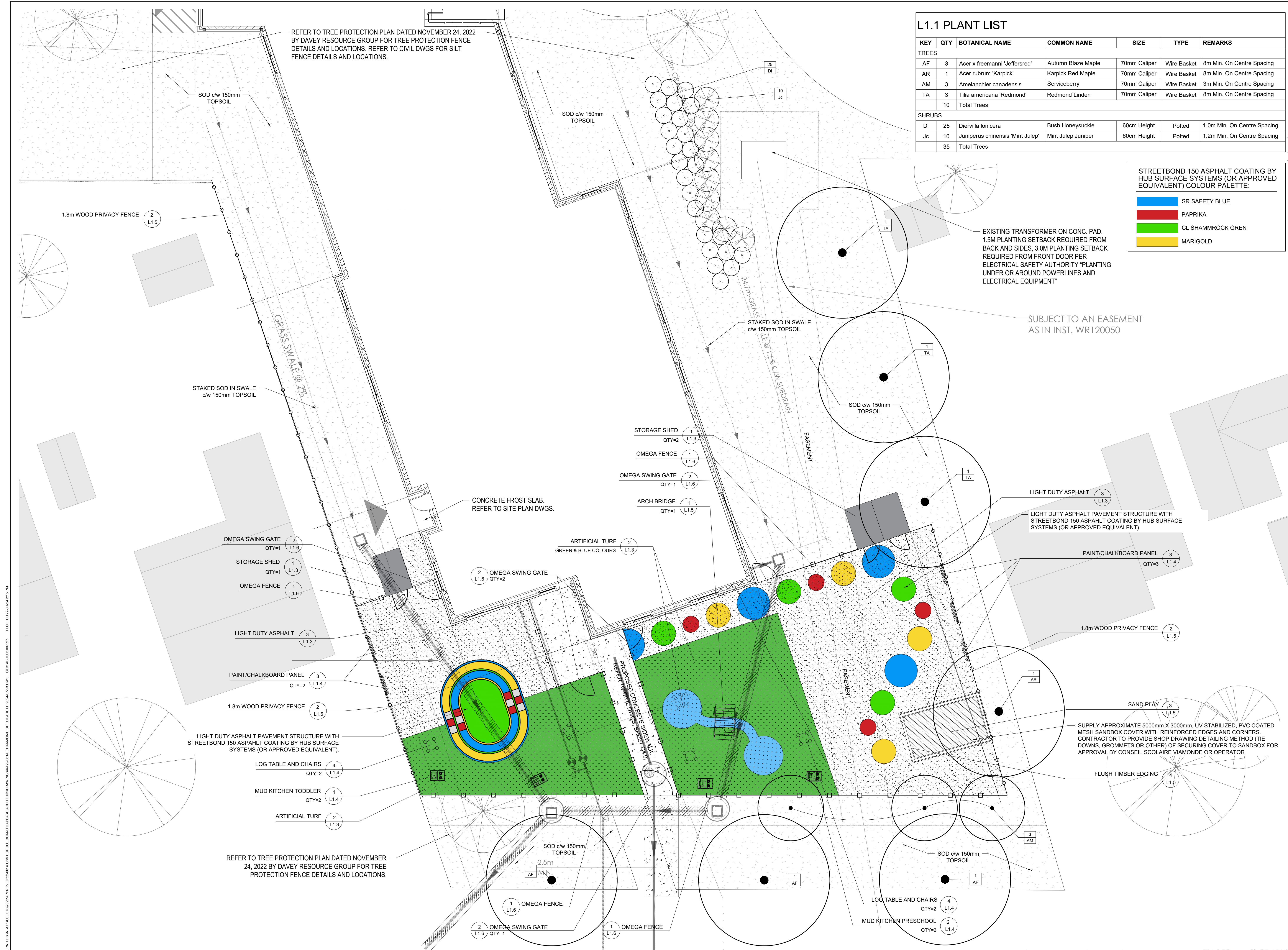
158 Bridgeport Road East
 Waterloo



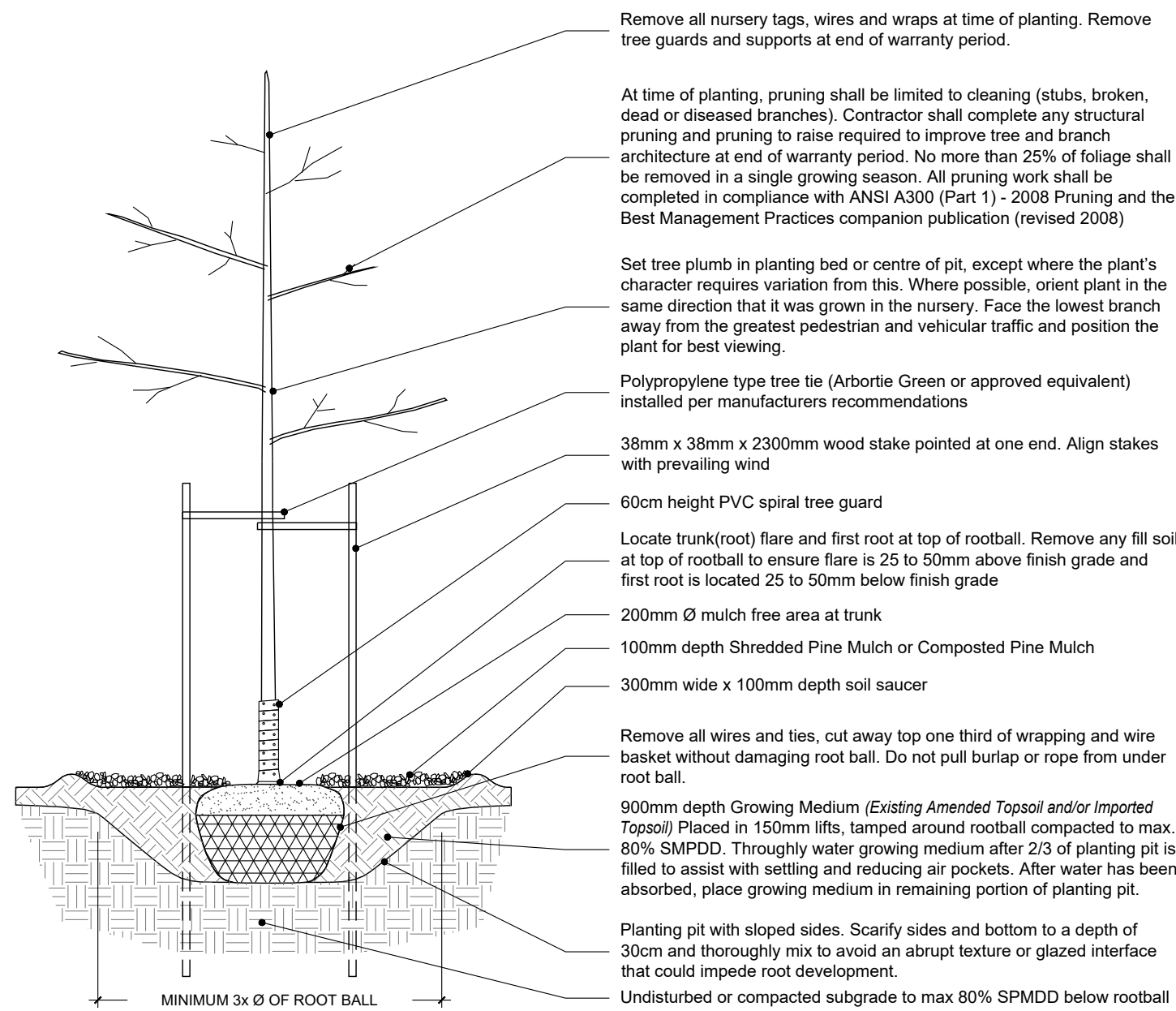
PROJECT CODE: 22_07
 SCALE: 1 : 100
 DATE: 24 May, 2023
 STATUS: Tender Documents

