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YORK REGION PARAMEDIC SERVICES

9601 ISLINGTON AVENUE
WOODBRIDGE, ONTARIO
L4H 3G7

RE-ISSUED FOR TENDER : 07MAY21

LIST OF DRAWINGS - PROJECT #20-1025

INTERIOR DESIGN DRAWINGS:

I-000	GENERAL NOTES
I-100	DEMOLITION PLAN
I-100.1	DEMOLITION CEILING PLAN
I-101	PARTITION PLAN
I-101.1	PARTITION TYPES
I-102	REFLECTED CEILING PLAN
I-103	POWER & COMMUNICATION PLAN
I-104	FLOOR FINISH PLAN
I-105	WALL FINISH PLAN
I-106	FURNITURE PLAN
I-107	RESERVED
I-108	MILLWORK DETAILS
I-108.1	MILLWORK DETAILS
I-108.2	MILLWORK DETAILS
I-108.3	MILLWORK DETAILS

MECHANICAL DRAWINGS:

M-1.0	MECHANICAL LEGEND, DETAILS AND SPECIFICATIONS
M-1.1	MECHANICAL SPECIFICATIONS - 1 OF 5
M-1.2	MECHANICAL SPECIFICATIONS - 2 OF 5
M-1.3	MECHANICAL SPECIFICATIONS - 3 OF 5
M-1.4	MECHANICAL SPECIFICATIONS - 4 OF 5
M-1.5	MECHANICAL SPECIFICATIONS - 5 OF 5
M-2.0	HVAC LAYOUT
M-3.0	PLUMBING & FIRE PROTECTION LAYOUT

ELECTRICAL DRAWINGS:

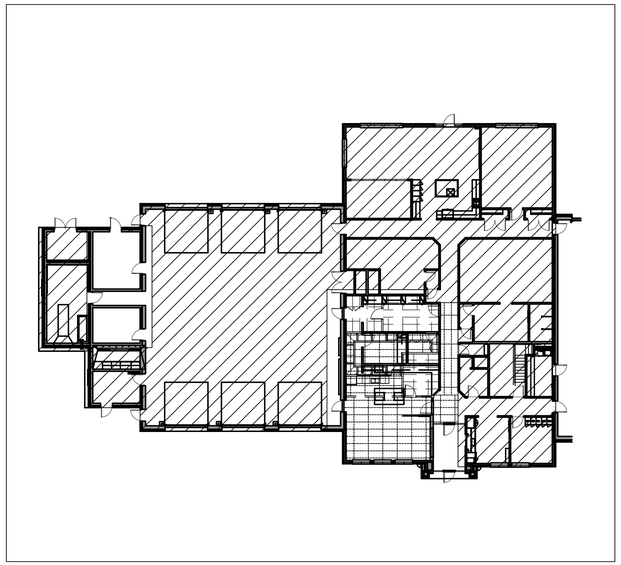
E-1.0	ELECTRICAL LEGEND AND SPECIFICATIONS
E-2.0	REFLECTED CEILING PLAN
E-3.0	POWER AND SYSTEMS PLAN

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

ABBREVIATIONS

ABV	ABOVE
ADJ	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
ALT	ALTERNATE
CLG	CEILING
CLR	CLEAR
CONT	CONTINUOUS
CT	CERAMIC TILE
CTR	CENTER
DBL	DOUBLE
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DR	DOOR
DWG	DRAWING
E	EAST
EA	EACH
ELEC	ELECTRIC
EQ	EQUAL
EQUIP	EQUIPMENT
EX	EXISTING
FIN	FINISH
FLR	FLOOR
FLUOR	FLUORESCENT
FT	FEET (FOOT)
GAL	GALLON
GALV	GALVANIZED
GL	GLASS
GND	GROUND
GWB	GYPSUM WALL BOARD
HT	HEIGHT
MAX	MAXIMUM
MECH	MECHANICAL
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
N	NORTH
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
P	PAINT
PLAM	PLASTIC LAMINATE
PR	PAIR
PTD	PAINTED
QTY	QUANTITY
REQD	REQUIRED
RM	ROOM
S	SOUTH
SCHED	SCHEDULE
SECT	SECTION
SF	SQUARE FEET
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STOR	STORAGE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VCT TILE	VINYL COMPOSITION
VERT	VERTICAL
W	WEST
W/	WITH
W/O	WITHOUT
WC	WATERCLOSET
WD	WOOD
WT	WEIGHT
YD	YARD

KEY PLAN (N.T.S)



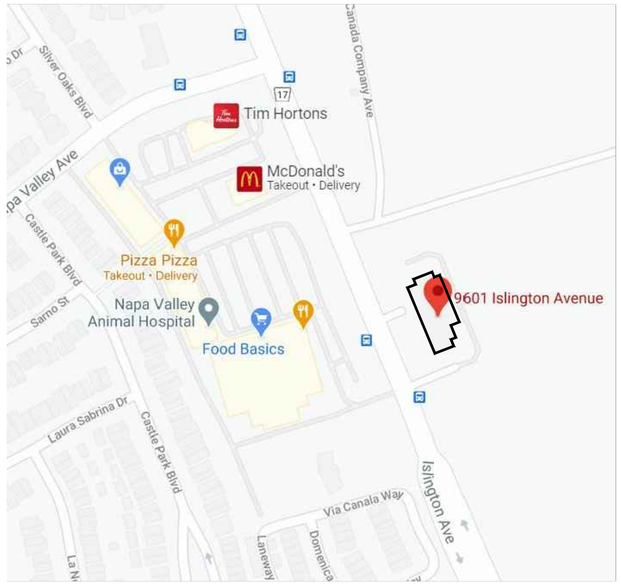
ONTARIO BUILDING CODE CLASSIFICATION
2012 O.B.C. 3.2.2
GROUP D
SPRINKLERED

AREA OF RENOVATIONS
PART GROUND FLOOR, 107 SQ.M. (1,155 SQ. FT.)

AREAS OF RENOVATION

N.I.C

SITE PLAN (N.T.S)



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York Region

no.	date	by	description
01	04MAY21	SJB	REVISED PER CLIENT

REVISIONS

no.	date	by	description
02	07MAY21	SJB	RE-ISSUED FOR TENDER
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ISSUED

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Association of Registered Interior Designers of Ontario

project title

YORK REGION
PARAMEDIC SERVICES
9601 ISLINGTON AVENUE
WOODBRIDGE, ON L4H 3G7

drawing title

GENERAL NOTES

date	03DEC20
drawn by	JF/SJB
checked by	SJB
scale	1:100
project no.	20-1025
cad file:	20-1025_I-100
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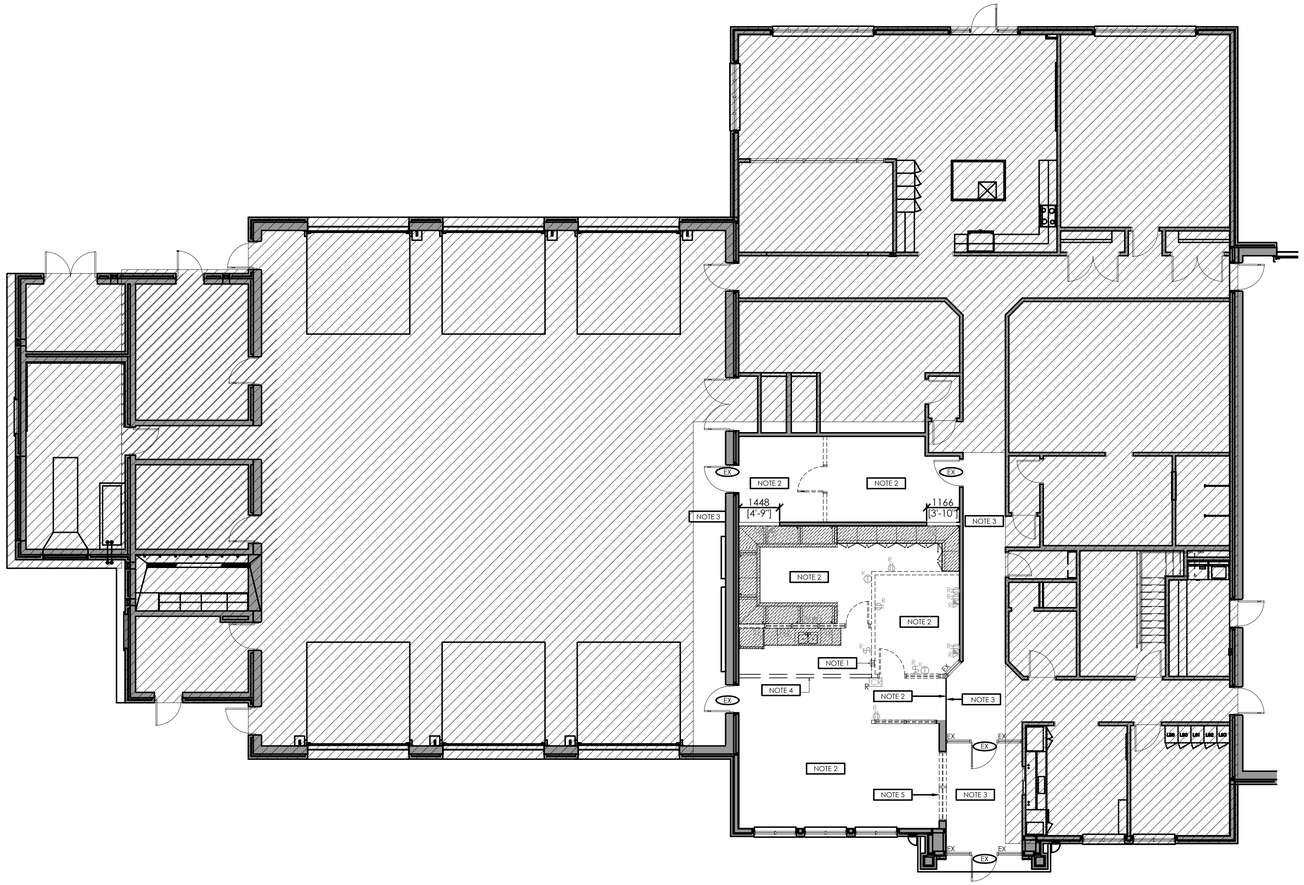

DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING PARTITION TO REMAIN
	DENOTES EXISTING PARTITION TO BE REMOVED
EX	DENOTES EXISTING DOOR AND FRAME TO REMAIN
EX	DENOTES EXISTING DOOR AND FRAME TO BE REMOVED
EX	DENOTES EXISTING SCREEN/SIDELIGHT AND FRAME TO REMAIN
	DENOTES EXISTING SCREEN/SIDELIGHT AND FRAME TO BE REMOVED
	DENOTES EXISTING MILLWORK TO BE REMOVED
R	DENOTES EXISTING WALL MOUNTED DUPLEX OUTLET TO BE REMOVED
R	DENOTES EXISTING WALL MOUNTED VOICE/DATA OUTLET TO BE REMOVED
R	DENOTES EXISTING CARD READER TO BE REMOVED AND RETAINED FOR RE-USE
R	DENOTES EXISTING WALL MOUNTED THERMOSTAT TO BE REMOVED
R	DENOTES EXISTING SWITCH TO BE REMOVED
	AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING SEMI-RECESSED FIRE EXTINGUISHER CABINET TO BE REMOVED AND RETAINED FOR RE-INSTALLATION. REFER TO ENGINEERING DWGS.
NOTE 2	ALL EXISTING FLOOR FINISHES, WALL BASE AND ALL EXISTING ADHESIVES TO BE REMOVED. CONTRACTOR TO PATCH & REPAIR FLOOR TO MAKE GOOD, LEVEL AND SMOOTH TO RECEIVE NEW FINISH
NOTE 3	EXISTING FLOOR FINISHES TO REMAIN
NOTE 4	EXISTING CEILING BULKHEAD TO REMAIN
NOTE 5	EXISTING WINDOW TO BE REMOVED AND TO BE FILLED IN. REFER TO PARTITION PLAN FOR DETAILS.

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

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01	07DEC20	JF/SJB	ISSUED TO ENGINEERS

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DEMOLITION PLAN

date: 03DEC20		project no.: 20-1025
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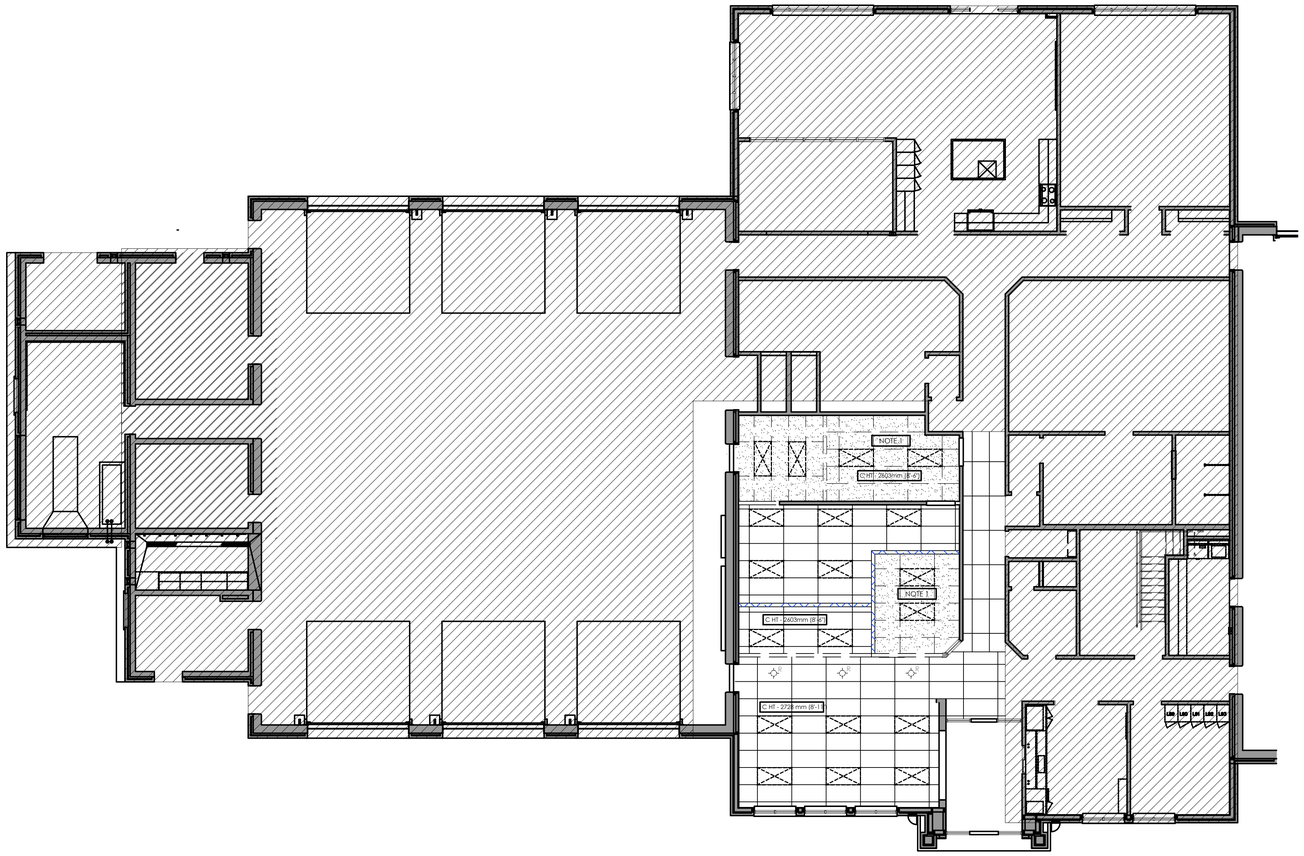

CEILING DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING BASE BUILDING STANDARD LUMINARIES TO BE REMOVED
	DENOTES AREA OF EXISTING T-BAR CEILING TO BE REMOVED
	INDICATES AREA OF EXISTING T-BAR CEILING TO BE PATCHED AND REPAIRED TO MAKE GOOD WHERE PARTITION WAS REMOVED. REFER TO REFLECTED CEILING PLAN
	DENOTES EXISTING RECESSED INCANDESCENT DOWN LIGHT TO BE REMOVED
	AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING T-BAR CEILING TO BE REMOVED. CONTRACTOR TO MAKE GOOD TO RECEIVE NEW T-BAR CEILING. REFER TO DWG I-102

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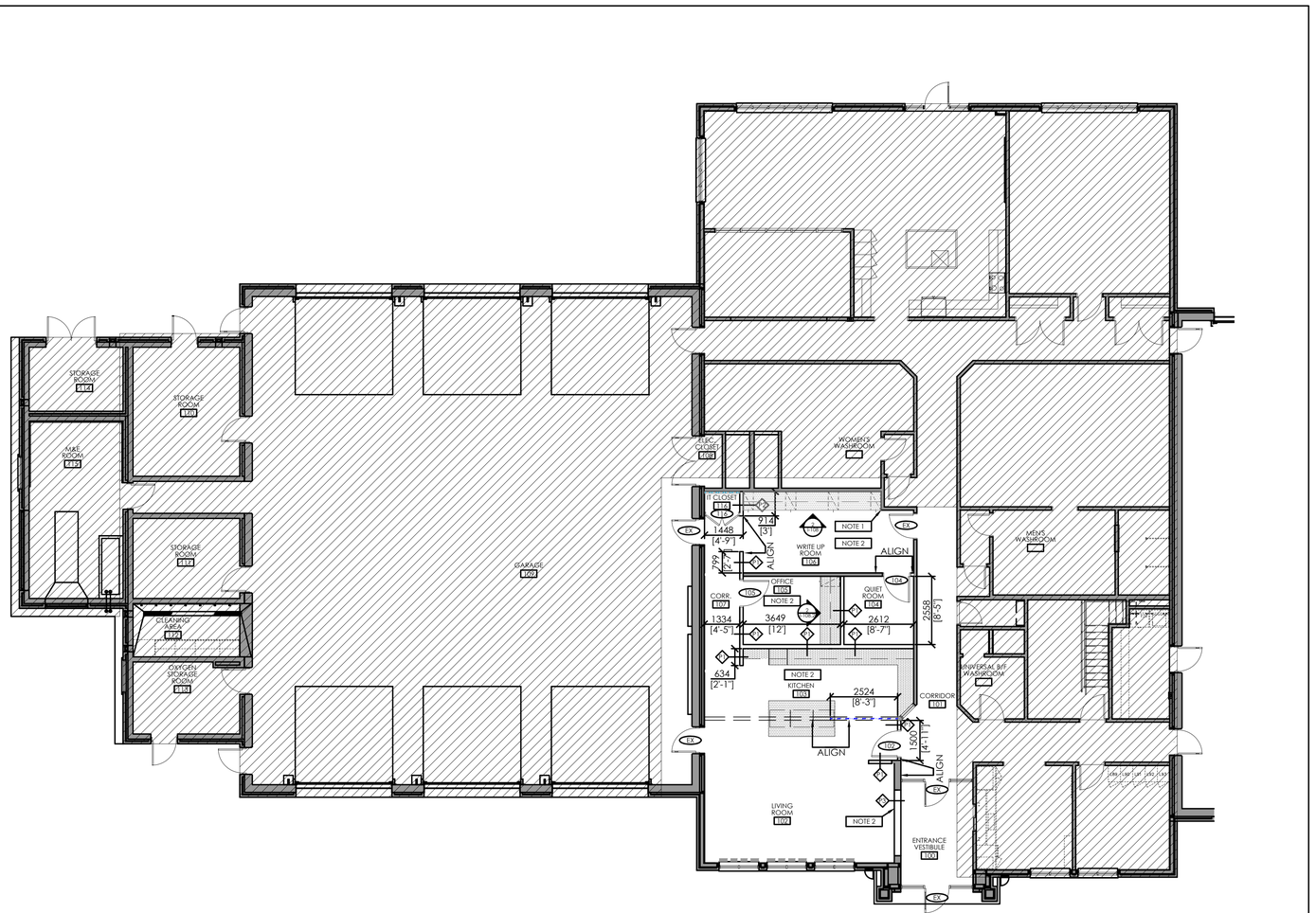
REFLECTED CEILING DEMOLITION PLAN

date: 03DEC20		project no.: 20-1025
drawn by: JF/SJB		cad file: 20-1025_I-100
checked by: SJB		drawing no.: I-100.1
scale: 1:100		



PARTITION LEGEND

SYMBOL	DETAIL	DESCRIPTION
		DENOTES EXISTING PARTITION TO REMAIN
		NEW PARTITION ASSEMBLY "P1" - 92mm METAL STUDS AT 400mm O.C. - ONE LAYER 16mm GYPSUM BOARD BOTH SIDES - SOUND ATTENUATION BLANKET - SLAB TO U/S OF CEILING - FOIL BACKED (BOTH SIDES) RIGID INSULATION ABOVE CEILING TO U/S OF DECK (CERTAPRO THERMAL FOIL FACED BATTS BY CERTAINTEED CORP. OR EQUAL) ****IN WET AREA (KITCHEN 103), CONTRACTOR TO SUBSTITUTE FOR 16mm CEMENT BOARD**
		NEW PARTITION ASSEMBLY "P2" - 92MM METAL STUDS AT 400MM O.C. - ONE LAYER 16MM GYPSUM BOARD BOTH SIDES - SOUND ATTENUATION BLANKET - SLAB TO U/S OF CEILING
		NEW PARTITION ASSEMBLY "P3" - PARTITION TO FILL IN OPENING FROM EXISTING WINDOW - TO MATCH EXISTING STANDARDS / ADJACENT PARTITION
		NEW MILLWORK REFER TO MILLWORK DRAWINGS AS INDICATED ON PLANS CONTRACTOR TO PROVIDE BLOCKING, AS REQUIRED.
		DENOTES LOCATION OF NEW DRYWALL BULKHEAD REFER TO REFLECTED CEILING PLAN 1-102
		DENOTES LOCATION OF NEW WINDOW COVERING; BLACKOUT SHADE: SUNPROJECT / ALTEX TEXOPAQUE 6000 BLACKOUT COL: 6000-06D WINDOW SHADE: SUNPROJECT SUNSCREEN COL: 10103-05 LIMETONE GREY
		DENOTES LOCATION OF NEW PLYWOOD BACKBOARD REFER TO ENGINEERING DWGS FOR DETAILS
EX		EXISTING DOOR & FRAME TO REMAIN
#116		NEW DOOR & FRAME REFER TO DOOR SCHEDULE
JSM		JOB SITE MEASUREMENT
AFF		ABOVE FINISHED FLOOR
CCD		CRITICAL CLEAR DIMENSION
		AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	MILLWORK SHALL ALIGN WITH EDGE OF EXISTING PARTITION
NOTE 2	CONTRACTOR SHALL INSTALL BLOCKING TO ENSURE ADEQUATE SUPPORT FOR ALL NEW MILLWORK AND TV

REFER TO SPECIFICATION CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION

DOOR SCHEDULE

SYMBOL	DESCRIPTION
#102 JSM MATCH EXISTING 965 [3'-2"]	NEW DOOR #102 DOOR: *SOLID CORE WOOD C/W VISION PANEL *STAIN FINISH TO MATCH EXISTING *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *DOOR STOP GLASS INSERT / VISION PANEL: *TO CONFORM TO OBC 3.8.3.3. (14) *TEMPERED GLASS INSERT 229mm (9") X 1067mm (42") *BOTTOM LESS OR EQUAL TO 900mm AFF, EDGE OF THE PANEL NOT MORE THAN 250mm IN FRONT OF THE LATCH SIDE
#104 JSM MATCH EXISTING 965 [3'-2"]	NEW DOOR #104 DOOR: *SOLID CORE WOOD C/W VISION PANEL *STAIN FINISH TO MATCH EXISTING *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *DOOR STOP *OCCUPANCY HARDWARE: THE BROTHERS MARKLE INC. DANSIGN PAPERFLEX C/W OCCUPIED/VACANT SLIDER GLASS INSERT / VISION PANEL: *TO CONFORM TO OBC 3.8.3.3. (14) *TEMPERED GLASS INSERT 229MM (9") X 1067MM (42") *BOTTOM LESS OR EQUAL TO 900MM AFF, EDGE OF THE PANEL NOT MORE THAN 250MM IN FRONT OF THE LATCH SIDE
#105 JSM MATCH EXISTING 965 [3'-2"]	NEW DOOR #105 DOOR: *SOLID CORE WOOD C/W VISION PANEL *STAIN FINISH TO MATCH EXISTING *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, STOREROOM FUNCTION, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *DOOR STOP *CARD ACCESS READER, REFER TO DWG I-103 AND ENGINEERING DRAWINGS GLASS INSERT / VISION PANEL: *TO CONFORM TO OBC 3.8.3.3. (14) *TEMPERED GLASS INSERT 229MM (9") X 1067MM (42") *BOTTOM LESS OR EQUAL TO 900MM AFF, EDGE OF THE PANEL NOT MORE THAN 250MM IN FRONT OF THE LATCH SIDE
#116 JSM MATCH EXISTING 410 [1'] 410 [1']	NEW DOUBLE DOORS #116 DOOR: *EACH DOOR TO BE 610MM (24")W *HOLLOW METAL *PAINT FINISH *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, STOREROOM FUNCTION, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *MANUAL FLUSHBOLT ON TOP/BOTTOM OF INACTIVE LEAF *CARD ACCESS READER, REFER TO DWG I-103 AND ENGINEERING DRAWINGS

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PARTTION PLAN

date: 03DEC20		project no.: 20-1025	
drawn by: JF/SJB		cad file: 20-1025_I-101	
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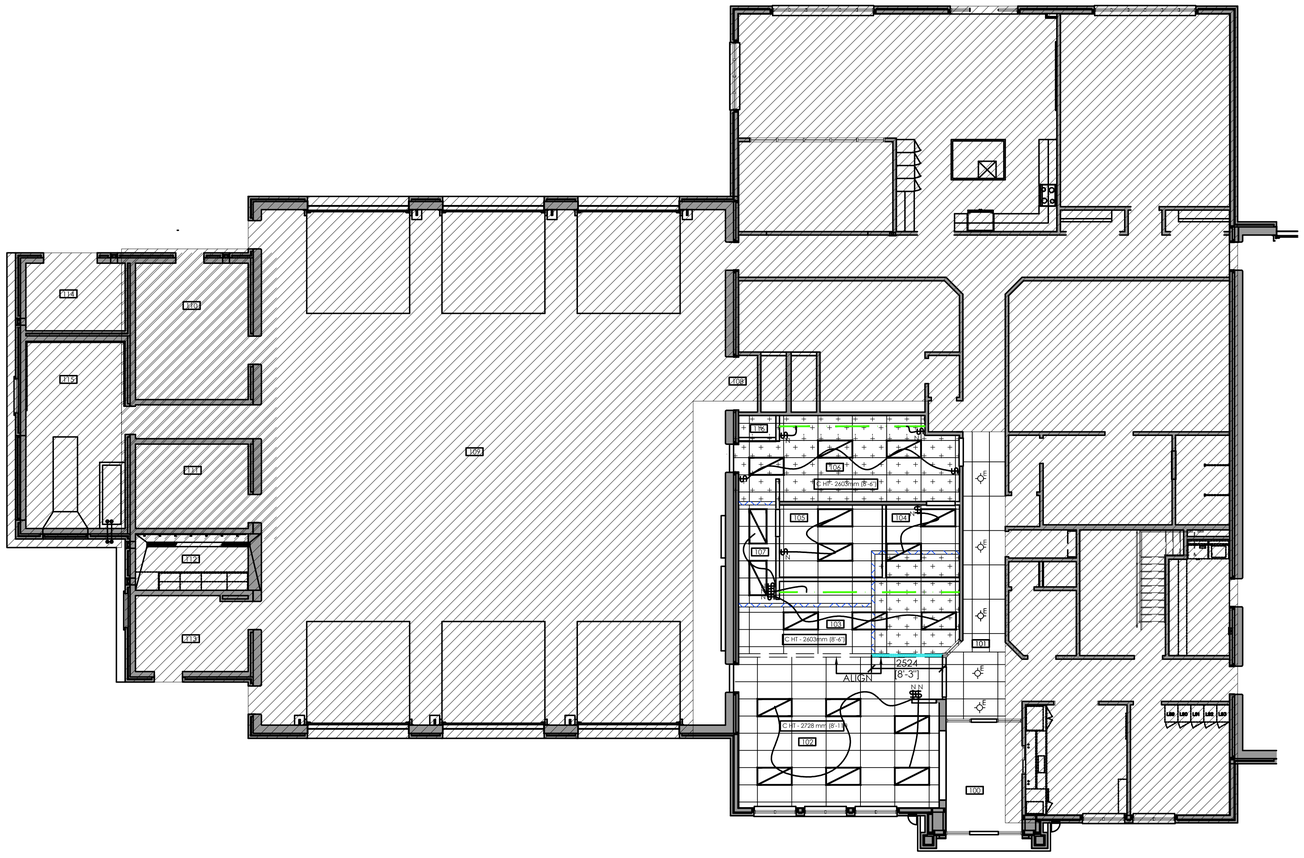
scale: 1:100			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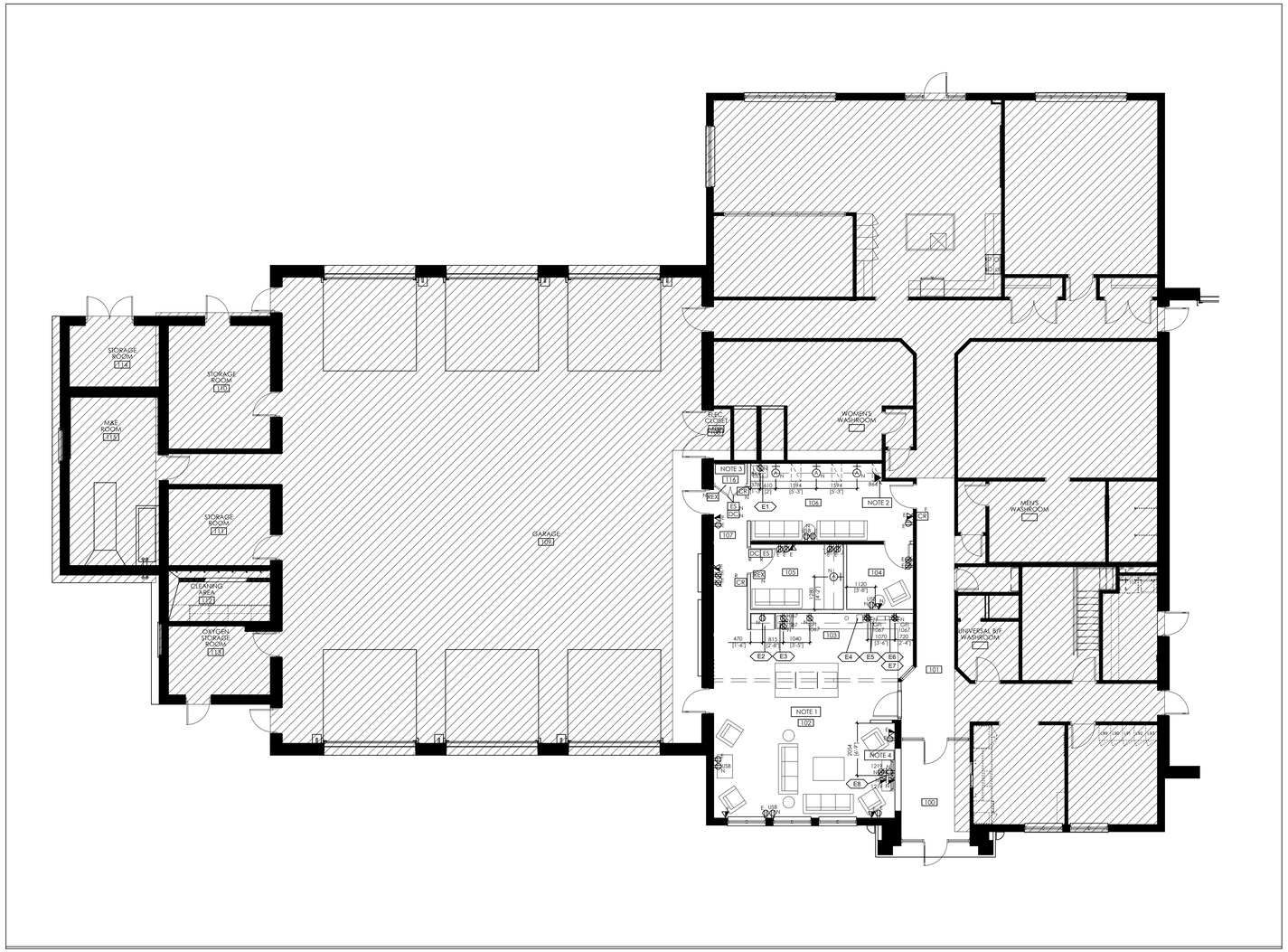

POWER & COMMUNICATION LEGEND

SYMBOL	DESCRIPTION
	WALL MOUNTED DUPLEX RECEPTACLE
XX	WALL MOUNTED DUPLEX RECEPTACLE AT XX MM ABOVE FINISHED FLOOR
USB	WALL MOUNTED COMBINATION DUPLEX / USB RECEPTACLE
	WALL MOUNTED QUAD RECEPTACLE (TO MATCH EXISTING HEIGHT OR 305 MM AFF)
XX	WALL MOUNTED TELEPHONE OUTLET AT 864 MM ABOVE FINISHED FLOOR
	WALL MOUNTED COMBINATION VOICE / DATA OUTLET
XX	WALL MOUNTED COMBINATION VOICE/DATA OUTLET AT XX MM ABOVE FINISHED FLOOR
	TV CABLE OUTLET
	NEW 'A' CLUSTER CONFIGURATION EACH TO RECEIVE: (2) VOICE/DATA (2) COMBINATION DUPLEX/USB RECEPTACLE 1@ VOICE/DATA & DUPLEX WALL MOUNTED STANDARD HEIGHT, 1@ VOICE/DATA & DUPLEX WALL MOUNTED ABOVE COUNTER / WORK SURFACE AT 864mm (44") AFF
ES	ELECTRIC STRIKE REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
CR	CARD READER REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
DC	CONCEALED DOOR CONTACT REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
REX	REQUEST TO EXIT MOTION DETECTOR REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
GFI	GROUND FAULT INTERRUPTER
E	DENOTES EXISTING ELECTRICAL EQUIPMENT TO REMAIN
N	DENOTES NEW ELECTRICAL EQUIPMENT TO REMAIN
R	DENOTES RELOCATED ELECTRICAL OUTLET / EQUIPMENT
DG	DENOTES DEDICATED GROUND CIRCUIT. PROVIDE DEDICATED GROUND WIRE AND SEPARATE CIRCUIT NEUTRAL.

EQUIPMENT NOTES

SYMBOL	DESCRIPTION
E1	PRINTER SUPPLIED & INSTALLED BY YR
E2	FRIDGE MAYTAG MFF2558FEZ, SIZE: 35-5/8"W X 70-1/8"H X 35-1/2"D SUPPLIED & INSTALLED BY YR
E3	MICROWAVE WHIRLPOOL YWMC30516HZ, SIZE: 21-3/4"W X 13"H X 17-1/4"D SUPPLIED & INSTALLED BY YR
E4	KETTLE SUPPLIED & INSTALLED BY YR
E5	COFFEE MAKER SUPPLIED & INSTALLED BY YR
E6	TOASTER OVEN SUPPLIED & INSTALLED BY YR
E7	TOASTER SUPPLIED & INSTALLED BY YR
E8	55" TV SUPPLIED & INSTALLED BY YR

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO ENGINEERING DRAWINGS FOR DETAILS
NOTE 2	LOCATION OF NEW TELEPHONE OUTLET TO BE DETERMINED BY REGION
NOTE 3	REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS
NOTE 4	ALL CABLING BEHIND TV SHALL BE CONCEALED IN CONDUIT. REFER TO ENGINEERING DRAWINGS
NOTE 5	ALL EXISTING CARD READERS/ELECTRIC STRIKES TO BE RE-USED WHERE POSSIBLE. CONTRACTOR TO PROVIDE NEW WHERE RE-USE IS NOT POSSIBLE

REFER TO SPECIFICATION
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POWER & COMM PLAN

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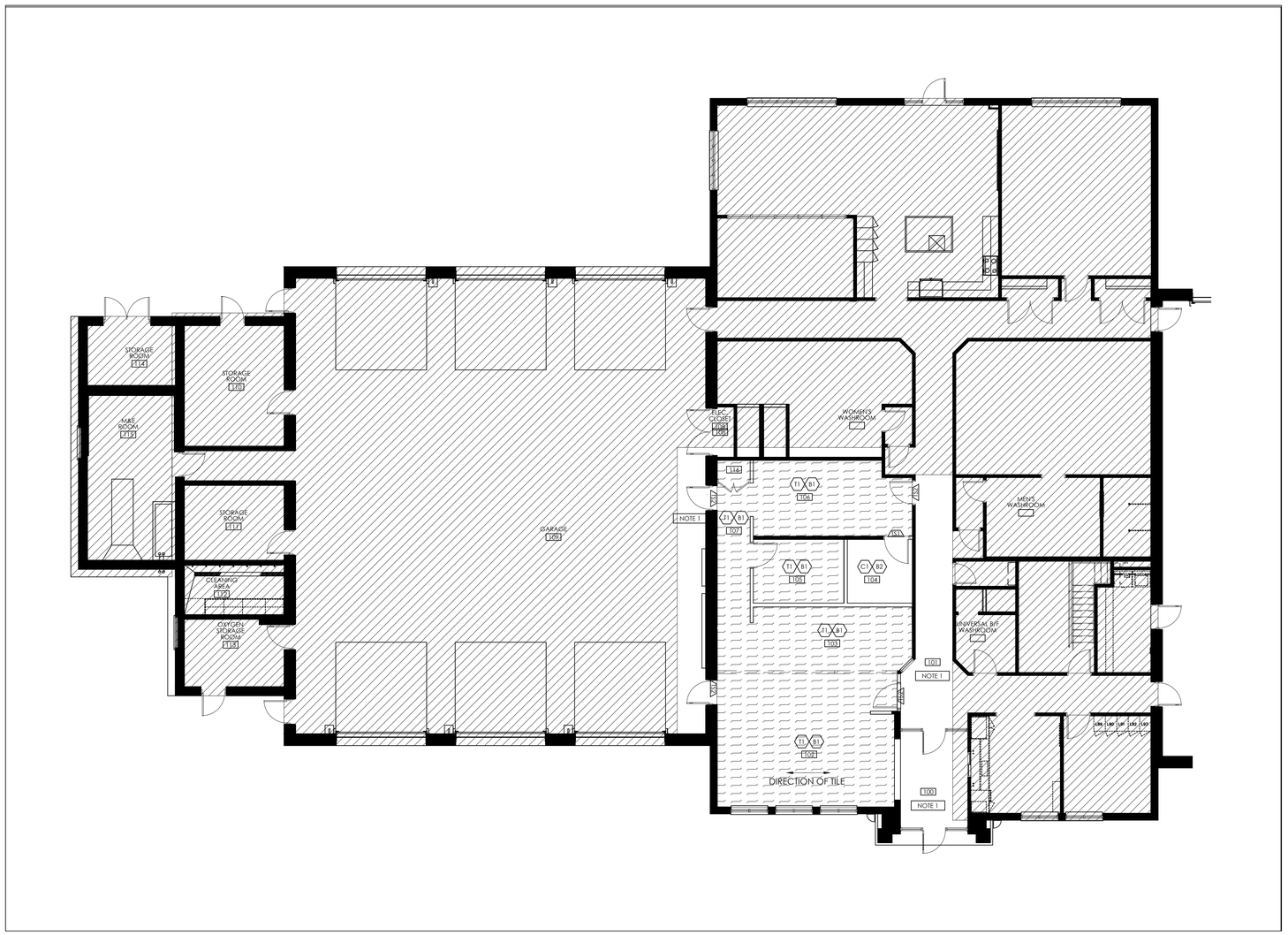

FLOOR FINISH LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING PARTITION TO REMAIN
	DENOTES NEW PARTITION
T1	PORCELAIN TILE: T1 MANUFACTURER: STONE TILE SERIES: SOLID COLOUR: ASH NATURAL SIZE: 300mm X 600mm GROUT SPEC: MAPEI 107 IRON INSTALL METHOD: 1/4" RUNNING BOND, 25% OVERLAP SUPPLIER/TEL: NANCY BRENNER 416-515-9000 EXT. 232 NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT
C1	CARPET TILE: C1 MANUFACTURER: SHAW COMMERCIAL SERIES: SURROUND 51125 COLOUR: LIMESTONE 17530 SIZE: 24" X 24" INSTALL METHOD: MONOLITHIC OR EQUIVALENT
	AREA NOT IN CONTRACT (NIC)

BASE TYPE LEGEND

SYMBOL	DESCRIPTION
B1	PORCELAIN TILE WALL BASE: B1 MANUFACTURER: STONE TILE SERIES: SOLID COLOUR: ASH NATURAL SIZE: 102mm (4") GROUT SPEC: MAPEI 107 IRON CONDITION: PORCELAIN TILE NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT
B2	VINYL WALL BASE: B2 MANUFACTURER: TARKETT/JOHNSONITE SERIES: TRADITIONAL / COVE BASE COLOUR: 20 CHARCOAL SIZE: 4" CONDITION: CARPET OR EQUIVALENT

TRANSITION STRIP LEGEND

SYMBOL	DESCRIPTION
S1	TRANSITION STRIP: TS1 COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CARPET OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANTS AND/OR REGIONS APPROVAL
S2	TRANSITION STRIP: TS2 COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CONCRETE OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANTS AND/OR REGIONS APPROVAL

NOTE: THE INSTALLER SHALL VERIFY TRANSITION WITH CONSULTANTS AND/OR REGION PRIOR TO ORDERING.

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING FLOOR FINISHES TO REMAIN
NOTE 2	CONTRACTOR SHALL ENSURE EXISTING SLAB IS FULLY CLEANED, PATCHED AND REPAIRED AND PREPPED AS REQUIRED TO ALLOW FOR NEW FLOOR FINISH INSTALLATION. SKIM COAT(S) TO BE APPLIED TO PROVIDE SMOOTH, LEVEL SUBSTRATE IN ALL AREAS OF CONSTRUCTION

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

BENNETT

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York Region

no.	date	by	description
01	04MAY21	SJB	REVISED PER CLIENT

REVISIONS

no.	date	by	description
03	07MAY21	SJB	RE-ISSUED FOR TENDER
02	16FEB21	SJB	ISSUED FOR PERMIT/TENDER
01	09DEC20	SJB	ISSUED FOR 90% REVIEW

ISSUED

ARIDO
SARA JANE BROWN
Association of Registered Interior Designers of Ontario

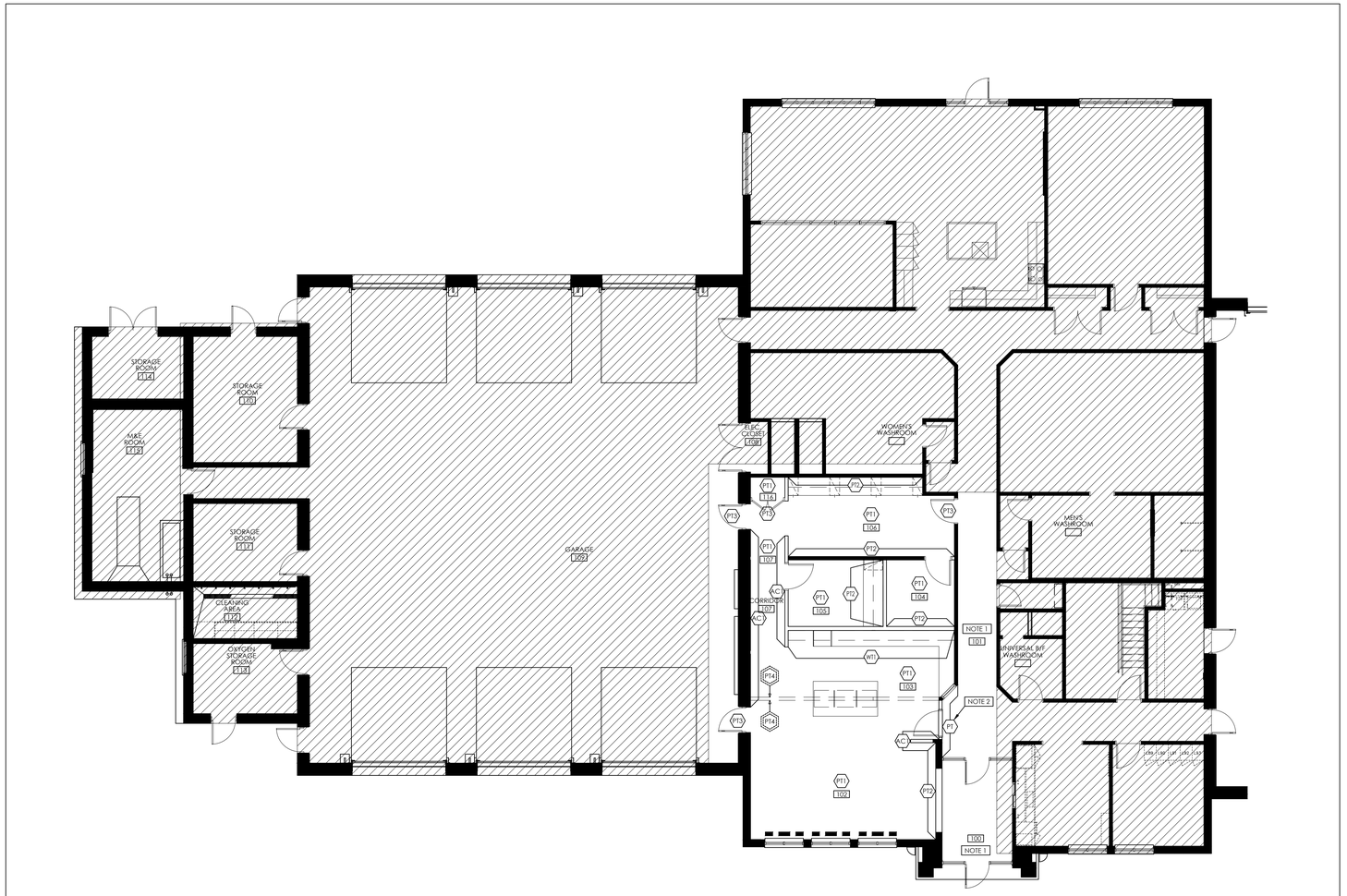
project title

YORK REGION
PARAMEDIC SERVICES
9601 ISLINGTON AVENUE
WOODBRIDGE, ON L4H 3G7

drawing title

FLOOR FINISH PLAN

date: 03DEC20	project no.: 20-1025
drawn by: JF/SJB	cad file: 20-1025_I-104
checked by: SJB	drawing no.: I-104
scale: 1:100	



WALL FINISH LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING PARTITION TO REMAIN
	DENOTES NEW PARTITION
PT1	FIELD PAINT: PT1 (WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: EGGSHELL OR EQUIVALENT
PT2	ACCENT PAINT: PT2 (BLUE) MANUFACTURER: SHERWIN WILLIAMS COLOUR: SW 7604 SMOKY BLUE FINISH: EGGSHELL NOTE: MINIMUM 3 TOP COATS OR EQUIVALENT
PT3	DOOR & FRAME PAINT: PT3 (BLACK) MANUFACTURER: DULUX COLOUR: FOREST BLACK 30YY 10/038, A1833 FINISH: SEMI-GLOSS **NOTE: EXISTING WOOD DOORS TO REMAIN AS IS** **NOTE: ALL FIRE RATED DOORS AND FRAMES TO BE PAINTED WITH INTUMESCENT PAINT** OR EQUIVALENT
PT4	CEILING PAINT (GWB CEILING UNLESS NOTED OTHERWISE): PT4 (WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: FLAT OR EQUIVALENT
WT1	WALL TILE: WT1 - KITCHEN BACKSPLASH MANUFACTURER: OLYMPIA TILE SERIES: COLOUR & DIMENSIONS COLOUR: BLACK, MATTE SIZE: 100 X 400 GROUT SPEC: MAPEI #38 AVALANCHE INSTALL METHOD: STACK BOND OR EQUIVALENT
AC	ACROVYN PANEL: AC1 - LOCATION MANUFACTURER: CONSTRUCTION SPECIALITIES SERIES: ACROVYN SOLID COLORS COLOUR: #949 WHITE SIZE: 1067MM (42") AFF OR EQUIVALENT
PT#	BULKHEADS TO BE PAINTED AS PER WALL FINISH PLAN
	DENOTES LOCATION OF NEW WINDOW COVERING REFER TO PARTITION PLAN FOR SPECIFICATIONS
	AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING WALL FINISHES TO REMAIN
NOTE 2	PAINT COLOUR TO MATCH EXISTING FINISH ON SURROUNDING PARTITIONS
NOTE 3	CONTRACTOR TO SUPPLY AND INSTALL 2" WIDE, BEVELED, STAINLESS STEEL CORNER GUARDS ON ALL CORNERS THRU-OUT

REFER TO SPECIFICATION
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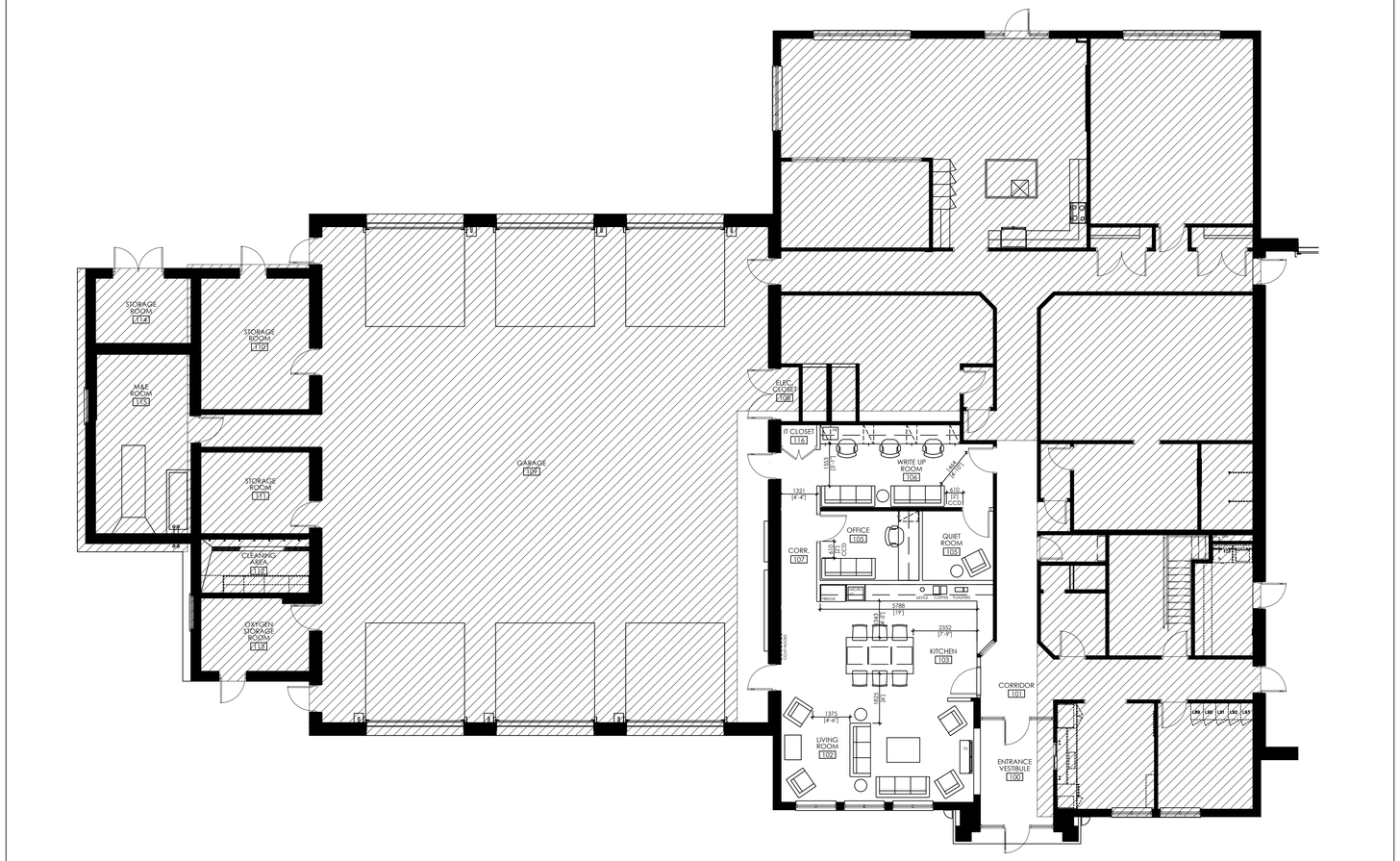
WOODBRIDGE, ON L4H 3G7

drawing title

WALL FINISH PLAN

date: 03DEC20	project no.: 20-1025
drawn by: JF/SJB	cad file: 20-1025_I-105
checked by: SJB	drawing no.: I-105
scale: 1:100	



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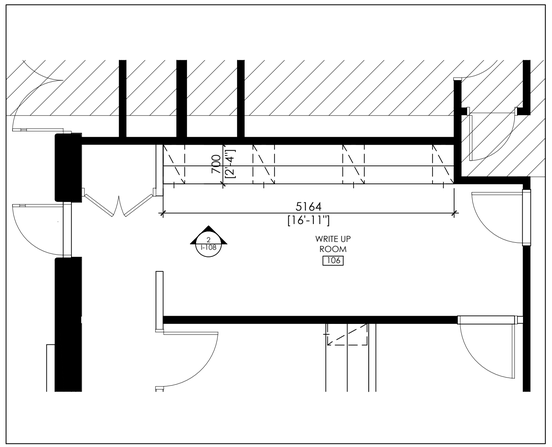
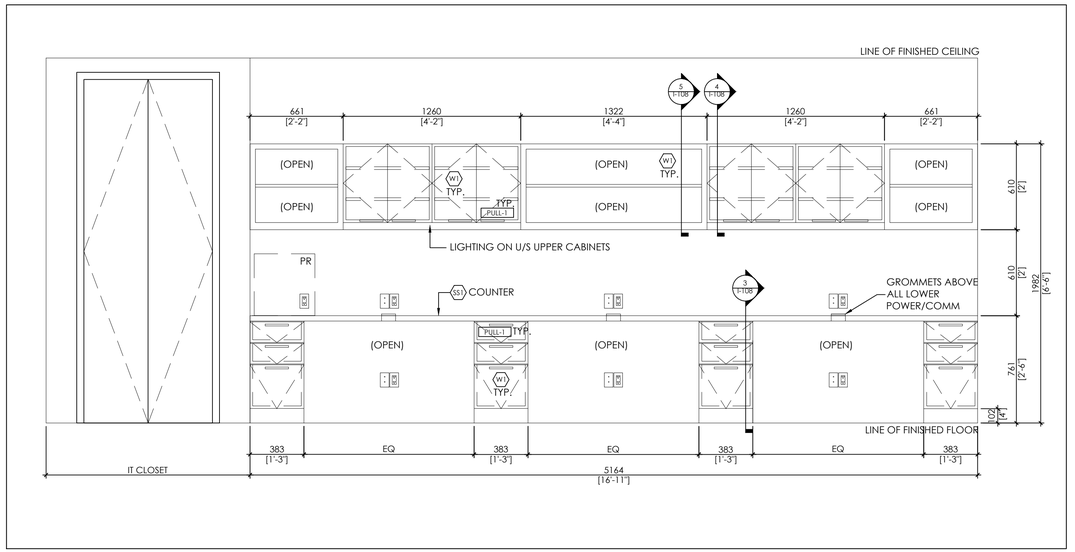
drawing title