Proposed Landscape Plan Enlargement

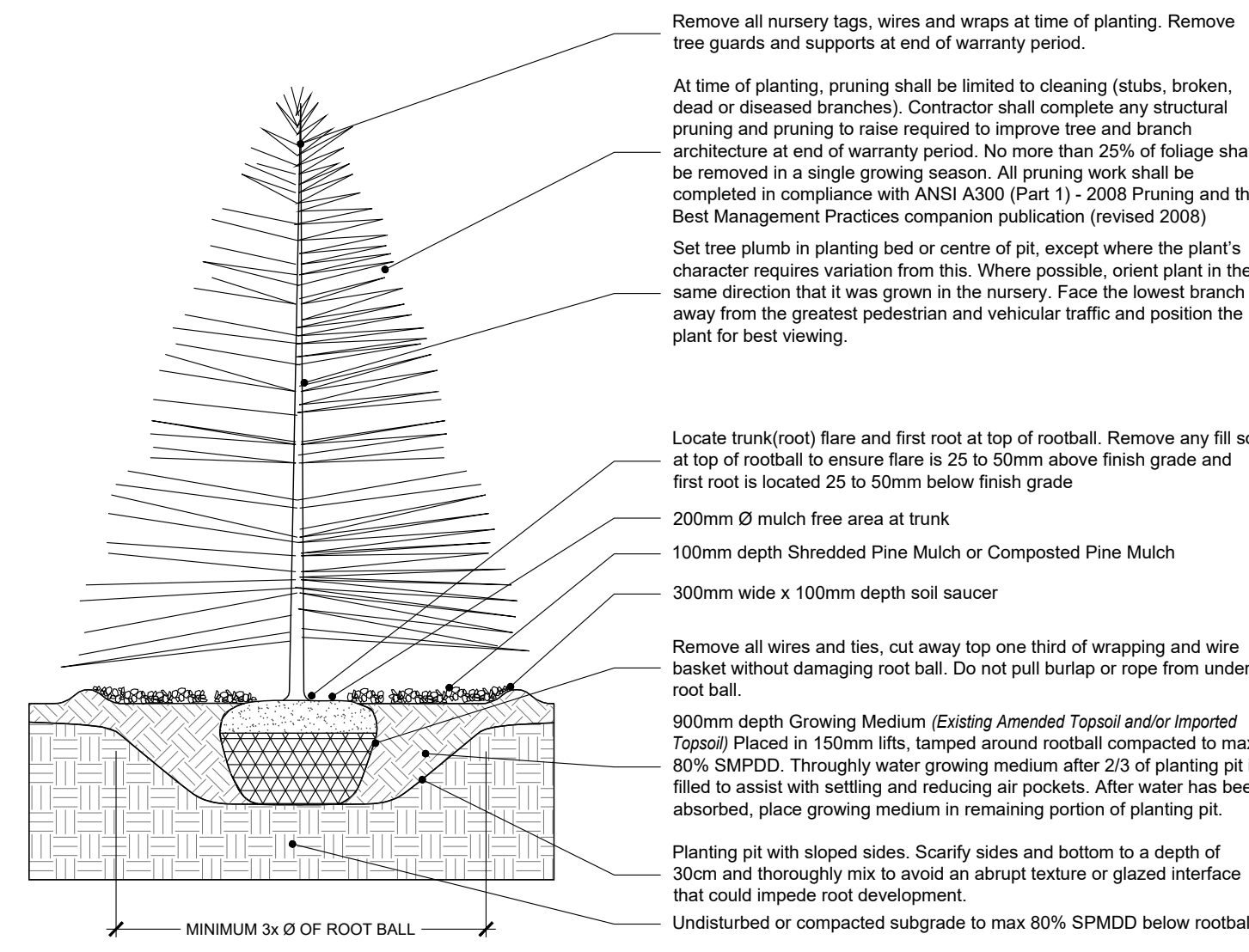
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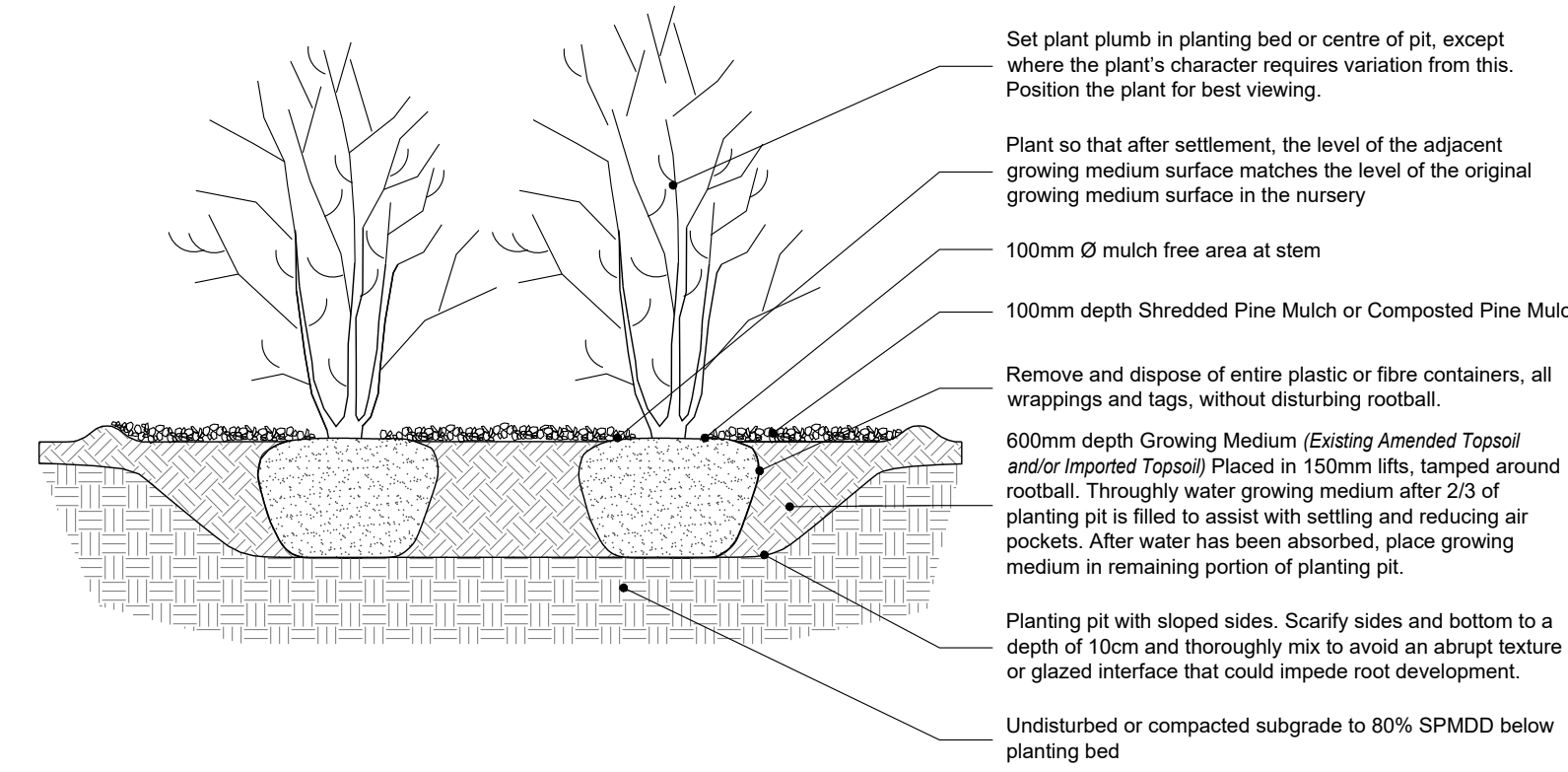
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1 TYPICAL DECIDUOUS TREE PLANTING DETAIL
L1.2 N.T.S.



2 TYPICAL CONIFEROUS TREE PLANTING DETAIL
L1.2 N.T.S.



3 TYPICAL SHRUB PLANTING DETAIL - CONTINUOUS BED
L1.2 N.T.S.

- All Landscape Drawings are fully coordinated with Site Plan and Engineering drawings submissions.
- The property Owner is responsible to implement the approved Landscape Plan. The Owner is financially responsible for all replacement costs for a two year warranty period.
- Any species substitutions must be to the satisfaction of the City of Waterloo.
- No vegetation removals may occur from the site until time of final site plan approval (inclusive of final Engineering acceptance).

CITY OF WATERLOO LANDSCAPE NOTES

- Base information sources:
 - Site Plan prepared by Workshop Architects Ltd, dated June 5, 2023.
 - Survey prepared by Land Survey Group received on October 18, 2022.
 - Grading and Servicing prepared by Mantecon Partners, dated May 16, 2023.
- All dimensions are in metric unless otherwise noted.
- Do not scale drawings. Dimensions are to be verified on site by Contractor prior to commencement of the work.
- These plans shall be read in conjunction with all details, notes, reports, written specifications, general conditions, any supplemental conditions and agreement which form the contract documents.
- These drawings shall not be used for construction purposes unless noted as "Issued for Construction" and signed by the Landscape Architect or Professional Engineer.
- Contractor shall review all drawings and verify actual field conditions to determine the total scope of work and all required coordination prior to submission of bids and commencement of the work. Report any discrepancies to the Landscape Architect, for action to the satisfaction of the Owner.
- Contractor shall locate all underground, at grade and overhead utilities prior to commencement of the work. All utilities not necessarily shown on these drawings. About & Associates assumes no responsibility for the accuracy of any utilities shown in these drawings.
- Contractor shall perform all work in accordance with the most current Ontario Building Code, CAN/CSA-Z614:20, Occupational Health and Safety Act and it's regulations, as well as local municipal codes, regulations and by-laws.
- Contractor shall identify the location of all internal/external construction access routes, parking and storage of materials in conformance with project erosion and sediment control plans for acceptance by the Owner. Construction, maintenance and removal/restoration of access, parking and storage facilities shall be included in the Contractor's bid price.
- Contractor shall submit shop drawings where indicated in these drawings. Shop drawings shall be certified by a Professional Engineer licensed to practice in Ontario and reviewed by the contractor for dimensional correlation with the drawings and field conditions. Fabrication of elements on shop drawings shall not proceed until drawings have been reviewed and approved by a Professional Engineer and have been accepted for general design conformance by the Landscape Architect in writing. The cost of preparing shop drawings, as well as the services of a Professional Engineer, shall be included in the Contractor's bid price.
- Contractor proposed substitution of materials and products shall be submitted in writing for review by Landscape Architect and acceptance by Owner and Municipality.
- Material quantities on drawings shall take precedent over those in lists and schedules.
- Where traffic control is necessary, Contractor shall use the guideline of the Construction Safety Association of Ontario, municipal by-laws, the Highway Traffic Act and the Ontario Traffic Manual (Book 7). The cost of preparing, obtaining approvals and implementing traffic control plans shall be included in the Contractor's bid price, unless otherwise noted.
- Contractor shall erect temporary barriers, as required, to secure the work area. Contractor shall maintain temporary barriers in good repair and remove at the end of the work.
- Contractor shall provide layout and staking services, for general review for design conformance by Landscape Architect and acceptance by Owner. The cost of layout and staking shall be included in the Contractor's bid price, unless otherwise noted.
- Contractor is responsible for protecting and/or reinstating site elements indicated in these drawings.
- Contractor is responsible for restoration of adjacent surfaces and existing site elements damaged by the Contractor in the performance of the work, including but not limited to roads, driveways, playground equipment, utilities, buildings, curbs, sidewalks, retaining walls, fencing, turf, flowers and woody vegetation. Restoration work shall be performed by the Contractor at no cost to the Owner and be completed in conformance with applicable Provincial, Municipal or Agency standards and requirements, to the satisfaction of the Owner/Agency of the damaged element.
- Where new paving or earthwork meets existing, smoothly blend line and grade of existing with new.
- Test existing topsoil to be reused as growing medium on site in accordance with:
 - Top Soil Basic Package (by SGS Laboratories or approved equal testing facility) Testing the following properties: Texture (%sand, %silt, %clay), total salts, pH, buffer pH, phosphorus, potassium, magnesium, calcium, cation exchange capacity, chloride, sodium, sodium absorption ratio, organic matter. Written recommendations for amendments.
 - The cost to amend existing topsoil to be reused shall be paid for by the Owner.
- Contractor shall provide imported topsoil test results (using analysis requirements for existing topsoil) prior to delivery to place of work, for each source.
- Plants specified on these plans are to be in accordance with the Canadian Nursery Landscape Association Canadian Standards for Nursery Stock from the Canadian Landscape Standard, current edition.
 - Only nursery grown plants will be accepted.
 - Landscape Architect reserves the right to reject any plant material not in conformance with the standard, displaying life-threatening, poor growth habits, injury, disease or not true to name. Contractor shall remove rejected plants from the site immediately and replace at no additional cost to the Owner.
- Proposed plants which come over or under any utility shall be relocated by the Contractor for review by the Landscape Architect, to the satisfaction of the utility provider.
- All work and materials are to be warranted by the Contractor for twenty-four (24) months from date of initial acceptance of all items by Municipal Staff and Project Landscape Architect.
- The Contractor shall perform maintenance, as described in these drawings for all the installed trees, shrubs, grasses and seeding during the warranty period.
 - OR
 - The Owner shall provide maintenance as described in these drawings for all installed trees, shrubs, grasses and seeding during the warranty period.
- Upon completion of the site landscape surface works, the Landscape Architect will review and certify for compliance with approved landscape plans.
- The Landscape Architect will provide written certification to the City at substantial completion to initiate the 2-year warranty/maintenance period.
- City will inspect, and if acceptable and upon written request, would consider the reduction of the Letter of Credit. After a full year, the LA can provide further written certification and following City inspection, if acceptable and upon written request, the Letter of Credit can be released.
- Due to unfavorable environmental conditions, landscape compliance inspections will be completed between May 1st and October 31st of a calendar year.