FURNITURE PLAN

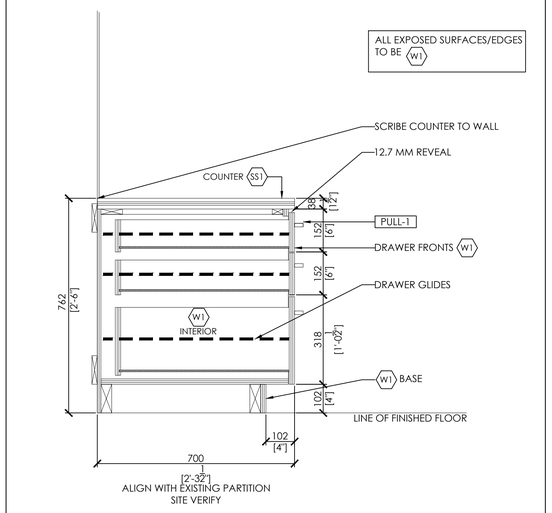
	date 03DEC20	project no. 20-1025	
	drawn by JF/SJB	cad file 20-1025_I-106	
	checked by SJB	drawing no. I-106	
	scale 1:100		



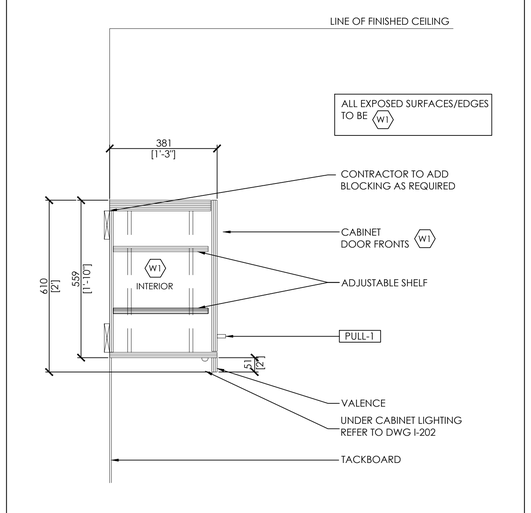
1 / I-108 PLAN: WRITE UP ROOM 106
1:50



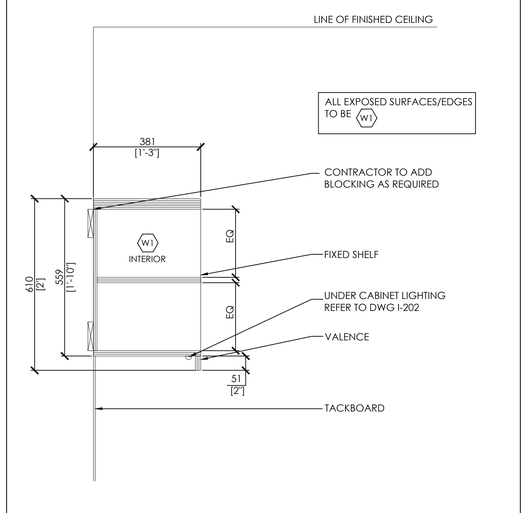
2 / I-108 ELEVATION: WRITE UP ROOM
1:20



3 / I-108 SECTION: THRU LOWER DRAWERS
1:10



4 / I-108 SECTION: THRU UPPER CABINET
1:10



5 / I-108 SECTION: THRU OPEN UPPER CABINET
1:10

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEND

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20 1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #110-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-AD,JUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

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ISSUED

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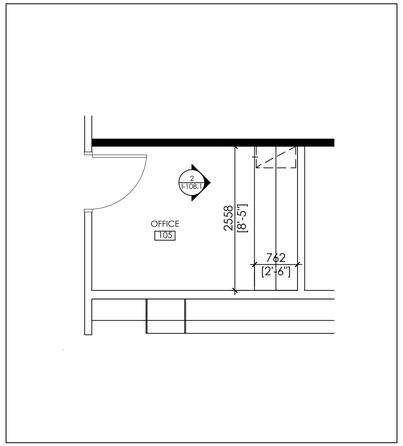
project title
YORK REGION
PARAMEDIC SERVICES
9601 ISLINGTON AVENUE
WOODBRIDGE, ON L4H 3G7

drawing title
MILLWORK DETAILS

date: 03DEC20		project no.: 20-1025	
drawn by: JF/SJB		cad file: 20-1025_I-105	
checked by: SJB		drawing no.: I-108	
scale: 1:100			



1 / I-108.1 PLAN: OFFICE 105
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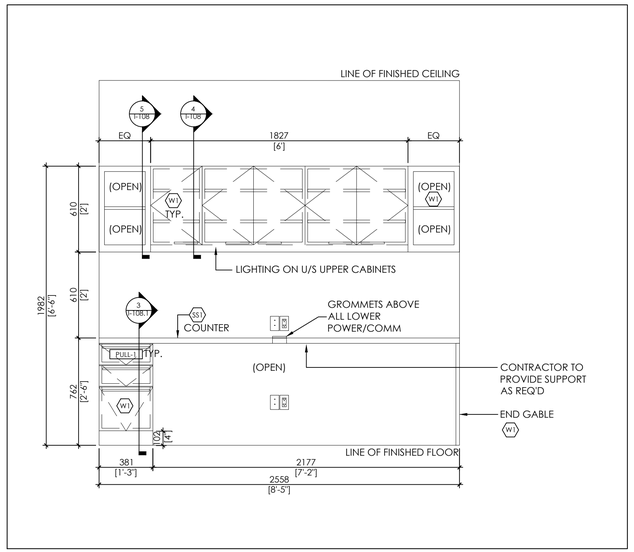
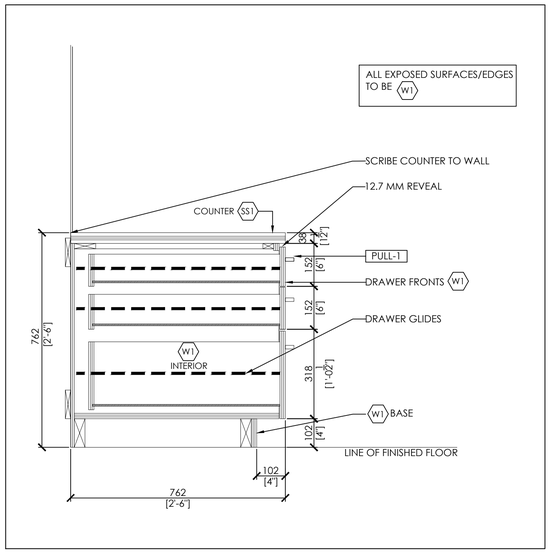
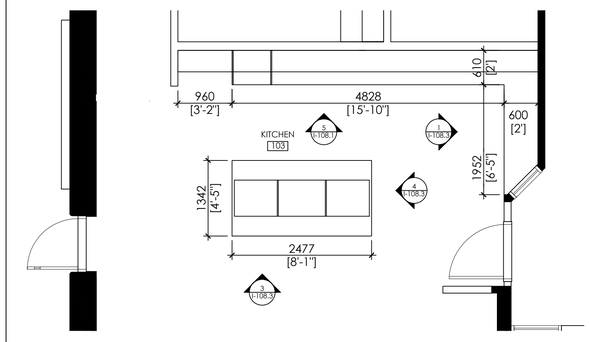


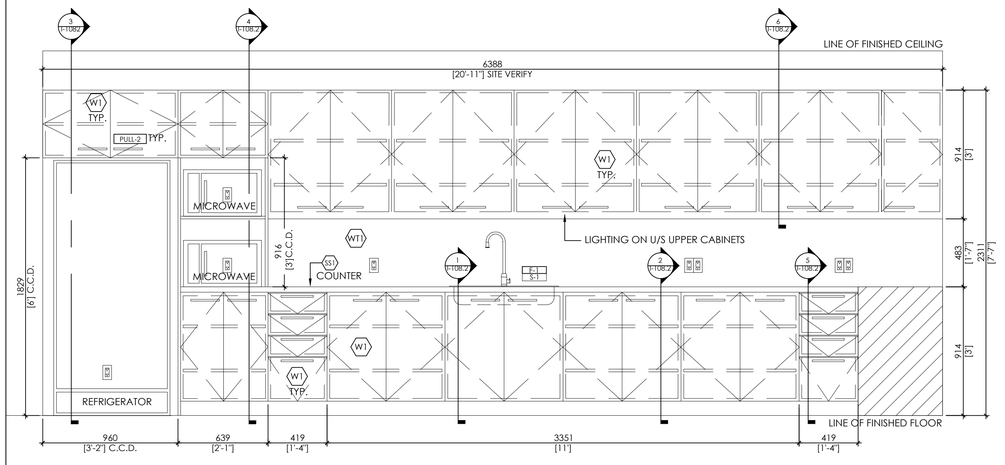
2 / I-108.1 ELEVATION: OFFICE
1:20



3 / I-108.1 SECTION: THRU LOWER DRAWERS
1:10



4 / I-108.1 PLAN: KITCHEN 103
1:50



5 / I-108.1 ELEVATION: KITCHEN, EAST SIDE
1:20

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEND

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20 1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #110-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

REFER TO SPECIFICATION
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PARAMEDIC SERVICES
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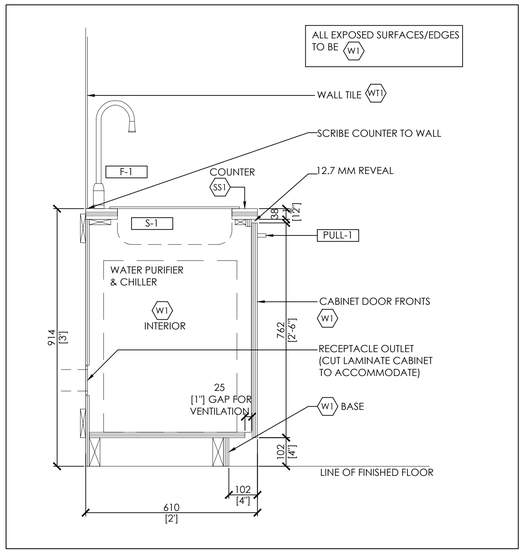
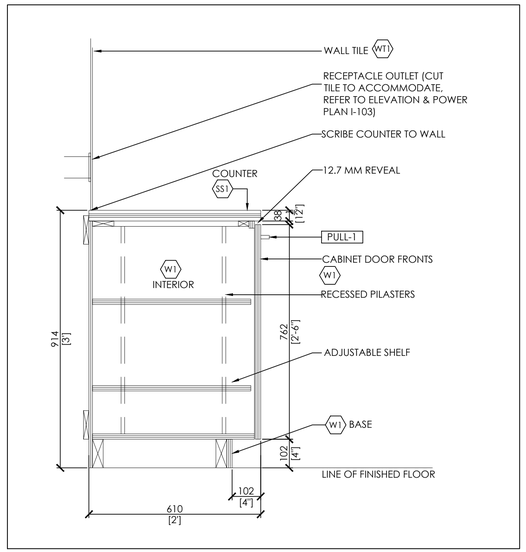
WOODBRIDGE, ON L4H 3G7

drawing title
MILLWORK DETAILS

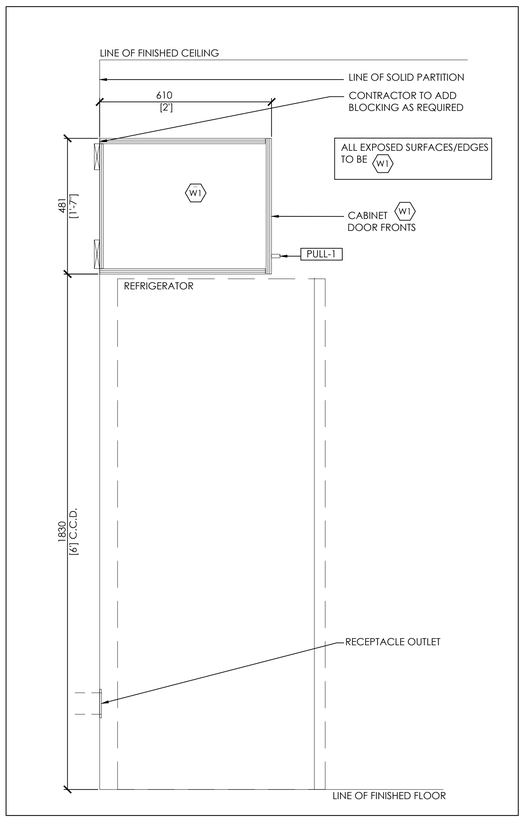
date	03DEC20	project no.	20-1025
drawn by	JF/SJB	cad file:	20-1025_I-105
checked by	SJB	drawing no.	I-108.1
scale	1:100		



1 / I-108.2 SECTION: THRU SINK
1:10



2 / I-108.2 SECTION: THRU LOWER CABINET
1:10



3 / I-108.2 SECTION: THRU FRIDGE
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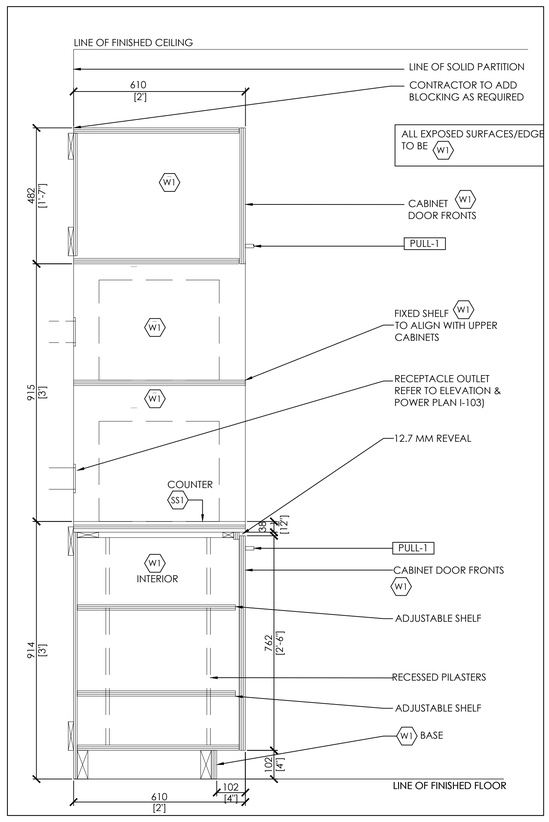

4 / I-108.2 SECTION: THRU MICROWAVES
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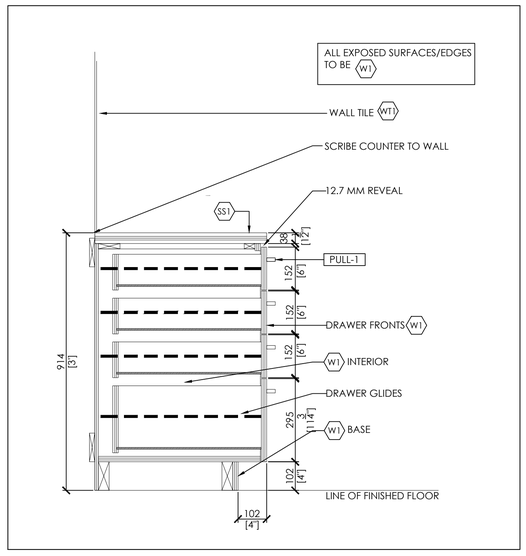

5 / I-108.2 SECTION: THRU LOWER DRAWERS
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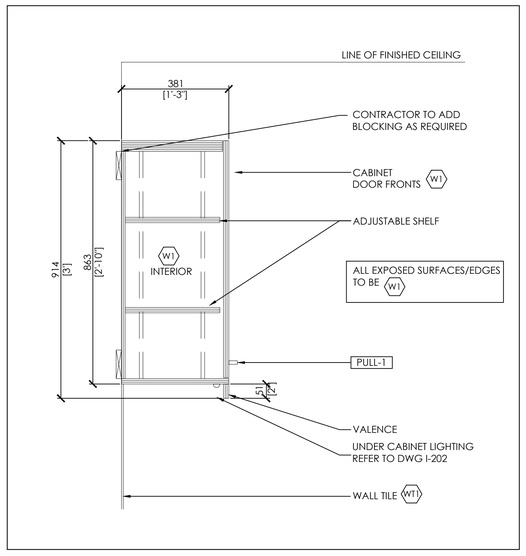

6 / I-108.2 SECTION: THRU UPPER CABINET
1:10

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 168mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEND

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20 1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #110-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

REFER TO SPECIFICATION CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION

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- DO NOT SCALE DRAWINGS.

York Region

no.	date	by	description
01	04MAY21	SJB	REVISED PER CLIENT

REVISIONS

no.	date	by	description
04	07MAY21	SJB	RE-ISSUED FOR TENDER
03	16FEB21	SJB	ISSUED FOR PERMIT/TENDER
02	09DEC20	SJB	ISSUED FOR 90% REVIEW
01	07DEC20	JF/SJB	ISSUED TO ENGINEERS

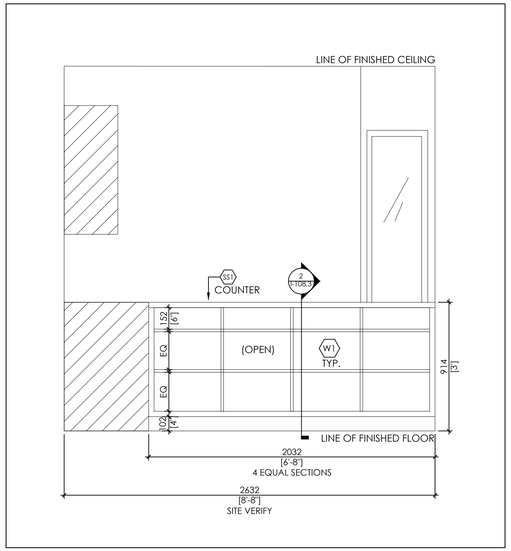
ISSUED

ARIDO
SARA JANE BROWN
Association of Registered Interior Designers of Ontario

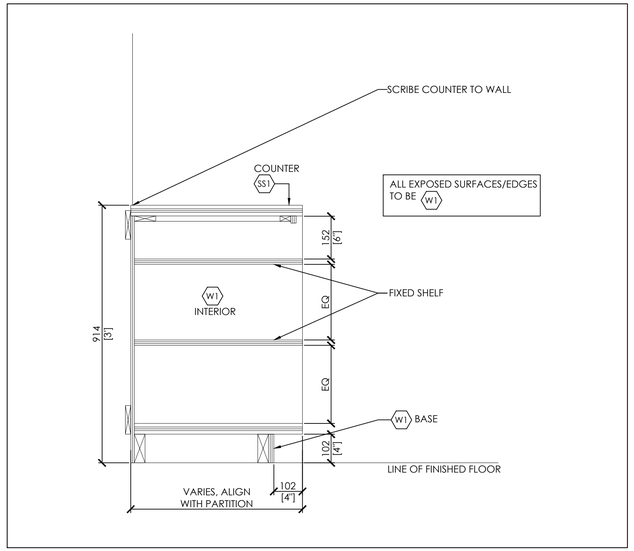
project title
YORK REGION
PARAMEDIC SERVICES
9601 ISLINGTON AVENUE
WOODBRIDGE, ON L4H 3G7

drawing title
MILLWORK DETAILS

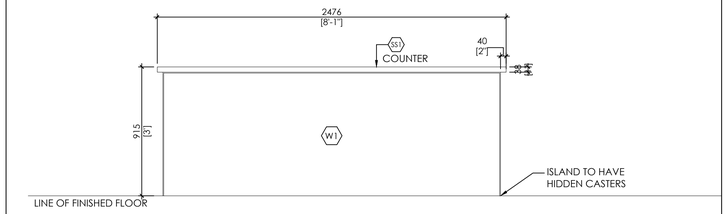
date	03DEC20
project no.	20-1025
drawn by	JF/SJB
cad file:	20-1025_I-105
checked by	SJB
drawing no.	I-108.2
scale	1:100



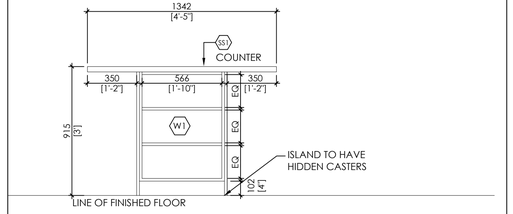
1 / I-108.3 ELEVATION: KITCHEN, SOUTH SIDE
1:20



2 / I-108.3 SECTION: OPEN SHELVES
1:10



3 / I-108.3 ELEVATION: KITCHEN ISLAND
1:20



4 / I-108.3 ELEVATION: KITCHEN ISLAND
1:20

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEND

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20 1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #110-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

REFER TO SPECIFICATION CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION

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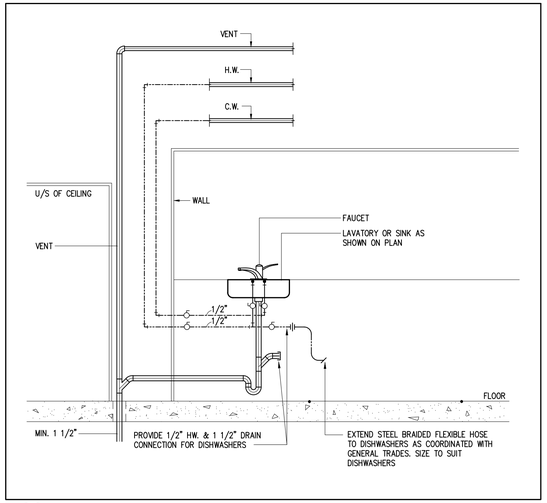
MILLWORK DETAILS

date: 03DEC20		project no.: 20-1025
drawn by: JF/SJB		cad file: 20-1025_I-105
checked by: SJB		drawing no.: I-108.3
scale: 1:100		



1 / M-1.0 TYPICAL DOMESTIC WATER PIPING ARRANGEMENT

N.T.S.

MECHANICAL LEGEND

- EXISTING MECHANICAL SERVICE/EQUIPMENT TO BE REMOVED OR RELOCATED. REFER TO PLAN DRAWINGS FOR FURTHER DETAIL.
- EXISTING RIGID DUCTWORK
- EXISTING ROUND RIGID DUCTWORK
- EXISTING SERVICE TO BE CAPPED
- NEW ACOUSTICALLY LINED DUCTWORK
- NEW THERMALLY INSULATED DUCTWORK
- NEW ROUND RIGID DUCTWORK
- NEW FLEXIBLE DUCTWORK
- BD — NEW BALANCING DAMPER
- FD — NEW FIRE DAMPER
- E CFM — EXISTING SUPPLY AIR DIFFUSER TO REMAIN. BALANCE TO CFM NOTED.
- R CFM — RELOCATED SUPPLY AIR DIFFUSER. BALANCE TO CFM NOTED.
- "TYPE" CFM — NEW SUPPLY AIR DIFFUSER. BALANCE TO CFM NOTED. NEW DIFFUSER TO MATCH BASE BUILDING STANDARD
- EXISTING EGG CRATE RETURN AIR GRILLE.
- R — RELOCATED EGG CRATE RETURN AIR GRILLE.
- "TYPE" SIZE — NEW EGG CRATE RETURN AIR GRILLE.
- 'B' CFM — NEW EXHAUST GRILLE BALANCE TO CFM NOTED.
- NEW 12"x12" AIR TRANSFER DUCT UNLESS NOTED OTHERWISE
- CONNECT TO EXISTING SERVICE
- INSTALL SOUND BAFFLE IN PERIMETER
- NEW ACCESS DOOR IN DRYWALL CEILING
- E T — EXISTING THERMOSTAT TO REMAIN
- R T — EXISTING RELOCATED THERMOSTAT
- N T — NEW THERMOSTAT
- FE — WALL MOUNTED FIRE EXTINGUISHER
- DCW — DOMESTIC COLD WATER
- DHWR — DOMESTIC HOT WATER RECIRC
- DHW — DOMESTIC HOT WATER
- V — SANITARY VENT
- C.O. SAN — SANITARY DRAIN WITH CLEAN OUT
- RUNNING TRAP
- CD — CONDENSATE DRAIN
- SHUT OFF VALVE
- MODULATING CONTROL VALVE
- CDS — CONDENSER WATER SUPPLY
- CDR — CONDENSER WATER RETURN
- CHS — CHILLED WATER SUPPLY
- CHR — CHILLED WATER RETURN
- FSP — NEW FIRE STANDPIPE WATER SUPPLY
- SP — SPRINKLER MAIN
- EXISTING SPRINKLER HEAD TO BE REMOVED
- E — EXISTING SPRINKLER HEAD TO REMAIN
- N — NEW PENDANT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING
- N — NEW UPRIGHT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING
- N — NEW CONCEALED TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC. PROVIDE CUSTOM COLOUR TO SUIT CEILING FINISH WHERE NOTED.
- N — NEW SIDEWALL TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC.
- F.D. — FLOOR DRAIN
- FHC — NEW FIRE HOSE CABINET
- N $ — NEW EXHAUST FAN SWITCH/SPEED CONTROLLER

DRAWING LIST

EQUIPMENT LIST

S-1 SINGLE COMPARTMENT SINK & FAUCET

MANUFACTURER: FRANKE COMMERCIAL
MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE
MODEL: 521mm (20-1/2") X 794mm (31-1/4"), 8" DEEP
MODEL: STAINLESS STEEL, SATIN FINISH RIM & BOWL
MCGUIRE #LFH165LKN3 FAUCET SUPPLIES, CHROME PLATED FINISH PLATE POLISHED BRASS, HEAVY DUTY ANGLE STOPS, 10 MM (3/8") I.P.S. INLET X 76 MM (3") LONG RIGID HORIZONTAL NIPPLES, V.P. LOOSE KEYS, ESCUTCHEON AND FLEXIBLE COPPER RISERS.

MANUFACTURER: CHICAGO FAUCETS
MODEL: #1100-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON

GRILLE AND DIFFUSER SCHEDULE

TYPE 'B' RETURN GRILLE

E.H PRICE TYPE 80 CORE ONLY FOR LAY-IN APPLICATION, ALUMINIUM EGGCRATE 1/2"X1/2"X1/2" GRID, B-12 FINISH, 24"X6" UNLESS NOTED OTHERWISE.

TYPE 'C' RETURN GRILLE

E.H PRICE TYPE 80 CORE ONLY FOR LAY-IN APPLICATION, ALUMINIUM EGGCRATE 1/2"X1/2"X1/2" GRID, B-12 FINISH, 24"X24" UNLESS NOTED OTHERWISE.

DUCT SIZING

DIFFUSER INLET SIZING	
AIR FLOW (cfm)	INLET SIZE
<125	6"ø
126-250	8"ø
251-450	10"ø
451-700	12"ø
701-1000	14"ø

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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HHAngus

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York Region

no.	date	by	description

REVISIONS

no.	date	by	description
03	14MAY21		RE-ISSUED FOR TENDER
02	17FEB21		ISSUED FOR PERMIT/TENDER
01	27JAN21		ISSUED FOR DRAWING REVIEW

ISSUED

LICENCE PROFESSIONAL ENGINEER
K.P. O'NEILL
100055807
2202027
PROVINCE OF ONTARIO

project title

YORK REGION
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title

MECHANICAL LEGEND, DETAILS AND SPECIFICATIONS

date: 01-14-2021	project no: 2202027
drawn by: FS	
checked by: DP	drawing no.: M-1.0
scale: N.T.S.	

MECHANICAL GENERAL REQUIREMENTS
20 01 01

1. GENERAL REQUIREMENTS
 1.1. EXAMINATION
  1.1.1. EXAMINE ANY EXISTING BUILDINGS, LOCAL CONDITIONS, BUILDING SITE, SPECIFICATIONS, AND DRAWINGS AND REPORT ANY CONDITION, DEFECT OR INTERFERENCE THAT WOULD PREVENT EXECUTION OF THE WORK.
  1.1.2. NO ALLOWANCE WILL BE MADE FOR ANY EXPENSE INCURRED THROUGH FAILURE TO MAKE THESE EXAMINATIONS OF THE SITE AND THE DOCUMENTS PRIOR TO TENDER OR ON ACCOUNT OF ANY CONDITIONS ON SITE OR ANY GROWTH OR ITEM EXISTING THERE WHICH WAS VISIBLE OR KNOWN TO EXIST AT TIME OF TENDER.
  1.1.3. EXAMINE WORK OF OTHER DIVISIONS BEFORE COMMENCING THIS WORK, AND REPORT ANY DEFECT OR INTERFERENCE.
 1.2. STANDARD OF MATERIAL AND EQUIPMENT
  1.2.1. MATERIALS AND EQUIPMENT:
   1.2.1.A. OF CANADIAN MANUFACTURE WHERE OBTAINABLE,
   1.2.1.B. STANDARD PRODUCTS OF APPROVED MANUFACTURE.
   1.2.1.C. LABELLED OR LISTED AS REQUIRED BY CODE AND/OR INSPECTION AUTHORITIES,
   1.2.1.D. IN COMPLIANCE WITH STANDARDS AND REGULATIONS WITH RESPECT TO;
    1.2.1.D.A. DESIGN,
    1.2.1.D.B. PERFORMANCE CHARACTERISTICS, AND
    1.2.1.D.C. METHODS OF CONSTRUCTION AND INSTALLATION.
   1.2.1.E. IDENTICAL UNITS OF EQUIPMENT TO BE OF SAME MANUFACTURE.
   1.2.1.F. IDENTICAL COMPONENT PARTS OF SAME MANUFACTURE IN SIMILAR UNITS OF EQUIPMENT, BUT VARIOUS COMPONENT PARTS OF EACH UNIT NEED NOT BE FROM ONE MANUFACTURER.
  1.2.2. MATERIALS AND EQUIPMENT ARE DESCRIBED TO ESTABLISH STANDARDS OF CONSTRUCTION AND WORKMANSHIP.
   1.2.2.A. WHERE MANUFACTURERS OR MANUFACTURERS PRODUCTS ARE IDENTIFIED IN LISTS WITH THE PHRASE "STANDARD OF ACCEPTANCE", THESE ARE MANUFACTURERS AND/OR PRODUCTS WHICH MEET REQUIRED STANDARDS WITH REGARD TO PERFORMANCE, QUALITY OF MATERIAL AND WORKMANSHIP.
   1.2.2.B. MANUFACTURERS AND OR PRODUCTS USED ARE TO BE CHOSEN FROM THESE LISTS.
   1.2.2.C. SELECT MATERIALS AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
   1.2.2.D. MATERIALS AND EQUIPMENT NOT SATISFYING THESE SELECTION CRITERIA WILL BE CONDEMNED.
   1.2.2.E. REMOVE CONDEMNED MATERIALS FROM JOB SITE AND PROVIDE PROPERLY SELECTED AND APPROVED MATERIALS.
2. SUBMITTALS
 2.1. SHOP DRAWINGS AND PRODUCT DATA SHEETS
  2.1.1. SUBMIT SHOP DRAWINGS IN THE SAME UNIT OF MEASURE AS ARE USED ON THE DRAWINGS. BOTH METRIC AND IMPERIAL MEASURES MAY BE INCLUDED.
  2.1.2. SUBMIT SHOP DRAWINGS BY EMAIL TO: SHOPDRAWINGS@HHANGUS.COM
 2.2. INCLUDE A H.H. ANGUS SHOP DRAWING COVER SHEET PREPARED FOR EACH ITEM ON THIS PROJECT AS A SEPARATE PDF.
 2.3. SUBMIT SHOP DRAWINGS IN PDF FORMAT;
  2.3.1. IF SUBMITTED IN HARDCOPY FORMAT, SUBMIT IN 8.5 X 11 OR 11 X 17 SIZE, BLACK AND WHITE ORIGINALS OF GRAPHIC QUALITY SUITABLE FOR PHOTOCOPYING. ALLOW ONE ADDITIONAL WEEK FOR PROCESSING OF SHOP DRAWINGS SUBMITTED IN HARDCOPY FORMAT.
 2.4. SUBMIT A SHOP DRAWING FOR EACH ITEM OF EQUIPMENT:
  2.4.1. PLUMBING FIXTURES,
  2.4.2. PUMPS,
  2.4.3. AIR-MOVING UNITS,
  2.4.4. HEATING UNITS,
  2.4.5. COILS,
  2.4.6. MOTOR CONTROL CENTRES,
  2.4.7. MOTOR STARTERS, AND
  2.4.8. SPECIAL SYSTEMS.
3. REFERENCE CODES, STANDARDS, AND REGULATIONS
 3.1. PERMITS, TESTS, AND CERTIFICATES
  3.1.1. ARRANGE AND PAY FOR PERMITS, TESTS, AND CERTIFICATES OF INSPECTION REQUIRED BY AUTHORITIES HAVING JURISDICTION.
  3.1.2. SUBMIT APPLICATIONS REQUIRING OWNER'S SIGNATURE BEFORE COMMENCING WORK.
  3.1.3. OBTAIN AND SUBMIT INSPECTION CERTIFICATES.
  3.1.4. CERTIFICATES TO BE RENEWED AS TO REMAIN IN FORCE FOR GUARANTEE PERIOD.
  3.1.5. CO-ORDINATE AND PERFORM TESTING REQUIRED BY AUTHORITIES HAVING JURISDICTION IN ACCORDANCE WITH CLAUSE TESTING IN THIS SECTION.
4. EQUIPMENT
 4.1. MANUFACTURERS NAMEPLATES
  4.1.1. PROVIDE METAL NAMEPLATE WITH RAISED OR RECESSED LETTERING, MOUNTED ON EACH PIECE OF EQUIPMENT.
 4.2. FACTORY APPLIED FINISH PAINTING
  4.2.1. APPLY PRIME AND FINAL PAINT COATS TO EQUIPMENT AND MATERIALS WHERE SPECIFICALLY DETAILED IN SECTIONS OF THESE DIVISIONS.
 4.3. FACTORY APPLIED PRIME PAINTING
  4.3.1. HAVE PRIME PAINT FACTORY-APPLIED TO OTHER EQUIPMENT FABRICATED FROM IRON OR STEEL INCLUDING ACCESS DOORS, REGISTERS, GRILLES, DIFFUSERS, DAMPERS, METAL RADIATION ENCLOSURES AND FIRE HOSE CABINETS.
 4.4. FIELD PAINTING
  4.4.1. AFTER EQUIPMENT HAS BEEN INSTALLED AND PIPING AND INSULATION IS COMPLETED, CLEAN RUST AND OIL FROM EXPOSED IRON AND STEEL WORK PROVIDED UNDER THIS DIVISION, WHETHER OR NOT IT HAS BEEN FACTORY PRIME PAINTED.
5. OFFICE, STORAGE AND TOOLS
 5.1. OFFICE AND STORAGE
  5.1.1. PROVIDE TEMPORARY OFFICE, WORKSHOP AND TOOLS AND MATERIAL STORAGE SPACE.
  5.1.2. ASSUME RESPONSIBILITY FOR SECURITY OF THESE FACILITIES AND PROVIDE HEAT, LIGHT AND TELEPHONE.
 5.2. APPLIANCES AND TOOLS
  5.2.1. PROVIDE TOOLS, EQUIPMENT, SCAFFOLDING, EXTENSION CORDS, LAMPS AND MISCELLANEOUS CONSUMABLE MATERIALS REQUIRED TO CARRY OUT WORK.
6. CO-ORDINATION
 6.1. GENERAL
  6.1.1. CONSULTANT DRAWINGS ARE DIAGRAMMATIC AND ILLUSTRATE THE GENERAL LOCATION OF EQUIPMENT, AND INTENDED ROUTING OF DUCTWORK, PIPING, ETC, AND DO NOT SHOW EVERY STRUCTURAL DETAIL. IN CONGESTED AREAS DRAWINGS AT GREATER SCALE MAY BE PROVIDED TO IMPROVE INTERPRETATION OF THE WORK. WHERE THEY ARE DONE SO EITHER TO IMPROVE "DOUBLE LINE" EQUIPMENT OR SYSTEMS ARE SHOWN AS UNDERSTANDING OF THE WORK, OR SIMPLY AS A RESULT OF THE USE OF A CAD DRAWING TOOL, AND IN EITHER CASE SUCH DRAWINGS ARE NOT REPRESENTED AS FABRICATION OR INSTALLATION DRAWINGS.
  6.1.2. LOCATION OF PIPES, DUCTWORK, RACEWAYS AND EQUIPMENT MAY BE ALTERED WITHOUT EXTRA COST PROVIDED INSTRUCTION IS GIVEN OR APPROVAL IS OBTAINED, IN ADVANCE OF INSTALLATION OF ITEMS INVOLVED. CHANGES WILL BE AUTHORIZED BY SITE INSTRUCTIONS AND ARE TO BE SHOWN ON RECORD DRAWINGS.
  6.1.3. LOCATION OF FLOOR DRAINS, HUB DRAINS, COMBINATION DRAINS, PLUMBING FIXTURES, CONVECTORS, UNIT HEATERS, DIFFUSER, REGISTERS GRILLES AND OTHER SIMILAR ITEMS MAY BE ALTERED WITHOUT EXTRA COST PROVIDED INSTRUCTION IS GIVEN PRIOR TO ROUGHING IN. NO CLAIM WILL BE PAID FOR EXTRA LABOUR AND MATERIALS FOR RELOCATING ITEMS UP TO 3 M (10 FT) FROM ORIGINAL LOCATION NOR WILL CREDITS BE ANTICIPATED WHERE RELOCATION UP TO 3 M (10 FT) REDUCES MATERIAL AND LABOUR.
7. PROTECTION OF WORK AND PROPERTY
 7.1. GENERAL
  7.1.1. PROTECT THIS WORK AND WORK OF OTHER TRADES FROM DAMAGE.
  7.1.2. COVER FLOORS WITH TARPAULINS AND PROVIDE PLYWOOD AND OTHER TEMPORARY PROTECTION.
  7.1.3. ASSUME RESPONSIBILITY FOR REPAIRING DAMAGE TO FLOOR AND WALL SURFACES RESULTING FROM FAILURE TO PROVIDE ADEQUATE PROTECTION.
  7.1.4. PROTECT EQUIPMENT, PIPE AND DUCT OPENINGS FROM DIRT, DUST AND OTHER FOREIGN MATERIALS.
8. WORK IN EXISTING BUILDING
 8.1. GENERAL
  8.1.1. .1 WORK INCLUDES CHANGES TO EXISTING BUILDING.
  8.1.2. ROUTE PIPES, DUCTS, CONDUITS AND OTHER SERVICES TO AVOID INTERFERENCE WITH EXISTING INSTALLATION.
  8.1.3. RELOCATE EXISTING PIPES, DUCTS, CONDUITS, BUS DUCTS AND ANY OTHER EQUIPMENT OR SERVICES REQUIRED FOR PROPER INSTALLATION OF NEW WORK, INCLUDING AS REQUIRED FOR TEMPORARY REMOVAL AND RE-INSTALLATION TO SUIT NEW INSTALLATION WORK.
  8.1.4. REMOVE EXISTING PLUMBING FIXTURES, LIGHTING FIXTURES, PIPING, DUCTWORK, WIRING, AND EQUIPMENT TO SUIT NEW CONSTRUCTION. CUT BACK AND CAP DRAIN, VENT AND WATER OUTLETS, CONDUITS AND ELECTRICAL OUTLETS, NOT BEING USED.
  8.1.5. PLUMBING FIXTURES, PIPING, DUCTWORK, CONDUIT AND WIRING SHOWN TO BE REMOVED AND NOT SHOWN RELOCATED, TO BECOME PROPERTY OF CONTRACTOR AND TO BE TAKEN FROM SITE.
  8.1.6. LIGHTING FIXTURES SHOWN TO BE REMOVED WILL REMAIN OWNER'S PROPERTY AND WILL BE TURNED OVER TO OWNER'S REPRESENTATIVE AS DIRECTED.
  8.1.7. WHERE OWNER WISHES TO TAKE OVER RENOVATED AREAS AHEAD OF PROJECT COMPLETION DATE AND THESE AREAS ARE TO BE FED FROM NEW DISTRIBUTION SYSTEMS, MAKE TEMPORARY CONNECTIONS TO EXISTING SERVICES IN THESE AREAS. RECONNECT TO PERMANENT SERVICES, AT LATER DATE, WHEN NEW DISTRIBUTION SYSTEMS ARE AVAILABLE.
9. RECORD DRAWINGS
 9.1. SITE RECORDS
  9.1.1. A SET OF DESIGN DRAWINGS IN AUTOCAD 2008 ON CD OR DVD ROM WILL BE PROVIDED BY THE CONSULTANT. MAKE SETS P
  9.1.2. OF WHITE PRINTS FOR EACH PHASE OF WORK, AND AS WORK PROGRESSES AND CHANGES OCCUR MARK WHITE PRINTS IN COLOURED INKS TO SHOW REVISIONS. DIMENSION LOCATIONS OF DRAINS, PIPES, DUCTWORK, CONDUIT, MANHOLES, FOUNDATIONS AND SIMILAR BURIED ITEMS WITHIN THE BUILDING, WITH RESPECT TO BUILDING COLUMN CENTRES. MARK LEVEL WITH RESPECT TO AN ELEVATION WHICH WILL BE PROVIDED.
  9.1.3. RETAIN THESE DRAWINGS AND MAKE AVAILABLE TO CONSULTANT FOR PERIODIC REVIEW.
 9.2. AS-BUILT DRAWINGS
  9.2.1. PRIOR TO TESTING, BALANCING AND ADJUSTING, TRANSFER SITE RECORD DRAWING INFORMATION TO AUTOCAD 2008 (CAD) FILES, TO RECORD FINAL AS-BUILT CONDITION. OBTAIN A CURRENT SET OF CAD FILES FROM THE CONSULTANT.
   9.2.1.A. DRAWINGS ARE TO REMAIN SET TO AND FOLLOW CONSULTANTS AUTOCAD STANDARDS. DO NOT ALTER DRAWING SCALES, X-REFS, COLOURS, LAYERS OR TEXT STYLES.
   9.2.1.B. THE CONSULTANT'S CAD FILES MAY NOT REFLECT ALL OR ANY CONSTRUCTION CHANGES.
  9.2.2. WHERE ITEMS HAVE BEEN DELETED, MOVED, RENUMBERED OR OTHERWISE CHANGED FROM CONTRACT DRAWINGS, THESE REVISIONS, AND PLACE THESE ANNOTATIONS "BUBBLE" REVISE THE CAD FILES TO RECORD THESE CHANGES. ON A SEPARATE AND EASILY IDENTIFIED DRAWING LAYER.
  9.2.3. SHOW ON MECHANICAL AS-BUILT DRAWINGS FINAL LOCATION OF PIPING, DUCTWORK, SWITCHES, STARTERS, MOTOR CONTROL CENTRES, THERMOSTATS, AND EQUIPMENT.
  9.2.4. SHOW SITE SERVICES AS-BUILT DRAWINGS SURVEY INFORMATION PROVIDED BY ONTARIO LAND SURVEYOR (OLS) MONITORING SERVICES INSTALLATION.
  9.2.5. SHOW ON ELECTRICAL AS-BUILT DRAWINGS FINAL LOCATION OF CONDUIT, OUTLETS, PANELS, BRANCH WIRING, SYSTEM WIRING, PULL BOXES, BUS DUCTS, AND EQUIPMENT.
  9.2.6. IDENTIFY EACH DRAWING IN LOWER RIGHT HAND CORNER IN LETTERS AT LEAST 12 MM (½ IN) HIGH AS FOLLOWS: "AS-BUILT DRAWINGS. THIS DRAWING HAS BEEN REVISED TO SHOW SYSTEMS AS INSTALLED" (SIGNATURE OF CONTRACTOR) (DATE). THE SITE SERVICES DRAWINGS ARE TO INCLUDE (SIGNATURE AND STAMP OF OLS) ATTACHED TO NOTE.
  9.2.7. SUBMIT ONE (1) SET OF WHITE PRINTS OF THE DRAFT AS-BUILT CAD FILES FOR CONSULTANTS' REVIEW.
  9.2.8. ONCE "AS BUILT DRAWINGS" WHITE PRINTS ARE REVIEWED, TRANSFER CONSULTANTS' COMMENTS TO THE CAD FILES. RETURN AUTOCAD DRAWINGS MODIFIED TO "AS BUILT" CONDITION TO CONSULTANTS ON CD OR DVD ROM.
  9.2.9. SUBMIT THREE (3) SETS OF WHITE PRINTS AND THREE (3) COPIES OF CAD FILES WITH OPERATING AND MAINTENANCE MANUALS.
10. OPERATING AND MAINTENANCE INSTRUCTIONS
 10.1. START-UP AND TESTING
  10.1.1. SUPPLY SERVICES OF SKILLED MECHANIC, TO START SYSTEMS IN PROPER SEQUENCE, AND TEST AND CALIBRATE CONTROLS, PRV'S, INSTRUMENTATION AND RELIEF VALVES AND DAMPERS AND TO SET-UP SYSTEMS.
 10.2. TRAINING
  10.2.1. DURING THIS PROCEDURE THOROUGHLY EXPLAIN OPERATION AND MAINTENANCE OF EACH SYSTEM, INCORPORATING SPECIALIZED INSTRUCTION BY MANUFACTURERS AS DESCRIBED UNDER OTHER SECTIONS IN THESE DIVISIONS.
  10.2.2. ARRANGE SUITABLE TIME FOR INSTRUCTIONS WITH OWNER'S OPERATING AND MAINTENANCE PERSONNEL.
 10.3. OPERATING AND MAINTENANCE MANUALS
  10.3.1. PROVIDE OPERATION AND MAINTENANCE DATA BOUND IN 210 MM X 300 MM X 50MM THICK (8½ IN X 11 IN X 2 IN THICK) SIZE, VINYL COVERED, HARD BACK, THREE-RING COVERS.
   10.3.1.A. ORGANIZE MATERIAL IN VOLUMES GENERALLY GROUPED BY TRADE SECTION; SITE SERVICES, PLUMBING, FIRE PROTECTION, HEATING AND COOLING PLANT AND DISTRIBUTION, AIR HANDLING, AND CONTROLS AND INSTRUMENTATION.
   10.3.1.B. TITLE SHEET IN EACH VOLUME TO BE LABELED "OPERATING AND MAINTENANCE MANUAL" AND TO BEAR PROJECT NAME, PROJECT NUMBER, DATE, TRADE SECTION, AND LIST OF CONTENTS.
  10.3.2. IN ADDITION, PROVIDE ADOBE PDF FILES FOR EACH DOCUMENT, PRODUCED FROM ORIGINAL DIRECT-TO-DIGITAL FILE CREATIONS.
11. CONSULTANT REVIEWS
 11.1. SITE REVIEWS
  11.1.1. DEFICIENCY REVIEWS CONDUCTED BY THE CONSULTANT ARE PERFORMED ON A SAMPLING BASIS, AND ANY DEFICIENCY ITEM IS TO BE INTERPRETED AS BEING INDICATIVE OF SIMILAR LOCATIONS ELSEWHERE IN THE WORK, UNLESS OTHERWISE SHOWN.
12. CORRECTION AFTER COMPLETION
 12.1. GENERAL
  12.1.1. SUBMIT SIMILAR GUARANTEE FOR ONE YEAR FROM DATE OF ACCEPTANCE FOR ANY PART OF WORK ACCEPTED BY OWNER, BEFORE COMPLETION OF WHOLE WORK.
 12.2. FINAL REVIEW
  12.2.1. AT PROJECT COMPLETION, SUBMIT WRITTEN REQUEST FOR FINAL REVIEW OF MECHANICAL AND ELECTRICAL SYSTEMS.

BASIC MATERIALS AND METHODS
20 05 01

1. GENERAL
 1.1. SCOPE
  1.1.1. ARTICLES THAT ARE OF A GENERAL NATURE, APPLICABLE TO EACH SECTION OF DIVISION 20 AND 26.
2. ACCESS DOORS
 2.1. PROVIDE ACCESS DOORS TO BE INSTALLED AT LOCATIONS WHERE EQUIPMENT REQUIRING INSPECTION, SERVICE, MAINTENANCE OR ADJUSTMENT IS "BUILT-IN" TO WORK OF OTHER TRADES.
 2.2. SUBMIT SHOP DRAWINGS SHOWING ACCESS DOOR SIZE, TYPE AND LOCATION.
 2.3. CONSTRUCTION:
  2.3.1. CONSTRUCTED OF STEEL, PRIME COATED
  2.3.2. CONSTRUCTED OF STAINLESS STEEL WITH NEOPRENE GASKETED DOOR IN DAMP AND HIGH HUMIDITY AREAS
  2.3.3. GENERALLY FITTED WITH SCREWDRIVER OPERATED LATCHES, EXCEPT IN AREAS SUBJECT TO SECURITY RISKS (PUBLIC CORRIDORS, PSYCHIATRIC PATIENT AREAS, PUBLIC WASHROOMS), IN THESE AREAS DOORS TO BE FITTED WITH KEYED CYLINDER LOCKS WITH SIMILAR KEYS.
3. SLEEVES
 3.1. GENERAL
  3.1.1. SLEEVE PIPES, DUCTS AND CONDUITS PASSING THROUGH MASONRY WALLS, CONCRETE FLOORS, AND FIRE RATED GYPSUM BOARD CEILINGS AND PARTITIONS.
  3.1.2. MAINTAIN FIRE RATING INTEGRITY WHERE PIPES AND DUCTS PASS THROUGH FIRE RATED WALLS, FLOORS AND PARTITIONS.
 3.2. FLOOR AND WALL SLEEVES
  3.2.1. SLEEVES IN FIRE SEPARATIONS:
   3.2.1.A. SIZED TO SUIT FIRE STOPPING METHODS EMPLOYED FOR BARE PIPES, CONDUITS, INSULATED PIPES, AND BARE AND INSULATED DUCTS WITHOUT FIRE DAMPERS, AND
   3.2.1.B. SIZED TO SUIT CONDITIONS OF APPROVAL GIVEN IN MANUFACTURERS INSTALLATION INSTRUCTIONS FOR FIRE AND SMOKE DAMPERS.
  3.2.2. SLEEVES IN OTHER CONSTRUCTION:
   3.2.2.A. SIZED TO CLEAR INSULATED PIPES AND DUCTS BY 13 MM (2 IN) ALL ROUND, AND
   3.2.2.B. SIZED TO CLEAR CONDUITS, BARE PIPES, AND BARE DUCTS BY 6 MM (3 IN) ALL ROUND.
  3.2.3. SLEEVES FOR PIPES, CONDUITS AND DUCTS SMALLER THAN 0.4 M5 (4 SQ FT) THROUGH SOLID WALLS AND FLOORS:
   3.2.3.A. SCHEDULE 40 STEEL PIPE OR 1 MM (20 GA) (MINIMUM) SHEET METAL, LAPPED AND SPOT WELDED.
   3.2.3.B. SLEEVES FOR PIPES, CONDUITS AND DUCTS SMALLER THAN 0.4 M5 (4 SQ FT) THROUGH GYPSUM BOARD PARTITIONS:
    3.1.3.B.A. 1 MM (20 GA) MINIMUM SHEET METAL, LAPPED AND SPOT WELDED WITH 20 MM (¾ IN) LIP FLANGE AT ONE END.
  3.1.4. SLEEVES FOR DUCTS 0.4 M5 (4 SQ FT) AND LARGER THROUGH WALLS AND FLOORS:
   3.1.4.A. 1.6 MM (16 GA) MINIMUM SHEET METAL, LAPPED AND SPOT WELDED WITH 20 MM (¾ IN) LIP FLANGE AT ONE END.
4. FIRE STOPPING AND SMOKE SEALS
 4.1. GENERAL
  4.1.1. PROVIDE FIRE STOPPING AND SMOKE SEALS WHERE DUCTS, PIPES OR CONDUITS PENETRATE FIRE SEPARATIONS. MATERIALS TO BE SUPPLYIED, WORKER TRAINING TO BE ARRANGED, AND INSTALLATION TO BE SUPERVISED, BY A SPECIALIST FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD.
 4.2. PRODUCTS
  4.2.1. MATERIALS TO FORM ULC LISTED OR CUL LISTED/CLASSIFIED ASSEMBLIES.
  4.2.2. OTHER MANUFACTURERS HAVING PRODUCTS WITH EXPLICITLY SIMILAR CHARACTERISTICS, LISTINGS OR CLASSIFICATIONS AND APPROVALS ARE ACCEPTABLE.
 4.3. INSTALLATION
  4.3.1. SEAL SPACE BETWEEN PENETRATING SERVICE AND SLEEVE OR OPENING IN SLAB WITH FIRESTOP AND SMOKE SEALING SYSTEM IN STRICT ACCORDANCE WITH TERMS AND CONDITIONS OF ORIGINAL ULC OR CUL LISTING AND MANUFACTURERS RECOMMENDED PROCEDURES.
  4.3.2. SELECT THICKNESS AND ARRANGEMENT OF BACK-UP MATERIALS TO SUIT SIZE OF SERVICE, LENGTH OF SLEEVE AND ANTICIPATED MOVEMENT.
  4.3.3. SELECT FIRESTOPPING SYSTEM TO ALLOW INSULATION AND VAPOUR BARRIER TO PASS UN-BROKEN THROUGH ASSEMBLY.
  4.3.4. SURFACES TO BE CLEAN, DRY AND FREE FROM DUST, OIL, GREASE, LOOSE OR FLAKING PAINT AND FOREIGN MATERIALS AT TIME OF APPLICATION OF MATERIALS
  4.3.5. DO NOT APPLY FIRE STOPPING MATERIALS TO FIRE OR SMOKE DAMPERS.
5. CUTTING AND PATCHING
 5.1. FORMING, CUTTING AND PATCHING OF GENERAL TRADES WORK TO ACCOMMODATE WORK OF THIS DIVISION, WILL BE DONE BY GENERAL CONTRACTOR TRADES, AND PAID FOR BY THIS DIVISION.
 5.2. EACH TRADE IS RESPONSIBLE FOR PROMPT INSTALLATION OF WORK IN ADVANCE OF CONCRETE POURING, MASONRY, ROOFING, FINISHING TRADES AND SIMILAR WORK.
 5.3. SHOULD ANY CUTTING OR REPAIRING OF EITHER UNFINISHED OR FINISHED NEW WORK OF THESE TRADES BE REQUIRED BECAUSE OF FAILURE TO CO-ORDINATE WORK, TRADE RESPONSIBLE FOR THE FAILURE TO EMPLOY AND PAY PARTICULAR TRADE CONTRACTOR WHOSE WORK IS INVOLVED, TO DO CUTTING AND PATCHING.
 5.4. REPAIR CUT OR DAMAGED SURFACES WITH MATERIALS AND FINISHES TO MATCH EXISTING.
 5.5. NEATLY CUT OR DRILL HOLES IN EXISTING CONSTRUCTION TO ACCOMMODATE PIPING, DUCTWORK OR CONDUITS.
 5.6. LAYOUT CUTTING OF STRUCTURAL ELEMENTS, SUCH AS FLOORS SLABS, WALLS, COLUMNS OR BEAMS AND OBTAIN APPROVAL BEFORE STARTING WORK. CONDUCT A ELECTROMAGNETIC SCAN OF REINFORCING RODS, SUCH AS HILTI PS200 FERROSCAN, AND REVIEW WITH STRUCTURAL ENGINEER. BASED ON THESE RESULTS, ARRANGE AND PAY FOR SUPPLEMENTAL X-RAY EXAMINATION TO LOCATE CONCRETE REINFORCEMENT AND EMBEDMENTS. SUBMIT X-RAYS AND OBTAIN APPROVAL BEFORE STARTING WORK.