GENERAL LANDSCAPE NOTES

LANDSCAPE MAINTENANCE NOTES

- Perform following maintenance operations from time of planting to end of warranty period two (2) years following substantial performance of the work.
 - Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion. In a typical loam soil, optimum soil moisture in planting beds at root depth is 65% of field capacity. Guidelines during a typical growing season are as follows:
 - 1.1.1. Deep root water newly planted plants once per week for the first three weeks, such that the water penetrates to a minimum depth of 300mm.
 - 1.1.2. Deep root or surface water trees and shrubs a minimum of every ten (10) days between May 15 and September 15.
 - 1.1.3. Deep root or surface water trees and shrubs a minimum of every twenty-one (21) days between September 15 and freeze up.
 - 1.1.4. Water evergreen plants thoroughly in late fall prior to freeze-up to saturate soil around root system.
 - Soil moisture to be monitored throughout the growing season:
 - 1.2.1. Watering schedule to be increased when plant materials are reaching the permanent wilting point.
 - 1.2.2. Watering schedule to be reduced when a sufficient volume of rainfall has penetrated the soil fully as required.
 - Replace or respad damaged, missing or disturbed mulch.
 - If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Consultant prior to application.
 - Control outbreaks of perennial weeds as directed by Consultant, and annual weeds by mechanical or chemical means utilizing acceptable integrated pest management practices to meet acceptance/success targets
 - 1.5.1. If chemical means are used, comply with all municipal, provincial, and federal legislation and regulations.
 - 1.5.2. Remove dead or broken branches from plant material using clean sharp horticultural tools using current arboricultural practices.
 - 1.5.3. Keep trunk protection and guy wires in proper repair and adjustment.
 - 1.5.4. Provide adequate protection from winter, wind and rodent damage.
 - Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings, unless otherwise directed by Consultant.
 - Remove trunk protection, tree supports and level watering saucers at end of warranty period, unless otherwise directed by Consultant.
 - 1.11.1. Submit monthly written reports in during the growing season (April - September) to Consultant identifying:
 - 1.11.1.1. Maintenance work carried out.
 - 1.11.1.2. Watering method, quantity of water used, water source.
 - 1.11.1.3. General development and condition of plant material.
 - 1.11.1.4. Preventative or corrective measures required which are outside Contractor's responsibility.
- The Contractor is to ensure that any trees with tree roots impacted by the work, both on site as well as on neighbouring properties shall be maintained and watered in accordance with all above maintenance requirements similar to any newly planted vegetation.

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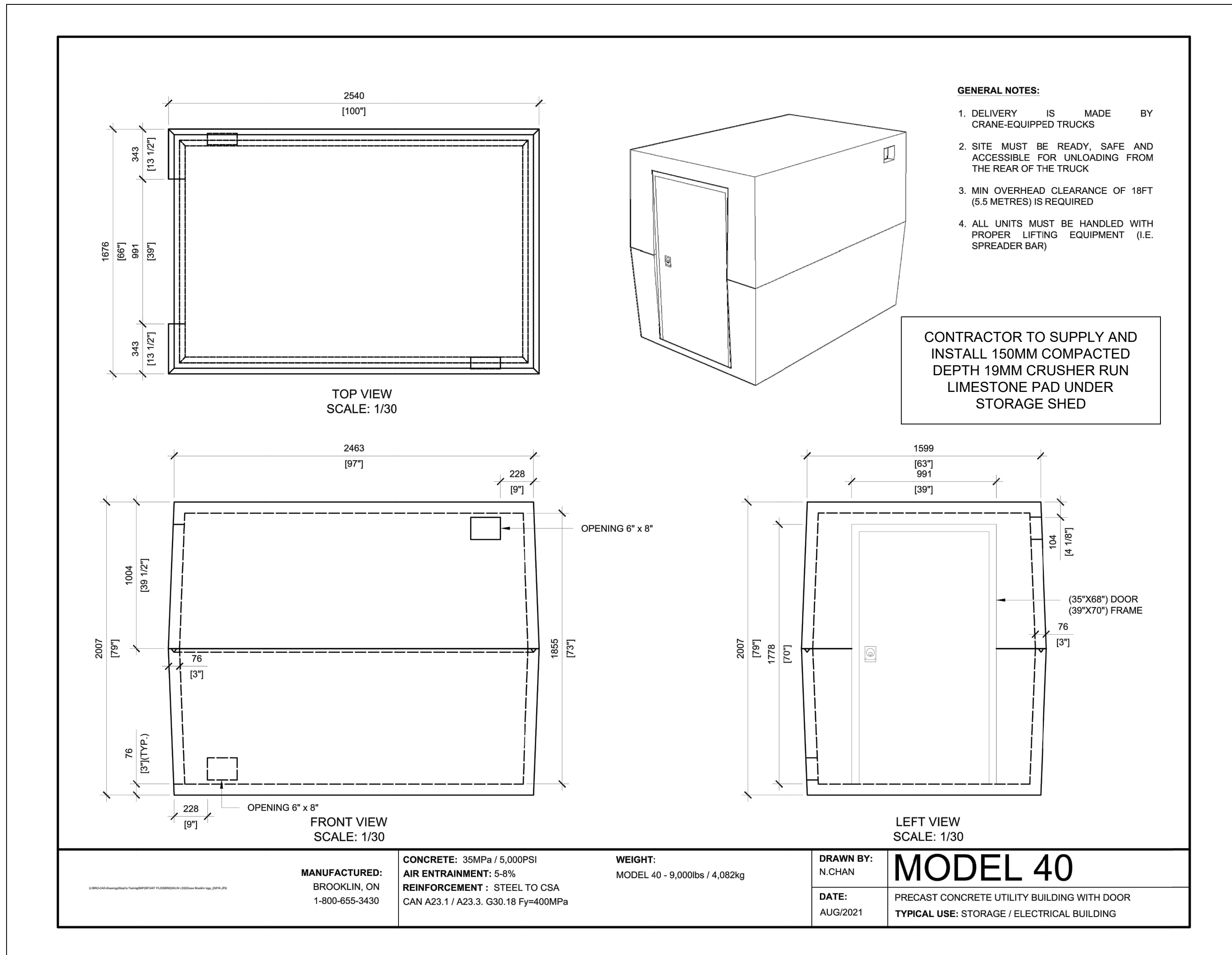


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DATE: 24 May, 2023	STATUS: Tender Documents