METERS AND GAUGES
20 05 19

1. GENERAL
 1.1. SCOPE
  1.1.1. PROVIDE LIQUID FLOW METERS, AND TEMPERATURE AND PRESSURE MEASURING DEVICES.
 1.2. SHOP DRAWINGS / PRODUCT DATA
  1.2.1. SUBMIT MANUFACTURER'S CATALOGUE LITERATURE.
 1.3. APPLICABLE CODES AND STANDARDS;
  1.3.1. ASME B40.200 THERMOMETERS, DIRECT READING AND REMOTE READING
  1.3.2. ASME B40.100 PRESSURE GAUGES AND GAUGE ATTACHMENTS
2. PRODUCTS
 2.1. FLOW INDICATORS;
  2.1.1. CONSTRUCTION:
   2.1.1.A. GIVE VISUAL FLOW INDICATION.
   2.1.1.B. EQUIPPED WITH DUAL FLOW SCALE CALIBRATED IN L/S AND USGPM.
   2.1.1.C. PROTECTED AGAINST ACCIDENTAL BREAKAGE OF THE GLASS INDICATOR.
   2.1.1.D. IN-LINE TYPE FOR PIPE SIZES UP TO NPS 1½.
    STANDARD OF ACCEPTANCE: ITT BELL & GOSSETT, BAILEY
 2.2. FLOW MEASUREMENT SYSTEMS (LIQUIDS)
  2.2.1. PRIMARY FLOW ELEMENTS:
   2.2.1.A. DIFFERENTIAL PRESSURE TYPE, WITH ISOLATING VALVES.
  2.2.2. FLOW ELEMENT IN COMBINATION WITH METER:
   2.2.2.A. ACCURACY OF ± 1% OF READING OVER MINIMUM OF 10:1 TURNDOWN.
   2.2.2.B. REPEATABILITY OF ± 0.1%.
   2.2.2.C. COMPLETE WITH 4-20 MA OR DC OUTPUT DIFFERENTIAL PRESSURE (DP) TRANSMITTER WITH THREE VALVE MANIFOLD FOR ISOLATION AND TESTING.
   2.2.2.D. EQUIPPED WITH DUAL FLOW SCALE CALIBRATED IN L/S AND USGPM.
   2.2.2.E. USED WITH 4-20 MA OR DC OUTPUT DIFFERENTIAL TEMPERATURE TRANSMITTER, WITH TEMPERATURE RTD'S IN THERMOWELLS WITH EXTENSION NECKS, FOR MEASUREMENT OF ENERGY FLOW IN KW AND BTU/HR.
    STANDARD OF ACCEPTANCE: ITT BELL & GOSSETT, BAILEY
 2.3. THERMOMETERS AND PRESSURE GAUGES - SELECTION CRITERIA
  2.3.1. GENERAL
   2.3.1.A. NORMAL OPERATING READING TO BE BETWEEN HALF AND TWO THIRDS OF FULL SCALE RANGE
   2.3.1.B. EXPECTED MAXIMUM AND MINIMUM READINGS TO BE WITHIN SCALE RANGE.
  2.3.1.C. THERMOMETERS TO HAVE BOTH FAHRENHEIT AND CELSIUS SCALES.
  2.3.1.D. PRESSURE GAUGES TO HAVE BOTH PSI AND KPA SCALES.
 2.3.2. PRODUCT IDENTIFICATION
  2.3.2.A. PRESSURE GAUGES AND THERMOMETERS TO BE SELECTED FROM MANUFACTURERS STANDARD PRODUCT LINE.
 2.3.3. MODEL DESIGNATIONS FROM TREMICE CATALOGUE ARE USED TO ESTABLISH QUALITY STANDARDS AND CONSTRUCTION DETAILS TO ALLOW ASSESSMENT OF PRODUCTS FROM OTHER UNLISTED MANUFACTURERS.
 2.4. DIRECT READING THERMOMETERS
  2.4.1. INDUSTRIAL, VARIABLE ANGLE TYPE, LIQUID FILLED, ALUMINUM 230 MM (9 IN) SCALE LENGTH, TO CGSB 14.4.
 2.5. PRESSURE GAUGES
  2.5.1. FOR DIFFERENTIAL PRESSURE MEASUREMENT
   2.5.1.A. 115 MM (4½ IN) DIAL TYPE, SILICONE-FREE DAMPENING, BLACK SOLID FRONT CASE, ½% ACCURACY, ADJUSTABLE POINTER AND MAXIMUM REGISTERING POINTER TO ASME B40.100 GRADE 2A., COMPLETE WITH IMPULSE SNUBBER AND 3-WAY SWITCHING VALVE.
  2.5.2. ACCESSORIES:
   2.5.2.A. PRESSURE SNUBBERS, BRASS OR T303 STAINLESS STEEL CONSTRUCTION.
   2.5.2.B. NEEDLE VALVES, RISING STEM, BRASS OR T316 STAINLESS STEEL CONSTRUCTION.
   2.5.2.C. COIL SYPHONS, SCHEDULE 40 CARBON STEEL.
3. EXECUTION
 3.1. METERING DEVICES
  3.1.1. INSTALLATION
   3.1.1.A. INSTALL FLOW MEASURING DEVICES IN HORIZONTAL STRAIGHT PIPE RUNS, FREE OF VALVES AND FITTINGS.
  3.1.2. LENGTH OF STRAIGHT PIPE BEFORE AND AFTER METERING ELEMENTS:
   3.1.2.A. NOT LESS THAN 1 M (3 FT) BEFORE AND 1 M (3 FT) AFTER OR,
   3.1.2.B. AS RECOMMENDED BY MANUFACTURER.
  3.1.3. MOUNT METER READOUT UNITS AND PROVIDE PIPING AND WIRING TO COMPLETE INSTALLATION.
 3.2. THERMOMETER AND PRESSURE GAUGES - GENERAL INSTALLATION CRITERIA
  3.2.1. INSTALL THERMOMETERS AND GAUGES NOT MORE THAN 3 M (10 FT) FROM FLOOR OR PLATFORM, OR INSTALL REMOTE READING THERMOMETERS AND GAUGES, WITH DIAL MOUNTED AT EYE LEVEL, ON STEEL OR ALUMINUM PLATE.

VALVES
20 05 23

4. SCOPE
 4.1. PROVIDE VALVES IN PIPING SYSTEMS THROUGHOUT PROJECT.
 4.2. APPLICABLE CODES AND STANDARDS
  4.2.1. TEMPERATURE AND PRESSURE RATINGS, MATERIAL COMPOSITION, AND MANUFACTURER'S TESTING PROCEDURES CONFORMING TO LATEST SPECIFICATIONS FROM: MANUFACTURERS STANDARDIZATION SOCIETY OF VALVE AND FITTINGS INDUSTRY (MSS)
 4.3. QUALITY AND EQUIVALENCE
  4.3.1. VALVE SELECTIONS ARE IN GENERAL IDENTIFIED BY MODEL DESIGNATIONS TAKEN FROM MANUFACTURERS CATALOGUES TO INDICATE PHYSICAL PROPERTIES AND QUALITY STANDARDS NOT OTHERWISE DESCRIBED.
  4.3.2. COMPANIES, AND/OR TRADE NAMES LISTED BELOW ARE ACCEPTABLE FOR VARIOUS VALVE TYPES, WHERE PRODUCTS OFFERED ARE ESSENTIALLY SIMILAR TO THOSE IDENTIFIED BY MANUFACTURER OR MODEL NUMBER UNDER "STANDARD OF ACCEPTANCE" DESIGNATION.
   4.3.2.A. SPECIFIC DUTY VALVES ARE SPECIFIED IN EACH PIPING SERVICE ARTICLE.
   4.3.2.B. FOR GATE, GLOBE, ANGLE, AND CHECK VALVES
   4.3.2.C. FOR DOUBLE REGULATING VALVES
   4.3.2.D. FOR SILENT CHECK VALVES
   4.3.2.E. FOR BUTTERFLY VALVES
   4.3.2.F. FOR BALL VALVES
   4.3.2.G. FOR GROOVED PIPING VALVE PRODUCTS
5. PRODUCTS
 5.1. SELECTION CRITERIA
  5.1.1. VALVES TO BE LINE SIZE, SELECTED AS FOLLOWS
   5.1.1.A. FOR SHUT-OFF OR ISOLATING SERVICE, VALVES TO BE
    5.1.1.A.A. GATE
    5.1.1.A.B. BUTTERFLY
    5.1.1.A.C. BALL
   5.1.1.B. FOR FLOW BALANCING AND SHUT-OFF SERVICE VALVES TO BE
    5.1.1.B.A. DOUBLE REGULATING
   5.1.1.C. AT DISCHARGE OF PUMPS CHECK VALVES TO BE SILENT OR SPRING ASSISTED OR COMBINATION CHECK AND FLOW CONTROL VALVES.
  5.1.2. ON MAINS AND RISERS, DRAIN VALVES TO BE SELECTED AS FOLLOWS
   5.1.2.A. ON MAINS NPS 4 AND UNDER
    5.1.2.A.A. NPS 3/4 BRASS THREADED BALL VALVE OF APPROPRIATE PRESSURE RATING WITH HOSE THREAD, CAP AND CHAIN.
   5.1.2.B. ON MAINS NPS 5 AND OVER
    5.1.2.B.A. NPS 1 BRASS THREADED BALL VALVE OF APPROPRIATE PRESSURE RATING WITH HOSE THREAD, CAP AND CHAIN.
 5.2. SPRINKLER AND STANDPIPE VALVES
  5.2.1. APPROVALS
   5.2.1.A. VALVES TO BE ULC AND FM LISTED FOR FIRE PROTECTION.
  5.2.2. GATE VALVES UP TO NPS 2, THREADED
   5.2.2.A. 1200 KPA (175 PSI) CLASS 150 BRONZE BODY, SOLID WEDGE BRONZE DISC, RISING STEM, OS & Y, SCREW IN YOKE BONNET,
  5.2.3. BUTTERFLY VALVES UP TO NPS 2½, THREADED
   5.2.3.A. 1200 KPA (175 PSI), BRONZE BODY, STAINLESS STEEL DISC, WITH LEVER HANDLE
  5.2.4. BUTTERFLY VALVES NPS 2½ AND OVER, GROOVED JOINT STYLE
   5.2.4.A. 1200 KPA (175 PSI), CA

1.3.1. O.REG. 220/01 MADE UNDER THE TSSA ACT
1.3.2. CSA B52 MECHANICAL REFRIGERATION CODE
1.3.3. PIPING STANDARDS TO:
1.3.3.A. ASME B31.9 CODE FOR BUILDING SERVICE PIPING.

2. EXECUTION
2.1. WELDER QUALIFICATION AND WELDING PROCEDURES
2.1.1. WELDING OF PIPING, CONDENSATE, HOT WATER OR CHILLED WATER, AT PRESSURES GREATER THAN 100 KPA (15 PSI)] TO BE CARRIED OUT USING APPROVED PROCEDURES BY WELDERS CERTIFIED FOR PRESSURE PIPING BY TSSA.
2.1.2. WELDING, BOTH SHOP AND FIELD, TO BE ELECTRIC ARC IN ACCORDANCE WITH RECOMMENDATIONS OF CANADIAN WELDING BUREAU.
2.1.3. WELDERS CERTIFICATES AND WELDING PROCEDURES USED ON JOB TO BE AVAILABLE FOR INSPECTION DURING PIPE WELDING OPERATIONS. EACH WELD TO BE STAMPED WITH WELDER'S IDENTIFYING NUMBER.
2.2. WELDED CONNECTIONS TO EXISTING PRESSURE PIPING SYSTEMS
2.2.1. AT THE COMMENCEMENT OF THE WORK, REVIEW WITH AUTHORITY-HAVING-JURISDICTION INSPECTOR TO DETERMINE THEIR WELD TESTING REQUIREMENTS TO VALIDATE THE PROPOSED WELDING PROCEDURES, INCLUDING BUT NOT LIMITED TO:
2.2.1.A. DIMENSIONAL MISALIGNMENT BETWEEN OLD AND NEW PIPE,
2.2.1.B. METALLURGICAL ANALYSIS OF EXISTING PIPING,
2.2.2. AFTER TESTING REQUIREMENTS ARE DETERMINED, PROVIDE A PROPOSED SCHEDULE FOR TIE-IN CONNECTIONS AND REQUIRED EXISTING SERVICE SHUT-DOWN PERIODS, FOR APPROVAL PRIOR TO COMMENCING WORK.
2.3. WELD QUALITY
2.3.1. WELDS TO BE SOLID HOMOGENEOUS PART OF METALS JOINED AND FREE FROM PITS AND INCORPORATED SLAG AND SCALE.
2.3.2. WELD SURFACES TO BE SMOOTH AND REGULAR AND WELD METAL DEPOSITION TO ACHIEVE FULL PENETRATION WITH GROOVE FILLED WITH WELD METAL, FUSED TO THE BASE METAL THROUGHOUT JOINT THICKNESS.
2.3.3. CONDUCT VISUAL EXAMINATION OF WELDS IN ACCORDANCE WITH THE APPLICABLE PIPING STANDARD AND SUBMIT COPY OF EXAMINATION REPORT FOR REVIEW. FOR REGISTERED PRESSURE PIPING SYSTEMS, INCLUDE COPIES OF TSSA FIELD INSPECTION REPORTS.
2.4. RADIOGRAPHY
2.4.1. ARRANGE AND PAY FOR SERVICES OF AN INSPECTION COMPANY SPECIALIZING IN MAKING AND INTERPRETING X-RAYS OF PIPE WELDS.
2.4.2. SUBMIT COPY OF RADIOGRAPH FOR EVERY WELD EXAMINED.
2.4.3. RADIOGRAPHY TO BE IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 PARA. UW-51, "TECHNIQUE FOR RADIOGRAPHIC EXAMINATION OF WELDED JOINTS".
2.4.4. WELDS ARE UNACCEPTABLE WITH IMPERFECTIONS AS DETAILED IN PARA. UW-51, CLAUSE (a)1 TO (a)4 INCLUSIVE OF SAME CODE.
2.4.5. REPAIRS TO BE CARRIED OUT AS PROVIDED IN PARA. UW-38 OF SAME CODE.

HEATING AND COOLING PIPING SYSTEMS GENERAL
23 05 01

1. SCOPE
1.1. PROVIDE HEATING AND COOLING PIPING SYSTEMS
1.2. HOT WATER HEATING SYSTEM
1.2.1. PIPING DESIGN CODE:
1.2.1.A. TO ASME B31.9 BUILDING SERVICE PIPING
1.2.2. SYSTEM INCLUDES:
1.2.2.A. BOILERS
1.2.2.B. HEAT EXCHANGERS
1.2.2.C. PUMPS
1.2.2.D. EXPANSION TANKS
1.2.2.E. CONVECTORS
1.2.2.F. RADIATORS
1.2.2.G. RADIANT PANELS
1.2.2.H. FINNED RADIATION
1.2.2.I. UNIT HEATERS
1.2.2.J. HEATING COILS
1.2.2.K. CONTROLS
1.2.3. SYSTEM DESIGN CRITERIA
1.2.3.A. CONSTANT TEMPERATURE SYSTEM
1.2.3.A.A. SUPPLY TEMPERATURE: [93°C (200°F)][87°C (190°F)]
1.2.3.A.B. RETURN TEMPERATURE: [77°C (170°F)][71°C (160°F)]
1.2.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.2.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.2.3.B. SCHEDULED TEMPERATURE SYSTEM
1.2.3.B.A. MAXIMUM WORKING PRESSURE : 900 KPA (125 PSI)
1.2.3.B.B. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.2.3.C. LOW TEMPERATURE SYSTEM (CONDENSER WATER HEAT RECOVERY)
1.2.3.C.A. SUPPLY TEMPERATURE: 40.5 °C (105 °F)
1.2.3.C.B. RETURN TEMPERATURE: 32 °C (90 °F)
1.2.3.C.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.2.3.C.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.3. COOLING WATER SYSTEMS
1.3.1. PIPING DESIGN CODE:
1.3.1.A. TO ASME B31.9 BUILDING SERVICE PIPING
1.3.2. SYSTEM INCLUDES:
1.3.2.A. REFRIGERATION MACHINES
1.3.2.B. THERMAL STORAGE TANKS
1.3.2.C. ICE BUILDERS
1.3.2.D. CIRCULATING PUMPS
1.3.2.E. PLATE HEAT EXCHANGERS
1.3.2.F. EXPANSION TANK
1.3.2.G. EVAPORATIVE or DRY COOLERS
1.3.2.H. COOLING TOWERS
1.3.2.I. INDOOR CONDENSER WATER BASIN
1.3.2.J. CONDENSER WATER FILTERS
1.3.2.K. COOLING COILS
1.3.2.L. FAN COIL UNITS
1.3.2.M. SERVER ROOM COOLING UNITS
1.3.2.N. CONTROLS
1.3.3. SYSTEM DESIGN CRITERIA
1.3.3.A. CHILLED WATER SYSTEM
1.3.3.A.A. SUPPLY TEMPERATURE: 5.5° C (42° F)
1.3.3.A.B. RETURN TEMPERATURE: 14.4° C (58° F)
1.3.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.3.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.3.3.B. SECONDARY CHILLED WATER SYSTEM
1.3.3.B.A. SUPPLY TEMPERATURE: 13°C (55°F)
1.3.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.3.3.B.C. DESIGN PRESSURE: 1030 KPA (125 PSI)
1.3.3.C. CONDENSER WATER SYSTEM
1.3.3.C.1. SUPPLY TEMPERATURE – SUMMER: 29.5°C (85°F)
1.3.3.C.2. RETURN TEMPERATURE – SUMMER: 35°C (95°F)
1.3.3.C.3. SUPPLY TEMPERATURE – WINTER: 4°C (40°F)
1.3.3.C.4. MAXIMUM WORKING PRESSURE: 700 KPA (100 PSI)
1.3.3.C.5. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.4. GLYCOL SYSTEM
1.4.1. PIPING DESIGN CODE:
1.4.1.A. TO ASME B31.9 BUILDING SERVICE PIPING
1.4.2. SYSTEM INCLUDES:
1.4.2.A. FILLING PUMP
1.4.2.B. REFRIGERATION MACHINES
1.4.2.C. BOILERS
1.4.2.D. [EVAPORATIVE][DRY] COOLERS
1.4.2.E. HEAT EXCHANGERS
1.4.2.F. MIXING TANK
1.4.2.G. CIRCULATING PUMP
1.4.2.H. EXPANSION TANK
1.4.2.I. COILS
1.4.2.J. CONTROLS
1.4.3. SYSTEM DESIGN CRITERIA
1.4.3.A. GLYCOL COOLING SYSTEM
1.4.3.A.A. SUPPLY TEMPERATURE: 2°C (36°F)
1.4.3.A.B. RETURN TEMPERATURE: 15.5°C (60°F)
1.4.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.4.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.4.3.A.E. GLYCOL TYPE: PROPYLENE
1.4.3.A.F. GLYCOL / WATER MIXTURE BY VOLUME: 40 % GLYCOL
1.4.3.A.G. WATER – CITY OF TORONTO
1.4.3.A.G.A. CACO3 = [9 GRAINS]
1.4.3.A.G.B. 32 PPM CHLORIDE IONS
1.4.3.A.G.C. 26 PPM SULPHATE IONS
1.4.3.B. GLYCOL [HEATING][HEAT RECLAIM] SYSTEM
1.4.3.B.A. SUPPLY TEMPERATURE[:][TO HEAT RECLAIM COILS:] –1°C (30°F)
1.4.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.4.3.B.C. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.4.3.B.D. GLYCOL TYPE: PROPYLENE
1.4.3.B.E. GLYCOL / WATER MIXTURE BY VOLUME: 40 % GLYCOL
1.4.3.B.F. WATER – CITY OF TORONTO
1.4.3.B.F.A. CACO3 = [9 GRAINS]
1.4.3.B.F.B. 32 PPM CHLORIDE IONS
1.4.3.B.F.C. 26 PPM SULPHATE IONS

2. PRODUCTS
2.1. GLYCOL
2.1.1. INDUSTRIAL TYPE COOLANT FORMULATED WITH CORROSION INHIBITORS.
2.1.2. PROPYLENE GLYCOL
2.1.3. ETHYLENE GLYCOL
STANDARD OF ACCEPTANCE: DOW – DOWFROST, UNION CARBIDE, INTERSTATE CHEMICAL – INTERCOOL HOUGHTON CHEMICAL – SAFE-T-THERM

3. EXECUTION
3.1. PIPE INSTALLATION
3.1.1. GENERAL LAYOUT OF MAINS, RISERS, RUN-OUTS AND CONNECTION DETAILS OF PIPING SYSTEMS ARE SHOWN.
3.1.2. PROVIDE BENDS, EXPANSION LOOPS, HOSES OR JOINTS TO COMPENSATE FOR PIPE EXPANSION AND CONTRACTION.
3.1.3. ANCHOR, GUIDE AND LATERALLY SUPPORT VERTICAL AND HORIZONTAL PIPING TO SUPPORT FILLED WEIGHT AND ABSORB THRUST UNDER OPERATING CONDITIONS.
3.1.4. ERECT PIPING SO THAT EXPANSION FORCES, GRAVITY FORCES AND THRUST FROM CHANGES IN DIRECTION DO NOT STRESS CONNECTIONS TO APPARATUS.
3.1.5. MECHANICAL GROOVED PIPE, COUPLINGS, FITTINGS AND VALVES MAY BE USED FOR WATER AND GLYCOL PIPING SYSTEMS IN PLACE OF WELDED, FLANGED OR THREADED PIPE JOINTING METHODS.
3.1.6. SEPARATE COPPER PIPE AND FITTING MATERIALS FROM CONTACT WITH FERROUS MATERIAL WITH DI-ELECTRIC COUPLINGS.
3.1.7. INSTALL DRAIN VALVES AT LOW POINTS IN WATER PIPING SYSTEMS AND IN VALVED RUN-OUTS FROM RISERS SO THAT SYSTEM OR ISOLATED PARTS OF SYSTEM CAN BE DRAINED.
3.1.8. DO NOT USE GALVANIZED MATERIALS IN CONTACT WITH GLYCOLS.
3.2. FILLING OF GLYCOL SYSTEMS
3.2.1. DELIVER GLYCOL TO SITE IN MANUFACTURER'S SEALED CONTAINERS.
3.2.2. AFTER SYSTEM HAS BEEN CLEANED AND TESTED FOR LEAKS, FILL WITH WATER THROUGH TEMPORARY WATER METER TO OBTAIN TOTAL SYSTEM VOLUME.
3.2.3. DRAIN WATER FROM SYSTEM AND EITHER FILL WITH PRE-MIXED GLYCOL SOLUTION, OR FIRST WITH CALCULATED VOLUME OF CONCENTRATED GLYCOL AND THEN MAKE UP TO SYSTEM VOLUME WITH WATER.
3.2.4. CIRCULATE SOLUTION FOR ONE WEEK AND THEN TAKE SAMPLES FOR TESTING FOR PERCENTAGE CONCENTRATION BY SPECIFIC GRAVITY METHOD, IN GLYCOL SUPPLIER'S LABORATORY.
3.2.5. SUBMIT RESULTS OF ANALYSIS.
3.2.5.A. IF CORRECTION OF CONCENTRATION IS REQUIRED, AMOUNT OF MIXTURE TO BE DRAWN FROM SYSTEM TO BE CALCULATED AND DRAINED INTO ORIGINAL CONTAINERS. TO THIS ADD WATER OR GLYCOL IN CALCULATED AMOUNTS TO CORRECT CONCENTRATION IN SYSTEM, AND RECHARGED SYSTEM.
3.2.5.B. PROVIDE 24 HOURS NOTICE BEFORE DRAINING AND REFILLING TO CORRECT CONCENTRATION.
3.2.5.C. CIRCULATE AFTER CORRECTING CONCENTRATION FOR A FURTHER 24 HOURS AND RETEST CONCENTRATION.
3.2.6. SUBMIT FINAL REPORT WITH HISTORICAL DATA SHOWING DATES AND TIMES, RESULTS OF EACH ANALYSIS, CALCULATIONS AND CORRECTIONS MADE, AND FINAL CONCENTRATION.
3.2.7. SUPPLY TWO 170 LITRE DRUMS OF 100% INHIBITED GLYCOL.

WATER SPECIALTIES – HEATING AND COOLING
23 21 11

1. SCOPE
1.1. PROVIDE WATER SPECIALTIES IN ACCORDANCE WITH THIS SECTION FOR SYSTEMS WHERE WORKING TEMPERATURES ARE IN RANGE OF –12C TO 120C (10◦F TO 248F) AND WORKING PRESSURE UP TO 1035 KPA (150 PSI).
1.2. THIS SECTION COVERS SPECIALITIES FOR:
1.2.1. HOT WATER AND LOW TEMPERATURE HEATING SYSTEM
1.2.2. EXTERIOR ZONE HEATING AND COOLING SYSTEM
1.2.3. WATER SYSTEM RELIEF VALVE VENTS & OVERFLOWS
1.2.4. GLYCOL HEATING AND COOLING SYSTEMS
1.2.5. CONDENSER WATER SYSTEM
1.2.6. CHILLED WATER SYSTEM
1.3. SHOP DRAWINGS
1.3.1. SUBMIT MANUFACTURERS DATA SHEETS FOR:
1.3.1.A. EXPANSION TANKS, AIR VENTS SEPARATORS STRAINERS PRESSURE REDUCING VALVES PRESSURE RELIEF VALVES, WATER MAKE-UP ASSEMBLIES, PUMP SUCTION DIFFUSERS AND GLYCOL MAKE-UP UNIT AND MIXING TANK.

2. PRODUCTS
2.1. CLOSED EXPANSION TANK
2.1.1. CONSTRUCTION: WELDED CONSTRUCTION CONFORMING TO ASME SECTION VIII FOR UNFIRED PRESSURE VESSELS, CSA B-51, AND PROVINCIAL REGULATIONS
2.1.2. MATERIAL: MANUFACTURED FROM ASTM A516 PRESSURE VESSEL CARBON STEEL PLATE WITH DISHED EDS, ASME CODE RATED FOR 860 KPA (125 PSI) TEST PRESSURE WITH ASME STAMP AND CERTIFICATION
2.1.3. GLYCOL SERVICE: BLACK STEEL FOR GLYCOL SERVICE PRIMED ON EXTERIOR SURFACE ONLY.
2.1.4. NOZZLES AND COUPLINGS
2.1.4.A. NPS 1 EXPANSION PIPE CONNECTION AT BOTTOM
2.1.4.B. NPS 1 MAKE-UP CONNECTION AT BOTTOM
2.1.4.C. NPS 1 DRAIN CONNECTION AT BOTTOM
2.1.4.D. NPS 1 VENT CONNECTION AT TOP
2.1.4.E. RELIEF VALVE CONNECTION NEAR BOTTOM
2.1.4.F. SCHRAEDER VALVE CONNECTION FOR COMPRESSED AIR AT TOP
2.1.5. ACCESSORIES
2.1.5.A. MANHOLE 275 MM X 375 MM (11 IN X 15 IN)
2.1.5.B. STRUCTURAL STEEL SADDLES FOR HORIZONTAL TANKS
2.1.5.C. THREE STRUCTURAL STEEL LEGS FOR VERTICAL TANKS SO THAT BOTTOM OF TANK IS 300 MM (12 IN) OFF FLOOR;
2.2. BLADDER TYPE EXPANSION TANKS
2.2.1. CONSTRUCTION
2.2.1.A. CYLINDRICAL, PRESSURIZED TYPE WITH ELASTOMER BLADDER, SUITABLE FOR 115°C (240°F) OPERATING TEMPERATURE
2.2.1.B. WELDED CONSTRUCTION CONFORMING TO ASME SECTION VIII FOR UNFIRED PRESSURE VESSELS, CSA B-51, AND PROVINCIAL REGULATIONS
2.2.1.C. MANUFACTURED FROM ASTM A516 PRESSURE VESSEL CARBON STEEL PLATE WITH DISHED ENDS
2.2.1.D. FINISH: PRIMED ON OUTSIDE
2.2.1.E. ASME CODE RATED FOR 860 KPA (125 PSI) WORKING PRESSURE WITH ASME STAMP AND CERTIFICATION
2.2.1.F. ANNULAR BASE MOUNT FOR VERTICAL INSTALLATION
2.3. AUTOMATIC AIR VENTS
2.3.1. FLOAT OPERATED WITH BRASS OR CAST IRON BODY
2.3.2. DESIGN PRESSURE: [690 KPA (100 PSI)][1035 KPA (150 PSI)][2070 KPA (300 PSI)] WORKING PRESSURE

STANDARD OF ACCEPTANCE: MAID-O-MIST, TACO, AMTROL NO., SPIRAX SARCO, ITT BELL & GOSSETT

2.4. AUTOMATIC RADIATOR AIR VENTS
2.4.1. FLOAT OPERATED WITH BRASS BODY
2.4.2. DESIGN PRESSURE: [690 KPA (100 PSI)][1035 KPA (150 PSI)][2070 KPA (300 PSI)]
2.5. AIR SEPARATOR–BOILER MOUNTED
2.5.1. DIP TUBE TYPE
2.5.1.A. DESIGN PRESSURE: 860 KPA (125 PSI)
2.6. AIR SEPARATOR (IN–LINE)
2.6.1. SCOOP SEPARATION TYPE
2.6.1.A. DESIGN PRESSURE: 860 KPA (125 PSI)
2.6.2. CENTRIFUGAL SEPARATION TYPE
2.6.2.A. DESIGNED AS UNFIRED PRESSURE VESSEL
2.6.2.B. DESIGN PRESSURE: 860 KPA (125 PSI)
2.7. WATER MAKE–UP ASSEMBLIES
2.7.1. IRON BODY WATER PRESSURE REGULATOR WITH INTEGRAL CHECK, AND FAST FILL /PURGE LEVER
2.7.1.A. STAINLESS STEEL STRAINER
2.7.1.B. IRON BODY DIAPHRAGM OPERATED RELIEF VALVE
2.8. HYDRONIC SYSTEM PRESSURE SAFETY RELIEF VALVES
2.8.1. BRASS OR IRON BODY TO ASME SECTION IV
2.8.1.A. ADJUSTABLE PRESSURE SETTING FROM 55 TO 172 KPA (8 TO 25 PSI)
2.8.1.B. OPERATING DIFFERENTIAL PRESSURE FROM OPEN TO CLOSE NOT MORE THAN 20 KPA (3 PSI)
2.9. STRAINERS
2.9.1. "Y" PATTERN
2.9.1.A. NPS 3 AND SMALLER, WOG SERVICE:
2.9.1.A.A. BRONZE, CAST IRON OR STEEL BODIES
2.9.1.A.B. DESIGN PRESSURE: 1030 KPA (CLASS 150)
2.9.1.A.C. FITTINGS: SCREWED OR FLANGED TO MATCH SPECIFICATION FOR FITTINGS IN SECTION OF PIPING SYSTEM WHERE STRAINER IS TO BE INSTALLED
2.9.1.A.D. BASKET: STAINLESS STEEL, 0.8 MM (1/32 IN) DIAMETER PERFORATIONS
2.10. WATER PRESSURE REDUCING VALVES
2.10.1. CONSTRUCTION
2.10.1.A. SELF–CONTAINED HYDRAULIC PILOT CONTROLLED TYPE
2.10.1.B. SINGLE SEATED WITH RESILIENT DISC IN IRON BODY
2.10.1.C. BRONZE SEAT FOR PRESSURE DROPS BELOW 480 KPA (70 PSI)
2.10.1.D. STAINLESS STEEL SEAT FOR 480 KPA (70 PSI) AND OVER
2.10.1.E. DIAPHRAGM SUITABLE FOR 120◦C (250◦F) SERVICE
2.11. GLYCOL MAKE–UP UNIT AND MIXING TANK
2.11.1. CONSTRUCTION
2.11.1.A. 210 LITRE (55 GALLON) OPEN CYLINDRICAL TANK
2.11.1.B. MATERIAL: POLYPROPLENE, STRUCTURALLY FORMED TANK OR WITH CHANNEL REINFORCED BOTTOM AND SUPPORT STAND
2.11.1.C. ENCLOSED, VENTED TANK, OR HINGED GASKETTED COVER WITH COUNTERWEIGHT BALANCED HOLD–OPEN MECHANISM
2.11.2. FITTINGS AND ACCESSORIES:
2.11.2.A. OVERFLOW, INLET AND SUCTION CONNECTIONS
2.11.2.B. PUMP MOUNTING ARRANGEMENT
2.11.2.C. SUCTION AND DISCHARGE PIPING WITH ISOLATION VALVES AND CHECK VALVES
2.11.3. GLYCOL TRANSFER PUMP
2.11.3.A. SINGLE CLOSE–COUPLED IRON FITTED CENTRIFUGAL FEED PUMP WITH MECHANICAL SEAL, MOUNTED TO MIXING TANK, AND PRE–PIPED TO SUCTION STRAINER
2.11.3.B. RATED FOR [0.63 L/S AT 210 KPA (10 GPM AT 30 PSI).][0.31 L/S AT 420 KPA (5 GPM AT 60 PSI).],
2.11.3.C. LOW WATER LEVEL CUT–OUT SWITCH
2.11.3.D. HIGH WATER LEVEL ALARM
2.11.3.E. SYSTEM LOW PRESSURE PUMP START SWITCH
2.11.3.F. REMOTE ANNUNCIATION CONTACTS FOR LOW LIQUID LEVEL, HIGH LIQUID LEVEL

3. EXECUTION
3.1. WATER SYSTEM EXPANSION TANK
3.1.1. PROVIDE DIAPHRAM TYPE TYPE TANK.
3.1.2. INSTALL EQUALIZER LINE FROM PIPING SYSTEM TO BOTTOM OF TANK,.
3.1.3. PROVIDE DOMESTIC COLD WATER LINE WITH GLOBE VALVE, STRAINER, AND LINE SIZE BACKFLOW PREVENTER WITH ISOLATING VALVES CONNECTED TO EQUALIZER LINE.
3.1.4. PROVIDE WATER MAKE–UP ASSEMBLY ON DOMESTIC WATER LINE ON TANK SIDE OF BACKFLOW PREVENTER, WITH:
3.1.4.A. CODE RATED WATER SAFETY RELIEF VALVE, LOCATED IN PIPING NEAR BOTTOM OF TANK WITH RELIEF PRESSURES SET TO MAINTAIN 70 KPA (10 PSI) AT HIGHEST POINT IN SYSTEM WITH PUMPS OFF
3.1.4.B. RELIEF VALVE OF MINIMUM 20 MM (¾ IN) SIZE AND OF SAME MODEL AND SIZE AS RELIEF VALVE USED ON HEATING CONVERTOR, IF TANK IS CONNECTED TO STEAM GENERATED HOT WATER SYSTEM
3.1.4.C. RELIEF CONNECTION ON BACKFLOW PREVENTER, ON MAKE–UP ASSEMBLY, AND SAFETY RELIEF VALVE PIPED TO NEAREST OPEN DRAIN
3.1.4.D. PRESSURE GAUGE TO SHOW PRESSURE IN TANK
3.1.4.E. COMPRESSED AIR TO EACH TANK OR GROUP OF TANKS WITH GLOBE VALVE AND CHECK VALVE TERMINATING 1200 MM (4 FT) ABOVE FINISHED FLOOR NEAR TANKS WITH 6 M (20 FT) LENGTH OF HOSE AND HOSE END FITTING COMPATIBLE WITH SCHRAEDER CONNECTION ON TANK
3.2. GLYCOL SYSTEM EXPANSION TANK
3.2.1. PROVIDE:
3.2.1.A. CLOSED CYLINDRICAL TYPE
3.2.1.B. EQUALIZER LINE FROM [][AIR SEPARATOR IN] PIPING SYSTEM TO BOTTOM OF TANK,
3.2.1.C. GLYCOL MAKE–UP LINE FROM GLYCOL FILL SYSTEM, AND VALVED DRAIN LINE FROM BOTTOM OF TANK PIPED TO GLYCOL MIXING TANK
3.2.1.D. DOMESTIC COLD WATER LINE WITH GLOBE VALVE, STRAINER, AND LINE SIZE BACKFLOW PREVENTER
3.2.1.E. MANUAL AIR VENT VALVE NEAR TOP OF TANK AND CODE RATED WATER SAFETY RELIEF VALVE, LOCATED IN PIPING NEAR BOTTOM OF TANK WITH RELIEF PRESSURES SET TO MAINTAIN 70 KPA (10 PSI) AT HIGHEST POINT IN SYSTEM WITH SYSTEM CIRCULATING PUMPS OFF
3.2.1.F. RELIEF VALVE OF MINIMUM 20 MM (¾ IN) SIZE AND OF SAME MODEL AND SIZE AS RELIEF VALVE USED ON HEATING CONVERTOR, IF TANK IS CONNECTED TO STEAM GENERATED HOT WATER SYSTEM.,
3.2.1.G. RELIEF CONNECTION ON BACKFLOW PREVENTER PIPED TO NEAREST OPEN DRAIN
3.2.1.H. RELIEF VALVE AND VALVED DRAIN LINE FROM BOTTOM OF TANK PIPED TO GLYCOL MIXING TANK
3.2.1.I. PRESSURE GAUGE TO SHOW PRESSURE IN TANK
3.2.1.J. COMPRESSED AIR TO EACH TANK OR GROUP OF TANKS WITH GLOBE VALVE AND CHECK VALVE, TERMINATING 1200 MM (4 FT) ABOVE FINISHED FLOOR NEAR TANKS WITH 6 M (20 FT) LENGTH OF HOSE AND HOSE END FITTING COMPATIBLE WITH SCHRAEDER CONNECTION ON TANK
3.2.1.K. CONTROLS FOR MAKE–UP PUMP AND ALARM SYSTEM CONNECTED AND TESTED],
3.3. AIR VENTS
3.3.1. PROVIDE ISOLATING VALVES INSTALLED BETWEEN UNIT AND PIPING
3.3.2. INSTALL AIR VENTS AT HIGH POINTS, AND IN SECTIONS OF PIPING SUBJECT TO AIR BINDING, IN BOTH SUPPLY AND RETURN MAINS
3.3.3. PIPE VENT OUTLETS TO DISCHARGE TO DRAIN, OVER JANITORS SINKS, OVER FLOOR DRAINS IN MECHANICAL ROOMS AND OTHER SIMILAR VISIBLE LOCATIONS
3.4. AIR VENTS FOR RADIATORS
3.4.1. INSTALL RADIATOR AIR VENTS ON 20 MM (¾ IN) BY 50 MM (2 IN) LONG AIR CHAMBERS ON RETURN SIDE OF HOT WATER CONVECTOR–RADIATORS AND WALL FIN HEATERS CONNECTED TO TOP OF FLOW RISERS. PIPE VENT OUTLETS TO DRAIN IN VISIBLE LOCATIONS
3.4.2. FIT OTHER HOT WATER CONVECTOR–RADIATORS WITH 20 MM (¾ IN) BY 150 MM (6 IN) AIR CHAMBER WITH SCREWDRIVER OPERATED AIR VENT PIPED THROUGH FRONT OR SIDE OF CABINET. FIT SIMILAR AIR CHAMBER AND SCREWDRIVER OPERATED AIR VENT, THROUGH FRONT OR SIDE OF CABINET, ON HIGH POINTS OF OTHER WALL–FIN HEATING ELEMENTS EXCEPT THAT AIR CHAMBER TO BE AS LONG AS IS POSSIBLE TO INSTALL WITHIN WALL–FIN ENCLOSURE HEIGHT
3.4.3. INSTALL AIR VENT ASSEMBLIES CLEAR OF DAMPERS WITHIN HEATING UNITS
3.5. PRESSURE SAFETY RELIEF VALVES
3.5.1. INSTALL ON HOT WATER BOILERS, HEATING CONVERTORS, EXPANSION TANKS AND OTHER PRESSURE VESSELS IN ACCORDANCE WITH RELEVANT CODES
3.5.2. PIPE OUTLETS TO DRAIN
3.6. STRAINERS
3.6.1. INSTALL STRAINERS IN HORIZONTAL OR DOWN FLOW LINES WITH CLEARANCE FOR REMOVAL OF BASKET.
3.6.2. UP TO NPS 2 SIZE PROVIDE SCREWED BLIND CAPS
3.6.3. ON WATER AND GLYCOL SYSTEMS NPS 2½ AND OVER PROVIDE NPS 1 VALVED BLOWOUT CONNECTION, CONSISTING OF BALL VALVE WITH HOSE END AND CHAINED CAP. PIPE VALVED BLOWOUT CONNECTIONS FROM STRAINERS AT PUMPS TO OPEN DRAIN.
3.6.4. PROVIDE LINE SIZE STRAINER IN EACH OF FOLLOWING LOCATIONS
3.6.4.A. ON INLET SIDE OF WATER METERS
3.6.4.B. ON INLET SIDE OF CONTROL VALVES (EXCEPT AT REHEAT COILS WITH PIPING CONNECTIONS NPS ¾ OR LESS, RADIATION, OR RADIANT PANELS)
3.6.4.C. ON INLET SIDE OF PRESSURE REDUCING VALVES
3.6.4.D. ON SUCTION SIDE OF WATER CIRCULATING PUMPS
3.7. PRESSURE REDUCING VALVES
3.7.1. INSTALL PRESSURE REDUCING VALVE STATIONS WITH SHUT–OFF VALVE ON EITHER SIDE OF ASSEMBLY AND 115 MM (4½ IN) PRESSURE GAUGES ON UPSTREAM AND DOWNSTREAM SIDES OF STATION.

AIR DISTRIBUTION – GENERAL
23 31 01

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE LABOUR, MATERIALS AND EQUIPMENT FOR INSTALLATION, TESTING AND PUTTING INTO OPERATION VENTILATING AND AIR CONDITIONING SYSTEMS
1.2. QUALIFIED TRADESMEN
1.2.1. WORK TO BE DONE BY QUALIFIED TRADESMEN HOLDING CERTIFICATES OF COMPETENCY.
1.3. APPLICABLE STANDARDS
.1 THE ONTARIO BUILDING CODE
.2 REGULATIONS OF PROVINCE CITY, OR LOCAL AUTHORITY HAVING JURISDICTION.

2. EXECUTION
2.1. DUCTWORK
2.1.1. DUCTWORK SYSTEM ROUTING IS SHOWN DIAGRAMMATICALLY. DRAWINGS ARE NOT CONSIDERED TO BE FABRICATION OR INSTALLATION DRAWINGS.
2.1.2. LOCATE MAINS, RISERS AND RUNOUTS TO BE CONCEALED BEHIND FURRINGS OR ABOVE CEILINGS EXCEPT IN MECHANICAL EQUIPMENT ROOMS AND ACCESS SPACES WHERE DUCTWORK IS TO BE EXPOSED.
2.1.3. DETERMINE AREAS WITHOUT CEILINGS FROM ARCHITECTURAL DRAWINGS AND ROOM FINISH SCHEDULES, AND IN THESE AREAS KEEP DUCTWORK AS HIGH AS POSSIBLE.
2.1.4. ANCHOR, GUIDE AND SUPPORT VERTICAL AND HORIZONTAL RUNS OF DUCTWORK TO RESIST DEAD LOAD AND ABSORB THRUST.
2.2. AIR SUPPLY EQUIPMENT
2.2.1. INSTALL AND CONNECT AIR HANDLING UNITS, AND AIR CONDITIONING UNITS, AND BUILD CASING AND PLENUMS.
2.3. AIR EXHAUST EQUIPMENT
2.3.1. INSTALL AND CONNECT EXHAUST FANS, ROOF AND WALL EXHAUSTERS AND DUST AND FUME COLLECTORS.
2.4. TERMINALS DEVICES
2.4.1. LOCATE AND INSTALL TERMINAL BOXES, REGISTERS, DIFFUSERS, AND GRILLE
2.5. LIFE SAFETY
2.5.1. INSTALL FIRE DAMPERS, SMOKE DAMPERS, AND COMBINATION SMOKE AND FIRE DAMPERS TO PROTECT OPENINGS IN FIRE SEPARATIONS.
2.5.2. PROVIDE SMOKE STOPPING AROUND UNPROTECTED DUCTS PASSING THROUGH SMOKE SEPARATIONS.
2.6. AIR BALANCING
2.6.1. CO–OPERATE WITH AIR BALANCING AGENCY; INSTALL SUPPLEMENTARY DAMPERS, ACCESS OPENINGS AND ACCESS DOORS TO FACILITATE TESTING AND ADJUSTMENT.
2.6.2. MINIMUM SET POINT OF VAV BOXES SHALL BE 10% OF MAXIMUM SETTING.

FLEXIBLE DUCTWORK
23 31 16

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE FLEXIBLE DUCTWORK AS SHOWN.
1.2. REFERENCE STANDARDS
1.2.1. CONFORM TO;
1.2.1.A. ULC S110M–1986 – FIRE TESTS FOR AIR DUCTS.
1.2.1.B. ULC 181–1981 – FACTORY MADE AIR DUCTS AND CONNECTIONS.
1.2.1.C. NFPA 90A – INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS.
1.2.1.D. NFPA 90B – INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS.
1.2.1.E. SMACNA – FLEXIBLE DUCT INSTALLATION STANDARDS

2. PRODUCTS
2.1. FLEXIBLE DUCTWORK
2.1.1. GENERAL REQUIREMENTS:
2.1.1.A. FACTORY FABRICATED,
2.1.1.B. PRESSURE DROP COEFFICIENTS AS LISTED BELOW BASED ON SHEET METAL DUCT PRESSURE DROP COEFFICIENT OF 1.00,
2.1.1.C. FLAME SPREAD RATING NOT TO EXCEED 25 AND SMOKE DEVELOPED RATING NOT TO EXCEED 50.
2.2. METALLIC UN–INSULATED FLEXIBLE DUCTWORK
2.2.1. CONSTRUCTION:
2.2.1.A. SPIRAL WOUND FLEXIBLE ALUMINUM,
2.2.1.B. MINIMUM WORKING PRESSURE: 2.5 KPA (10 IN WG),
2.2.1.C. MAXIMUM PRESSURE DROP COEFFICIENT [3],
2.2.1.D. LEAKAGE RATE: IN ACCORDANCE WITH SMACNA
2.3. METALLIC INSULATED FLEXIBLE DUCTWORK
2.3.1. CONSTRUCTION:
2.3.1.A. SPIRAL WOUND FLEXIBLE ALUMINUM WITH FACTORY APPLIED FLEXIBLE GLASS FIBRE THERMAL INSULATION WITH VAPOUR BARRIER AND VINYL OR ALUMINUM JACKET,
2.3.1.B. MINIMUM WORKING PRESSURE: 2.5 KPA (10 IN WG),
2.3.1.C. MAXIMUM PRESSURE DROP COEFFICIENT 3,
2.3.1.D. LEAKAGE RATE: IN ACCORDANCE WITH SMACNA

3. EXECUTION
3.1. DUCT INSTALLATION
3.1.1. MAXIMUM LENGTH OF FLEXIBLE DUCT FEEDING CEILING OUTLET: 2 M (6 FT)
3.1.2. PROVIDE FLEXIBLE DUCT AND MAKE CONNECTIONS TO SUPPLY DIFFUSERS AND GRILLES [AND INDUCTION UNITS] AS SHOWN. DO NOT USE FLEXIBLE DUCT CONNECTORS ON RETURN OR EXHAUST AI

2.6.1. MANUFACTURED PRODUCT:
2.6.1.A. POSITIVE SEAL,
2.6.1.B. LOCKING MECHANISM
2.6.1.C. 350 MM X 450 MM (14 IN X 17 IN) WHERE DUCT SIZE PERMITS

3. EXECUTION
3.1. CONSTRUCTION
3.1.1. CONSTRUCTION DETAILS, SHEET GAUGES, REINFORCING, AND BRACING TO BE TAKEN FROM SMACNA HVAC DUCT CONSTRUCTION STANDARDS (METAL AND FLEXIBLE).
3.1.2. RECTANGULAR DUCTWORK:
3.1.2.A. MAKE UP LONGITUDINAL SEAMS WITH PITTSBURGH LOCK, WITH SEALANT APPLIED PRIOR TO HAMMERING OF JOINT.
3.1.3. ROUND DUCTWORK, 500 PA (2 IN WG) PRESSURE CLASS AND HIGHER:
3.1.3.A. SPIRAL FLAT TYPE LONGTUDINAL SEAM, BUTTON PUNCHED.
3.2. BALANCING DAMPERS
3.2.1. PROVIDE SPLITTER DAMPERS WHERE BRANCH CONNECTIONS ARE TAKEN FROM SUPPLY MAINS.
3.2.2. PROVIDE SINGLE BLADE DAMPERS ON EACH BRANCH OF SUPPLY AIR SYSTEMS DOWNSTREAM OF TERMINAL BOXES.
3.2.3. PROVIDE OPPOSED BLADE DAMPERS (OBD) AT BRANCH AND MAIN CONNECTION ON EXHAUST AND RETURN AIR SYSTEMS.
3.3. WATERTIGHT DUCTS FOR DISHWASHERS, HUMIDIFIERS AND SHOWERS
3.3.1. CONSTRUCTION:
3.3.1.A. WITHOUT LONGITUDINAL SEAMS IN BOTTOM OF HORIZONTAL DUCTS,
3.3.1.B. WITH SOLDERED OR WELDED TRANSVERSE JOINTS BETWEEN BOTTOM SHEETS AND SIDE SHEETS, AND
3.3.1.C. WITH OTHER LONGITUDINAL AND TRANSVERSE JOINTS SEALED WITH TAPE AND DUCT SEALER.
3.3.2. DISHWASHER EXHAUST:
3.3.2.A. TYPE 304 STAINLESS STEEL, EXTENDED FROM STUB CONNECTIONS ON DISHWASHER TO INLET CONNECTION TO EXHAUST FAN,
3.3.2.B. BUILT AS A PAN,
3.3.2.C. SLOPPED BACK TO DRAIN INTO DISHWASHER CONNECTION STUBS WHERE HORIZONTAL RUN IS LESS THAN 3M (10 FT),
3.3.2.D. SLOPED TO BASE OF RISER WHERE HORIZONTAL RUN IS MORE THAN 3M (10 FT), WITH NPS ¾ DRAIN CONNECTION FROM LOW POINTS IN BOTTOM OF DUCT, TRAPPED AND PIPED TO DRAIN.
3.3.3. SHOWER EXHAUST DUCTS:
3.3.3.A. ALUMINUM, EXTENDED MINIMUM OF 1500 MM (5 FT) FROM SHOWER EXHAUST GRILLES AND SLOPED DOWN TO DRAIN BACK THROUGH EXHAUST GRILLES SERVED.
3.4. PROTECTION OF DUCT OPENINGS
3.4.1. CAP OFF ENDS OF UNFINISHED DUCTS WHILE PLASTERING, DRYWALL AND OTHER FINISHING OPERATIONS ARE IN PROGRESS,
3.4.2. COVER OPEN ENDS OR REGISTERS OF ACTIVE EXHAUST/RETURN DUCTS WITH 25 MM (1") THICK FILTER MEDIA SECURED WITH TAPE. MAINTAIN MEDIA UNTIL DUST PRODUCING FINISHING OPERATIONS ARE COMPLETED.
3.5. DUCT ACCESS DOORS:
3.5.1. PROVIDE FOR INSPECTION AND SERVICING OF DUCT MOUNTED COMPONENTS AND CLEANING OF DUCT SYSTEM;
3.5.1.A. LOCATED SUCH THAT ANY SECTION OF DUCT IS NOT MORE THAN 15 M (50 FT) FROM POINT OF ACCESS,
3.5.1.B. AT BASE OF EACH MAIN RISER
3.5.1.C. IN FRONT OF AND BEHIND TURNING VANES
3.5.1.D. AT FIRE, SMOKE, AND MOTORIZED DAMPERS
3.6. DUCT CLEANING
3.6.1. CLEANING TO BE PERFORMED BY AGENT SPECIALIZING IN THIS FIELD OF WORK, BE A MEMBER IN GOOD STANDING WITH NATIONAL AIR DUCT CLEANERS ASSOCIATION (NADCA), AND TO COMPLY WITH NADCA STANDARDS.
3.6.2. CLEAN NEW HORIZONTAL AND VERTICAL DUCTS (SUPPLY, RETURN, EXHAUST, TRANSFER), AS WELL AS, EXISTING SUPPLY AND RETURN DUCTWORK CONNECTED TO NEW FAN SYSTEMS.
3.6.3. CLEAN DUCTWORK USING HIGH POWERED VACUUM SYSTEM, HAND TOOLS AND MECHANICAL BRUSHING SYSTEMS SUCH THAT METAL SURFACES ARE VISIBLY CLEAN.
3.6.4. RESET BALANCING DAMPERS TO ORIGINAL SETTINGS IF MOVED DURING WORK. HAVE TAB AGENT CONFIRM DAMPER SETTINGS.
3.6.5. MAINTAIN SET OF DRAWINGS ON SITE, COLOURED EACH DAY DURING CLEANING TO INDICATE EXTENT OF DUCT CLEANING COMPLETED.
3.6.6. SUBMIT A WRITTEN REPORT, VERIFIED BY TAB AGENT, IDENTIFYING EXTENT OF DUCT SYSTEM CLEANING AND CERTIFYING THAT NADCA STANDARDS HAVE BEEN MET.

ACOUSTIC LINING (DUCTWORK)
23 32 48

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE ACOUSTIC LINING OF DUCTWORK.
2. PRODUCTS
2.1. DUCT LINER – GLASS FIBER
2.1.1. FIBROUS GLASS DUCT LINER DENSITY 24 KG/M3 (1.5 LB/CU FT) WITH ONE SIDE COATED WITH ACRYLIC COATING AND FLEXIBLE GLASS CLOTH REINFORCEMENT.
2.1.2. FLAME SPREAD RATING NOT TO EXCEED 25, SMOKE DEVELOPMENT RATING NOT TO EXCEED 50.
2.1.3. FOR RECTANGULAR DUCTWORK USE 25 MM (1 IN) RIGID LINER,
2.1.4. FOR PLENUMS AND CASINGS USE 50 MM (2 IN) OF FIBROUS GLASS RIGID BOARD DUCT LINER.
2.1.5. FOR ROUND OR OVAL DUCTWORK AND CURVED SURFACES USE 25 MM (1 IN) OF FIBROUS GLASS BLANKET LINER.
2.2. ADHESIVE
2.2.1. FLAME SPREAD RATING NOT TO EXCEED 25, SMOKE DEVELOPED RATING NOT TO EXCEED 50,
2.2.2. TEMPERATURE RANGE– 40°C TO 82°C (– 40°F TO 180°F),
2.2.3. MEET REQUIREMENTS OF NFPA 90A.
2.3. FASTENERS:
2.3.1. 2.0 MM (1/16 IN) DIAMETER WELD PINS,
2.3.2. LENGTH SELECTED TO SUIT THICKNESS OF INSULATION,
2.3.3. 32 MM (1¼ IN) SQUARE NYLON RETAINING CLIPS.
2.4. SEALER AND TAPE
2.4.1. ARMSTRONG WB ARMAFLEX FINISH, MANVILLE SUPERSEAL COATING, AND
2.4.2. POLYVINYL TREATED OPEN WEAVE FIBREGLASS MEMBRANE 50MM (2 IN) WIDE.
3. EXECUTION
3.1. INSTALLATION
3.1.1. DUCT SIZE INDICATED TO BE SIZE AS MEASURED INSIDE LINER
3.1.2. FASTEN LINER TO INTERIOR SHEET METAL SURFACE OF DUCT WITH 100% COVERAGE OF ADHESIVE, AND INSTALL WELD PINS AT 1 PIN PER 0.5M2 (5 SQ FT) BUT NOT LESS THAN 1 ROW ON EACH DUCT SIDE.
3.1.3. POSITION AND ADHERE SHEETS TO OVERLAP PREVIOUSLY INSTALLED SHEETS BY 4 MM (1/8 IN). AFTER BONDING OF SHEETS SPREAD BUTT JOINTS AND BRUSH APPLY ADHESIVE TO BOTH BUTT EDGES AND APPLY PRESSURE TO JOINT.
3.1.4. APPLY TAPE TO JOINTS, EXPOSED EDGES, WELD PINS AND CLIP PENETRATIONS AND DAMAGED AREAS OF LINER.
3.1.5. BED TAPE IN SEALER AND APPLY 2 COATS OF SEALER OVER TAPE.
OVER ACOUSTIC INSULATION IN ROUND OR OVAL DUCTWORK WHERE AIR VELOCITY EXCEEDS 10 M/SEC (2000 FPM)] APPLY PERFORATED METAL LINER AND SECURE WITH WELD PINS AND SPEED WASHERS.

DUCT ACCESSORIES
23 33 05

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE DUCT ACCESSORIES AS SHOWN.
1.2. SHOP DRAWINGS
1.2.1. SUBMIT PRODUCT DATA SHEETS FOR:
1.2.1.A. FLEXIBLE CONNECTIONS
1.2.1.B. SEALANTS
1.2.1.C. TAPES
1.2.1.D. DUCT ACCESS DOORS AND HARDWARE
1.2.1.E. INSTRUMENT TEST PORTS
2. PRODUCTS
2.1. FLEXIBLE CONNECTIONS
2.1.1. NEOPRENE:
2.1.1.A. GALVANIZED 0.66 MM (24 GA) SHEET METAL FRAME, WITH FABRIC CLENCHED WITH DOUBLE LOCKED SEAMS,
2.1.1.B. FIRE RESISTANT, SELF–EXTINGUISHING, NEOPRENE COATED GLASS FABRIC,
2.1.1.C. OPERATING TEMPERATURE: –40°C TO 90°C (–40°F TO 194°F),
2.1.1.D. DENSITY: 0.653 KG/M2 (0.13 LB/SQ FT) IN CONVENTIONAL SYSTEMS.
2.1.2. VINYL COATED, INSULATED:
2.1.2.A. FLAME RESISTANT, 0.56 MM (0.022 IN) THICK VINYL COATED FABRIC ENVELOPE, ENCLOSING 32MM (1¼ IN),12KG/M3 (0.75 LB/CU FT) FIBERGLASS INSULATION,
2.1.2.B. OPERATING TEMPERATURE: 82°C (180°F) CONTINUOUS AND 93°C (200°F) INTERMITTENT,
2.1.3. INSTALLED;
2.1.3.A. IN CONNECTIONS FOR INSULATED DUCT SYSTEMS,
2.1.3.B. IN CIRCULAR DUCT CONNECTIONS SUBJECT TO NEGATIVE PRESSURE WITH DIAMETER LESS THAN 250MM (10IN), AND
2.1.3.C. IN RECTANGULAR DUCT CONNECTIONS SUBJECT TO NEGATIVE PRESSURE WITH SMALLEST SIDE LESS THAT 300MM (12 IN)
2.2. SEALANT
2.2.1. WATER BASED POLYMER EMULSION TYPE FLAME RESISTANT DUCT SEALING COMPOUND.
2.2.2. OPERATING TEMPERATURE RANGE: –29°C TO 93°C (–20°F TO 200°F).
2.3. TAPE
2.3.1. POLYVINYL TREATED OPEN WEAVE GLASS FIBRE TAPE, 50MM (2") WIDE.
2.4. DUCT ACCESS DOORS
2.4.1. CONSTRUCTION – UNINSULATED DUCT OR PLENUM:
2.4.1.A. SHOP OR FIELD FABRICATED FROM SAME MATERIAL AS DUCT, ONE SHEET METAL THICKNESS HEAVIER BUT NOT LESS THAN 0.6MM (26GA.) THICK,
2.4.1.B. WITH GASKETED SHEET METAL ANGLE FRAME.
2.4.2. CONSTRUCTION – INSULATED DUCT OR PLENUM:
2.4.2.A. SHOP FABRICATED AS DOUBLE WALL INSULATED SANDWICH, OF SAME MATERIAL AS DUCT, ONE SHEET METAL THICKNESS HEAVIER BUT NOT LESS THAN 0.6MM (26GA) THICK,
2.4.2.B. WITH GASKETED SHEET METAL ANGLE FRAME AND 25 MM (1") THICK RIGID GLASS FIBRE INSULATION.
2.4.2.C. GASKETED WITH NEOPRENE OR FOAM RUBBER.
2.4.2.D. FITTED WITH HARDWARE AS FOLLOWS;
2.4.2.D.A. TWO SASH LOCKS FOR DOORS UP TO 300MM X 300MM (12" X 12").
2.4.2.D.B. FOUR SASH LOCKS FOR DOORS UP TO 301MM X 450MM (13" x 18").
2.4.1.D.C. PIANO HINGE AND MINIMUM 2 SASH LOCKS FOR DOORS UP TO 451MM X 1000MM (19" X 40")
2.4.1.D.D. PIANO HINGE AND 2 HANDLES OPERABLE FROM BOTH SIDES FOR DOORS OVER 1000MM (40") IN HEIGHT.
2.5. INSTRUMENT TEST PORTS
2.5.1. CONSTRUCTION:
2.5.1.A. .1 1.6MM (16GA.) THICK STEEL BODY ZINC PLATED AFTER MANUFACTURE,
2.5.1.B. .2 CHAIN SECURED NEOPRENE EXPANSION PLUG WITH CAM LOCK HANDLE,
2.5.1.C. .3 28MM (1") MINIMUM INSIDE DIAMETER, LENGTH TO SUIT INSULATION THICKNESS,
2.5.1.D. .4 NEOPRENE MOUNTING GASKET: FLAT FOR RECTANGULAR DUCT AND MOULDED FOR ROUND DUCT.
STANDARD OF ACCEPTANCE: BAKOR, RCD, 3M FASTBOND, DURO DYNE DWN (WATER BASED)
3. EXECUTION
3.1. FLEXIBLE CONNECTIONS
3.1.1. PROVIDE TO ISOLATE AIR HANDLING EQUIPMENT, FANS, DUCTWORK, AND AS SHOWN.
3.1.2. MINIMUM LENGTH: 75 MM (3") LENGTH OF FABRIC MEASURED IN DIRECTION OF AIR FLOW,
3.1.3. MINIMUM DISTANCE BETWEEN METAL PARTS WHEN SYSTEM IS IN OPERATION: 25 MM (1").
3.1.4. ANCHORED ON STATIC SIDE OF CONNECTION.
3.2. SEALANT AND TAPE
3.2.1. APPLY TO DUCTWORK JOINTS AND SEAMS AS DETAILED IN OTHER SECTIONS.
3.3. ACCESS DOORS
3.3.1. INSTALL IN DUCTWORK;
3.3.1.A. BEFORE AND AFTER REHEAT COILS, AND AT
3.3.1.B. FIRE DAMPERS,
3.3.1.C. DUCT SMOKE DETECTORS,
3.3.1.D. VOLUME CONTROL DEVICES, AND
3.3.1.E. CONTROL ELEMENTS.
3.3.2. WELD DOOR FRAMES IN PLACE FOR PLENUMS, CASINGS, AND HIGH VELOCITY DUCTWORK.
3.3.3. DOOR SIZES:
3.3.3.A. AS LARGE AS POSSIBLE, WITH 1:1.5 ASPECT RATIO, FOR DUCT SIDES UP TO AND INCLUDING 360 MM (14"),
3.3.3.B. 300 MM X 380 MM (12 IN X 15") FOR DUCT SIDES 380 MM (15") AND LARGER,
3.3.3.C. 1500 MM (60") HIGH BY 450 MM (18") WIDE IN CASINGS AND PLENUMS.
3.4. INSTRUMENT TEST PORTS
3.4.1. INSTALL FOR DUCT VELOCITY TRAVERSE READINGS AND FOR DUCT AIR TEMPERATURE READINGS.
3.4.2. LOCATE ACROSS DUCT OR PLENUM AT RIGHT ANGLES TO FLOW, AT NOT MORE THAN 250 MM (10") INTERVALS FOR TRAVERSES AND AT NOT MORE THAN 500 MM (20") FOR TEMPERATURE MEASUREMENTS.
3.4.3. INSTALL FOR VELOCITY TRAVERSES;
3.4.3.A. AT DUCTED INLETS TO ROOF AND WALL EXHAUSTERS,
3.4.3.B. AT INLET TO AND OUTLET FROM OTHER FAN SYSTEMS, AND
3.4.3.C. AT MAIN AND BRANCH WHERE BRANCH SERVES MORE THAN ONE OUTLET. PORTS IN MAIN TO BE UPSTREAM OF BRANCH IN BOTH DIVERGING AND CONVERGING FLOW.
3.4.3.D. INSTALL FOR TEMPERATURE MEASUREMENT;
3.4.3.D.A. AT OUTSIDE AIR INTAKES,
3.4.3.D.B. AT INLET AND OUTLET OF COILS, AND
3.4.3.D.C. DOWNSTREAM OF INTERSECTION OF CONVERGING AIR STREAMS OF DIFFERENT TEMPERATURES.

HIGH PRESSURE INDUCTION UNITS AND HOT WATER RADIATORS
23 82 26

1. GENERAL
1.1. SCOPE
1.1.1. INSPECT PERFORMANCE AND CLEAN INDUCTION UNITS OR RADIATORS SHOWN ON FLOOR PLAN BEFORE COMPLETION OF PROJECT.
1.2. CLEANING KIT
1.2.1. HIGH PRESSURE PORTABLE ELECTRIC BLOWER WITH FLEXIBLE HOSE AND ATTACHMENTS FOR CLEANING NOZZLES AND COILS.
2. EXECUTION
2.1. COMPLETION
2.1.1. REMOVE TEMPORARY PROTECTION, CLEAN COILS REMOVE DEBRIS FROM BASE CABINET AND COMB FINS STRAIGHT.
2.1.2. SUPPLY OWNERS OPERATING STAFF WITH TWO CLEANING KITS.

DAMPERS – FIRE AND SMOKE
23 33 15

1. SCOPE
1.1. PROVIDE FIRE AND SMOKE DAMPERS AS SHOWN.
1.2. SHOP DRAWINGS AND PRODUCT DATA
1.2.1. SUBMIT MANUFACTURERS PRODUCT SHEETS WITH INSTALLATION DATA FOR:
1.2.1.A. FIRE DAMPERS.
1.2.1.B. SMOKE DAMPERS.
1.2.1.C. COMBINATION SMOKE AND FIRE DAMPERS.
1.3. APPLICABLE CODES AND STANDARDS
1.3.1. GENERAL:
1.3.1.A. AMCA 500 LABORATORY METHODS OF TESTING DAMPERS FOR RATINGS.
1.3.1.B. AMCA 503 FIRE CEILING (RADIATION), SMOKE, AND FIRE/SMOKE DAMPERS APPLICATION MANUAL.
1.3.2. FIRE DAMPERS:
1.3.2.A. TESTED IN ACCORDANCE WITH APPROPRIATE PROVISIONS OF;
1.3.2.A.A. CAN/ULC – S112 STANDARD METHOD OF FIRE TEST OF FIRE DAMPER ASSEMBLIES
1.3.2.A.B. UL–555 FIRE DAMPERS OR UL–555C CEILING DAMPERS, INCLUDING TESTS TO DEMONSTRATE CLOSURE UNDER DYNAMIC CONDITIONS.
1.3.2.B. LISTINGS:
1.3.2.B.A. LISTED BY AND BEARING LABEL OF ULC
1.3.2.B.B. CLASSIFIED BY AND BEARING LABEL OF UL, LABELLED BY WARNOCK HERSEY OR OTHER APPROVED TESTING AGENCY.
1.3.2.C. IN COMPLIANCE WITH REQUIREMENTS OF ONTARIO BUILDING CODE.
1.3.3. SMOKE DAMPERS:
1.3.3.A. TESTED IN ACCORDANCE WITH APPROPRIATE PROVISIONS OF;
1.3.3.A.A. CAN/ULC – S112.1 STANDARD FOR LEAKAGE RATED DAMPERS FOR USE IN SMOKE CONTROL SYSTEMSUL–555S SMOKE DAMPERS.
1.3.3.B. LISTINGS:
1.1.3.B.A. LISTED BY AND BEARING LABEL OF ULC
1.1.3.B.B. CLASSIFIED BY AND BEARING LABEL OF UL, LABELLED BY WARNOCK HERSEY OR OTHER APPROVED TESTING AGENCY AND MEETING REQUIREMENTS FOR CLASS I LEAKAGE RATING AT 250°C (350°F).
1.1.4. COMBINATION SMOKE AND FIRE DAMPERS:
1.1.4.A. TESTED AND LISTED BY ULC
1.1.4.B. AS SPECIFIED ABOVE FOR BOTH FIRE AND SMOKE DAMPERS.
2. PRODUCTS
2.1. FIRE DAMPERS – GENERAL
2.1.1. TYPE:
2.1.1.A. "STATIC": RATED ONLY TO CLOSE WITH ESSENTIALLY NO AIRFLOW THROUGH DAMPER.
2.1.1.B. "DYNAMIC": RATED TO CLOSE WITH AIR FLOW THROUGH DAMPER.
2.1.2. STYLEP
2.1.3. AS PER SMACNA:
2.1.3.A. TYPE A: BLADES AND FRAMES IN AIRSTREAM,
2.1.3.B. TYPE B: BLADES OUT OF AIRSTREAM,
2.1.3.C. TYPE C: BLADES AND FRAME OUT OF AIRSTREAM, RECTANGULAR, ROUND AND FLAT OVAL DUCTWORK.
2.1.4. RATINGS, EACH DYNAMIC DAMPER;
2.1.4.A. AIR VELOCITY, MAXIMUM: 10 M/S (2000 FPM)
2.1.4.B. DIFFERENTIAL PRESSURE, MAXIMUM:1000 PA (4 IN WC.)
2.2. FIRE DAMPERS – CURTAIN TYPE
2.2.1. CONSTRUCTION:
2.2.1.A. FRAME: G60 ROLL FORMED GALVANIZED STEEL FRAME,
2.2.1.B. BLADES: CURTAIN TYPE, INTERLOCKING BLADES, G60 GALVANIZED STEEL,
2.2.1.C. SLEEVE: SAME MATERIAL AS DAMPER FRAME, LENGTH TO SUIT APPLICATION WITH STEEL ENCLOSURE AND TRANSITION COLLARS, AND RETAINING ANGLES. FOR TYPE B DAMPERS, TOP OF SLEEVE IS FORMED CLOSELY AROUND TOP OF DAMPER; SLEEVE CONSTRUCTION THAT LEAVES THE BLADE PACK IN THE AIRSTREAM IS NOT PERMITTED.
2.2.1.D. DAMPER ENCLOSURE: TYPE A, B, AND C.
2.2.1.E. FUSIBLE LINK: 74°C (165°F) UNLESS OTHERWISE SHOWN.
2.2.1.F. NOTWITHSTANDING THE ABOVE, FRAME, SLEEVE, AND BLADES TO BE STAINLESS STEEL WHERE DAMPER IS INSTALLED IN A DUCT SYSTEM WHICH IS STAINLESS STEEL.
2.2.2. DYNAMIC DAMPERS:
2.2.2.A. AS ABOVE, AND
2.2.2.B. FITTED WITH STAINLESS STEEL CLOSURE SPRING,
2.2.2.C. STATIC DAMPERS:
2.2.2.C.A. AS ABOVE, AND
2.2.2.C.B. MOUNTING IN VERTICAL PLANE: FITTED WITH STAINLESS STEEL CLOSURE SPRING.
2.2.2.C.C. MOUNTING IN HORIZONTAL PLANE: FITTED WITH STAINLESS STEEL CLOSURE SPRING.
2.3. FIRE DAMPERS – DYNAMIC TYPE
2.3.1. CONSTRUCTION
2.3.1.A. FRAME: G60 GALVANIZED STEEL HAT CHANNEL,
2.3.1.B. LINKAGE: CONCEALED IN FRAME (OUT OF AIRSTREAM),
2.3.1.C. JACKSHAFT: WITH INTERNAL LOCKING QUADRANT, FOR USE AS A BALANCING DAMPER,
2.3.1.D. SLEEVE: SAME MATERIAL AS DAMPER FRAME, LENGTH TO SUIT APPLICATION WITH STEEL ENCLOSURE AND TRANSITION COLLARS, AND RETAINING ANGLES,
2.3.1.E. ENCLOSURE: TYPE A AND B
2.3.1.F. FUSIBLE LINK: HIGH TORQUE SPRING/FUSIBLE LINK, 74°C (165°F) UNLESS OTHERWISE SHOWN.
2.3.1.G. NOTWITHSTANDING THE ABOVE, FRAME, SLEEVE, AND BLADES TO BE STAINLESS STEEL WHERE DAMPER IS INSTALLED IN A DUCT SYSTEM WHICH IS STAINLESS STEEL.
2.3.2. OPERATOR, ELECTRIC:
2.3.2.A. WHERE REQUIRED BY LISTING, FOR MULTIPLE DAMPER INSTALLATIONS:
2.3.2.A.A. FACTORY INSTALLED ELECTRIC TWO POSITION, FAIL CLOSE, OPERATOR, 120 VAC MOTOR,
2.3.2.A.B. ELECTRIC RESETTABLE LINK: 121°C (250°F), WITH MANUAL RESET BUTTON,
2.3.2.A.C. CONTROLLED RATE SPRING CLOSURE.
2.4. SMOKE DAMPERS – DYNAMIC TYPE
2.4.1. CONSTRUCTION
2.4.1.A. FRAME: G60 GALVANIZED STEEL HAT CHANNEL, WITH STAINLESS STEEL JAMB SEALS,
2.4.1.B. BLADES: , PARALLEL ACTION, INTERLOCKING BLADES, 6063–T5 EXTRUDED ALUMINUM, WITH SILICONE BLADE SEALS,
2.4.1.C. LINKAGE: EXTERIOR SIDE OF FRAME (OUT OF AIRSTREAM),
2.4.1.D. SLEEVE: SAME MATERIAL AS DAMPER FRAME, LENGTH TO SUIT APPLICATION WITH STEEL ENCLOSURE AND TRANSITION COLLARS, CAULKED JOINTS, AND RETAINING ANGLES,
2.4.1.E. ENCLOSURE: TYPE A AND B
2.4.1.F. FUSIBLE LINK: HIGH TORQUE SPRING/FUSIBLE LINK, 74°C (165°F) UNLESS OTHERWISE SHOWN.
2.4.1.G. NOTWITHSTANDING THE ABOVE, FRAME, SLEEVE, AND BLADES TO BE STAINLESS STEEL WHERE DAMPER IS INSTALLED IN A DUCT SYSTEM WHICH IS STAINLESS STEEL.
2.4.2. OPERATOR, ELECTRIC:
2.4.2.A. FACTORY INSTALLED ELECTRIC TWO POSITION, FAIL CLOSE, OPERATOR, 120 VAC MOTOR,
2.4.2.B. ELECTRIC RESETTABLE LINK: 121°C (250°F), WITH MANUAL RESET BUTTON,
2.4.2.C. CONTROLLED RATE SPRING CLOSURE.
2.4.2.D. MAXIMUM POWER: 25 VA OPENING, 12 VA HOLDING.
2.4.3. DAMPER POSITION SWITCH:
2.4.3.A. FACTORY INSTALLED, DAMPER POSITION CONTACT SWITCHES,
2.4.3.A.A. PROVE DAMPER OPEN,
2.4.3.A.B. PROVE DAMPER CLOSED.
3. EXECUTION
3.1. FIRE DAMPERS AND FIRE STOP FLAPS
3.1.1. INSTALL FIRE DAMPERS AND FIRE STOP FLAPS THROUGHOUT SUPPLY, RETURN AND EXHAUST AIR SYSTEMS..
3.1.2. INSTALL FIRE DAMPERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, WITH SLEEVE, DUCT CONNECTIONS AND ANGLE SUPPORTS TO COMPLY WITH TERMS AND CONDITIONS OF LISTING OR CLASSIFICATION AND MAINTAIN INTEGRITY OF FIRE WALL AND/OR FIRE SEPARATION.
3.2. FIRE DAMPER SELECTION
3.2.1. SELECT DAMPER TYPES AS FOLLOWS:
3.2.1.A. "DYNAMIC" – ALL LOCATIONS,
3.2.1.B. "STATIC" – RESTRICTED TO UNDUCTED, TRANSFER AIR OPENINGS ONLY.
3.2.1.C. "STATIC" – IN AIR HANDLING SYSTEMS DESIGNED TO SHUT–DOWN ON FIRE ALARM AND NOT USED FOR SMOKE VENTING OR CONTROL SYSTEMS.
3.2.2. SELECT DAMPER STYLES AS FOLLOWS:
3.2.2.A. DYNAMIC DAMPER:
3.2.2.A.A. REQUIREMENT IN EACH COLUMN MUST BE MET.
3.2.2.A.B. WIDTH IS DUCT DIMENSION PARALLEL TO BLADES, HEIGHT IS DUCT DIMENSION PERPENDICULAR TO BLADES.
3.2.2.B. STATIC DAMPERS:
3.2.2.B.A. REQUIREMENT IN EACH COLUMN MUST BE MET.
3.2.2.B.B. WIDTH IS DUCT DIMENSION PARALLEL TO BLADES, HEIGHT IS DUCT DIMENSION PERPENDICULAR TO BLADES.
3.2.3. INSTALL INDIVIDUAL DAMPERS AND/OR ASSEMBLIES OF INDIVIDUAL DAMPERS WITHIN LIMITATIONS OF LISTING OR CLASSIFICATION;
3.2.3.A. USE CURTAIN DAMPERS IN SINGLE DAMPER INSTALLATIONS;
3.2.3.A.A. FOR GREATER CLARITY, DO NOT USE CURTAIN DAMPERS IN MULTIPLE DAMPER ASSEMBLIES, WITH OR WITHOUT MULLIONS.
3.2.3.B. WHERE DUCT SIZE EXCEEDS ABOVE REQUIREMENTS FOR CURTAIN DAMPERS, USE MULTIBLADE FIRE DAMPERS,
3.2.3.C. WHERE LISTING REQUIRES MULTIPLE DAMPER ASSEMBLIES, USE MULTIBLADE FIRE DAMPERS,
3.2.3.D. WHERE DUCT SIZE EXCEEDS ALLOWABLE DIMENSIONS FOR LISTED OR CLASSIFIED MULTIBLADE FIRE DAMPER ASSEMBLIES, USE COMBINATION FIRE AND SMOKE DAMPERS.
3.2.4. INSTALL STAINLESS STEEL DAMPERS IN STAINLESS STEEL DUCT SYSTEMS AND/OR WHEREVER DUCTWORK IS SPECIFIED TO BE WATERTIGHT CONSTRUCTION.
3.2.5. INSTALL FIRE STOP FLAPS IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS TO COMPLY WITH TERMS AND CONDITIONS OF LISTING OR CLASSIFICATION. POSITION SUPPLIED THERMAL BLANKETS TO COVER CEILING DIFFUSERS.
3.3. FIRE DAMPER SLEEVES
3.3.1. FABRICATE FIRE DAMPER SLEEVES IN ACCORDANCE WITH DAMPER LISTING REQUIREMENTS, AND AS DESCRIBED UNDER PRODUCTS HEREIN.
3.3.1.A. FOR TYPE 'B' DAMPERS, FABRICATE THE SLEEVE TO KEEP THE FOLDED–BLADE STACK OUT OF THE AIR STREAM, BY FORMING THAT PORTION OF THE SLEEVE TO WRAP–AROUND THE BLADE STACK TO ELIMINATE AIR POCKETS ON THE ENTERING AND LEAVING SIDE OF THE DAMPER.
3.4. SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS
3.4.1. INSTALL SMOKE DAMPERS AND COMBINATION SMOKE AND FIRE DAMPERS, WITH LEAKAGE CLASS AS INDICATED, THROUGHOUT SUPPLY, RETURN AND EXHAUST AIR SYSTEMS AS SHOWN. PROVIDE LOW PRESSURE LOSS DAMPERS WHERE INDICATED.
3.4.2. INSTALL INDIVIDUAL DAMPERS AND/OR ASSEMBLIES OF INDIVIDUAL DAMPERS WITHIN LIMITATIONS OF LISTING OR CLASSIFICATION.
3.4.3. WHERE COMBINATION SMOKE AND FIRE DAMPERS ARE SHOWN IN STAINLESS STEEL OR WATERTIGHT DUCT SYSTEMS, INSTALL STAINLESS STEEL INTERLOCKING BLADE FIRE DAMPER AND SEPARATE SMOKE DAMPER CONSTRUCTED TO LISTED OR CLASSIFIED LEAKAGE RATING, BUT WITH STAINLESS STEEL BLADES.
3.4.4. INSTALL AND CONNECT DAMPER OPERATORS TO ACHIEVE SMOKE CONTROL AND SMOKE VENTING SEQUENCES AS SHOWN.
3.5. POWER FOR SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS
3.5.1. POWER WIRE AND CONDUIT PROVIDED BY DIVISION 26 UP TO JUNCTION BOX ADJACENT TO DAMPER.
3.5.2. PROVIDE WIRE AND CONDUIT BETWEEN JUNCTION BOX AND DAMPER ACTUATOR.
3.6. DAMPER ACCESS
3.6.1. POSITION DUCT ACCESS DOOR AT EACH FIRE DAMPER, TO PERMIT VISUAL INSPECTION AND REPLACEMENT OF FUSIBLE LINK.
3.6.2. POSITION DUCT ACCESS DOOR AT EACH COMBINATION FIRE AND SMOKE DAMPER, TO PERMIT VISUAL INSPECTION AND SERVICE OF DETECTION/ACTUATION MECHANISM.
3.6.3. PROVIDE SIMILAR ACCESS DOOR UPSTREAM OR DOWNSTREAM OF EACH SMOKE DAMPER FOR VISUAL INSPECTION.

LOUVRES
23 33 63

1. GENERAL
1.1. SCOPE
1.1.1. LOUVRES ARE PROVIDED UNDER GENERAL TRADES SCOPE OF WORK. PROVIDE LOUVRES AS SHOWN.
1.2. SHOP DRAWINGS
1.2.1. SUBMIT MANUFACTURER'S DATA SHEETS FOR WALL LOUVRES WITH MODEL NUMBERS, DESIGN DATA, SUPPORT AND ANCHOR DETAILS AND OUTLINE DIMENSIONS.
2. PRODUCTS
2.1. LOUVRES
2.1.1. PERFORMANCE:
2.1.1.A. FREE AREA NOT LESS THAN 40% OF NOMINAL SIZE,
2.1.1.B. CONSTRUCTION:
2.1.1.B.A. MATERIAL: EXTRUDED ALUMINUM ALLOY [6063–T5],
2.1.1.B.B. EXPOSED JOINTS GROUND FLUSH AND SMOOTH,
2.1.1.B.C. STORM PROOF PATTERN BLADE WITH CENTRE WATERSHED, REINFORCING BOSSES AND MAXIMUM BLADE LENGTH OF 1500 MM (60 IN),
2.1.1.B.D. FRAME, HEAD, SILL AND JAMB: 150 MM (6 IN) DEEP ONE PIECE EXTRUSIONS, MINIMUM 3 MM (C IN) THICK WITH INTEGRAL CAULKING SLOT,
2.1.1.B.E. MULLIONS: AT 1500 MM (60 IN) MAXIMUM CENTRES.
2.1.1.B.F. FASTENERS: STAINLESS STEEL TO (SOCIETY OF AUTOMOTIVE ENGINEERS) SAE–194–AF WITH SAE–194–SFB NUTS AND RESILIENT NEOPRENE WASHERS BETWEEN ALUMINUM AND HEAD OF BOLT OR BETWEEN NUT, STAINLESS STEEL WASHER AND ALUMINUM BODY,
2.1.1.B.G. SCREEN:
– 2 MM (14 GA) WIRE IN FORMED U–FRAME,
– EXHAUST LOUVRES: 12 MM (½ IN) MESH,
– INTAKE LOUVRES: 25 MM (1 IN) MESH.
2.1.1.B.H. FINISH: CLEAR ANODIZED SATIN.
STANDARD OF ACCEPTANCE: CONSTRUCTION SPECIALTIES – MODEL 6110, AIROLITE – CB638 ALUMAVENT – AL–445–5, CARNES, K.N. CROWDER – CANADIAN LOUVRES 411S
3. EXECUTION
3.1. INSTALLATION
3.1.1. CONFIRM OPENING SIZE AND CO–ORDINATE LOCATION OF LOUVRES WITH OTHER TRADES.
3.1.2. WHERE BLANK–OFF OPENINGS AT BACK OF LOUVRE ARE OVERSIZED, INSTALL 1.2 MM (18 GA) REINFORCED GALVANIZED SHEET STEEL BLANK–OFFS, SEALED WITH FIRE RESISTANT MASTIC BETWEEN GALVANIZED STEEL AND ALUMINUM.

GRILLES, REGISTERS AND DIFFUSERS
23 37 13

1. SCOPE
1.1. PROVIDE GRILLES, REGISTERS, AND DIFFUSERS AS SHOWN.
1.2. SHOP DRAWINGS
1.2.1. SUBMIT MANUFACTURER'S DATA SHEETS WITH EQUIPMENT MODEL NUMBERS, PERFORMANCE AND DESIGN DATA, OUTLINE DIMENSIONS, SUPPORT RECOMMENDATIONS AND CONNECTION DETAILS.
2. PRODUCTS
2.1. GENERAL
2.1.1. GRILLES, REGISTERS AND DIFFUSERS:
2.1.1.A. PRODUCT OF ONE MANUFACTURER WHERE SAME MODEL OR TYPE IDENTIFICAT

ADJUSTABLE MINIMUM STOP

2.2.1.B. DAMPER ARRANGED "NORMALLY OPEN" FOR MORNING WARM–UP.

2.2.1.C. CONTROLLER CAPABLE OF MAINTAINING AIR QUANTITY WITHIN ±5% OF SET VALUE BETWEEN ZERO AND STIPULATED RATED AIR FLOW,

2.2.1.D. SOUND LEVEL BELOW SPECIFIED VALUES WHEN OPERATING FROM MINIMUM TO MAXIMUM INLET STATIC PRESSURE.

2.2.2. SILENCER/ATTENUATOR:

2.2.2.A. ON BOX DISCHARGE, ACOUSTICALLY TREATED OPEN END OR MULTIPLE OUTLET ATTENUATOR 900MM (30 IN) LONG ON BOXES UP TO SIZE 10 AND 1.5M (5 FT) LONG ON BOXES SIZE 12 AND LARGER

2.2.2.B. ACOUSTIC LINING – FIBREGLASS:

2.2.2.B.A. 20MM (13/16 IN) THICK, 64KG/M3 (4 LB/SQ FT) DENSITY, RIGID FIBREGLASS WITH FIRE RESISTIVE REINFORCED ALUMINUM FOIL–SCRIM–KRAFT (FSK) FACING,

2.2.2.B.B. FLAME SPREAD RATING NOT TO EXCEED 25, SMOKE DEVELOPMENT RATING NOT TO EXCEED 50,

2.2.2.B.C. FASTENED TO INTERIOR SHEET METAL SURFACE WITH 100% COVERAGE OF ADHESIVE, AND FASTENERS AT 1 PIN PER 0.2M2 (2 SQ FT) BUT NOT LESS THAN 1 ROW ON EACH DUCT SIDE.

2.2.2.B.D. EDGES CONCEALED BY METAL NOSINGS AT INLET AND DISCHARGE, WITH NOTCH AND TUCK FABRICATION AND SEAMS PROTECTED BY 2 STRIPS

STANDARD OF ACCEPTANCE: STERI–LINER DUCT LINER FASTENERS: 2.0 MM (1/16 IN) DIAMETER PINS, LENGTH SELECTED TO SUIT THICKNESS OF INSULATION, 32 MM (1¼ IN) SQUARE NYLON RETAINING CLIPS.

2.3. CONTROLLERS

2.3.1. DIRECT DIGITAL CONTROLLERS (DDC) INCLUDING ACTUATORS TO BE SUPPLIED BY A LANDLORD APPROVED CONTROLS CONTRACTOR AND MOUNTED ON THE TERMINAL BOX IN THE FIELD.

2.3.2. AIR FLOW SENSOR TO BE PROVIDED BY TERMINAL BOX MANUFACTURER.

2.3.3. .3 120 VAC TO 24 VAC TRANSFORMER FOR DDC CONTROLLER TO BE SUPPLIED BY APPROVED CONTROLS CONTRACTOR AND FACTORY INSTALLED BY THE TERMINAL BOX MANUFACTURER.

2.3.4. FOR PNEUMATIC CONTROL SYSTEMS PLEASE SEEK CLARIFICATION ON SCOPE OF WORK BEFORE PRICING.

3. EXECUTION

3.1. BOX INSTALLATION

3.1.1. SUPPORT TERMINAL BOXES FROM BUILDING STRUCTURE WITH ANGLES, HANGERS AND SUPPLEMENTARY STEEL BEFORE INSTALLATION OF PIPING AND CONNECTING DUCTWORK.

3.1.2. PROVIDE ACCESS DOOR IN DUCTWORK DOWNSTREAM OF REHEAT COIL.

3.2. DUCTWORK CONNECTIONS

3.2.1. CONNECT INLET DUCTWORK WITH SPIRAL FLAT SEAM ROUND DUCT OF SAME DIAMETER AS TERMINAL BOX INLET

3.2.2. SUPPORT OUTLET DUCTWORK INDEPENDENT FROM BOX.

3.2.3. PROVIDE SCREW DRIVER AIR VENT AT HIGH POINT OF PIPING TO EACH COIL.

3.3. ELECTRICAL CONNECTIONS

3.3.1. ELECTRICAL WILL PROVIDE 120 VOLT, SINGLE PHASE POWER SUPPLY WITH A JUNCTION BOX FOR EACH GROUP OF TERMINAL BOXES WITH MAXIMUM OF 12 TERMINAL BOX CONTROLS FED FROM ONE JUNCTION BOX. EXTEND POWER SUPPLY FROM THESE JUNCTION BOXES AND CONNECT TO TERMINAL UNITS.

3.4. LEAKAGE TESTING

3.4.1. TERMINAL BOXES AND ATTENUATORS TO BE INCLUDED IN DUCTWORK LEAKAGE TESTING.

DUCTWORK INSULATION
23 37 16

1. GENERAL

1.1. SCOPE

1.1.1. INSULATE AND FINISH DUCTS, CASING, AND PLENUMS;

1.1.2. PROVIDE INSULATION, SEALER COATINGS, FINISHES, AND MECHANICAL PROTECTION.

1.1.3. INSULATION IS NOT REQUIRED ON FACTORY INSULATED AND/OR AND ACOUSTICALLY LINED DUCTWORK EXCEPT AS OTHERWISE SHOWN.

1.2. QUALITY

1.2.1. MANUFACTURERS AND PRODUCTS ARE LISTED IN THIS SECTION TO ESTABLISH QUALITY AND MANUFACTURING STANDARDS. PRODUCTS FROM OTHER MANUFACTURERS WITH EXPLICITLY SIMILAR CHARACTERISTICS MAY BE ACCEPTABLE BUT MUST BE SUBMITTED AS AN ALTERNATIVE PRODUCT SUBMISSION.

1.3. QUALIFICATIONS

1.3.1. PROVIDE INSULATION AND COVERING BY RECOGNIZED SPECIALIST APPLICATOR WITH AN ESTABLISHED REPUTATION FOR THIS TYPE OF WORK.

STANDARD OF ACCEPTANCE: CUSTOM INSULATION SYSTEMS, GUARANTEED INSULATION LTD, WHITE & GREER CO LTD, DEWPOINT INSULATION SYSTEMS.

1.4. SAMPLE BOARDS

1.4.1. SUBMIT SAMPLE ASSEMBLY OF EACH TYPE OF INSULATION AND COVERING.

1.5. MATERIAL TEST CRITERIA

1.5.1. INSULATION, ADHESIVES, COATINGS, FINISHES, SEALERS, AND TAPES:

1.5.1.A. MAXIMUM FLAME SPREAD RATING OF 25 TO CAN/ULC–S102,

1.5.1.B. MAXIMUM SMOKE DEVELOPED RATING OF 50 TO CAN/ULC–S102.

1.5.1.B.A. EXCEPTION: VAPOR BARRIER MASTICS INSTALLED OUTSIDE OF BUILDING.

1.6. APPLICABLE CODES AND STANDARDS

1.6.1. MATERIAL AND METHOD OF APPLICATION TO COMPLY WITH OR BE TESTED IN ACCORDANCE WITH FOLLOWING STANDARDS;

1.6.1.A. THERMAL INSULATION ASSOCIATION OF CANADA (TIAC) NATIONAL INSULATION STANDARD, EXCLUDING SECTION 12

1.6.1.B. NFPA 90–A INSTALLATION OF AIR–CONDITIONING AND VENTILATING SYSTEMS

1.6.1.C. ASHRAE/IES 90.1 ENERGY STANDARD FOR BUILDINGS EXCEPT LOW–RISE RESIDENTIAL BUILDINGS

1.6.1.D. NFPA 255 TEST OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS

1.6.1.E. CAN/ULC–S102 STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF FLOORING, FLOOR COVERING, AND MISCELLANEOUS MATERIALS AND ASSEMBLIES

2. PRODUCTS

2.1. ADHESIVES, FASTENERS, AND TAPE

2.1.1. CONTACT BOND CEMENT:

2.1.1.1. FOR QUICK SETTING FOR METAL SURFACES.

2.1.2. WATERPROOF VAPOUR RETARDER:

2.1.2.A. FOR FLEXIBLE ELASTOMERIC CLOSED CELL FOAM:

2.1.3. LAP SEAL ADHESIVE:

2.1.3.A. FOR JOINTS AND LAP SEALING OF VAPOUR BARRIERS.

2.1.4. CONTACT ADHESIVE:

2.1.4.A. FOR FIBROUS INSULATION.

2.1.5. VAPOUR BARRIER TAPE:

2.1.5.A. COLOUR MATCHED AND FOIL FACED

2.1.5.B. UL 181A LISTED.

2.1.6. WELD PINS, STUDS AND CLIPS

2.1.7. STAPLES

2.1.7.A. MONEL, FLARE TYPE, MINIMUM SIZE 12 MM (½ IN).

2.1.8. TIE WIRE

2.1.8.A. 1.6 MM (16 GA) STAINLESS STEEL WITH TWISTED ENDS.

2.1.9. CAULKING

2.1.9.A. FAST–DRYING COLOUR MATCHED FLEXIBLE BUTYL ELASTOMER BASED VAPOUR BARRIER SEALANT.

2.2. COATINGS AND MEMBRANES

2.2.1. REINFORCING MEMBRANE:

2.2.1.A. SYNTHETIC FIBRE:

2.2.1.A.A. LENO WEAVE,

2.2.1.A.B. INDOOR AND OUTDOOR USE.

2.2.1.B. GLASS–FIBRE FABRIC:

2.2.1.B.A. INDOOR USE.

2.2.1.C. GLASS–FIBRE FABRIC FOR USE WITH ELASTOMERIC CLOSED CELL FOAM:

2.2.1.C.A. INDOOR USE.

2.2.2. BREATHER COATING – INDOORS:

2.2.2.A. FOR BREATHER COATINGS AND LAGGING ADHESIVE,

2.2.2.B. WHITE IN COLOUR,

2.2.2.C. FOR INSULATION EXCEPT ELASTOMERIC CLOSED CELL FOAM.

2.2.2.D. FOR USE WITH ELASTOMERIC CLOSED CELL FOAM.

2.3. INSULATION CEMENT

2.3.1. HYDRAULIC–SETTING FINISHING TYPE.

2.4. FIELD APPLIED FINISHES

2.4.1. PVC (POLYVINYL CHLORIDE) FINISH JACKET:

2.4.1.A. MINIMUM 20 MIL THICKNESS WITH PERMEABILITY NOT MORE THAN 0.09 PERMS,

2.4.1.B. FLEXIBLE FLAT–SHEET,

2.4.1.C. PRESSURE SENSITIVE, COLOUR MATCHING VINYL TAPE.

2.4.2. FABRIC FINISH JACKET:

2.4.2.A. ULC LISTED PLAIN WEAVE COTTON FABRIC AT 220 G/M2 (6 OZ/SQ YD), TREATED WITH FIRE RETARDANT LAGGING ADHESIVE, OR

2.4.2.B. RE–WETABLE FIBERGLASS LAGGING FABRIC WITH WATER ACTIVATED SELF–ADHESIVE.

2.4.2.C. SUITABLE FOR FIELD PAINTING.

2.4.3. METAL FINISH JACKET:

2.4.3.A. EQUIPMENT:

2.4.3.A.A. STUCCO EMBOSSED ALUMINUM NOT LESS THAN 0.45 MM (0.016 IN) THICK SHEET OR,

2.4.3.A.B. CORRUGATED STAINLESS STEEL NOT LESS THAN 0.25 MM (0.010 IN) THICK SHEET.

2.4.3.B. FITTINGS:

2.4.3.B.A. CUSTOM MADE SWAGED RING OR LOBSTER BACK COVERS ON BENDS AND DIE SHAPED FITTING COVERS OVER FITTING, VALVES, STRAINERS, FLANGES, AND GROOVED COUPLINGS.

2.4.3.C. BANDS:

2.4.3.C.A. 12 MM (½ IN) WIDE STAINLESS STEEL WITH MECHANICAL FASTENERS.

2.4.3.D. PROTECTIVE FINISH FOR ELASTOMERIC CELLULAR FOAM INSULATION.

2.5. DUCTWORK INSULATION

2.5.1. TYPE D–1 GLASS FIBRE BLANKET:

2.5.1.A. TO ASTM C1290

2.5.1.B. SERVICE TEMPERATURE: UP TO 121°C (250 F)

2.5.1.C. FLEXIBLE BLANKET,

2.5.1.D. FSK JACKET OF KRAFT BONDED TO ALUMINUM FOIL REINFORCED WITH GLASS FIBRE YARN, MAXIMUM 0.02 PERMS TO ASTM E96 PROCEDURE A.

2.5.1.E. NONCOMBUSTIBLE,

2.5.1.F. THERMAL PERFORMANCE: R = 0.74 M2 °C/W @ 24 C (4.2 BTU °FT2 F/BTU @ 75 F)

2.5.1.G. DENSITY: 12 KG/M3 (0.75 PCF)

2.5.1.H. VAPOR TRANSMISSION : MAXIMUM 0.02 PERMS

2.5.2. TYPE D–2 GLASS FIBRE BOARD :

2.5.2.A. TO ASTM C612,

2.5.2.B. SERVICE TEMPERATURE: UP TO JACKET SURFACE TEMPERATURE (AIR CONTACT) UP TO 66 C (150 F) AND UN–JACKETED SURFACE TEMPERATURE (EQUIPMENT CONTACT) UP TO 232 C (450 F).

2.5.2.C. RIGID FOR FLAT SURFACES OR,

2.5.2.D. SCORED BOARD FOR CURVED SURFACES 250 MM (10 IN) DIA AND OVER,

2.5.2.E. JACKET OF KRAFT BONDED TO ALUMINUM FOIL REINFORCED WITH GLASS FIBRE YARN,

2.5.2.F. THERMAL PERFORMANCE: 0.033 W/M/C @ 24 C (0.23 BTU/HR/IN/SQ FT/F @ 75 F),

2.5.2.G. VAPOR TRANSMISSION: MAXIMUM 0.02 PERMS

2.5.2.H. DENSITY: 48 KG/M3 (3.0 LB/CU FT),

2.5.2.I. SUITABLE FOR JACKET SURFACE TEMPERATURE (AIR CONTACT) UP TO 66 C (150 F) AND UN–JACKETED SURFACE TEMPERATURE (EQUIPMENT CONTACT) UP TO 232 C (450 F).

2.5.3. TYPE D–3 FLEXIBLE ELASTOMERIC CLOSED CELL FOAM:

2.5.3.A. TO ASTM C534,

2.5.3.B. SERVICE TEMPERATURE: UP TO 82 C (180 F).

2.5.3.C. SHEET SELF–ADHERING, ROLL TYPE,

2.5.3.D. THERMAL PERFORMANCE: 0.04 W/M/C @ 24 C (0.28 BTU/HR/IN/SQ FT/F @ 75 F),

2.5.3.E. MANUFACTURER SPECIFIC SEALER/ADHESIVE.

2.5.4. TYPE D–4 LOW TEMPERATURE PHENOLIC BOARD:

2.5.4.A. TO ASTM C1126 (GR.1),

2.5.4.B. SERVICE TEMPERATURE: –73°C TO+121 °C (–100°F TO 250°F).

2.5.4.C. RIGID FOR FLAT SURFACES,

2.5.4.D. MEETING 25/50 FLAME SPREAD/SMOKE DEVELOPMENT WHEN TESTED TO ASTM E84,

2.5.4.E. THERMAL PERFORMANCE: 0.021 W/M/C°@ 10°C (0.145 BTU/HR/IN/SQ FT/F° @ 50°F),

2.5.4.F. DENSITY: 37 KG/M3 (2.3 IB/CUFT),

3. EXECUTION

3.1. INSULATION LIMITS

3.1.1. EXTERNALLY INSULATE AIR HANDLING SYSTEM COMPONENTS:

3.1.1.A. CONDITIONED AIR WITH COOLING COILS : SUPPLY UNIT CASINGS AND PLENUMS, AND FREE STANDING SUPPLY FANS FOR BOTH RECIRCULATING AND NON RECIRCULATING TYPE SYSTEMS,

3.1.1.B. CONDITIONED AIR WITH HEATING ONLY: SUPPLY UNIT CASING AND PLENUMS, FREE–STANDING SUPPLY FANS, AND SUPPLY AIR DUCTS AND PLENUMS UP TO THE SPACE SERVED BUT NOT IN THE SPACE ITSELF,

3.1.1.C. CONDITIONED AIR SUPPLY DUCTS INCLUDING DOWNSTREAM OF REHEAT COILS,

3.1.1.D. UN–CONDITIONED SUPPLY AIR DUCTS AND PLENUMS THAT PASS THROUGH UNHEATED ROOMS OR SPACES,

3.1.1.E. THE FIRST 300 MM (12 IN) LENGTH OF ACOUSTICALLY LINED DUCTWORK,

3.1.1.F. RETURN AIR DUCTS AND PLENUMS IN UNHEATED SPACES,

3.1.1.G. EXHAUST AIR DUCTS AND PLENUMS IN UNHEATED SPACES,

3.1.1.H. EXHAUST AIR DUCTS BETWEEN EXHAUST AIR DAMPER AND POINT OF DISCHARGE TO OUTSIDE OF BUILDING,

3.1.1.I. OUTSIDE AIR INTAKE DUCTS AND PLENUMS;

3.1.1.I.A. FOR NON–RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT COOLING COILS, TERMINATE PLENUM OR CASING INSULATION 300 MM (12 IN) DOWNSTREAM OF FINAL HEATING COIL,

3.1.1.J. MIXED AIR PLENUMS AND DUCTS;

3.1.1.J.A. FOR RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT COOLING COILS, TERMINATE OUTSIDE AIR INTAKE INSULATION 300 MM (12 IN) DOWNSTREAM OF MIXING PLENUM,

3.1.1.K. SHEET METAL BLANK–OFF PLATES BEHIND UNUSED SECTIONS OF AIR INTAKE LOUVRES.

3.1.2. EXTERNALLY INSULATE DUCTWORK LOCATED OUTDOORS:

3.1.2.A. SUPPLY DUCTS.

3.1.2.B. CONDITIONED SUPPLY DUCTS.

3.1.2.C. RETURN DUCTS,

3.1.2.D. EXHAUST DUCTS,

3.1.2.D.A. EXCLUDING FAN DISCHARGE DUCT,

3.1.2.E. KITCHEN EXHAUST DUCTS WITH MORE THAN 3 M (10 FT) LENGTH OF DUCT ON ROOF.

3.1.2.E.A. EXCLUDING FAN DISCHARGE DUCT.

3.1.3. EXTERNAL INSULATION IS NOT REQUIRED ON:

3.1.3.A. CASINGS, DUCTS OR PLENUMS WHICH HAVE BEEN LINED WITH ACOUSTIC INSULATION, EXCEPT AS DESCRIBED ABOVE,

3.1.3.B. FREE STANDING UNCONDITIONED SUPPLY FANS, SUPPLY DUCTS AND PLENUMS,

3.1.3.C. PORTIONS OF INTAKE DUCTS OR PLENUMS, UNIT CASINGS AND CONDITIONED AIR PLENUMS WHICH ARE OF DOUBLE WALL INSULATED CONSTRUCTION,

3.1.3.D. PRE–INSULATED FLEXIBLE DUCTS.

3.1.3.E. FACTORY INSULATED AIR HANDLING UNITS.

3.2. GENERAL REQUIREMENTS

3.2.1. INSULATE DUCTWORK IN ACCORDANCE WITH TABLE 1 AT THE END OF THIS SECTION.

3.2.2. STORE AND USE ADHESIVES, MASTICS, AND INSULATION CEMENTS AT AMBIENT TEMPERATURES AND CONDITIONS RECOMMENDED BY PRODUCT MANUFACTURERS.

3.2.3. SURFACES TO BE CLEAN AND DRY BEFORE APPLICATION OF INSULATION. APPLY INSULATION AFTER PRESSURE AND LEAKAGE TESTING IS COMPLETED AND ACCEPTED.

3.2.4. PLACE INSULATION WITH JOINTS STAGGERED AND TIGHTLY BUTTED, WITH NO VISIBLE GAPS.

3.2.5. NEATLY FINISH INSULATION AT SUPPORTS, PROTRUSIONS, AND INTERRUPTIONS.

3.2.6. SEAL EXPOSED INSULATION WITH REINFORCED VAPOR BARRIER OR BREATHER COATING/MASTIC AS SHOWN.

3.2.7. FINISH DUCTWORK WITH FIELD INSTALLED FINISH JACKETS AS SHOWN.

TABLE 1 : DUCTWORK AND PLENUM INSULATION TYPE AND THICKNESS MM (IN)

NOMINAL SURFACE TEMPERATURE	EQUIPMENT DESCRIPTION	INSULATION TYPE	INSULATION THICKNESS
5°C TO 65°C (40°F TO 150°F)	SUPPLY UNIT CASINGS AND PLENUMS FREE STANDING SUPPLY FANS RECTANGULAR, EXPOSED RECTANGULAR, CONCEALED	D–2	25 (1)
	RECTANGULAR, CONCEALED ROUND AND OVAL, EXPOSED ROUND AND OVAL, CONCEALED	D–1	38 (1–1/2) NOTE (1)

TABLE 2: DUCTWORK AND PLENUM INSULATION TYPE AND THICKNESS MM (IN)

NOMINAL SURFACE TEMPERATURE	EQUIPMENT DESCRIPTION	INSULATION TYPE	INSULATION THICKNESS
AMBIENT TO 65°C (AMBIENT TO 150°F)	PLENUMS AND CASINGS – AIR INTAKE	D2	TWO LAYERS EACH 50 (2)
		D4	75 (3)
	PLENUMS AND CASINGS – EXHAUST	D2	50 (2)
		D4	38 (1–1/2)
	RECTANGULAR – OUTDOOR – SUPPLY	D2	50 (2)
	RECTANGULAR – OUTDOOR – RETURN RECTANGULAR – OUTDOOR – EXHAUST	D2	38 (1–1/2)
	ROUND – OUTDOOR	D3	TWO LAYERS EACH 25 (1)
	DRAIN PANS D3 20 (3/4)	D3	20 (3/4)

NOTE (1) : THICKNESS IS "OUT OF BOX" BEFORE INSTALLATION

PLUMBING GENERAL
22 05 01

1. GENERAL

1.1. SCOPE

1.1.1. PROVIDE LABOUR, MATERIALS AND EQUIPMENT FOR INSTALLATION, TESTING AND PUTTING INTO OPERATION PLUMBING AND DRAINAGE SYSTEMS.

1.2. QUALIFIED TRADESMEN

1.2.1. WORK TO BE DONE BY QUALIFIED AND RECOGNIZED FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD USING TRADESMEN HOLDING CERTIFICATES OF COMPETENCY.

1.3. APPLICABLE CODES AND STANDARDS

1.3.1. ONTARIO BUILDING CODE

1.3.2. REGULATIONS OF PROVINCE CITY, OR LOCAL AUTHORITY HAVING JURISDICTION.

1.3.3. AWWA C651, DISINFECTING WATER MAINS.

1.3.4. CSA B149.1 NATURAL GAS AND PROPANE INSTALLATION CODE

1.4. QUALIFICATIONS

1.4.1. CONTRACTORS PERFORMING WORK ON NATURAL GAS OR PROPANE SYSTEMS TO BE LICENSED AS A GAS AND PROPANE INSTALLER UNDER O.REG. 215/01, BY THE TECHNICAL STANDARDS AND SAFETY AUTHORITY.

2. PRODUCTS

2.1. WATER SERVICE METER

2.1.1. COMPOUND TYPE, TO APPROVAL OF AUTHORITIES.

2.1.2. SUITABLE FOR FUTURE INSTALLATION OF REMOTE READER. PROVIDE CONDUIT FOR FUTURE WIRING FROM METER TO REMOTE READER.

2.1.3. PAY CALIBRATION AND TRANSPORTATION CHARGES IN CONNECTION WITH METER. WATER METER TO READ IN CUBIC METERS (M3) AND GALLONS PER MINUTE.

3. INSTALLATION

3.1. PIPING

3.1.1. PIPING SYSTEM ROUTING IS SHOWN DIAGRAMMATICALLY. LOCATE MAINS, RISERS AND RUNOUTS CONCEALED BEHIND FURRINGS OR ABOVE CEILINGS EXCEPT IN MECHANICAL EQUIPMENT ROOMS AND ACCESS SPACES WHERE PIPING IS TO BE EXPOSED.

3.1.2. DETERMINE AREAS WITHOUT CEILINGS FROM ARCHITECTURAL DRAWINGS AND ROOM FINISH SCHEDULES, AND IN THESE AREAS KEEP PIPING AS HIGH AS POSSIBLE.

3.1.3. ANCHOR, GUIDE AND SUPPORT VERTICAL AND HORIZONTAL RUNS OF PIPING TO RESIST DEAD LOAD AND ABSORB THRUST.

3.2. WATER SERVICE

3.2.1. INSTALL WATER METER IN ACCORDANCE WITH LOCAL AUTHORITY STANDARDS AND PROVIDE THREE–VALVE BY–PASS ARRANGEMENT WITH STRAINER ON STREET SIDE AND DRAIN VALVE ON BUILDING SIDE OF METER.

3.2.2. MOUNT METER;

3.2.2.A. 150 MM (6") CLEAR OF FLOOR,

3.2.2.B. MOUNT VALVES IN UPRIGHT POSITION,

3.2.2.C. LOCATE BY–PASS TO PROVIDE 500 MM (20 IN) CLEAR ABOVE TOP OF METER,

3.2.2.D. LOCATE ASSEMBLY SO THAT METER IS AT LEAST 600 MM (24 IN) FROM BACK WALL AND WITH 1050MM (42 IN) CLEAR IN FRONT.

3.2.3. METER BY–PASS LINE:

3.2.3.A. SAME SIZE AS INCOMING LINE FOR TURBINE OR PROTECTUS METER,

3.2.3.B. ONE PIPE SIZE SMALLER THAN INCOMING LINE FOR COMPOUND METER,

3.3. DOMESTIC COLD WATER SYSTEM DISTRIBUTION

3.3.1. EXTEND EXISTING DOMESTIC COLD WATER SYSTEM WITH

3.3.1.A. DISTRIBUTION PIPE AND FITTINGS,

3.3.1.B. VALVES,

3.3.1.C. PREMISES BACKFLOW ISOLATION,

3.3.1.D. ZONE OR EQUIPMENT BACKFLOW PROTECTION.

3.3.2. MINIMUM WATER PRESSURE AT STREET LEVEL: APPROXIMATELY 500 KPA (70 PSI).

3.3.3. PROVIDE VALVED CONNECTIONS FROM SUPPLY SYSTEM, TO FIXTURES AND OTHER EQUIPMENT REQUIRING COLD WATER.

3.4. DOMESTIC HOT WATER SYSTEM DISTRIBUTION

3.4.1. PROVIDE DOMESTIC HOT WATER SYSTEM WITH

3.4.1.A. DISTRIBUTION PIPE AND FITTINGS

3.4.1.B. VALVES

3.4.1.C. ZONE OR EQUIPMENT BACKFLOW PROTECTION.