Proposed Landscape Plan Details I

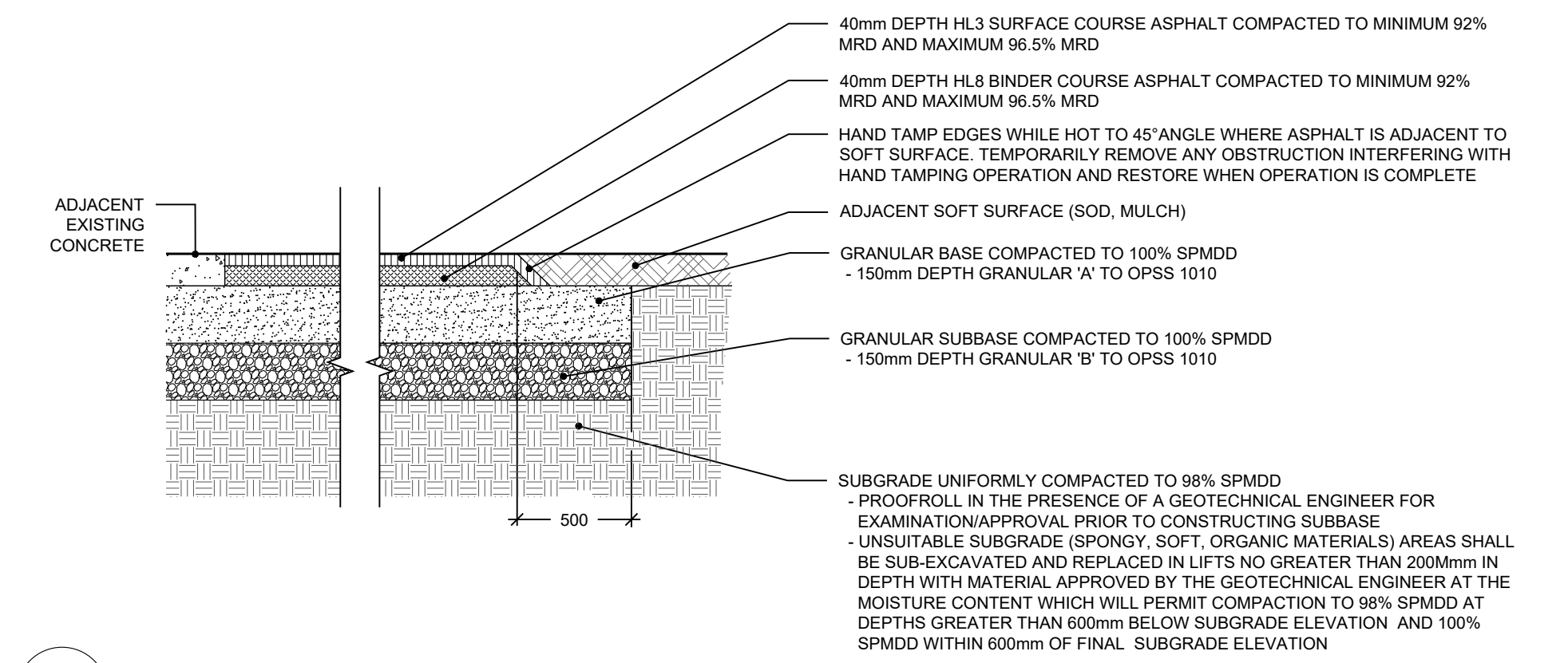
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L1.2

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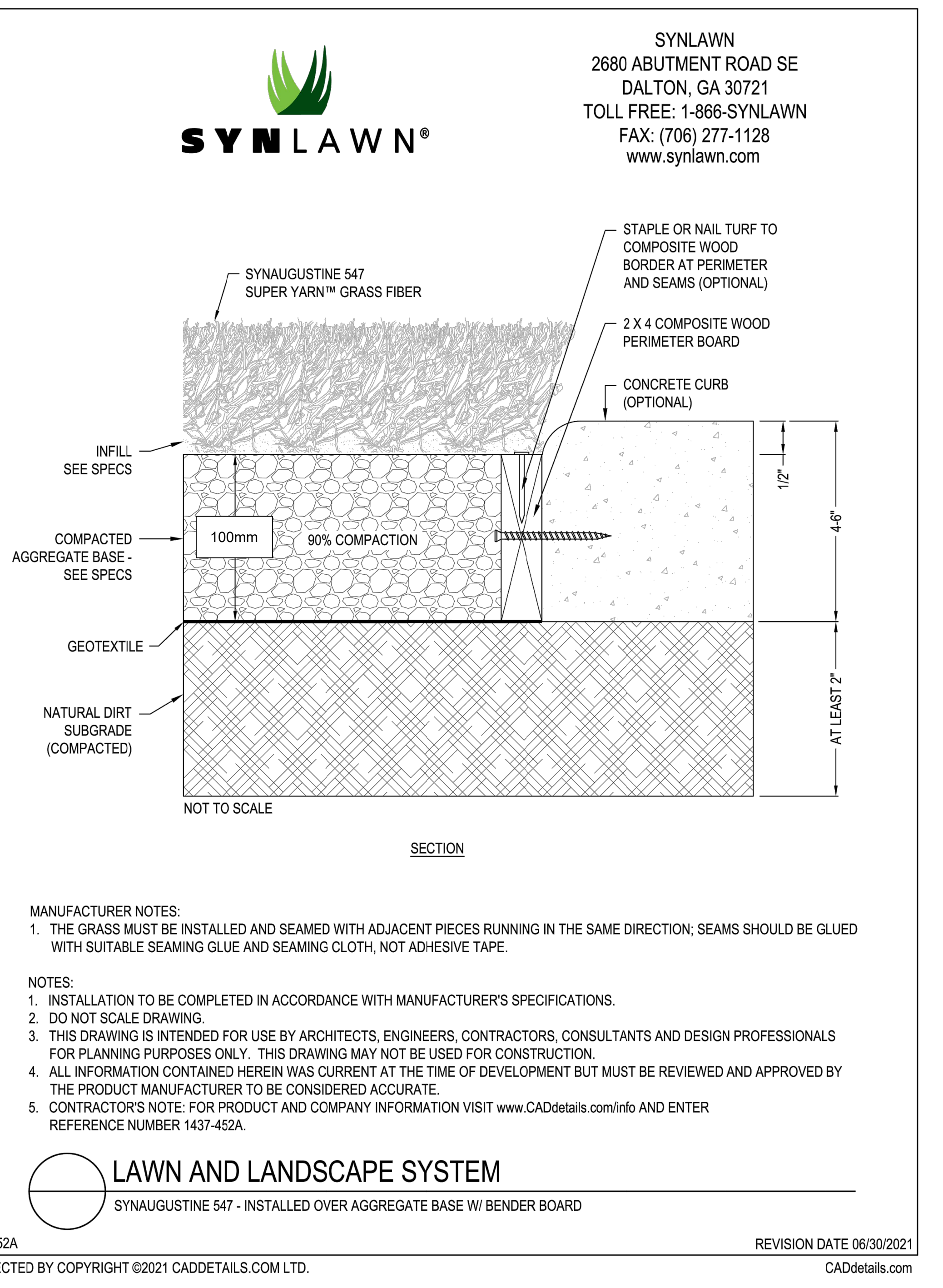


1 STORAGE SHED
L1.3 N.T.S.

- NOTES:**
- ALL DIMENSIONS ARE IN MILLIMETERS. DO NOT SCALE DRAWING.
 - EXISTING GRANULAR BASE MATERIAL ON SITE MAY BE REUSED FOR NEW PAVING INSTALLATIONS, PROVIDED THAT MATERIAL IS INSPECTED AND APPROVED IN WRITING BY A GEOTECHNICAL ENGINEER.
 - AGGREGATE MATERIALS SHALL CONFORM TO OPSS 1001, OPSS 1003 AND OPSS 1010.
 - ASPHALT MATERIALS SHALL CONFORM TO OPSS 1150.
 - TACK COAT SHALL BE AN ASPHALTIC EMULSION SS-1, DILUTED WITH AN EQUAL VOLUME OF WATER, CONFORMING TO OPSS 1103.
 - MIX, HANDLE, PLACE AND COMPACT ASPHALT IN ACCORDANCE WITH OPSS 310.
 - SPECIFIED DEPTHS OF MULCH, SAFETY SURFACE AND TOPSOIL ARE DEPTHS AFTER SETTLEMENT. SPECIFIED DEPTH OF ASPHALT AND GRANULAR BASES IS COMPACTED DEPTH.
 - ENSURE THAT THERE IS A SMOOTH TRANSITION BETWEEN HARD AND SOFT SURFACES (ASPHALT TO SOG AND ASPHALT TO MULCH).
 - CONTRACTOR SHALL PROVIDE GEOTECHNICAL ENGINEER'S WRITTEN APPROVAL OF MATERIALS, COMPACTION AND DENSITY TESTING RESULTS, AS WELL AS VERIFICATION OF DEPTHS, FOR FILL, SUBGRADE, GRANULAR SUBBASE, GRANULAR BASE, ASPHALT BINDER COURSE, AND ASPHALT SURFACE COURSE PRIOR TO PROCEEDING TO EACH SUBSEQUENT COURSE.
- ASPHALT PATCHING AND SEAMS AT EXISTING ASPHALT NOTES**
- EXISTING PAVEMENT SHALL BE REMOVED OVER ANY UNDERMINING. ALL VERTICAL EDGES TO BE TACK COATED WITH SS-1 EMULSIFIED ASPHALT TO OPSS 310. SURFACE OF ALL EDGES TO BE SEALED WITH A BEAD OF HOT RUBBERIZED ASPHALT.



3 ASPHALT PAVING - LIGHT DUTY
L1.3 N.T.S.



2 ARTIFICIAL TURF
L1.3 N.T.S.

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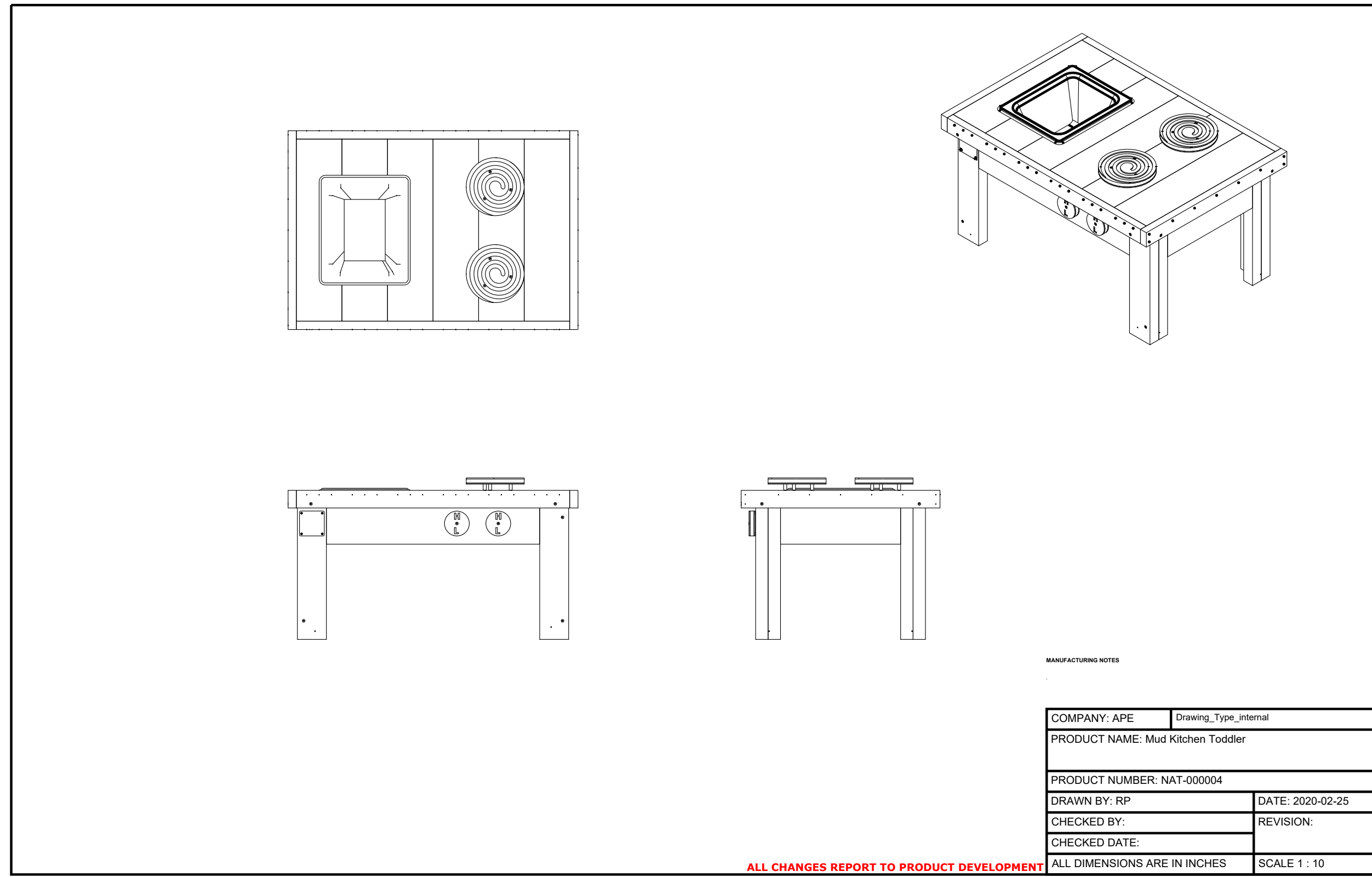
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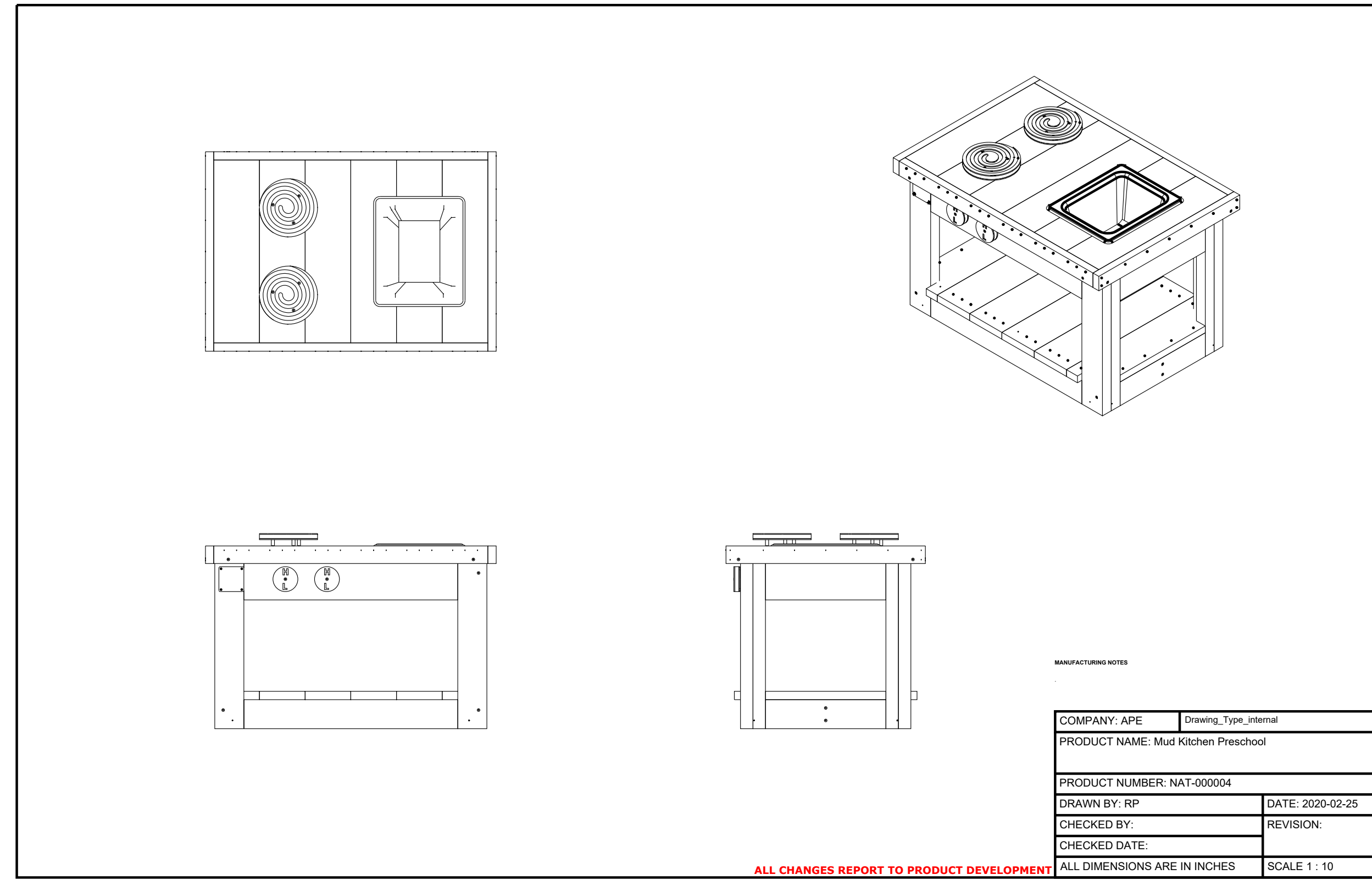
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Proposed Landscape Plan Details II