3.4.2. PROVIDE COLD WATER CONNECTIONS TO HOT WATER TANK, WITH SHUT–OFF AND CHECK VALVE ON SUPPLY AND VALVED DRAIN AT BOTTOM OF TANK. DRILL CHECK VALVE DISC WITH 1.6 MM (1/16 IN) HOLE IN ITS CENTRE.

3.4.3. PROVIDE VALVED CONNECTIONS FROM HOT WATER SUPPLY SYSTEM TO FIXTURES AND OTHER EQUIPMENT REQUIRING HOT WATER.

3.5. DRAINAGE

3.5.1. PROVIDE WASTE AND VENT CONNECTIONS TO PLUMBING FIXTURES AND EQUIPMENT.

3.5.2. FITTINGS;

3.5.2.A. DO NOT USE DOUBLE HUBS, STRAIGHT CROSSES, DOUBLE T'S, OR DOUBLE TY'S IN SOIL OR WASTE PIPE BELOW ANY FIXTURE.

3.5.2.B. DO NOT USE BRANCH FITTINGS OTHER THAN FULL "Y" OR "Y" AND AN EIGHTH BEND, ON SOIL OR WASTE PIPE RUNNING IN HORIZONTAL DIRECTION.

3.5.2.C. DO NOT USE QUARTER BEND PLACED ON ITS SIDE.

3.5.2.D. DO NOT USE INVERTED JOINTS BELOW FIXTURES.

3.5.2.E. DO NOT INSTALL CLEANOUTS ABOVE FOOD PREPARATION OR PATIENT TREATMENT AREAS. IN THESE AREAS CARRY RODDING CONNECTION UP TO FLOOR CLEANOUT FITTED WITH ADJUSTABLE GASKETED ACCESS COVER AND PLUG, WITH CLEANOUT BODY CAST IN FLOOR SLAB ABOVE.

3.5.2.F. DRAINAGE FITTINGS TO MATCH CONNECTED PIPING FOR QUALITY AND WALL THICKNESS.

3.6. FLUSHING AND CLEANING – BUILDING WATER DISTRIBUTION PIPING

3.6.1. CONDUCT FIRST FILL AND PRESSURE TESTING OF BUILDING DISTRIBUTION PIPING ONLY AFTER COMPLETION OF FLUSHING AND DISINFECTION OF WATER SERVICE PIPE.

3.6.2. COMPLETE PIPING PRESSURE TESTS PRIOR TO FLUSHING AND CLEANING OPERATIONS.

3.6.3. FLUSH WATER DISTRIBUTION PIPING THROUGH AVAILABLE OUTLETS WITH SUFFICIENT FLOW TO PRODUCE VELOCITY OF 1.5 M/S, WITHIN PIPE FOR 10 MINUTES, OR UNTIL FOREIGN MATERIALS HAVE BEEN REMOVED AND FLUSHED WATER IS CLEAR.

3.6.3.A. DRAIN DOWN SYSTEM TO REMOVE FLUSHING WATER,

3.6.3.B. INTRODUCE CHLORINE CLOSE TO POINT OF RE–FILLING OF SYSTEM, AND EVENLY ADD TO WATER AS SYSTEM IS REFILLING, TO PROVIDE AN INITIAL CONCENTRATION OF 50 MG/L,

3.6.3.C. OPERATE VALVES, HYDRANTS, AND APPURTENANCES WHILE MAIN CONTAINS CHLORINE SOLUTION.

3.6.3.D. FLUSH LINE TO REMOVE CHLORINE SOLUTION AFTER 24 HOURS CONTACT TIME.

3.6.3.E. ARRANGE AND PAY FOR LABORATORY TESTING OF WATER SAMPLES TAKEN FROM NEWLY DISINFECTED MAIN.

3.6.3.F. WHERE SAMPLES DO NOT MEET LABORATORY TEST STANDARD FOR POTABLE WATER, DISINFECTION PROCEDURE AND TESTING IS TO BE REPEATED UNTIL SATISFACTORY RESULTS ARE ACHIEVED.

PIPING INSULATION
22 14 19

1. 1 GENERAL

1.1. SCOPE

1.1.1. INSULATE AND FINISH PIPING, VALVES, FITTINGS, AND PIPELINE ACCESSORIES.

1.1.1.A. PROVIDE INSULATION, COATINGS, FINISHES, AND MECHANICAL PROTECTION.

1.1.2. PROVIDE FIRE RATED INSULATION ON PIPING AS SHOWN, INCLUDING FIRE PROTECTION STANDPIPES.

1.1.2.A. COORDINATE WITH THE CONTRACTOR UNDER DIVISION 21 FOR LOCATION AND EXTENT OF STANDPIPES TO BE PROTECTED.

1.2. RELATED WORK

1.2.1. THE FOLLOWING WORK IS SPECIFIED IN OTHER SECTION OF DIVISION 20:

1.2.1.A. SUPPLY OF INSULATION SHIELDS FOR COLD AND DUAL TEMPERATURE PIPING:

1.2.2. PROVISION OF WELDED SADDLES FOR HOT PIPING.

1.2.3. INSULATION OF UNDERGROUND PIPING: SECTION 20 07 21.

1.3. QUALITY

1.3.1. MANUFACTURERS AND PRODUCTS ARE LISTED IN THIS SECTION TO ESTABLISH QUALITY AND MANUFACTURING STANDARDS. PRODUCTS FROM OTHER MANUFACTURERS WITH EXPLICITLY SIMILAR CHARACTERISTICS MAY BE ACCEPTABLE BUT MUST BE SUBMITTED AS AN ALTERNATIVE PRODUCT SUBMISSION.

1.4. QUALIFICATIONS

1.4.1. PROVIDE INSULATION AND COVERING BY RECOGNIZED SPECIALIST APPLICATOR WITH AN ESTABLISHED REPUTATION FOR THIS TYPE OF WORK.

1.5. 1.5MATERIAL TEST CRITERIA

1.5.1. INSULATION, ADHESIVES, COATINGS, FINISHES, SEALERS, AND TAPES:

1.5.1.A. MAXIMUM FLAME SPREAD RATING OF 25 TO CAN/ULC–S102,

1.5.2. MAXIMUM SMOKE DEVELOPED RATING OF 50 TO CAN/ULC–S102..

1.5.2.A. EXCEPTION: VAPOR BARRIER MASTICS INSTALLED OUTSIDE OF BUILDING.

1.6. APPLICABLE CODES AND STANDARDS

1.6.1. MATERIAL AND METHOD OF APPLICATION TO COMPLY WITH OR BE TESTED IN ACCORDANCE WITH FOLLOWING STANDARDS;

1.6.1.A. THERMAL INSULATION ASSOCIATION OF CANADA (TIAC) NATIONAL INSULATION STANDARD, EXCLUDING SECTION 12

1.6.1.B. NFPA 90–A INSTALLATION OF AIR–CONDITIONING AND VENTILATING SYSTEMS

1.6.1.C. ASHRAE/IES 90.1 ENERGY STANDARD FOR BUILDINGS EXCEPT LOW–RISE RESIDENTIAL BUILDINGS

1.6.1.D. NFPA 255 TEST OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS

1.6.1.E. CAN/ULC–S102 STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF FLOORING, FLOOR COVERING, AND MISCELLANEOUS MATERIALS AND ASSEMBLIES

2. PRODUCTS

2.1. GENERAL

2.1.1. NEW DOMESTIC HOT, COLD, HOT WATER RE–CIRCULATING LINES, HORIZONTAL SANITARY DRAINS AND VALVES AND FITTINGS, CONDENSER WATER PIPING AND VALVES AND FITTINGS AND CONDENSATE DRAIN PIPING AND FITTINGS FOR FIRST 15 FT. FROM COIL DRAIN PAN TO BE INSULATED WITH 1 IN STANDARD MOULDED SECTIONAL RIGID GLASS FIBRE PIPE INSULATION WITH VAPOUR BARRIER JACKET HAVING MOISTURE TRANSMISSION OF .02 PERM.

2.1.2. NEW INDUCTION UNIT VALVES, PIPING & FITTINGS TO BE INSULATED WITH 5/8" ARMAFLEX INSULATION.

2.1.3. RECOVER EXPOSED INSULATED PIPING WITH PVC JACKETING.

2.1.4. ACCEPTABLE MANUFACTURERS OF INSULATION AND VAPOUR BARRIER:MANSON INSULATION INC. FIBERGLAS CANADA KNAUF FIBER GLASS MANVILLE CANADA INC.

2.1.5. ACCEPTABLE MANUFACTURERS OF PVC JACKETING: ACWIL INSULATIONS LTD.

DOMESTIC WATER HEATERS
22 33 13

1. GENERAL

1.1. SCOPE

1.1.1. PROVIDE DOMESTIC HOT WATER HEATERS AS SHOWN

1.2. SHOP DRAWINGS

1.2.1. SUBMIT SHOP DRAWINGS FOR EACH HEATER WITH MODEL NUMBER, OUTLINE DIMENSIONS, FUEL OR POWER REQUIREMENTS, INLET AND OUTLET CONNECTION DETAILS AND CAPACITY.

1.3. APPLICABLE CODES AND STANDARDS

1.3.1. CSA C22.2 NO. 110 CONSTRUCTION AND TEST OF ELECTRIC STORAGE–TANK WATER HEATERS

1.3.2. CSA C191 PERFORMANCE OF ELECTRIC STORAGE TANK WATER HEATERS FOR HOUSEHOLD SERVICE

2. PRODUCTS

2.1. GENERAL

2.1.1. DESIGN CONDITIONS:

2.1.1.A. DESIGN PRESSURE: [860 KPA (125 PSI)] [1035 KPA (150 PSI)]

2.1.1.B. DESIGN TEMPERATURE: 60°C (180°F).

2.1.2. PIPING CONNECTIONS:

2.1.2.A. UP TO NPS 3: THREADED

2.1.2.B. NPS 3 AND OVER: FLANGED.

2.1.3. FITTINGS, ALL HEATERS:

2.1.3.A. REPLACEABLE MAGNESIUM ANODE,

2.1.3.B. 50 MM (2 IN) MINERAL WOOL INSULATION,

2.1.3.C. ENAMELLED STEEL JACKET,

2.1.3.D. HOSE THREADED DRAIN VALVE,

2.1.3.E. ASME RATED TEMPERATURE AND PRESSURE RELIEF VALVE

2.2. ELECTRIC HOT WATER HEATERS

2.2.1. CONFORM TO CSA C22.2 NO. 110 AND CSA C191

2.2.2. FACTORY ASSEMBLED AND TESTED, GLASS LINED STEEL TANK UNITS, WITH;

2.2.2.A. COPPER SHEATHED IMMERSION ELEMENTS ARRANGED FOR FLIP–FLOP OPERATION

2.2.2.B. CLOSE TOLERANCE POSITIVE SNAP ACTION THERMOSTATS

2.2.2.C. MANUAL RESET HIGH TEMPERATURE LIMIT SWITCH.

2.2.2.D. BUILT–IN AND FACTORY PRE–WIRED CONTROLS INCLUDING CONTACTORS.

3. EXECUTION

3.1. INSTALLATION

3.1.1. PROVIDE SU

2.7.2.C. BALL TEST COCKS, AND
2.7.2.D. AIR GAP DRAIN.
2.7.3. NPS ¼ AND ½:
2.8. STRAINERS
2.8.1. "Y" PATTERN WITH ;
2.8.1.A. BRONZE, CAST IRON OR STEEL BODIES ,
2.8.1.B. SCREWED OR FLANGED TO MATCH PRESSURE CLASS AND SIZE RESTRICTIONS SPECIFIED FOR GLOBE VALVES IN SECTION OF PIPING SYSTEM WHERE STRAINER IS TO BE INSTALLED,
2.8.1.C. STAINLESS STEEL BASKETS WITH;
2.1.1.C.A. 0.8 MM (1/32 IN) DIAMETER PERFORATIONS FOR STRAINERS UP TO NPS 3 SIZE AND
2.1.1.C.B. 3.2 MM (C IN) DIAMETER PERFORATIONS FOR STRAINERS NPS 4 AND LARGER,
2.1.1.C.C. BASKETS WITH 3.2 MM (C IN) DIAMETER PERFORATIONS TO BE MADE FROM 0.9 MM (0.037 IN) STOCK REINFORCED WITH 13 MM X 0.9 MM (½ IN X 0.037 IN) BANDS OF THE SAME MATERIAL SPOT WELDED TO BASKETS.

3. EXECUTION
3.1. INSTALLATION GENERAL
3.1.1. INSTALL TO CONFORM WITH CANADIAN PLUMBING CODE, PROVINCIAL CODES, AND LOCAL AUTHORITY HAVING JURISDICTION.
3.2. CLEANOUTS
3.2.1. INSTALL AT BASE OF SOIL AND WASTE STACKS, AND RAINWATER LEADERS AND AT CHANGES IN DIRECTION .
3.2.2. EXTEND CLEANOUTS FLUSH TO WALL OR FINISHED FLOOR UNLESS SERVICEABLE FROM BELOW FLOOR.
3.2.3. INSTALL CLEANOUTS LOCATED IN FLOORS CLEAR OF OBSTRUCTIONS.
3.3. WATER HAMMER ARRESTERS
3.3.1. SELECT AND INSTALL IN ACCORDANCE WITH PDI–WH 201 ON BRANCH SUPPLIES TO EACH FIXTURE OR GROUP OF FIXTURES.
3.4. TRAP SEAL PRIMERS
3.4.1. SELECT AND INSTALL TO PRIME FLOOR AND FUNNEL DRAIN TRAPS.
3.4.2. 120V 1PH 60 HZ SUPPLY WILL BE BROUGHT TO ELECTRIC MANIFOLDED UNITS UNDER DIVISION 26 AND CONNECTED UNDER DIVISION 22.
3.5. BACK–FLOW PREVENTERS AND VACUUM BREAKERS
3.5.1. INSTALL IN ACCORDANCE WITH CSA B64.10.
3.5.2. INSTALL BACKFLOW PREVENTERS HORIZONTALLY, IN ACCORDANCE WITH MANUFACTURERS RECCOMENDATIONS, BUT NOT LESS THAN 300MM (12") AND NOT GREATER THAN 1500MM (60") ABOVE THE FLOOR.
3.5.3. PIPE DISCHARGE FROM BACKFLOW PREVENTER, WITH AIR GAP, TO NEAREST DRAIN OR SERVICE SINK.

DOMESTIC WATER SUPPLY PIPING COPPER 22 11 16

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE COPPER PIPE AND FITTINGS FOR POTABLE DOMESTIC WATER PIPING, ABOVE GROUND.
1.2. APPLICABLE CODES AND STANDARDS
1.2.1. ASTM B88 STANDARD SPECIFICATION FOR SEAMLESS COPPER WATER TUBE
1.2.2. ASME B16.15 CAST BRONZE THREADED FITTINGS, CLASSES 125 AND 250
1.2.3. ASME B16.18 CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS
1.2.4. ASME B16.22 WROUGHT COPPER AND COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS
1.2.5. ASTM B828 STANDARD PRACTICE FOR MAKING CAPILLARY JOINTS BY SOLDERING OF COPPER AND COPPER ALLOY TUBE AND FITTINGS.
1.2.6. CSA B242 GROOVE AND SHOULDERED TYPE MECHANICAL COUPLINGS
1.2.7. AWS A5.8 BRAZING FILLER METAL.
1.2.8. AWWA C606 GROOVED AND SHOULDERED JOINTS
1.2.9. ASTM A307 STANDARD SPECIFICATION FOR CARBON STEEL BOLTS AND STUDS 60,000PSI TENSILE STRENGTH
1.2.10. ASTM A563 STANDARD SPECIFICATION FOR CARBON AND ALLOY STEEL NUTS
1.2.11. ASTM B–32 SPECIFICATION FOR SOLDER METAL
2. PRODUCTS
2.1. DOMESTIC HOT, COLD AND RECIRCULATING PIPING, WITHIN BUILDING
2.1.1. COPPER TUBE: TO ASTM B88.
2.1.1.A. HARD DRAWN, TYPE K ABOVE GROUND.
2.1.1.B. SOFT ANNEALED, TYPE K BELOW GROUND.
2.1.2. TUBE TO HAVE CERTIFICATION MARKINGS MADE BY TESTING AGENCY ACCREDITED BY STANDARDS COUNCIL OF CANADA.
2.2. FITTINGS
2.2.1. BRASS OR BRONZE FLANGES AND FLANGED FITTINGS: TO ASME B16.24.
2.2.2. BRASS OR BRONZE THREADED FITTINGS: TO ASME B16.15.
2.2.3. SOLDER/BRAZED FITTINGS: CAST BRONZE TO ASME B16.18, OR WROUGHT COPPER AND BRONZE TO ASME B16.22.
2.2.4. ROLL GROOVE FULL FLOW STANDARD RADIUS CAST BRONZE FITTINGS FOR SIZES NPS 2 1/2 AND LARGER: TO AWWA C606.
2.3. JOINTS
2.3.1. FLANGED JOINTS:
2.3.1.A. MADE UP WITH RUBBER GASKETS 1.6 MM (1/16 IN) THICK TO AWWA C111 AND
2.3.1.B. HEAVY SERIES BOLTS, HEXAGONAL HEAD PATTERN TO ASTM A307, NUTS TO ASTM 563, AND WASHERS.
2.3.2. SOLDER : TIN ANTIMONY SOLDER, 95:5 TO ASTM B–32 .
2.3.3. SILVER BRAZING ALLOY AWS CLASSIFICATION BCUP–5
2.3.4. ROLL GROOVED PIPING:
2.3.4.A. MADE UP WITH ROLL GROOVE POSITIVE CLAMP GASKETTED COUPLINGS OR ROLL GROOVE FLANGE ADAPTERS FOR COPPER PIPING TO CSA B242 OR AWWA C606.
3. EXECUTION
3.1. INSTALLATION
3.1.1. ISOLATE EQUIPMENT, FIXTURES AND BRANCHES WITH GATE, BALL OR BUTTERFLY VALVES.
3.1.2. USE GLOBE, DRVS, BALL OR BUTTERFLY VALVES FOR THROTTLING SERVICE.
3.1.3. INSTALL PIPING CLOSE TO BUILDING STRUCTURE TO MINIMIZE FURRING AND CONSERVE HEADROOM. GROUP PIPING AND RUN PARALLEL TO WALLS AND CEILINGS.
3.1.4. CUT TUBE SQUARE, REAM TUBE ENDS AND CLEAN TUBING AND TUBE ENDS BEFORE JOINT ASSEMBLY.
3.1.5. PREPARE ROLL GROOVE JOINTS IN SHOP OR FIELD USING GROOVE ROLLING MACHINE.
3.1.6. ASSEMBLE ROLL GROOVE JOINTS USING DRY LUBRICATED GASKETS.
3.1.7. ANCHORS, GUIDE AND SUPPORT ROLL GROOVED PIPING IN ACCORDANCE WITH COUPLING MANUFACTURERS INSTRUCTIONS.
3.1.8. BEFORE ASSEMBLING SOLDER OR BRAZED JOINTS, REMOVE WORKING PARTS OF VALVES, CLEAN INSIDE OF SOLDER FITTINGS AND OUTSIDE OF MATING PIPE WITH EMERY PAPER AND COAT WITH FLUX.
3.1.9. SOLDER OR BRAZE JOINTS WITH BLOW TORCH OR OXY–ACETYLENE FLAME.
3.1.10. JOINT CONSTRUCTION, BURIED:
3.1.10.A. ALL SIZES: BRAZED.
3.1.11. JOINT CONSTRUCTION, ABOVE GROUND:
3.1.11.A. UP TO NPS 2½: SOLDERED IN ALL LOCATIONS
3.1.11.B. NPS 3 AND LARGER: BRAZED IN ALL LOCATIONS
3.1.11.C. NPS 3 AND LARGER: GROOVED JOINT IN EXPOSED AREAS ONLY.
3.1.11.C.A. FOR GREATER CLARITY, 'EXPOSED AREAS'?INCLUDE INSIDE SERVICE ROOMS AND ABOVE LAY–IN TILE CEILINGS, BUT EXCLUDES VERTICAL AND HORIZONTAL SERVICE SHAFTS, ABOVE ANY OTHER CEILING CONSTRUCTION, AND INSIDE WALLS AND PARTITIONS.
3.2. TESTING AND BALANCING
3.2.1. PRESSURE TEST PIPING BEFORE INSULATION IS APPLIED. CUT–OUT AND REPLACE LEAKING SOLDERED OR BRAZED FITTINGS AND RETEST.
3.2.2. BALANCE SUPPLY SYSTEMS USING LOCK SHIELD GLOBE VALVES OR DVR.

DRAINAGE & VENT PIPING CAST IRON & COPPER 22 13 16

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE CAST IRON PIPE & FITTINGS &/OR COPPER TUBE & FITTINGS FOR DRAIN, WASTE & VENT SERVICES.
1.1.1.A. FOR ABOVEGROUND SERVICES.
1.2. RELATED SECTIONS
1.2.1. 22 13 21 : DRAINAGE PIPING – PUMPED
1.3. APPLICABLE CODES & STANDARDS
1.3.1. STANDARDS:
1.3.1.A. CSA B70 CAST IRON SOIL PIPE, FITTINGS, & MEANS OF JOINING
1.3.1.B. CSA–B125 PLUMBING FITTINGS.
1.3.1.C. CSA B158.1 CAST BRASS SOLDER JOINT DRAINAGE, WASTE, & VENT FITTINGS
1.3.1.D. CSA B602 MECHANICAL COUPLINGS FOR DRAIN, WASTE, & VENT PIPE & SEWER PIPE.
1.3.1.E. ASTM A74 STANDARD SPECIFICATION FOR CAST IRON SOIL PIPE & FITTINGS
1.3.1.F. ASTM A888 STANDARD SPECIFICATION FOR HUBLESS CAST IRON PIPE & FITTINGS FOR SANITARY & STORM DRAIN, WASTE & VENT PIPING APPLICATIONS
1.3.1.G. ASME B16.29 WROUGHT COPPER & WROUGHT COPPER ALLOY SOLDER JOINT DRAINAGE FITTINGS DWV
1.3.1.H. ASTM B32 SPECIFICATION FOR SOLDER METAL
1.3.1.I. STM B306 STANDARD SPECIFICATION FOR COPPER DRAINAGE TUBE (DWV)
1.3.1.J. ASTM C564– SPECIFICATION FOR RUBBER GASKETS FOR CAST IRON SOIL PIPE & FITTINGS.
1.3.1.K. ASTM C1540 STANDARD SPECIFICATION FOR HEAVY DUTY SHIELDED COUPLINGS JOINING HUBLESS CAST IRON SOIL PIPE & FITTINGS.
1.3.1.L. ASTM B828 STANDARD PRACTICE FOR MAKING CAPILLARY JOINTS BY SOLDERING OF COPPER & COPPER ALLOY TUBE & FITTINGS.
1.3.1.M. CANADIAN PIPE INSTITUTE STANDARD SPECIFICATION
1.3.1.N. CAST IRON SOIL PIPE INSTITUTE (CISPI) TECHNICAL MANUAL
1.3.1.O. CISPI 301 STANDARD SPECIFICATION FOR HUBLESS CAST IRON PIPE & FITTINGS FOR SANITARY & STORM DRAIN, WASTE & VENT PIPING APPLICATIONS
1.3.1.P. CISPI 310 SPECIFICATION FOR COUPLINGS FOR USE IN CONNECTION WITH HUBLESS CAST IRON SOIL PIPE & FITTINGS FOR SANITARY & STORM DRAIN, WASTE & VENT PIPING APPLICATIONS
2. PRODUCTS
2.1. PIPE; COPPER VENT PIPE & FITTINGS, WITHIN BUILDING
2.1.1. COPPER DWV TUBE, TO ASTM B306
2.1.2. CERTIFICATION MARKINGS BY TESTING AGENCY ACCREDITED BY STANDARDS COUNCIL OF CANADA.
2.2. FITTINGS:
2.2.1. CAST BRASS TO CSA B158.1
2.2.2. WROUGHT COPPER TO ANSI B16.29
2.3. SOLDER: TIN–ANTIMONY 95/5, TO ASTM B32 ALLOY SB5.
2.4. CAST IRON PIPE & FITTINGS FOR DRAIN WASTE & VENT SERVICES
2.4.1. PIPE & FITTINGS: CAST TO CSA B70, ASTM A74 OR ASTM A888
2.4.2. WITH HEAVY BITUMINOUS COATING FOR BURIED SERVICE.
2.4.3. JOINTS BELOW GRADE:
2.4.3.A. PLAIN END MADE UP USING MECHANICAL SLEEVE JOINTS TO CSA B602 & ASTM C1540 WITH NEOPRENE OR BUTYL RUBBER COMPRESSION GASKETS TO ASTM C564, WITH STAINLESS STEEL SLEEVE & NOT LESS THAN FOUR STAINLESS STEEL DRIVE CLAMPS WITH STAINLESS STEEL WORM GEARS.
3. EXECUTION
3.1. INSTALLATION GENERAL
3.1.1. INSTALL SUSPENDED PIPING TO GRADE, PARALLEL & CLOSE TO WALLS & CEILINGS TO CONSERVE HEADROOM & SPACE.
3.1.2. INSTALL PIPING CLOSE TO BUILDING STRUCTURE TO MINIMIZE FURRING. GROUP PIPING & RUN PARALLEL TO WALLS & CEILINGS.
3.2. CAST IRON PIPING
3.2.1. INSTALL CAST IRON DRAINAGE PIPING IN ACCORDANCE WITH CAST IRON SOIL PIPE & FITTINGS (CISPI') TECHNICAL MANUAL.
3.2.2. FOR SUSPENDED PIPING, PROVIDE HANGERS WITHIN 450 MM (18 IN) OF EACH JOINT, AT EACH CHANGE OF DIRECTION, & WITHIN 450 MM (18 IN) OF THE TERMINAL END OF EACH PIPE RUN.
3.2.3. ASSEMBLE & TIGHTEN MECHANICAL SLEEVE JOINTS TO COUPLING MANUFACTURERS RECOMMENDED TORQUE VALUE WITH TORQUE WRENCH.
3.2.4. PROVIDE BRACES OR TIE–RODS ON HORIZONTAL PIPING NPS 5 & LARGER:
3.2.4.A. AT EACH BRANCH OPENING OR CHANGE OF DIRECTION,
3.2.4.B. AT EACH PIPE RUN COUPLING.
3.2.5. PROVIDE SWAY BRACING ON ALL HORIZONTAL PIPING WHERE THE HANGER LENGTH IS GREATER THAN 450MM (18 IN) FROM THE TOP OF THE PIPE TO THE CONNECTING POINT ON THE STRUCTURE.
3.3. COPPER TUBING
3.3.1. CUT COPPER TUBE SQUARE, REAM TUBE ENDS & CLEAN TUBING & TUBE ENDS BEFORE JOINT ASSEMBLY.
3.3.2. BEFORE ASSEMBLING SOLDER JOINTS, CLEAN INSIDE OF SOLDER FITTINGS & OUTSIDE OF MATING PIPE WITH EMERY PAPER & COAT WITH FLUX.
3.3.3. SOLDER JOINTS IN COPPER PIPE WITH BLOW TORCH OR OXY–ACETYLENE FLAME.
3.4. TESTING
3.4.1. TEST BEFORE PIPING IS CONCEALED.
3.4.2. CUT–OUT & REPLACE LEAKING SOLDERED FITTINGS, REMAKE JOINTS IN CAST IRON PIPING, & RETEST.

FIRE PROTECTION GENERAL 21 05 01

1. GENERAL
1.1. SCOPE
1.1.1. FIRE PROTECTION WORK INCLUDES;
1.1.1.A. STANDPIPE & HOSE SYSTEMS
1.1.1.B. FIRE EXTINGUISHERS
1.1.1.C. WET PIPE SPRINKLER SYSTEM
1.2. APPLICABLE CODES AND STANDARDS
1.2.1. FIRE PROTECTION WORK TO CONFORM TO STANDARDS OF NATIONAL FIRE PREVENTION ASSOCIATION (NFPA) AND RELEVANT SECTIONS OF THE ONTARIO BUILDING CODE.
1.3. WATER SUPPLY TEST RESULTS
1.3.1. PROVIDE WATER FLOW TEST ON MUNICIPAL WATER SERVICE IN PROXIMITY TO BUILDING CONNECTION, IN ACCORDANCE WITH NFPA 14 AND NFPA 291. FLOW TEST MUST BE CONDUCTED WITHIN ONE (1) YEAR PRIOR TO SYSTEM DESIGN. SUBMIT RECORD OF TEST INCLUDING STATIC PRESSURE, AND RESIDUAL PRESSURE AND FLOW.
1.3.2. OBTAIN MUNICIPAL APPROVAL AND PAY FEES ASSOCIATED WITH TESTING.
2. PRODUCTS
2.1. PIPE, HANGERS AND GASKETS
2.1.1. PIPE:
2.1.1.A. ASTM A53 GRADE B, SCHEDULE 40 CONTINUOUS WELD STEEL TO UP TO NPS 2, GROOVED OR SCREWED.
2.1.1.A.A. GALVANIZED WHERE SPECIFIED.
2.1.1.B. ASTM A53–63R GRADE B, SCHEDULE 40 ELECTRIC RESISTANCE WELD STEEL FOR NPS 2 ½ TO NPS 10, WELDED.
2.1.1.C. NPS 2½ AND OVER ASTM A53–72A SCHEDULE 10 THIN WALL, ROLLED GROOVED.
2.1.1.D. ASTM A53–63R GRADE B ELECTRIC RESISTANCE WELD STEEL 9.53 MM (0.375 IN) WALL THICKNESS FOR NPS 12 AND OVER, WELDED.
2.1.2. PIPE HANGERS:
2.1.2.A. UL/ULC LISTED FOR FIRE PROTECTION, AND
2.1.2.B. SWIVEL RING HANGER TYPE OR
2.1.2.C. AS SPECIFIED IN SECTION 20 05 29 HANGERS AND SUPPORTS.
2.1.3. GASKETS FOR FLANGED JOINTS:
2.1.3.A. RED RUBBER SHEET 1.6 MM (1/16 IN) THICK.
2.2. FITTINGS, AND VALVES UP TO 1200 KPA (175 PSI) WORKING PRESSURE
2.2.1. FITTINGS:
2.2.1.A. 1035 KPA (150 #) BLACK MALLEABLE IRON SCREWED UP TO NPS 2.
2.2.1.B. FORGED STEEL, BUTT WELDING SCHEDULE 40 FOR NPS 2½ AND OVER.
2.2.2. UNIONS:
2.2.2.A. 1035 KPA (150 #) BLACK MALLEABLE GROUND JOINT UNION, BRONZE TO IRON SEAT UP TO NPS 2.
2.2.3. FLANGES:
2.2.3.A. 1035 KPA (150 #) FORGED STEEL, SLIP–ON OR WELD NECK, RAISED FACE STYLE.
2.2.4. VALVES:
2.2.4.A. ULC AND FM LISTED FOR FIRE PROTECTION SERVICE.
2.3. FITTINGS FOR GROOVED PIPE TO 1200 KPA (175 PSI)
2.3.1. COUPLINGS:
2.3.1.A. MALLEABLE OR DUCTILE IRON NPS 2½ AND OVER.
2.3.2. FITTINGS:
2.3.2.A. MALLEABLE IRON OR DUCTILE IRON TO NPS 2½ TO NPS 12.
2.3.2.B. FABRICATED STEEL NPS 14 AND OVER.
2.3.3. FLANGES:
2.3.3.A. CAST IRON, RAISED FACE FLANGE WITH COUPLING GROOVE NPS 2½ AND OVER.
2.3.4. GASKETS FOR GROOVED COUPLINGS:
2.3.4.A. EPDM GRADE "E", DRY LUBRICATED.
2.4. BACKFLOW PREVENTER
2.4.1. ULC AND FM LISTED FOR FIRE SERVICE,
2.4.2. DOUBLE CHECK VALVE FOR FIRE SYSTEMS (DCVAF) ASSEMBLIES, TO CSA STANDARD B64.5.1–01
2.4.3. REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLIES FOR FIRE SYSTEMS (RPF) TO CSA STANDARD B64.4.1–01.
3. EXECUTION
3.1. WATER SERVICE CONNECT TO STANDPIPE, SPRINKLER, AND DOMESTIC WATER SYSTEM AS SHOWN.
3.2. PIPING INSTALLATION
3.2.1. GENERAL LAYOUT OF MAINS, RISERS, RUN–OUTS AND CONNECTION DETAILS OF PIPING SYSTEMS ARE SHOWN.
3.2.2. PROVIDE BENDS, EXPANSION LOOPS, HOSES OR JOINTS TO COMPENSATE FOR PIPE SEISMIC MOVEMENT.
3.2.3. ANCHOR, GUIDE AND LATERALLY SUPPORT VERTICAL AND HORIZONTAL PIPING TO SUPPORT FILLED WEIGHT AND ABSORB THRUST UNDER OPERATING CONDITIONS.
3.2.4. ERECT PIPING SO THAT GRAVITY FORCES AND THRUST FROM CHANGES IN DIRECTION DO NOT STRESS CONNECTIONS TO APPARATUS.
3.2.5. SEPARATE COPPER PIPE AND FITTING MATERIALS FROM CONTACT WITH FERROUS MATERIAL WITH DI–ELECTRIC COUPLINGS.
3.2.6. INSTALL DRAIN VALVES AT LOW POINTS IN WATER PIPING SYSTEMS AND IN VALVED RUN–OUTS FROM RISERS SO THAT SYSTEM OR ISOLATED PARTS OF SYSTEM CAN BE DRAINED.
3.3. PREMISES BACKFLOW PROTECTION
3.3.1. PROVIDE A PREMISES BACKFLOW PREVENTION IN ACCORDANCE WITH THE ONTARIO BUILDING CODE.

FIRE EXTINGUISHERS 21 12 29

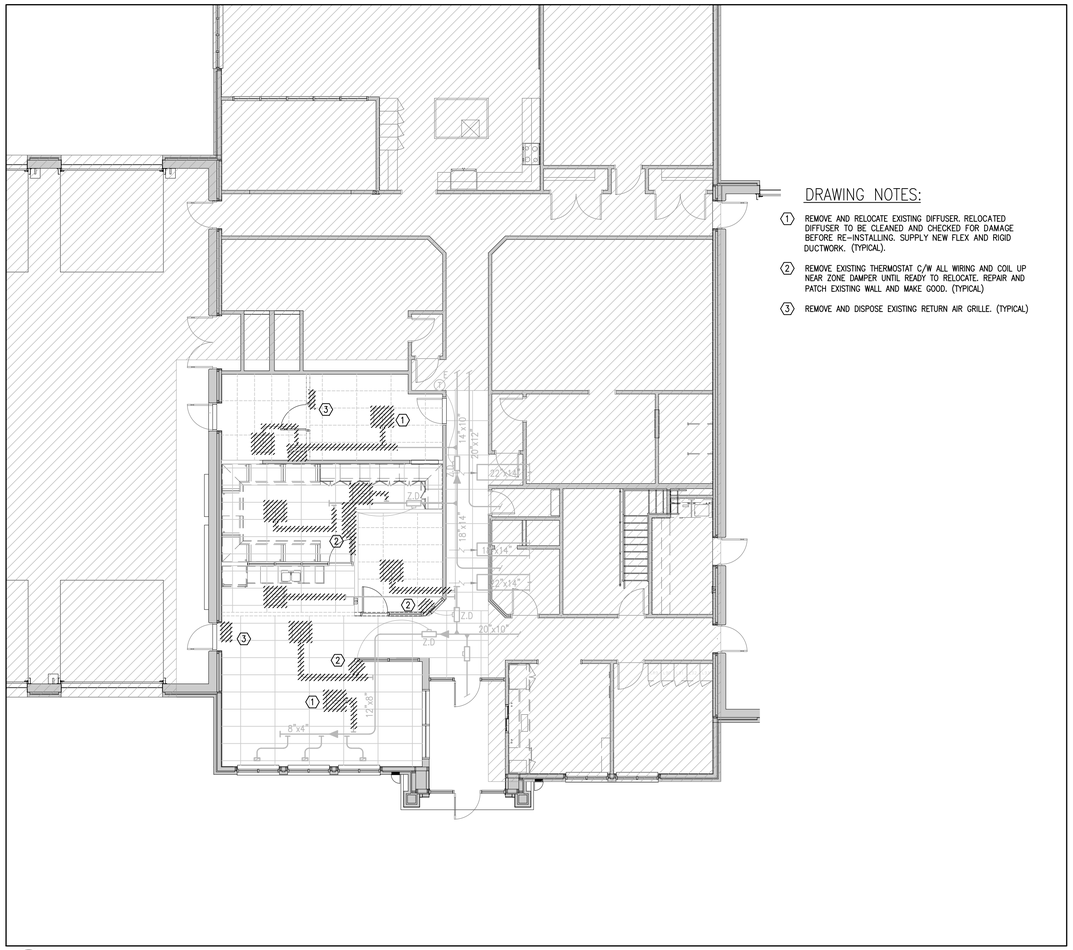
1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE EXTINGUISHERS IN SERVICE ROOMS, KITCHENS AND FIRE HOSE CABINETS.
1.2. APPLICABLE STANDARDS
1.2.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 10 STANDARD FOR PORTABLE FIRE EXTINGUISHERS.
2. PRODUCTS
2.1. PRESSURIZED WATER EXTINGUISHERS (TO MATCH EXISTING)
2.1.1. STORED PRESSURE TYPE, SQUEEZE–GRIP OPERATED OF STAINLESS STEEL CONSTRUCTION, ULC LABELED, 9.1 L (2 GAL) SIZE, 2–A RATING.
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LTD. – MODEL WBDL–W2.5, FLAG FIRE EQUIPMENT LTD – MODEL PWS–25–F
2.2. MULTIPURPOSE DRY CHEMICAL EXTINGUISHERS (IN ALL SERVICE ROOMS)
2.2.1. STORED PRESSURE RECHARGEABLE TYPE WITH HOSE AND SHUT–OFF NOZZLE, ULC LABELED FOR A, B AND C CLASS PROTECTION, RED ENAMEL FINISH. SIZES 2.25 KG (5 LB).
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LIMITED – ABC, FLAG FIRE EQUIPMENT LIMITED – ABC
2.3. ORDINARY DRY CHEMICAL EXTINGUISHERS
2.3.1. STORED PRESSURE TYPE WITH HOSE AND SHUT–OFF NOZZLE, ULC LABELED FOR B AND C CLASS PROTECTION, GLOSSY ENAMEL FINISH. SIZES 2.25 KG (5 LB).
2.3.2. PROVIDE 1.25 KG (2 ? LB) SIZE IF NOT OTHERWISE SHOWN.
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LIMITED – PDC, FLAG FIRE EQUIPMENT LIMITED – PDC
2.4. IDENTIFICATION OF EXTINGUISHERS
2.4.1. INCLUDE BILINGUAL TAG OR LABEL ATTACHED TO EXTINGUISHERS, IN ACCORDANCE WITH RECOMMENDATIONS OF NFPA 10, INDICATING MONTH AND YEAR OF INSTALLATION, WITH SPACE FOR SERVICE DATES.
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LIMITED – FB–6078, FLAG FIRE EQUIPMENT LIMITED.
3. EXECUTION
3.1. MOUNT CABINETS AND BRACKETS.

STANDPIPE AND HOSE SYSTEMS 21 12 13

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE STANDPIPE AND HOSE SYSTEMS AS SHOWN WITH HEADER ASSEMBLY, PIPING, SUPERVISED VALVES, FIREHOSE CABINETS, HOSE AND FIRE EXTINGUISHERS.
1.1.2. PROVIDE FIRE RATED PIPE INSULATION ON STANDPIPE RISERS AS SHOWN.
1.1.2.A. FOR GREATER CLARITY, THE CONTRACTOR UNDER THIS SECTION OF THE WORK IS RESPONSIBLE FOR PROVIDING THE STANDPIPE FIRE PROTECTION SYSTEM, INCLUDING ANY SUB–CONTRACTING OF ALL OR A PORTION OF THE WORK TO ANOTHER TRADE.
1.2. APPLICABLE CODES AND STANDARDS
1.2.1. ONTARIO BUILDING CODE
1.2.2. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 14 – STANDARD FOR THE INSTALLATION OF STANDPIPE, PRIVATE HYDRANTS, AND HOSE SYSTEMS
1.2.3. NFPA 25 – STANDARD FOR THE INSPECTION, TESTING AND MAINTENANCE OF WATER–BASED FIRE PROTECTION SYSTEMS
1.2.4. ONTARIO FIRE CODE
1.2.5. ASTM A53 STANDARD SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT–DIPPED, ZINC–COATED, WELDED AND SEAMLESS
1.2.6. COMPONENTS TO BE ULC OR FM LISTED FOR FIRE PROTECTION SERVICE.
1.3. ENGINEERING DATA
1.3.1. STAND PIPE SYSTEM:
1.3.2. HYDRAULICALLY SIZED TO NFPA 14 USING WATER SUPPLY FLOW TEST DATA
1.4. SHOP DRAWINGS AND PRODUCT DATA.
1.4.1. SUBMIT PRODUCT DATA SHEETS FOR:
1.4.1.A. FIRE HOSE CABINETS,
1.4.2. PREPARE AND SUBMIT SHOP DRAWINGS AND HYDRAULIC CALCULATIONS TO AUTHORITIES HAVING JURISDICTION AND OBTAIN APPROVAL BEFORE COMMENCING WORK.
2. PRODUCTS
2.1. GENERAL
2.1.1. PROVIDE FIREHOSE CABINETS, HOSE RACKS, HOSE FITTINGS, FIRE EXTINGUISHERS AND SIAMESE CONNECTIONS, FROM ONE MANUFACTURER/SUPPLIER. PRODUCT MODEL NUMBERS OF NATIONAL FIRE EQUIPMENT LTD. HAVE BEEN USED TO INDICATE CONSTRUCTION FEATURES AND QUALITY STANDARDS NOT OTHERWISE DESCRIBED.
2.2. PIPE, VALVES AND FITTINGS
2.2.1. PIPE AND FITTINGS : TO SECTION 21 05 01
2.2.2. VALVES: TO SECTION 20 05 23
2.3. CABINETS
2.3.1. FLUSH MOUNTED IN FINISHED AREAS, AND SURFACE MOUNTED IN SERVICE AREAS, UNLESS OTHERWISE SHOWN.
2.3.2. ACCOMMODATE ANGLE VALVE, HOSE AND RACK, FIRE HOSE NOZZLE AND SPANNER, FIRE EXTINGUISHER, AND NPS 2½ FIRE DEPARTMENT VALVE.
2.3.3. 1.4 MM (18 GA) STEEL TUB, GLASS CHANNEL DOOR, 2 MM (14 GA) FLUSH ADJUSTABLE PLASTER TRIM WITH DOOR FRAME WITH ROLLED EDGES. FULL REBATE FOR DOOR.
2.3.4. DOOR WITH 6 MM (¼ IN) PLATE GLASS VIEWING PANEL 90% AREA OF DOOR AND THREE FULLY CONCEALED 180 OPENING DOOR HINGES AND CORBIN CATCH OF FLUSH CAST CONSTRUCTION. DOOR FRAME WITH ROLLED EDGES.
2.3.5. STAINLESS STEEL PRESSURIZED WATER FIRE EXTINGUISHER.
2.4. HOSE RACKS FOR CABINETS
2.4.1. MOUNTING AS INDICATED.
2.4.2. SEMIAUTOMATIC OPEN TYPE WITH WATER STOP SIZED FOR [30 M (100 FT)][23 M (75 FT)] OF NPS 1½ HOSE.
2.5. WATER STOP
2.5.1. DESIGNED FOR ONE MAN OPERATION OF HOSE BY HOLDING BACK WATER FLOW UNTIL LAST FOLD OF HOSE IS PULLED FREE FROM RACK.
2.6. FIRE HOSE AND NOZZLE
2.6.1. HOSE: 38 MM (NPS 1½) NOMINAL DIAMETER, [30 M (100 FT)][23 M (75 FT)] LONG, POLYURETHANE LINED 1000%% SYNTHETIC TWISTED POLYESTER FILAMENT TYPE COUPLED WITH CHROME PLATED FORGED BRASS COUPLINGS WITH SPANNER LUGS ON BOTH MALE AND FEMALE ENDS.
2.6.2. NOZZLE TO BE ULC LISTED, 38 MM (NPS 1½) NOMINAL DIAMETER, CHROME PLATED MERLON T–70, ADJUSTABLE COMBINATION FOG–STRAIGHT STREAM WITH SHUT–OFF.
2.7. FIRST AID STREAM ANGLE VALVES
2.7.1. NPS 1½ SIZE, CAST OR FORGED CHROME PLATED BRASS 2070 KPA (300 PSI) WITH HAND WHEEL AND INTEGRAL HYDROLATOR.
2.7.2. NPS 1 ½ SIZE, ADJUSTABLE CHROME PLATED PRESSURE RESTRICTING ANGLE VALVE WITH HAND WHEEL AND INTEGRAL HYDROLATOR CONTROLLING MAXIMUM OUTLET PRESSURE TO 550 KPA (80 PSI), WHERE WATER PRESSURE EXCEEDS 690 KPA (90 PSI).
2.7.3. WHERE WATER PRESSURE EXCEEDS 1050 KPA (150 PSIG) NPS 1½ CHROME PLATED PRESSURE REGUARITY VALVE TO CONTROL OUTLET PRESSURE TO 550 KPA (80 PSIG).
2.8. FIRE DEPARTMENT VALVES
2.8.1. NPS 2 ½ ANGLE, MALE OUTLET, UNDERWRITERS' APPROVED, CHROME PLATED VALVE WITH HANDWHEEL, CAP AND CHAIN MOUNTED IN CABINET UNDER RACK.
2.8.2. VALVE THREAD COMPATIBLE WITH LOCAL FIRE DEPARTMENT HOSE.
2.9. FINISHES
2.9.1. FINISHED AREAS;
2.9.1.A. FIRE HOSE CABINET: PRIME COATED,
2.9.1.B. DOOR AND FRAME: **[NO.4 SATIN FINISH STAINLESS STEEL] [PRIME PAINTED]**
2.9.1.C. VALVES, NOZZLE, FITTINGS, HOSE RACK AND SPANNER: CHROME PLATED.
2.9.2. IN PARKING GARAGES, MECHANICAL AREAS, BOILER ROOMS, PENTHOUSE MECHANICAL ROOMS, AND FAN ROOMS;
2.9.2.A. FIRE HOSE CABINETS: PRIME PAINTED,
2.9.2.B. VALVES, NOZZLE, FITTINGS, HOSE RACK AND SPANNER: BRASS. 2.10 FIRE RATED PIPE INSULATION
2.9.2.C. TYPE: WH; ULC, OR UL CLASSIFIED INORGANIC MATERIAL, NON–COMBUSTIBLE, LISTED FOR PROTECTION OF METALLIC PIPING,
2.9.2.C.A. MEETING ASTM C518,
2.9.2.C.B. FLEXIBLE BLANKET, 1 HOUR FIRE RATING,
2.9.2.C.C. FOIL ENCAPSULATED, F). °F TO 2300 °C (–280 °C TO 1260
2.9.2.C.D. SUITABLE FOR SERVICE BETWEEN:–173
3. EXECUTION
3.1. INSTALLATION
3.1.1. INSTALL WATER PIPING AND FIRE PROTECTION HEADER AS SHOWN. PROVIDE SUPERVISED ISOLATING VALVES AND RUN PIPING TO FIRE HOSE CABINETS.
3.2. PROTECTION OF STANDPIPE RISERS
3.2.1. INSTALL STANDPIPE RISERS IN EXIT STAIR WELLS, FIRE RATED SERVICE SPACES, OR PROVIDE FIRE RATED PIPE INSULATION.
3.2.2. PROVIDE 1 HR FIRE–RATED PIPE INSULATION OF PIPING AND HANGERS FOR THE FOLLOWING:
3.2.2.A. STANDPIPE RISERS, ORIENTED IN THE VERTICAL, HORIZONTAL OR AT AN ANGLE, WHICH ARE NOT LOCATED IN EITHER AN EXIT STAIR OR SERVICE SPACES WHICH ARE CONSTRUCTED WITH A FIRE RESISTANCE RATING EQUIVALENT TO A VERTICAL SERVICE SPACE.
3.2.2.B. HORIZONTAL OFFSETS OF STANDPIPES NOT ENCLOSED IN EXIT STAIR SHAFTS OR FIRE RATED SERVICE SPACES.
3.2.2.C. LATERAL PIPING SERVING CLASS I AND CLASS III 65MM (2½ THE SAME FLOOR LEVEL.
3.2.2.D. WRAP PIPE HANGERS IN ACCORDANCE WITH THE FIRE–RATED INSULATION MANUFACTURER LISTED INSTALLATION INSTRUCTIONS.
3.2.3. EXCEPTION FOR SPRINKLERED BUILDINGS:
3.2.3.A. FIRE RATED PIPE INSULATION IS NOT REQUIRED IN BUILDINGS WITH AN APPROVED AUTOMATIC SPRINKLER) HOSE CONNECTIONS ON THE SAME FLOOR. "SYSTEM FOR LATERAL PIPING SERVING CLASS I AND III 65MM (2½) HOSE VALVES / FIRE HOSE CABINETS ONLY"
3.2.4. FOR GREATER CLARITY, LATERAL PIPING SERVING CLASS II 1½ DO NOT REQUIRE PROTECTION.
3.2.5. FOR GREATER CLARITY, FEED MAIN PIPING, FROM THE ENTRY TO THE BUILDING AND UP TO THE SERVICE VALVE ISOLATING A STANDPIPE RISER, DOES NOT REQUIRE PROTECTION.

WET PIPE SPRINKLER SYSTEM 21 13 13

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE WET PIPE AUTOMATIC SPRINKLER SYSTEMS.
1.1.2. PROVIDE INSTALLATION DRAWINGS AND HYDRAULIC CALCULATIONS, DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENCED IN THE PROVINCE OF ONTARIO.
1.2. QUALIFIED SUBCONTRACTORS
1.2.1. SPRINKLER WORK TO BE UNDERTAKEN BY SPECIALIST AUTOMATIC SPRINKLER INSTALLATION FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD.
1.3. APPLICABLE CODES AND STANDARDS
1.3.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 13 – STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
1.3.2. NFPA 25 – STANDARD FOR THE INSPECTION, TESTING AND MAINTENANCE OF WATER–BASED FIRE PROTECTION SYSTEMS
1.3.3. ONTARIO BUILDING CODE
1.3.4. ONTARIO FIRE CODE
1.3.5. ASTM A53 STANDARD SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT–DIPPED, ZINC–COATED, WELDED AND SEAMLESS
1.3.6. CSA B64 – BACKFLOW PREVENTERS AND VACUUM BREAKERS
1.4. SHOP DRAWINGS AND PRODUCT DATA
1.4.1. PREPARE SHOP DRAWINGS AND FORWARD THREE COPIES WITH HYDRAULIC CALCULATIONS TO OWNERS INSURERS FOR REVIEW AND ACCEPTANCE.
1.4.2. AFTER SHOP DRAWINGS ARE ACCEPTED BY REVIEWING AUTHORITY SUBMIT COPIES OF THESE STAMPED SHOP DRAWINGS AND PRODUCT DATA SHEETS FOR REVIEW IN ACCORDANCE WITH DIVISION 1 PROCEDURES.
1.5



DRAWING NOTES:

1. REMOVE AND RELOCATE EXISTING DIFFUSER. RELOCATED DIFFUSER TO BE CLEANED AND CHECKED FOR DAMAGE BEFORE RE-INSTALLING. SUPPLY NEW FLEX AND RIGID DUCTWORK. (TYPICAL).
2. REMOVE EXISTING THERMOSTAT C/W ALL WIRING AND COIL UP NEAR ZONE DAMPER UNTIL READY TO RELOCATE. REPAIR AND PATCH EXISTING WALL AND MAKE GOOD. (TYPICAL)
3. REMOVE AND DISPOSE EXISTING RETURN AIR GRILLE. (TYPICAL)

1 M-2.0 HVAC LAYOUT – DEMO
1:100

DRAWING NOTES:

1. NEW LOCATION OF RELOCATED SQUARE DIFFUSER C/W NEW FLEX, RIGID DUCTWORK AND BALANCING DAMPER. (TYPICAL)
2. NEW LOCATION OF RELOCATED THERMOSTAT. CONTRACTOR TO CONFIRM EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. REVIEW AND CONFIRM LOCATION ON SITE. (TYPICAL)
3. BALANCE DIFFUSER TO NEW AIR FLOW IN CFM. (TYPICAL)
4. NEW EGGRATE TYPE RETURN AIR GRILLE. SEE SCHEDULE FOR SIZING. (TYPICAL)
5. CUT AND MODIFY EGGCRATE RETURN AIR GRILLE TO FIT GRID IN CLOSET.

2 M-2.0 HVAC LAYOUT – NEW
1:100

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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York Region

no.	date	by	description

REVISIONS

03	14MAY21		RE-ISSUED FOR TENDER
02	17FEB21		ISSUED FOR PERMIT/TENDER
01	27JAN21		ISSUED FOR DRAWING REVIEW

no.	date	by	description

ISSUED

LICENSED PROFESSIONAL ENGINEER
K.P. O'NEILL
100055807
2202027
PROVINCE OF ONTARIO

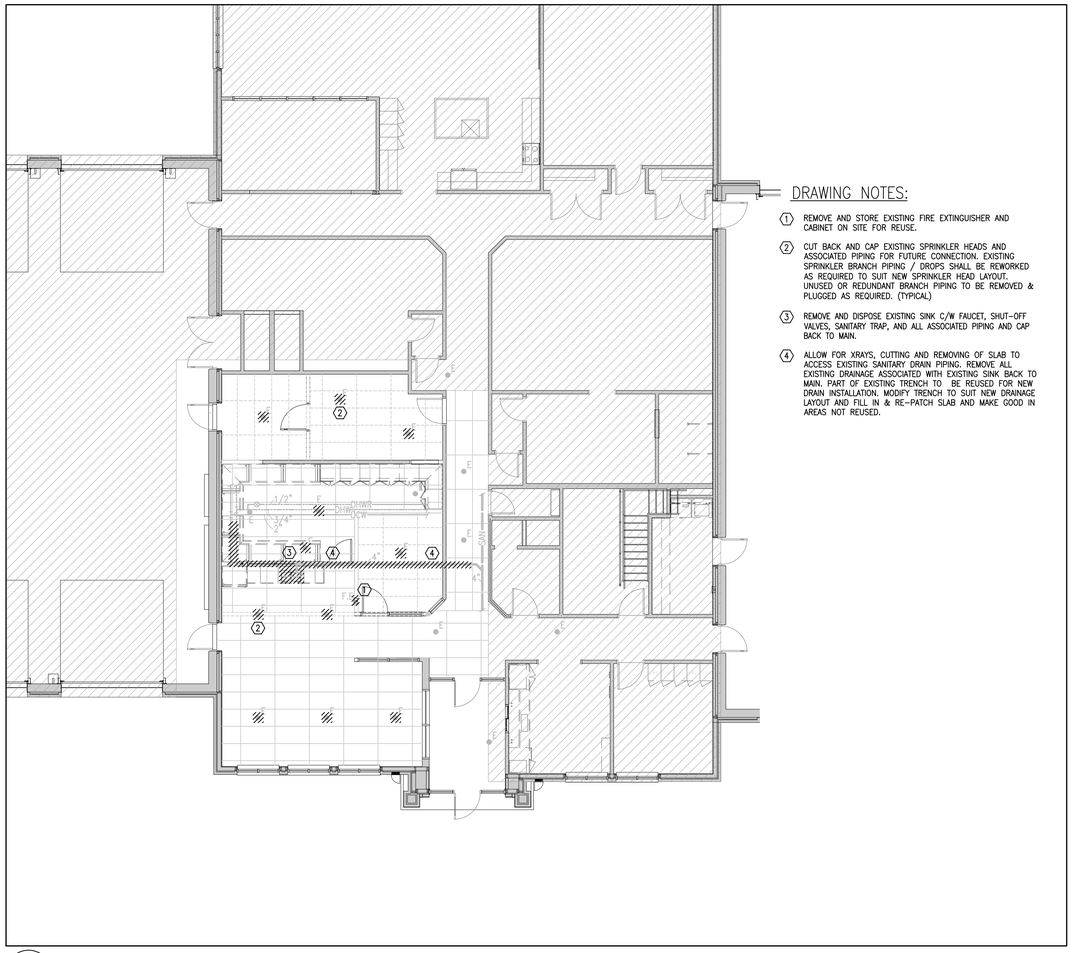
project title

YORK REGION
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title

HVAC LAYOUT

date: 01-14-2021	project no.: 2202027
drawn by: FS	
checked by: DP	drawing no.: M-2.0
scale: 1:100	



DRAWING NOTES:

1. REMOVE AND STORE EXISTING FIRE EXTINGUISHER AND CABINET ON SITE FOR REUSE.
2. CUT BACK AND CAP EXISTING SPRINKLER HEADS AND ASSOCIATED PIPING FOR FUTURE CONNECTION. EXISTING SPRINKLER BRANCH PIPING / DROPS SHALL BE REWORKED AS REQUIRED TO SUIT NEW SPRINKLER HEAD LAYOUT. UNUSED OR REDUNDANT BRANCH PIPING TO BE REMOVED & PLUGGED AS REQUIRED. (TYPICAL)
3. REMOVE AND DISPOSE EXISTING SINK C/W FAUCET, SHUT-OFF VALVES, SANITARY TRAP, AND ALL ASSOCIATED PIPING AND CAP BACK TO MAIN.
4. ALLOW FOR XRAYS, CUTTING AND REMOVING OF SLAB TO ACCESS EXISTING SANITARY DRAIN PIPING. REMOVE ALL EXISTING DRAINAGE ASSOCIATED WITH EXISTING SINK BACK TO MAIN. PART OF EXISTING TRENCH TO BE REUSED FOR NEW DRAIN INSTALLATION. MODIFY TRENCH TO SUIT NEW DRAINAGE LAYOUT AND FILL IN & RE-PATCH SLAB AND MAKE GOOD IN AREAS NOT REUSED.