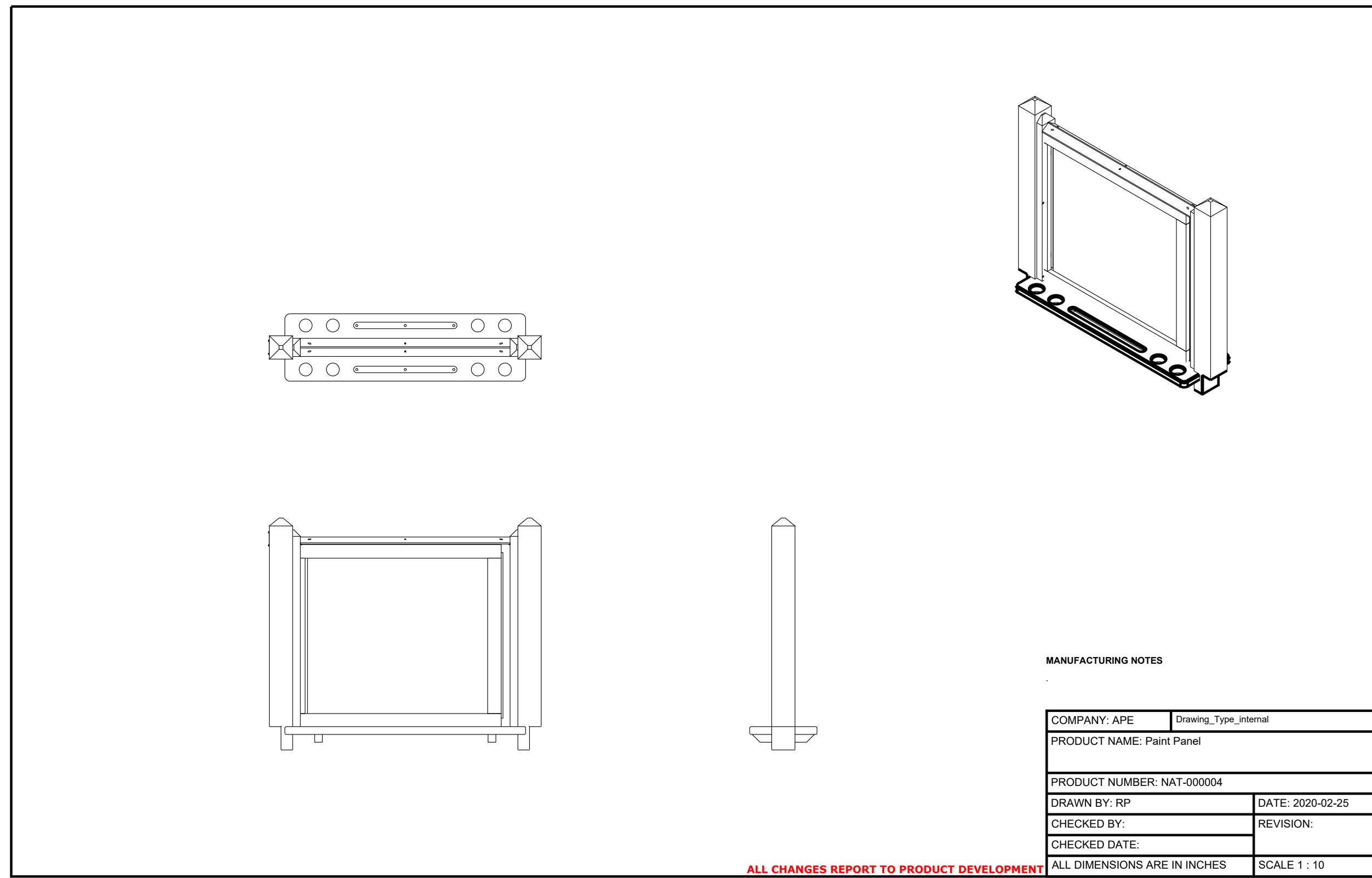
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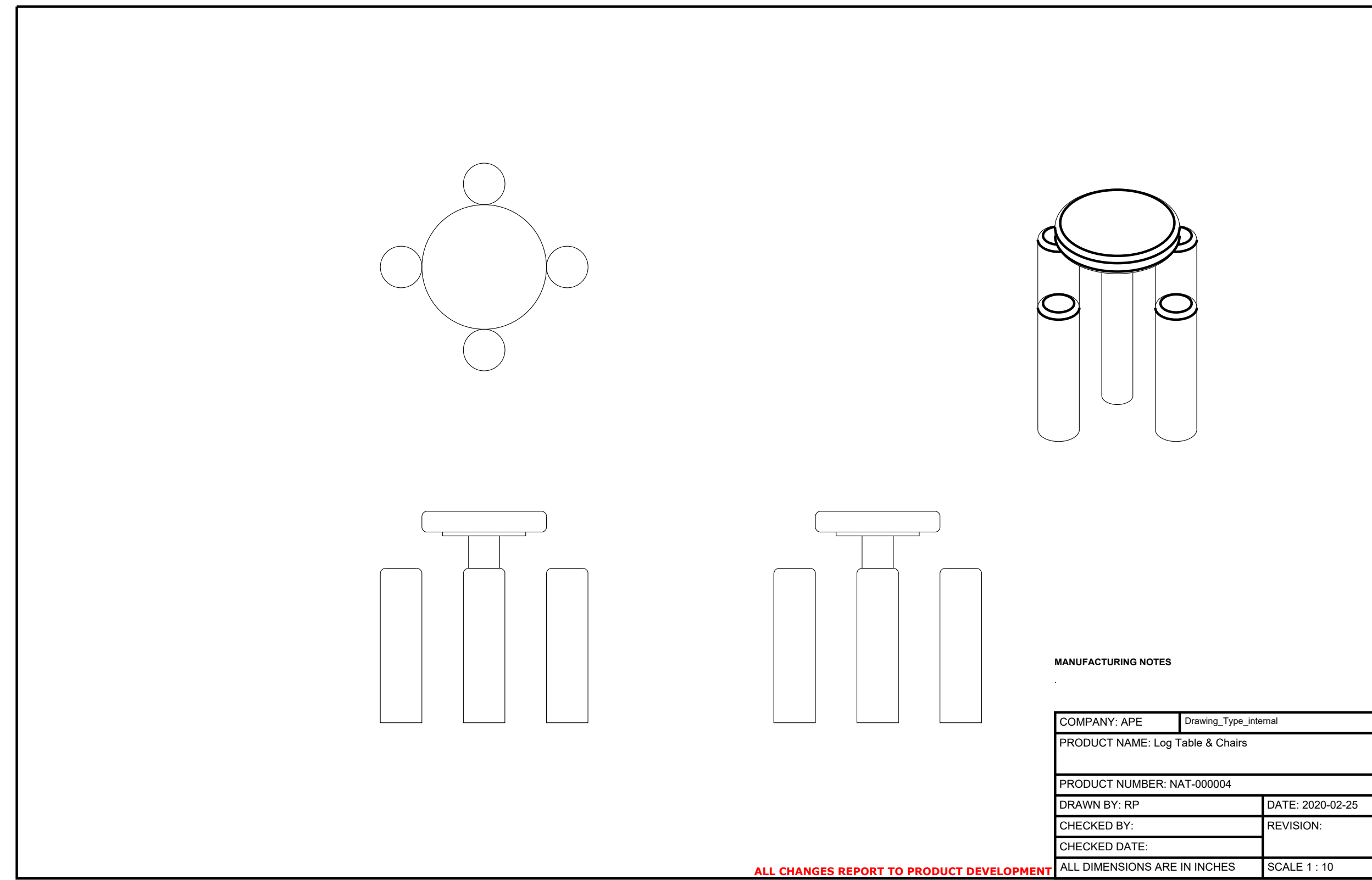
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L1.4 N.T.S.



2 MUD KITCHEN - PRESCHOOL
L1.4 N.T.S.



3 PAINT/ CHALKBOARD PANEL
L1.4 N.T.S.



4 LOG TABLE AND CHAIRS
L1.4 N.T.S.

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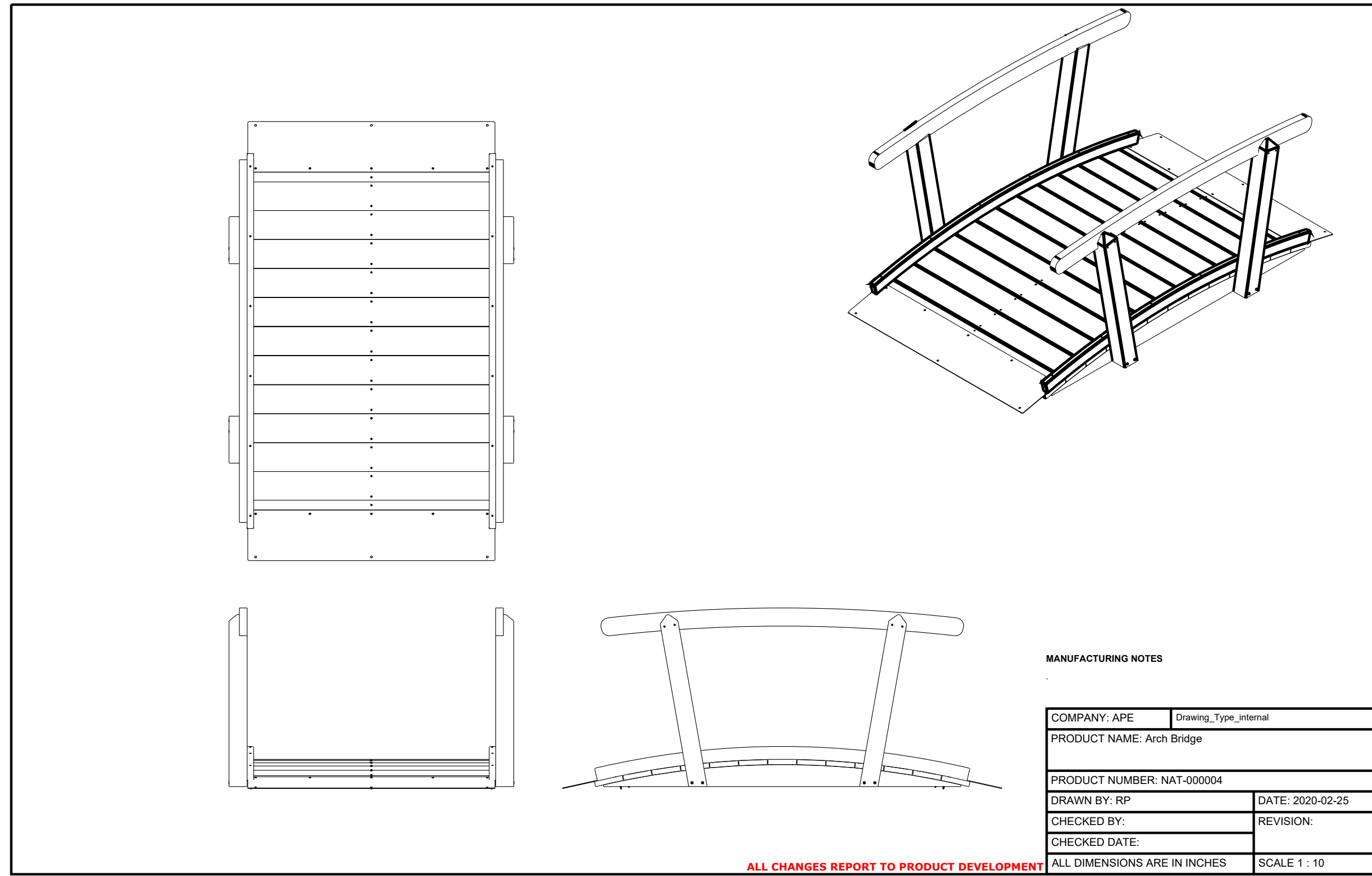
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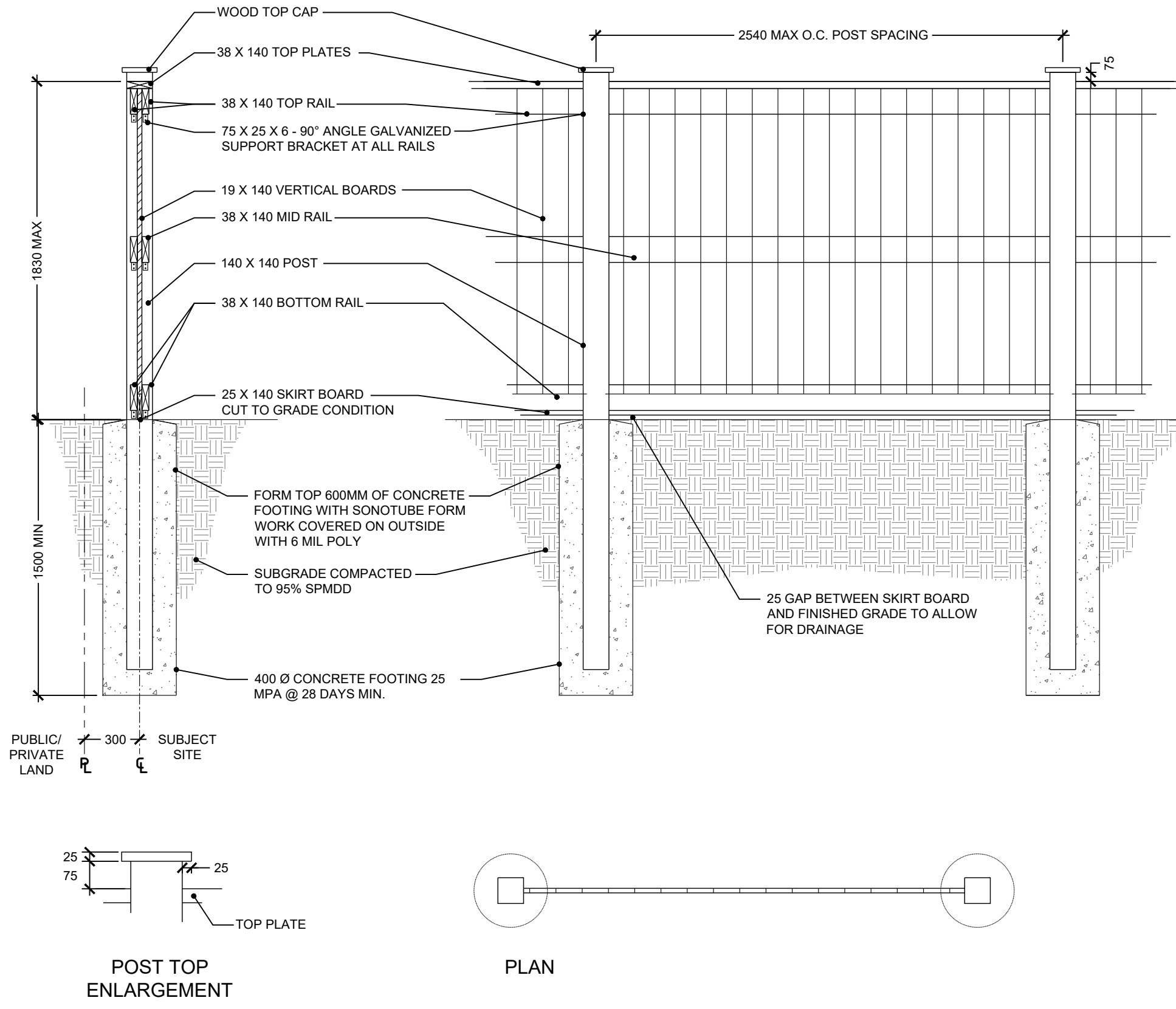
PROJECT CODE: 22_07
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STATUS: Tender Documents