1 M-2.0 HVAC LAYOUT – DEMO
1:100

DRAWING NOTES:

1. NEW LOCATION OF RELOCATED RECESSED FIRE EXTINGUISHER AND CABINET. CONFIRM EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.
2. CONNECT TO EXISTING SPRINKLER MAIN WITH MINIMUM 1" BRANCH PIPE, PROVIDE NEW SPRINKLER HEAD AS SHOWN. (TYPICAL)
3. 1/2" CW & 1/2" HW. & VENT DOWN IN WALL TO SINK S-1 & DISHWASHER, 1-1/2" WASTE DOWN THROUGH FLOOR SLAB. PROVIDE 1/2" VALVED DCW. PROVIDE 1/2" VALVED DHW. & 1-1/2" DRAIN CONNECTIONS UNDER COUNTER FOR DISHWASHERS. INSTALL DISHWASHERS AS SUPPLIED BY OWNER. ALLOW SUFFICIENT CLEARANCE FOR SINK DRAIN TRAP ACCESS. CONTRACTOR TO INVESTIGATE SITE PRIOR TO COMMENCING WORK. SEE DETAIL 1/M-1.0.
4. CONNECT NEW PLUMBING TO EXISTING EXISTING CONNECTIONS. PROVIDE NEW SHUTOFF VALVE ON DOMESTIC COLD WATER AND HOT WATER LINES. CONFIRM EXACT ROUTING OF PIPING ON SITE.
5. NEW 4" DRAIN LINE UNDER SLAB. CONNECT TO NEAREST 4" MAIN. INCLUDE FOR REPAIR AND PATCHING OF SLAB AND MAKE GOOD.
6. NEW VENT SHALL USE EXISTING OPENING THROUGH ROOF. MODIFY AND CONNECT NEW VENT.

SPRINKLER HEAD DISCHARGE DENSITIES	
HAZARD CLASSIFICATIONS	DESIGN DENSITY (U.S. gpm/ft/sq)
LIGHT HAZARD OFFICE	0.1
ORDINARY HAZARD (GROUP 1) MECHANICAL SERVICE AREAS COMMUNICATION ROOMS	0.15

NOTE:

DURING CONSTRUCTION, CONTRACTOR IS TO KEEP EXISTING FIRE PROTECTION SYSTEM IN OPERATION AT ALL TIMES. WHEN SYSTEM NOT IN OPERATION CONTRACTOR IS TO PROVIDE A FIRE WATCH. FIRE WATCH SHALL COMPLY WITH THE ONTARIO FIRE CODE SECTION 8.1.2.2.

2 M-2.0 HVAC LAYOUT – NEW
1:100

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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LICENSED PROFESSIONAL ENGINEER
K.P. O'NEILL
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PROVINCE OF ONTARIO

project title
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PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title
PLUMBING & FIRE PROTECTION LAYOUT

date 01-14-2021		project no. 2202027
drawn by FS		
checked by DP		drawing no. M-3.0
scale 1:100		

DRAWING LIST

DRAWING No.	DRAWING TITLE
E-1.0	ELECTRICAL LEGEND
E-2.0	REFLECTED CEILING PLAN
E-3.0	POWER AND SYSTEMS PLAN
E-4.0	ELECTRICAL DETAILS, SINGLE LINE DIAGRAM, AND PANEL SCHEDULES
E-4.1	ELECTRICAL PANEL SCHEDULES
E-5.0	DEMOLITION REFLECTED CEILING PLAN
E-6.0	DEMOLITION POWER AND SYSTEMS PLAN

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	EXISTING BASE BUILDING LUMINAIRE TO REMOVED AND/OR RELOCATED.
	NEW 2' x 4' 120V LED LIGHT FIXTURE, 4000K, 0-10V DIMMING, MAX 50 WATTS, 6000 LUMEN. LITELINE – FORUM LED PANEL LIGHT #LEDP-24-WH-40-50-1 CONTACT: LITELINE / 416-996-1856
	NEW 4' 120V LED STRIP LIGHT, 4000K, MAX 20 WATTS, 3000 LUMENS. COOPER – #4SNLED-L04-305L-LN-UNV-L840-1 CONTACT: COOPER LIGHTING SOLUTIONS

NEW	EXISTING	DESCRIPTION
		CEILING MOUNTED RECESSED EDGE LIT GREEN RUNNING MAN EXIT SIGN. FACES AND DIRECTIONAL ARROWS SHALL BE CONFIRMED ON SITE. MATCH NEW BASE BUILDING STANDARD. LED SERIES FLUSH MOUNTED.
		SAME AS ABOVE EXCEPT WALL MOUNTED.
		RECESSED INCANDESCENT DOWNLIGHT FIXTURE.
		120V WALL MOUNTED LIGHT SWTICH. 'D' DENOTES DIMMER. CONTRACTOR TO ENSURE COMPATIBILITY OF SWITCH WITH DRIVER WITH MANUFACTURE PRIOR TO INSTALLATION. 'OS' DENOTES OCCUPANCY SENSOR. '3' DENOTES 3-WAY SWITCH.
		WALL MOUNTED 120V, 15A GROUNDED DUPLEX RECEPTACLE.
USB	USB	WALL MOUNTED 120V, 15A GROUNDED DUPLEX RECEPTACLE WITH USB. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A T-SLOT GROUNDED DUPLEX RECEPTACLE WITH USB. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A T-SLOT GROUNDED DUPLEX RECEPTACLE WITH USB.
		WALL MOUNTED 120V, 15A GROUNDED DUPLEX RECEPTACLE AT NON-STANDARD HEIGHT. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 15A GROUNDED QUAD DUPLEX RECEPTACLE AT NON-STANDARD HEIGHT. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A GFCI RECEPTACLE. ALL GFCI RECEPTACLES TO BE SEPARATE CIRCUIT AND HAVE 20A CIRCUIT BREAKER IN PANEL. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A GFCI QUAD RECEPTACLE. ALL GFCI RECEPTACLES TO BE SEPARATE CIRCUIT AND HAVE 20A CIRCUIT BREAKER IN PANEL. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
A	A	'A' CLUSTER CONFIGURATION. EACH TO RECEIVE: (2) VOICE/DATA, (2) COMBINATION DUPLEX/USB RECEPTACLE. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
B	B	'B' CLUSTER CONFIGURATION. EACH TO RECEIVE: (2) VOICE/DATA, (2) COMBINATION DUPLEX/USB RECEPTACLE, (2) BACK BOX FOR HDMI CABLING. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED VOICE/DATA OUTLET.
	24RC	ELECTRICAL PANEL.
CR	CR	CARD READER.
ES	ES	ELECTRIC STRIKE.
DC	DC	DOOR CONTACT.
REX	REX	REQUEST TO EXIT.
	FA	FIRE ALARM BELL.
		NEW FIRE ALARM CEILING MOUNTED SMOKE DETECTOR.
SA	SA	EXISTING WALL MOUNTED AND CEILING MOUNTED STANDALONE SMOKE ALARM.
CO	CO	EXISTING WALL MOUNTED AND CEILING MOUNTED CARBON MONOXIDE DETECTOR.
N	N	EXISTING CEILING MOUNTED NITROGEN DIOXIDE DETECTOR.
C	C	EXISTING DOOR CHIME/BUZZER.
	FACP	EXISTING FIRE ALARM MIRCOM FA1000 PANEL.
		NEW FIRE RATED PLYWOOD.
1 / E4		DETAIL 1, DRAWING E-4 — REFER TO DETAIL 1, ON DRAWING #E-4. (EXAMPLE).
E		DENOTES EXISTING ITEM TO REMAIN.
R		DENOTES EXISTING ITEM TO BE REMOVED.
RL		DENOTES EXISTING ITEM IN RELOCATED POSITION. REUSE EXISTING ITEMS, UNLESS OTHERWISE NOTED.
RR		DENOTES EXISTING ITEM TO BE REMOVED AND REINSTALLED/RELOCATED IN SAME POSITION OR VICINITY.
TYP		DENOTES TYPICAL THROUGHOUT.

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York Region

no.	date	by	description

REVISIONS

no.	date	by	description
04	14MAY2021	RD	RE-ISSUED FOR TENDER
03	05MAY2021	RD	RE-ISSUED FOR TENDER
02	17FEB2021	RD	ISSUED FOR PERMIT/TENDER
01	27JAN2021	RD	ISSUED FOR DRAWING REVIEW

ISSUED

LICENSED PROFESSIONAL ENGINEER
R.I. TIBBS
2202027
PROVINCE OF ONTARIO

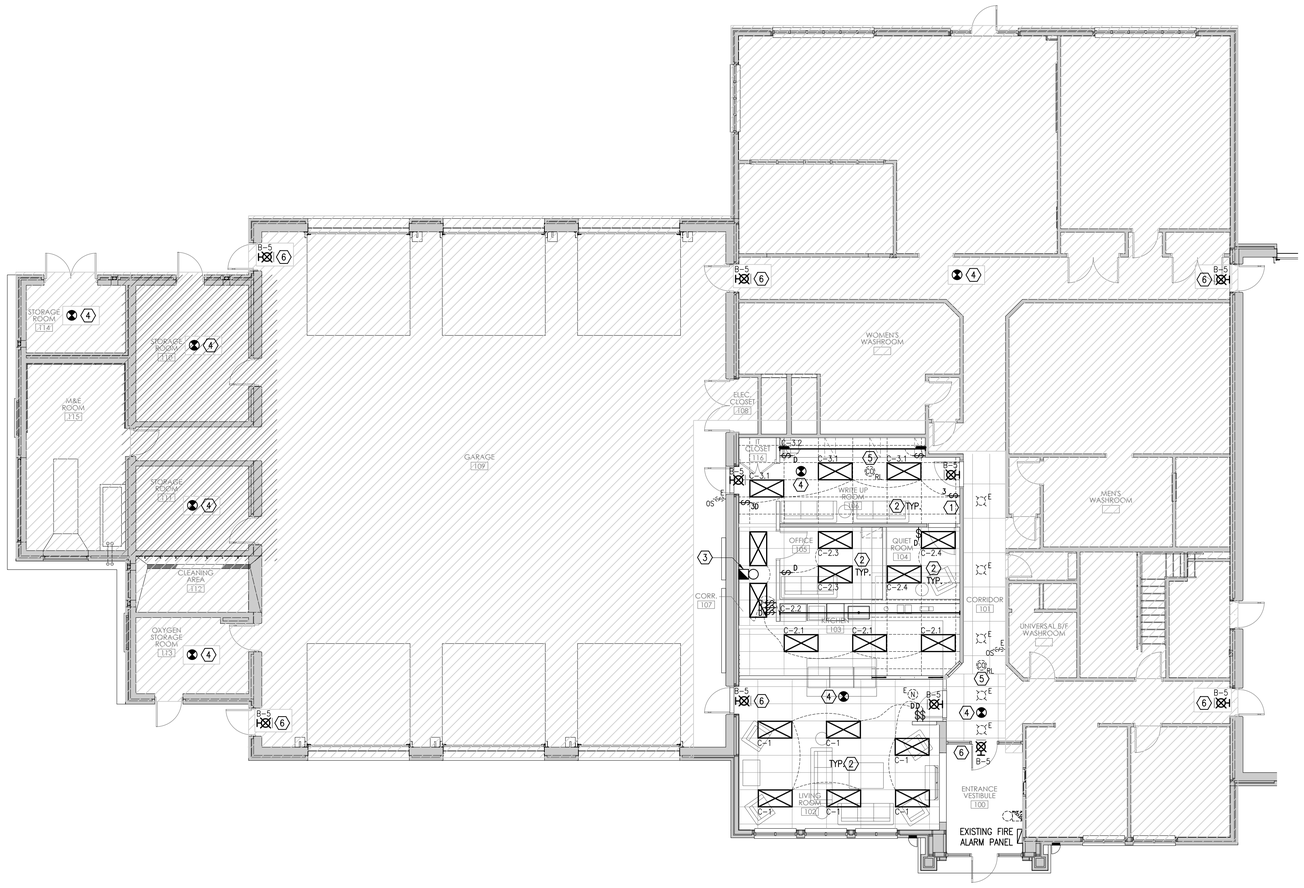
project title

YORK REGION
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title

ELECTRICAL LEGEND

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-1.0
scale: NTS	



DRAWING NOTES:

1. NEW 3-WAY LIGHTING SWITCHES TO CONTROL AND SUIT NEW LED LIGHTING FIXTURE LAYOUT IN WRITE UP ROOM 106. ONE (1) OF THE TWO (2) NEW 3-WAY SWITCHES TO HAVE DIMMING CAPABILITIES AS SHOWN.
2. REUSE EXISTING 120V LIGHTING CIRCUITS FROM DEMOLITION FOR NEW LED LIGHTING FIXTURE LAYOUT. TYPICAL.
3. NEW FIRE ALARM BELL TO BE INSTALLED AND CONNECTED TO EXISTING MIRCOM FA1000 FIRE ALARM PANEL LOCATED IN MAIN ENTRANCE. NEW FIRE ALARM BELL TO MATCH EXISTING BASE BUILDING BELLS.
4. NEW SMOKE DETECTORS TO BE INSTALLED AND CONNECTED TO EXISTING MIRCOM FA1000 FIRE ALARM PANEL LOCATED IN MAIN ENTRANCE.
5. EXISTING CARBON MONOXIDE DETECTOR SHOWN IN PROPOSED LOCATION. FINAL LOCATION TO BE COORDINATED ON SITE.
6. EXISTING RED EXIT SIGNAGE TO BE REMOVED AND REPLACED WITH NEW GREEN PICTOGRAM RUNNING MAN EXIT SIGN. CIRCUIT TO BE REUSED.

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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no.	date	by	description

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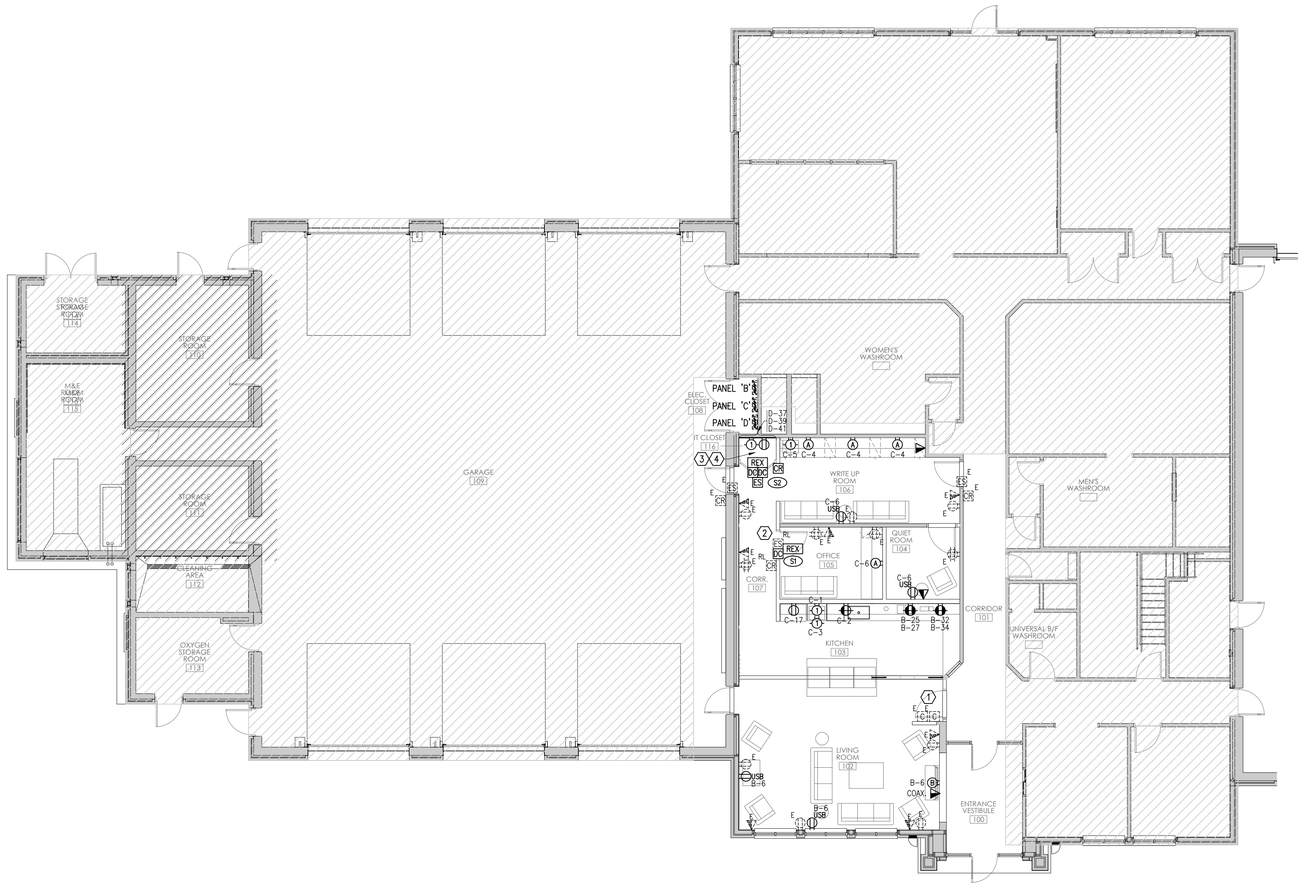
YORK REGION
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title

REFLECTED CEILING PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-2.0
scale: 1:100	



DRAWING NOTES:

1. EXISTING FRONT DOOR CHIME AND BACK DOOR BUZZER FINAL LOCATION TO BE DETERMINED ON SITE. RELOCATE AS NECESSARY.
2. CARD READER AND ELECTRIC STRIKE SHOWN IN PROPOSED LOCATION. FINAL LOCATION TO BE COORDINATED ON SITE.

   CONTRACTOR TO PROVIDE ITEMIZED PRICE FOR NEW ELECTRIC STRIKE TO SUIT NEW DOOR HARDWARE IN OFFICE 105.
3. IT CLOSET TO INCLUDE DEDICATED 15A CIRCUIT FOR MOH EQUIPMENT, AND L20-5R RECEPTACLE FOR APC 2200 COMPLETE WITH FIRE RATED PLYWOOD ON WALL.
4. CONTRACTOR TO INSTALL TELECOMMUNICATION GROUND BAR IN IT CLOSET. FINAL LOCATION TO BE DETERMINED ON SITE PRIOR TO INSTALLATION.

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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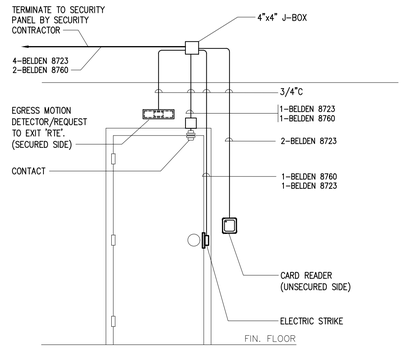
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title

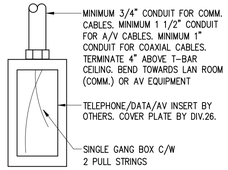
POWER AND SYSTEMS PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-3.0
scale: 1:100	

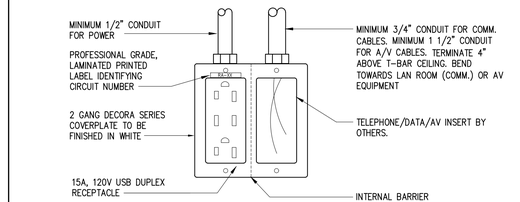


GENERAL NOTE:
CONTRACTOR TO INCLUDE FOR STOREROOM FUNCTION LOCKSET TO ACCOMMODATE STRIKE.

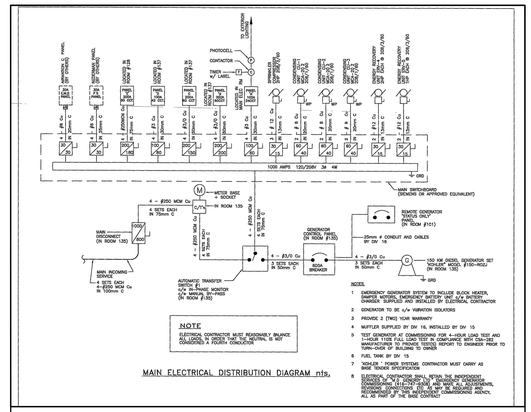
6 E4.0 TYPICAL SECURITY ROUGH-IN FOR ELECTRIC STRIKE DOOR:
SYMBOL: (S1) N.T.S.



5 E4.0 DETAIL OF WALL MOUNTED COMMUNICATIONS OUTLET:
SYMBOL: ▼ N.T.S.



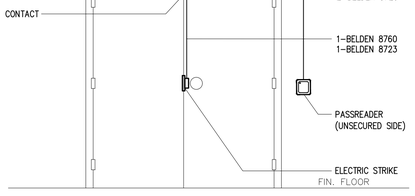
3 E4.0 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET:
SYMBOL: ▼ N.T.S.



GENERAL NOTE:

1. ALL EQUIPMENT IS EXISTING TO REMAIN UNLESS OTHERWISE NOTED

1 E4.0 9601 ISLINGTON ELECTRICAL DISTRIBUTION SINGLE LINE DIAGRAM
SCALE: NTS

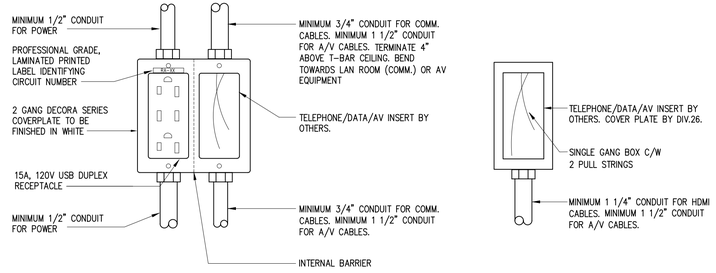


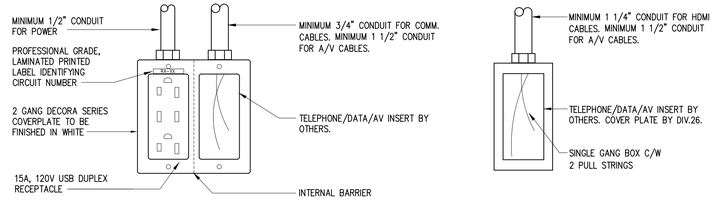
GENERAL NOTE:
CONTRACTOR TO INCLUDE FOR STOREROOM FUNCTION LOCKSET TO ACCOMMODATE STRIKE.

7 E4.0 TYPICAL SECURITY ROUGH-IN FOR ELECTRIC STRIKE DOOR:
SYMBOL: (S2) N.T.S.

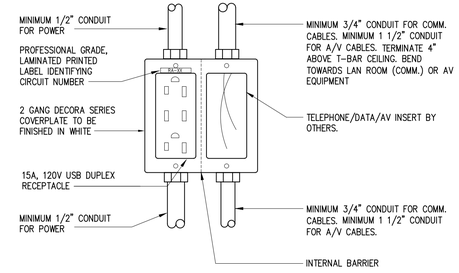
SECURITY SYSTEMS NOTES:

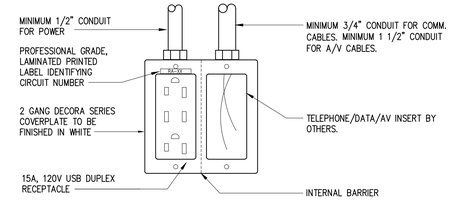
1. ALL CONDUITS, WIRING & OUTLET BOXES TO BE SUPPLIED AND INSTALLED BY DIVISION 26. ALL DEVICES ASSOCIATED WITH SECURITY TO BE BY SECURITY VENDOR. ALL TERMINATION'S BY DIVISION 26.
2. ALL JUNCTION BOXES SHALL BE MOUNTED INSIDE SECURE AREA OF FLOOR SPACE.
3. PROVIDE A 1/8" NYLON PULL CORD FOR ALL CONDUIT ASSOCIATED WITH SECURITY.
4. SECURITY WIRING AS SHOWN IS DIAGRAMMATIC ONLY. PROVIDE WIRING AS PER SECURITY SYSTEM MANUFACTURERS REQUIREMENTS.





4 E4.0 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET:
SYMBOL: (B) N.T.S.





2 E4.0 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET:
SYMBOL: (A) N.T.S.

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01	27JAN2021	RD	ISSUED FOR DRAWING REVIEW
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LICENSED PROFESSIONAL ENGINEER
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YORK REGION
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title
ELECTRICAL DETAILS AND SINGLE LINE DIAGRAM

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-4.0
scale: NTS	

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PANEL DESIGNATION: PANEL C | PROJECT NAME: YORK REGION PARAMEDIC SERVICES – 111 RACCO PKWY

JOB No. 2202027 | CALCULATED BY: RD | DATE: FEB 2021 | MAINS: 200A | VOLTAGE: 120/208V, 3ø, 4W

	LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PHASE A	PHASE B	PHASE C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION	
*	MICROWAVE	20A	1	●			2	20A	KITCHEN GFCI	*
*	MICROWAVE	20A	3		●		4	15A	PLUGS RM 104	*
*	PRINTER/COPIER	20A	5			●	6	15A	PLUGS RM 104,105,106	*
	EXISTING CCT	15A	7	●			8	15A	EXISTING CCT	
	EXISTING CCT	15A	9		●		10	15A	EXISTING CCT	
	EXISTING CCT	15A	11			●	12	15A	EXISTING CCT	
	EXISTING CCT	15A	13	●			14	15A	EXISTING CCT	
	EXISTING CCT	15A	15		●		16	15A	EXISTING CCT	
	FRIDGE	15A	17			●	18	15A	EXISTING CCT	
	EXISTING CCT	15A	19	●			20	20A	EXISTING CCT	
	EXISTING CCT	15A	21		●		22	15A	EXISTING CCT	
	EXISTING CCT	15A	23			●	24	15A	EXISTING CCT	
	EXISTING CCT	15A	25	●			26	15A	EXISTING CCT	
	EXISTING CCT	15A	27		●		28	15A	EXISTING CCT	
	EXISTING CCT	15A	29			●	30	15A	EXISTING CCT	
	EXISTING CCT	15A	31	●			32	15A	EXISTING CCT	
	EXISTING CCT	15A	33		●		34	15A	EXISTING CCT	
	EXISTING CCT	15A	35			●	36	15A	EXISTING CCT	
	EXISTING CCT	15A	37	●			38	15A	EXISTING CCT	
	EXISTING CCT	15A	39		●		40	15A	EXISTING CCT	
	EXISTING CCT	15A	41			●	42	15A	EXISTING CCT	
	EXISTING CCT	15A	43	●			44	15A	EXISTING CCT	
	EXISTING CCT	15A	45		●		46	15A	EXISTING CCT	
	EXISTING CCT	20A	47			●	48	15A	EXISTING CCT	
	EXISTING CCT	15A	49	●			50	15A	EXISTING CCT	
	EXISTING CCT	15A	51		●		52	15A	EXISTING CCT	
	EXISTING CCT	15A	53			●	54	15A	EXISTING CCT	
	EXISTING CCT	15A	55	●			56	15A	EXISTING CCT	
	EXISTING CCT	15A	57		●		58	15A	EXISTING CCT	
	EXISTING CCT	15A	59			●	60	15A	EXISTING CCT	
	EXISTING CCT	15A	61	●			62	15A	EXISTING CCT	
	EXISTING CCT	15A	63		●		64		SPACE	
	EXISTING CCT	20A	65			●	66		SPACE	

SURFACE MOUNTED: ☒ FLUSH MOUNTED: ☐ NEW: ☐ EXISTING: ☒

* DENOTES NEW BREAKER

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PANEL DESIGNATION: PANEL B | PROJECT NAME: YORK REGION PARAMEDIC SERVICES – 111 RACCO PKWY

JOB No. 2202027 | CALCULATED BY: RD | DATE: FEB 2021 | MAINS: 200A | VOLTAGE: 120/208V, 3ø, 4W

	LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PHASE A	PHASE B	PHASE C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION	
	SPACE		1	●			2		SPACE	
	SPACE		3		●		4		SPACE	
	EMS EXISTING SIGNS	15A	5			●	6	15A	PLUGS ROOM 102	*
	EXISTING CCT	15A	7	●			8	15A	EXISTING CCT	
	EXISTING CCT	15A	9		●		10	15A	EXISTING CCT	
	EXISTING CCT	15A	11			●	12	15A	EXISTING CCT	
	EXISTING CCT	15A	13	●			14	15A	EXISTING CCT	
	EXISTING CCT	15A	15		●		16	15A	EXISTING CCT	
	EXISTING CCT	15A	17			●	18	15A	EXISTING CCT	
	EXISTING CCT	15A	19	●			20	20A	EXISTING CCT	
	EXISTING CCT	15A	21		●		22	15A	EXISTING CCT	
	EXISTING CCT	15A	23			●	24	15A	EXISTING CCT	
*	KITCHEN GFCI	20A	25	●			26	15A	EXISTING CCT	
*	KITCHEN GFCI	20A	27		●		28	15A	EXISTING CCT	
	EXISTING CCT	15A	29			●	30	15A	EXISTING CCT	
	EXISTING CCT	15A	31	●			32	20A	KITCHEN GFCI	*
	EXISTING CCT	15A	33		●		34	20A	KITCHEN GFCI	*
	EXISTING CCT	15A	35			●	36	15A	EXISTING CCT	
	EXISTING CCT	15A	37	●			38	15A	EXISTING CCT	
	EXISTING CCT	15A	39		●		40	15A	EXISTING CCT	
	EXISTING CCT	15A	41			●	42	15A	EXISTING CCT	
	EXISTING CCT	15A	43	●			44	15A	EXISTING CCT	
	EXISTING CCT	15A	45		●		46		SPACE	
	EXISTING CCT	20A	47			●	48		SPACE	
	EXISTING CCT	15A	49	●			50			
			51		●		52	15A	EXISTING CCT	
			53			●	54			
	EXISTING CCT	15A	55	●			56			
			57		●		58	15A	EXISTING CCT	
			59			●	60			
	EXISTING CCT	15A	61	●			62			
			63		●		64	15A	EXISTING CCT	
			65			●	66			

SURFACE MOUNTED: ☒ FLUSH MOUNTED: ☐ NEW: ☐ EXISTING: ☒

* DENOTES NEW BREAKER

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PANEL DESIGNATION: PANEL D | PROJECT NAME: YORK REGION PARAMEDIC SERVICES – 111 RACCO PKWY

JOB No. 2202027 | CALCULATED BY: RD | DATE: FEB 2021 | MAINS: 100A | VOLTAGE: 120/208V, 3ø, 4W

	LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PHASE A	PHASE B	PHASE C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION	
	EXISTING CCT	15A	1	●			2	15A	EXISTING CCT	
	EXISTING CCT	15A	3		●		4	15A	EXISTING CCT	
	EXISTING CCT	15A	5			●	6	15A	EXISTING CCT	
	EXISTING CCT	15A	7	●			8	15A	EXISTING CCT	
	EXISTING CCT	15A	9		●		10	15A	EXISTING CCT	
	EXISTING CCT	15A	11			●	12	15A	EXISTING CCT	
	EXISTING CCT	15A	13	●			14	15A	EXISTING CCT	
	EXISTING CCT	15A	15		●		16	15A	EXISTING CCT	
	EXISTING CCT	15A	17			●	18	15A	EXISTING CCT	
	EXISTING CCT	15A	19	●			20	20A	EXISTING CCT	
	EXISTING CCT	15A	21		●		22	15A	EXISTING CCT	
	EXISTING CCT	15A	23			●	24	15A	EXISTING CCT	
	EXISTING CCT	15A	25	●			26	15A	EXISTING CCT	
	EXISTING CCT	15A	27		●		28	15A	EXISTING CCT	
	EXISTING CCT	15A	29			●	30	15A	EXISTING CCT	
	EXISTING CCT	15A	31	●			32	15A	EXISTING CCT	
	EXISTING CCT	15A	33		●		34	15A	EXISTING CCT	
	EXISTING CCT	15A	35			●	36	15A	EXISTING CCT	
*	IT CLOSET 106 MOH EQUIPMENT	15A	37	●			38	30A	EXISTING CCT	
*	IT CLOSET 106 APC 2200	20A	39		●		40			
*	IT CLOSET 106 P.A. SYSTEM AMP.	15A	41			●	42		SPACE	

SURFACE MOUNTED: ☒ FLUSH MOUNTED: ☐ NEW: ☐ EXISTING: ☒

* DENOTES NEW BREAKER

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York Region

no.	date	by	description

REVISIONS

04	14MAY2021	RD	RE-ISSUED FOR TENDER
03	05MAY2021	RD	RE-ISSUED FOR TENDER
02	17FEB2021	RD	ISSUED FOR PERMIT/TENDER
01	27JAN2021	RD	ISSUED FOR DRAWING REVIEW

no.	date	by	description

ISSUED

LICENSED PROFESSIONAL ENGINEER
R.I. TIBBS
2202027
PROVINCE OF ONTARIO

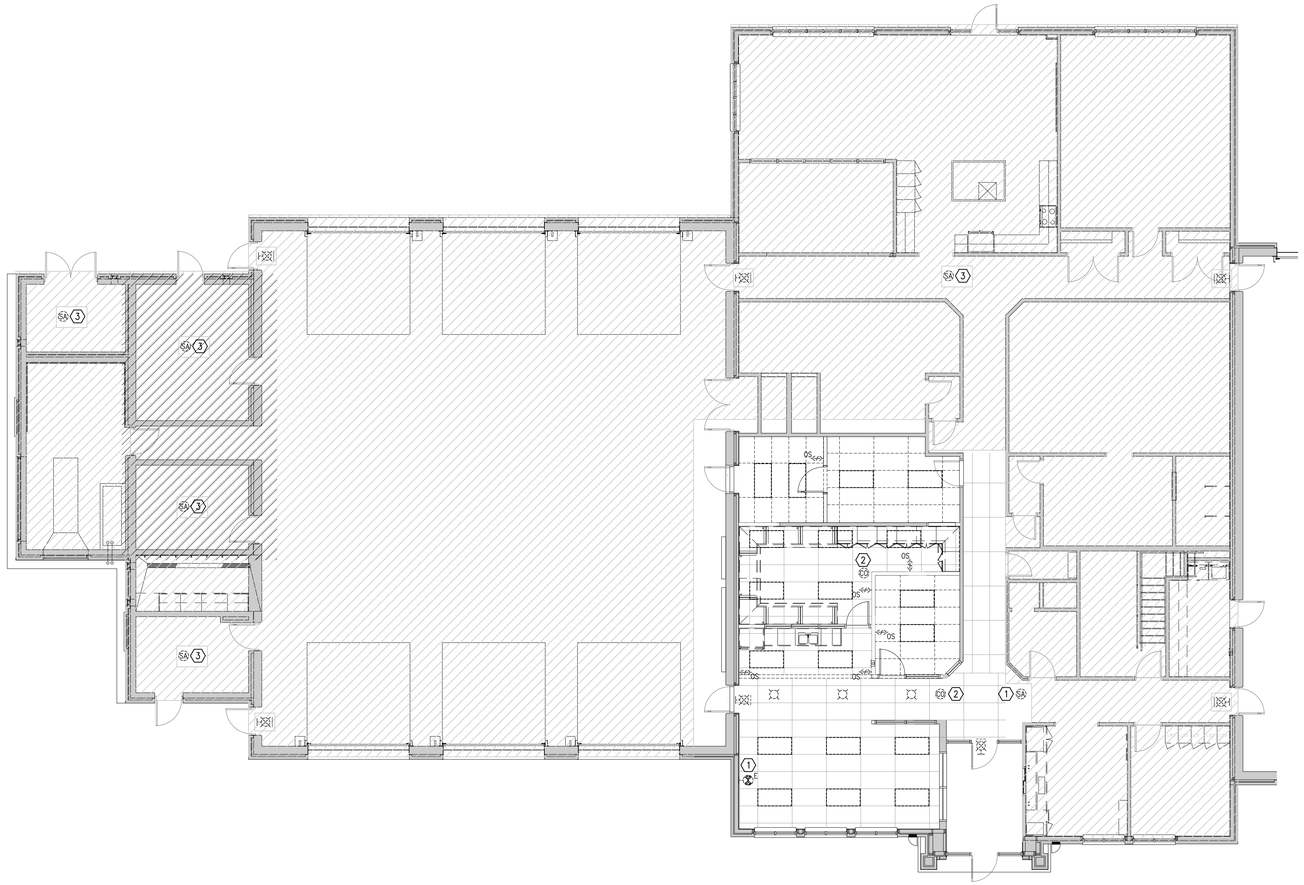
project title

YORK REGION
PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

drawing title

ELECTRICAL PANEL SCHEDULES

	date: 2021-01-14		project no.: 2202027
	drawn by: RD		
	checked by:		drawing no.: E-4.1
	scale: NTS		



DRAWING NOTES:

1. EXISTING 120V STANDALONE SMOKE ALARM TO BE REMOVED. WIRING AND CONDUIT TO BE CUT BACK TO SOURCE.
2. EXISTING CARBON MONOXIDE DETECTOR TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-2.0 – REFLECTED CEILING PLAN.
3. EXISTING 120V STANDALONE SMOKE ALARM TO BE REMOVED AND REPLACED WITH CEILING MOUNTED FIRE ALARM EVAC SMOKE DETECTOR.

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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project title

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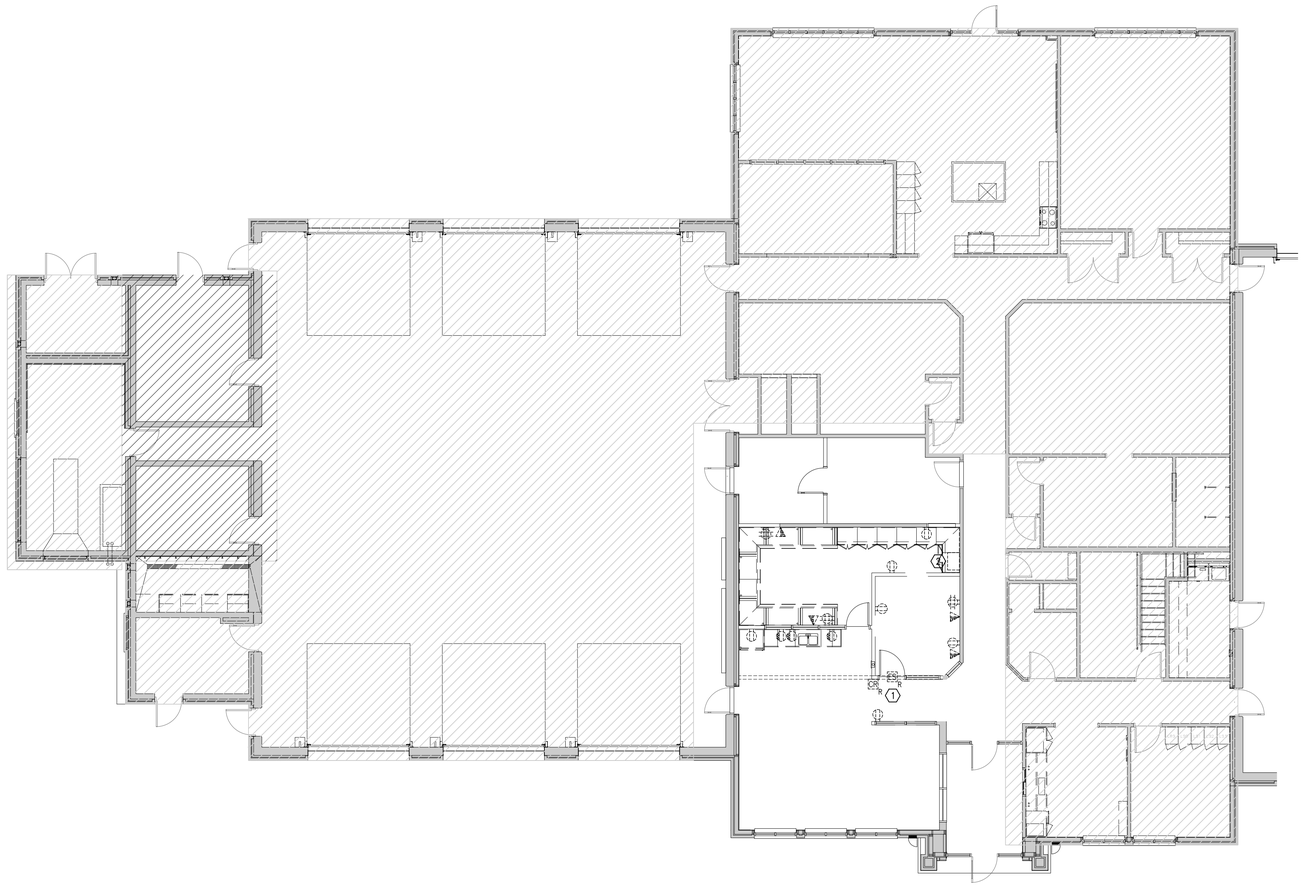
drawing title

DEMOLITION REFLECTED CEILING PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-5.0
scale: 1:100	



DRAWING NOTES:

1. EXISTING CARD READER AND ELECTRIC STRIKE TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-3.0 – POWER AND SYSTEMS PLAN.
2. EXISTING P.A. SYSTEM SPEAKER AMPLIFIER FOR E.M.S. STATION TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-3.0 – POWER AND SYSTEMS PLAN.

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2202027
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project title

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drawing title

DEMOLITION POWER AND SYSTEMS PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-6.0
scale: 1:100	

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L4J 8X9

RE-ISSUED FOR TENDER : 07MAY21

LIST OF DRAWINGS - PROJECT #20-1025

INTERIOR DESIGN DRAWINGS:

I-000	GENERAL NOTES
I-100	DEMOLITION PLAN
I-100.1	DEMOLITION CEILING PLAN
I-101	PARTITION PLAN
I-101.1	PARTITION TYPES
I-102	REFLECTED CEILING PLAN
I-103	POWER & COMMUNICATION PLAN
I-104	FLOOR FINISH PLAN
I-105	WALL FINISH PLAN
I-106	FURNITURE PLAN
I-107	RESERVED
I-108	MILLWORK DETAILS
I-108.1	MILLWORK DETAILS
I-108.2	MILLWORK DETAILS
I-108.3	MILLWORK DETAILS

MECHANICAL DRAWINGS:

M-1.0	MECHANICAL LEGEND, DETAILS AND SPECIFICATIONS
M-1.1	MECHANICAL SPECIFICATIONS - 1 OF 5
M-1.2	MECHANICAL SPECIFICATIONS - 2 OF 5
M-1.3	MECHANICAL SPECIFICATIONS - 3 OF 5
M-1.4	MECHANICAL SPECIFICATIONS - 4 OF 5
M-1.5	MECHANICAL SPECIFICATIONS - 5 OF 5
M-2.0	HVAC LAYOUT
M-3.0	PLUMBING & FIRE PROTECTION LAYOUT

ELECTRICAL DRAWINGS:

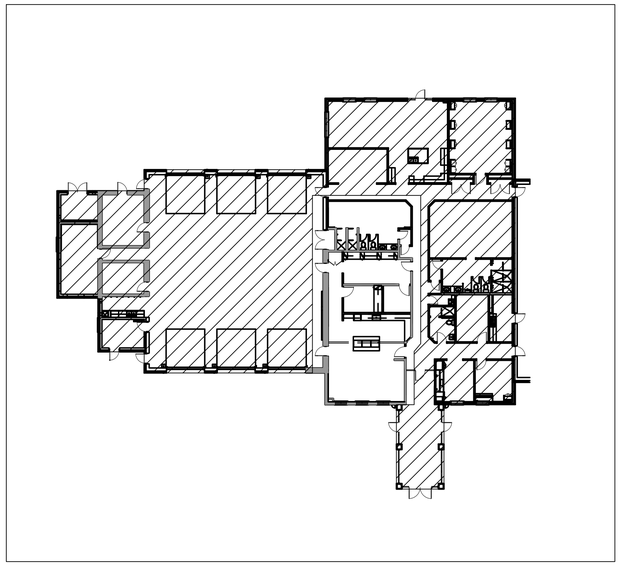
E-1.0	ELECTRICAL LEGEND AND SPECIFICATIONS
E-2.0	REFLECTED CEILING PLAN
E-3.0	POWER AND SYSTEMS PLAN

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

ABBREVIATIONS

ABV	ABOVE
ADJ	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
ALT	ALTERNATE
CLG	CEILING
CLR	CLEAR
CONT	CONTINUOUS
CT	CERAMIC TILE
CTR	CENTER
DBL	DOUBLE
DET	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DR	DOOR
DWG	DRAWING
E	EAST
EA	EACH
ELEC	ELECTRIC
EQ	EQUAL
EQUIP	EQUIPMENT
EX	EXISTING
FIN	FINISH
FLR	FLOOR
FLUOR	FLUORESCENT
FT	FEET (FOOT)
GAL	GALLON
GALV	GALVANIZED
GL	GLASS
GND	GROUND
GWB BOARD	GYPSUM WALL
HT	HEIGHT
MAX	MAXIMUM
MECH	MECHANICAL
MIN	MINIMUM
MISC	MISCELLANEOUS
MTL	METAL
N	NORTH
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
P	PAINT
PLAM	PLASTIC LAMINATE
PR	PAIR
PTD	PAINTED
QTY	QUANTITY
REQD	REQUIRED
RM	ROOM
S	SOUTH
SCHED	SCHEDULE
SECT	SECTION
SF	SQUARE FEET
SPEC SPECIFICATION	
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STOR	STORAGE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VCT TILE	VINYL COMPOSITION
VERT	VERTICAL
W	WEST
W/	WITH
W/O	WITHOUT
WC	WATERCLOSET
WD	WOOD
WT	WEIGHT
YD	YARD

KEY PLAN (N.T.S)



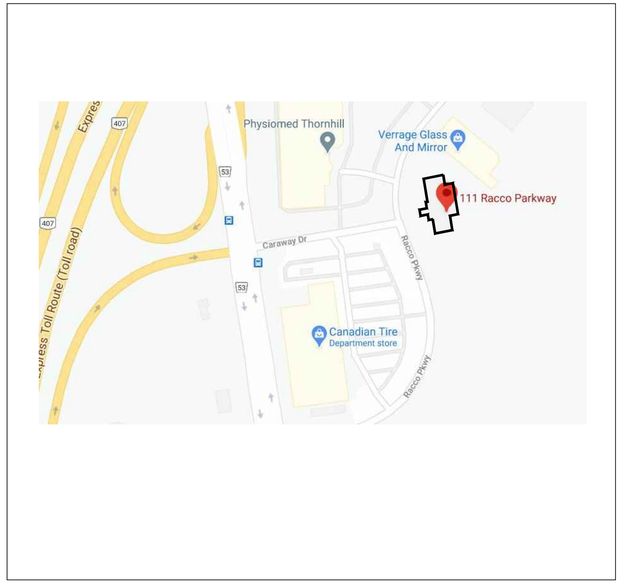
ONTARIO BUILDING CODE CLASSIFICATION
2012 O.B.C. 3.2.2
GROUP D
SPRINKLERED

AREA OF RENOVATIONS
PART GROUND FLOOR, 106 SQ. M. (1,141 SQ. FT.)

AREAS OF RENOVATION

N.I.C

SITE PLAN (N.T.S)



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01	04MAY21	SJB	REVISED PER CLIENT

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01	16FEB21	SJB	ISSUED FOR PERMIT/TENDER

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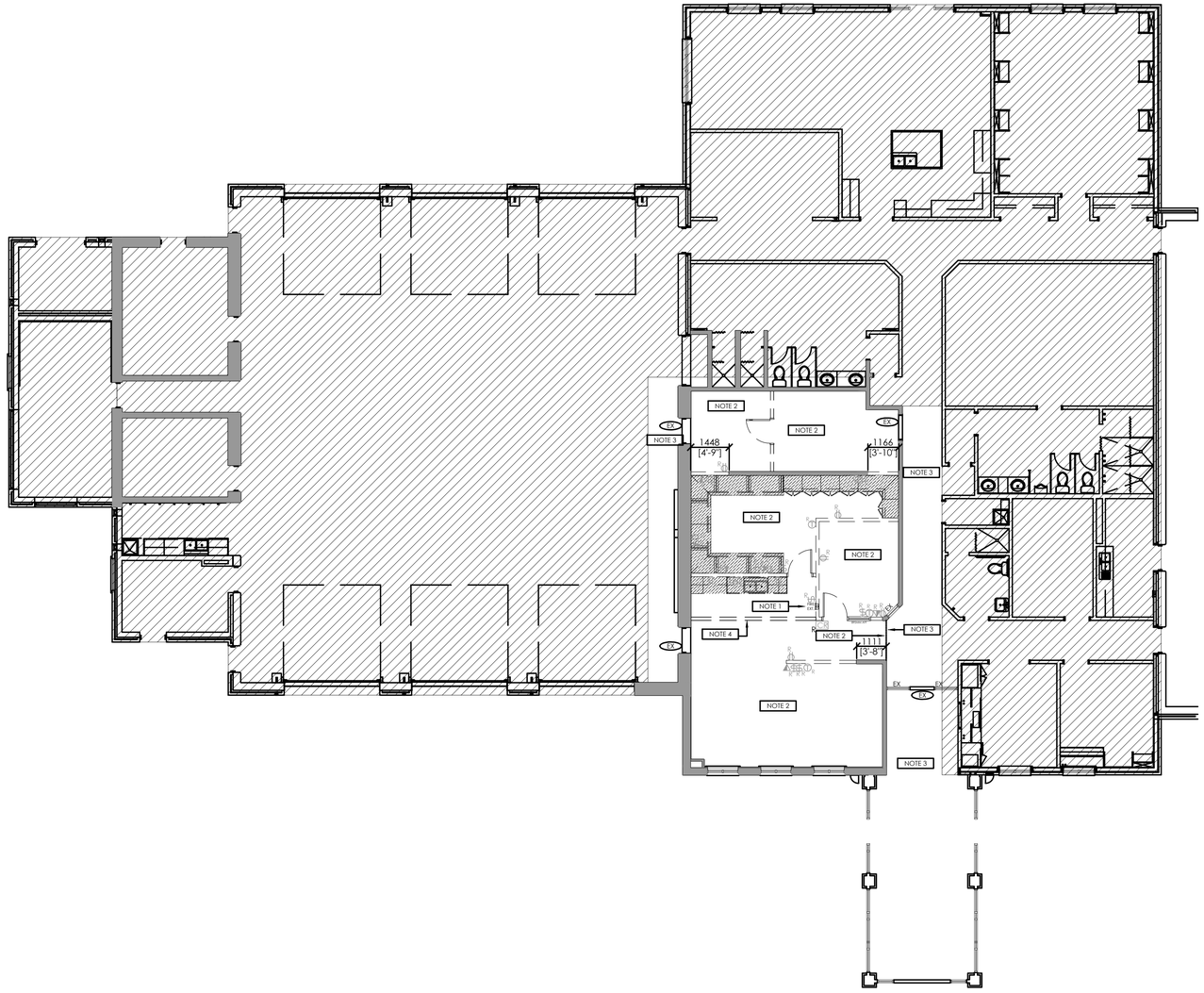
SARA JANE BROWN
Association of Registered Interior Designers of Ontario

project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON
L4J 8X9

drawing title
GENERAL NOTES

date 17AUG20	project no. 20-1025
drawn by SJB	cad file 20-1025_I-000
checked by	drawing no. I-000
scale 1:100	



DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING PARTITION TO REMAIN
	DENOTES EXISTING PARTITION TO BE REMOVED
EX	DENOTES EXISTING DOOR AND FRAME TO REMAIN
EX	DENOTES EXISTING DOOR AND FRAME TO BE REMOVED
EX	DENOTES EXISTING SCREEN/SIDELIGHT AND FRAME TO REMAIN
	DENOTES EXISTING MILLWORK TO BE REMOVED
R	DENOTES EXISTING WALL MOUNTED DUPLEX OUTLET TO BE REMOVED
R	DENOTES EXISTING WALL MOUNTED VOICE/DATA OUTLET TO BE REMOVED
CR R	DENOTES EXISTING CARD READER TO BE REMOVED AND RETAINED FOR RE-USE
R	DENOTES EXISTING WALL MOUNTED THERMOSTAT TO BE REMOVED
R	DENOTES EXISTING SWITCH TO BE REMOVED
	AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING SEMI-RECESSED FIRE EXTINGUISHER CABINET TO BE REMOVED AND RETAINED FOR RE-INSTALLATION. REFER TO ENGINEERING DWGS
NOTE 2	ALL EXISTING FLOOR FINISHES, WALL BASE AND ALL EXISTING ADHESIVES TO BE REMOVED. CONTRACTOR TO PATCH & REPAIR FLOOR TO MAKE GOOD, LEVEL AND SMOOTH TO RECEIVE NEW FINISH
NOTE 3	EXISTING FLOOR FINSHES TO REMAIN
NOTE 4	EXISTING CEILING BULKHEAD TO REMAIN

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

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01	08APR21	SJB	REVISED NOTES PER CLIENT

REVISIONS

no.	date	by	description
06	07MAY21	SJB	RE-ISSUED FOR TENDER
05	16FEB21	SJB	ISSUED FOR PERMIT/TENDER
04	09DEC20	SJB	ISSUED FOR 90% REVIEW
03	07DEC20	JF/SJB	ISSUED TO ENGINEERS
02	22SEPT20	SJB	RE-ISSUED FOR 60% REVIEW
01	21SEPT20	SJB	ISSUED FOR CLIENT REVIEW

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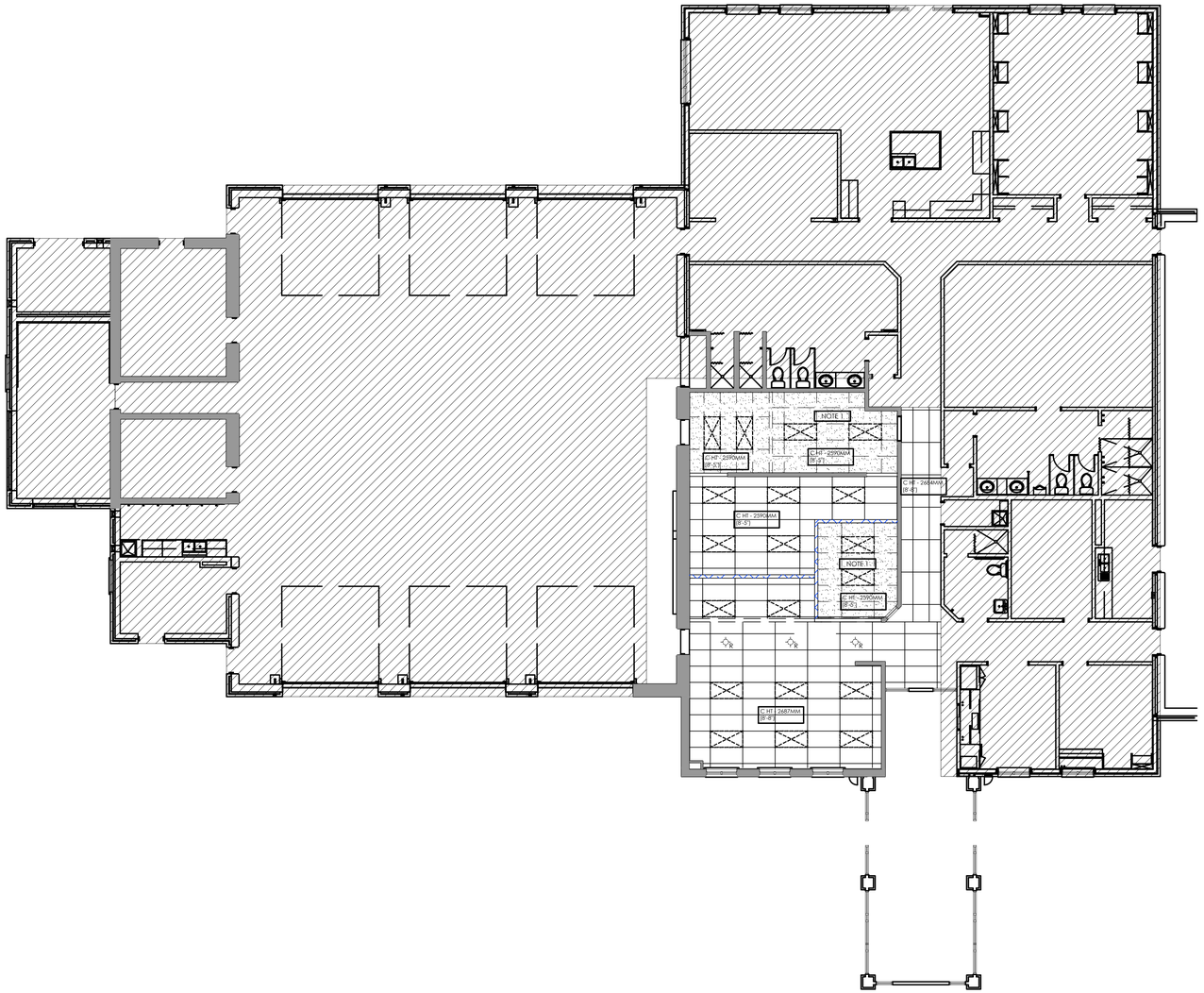
DEMOLITION PLAN

	date 17AUG20		project no. 20-1025
	drawn by SJB		cad file 20-1025_I-100
	checked by		drawing no. I-100
	scale 1:100		



CEILING DEMOLITION LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING BASE BUILDING STANDARD LUMINARIES TO BE REMOVED
	DENOTES AREA OF EXISTING T-BAR CEILING TO BE REMOVED
	INDICATES AREA OF EXISTING T-BAR CEILING TO BE PATCHED AND REPAIRED TO MAKE GOOD. ALIGN WITH EXISTING T-BAR CEILING GRID IN ADJACENT AREAS
	DENOTES EXISTING RECESSED INCANDESCENT DOWN LIGHT TO BE REMOVED
	AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING T-BAR CEILING TO BE REMOVED. CONTRACTOR TO MAKE GOOD TO RECEIVE NEW T-BAR CEILING, REFER TO DWG I-102

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
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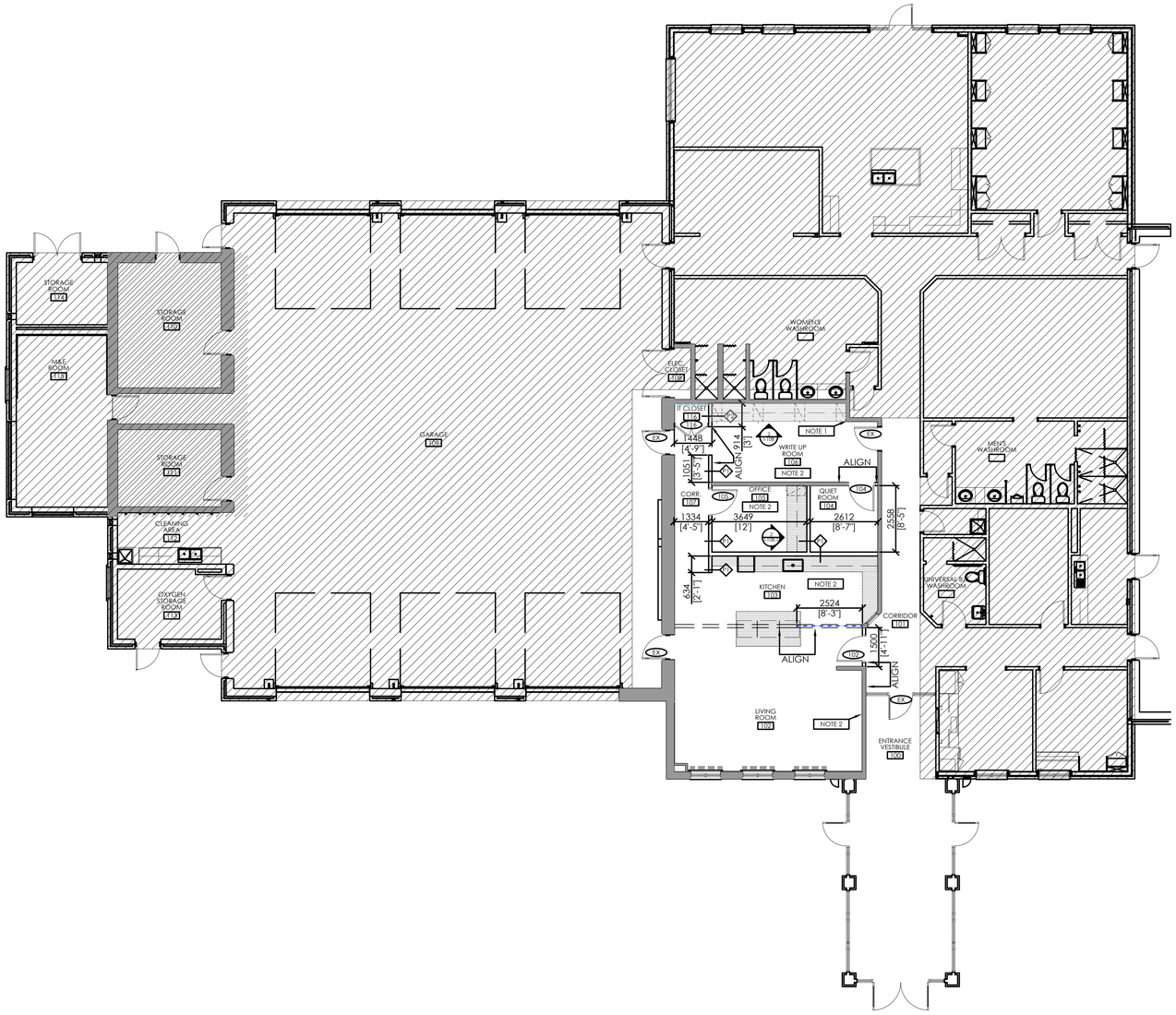
REFLECTED CEILING DEMOLITION PLAN

date	17AUG20	project no.	20-1025
drawn by	SJB	cad file	20-1025_I-100
checked by		drawing no.	I-100.1
scale	1:100		



PARTITION LEGEND

SYMBOL	DETAIL	DESCRIPTION
		DENOTES EXISTING PARTITION TO REMAIN
P1		NEW PARTITION ASSEMBLY "P1" - 92mm METAL STUDS AT 400mm O.C. - ONE LAYER 16mm GYPSUM BOARD BOTH SIDES - SOUND ATTENUATION BLANKET - SLAB TO U/S OF CEILING - FOIL BACKED (BOTH SIDES) RIGID INSULATION ABOVE CEILING TO U/S OF DECK (CERTAPRO THERMAL FOIL FACED BATTS BY CERTAINTEED CORP. OR EQUIVALENT) ***IN WET AREA (KITCHEN 103), CONTRACTOR SHALL SUBSTITUTE FOR 16mm CEMENT BOARD**
P2		NEW PARTITION ASSEMBLY "P2" - 92MM METAL STUDS AT 400MM O.C. - ONE LAYER 16MM GYPSUM BOARD BOTH SIDES - SOUND ATTENUATION BLANKET - SLAB TO U/S OF CEILING
		NEW MILLWORK REFER TO MILLWORK DRAWINGS AS INDICATED ON PLANS CONTRACTOR TO PROVIDE BLOCKING, AS REQUIRED.
		DENOTES LOCATION OF NEW DRYWALL BULKHEAD REFER TO REFLECTED CEILING PLAN I-102
		DENOTES LOCATION OF NEW WINDOW COVERING; BLACKOUT SHADE: SUNPROJECT / ALTEX TEXOPAQUE 6000 BLACKOUT COL: 6000-060 WINDOW SHADE: SUNPROJECT SUNSCREEN COL: 10103-05 LIMETONE GREY
		DENOTES LOCATION OF NEW PLYWOOD BACKBOARD REFER TO ENGINEERING DWGS FOR DETAILS
EX		EXISTING DOOR & FRAME TO REMAIN
NEW		NEW DOOR & FRAME REFER TO DOOR SCHEDULE
JSM		JOB SITE MEASUREMENT
AFF		ABOVE FINISHED FLOOR
CCD		CRITICAL CLEAR DIMENSION
		AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	MILLWORK SHALL ALIGN WITH EDGE OF EXISTING PARTITION
NOTE 2	CONTRACTOR SHALL INSTALL BLOCKING TO ENSURE ADEQUATE SUPPORT FOR ALL NEW MILLWORK AND TV

REFER TO SPECIFICATION CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION

DOOR SCHEDULE

SYMBOL	DESCRIPTION
102	NEW DOOR #102 DOOR: *SOLID CORE WOOD C/W VISION PANEL *STAIN FINISH TO MATCH EXISTING *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *DOOR STOP GLASS INSERT / VISION PANEL: *TO CONFORM TO OBC 3.8.3.3. (14) *TEMPERED GLASS INSERT 229mm (9") X 1067mm (42") *BOTTOM LESS OR EQUAL TO 900mm AFF, EDGE OF THE PANEL NOT MORE THAN 250mm IN FRONT OF THE LATCH SIDE
104	NEW DOOR #104 DOOR: *SOLID CORE WOOD C/W VISION PANEL *STAIN FINISH TO MATCH EXISTING *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *DOOR STOP *OCCUPANCY HARDWARE: THE BROTHERS MARKLE INC. DANSIGN PAPERFLEX C/W OCCUPIED/VACANT SLIDER GLASS INSERT / VISION PANEL: *TO CONFORM TO OBC 3.8.3.3. (14) *TEMPERED GLASS INSERT 229MM (9") X 1067MM (42") *BOTTOM LESS OR EQUAL TO 900MM AFF, EDGE OF THE PANEL NOT MORE THAN 250MM IN FRONT OF THE LATCH SIDE
105	NEW DOOR #105 DOOR: *SOLID CORE WOOD C/W VISION PANEL *STAIN FINISH TO MATCH EXISTING *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, STOREROOM FUNCTION, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *DOOR STOP *CARD ACCESS READER, REFER TO DWG I-103 AND ENGINEERING DRAWINGS GLASS INSERT / VISION PANEL: *TO CONFORM TO OBC 3.8.3.3. (14) *TEMPERED GLASS INSERT 229MM (9") X 1067MM (42") *BOTTOM LESS OR EQUAL TO 900MM AFF, EDGE OF THE PANEL NOT MORE THAN 250MM IN FRONT OF THE LATCH SIDE
116	NEW DOUBLE DOORS #116 DOOR: *EACH DOOR TO BE 610MM (24")W *HOLLOW METAL *PAINT FINISH *HEIGHT TO MATCH EXISTING FRAME: *HOLLOW METAL *PAINT FINISH *REFER TO DRAWING I-105 HARDWARE: *LEVER, STOREROOM FUNCTION, FINISH TO MATCH EXISTING *SURFACE MOUNTED CLOSER *MANUAL FLUSHBOLT ON TOP/BOTTOM OF INACTIVE LEAF *CARD ACCESS READER, REFER TO DWG I-103 AND ENGINEERING DRAWINGS

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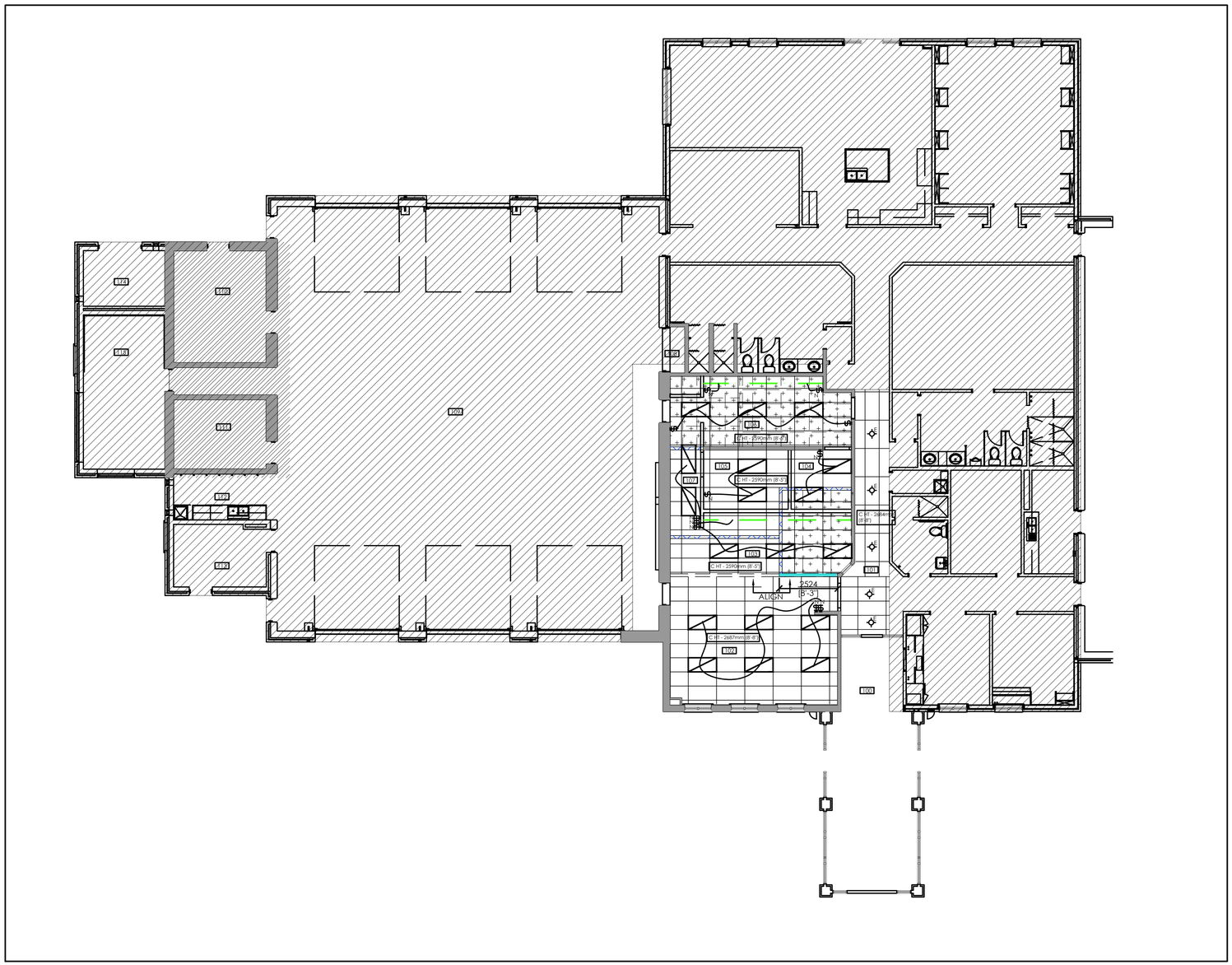
drawing title
PARTITION PLAN

date	17AUG20	project no.	20-1025
drawn by	SJB	cad file	20-1025_I-101
checked by		drawing no.	I-101
scale	1:100		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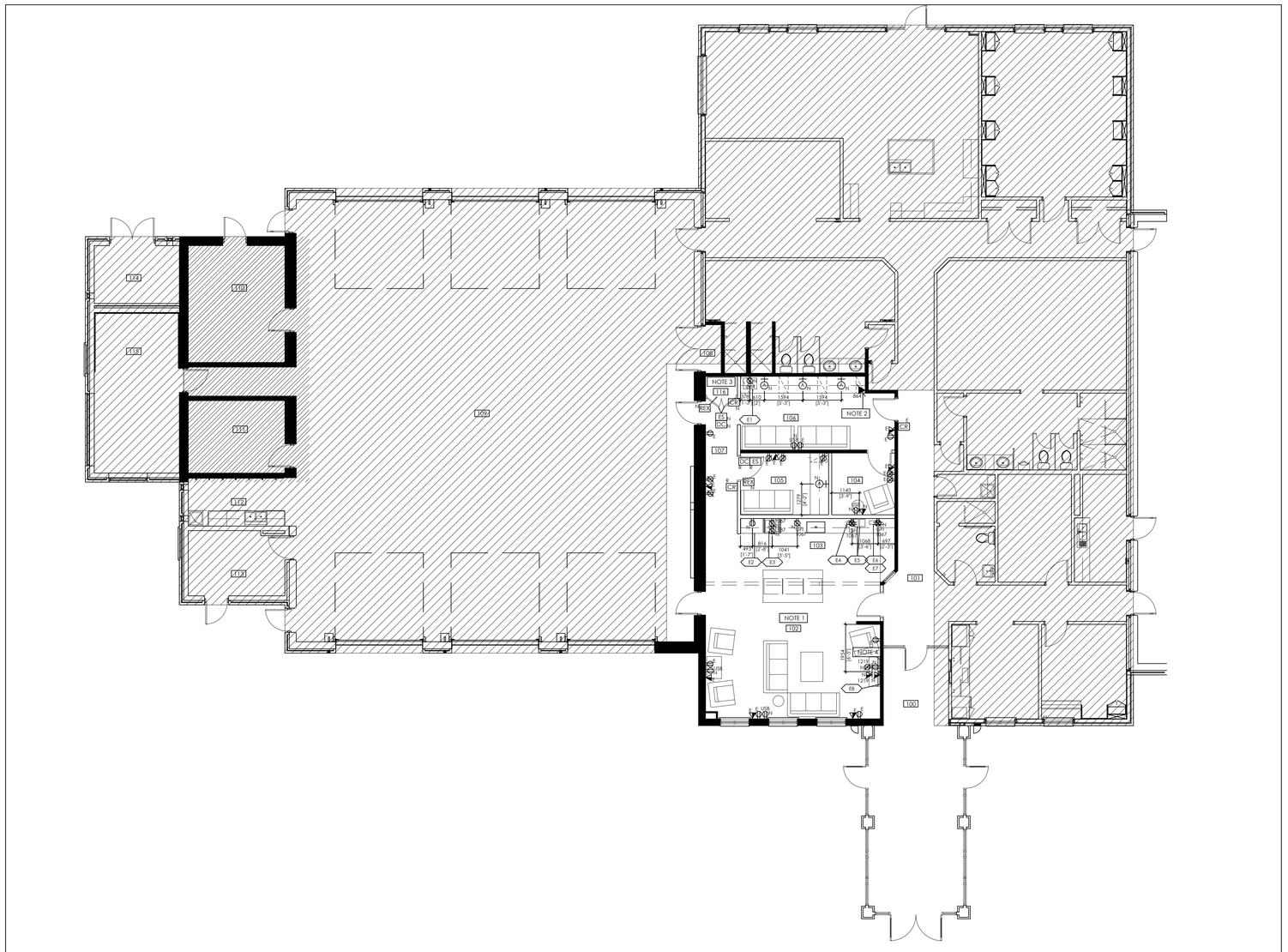

POWER & COMMUNICATION LEGEND

SYMBOL	DESCRIPTION
	WALL MOUNTED DUPLEX RECEPTACLE
XX	WALL MOUNTED DUPLEX RECEPTACLE AT XX MM ABOVE FINISHED FLOOR
USB	WALL MOUNTED COMBINATION DUPLEX / USB RECEPTACLE
	WALL MOUNTED QUAD RECEPTACLE (TO MATCH EXISTING HEIGHT OR 305 MM AFF)
XX	WALL MOUNTED TELEPHONE OUTLET AT 864 MM ABOVE FINISHED FLOOR
	WALL MOUNTED COMBINATION VOICE / DATA OUTLET
XX	WALL MOUNTED COMBINATION VOICE/DATA OUTLET AT XX MM ABOVE FINISHED FLOOR
	TV CABLE OUTLET
	NEW 'A' CLUSTER CONFIGURATION EACH TO RECEIVE: (2) VOICE/DATA (2) COMBINATION DUPLEX/USB RECEPTACLE 1@ VOICE/DATA & DUPLEX WALL MOUNTED STANDARD HEIGHT, 1@ VOICE/DATA & DUPLEX WALL MOUNTED ABOVE COUNTER / WORK SURFACE AT 864mm (44") AFF
ES	ELECTRIC STRIKE REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
CR	CARD READER REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
DC	CONCEALED DOOR CONTACT REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
REX	REQUEST TO EXIT MOTION DETECTOR REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION
GFI	GROUND FAULT INTERRUPTER
E	DENOTES EXISTING ELECTRICAL EQUIPMENT TO REMAIN
N	DENOTES NEW ELECTRICAL EQUIPMENT TO REMAIN
R	DENOTES RELOCATED ELECTRICAL OUTLET / EQUIPMENT
DG	DENOTES DEDICATED GROUND CIRCUIT. PROVIDE DEDICATED GROUND WIRE AND SEPARATE CIRCUIT NEUTRAL.

EQUIPMENT NOTES

SYMBOL	DESCRIPTION
E1	PRINTER SUPPLIED & INSTALLED BY YR
E2	FRIDGE MAYTAG MFF2558FEZ, SIZE: 35-5/8"W X 70-1/8"H X 35-1/2"D SUPPLIED & INSTALLED BY YR
E3	MICROWAVE WHIRLPOOL YWMC3051-6HZ, SIZE: 21-3/4"W X 13"H X 17-1/4"D SUPPLIED & INSTALLED BY YR
E4	KETTLE SUPPLIED & INSTALLED BY YR
E5	COFFEE MAKER SUPPLIED & INSTALLED BY YR
E6	TOASTER OVEN SUPPLIED & INSTALLED BY YR
E7	TOASTER SUPPLIED & INSTALLED BY YR
E8	55" TV SUPPLIED & INSTALLED BY YR

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO ENGINEERING DRAWINGS FOR DETAILS
NOTE 2	LOCATION OF NEW TELEPHONE OUTLET TO BE DETERMINED BY REGION
NOTE 3	REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS
NOTE 4	ALL CABLING BEHIND TV SHALL BE CONCEALED IN CONDUIT. REFER TO ENGINEERING DRAWINGS
NOTE 5	ALL EXISTING CARD READERS/ELECTRIC STRIKES TO BE RE-USED WHERE POSSIBLE. CONTRACTOR TO PROVIDE NEW WHERE RE-USE IS NOT POSSIBLE

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
ADDITIONAL INFORMATION

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03	07DEC20	JF/SJB	ISSUED TO ENGINEERS
02	22SEPT20	SJB	RE-ISSUED FOR 60% REVIEW
01	21SEPT20	SJB	ISSUED FOR CLIENT REVIEW

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Association of Registered Interior Designers of Ontario

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PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON
L4J 8X9

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POWER & COMMUNICATION PLAN

date	17AUG20	project no.	20-1025
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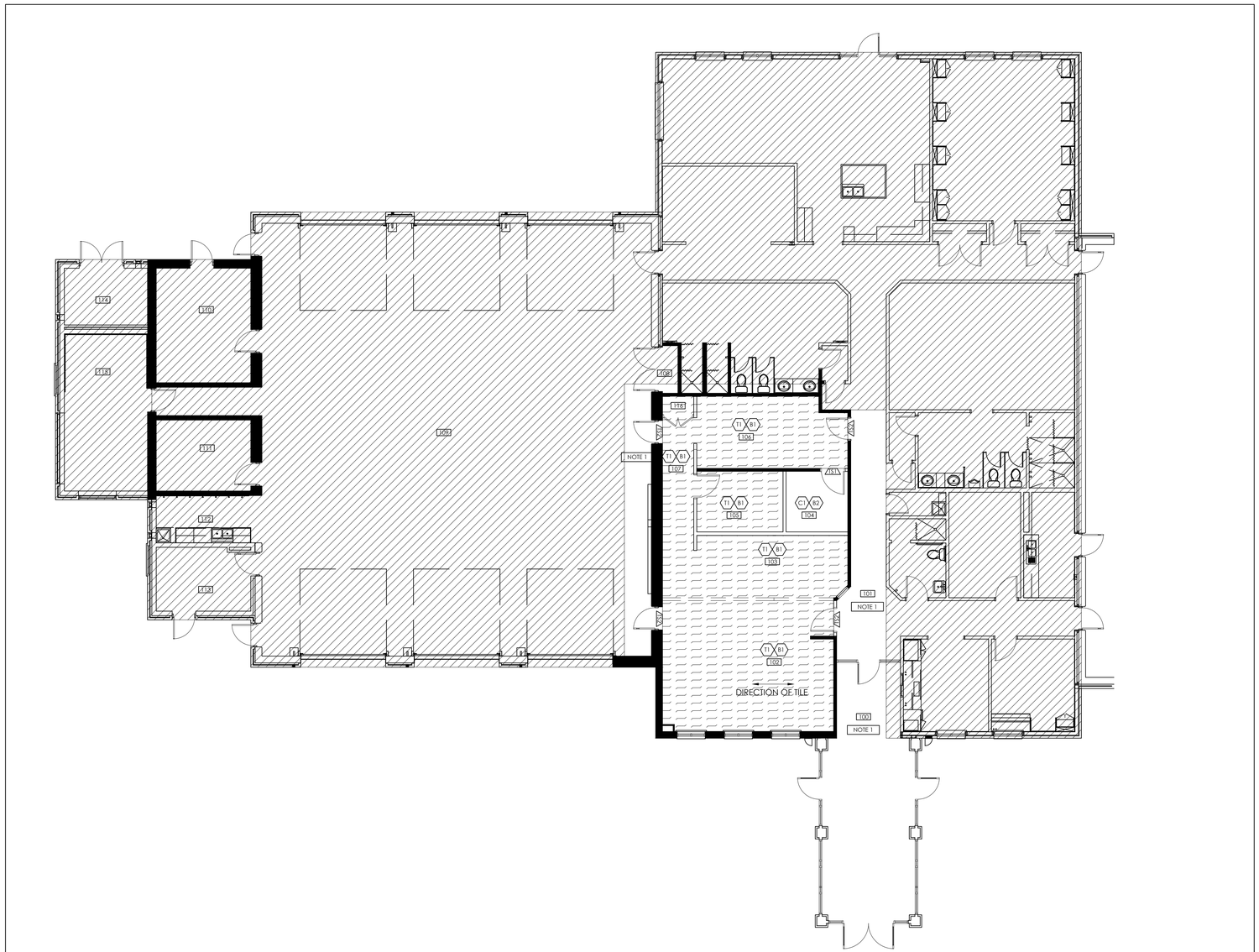

FLOOR FINISH LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING PARTITION TO REMAIN
	DENOTES NEW PARTITION
T1	PORCELAIN TILE: T1 MANUFACTURER: STONE TILE SERIES: SOLID COLOUR: ASH NATURAL SIZE: 300mm X 600mm GROUT SPEC: MAPEI, 107 IRON INSTALL METHOD: 1/4" RUNNING BOND, 25% OVERLAP SUPPLIER/TEL: NANCY BRENNER 416-515-9000 EXT. 232 NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT
C1	CARPET TILE: C1 MANUFACTURER: SHAW COMMERCIAL SERIES: SURROUND ST125 COLOUR: LIMESTONE 17530 SIZE: 24" X 24" INSTALL METHOD: MONOLITHIC OR EQUIVALENT
	AREA NOT IN CONTRACT (NIC)

BASE TYPE LEGEND

SYMBOL	DESCRIPTION
B1	PORCELAIN TILE WALL BASE: B1 MANUFACTURER: STONE TILE SERIES: SOLID COLOUR: ASH NATURAL SIZE: 102mm (4") GROUT SPEC: MAPEI, 107 IRON CONDITION: PORCELAIN TILE NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT
B2	VINYL WALL BASE: B2 MANUFACTURER: TARKETT/JOHNSONITE SERIES: TRADITIONAL / COVE BASE COLOUR: 20 CHARCOAL SIZE: 4" CONDITION: CARPET OR EQUIVALENT

TRANSITION STRIP LEGEND

SYMBOL	DESCRIPTION
TS1	TRANSITION STRIP: TS1 COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CARPET OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANTS AND/OR REGION'S APPROVAL
TS2	TRANSITION STRIP: TS2 COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CONCRETE OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANTS AND/OR REGION'S APPROVAL

NOTE: THE INSTALLER SHALL VERIFY TRANSITION WITH CONSULTANTS AND/OR REGION PRIOR TO ORDERING.

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING FLOOR FINISHES TO REMAIN
NOTE 2	CONTRACTOR SHALL ENSURE EXISTING SLAB IS FULLY CLEANED, PATCHED AND REPAIRED AND PREPPED AS REQUIRED TO ALLOW FOR NEW FLOOR FINISH INSTALLATION. SKIM COAT(S) TO BE APPLIED TO PROVIDE SMOOTH, LEVEL SUBSTRATE IN ALL AREAS OF CONSTRUCTION

REFER TO SPECIFICATION
CONTRACT #T-21-28 FOR
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01	21SEPT20	SJB	ISSUED FOR CLIENT REVIEW

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FLOOR FINISH PLAN

date: 17AUG20	project no.: 20-1025
drawn by: SJB	cad file: 20-1025_I-104
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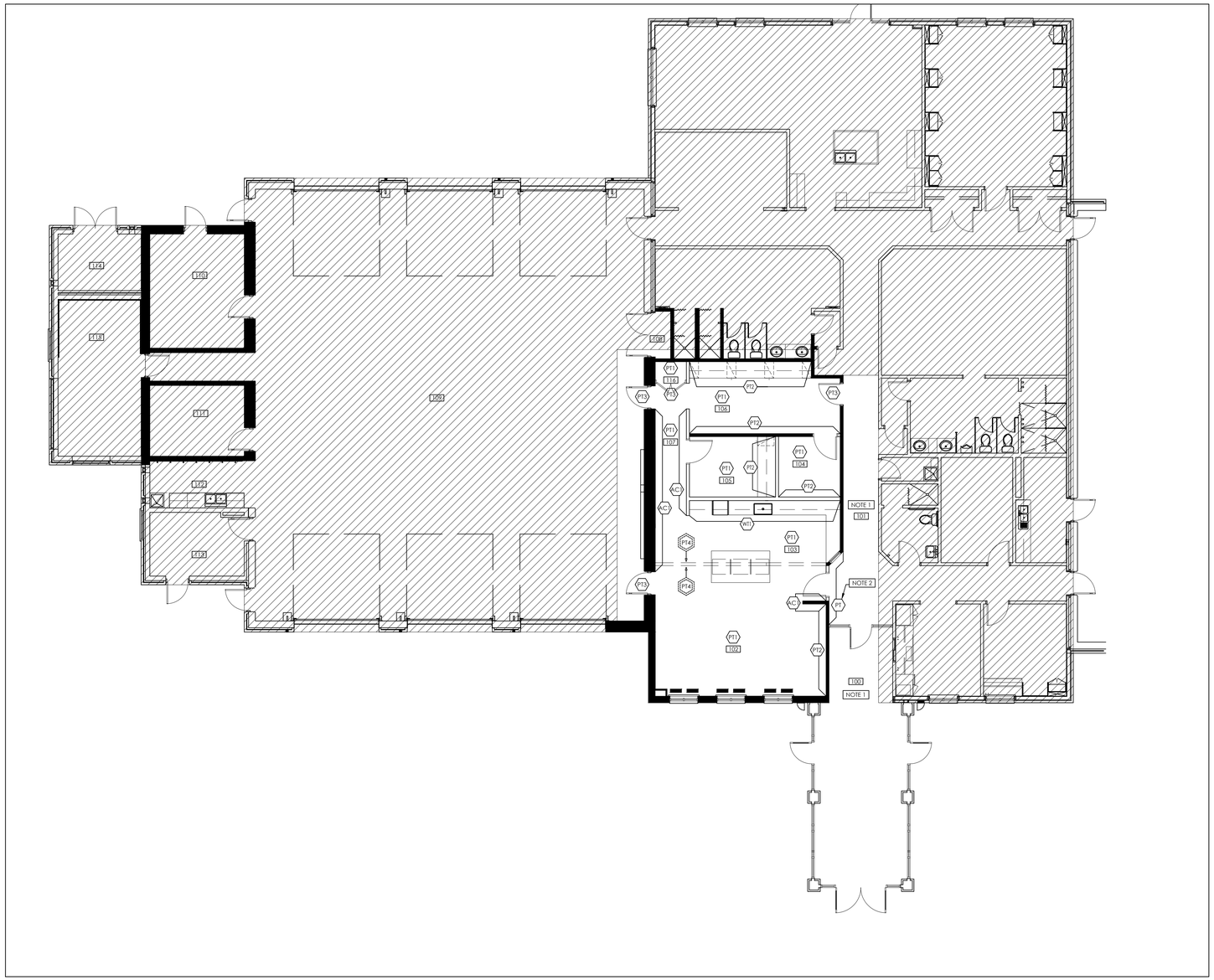

WALL FINISH LEGEND

SYMBOL	DESCRIPTION
	DENOTES EXISTING PARTITION TO REMAIN
	DENOTES NEW PARTITION
PT1	FIELD PAINT: PT1 (WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: EGGSHELL OR EQUIVALENT
PT2	ACCENT PAINT: PT2 (BLUE) MANUFACTURER: SHERWIN WILLIAMS COLOUR: SW 7604 SMOKY BLUE FINISH: EGGSHELL NOTE: MINIMUM 3 TOP COATS OR EQUIVALENT
PT3	DOOR & FRAME PAINT: PT3 (BLACK) MANUFACTURER: DULUX COLOUR: FOREST BLACK 30YY 10/038, A1833 FINISH: SEMI-GLOSS **NOTE: EXISTING WOOD DOORS TO REMAIN AS IS** **NOTE: ALL FIRE RATED DOORS AND FRAMES TO BE PAINTED WITH INTUMESCENT PAINT** OR EQUIVALENT
PT4	CEILING PAINT (GWB CEILING UNLESS NOTED OTHERWISE): PT4 (WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: FLAT OR EQUIVALENT
WT1	WALL TILE: WT1 - KITCHEN BACKSPLASH MANUFACTURER: OLYMPIA TILE SERIES: COLOUR & DIMENSIONS COLOUR: BLACK, MATTE SIZE: 100 X 400 GROUT SPEC: MAPEI #38 AVALANCHE INSTALL METHOD: STACK BOND OR EQUIVALENT
AC1	ACROVYN PANEL: AC1 - LOCATION MANUFACTURER: CONSTRUCTION SPECIALITIES SERIES: ACROVYN SOLID COLORS COLOUR: #949 WHITE SIZE: 1067MM (42") AFF OR EQUIVALENT
PT#/	BULKHEADS TO BE PAINTED AS PER WALL FINISH PLAN
	DENOTES LOCATION OF NEW WINDOW COVERING REFER TO PARTITION PLAN FOR SPECIFICATIONS
	AREA NOT IN CONTRACT (NIC)

DRAWING NOTES

SYMBOL	DESCRIPTION
NOTE 1	EXISTING WALL FINISHES TO REMAIN
NOTE 2	PAINT COLOUR TO MATCH EXISTING FINISH ON SURROUNDING PARTITIONS
NOTE 3	CONTRACTOR TO SUPPLY AND INSTALL 2" WIDE, BEVELED, STAINLESS STEEL CORNER GUARDS ON ALL CORNERS THRU-OUT

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WALL FINISH PLAN

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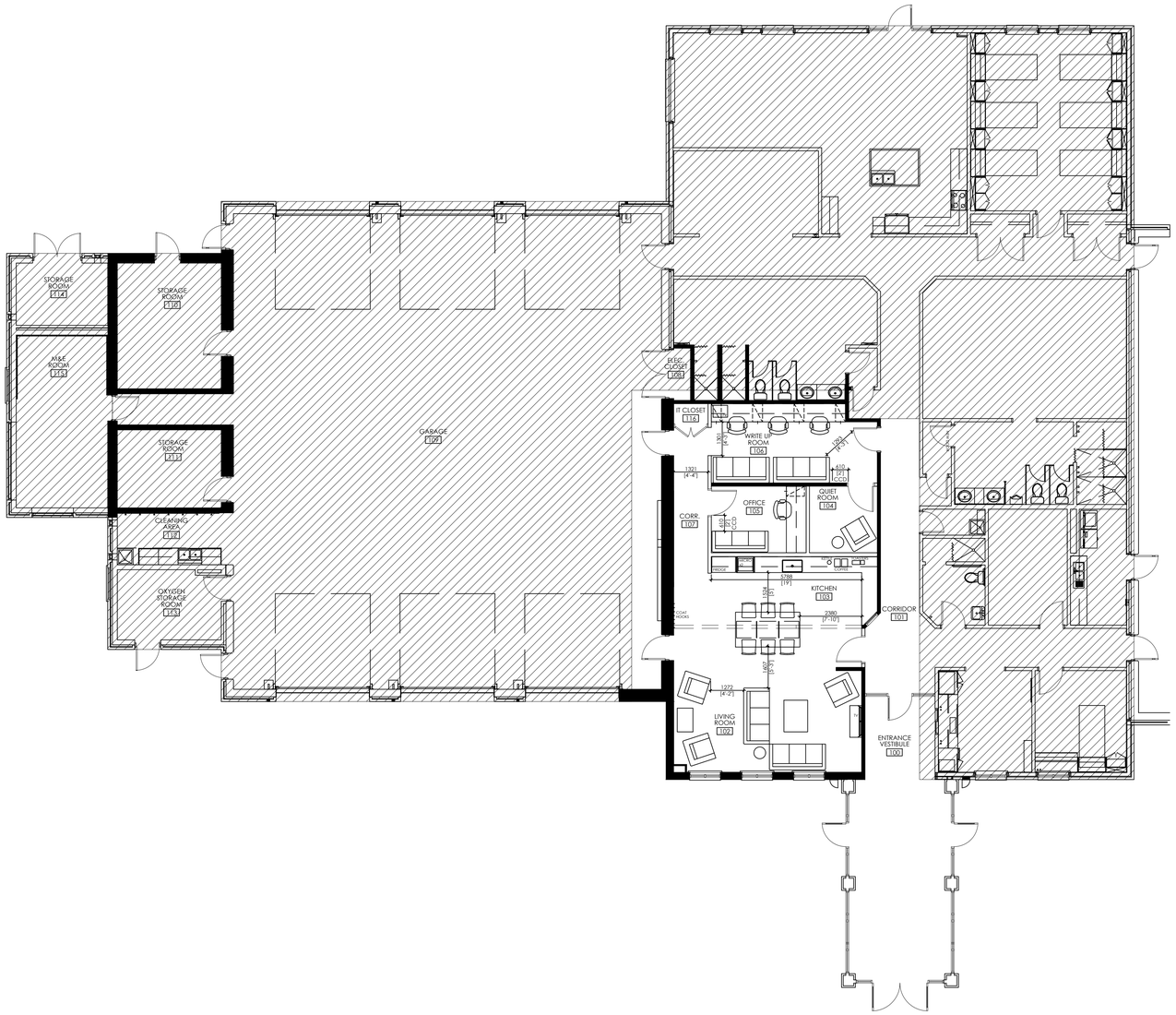

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FURNITURE PLAN

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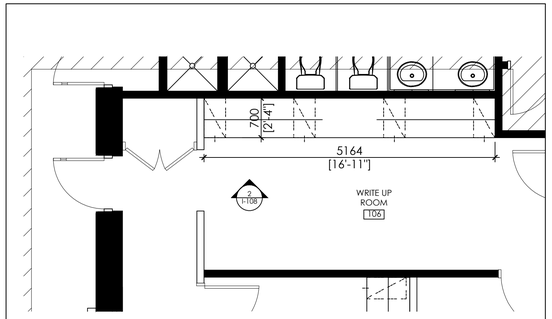
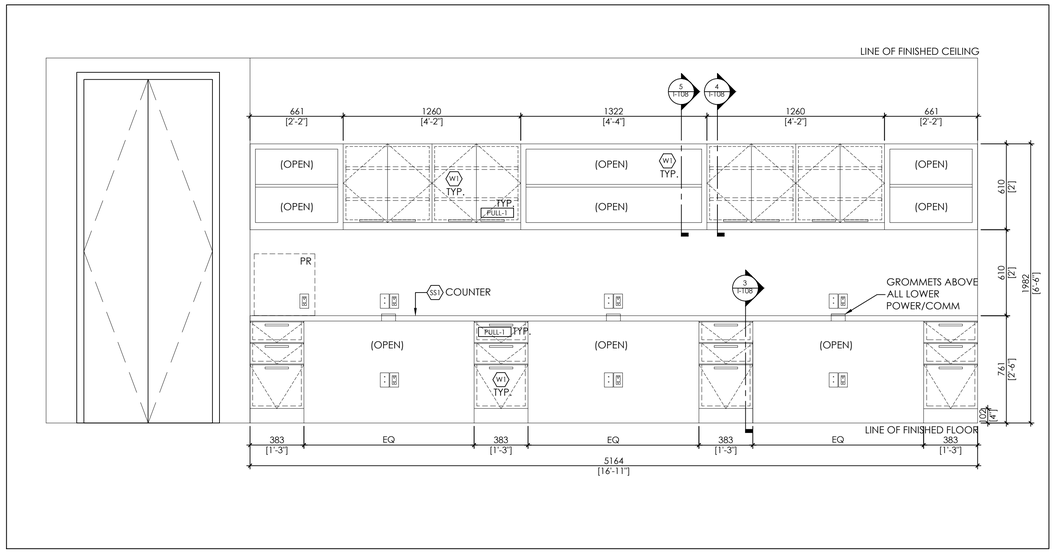
	checked by	drawing no.	
	scale 1:100	I-106	



1 / I-108 PLAN: WRITE UP ROOM 106
1:50



2 / I-108 ELEVATION: WRITE UP ROOM
1:20

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BUZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEN

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #LBD40B-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20-1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #1100-LB-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

REFER TO SPECIFICATION
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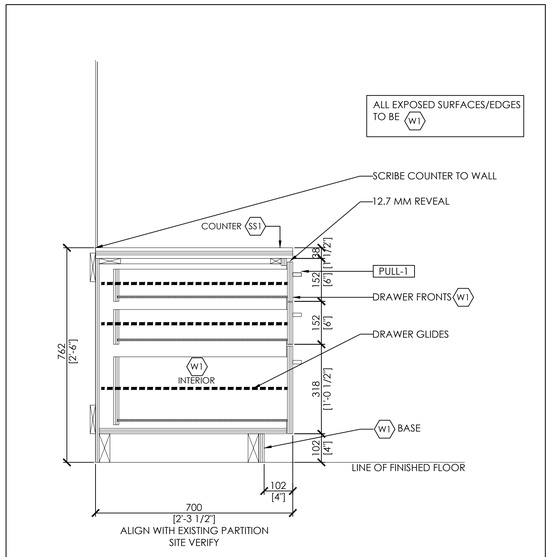
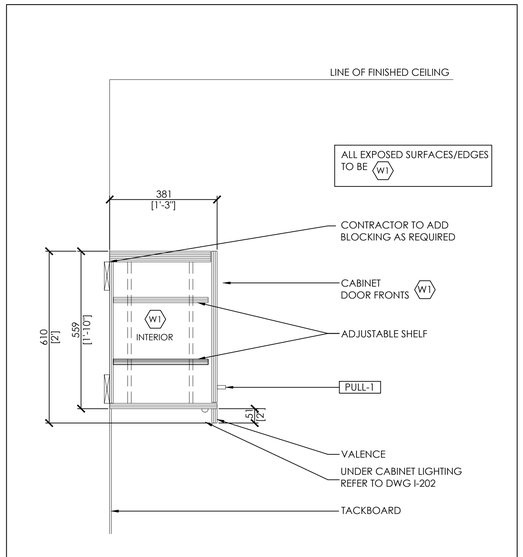
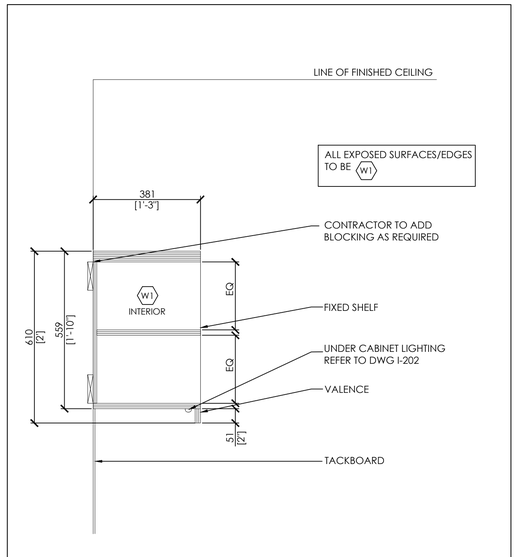


3 / I-108 SECTION: THRU LOWER DRAWERS
1:10



4 / I-108 SECTION: THRU UPPER CABINET
1:10



5 / I-108 SECTION: THRU OPEN UPPER CABINET
1:10

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PARAMEDIC SERVICES
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L4J 8X9

drawing title
MILLWORK DETAILS

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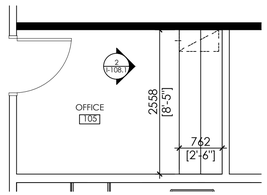
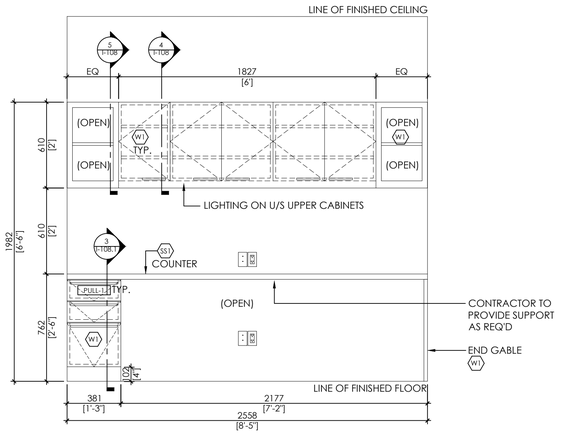
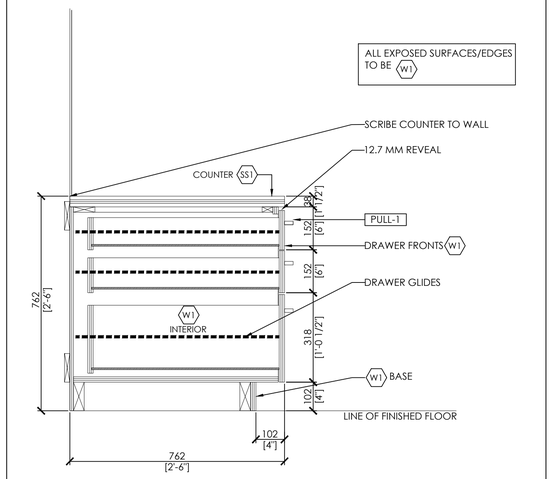


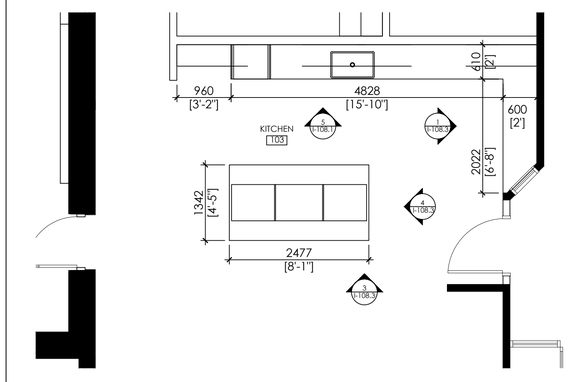
1 I-108.1 PLAN: OFFICE 105
1:50



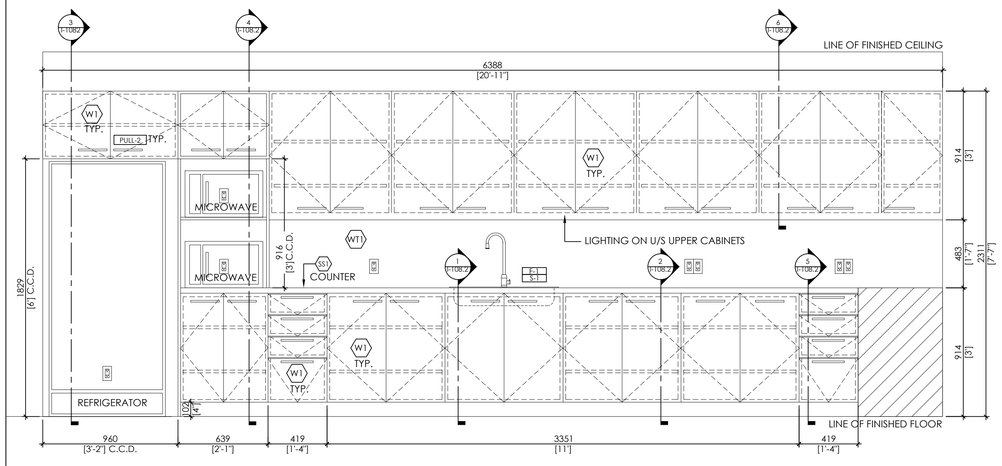
2 I-108.1 ELEVATION: OFFICE
1:20



3 I-108.1 SECTION: THRU LOWER DRAWERS
1:10



4 I-108.1 PLAN: KITCHEN 103
1:50



5 I-108.1 ELEVATION: KITCHEN, EAST SIDE
1:20

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BUZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEN

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #1BD40B-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20-1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #1100-LB-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

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York Region

no.	date	by	description
01	04MAY21	SJB	REVISED PER CLIENT

REVISIONS

06	07MAY21	SJB	RE-ISSUED FOR TENDER
05	16FEB21	SJB	ISSUED FOR PERMIT/TENDER
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02	22SEPT20	SJB	RE-ISSUED FOR 60% REVIEW
01	21SEPT20	SJB	ISSUED FOR CLIENT REVIEW

no.	date	by	description

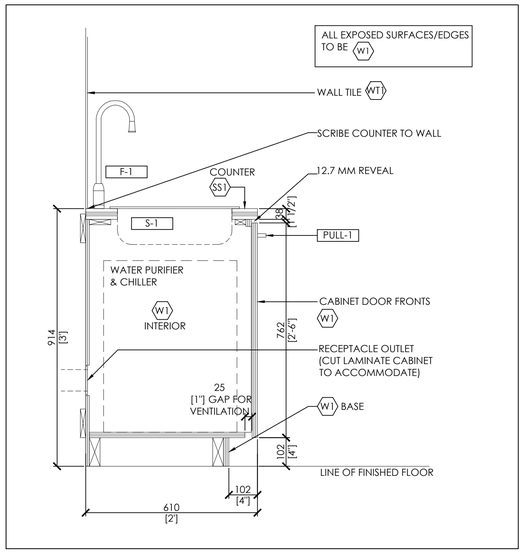
ISSUED

ARIDO
SARA JANE BROWN
Association of Registered Interior Designers of Ontario

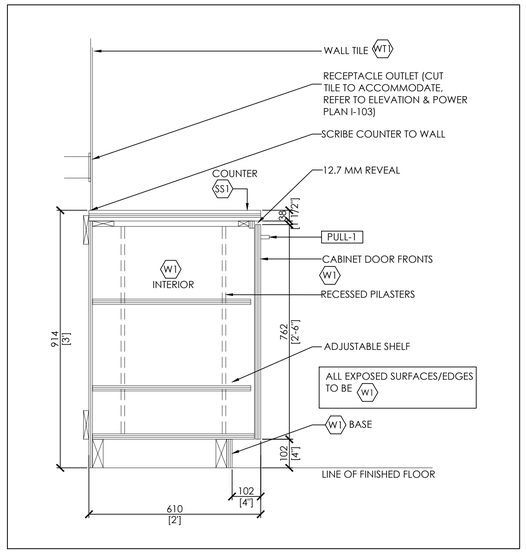
project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON
L4J 8X9

drawing title
MILLWORK DETAILS

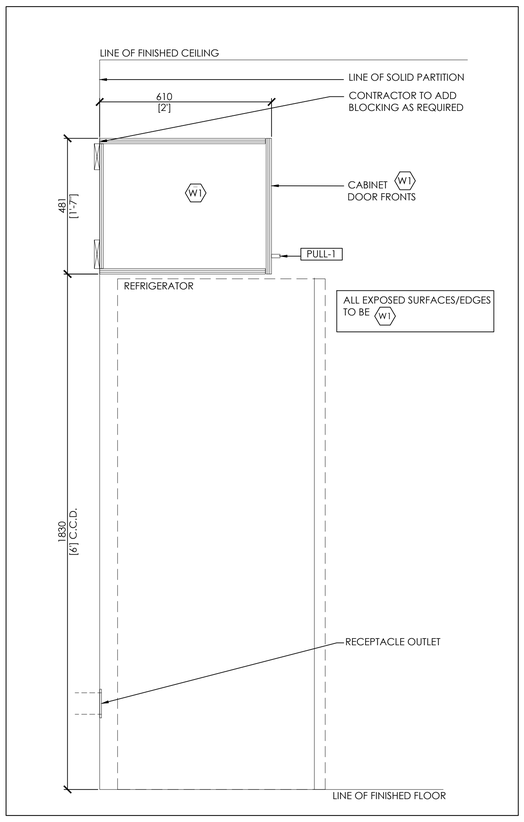
date: 17AUG20		project no.: 20-1025	
drawn by: SJB		cad file: 20-1025_I-108	
checked by:		drawing no.: I-108.1	
scale: 1:100			