Proposed Landscape Plan Details III





1 ARCH BRIDGE
L1.5 N.T.S.

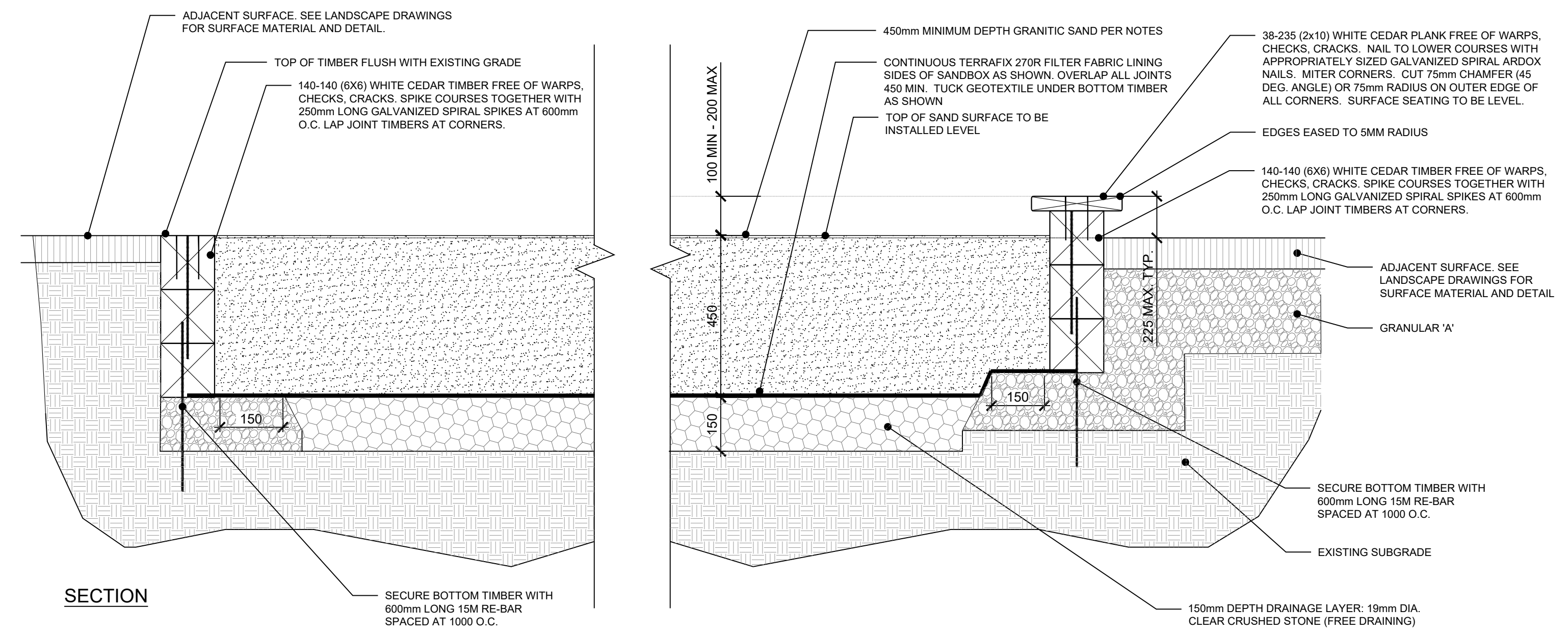


2 1.8m SOLID WOOD PRIVACY FENCE
L1.5 N.T.S.

- NOTES:
1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
 2. STEP FENCING PANELS 50mm MIN AND 150mm MAX AT POSTS AS REQUIRED BY GRADE CONDITIONS.
 3. ALL MATERIALS, COMPONENTS AND WORKMANSHIP TO CONFORM TO OBC AND LOCAL BY-LAWS.
 4. ALL LUMBER SIZES ARE ACTUAL RATHER THAN NOMINAL.
 5. ALL WOOD SHALL BEAR GRADING STAMP OF C.L.S. CERTIFIED AGENCY.
 6. WARRANTY: THE FENCE SHALL BE GUARANTEED FOR THREE YEARS AS FOLLOWS: 5mm/m ON PLUMB OF POSTS AND LEVEL OF VERTICAL BOARDS. GAPS BETWEEN VERTICAL BOARDS SHALL NOT EXCEED 6mm. VERTICAL BOARDS SHALL BE TIGHT AND FREE OF RATTLING.
 7. WOOD:
 - 7.1. ALL WOOD SHALL BE PRESSURE TREATED SELECTED FOR GOOD APPEARANCE AND FREE OF WANE AND BARK POCKETS.
 - 7.2. ALL TORN GRAIN AND SURFACE STAIN SHALL BE ELIMINATED BY SANDING OR PLANING.
 - 7.3. MEMBERS WITH HEAVY KNOTS AND/OR SAP STAIN SHALL BE WELL DISTRIBUTED THROUGHOUT THE INSTALLATION.
 - 7.4. MOISTURE CONTENT OF WOOD SHALL NOT EXCEED 20% AT TIME OF CONSTRUCTION.
 - 7.5. VERTICAL/HORIZONTAL BOARDS:
 - 7.5.1. TO NLGA 204A OR BETTER "SELECT KNOTTY" GRADE.
 - 7.5.2. TO NLGA 131B#1 STRUCTURAL POST AND TIMBER.
 - 7.6. POSTS
 - 7.6.1. SHALL BE PLUMB WITHIN 5mm/m ABOVE GRADE.
 - 7.6.2. SHALL BE PLUMB WITHIN 5mm/m ABOVE GRADE.
 8. FASTENERS
 - 8.1. ALL FASTENERS INCLUDING ARDOX NAILS, LAG SCREWS, BOLTS, NUTS, WASHERS AND BRACKETS SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE TO CSA STANDARD G164. LAG SCREWS AND BOLTS SHALL CONFORM TO ASTM A307 COUNTER-SINK ALL LAG SCREWS AND BOLTS AND DRIVE ALL NAIL HEADS BELOW SURFACE OF WOOD.
 - 8.2. ALL ARDOX NAILS TO BE EVENLY SPACED AND SET NOT LESS THAN 25mm FROM EDGE OF ANY WOOD MEMBER.
 - 8.3. USE SUFFICIENT SIZE AND QUANTITY OF FASTENERS TO ENSURE A STABLE AND SECURE STRUCTURE.

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- NOTES:
1. All dimensions are in millimeters. Do not scale drawing.
 2. Specified depth of mulch and sand are depths after settlement. Specified depth of granulars and granular bases is compacted depth.
 3. All logs to be installed with seating surface level end to end.
 4. All timber, lumber, and logs to be free from warps, checks, and cracks.
 5. All spikes, nails and other fasteners to be galvanized.
 6. Granitic sand:
 - 6.1. Consists of sub-angular or slightly rounded grains of naturally weather granitic sand, washed to remove all organics, silt, and clay contaminants; with a pH of 5.8 to 6.2, and consisting of 80-92% coarse/medium sand with particle diameter of 0.25 to 1.0mm.
 - 6.2. Acceptable granitic sand products and suppliers: JMT sand mixes playground sand (TDS-2 washed) available through JMT sand mixes (division of Brent Quarries) 705-783-8555 or Hutcheson granitic playground sand available through Hutcheson sand mixes 1-800-461-5521.

3 SAND PLAY WITH TIMBER EDGING
L1.5 N.T.S.

WORKSHOP

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CSV L'Harmonie Daycare Addition
158 Bridgeport Road East
Waterloo



PROJECT CODE: 22_07
SCALE: AS SHOWN
DATE: 24 May, 2023
STATUS: Tender Documents

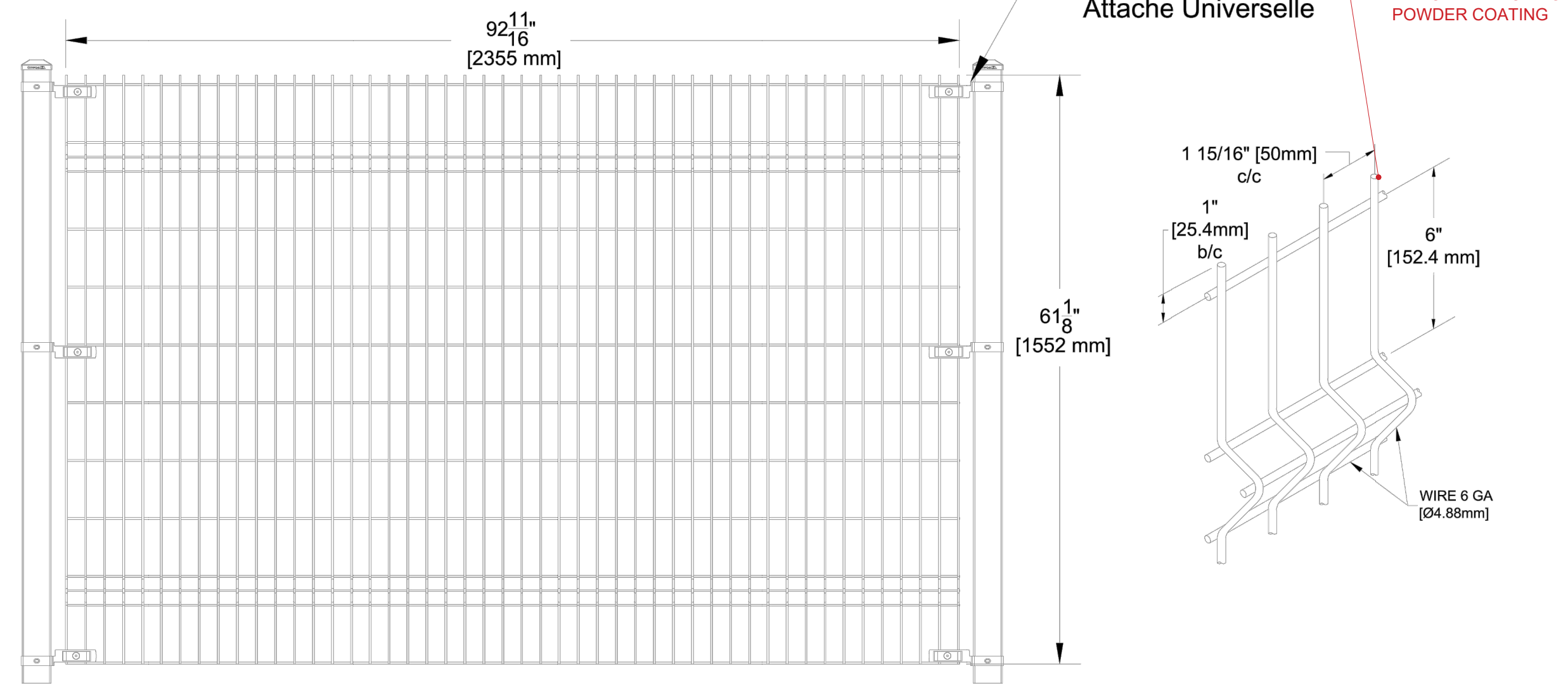
Proposed Landscape Plan Details IV

drawing number
L1.5

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OMEGA ARCHITECTURAL PANELS MOUNTED ON SQUARE POSTS (HEIGHT 5')
 PANNEAUX OMEGA ARCHITECTURALE SUR POTEAUX CARRÉS (GRANDEUR 5')

Panel / Panneau 5' (33 lb/15 kg)



Omega II Fence Systems
 1735, Blvd. St-Elzéar West
 Laval, Quebec
 H7L 3N6

Tel: 450-686-9600
 1-800-836-6342
 Fax: 450-681-5318
 www.omegafence.com

WEB

REVISION : 05/21

1 OMEGA ARCHITECTURAL 1552mm HEIGHT FENCE
 L1.6 N.T.S.

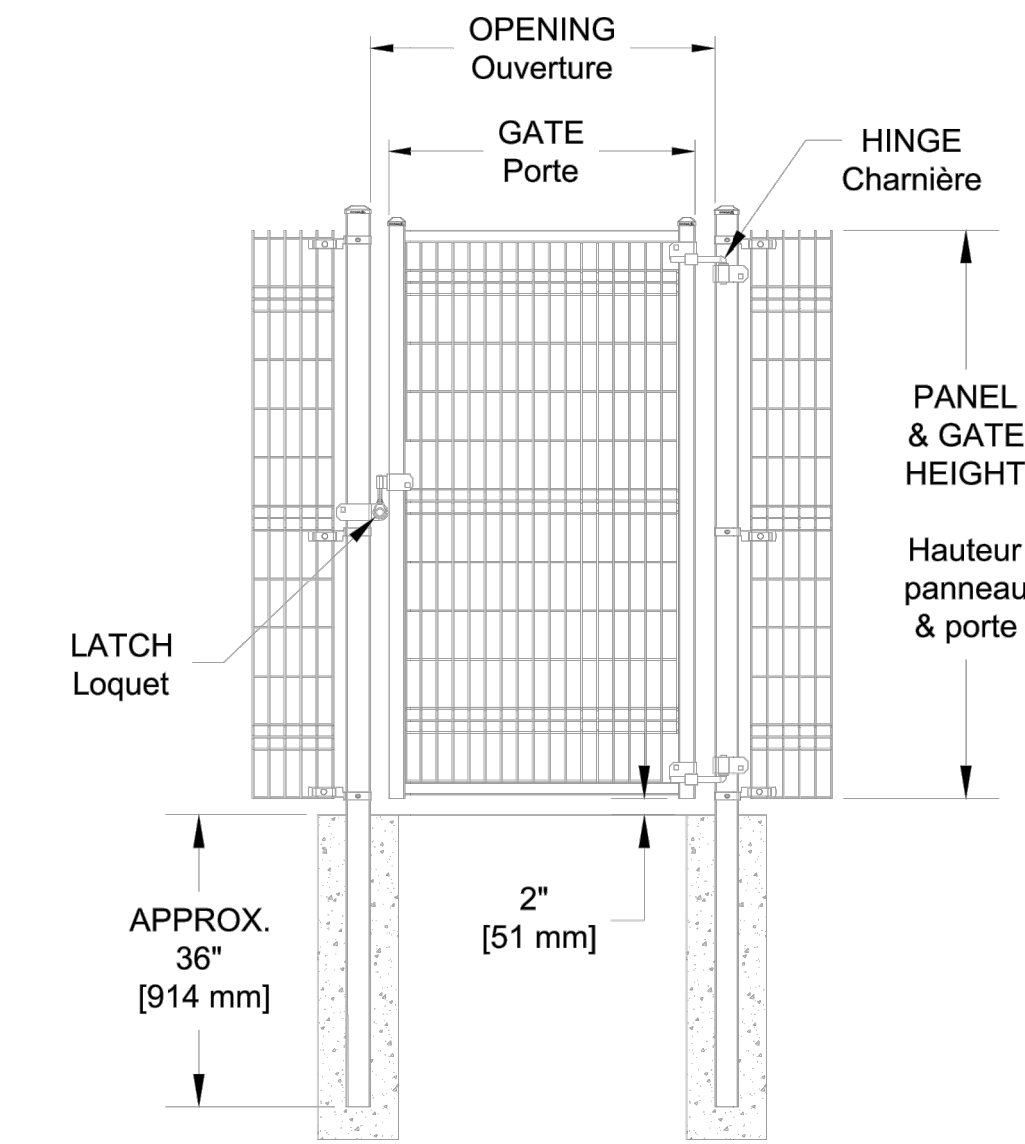
OMEGA ARCHITECTURAL SINGLE SWING GATE
 BARRIÈRE OMEGA ARCHITECTURALE À BATTANT SIMPLE

GATE POST DIMENSIONS

GATE HEIGHT	OPENING OF A SINGLE LEAF OVER	OPENING OF A SINGLE LEAF UP TO	POST
4'-0"	9'	11'	3" x 3" 11 ga
4'-0"	11'	16'	4" x 4" 11ga
4'-0"	16'	19'	6" x 6" 3/16"
6'-0"	3'	9'	3" x 3" 11 ga
6'-0"	9'	13'	4" x 4" 11ga
6'-0"	13'	19'	6" x 6" 3/16"
8'-0"	3'	7'	3" x 3" 11 ga
8'-0"	7'	9'	4" x 4" 11ga
8'-0"	9'	19'	6" x 6" 3/16"

~~DIMENSION DES POTEAUX DE PORTE~~

HAUTEUR DE PORTE	OUVERTURE D'UN SIMPLE BATTANT AU DESSUS	OUVERTURE D'UN SIMPLE BATTANT JUSQU'À	POTEAU
4'-0"	3'	11'	3" x 3" 11 ga
4'-0"	11'	16'	4" x 4" 11ga
4'-0"	16'	19'	6" x 6" 3/16"
6'-0"	3'	9'	3" x 3" 11 ga
6'-0"	9'	13'	4" x 4" 11ga
6'-0"	13'	19'	6" x 6" 3/16"
8'-0"	3'	7'	3" x 3" 11 ga
8'-0"	7'	9'	4" x 4" 11ga
8'-0"	9'	19'	6" x 6" 3/16"



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WEB

REVISION : 12/21

2 OMEGA ARCHITECTURAL 1552mm HEIGHT SWING GATES
 L1.6 N.T.S.

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Rev	Description	Date
1	Issued for 60% Review	22 Nov, 2022
2	Issued for Site Plan Approval	21 Dec, 2022
3	Re-Issued for Site Plan Approval	19 Jun, 2023
4	Issued for Permit/Tender	26 July, 2024

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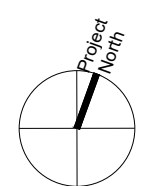


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 Addition
 158 Bridgeport Road East
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Proposed Landscape Plan
 Details V



drawing number

L1.6