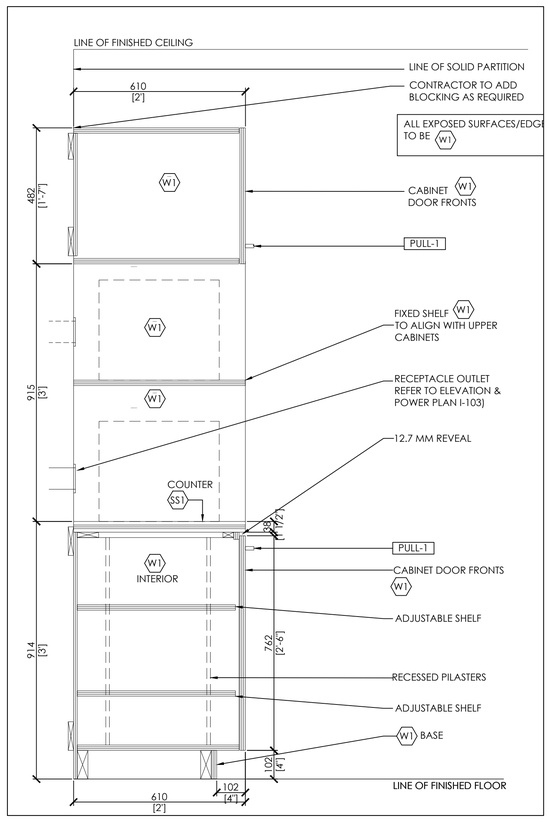
1 I-108.2 SECTION: THRU SINK
1:10



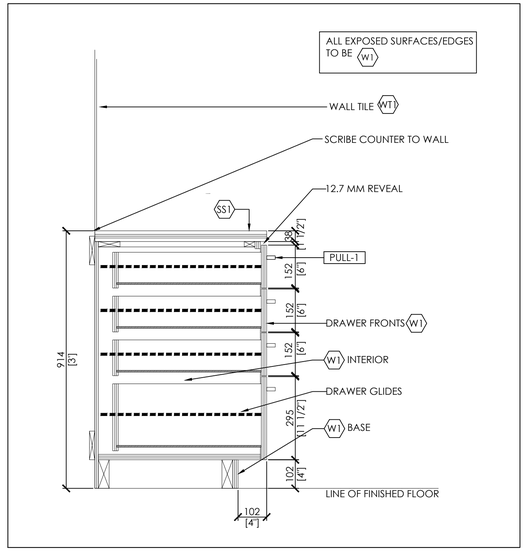
2 I-108.2 SECTION: THRU LOWER CABINET
1:10



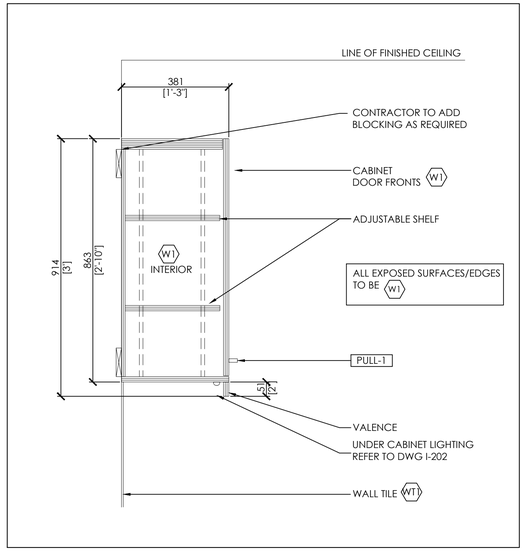
3 I-108.2 SECTION: THRU FRIDGE
1:10



4 I-108.2 SECTION: THRU MICROWAVES
1:10



5 I-108.2 SECTION: THRU LOWER DRAWERS
1:10



6 I-108.2 SECTION: THRU UPPER CABINET
1:10

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BUZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEN

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #1BD40B-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20-1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #1100-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

REFER TO SPECIFICATION CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION

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10 Douglas Road
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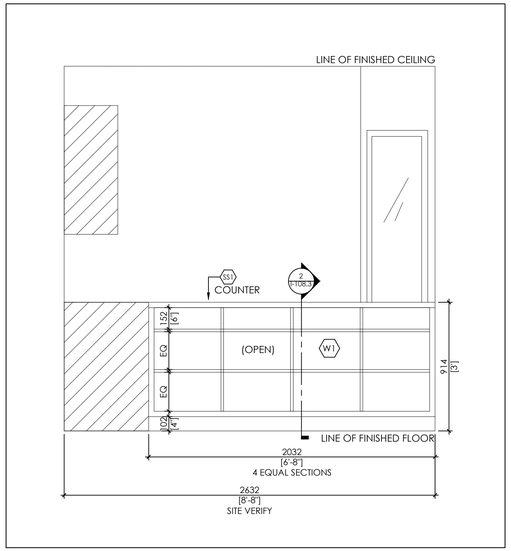
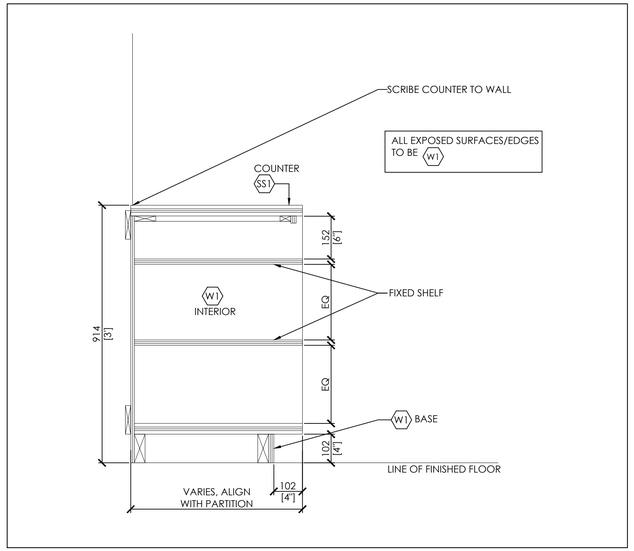
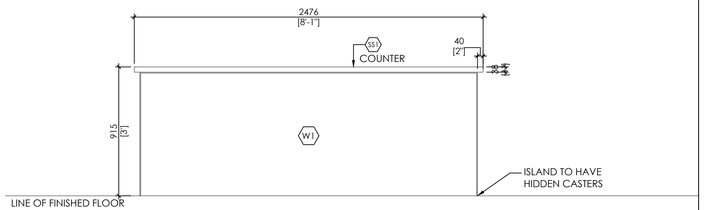


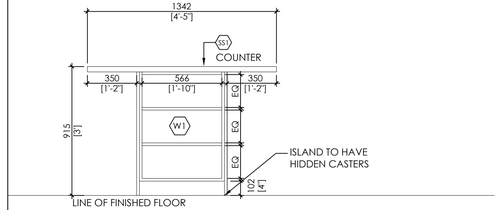
1 I-108.3 ELEVATION: KITCHEN, SOUTH SIDE
1:20



2 I-108.3 SECTION: OPEN SHELVES
1:10



3 I-108.3 ELEVATION: KITCHEN ISLAND
1:20



4 I-108.3 ELEVATION: KITCHEN ISLAND
1:20

MILLWORK FINISHES LEGEND

SYMBOL	DESCRIPTION
W1	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT
SS1	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BUZZARD OR EQUIVALENT

MILLWORK HARDWARE LEGEND

SYMBOL	DESCRIPTION
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT

MECHANICAL SPECIFICATIONS LEGEN

SYMBOL	DESCRIPTION
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKLEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE SIZE: 521mm (20-1/2") X 794mm (31-1/4"), 8" DEEP FINISH: STAINLESS STEEL, SATIN FINISH RIM & BOWL OR EQUIVALENT
F-1	FAUCET #1 MANUFACTURER: CHICAGO FAUCETS MODEL: #1100-LB-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON OR EQUIVALENT

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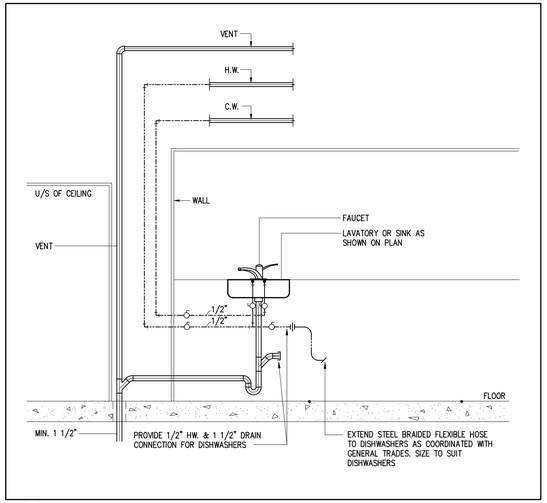
MILLWORK DETAILS

date: 17AUG20		project no.: 20-1025
drawn by: SJB		cad file: 20-1025_I-108
checked by:		drawing no.: I-108.3
scale: 1:100		



1 / M-1.0 TYPICAL DOMESTIC WATER PIPING ARRANGEMENT

N.T.S.

MECHANICAL LEGEND

- EXISTING MECHANICAL SERVICE/EQUIPMENT TO BE REMOVED OR RELOCATED. REFER TO PLAN DRAWINGS FOR FURTHER DETAIL.
- EXISTING RIGID DUCTWORK
- EXISTING ROUND RIGID DUCTWORK
- EXISTING SERVICE TO BE CAPPED
- NEW ACOUSTICALLY LINED DUCTWORK
- NEW THERMALLY INSULATED DUCTWORK
- NEW ROUND RIGID DUCTWORK
- NEW FLEXIBLE DUCTWORK
- BD — NEW BALANCING DAMPER
- FD — NEW FIRE DAMPER
- E CFM — EXISTING SUPPLY AIR DIFFUSER TO REMAIN. BALANCE TO CFM NOTED.
- R CFM — RELOCATED SUPPLY AIR DIFFUSER. BALANCE TO CFM NOTED.
- "TYPE" CFM — NEW SUPPLY AIR DIFFUSER. BALANCE TO CFM NOTED. NEW DIFFUSER TO MATCH BASE BUILDING STANDARD
- EXISTING EGG CRATE RETURN AIR GRILLE.
- R — RELOCATED EGG CRATE RETURN AIR GRILLE.
- "TYPE" SIZE — NEW EGG CRATE RETURN AIR GRILLE.
- 'B' CFM — NEW EXHAUST GRILLE BALANCE TO CFM NOTED.
- NEW 12"x12" AIR TRANSFER DUCT UNLESS NOTED OTHERWISE
- CONNECT TO EXISTING SERVICE
- INSTALL SOUND BAFFLE IN PERIMETER
- NEW ACCESS DOOR IN DRYWALL CEILING
- E — EXISTING THERMOSTAT TO REMAIN
- R — EXISTING RELOCATED THERMOSTAT
- N — NEW THERMOSTAT
- FE — WALL MOUNTED FIRE EXTINGUISHER
- DCW — DOMESTIC COLD WATER
- DHWR — DOMESTIC HOT WATER RECIRC
- DHW — DOMESTIC HOT WATER
- V — SANITARY VENT
- C.O. / SAN — SANITARY DRAIN WITH CLEAN OUT
- RUNNING TRAP
- CD — CONDENSATE DRAIN
- SHUT OFF VALVE
- MODULATING CONTROL VALVE
- CDS — CONDENSER WATER SUPPLY
- CDR — CONDENSER WATER RETURN
- CHS — CHILLED WATER SUPPLY
- CHR — CHILLED WATER RETURN
- FSP — NEW FIRE STANDPIPE WATER SUPPLY
- SP — SPRINKLER MAIN
- EXISTING SPRINKLER HEAD TO BE REMOVED
- E — EXISTING SPRINKLER HEAD TO REMAIN
- N — NEW PENDANT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING
- N — NEW UPRIGHT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING
- N — NEW CONCEALED TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC. PROVIDE CUSTOM COLOUR TO SUIT CEILING FINISH WHERE NOTED.
- N — NEW SIDEWALL TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC.
- F.D. — FLOOR DRAIN
- FHC — NEW FIRE HOSE CABINET
- N, $ — NEW EXHAUST FAN SWITCH/SPEED CONTROLLER

DRAWING LIST

EQUIPMENT LIST

S-1 SINGLE COMPARTMENT SINK & FAUCET

MANUFACTURER: FRANKE COMMERCIAL
MODEL: #LBD408-1/3 DOUBLE BOWL COUNTERTOP MOUNT, 3 HOLE, 8" CENTER, SPILLWAY, BACKEDGE, TYPE 302, 20 GAUGE, MOUNTING KIT, FULLY UNDERCOATED TO REDUCE CONDENSATION AND RESONANCE, FACTORY APPLIED RIM SEAL, 3-1/2" CRUMB CUP WASTE ASSEMBLY WITH 1-1/2" TAILPIECE
MODEL: 521mm (20-1/2") X 794mm (31-1/4"), 8" DEEP
MODEL: STAINLESS STEEL, SATIN FINISH RIM & BOWL
MCGUIRE #LFH165LKN3 FAUCET SUPPLIES, CHROME PLATED FINISH PLATE POLISHED BRASS, HEAVY DUTY ANGLE STOPS, 10 MM (3/8") I.P.S. INLET X 76 MM (3") LONG RIGID HORIZONTAL NIPPLES, V.P. LOOSE KEYS, ESCUTCHEON AND FLEXIBLE COPPER RISERS.

MANUFACTURER: CHICAGO FAUCETS
MODEL: #1100-L8-E35VP-XK TWO HANDLE FAUCET, 8" CENTERSET, SOLID BRASS BODY CONSTRUCTION, CERAMIC 1/4 TURN CARTRIDGE, 8" SWING CAST BRASS SPOUT, VANDAL RESISTANT, 5.7LPM (1.5GPM), AERATOR OUTLET, METAL RED AND BLUE INDEX BUTTONS 2" LONG CANOPY LEVER HANDLE WITH VANDAL RESISTANT SCREW, PROVIDE FAUCET SUPPLIES, CHROME FINISH ALL METAL CONSTRUCTION, ESCUTCHEONS AND FLEXIBLE METAL RISERS, PROVIDE P-TRAP-ADJUSTABLE ALL METAL CONSTRUCTION, 1-1/2" SIZE AND ESCUTCHEON

GRILLE AND DIFFUSER SCHEDULE

TYPE 'B' RETURN GRILLE

E.H PRICE TYPE 80 CORE ONLY FOR LAY-IN APPLICATION, ALUMINIUM EGGCRATE 1/2"X1/2"X1/2" GRID, B-12 FINISH, 24"X6" UNLESS NOTED OTHERWISE.

TYPE 'C' RETURN GRILLE

E.H PRICE TYPE 80 CORE ONLY FOR LAY-IN APPLICATION, ALUMINIUM EGGCRATE 1/2"X1/2"X1/2" GRID, B-12 FINISH, 24"X24" UNLESS NOTED OTHERWISE.

DUCT SIZING

DIFFUSER INLET SIZING	
AIR FLOW (cfm)	INLET SIZE
<125	6"ø
126-250	8"ø
251-450	10"ø
451-700	12"ø
701-1000	14"ø

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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HHAngus

HHAngus & Associates Limited Consulting Engineers
1127 Leslie Street, Toronto, ON, M3C 2J6 Canada
www.hhangus.com | T 416 443 8200 | F 416 443 8290

York Region

no.	date	by	description

REVISIONS

03	14MAY21		RE-ISSUED FOR TENDER
02	17FEB21		ISSUED FOR PERMIT/TENDER
01	27JAN21		ISSUED FOR DRAWING REVIEW

no.	date	by	description

ISSUED

LICENSED PROFESSIONAL ENGINEER
K.P. O'NEILL
100055807
2202027
PROVINCE OF ONTARIO

project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
MECHANICAL LEGEND, DETAILS AND SPECIFICATIONS

date: 01-14-2021	project no: 2202027
drawn by: FS	
checked by: DP	drawing no.: M-1.0
scale: N.T.S.	

MECHANICAL GENERAL REQUIREMENTS
20 01 01

1. GENERAL REQUIREMENTS
 1.1. EXAMINATION
  1.1.1. EXAMINE ANY EXISTING BUILDINGS, LOCAL CONDITIONS, BUILDING SITE, SPECIFICATIONS, AND DRAWINGS AND REPORT ANY CONDITION, DEFECT OR INTERFERENCE THAT WOULD PREVENT EXECUTION OF THE WORK.
  1.1.2. NO ALLOWANCE WILL BE MADE FOR ANY EXPENSE INCURRED THROUGH FAILURE TO MAKE THESE EXAMINATIONS OF THE SITE AND THE DOCUMENTS PRIOR TO TENDER OR ON ACCOUNT OF ANY CONDITIONS ON SITE OR ANY GROWTH OR ITEM EXISTING THERE WHICH WAS VISIBLE OR KNOWN TO EXIST AT TIME OF TENDER.
  1.1.3. EXAMINE WORK OF OTHER DIVISIONS BEFORE COMMENCING THIS WORK, AND REPORT ANY DEFECT OR INTERFERENCE.
 1.2. STANDARD OF MATERIAL AND EQUIPMENT
  1.2.1. MATERIALS AND EQUIPMENT:
   1.2.1.A. OF CANADIAN MANUFACTURE WHERE OBTAINABLE,
   1.2.1.B. STANDARD PRODUCTS OF APPROVED MANUFACTURE.
   1.2.1.C. LABELLED OR LISTED AS REQUIRED BY CODE AND/OR INSPECTION AUTHORITIES,
   1.2.1.D. IN COMPLIANCE WITH STANDARDS AND REGULATIONS WITH RESPECT TO;
    1.2.1.D.A. DESIGN,
    1.2.1.D.B. PERFORMANCE CHARACTERISTICS, AND
    1.2.1.D.C. METHODS OF CONSTRUCTION AND INSTALLATION.
   1.2.1.E. IDENTICAL UNITS OF EQUIPMENT TO BE OF SAME MANUFACTURE.
   1.2.1.F. IDENTICAL COMPONENT PARTS OF SAME MANUFACTURE IN SIMILAR UNITS OF EQUIPMENT, BUT VARIOUS COMPONENT PARTS OF EACH UNIT NEED NOT BE FROM ONE MANUFACTURER.
  1.2.2. MATERIALS AND EQUIPMENT ARE DESCRIBED TO ESTABLISH STANDARDS OF CONSTRUCTION AND WORKMANSHIP.
   1.2.2.A. WHERE MANUFACTURERS OR MANUFACTURERS PRODUCTS ARE IDENTIFIED IN LISTS WITH THE PHRASE "STANDARD OF ACCEPTANCE", THESE ARE MANUFACTURERS AND/OR PRODUCTS WHICH MEET REQUIRED STANDARDS WITH REGARD TO PERFORMANCE, QUALITY OF MATERIAL AND WORKMANSHIP.
   1.2.2.B. MANUFACTURERS AND OR PRODUCTS USED ARE TO BE CHOSEN FROM THESE LISTS.
   1.2.2.C. SELECT MATERIALS AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
   1.2.2.D. MATERIALS AND EQUIPMENT NOT SATISFYING THESE SELECTION CRITERIA WILL BE CONDEMNED.
   1.2.2.E. REMOVE CONDEMNED MATERIALS FROM JOB SITE AND PROVIDE PROPERLY SELECTED AND APPROVED MATERIALS.
2. SUBMITTALS
 2.1. SHOP DRAWINGS AND PRODUCT DATA SHEETS
  2.1.1. SUBMIT SHOP DRAWINGS IN THE SAME UNIT OF MEASURE AS ARE USED ON THE DRAWINGS. BOTH METRIC AND IMPERIAL MEASURES MAY BE INCLUDED.
  2.1.2. SUBMIT SHOP DRAWINGS BY EMAIL TO: SHOPDRAWINGS@HHANGUS.COM
 2.2. INCLUDE A H.H. ANGUS SHOP DRAWING COVER SHEET PREPARED FOR EACH ITEM ON THIS PROJECT AS A SEPARATE PDF.
 2.3. SUBMIT SHOP DRAWINGS IN PDF FORMAT;
  2.3.1. IF SUBMITTED IN HARDCOPY FORMAT, SUBMIT IN 8.5 X 11 OR 11 X 17 SIZE, BLACK AND WHITE ORIGINALS OF GRAPHIC QUALITY SUITABLE FOR PHOTOCOPYING. ALLOW ONE ADDITIONAL WEEK FOR PROCESSING OF SHOP DRAWINGS SUBMITTED IN HARDCOPY FORMAT.
 2.4. SUBMIT A SHOP DRAWING FOR EACH ITEM OF EQUIPMENT:
  2.4.1. PLUMBING FIXTURES,
  2.4.2. PUMPS,
  2.4.3. AIR-MOVING UNITS,
  2.4.4. HEATING UNITS,
  2.4.5. COILS,
  2.4.6. MOTOR CONTROL CENTRES,
  2.4.7. MOTOR STARTERS, AND
  2.4.8. SPECIAL SYSTEMS.
3. REFERENCE CODES, STANDARDS, AND REGULATIONS
 3.1. PERMITS, TESTS, AND CERTIFICATES
  3.1.1. ARRANGE AND PAY FOR PERMITS, TESTS, AND CERTIFICATES OF INSPECTION REQUIRED BY AUTHORITIES HAVING JURISDICTION.
  3.1.2. SUBMIT APPLICATIONS REQUIRING OWNER'S SIGNATURE BEFORE COMMENCING WORK.
  3.1.3. OBTAIN AND SUBMIT INSPECTION CERTIFICATES.
  3.1.4. CERTIFICATES TO BE RENEWED AS TO REMAIN IN FORCE FOR GUARANTEE PERIOD.
  3.1.5. CO-ORDINATE AND PERFORM TESTING REQUIRED BY AUTHORITIES HAVING JURISDICTION IN ACCORDANCE WITH CLAUSE TESTING IN THIS SECTION.
4. EQUIPMENT
 4.1. MANUFACTURERS NAMEPLATES
  4.1.1. PROVIDE METAL NAMEPLATE WITH RAISED OR RECESSED LETTERING, MOUNTED ON EACH PIECE OF EQUIPMENT.
 4.2. FACTORY APPLIED FINISH PAINTING
  4.2.1. APPLY PRIME AND FINAL PAINT COATS TO EQUIPMENT AND MATERIALS WHERE SPECIFICALLY DETAILED IN SECTIONS OF THESE DIVISIONS.
 4.3. FACTORY APPLIED PRIME PAINTING
  4.3.1. HAVE PRIME PAINT FACTORY-APPLIED TO OTHER EQUIPMENT FABRICATED FROM IRON OR STEEL INCLUDING ACCESS DOORS, REGISTERS, GRILLES, DIFFUSERS, DAMPERS, METAL RADIATION ENCLOSURES AND FIRE HOSE CABINETS.
 4.4. FIELD PAINTING
  4.4.1. AFTER EQUIPMENT HAS BEEN INSTALLED AND PIPING AND INSULATION IS COMPLETED, CLEAN RUST AND OIL FROM EXPOSED IRON AND STEEL WORK PROVIDED UNDER THIS DIVISION, WHETHER OR NOT IT HAS BEEN FACTORY PRIME PAINTED.
5. OFFICE, STORAGE AND TOOLS
 5.1. OFFICE AND STORAGE
  5.1.1. PROVIDE TEMPORARY OFFICE, WORKSHOP AND TOOLS AND MATERIAL STORAGE SPACE.
  5.1.2. ASSUME RESPONSIBILITY FOR SECURITY OF THESE FACILITIES AND PROVIDE HEAT, LIGHT AND TELEPHONE.
 5.2. APPLIANCES AND TOOLS
  5.2.1. PROVIDE TOOLS, EQUIPMENT, SCAFFOLDING, EXTENSION CORDS, LAMPS AND MISCELLANEOUS CONSUMABLE MATERIALS REQUIRED TO CARRY OUT WORK.
6. CO-ORDINATION
 6.1. GENERAL
  6.1.1. CONSULTANT DRAWINGS ARE DIAGRAMMATIC AND ILLUSTRATE THE GENERAL LOCATION OF EQUIPMENT, AND INTENDED ROUTING OF DUCTWORK, PIPING, ETC, AND DO NOT SHOW EVERY STRUCTURAL DETAIL. IN CONGESTED AREAS DRAWINGS AT GREATER SCALE MAY BE PROVIDED TO IMPROVE INTERPRETATION OF THE WORK. WHERE THEY ARE DONE SO EITHER TO IMPROVE "DOUBLE LINE" EQUIPMENT OR SYSTEMS ARE SHOWN AS UNDERSTANDING OF THE WORK, OR SIMPLY AS A RESULT OF THE USE OF A CAD DRAWING TOOL, AND IN EITHER CASE SUCH DRAWINGS ARE NOT REPRESENTED AS FABRICATION OR INSTALLATION DRAWINGS.
  6.1.2. LOCATION OF PIPES, DUCTWORK, RACEWAYS AND EQUIPMENT MAY BE ALTERED WITHOUT EXTRA COST PROVIDED INSTRUCTION IS GIVEN OR APPROVAL IS OBTAINED, IN ADVANCE OF INSTALLATION OF ITEMS INVOLVED. CHANGES WILL BE AUTHORIZED BY SITE INSTRUCTIONS AND ARE TO BE SHOWN ON RECORD DRAWINGS.
  6.1.3. LOCATION OF FLOOR DRAINS, HUB DRAINS, COMBINATION DRAINS, PLUMBING FIXTURES, CONVECTORS, UNIT HEATERS, DIFFUSER, REGISTERS GRILLES AND OTHER SIMILAR ITEMS MAY BE ALTERED WITHOUT EXTRA COST PROVIDED INSTRUCTION IS GIVEN PRIOR TO ROUGHING IN. NO CLAIM WILL BE PAID FOR EXTRA LABOUR AND MATERIALS FOR RELOCATING ITEMS UP TO 3 M (10 FT) FROM ORIGINAL LOCATION NOR WILL CREDITS BE ANTICIPATED WHERE RELOCATION UP TO 3 M (10 FT) REDUCES MATERIAL AND LABOUR.
7. PROTECTION OF WORK AND PROPERTY
 7.1. GENERAL
  7.1.1. PROTECT THIS WORK AND WORK OF OTHER TRADES FROM DAMAGE.
  7.1.2. COVER FLOORS WITH TARPAULINS AND PROVIDE PLYWOOD AND OTHER TEMPORARY PROTECTION.
  7.1.3. ASSUME RESPONSIBILITY FOR REPAIRING DAMAGE TO FLOOR AND WALL SURFACES RESULTING FROM FAILURE TO PROVIDE ADEQUATE PROTECTION.
  7.1.4. PROTECT EQUIPMENT, PIPE AND DUCT OPENINGS FROM DIRT, DUST AND OTHER FOREIGN MATERIALS.
8. WORK IN EXISTING BUILDING
 8.1. GENERAL
  8.1.1. .1 WORK INCLUDES CHANGES TO EXISTING BUILDING.
  8.1.2. ROUTE PIPES, DUCTS, CONDUITS AND OTHER SERVICES TO AVOID INTERFERENCE WITH EXISTING INSTALLATION.
  8.1.3. RELOCATE EXISTING PIPES, DUCTS, CONDUITS, BUS DUCTS AND ANY OTHER EQUIPMENT OR SERVICES REQUIRED FOR PROPER INSTALLATION OF NEW WORK, INCLUDING AS REQUIRED FOR TEMPORARY REMOVAL AND RE-INSTALLATION TO SUIT NEW INSTALLATION WORK.
  8.1.4. REMOVE EXISTING PLUMBING FIXTURES, LIGHTING FIXTURES, PIPING, DUCTWORK, WIRING, AND EQUIPMENT TO SUIT NEW CONSTRUCTION. CUT BACK AND CAP DRAIN, VENT AND WATER OUTLETS, CONDUITS AND ELECTRICAL OUTLETS, NOT BEING USED.
  8.1.5. PLUMBING FIXTURES, PIPING, DUCTWORK, CONDUIT AND WIRING SHOWN TO BE REMOVED AND NOT SHOWN RELOCATED, TO BECOME PROPERTY OF CONTRACTOR AND TO BE TAKEN FROM SITE.
  8.1.6. LIGHTING FIXTURES SHOWN TO BE REMOVED WILL REMAIN OWNER'S PROPERTY AND WILL BE TURNED OVER TO OWNER'S REPRESENTATIVE AS DIRECTED.
  8.1.7. WHERE OWNER WISHES TO TAKE OVER RENOVATED AREAS AHEAD OF PROJECT COMPLETION DATE AND THESE AREAS ARE TO BE FED FROM NEW DISTRIBUTION SYSTEMS, MAKE TEMPORARY CONNECTIONS TO EXISTING SERVICES IN THESE AREAS. RECONNECT TO PERMANENT SERVICES, AT LATER DATE, WHEN NEW DISTRIBUTION SYSTEMS ARE AVAILABLE.
9. RECORD DRAWINGS
 9.1. SITE RECORDS
  9.1.1. A SET OF DESIGN DRAWINGS IN AUTOCAD 2008 ON CD OR DVD ROM WILL BE PROVIDED BY THE CONSULTANT. MAKE SETS P
  9.1.2. OF WHITE PRINTS FOR EACH PHASE OF WORK, AND AS WORK PROGRESSES AND CHANGES OCCUR MARK WHITE PRINTS IN COLOURED INKS TO SHOW REVISIONS. DIMENSION LOCATIONS OF DRAINS, PIPES, DUCTWORK, CONDUIT, MANHOLES, FOUNDATIONS AND SIMILAR BURIED ITEMS WITHIN THE BUILDING, WITH RESPECT TO BUILDING COLUMN CENTRES. MARK LEVEL WITH RESPECT TO AN ELEVATION WHICH WILL BE PROVIDED.
  9.1.3. RETAIN THESE DRAWINGS AND MAKE AVAILABLE TO CONSULTANT FOR PERIODIC REVIEW.
 9.2. AS-BUILT DRAWINGS
  9.2.1. PRIOR TO TESTING, BALANCING AND ADJUSTING, TRANSFER SITE RECORD DRAWING INFORMATION TO AUTOCAD 2008 (CAD) FILES, TO RECORD FINAL AS-BUILT CONDITION. OBTAIN A CURRENT SET OF CAD FILES FROM THE CONSULTANT.
   9.2.1.A. DRAWINGS ARE TO REMAIN SET TO AND FOLLOW CONSULTANTS AUTOCAD STANDARDS. DO NOT ALTER DRAWING SCALES, X-REFS, COLOURS, LAYERS OR TEXT STYLES.
   9.2.1.B. THE CONSULTANT'S CAD FILES MAY NOT REFLECT ALL OR ANY CONSTRUCTION CHANGES.
  9.2.2. WHERE ITEMS HAVE BEEN DELETED, MOVED, RENUMBERED OR OTHERWISE CHANGED FROM CONTRACT DRAWINGS, THESE REVISIONS, AND PLACE THESE ANNOTATIONS "BUBBLE" REVISE THE CAD FILES TO RECORD THESE CHANGES. A SEPARATE AND EASILY IDENTIFIED DRAWING LAYER.
  9.2.3. SHOW ON MECHANICAL AS-BUILT DRAWINGS FINAL LOCATION OF PIPING, DUCTWORK, SWITCHES, STARTERS, MOTOR CONTROL CENTRES, THERMOSTATS, AND EQUIPMENT.
  9.2.4. SHOW ON SITE SERVICES AS-BUILT DRAWINGS SURVEY INFORMATION PROVIDED BY ONTARIO LAND SURVEYOR (OLS) MONITORING SERVICES INSTALLATION.
  9.2.5. SHOW ON ELECTRICAL AS-BUILT DRAWINGS FINAL LOCATION OF CONDUIT, OUTLETS, PANELS, BRANCH WIRING, SYSTEM WIRING, PULL BOXES, BUS DUCTS, AND EQUIPMENT.
  9.2.6. IDENTIFY EACH DRAWING IN LOWER RIGHT HAND CORNER IN LETTERS AT LEAST 12 MM (½ IN) HIGH AS FOLLOWS: "AS-BUILT DRAWINGS. THIS DRAWING HAS BEEN REVISED TO SHOW SYSTEMS AS INSTALLED" (SIGNATURE OF CONTRACTOR) (DATE). THE SITE SERVICES DRAWINGS ARE TO INCLUDE (SIGNATURE AND STAMP OF OLS) ATTACHED TO NOTE.
  9.2.7. SUBMIT ONE (1) SET OF WHITE PRINTS OF THE DRAFT AS-BUILT CAD FILES FOR CONSULTANTS' REVIEW.
  9.2.8. ONCE "AS BUILT DRAWINGS" WHITE PRINTS ARE REVIEWED, TRANSFER CONSULTANTS' COMMENTS TO THE CAD FILES. RETURN AUTOCAD DRAWINGS MODIFIED TO "AS BUILT" CONDITION TO CONSULTANTS ON CD OR DVD ROM.
  9.2.9. SUBMIT THREE (3) SETS OF WHITE PRINTS AND THREE (3) COPIES OF CAD FILES WITH OPERATING AND MAINTENANCE MANUALS.
10. OPERATING AND MAINTENANCE INSTRUCTIONS
 10.1. START-UP AND TESTING
  10.1.1. SUPPLY SERVICES OF SKILLED MECHANIC, TO START SYSTEMS IN PROPER SEQUENCE, AND TEST AND CALIBRATE CONTROLS, PRV'S, INSTRUMENTATION AND RELIEF VALVES AND DAMPERS AND TO SET-UP SYSTEMS.
 10.2. TRAINING
  10.2.1. DURING THIS PROCEDURE THOROUGHLY EXPLAIN OPERATION AND MAINTENANCE OF EACH SYSTEM, INCORPORATING SPECIALIZED INSTRUCTION BY MANUFACTURERS AS DESCRIBED UNDER OTHER SECTIONS IN THESE DIVISIONS.
  10.2.2. ARRANGE SUITABLE TIME FOR INSTRUCTIONS WITH OWNER'S OPERATING AND MAINTENANCE PERSONNEL.
 10.3. OPERATING AND MAINTENANCE MANUALS
  10.3.1. PROVIDE OPERATION AND MAINTENANCE DATA BOUND IN 210 MM X 300 MM X 50MM THICK (8½ IN X 11 IN X 2 IN THICK) SIZE, VINYL COVERED, HARD BACK, THREE-RING COVERS.
   10.3.1.A. ORGANIZE MATERIAL IN VOLUMES GENERALLY GROUPED BY TRADE SECTION; SITE SERVICES, PLUMBING, FIRE PROTECTION, HEATING AND COOLING PLANT AND DISTRIBUTION, AIR HANDLING, AND CONTROLS AND INSTRUMENTATION.
   10.3.1.B. TITLE SHEET IN EACH VOLUME TO BE LABELED "OPERATING AND MAINTENANCE MANUAL" AND TO BEAR PROJECT NAME, PROJECT NUMBER, DATE, TRADE SECTION, AND LIST OF CONTENTS.
  10.3.2. IN ADDITION, PROVIDE ADOBE PDF FILES FOR EACH DOCUMENT, PRODUCED FROM ORIGINAL DIRECT-TO-DIGITAL FILE CREATIONS.
11. CONSULTANT REVIEWS
 11.1. SITE REVIEWS
  11.1.1. DEFICIENCY REVIEWS CONDUCTED BY THE CONSULTANT ARE PERFORMED ON A SAMPLING BASIS AND ANY DEFICIENCY ITEM IS TO BE INTERPRETED AS BEING INDICATIVE OF SIMILAR LOCATIONS ELSEWHERE IN THE WORK, UNLESS OTHERWISE SHOWN.
12. CORRECTION AFTER COMPLETION
 12.1. GENERAL
  12.1.1. SUBMIT SIMILAR GUARANTEE FOR ONE YEAR FROM DATE OF ACCEPTANCE FOR ANY PART OF WORK ACCEPTED BY OWNER, BEFORE COMPLETION OF WHOLE WORK.
 12.2. FINAL REVIEW
  12.2.1. AT PROJECT COMPLETION, SUBMIT WRITTEN REQUEST FOR FINAL REVIEW OF MECHANICAL AND ELECTRICAL SYSTEMS.

BASIC MATERIALS AND METHODS
20 05 01

1. GENERAL
 1.1. SCOPE
  1.1.1. ARTICLES THAT ARE OF A GENERAL NATURE, APPLICABLE TO EACH SECTION OF DIVISION 20 AND 26.
2. ACCESS DOORS
 2.1. PROVIDE ACCESS DOORS TO BE INSTALLED AT LOCATIONS WHERE EQUIPMENT REQUIRING INSPECTION, SERVICE, MAINTENANCE OR ADJUSTMENT IS "BUILT-IN" TO WORK OF OTHER TRADES.
 2.2. SUBMIT SHOP DRAWINGS SHOWING ACCESS DOOR SIZE, TYPE AND LOCATION.
 2.3. CONSTRUCTION:
  2.3.1. CONSTRUCTED OF STEEL, PRIME COATED
  2.3.2. CONSTRUCTED OF STAINLESS STEEL WITH NEOPRENE GASKETED DOOR IN DAMP AND HIGH HUMIDITY AREAS
  2.3.3. GENERALLY FITTED WITH SCREWDRIVER OPERATED LATCHES, EXCEPT IN AREAS SUBJECT TO SECURITY RISKS (PUBLIC CORRIDORS, PSYCHIATRIC PATIENT AREAS, PUBLIC WASHROOMS). IN THESE AREAS DOORS TO BE FITTED WITH KEYED CYLINDER LOCKS WITH SIMILAR KEYS.
3. SLEEVES
 3.1. GENERAL
  3.1.1. SLEEVE PIPES, DUCTS AND CONDUITS PASSING THROUGH MASONRY WALLS, CONCRETE FLOORS, AND FIRE RATED GYPSUM BOARD CEILINGS AND PARTITIONS.
  3.1.2. MAINTAIN FIRE RATING INTEGRITY WHERE PIPES AND DUCTS PASS THROUGH FIRE RATED WALLS, FLOORS AND PARTITIONS.
 3.2. FLOOR AND WALL SLEEVES
  3.2.1. SLEEVES IN FIRE SEPARATIONS:
   3.2.1.A. SIZED TO SUIT FIRE STOPPING METHODS EMPLOYED FOR BARE PIPES, CONDUITS, INSULATED PIPES, AND BARE AND INSULATED DUCTS WITHOUT FIRE DAMPERS, AND
   3.2.1.B. SIZED TO SUIT CONDITIONS OF APPROVAL GIVEN IN MANUFACTURERS INSTALLATION INSTRUCTIONS FOR FIRE AND SMOKE DAMPERS.
  3.2.2. SLEEVES IN OTHER CONSTRUCTION:
   3.2.2.A. SIZED TO CLEAR INSULATED PIPES AND DUCTS BY 13 MM (2 IN) ALL ROUND, AND
   3.2.2.B. SIZED TO CLEAR CONDUITS, BARE PIPES, AND BARE DUCTS BY 6 MM (3 IN) ALL ROUND.
  3.2.3. SLEEVES FOR PIPES, CONDUITS AND DUCTS SMALLER THAN 0.4 M5 (4 SQ FT) THROUGH SOLID WALLS AND FLOORS:
   3.2.3.A. SCHEDULE 40 STEEL PIPE OR 1 MM (20 GA) (MINIMUM) SHEET METAL, LAPPED AND SPOT WELDED.
   3.2.3.B. SLEEVES FOR PIPES, CONDUITS AND DUCTS SMALLER THAN 0.4 M5 (4 SQ FT) THROUGH GYPSUM BOARD PARTITIONS:
    3.1.3.B.A. 1 MM (20 GA) MINIMUM SHEET METAL, LAPPED AND SPOT WELDED WITH 20 MM (¾ IN) LIP FLANGE AT ONE END.
  3.1.4. SLEEVES FOR DUCTS 0.4 M5 (4 SQ FT) AND LARGER THROUGH WALLS AND FLOORS:
   3.1.4.A. 1.6 MM (16 GA) MINIMUM SHEET METAL, LAPPED AND SPOT WELDED WITH 20 MM (¾ IN) LIP FLANGE AT ONE END.
4. FIRE STOPPING AND SMOKE SEALS
 4.1. GENERAL
  4.1.1. PROVIDE FIRE STOPPING AND SMOKE SEALS WHERE DUCTS, PIPES OR CONDUITS PENETRATE FIRE SEPARATIONS. MATERIALS TO BE SUPPLYIED, WORKER TRAINING TO BE ARRANGED, AND INSTALLATION TO BE SUPERVISED, BY A SPECIALIST FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD.
 4.2. PRODUCTS
  4.2.1. MATERIALS TO FORM ULC LISTED OR CUL LISTED/CLASSIFIED ASSEMBLIES.
  4.2.2. OTHER MANUFACTURERS HAVING PRODUCTS WITH EXPLICITLY SIMILAR CHARACTERISTICS, LISTINGS OR CLASSIFICATIONS AND APPROVALS ARE ACCEPTABLE.
 4.3. INSTALLATION
  4.3.1. SEAL SPACE BETWEEN PENETRATING SERVICE AND SLEEVE OR OPENING IN SLAB WITH FIRESTOP AND SMOKE SEALING SYSTEM IN STRICT ACCORDANCE WITH TERMS AND CONDITIONS OF ORIGINAL ULC OR CUL LISTING AND MANUFACTURERS RECOMMENDED PROCEDURES.
  4.3.2. SELECT THICKNESS AND ARRANGEMENT OF BACK-UP MATERIALS TO SUIT SIZE OF SERVICE, LENGTH OF SLEEVE AND ANTICIPATED MOVEMENT.
  4.3.3. SELECT FIRESTOPPING SYSTEM TO ALLOW INSULATION AND VAPOUR BARRIER TO PASS UN-BROKEN THROUGH ASSEMBLY.
  4.3.4. SURFACES TO BE CLEAN, DRY AND FREE FROM DUST, OIL, GREASE, LOOSE OR FLAKING PAINT AND FOREIGN MATERIALS AT TIME OF APPLICATION OF MATERIALS
  4.3.5. DO NOT APPLY FIRE STOPPING MATERIALS TO FIRE OR SMOKE DAMPERS.
5. CUTTING AND PATCHING
 5.1. FORMING, CUTTING AND PATCHING OF GENERAL TRADES WORK TO ACCOMMODATE WORK OF THIS DIVISION, WILL BE DONE BY GENERAL CONTRACTOR TRADES, AND PAID FOR BY THIS DIVISION.
 5.2. EACH TRADE IS RESPONSIBLE FOR PROMPT INSTALLATION OF WORK IN ADVANCE OF CONCRETE POURING, MASONRY, ROOFING, FINISHING TRADES AND SIMILAR WORK.
 5.3. SHOULD ANY CUTTING OR REPAIRING OF EITHER UNFINISHED OR FINISHED NEW WORK OF THESE TRADES BE REQUIRED BECAUSE OF FAILURE TO CO-ORDINATE WORK, TRADE RESPONSIBLE FOR THE FAILURE TO EMPLOY AND PAY PARTICULAR TRADE CONTRACTOR WHOSE WORK IS INVOLVED, TO DO CUTTING AND PATCHING.
 5.4. REPAIR CUT OR DAMAGED SURFACES WITH MATERIALS AND FINISHES TO MATCH EXISTING.
 5.5. NEATLY CUT OR DRILL HOLES IN EXISTING CONSTRUCTION TO ACCOMMODATE PIPING, DUCTWORK OR CONDUITS.
 5.6. LAYOUT CUTTING OF STRUCTURAL ELEMENTS, SUCH AS FLOORS SLABS, WALLS, COLUMNS OR BEAMS AND OBTAIN APPROVAL BEFORE STARTING WORK. CONDUCT A ELECTROMAGNETIC SCAN OF REINFORCING RODS, SUCH AS HILTI PS200 FERROSCAN, AND REVIEW WITH STRUCTURAL ENGINEER. BASED ON THESE RESULTS, ARRANGE AND PAY FOR SUPPLEMENTAL X-RAY EXAMINATION TO LOCATE CONCRETE REINFORCEMENT AND EMBEDMENTS. SUBMIT X-RAYS AND OBTAIN APPROVAL BEFORE STARTING WORK.

METERS AND GAUGES
20 05 19

1. GENERAL
 1.1. SCOPE
  1.1.1. PROVIDE LIQUID FLOW METERS, AND TEMPERATURE AND PRESSURE MEASURING DEVICES.
 1.2. SHOP DRAWINGS / PRODUCT DATA
  1.2.1. SUBMIT MANUFACTURER'S CATALOGUE LITERATURE.
 1.3. APPLICABLE CODES AND STANDARDS;
  1.3.1. ASME B40.200 THERMOMETERS, DIRECT READING AND REMOTE READING
  1.3.2. ASME B40.100 PRESSURE GAUGES AND GAUGE ATTACHMENTS
2. PRODUCTS
 2.1. FLOW INDICATORS;
  2.1.1. CONSTRUCTION:
   2.1.1.A. GIVE VISUAL FLOW INDICATION.
   2.1.1.B. EQUIPPED WITH DUAL FLOW SCALE CALIBRATED IN L/S AND USGPM.
   2.1.1.C. PROTECTED AGAINST ACCIDENTAL BREAKAGE OF THE GLASS INDICATOR.
   2.1.1.D. IN-LINE TYPE FOR PIPE SIZES UP TO NPS 1½.
    STANDARD OF ACCEPTANCE: ITT BELL & GOSSETT, BAILEY
 2.2. FLOW MEASUREMENT SYSTEMS (LIQUIDS)
  2.2.1. PRIMARY FLOW ELEMENTS:
   2.2.1.A. DIFFERENTIAL PRESSURE TYPE, WITH ISOLATING VALVES.
  2.2.2. FLOW ELEMENT IN COMBINATION WITH METER:
   2.2.2.A. ACCURACY OF ± 1% OF READING OVER MINIMUM OF 10:1 TURNDOWN.
   2.2.2.B. REPEATABILITY OF ± 0.1%.
   2.2.2.C. COMPLETE WITH 4-20 MA OR DC OUTPUT DIFFERENTIAL PRESSURE (DP) TRANSMITTER WITH THREE VALVE MANIFOLD FOR ISOLATION AND TESTING.
   2.2.2.D. EQUIPPED WITH DUAL FLOW SCALE CALIBRATED IN L/S AND USGPM.
   2.2.2.E. USED WITH 4-20 MA OR DC OUTPUT DIFFERENTIAL TEMPERATURE TRANSMITTER, WITH TEMPERATURE RTD'S IN THERMOWELLS WITH EXTENSION NECKS, FOR MEASUREMENT OF ENERGY FLOW IN KW AND BTU/HR.
    STANDARD OF ACCEPTANCE: ITT BELL & GOSSETT, BAILEY
 2.3. THERMOMETERS AND PRESSURE GAUGES - SELECTION CRITERIA
  2.3.1. GENERAL
   2.3.1.A. NORMAL OPERATING READING TO BE BETWEEN HALF AND TWO THIRDS OF FULL SCALE RANGE
   2.3.1.B. EXPECTED MAXIMUM AND MINIMUM READINGS TO BE WITHIN SCALE RANGE.
  2.3.1.C. THERMOMETERS TO HAVE BOTH FAHRENHEIT AND CELSIUS SCALES.
  2.3.1.D. PRESSURE GAUGES TO HAVE BOTH PSI AND KPA SCALES.
  2.3.2. PRODUCT IDENTIFICATION
   2.3.2.A. PRESSURE GAUGES AND THERMOMETERS TO BE SELECTED FROM MANUFACTURERS STANDARD PRODUCT LINE.
  2.3.3. MODEL DESIGNATIONS FROM TREROCE CATALOGUE ARE USED TO ESTABLISH QUALITY STANDARDS AND CONSTRUCTION DETAILS TO ALLOW ASSESSMENT OF PRODUCTS FROM OTHER UNLISTED MANUFACTURERS.
 2.4. DIRECT READING THERMOMETERS
  2.4.1. INDUSTRIAL, VARIABLE ANGLE TYPE, LIQUID FILLED, ALUMINUM 230 MM (9 IN) SCALE LENGTH, TO CGSB 14.4.
 2.5. PRESSURE GAUGES
  2.5.1. FOR DIFFERENTIAL PRESSURE MEASUREMENT
   2.5.1.A. 115 MM (4½ IN) DIAL TYPE, SILICONE-FREE DAMPENING, BLACK SOLID FRONT CASE, ½% ACCURACY, ADJUSTABLE POINTER AND MAXIMUM REGISTERING POINTER TO ASME B40.100 GRADE 2A., COMPLETE WITH IMPULSE SNUBBER AND 3-WAY SWITCHING VALVE.
  2.5.2. ACCESSORIES:
   2.5.2.A. PRESSURE SNUBBERS, BRASS OR T303 STAINLESS STEEL CONSTRUCTION:
   2.5.2.B. NEEDLE VALVES, RISING STEM, BRASS OR T316 STAINLESS STEEL CONSTRUCTION.
   2.5.2.C. COIL SYPHONS, SCHEDULE 40 CARBON STEEL.
3. EXECUTION
 3.1. METERING DEVICES
  3.1.1. INSTALLATION
   3.1.1.A. INSTALL FLOW MEASURING DEVICES IN HORIZONTAL STRAIGHT PIPE RUNS, FREE OF VALVES AND FITTINGS.
  3.1.2. LENGTH OF STRAIGHT PIPE BEFORE AND AFTER METERING ELEMENTS:
   3.1.2.A. NOT LESS THAN 1 M (3 FT) BEFORE AND 1 M (3 FT) AFTER OR,
   3.1.2.B. AS RECOMMENDED BY MANUFACTURER.
  3.1.3. MOUNT METER READOUT UNITS AND PROVIDE PIPING AND WIRING TO COMPLETE INSTALLATION.
 3.2. THERMOMETER AND PRESSURE GAUGES - GENERAL INSTALLATION CRITERIA
  3.2.1. INSTALL THERMOMETERS AND GAUGES NOT MORE THAN 3 M (10 FT) FROM FLOOR OR PLATFORM, OR INSTALL REMOTE READING THERMOMETERS AND GAUGES, WITH DIAL MOUNTED AT EYE LEVEL, ON STEEL OR ALUMINUM PLATE.

VALVES
20 05 23

4. SCOPE
 4.1. PROVIDE VALVES IN PIPING SYSTEMS THROUGHOUT PROJECT.
 4.2. APPLICABLE CODES AND STANDARDS
  4.2.1. TEMPERATURE AND PRESSURE RATINGS, MATERIAL COMPOSITION, AND MANUFACTURER'S TESTING PROCEDURES CONFORMING TO LATEST SPECIFICATIONS FROM: MANUFACTURERS STANDARDIZATION SOCIETY OF VALVE AND FITTINGS INDUSTRY (MSS)
 4.3. QUALITY AND EQUIVALENCE
  4.3.1. VALVE SELECTIONS ARE IN GENERAL IDENTIFIED BY MODEL DESIGNATIONS TAKEN FROM MANUFACTURERS CATALOGUES TO INDICATE PHYSICAL PROPERTIES AND QUALITY STANDARDS NOT OTHERWISE DESCRIBED.
  4.3.2. COMPANIES, AND/OR TRADE NAMES LISTED BELOW ARE ACCEPTABLE FOR VARIOUS VALVE TYPES, WHERE PRODUCTS OFFERED ARE ESSENTIALLY SIMILAR TO THOSE IDENTIFIED BY MANUFACTURER OR MODEL NUMBER UNDER "STANDARD OF ACCEPTANCE" DESIGNATION.
   4.3.2.A. SPECIFIC DUTY VALVES ARE SPECIFIED IN EACH PIPING SERVICE ARTICLE.
   4.3.2.B. FOR GATE, GLOBE, ANGLE, AND CHECK VALVES
   4.3.2.C. FOR DOUBLE REGULATING VALVES
   4.3.2.D. FOR SILENT CHECK VALVES
   4.3.2.E. FOR BUTTERFLY VALVES
   4.3.2.F. FOR BALL VALVES
   4.3.2.G. FOR GROOVED PIPING VALVE PRODUCTS
5. PRODUCTS
 5.1. SELECTION CRITERIA
  5.1.1. VALVES TO BE LINE SIZE, SELECTED AS FOLLOWS
   5.1.1.A. FOR SHUT-OFF OR ISOLATING SERVICE, VALVES TO BE
    5.1.1.A.A. GATE
    5.1.1.A.B. BUTTERFLY
    5.1.1.A.C. BALL
   5.1.1.B. FOR FLOW BALANCING AND SHUT-OFF SERVICE VALVES TO BE
    5.1.1.B.A. DOUBLE REGULATING
   5.1.1.C. AT DISCHARGE OF PUMPS CHECK VALVES TO BE SILENT OR SPRING ASSISTED OR COMBINATION CHECK AND FLOW CONTROL VALVES.
  5.1.2. ON MAINS AND RISERS, DRAIN VALVES TO BE SELECTED AS FOLLOWS
   5.1.2.A. ON MAINS NPS 4 AND UNDER
    5.1.2.A.A. NPS 3/4 BRASS THREADED BALL VALVE OF APPROPRIATE PRESSURE RATING WITH HOSE THREAD, CAP AND CHAIN.
   5.1.2.B. ON MAINS NPS 5 AND OVER
    5.1.2.B.A. NPS 1 BRASS THREADED BALL VALVE OF APPROPRIATE PRESSURE RATING WITH HOSE THREAD, CAP AND CHAIN.
 5.2. SPRINKLER AND STANDPIPE VALVES
  5.2.1. APPROVALS
   5.2.1.A. VALVES TO BE ULC AND FM LISTED FOR FIRE PROTECTION.
  5.2.2. GATE VALVES UP TO NPS 2, THREADED
   5.2.2.A. 1200 KPA (175 PSI) CLASS 150 BRONZE BODY, SOLID WEDGE BRONZE DISC, RISING STEM, OS & Y, SCREW IN YOKE BONNET,
  5.2.3. BUTTERFLY VALVES UP TO NPS 2½, THREADED
   5.2.3.A. 1200 KPA (175 PSI), BRONZE BODY, STAINLESS STEEL DISC, WITH LEVER HANDLE
  5.2.4. BUTTERFLY VALVES NPS 2½ AND OVER, GROOVED JOINT STYLE
   5.2.4.A. 1200 KPA (175 PSI), CAST

1.3.1. O.REG. 220/01 MADE UNDER THE TSSA ACT
1.3.2. CSA B52 MECHANICAL REFRIGERATION CODE
1.3.3. PIPING STANDARDS TO:
1.3.3.A. ASME B31.9 CODE FOR BUILDING SERVICE PIPING.

2. EXECUTION
2.1. WELDER QUALIFICATION AND WELDING PROCEDURES
2.1.1. WELDING OF PIPING, CONDENSATE, HOT WATER OR CHILLED WATER, AT PRESSURES GREATER THAN 100 KPA (15 PSI)] TO BE CARRIED OUT USING APPROVED PROCEDURES BY WELDERS CERTIFIED FOR PRESSURE PIPING BY TSSA.
2.1.2. WELDING, BOTH SHOP AND FIELD, TO BE ELECTRIC ARC IN ACCORDANCE WITH RECOMMENDATIONS OF CANADIAN WELDING BUREAU.
2.1.3. WELDERS CERTIFICATES AND WELDING PROCEDURES USED ON JOB TO BE AVAILABLE FOR INSPECTION DURING PIPE WELDING OPERATIONS. EACH WELD TO BE STAMPED WITH WELDER'S IDENTIFYING NUMBER.
2.2. WELDED CONNECTIONS TO EXISTING PRESSURE PIPING SYSTEMS
2.2.1. AT THE COMMENCEMENT OF THE WORK, REVIEW WITH AUTHORITY-HAVING-JURISDICTION INSPECTOR TO DETERMINE THEIR WELD TESTING REQUIREMENTS TO VALIDATE THE PROPOSED WELDING PROCEDURES, INCLUDING BUT NOT LIMITED TO:
2.2.1.A. DIMENSIONAL MISALIGNMENT BETWEEN OLD AND NEW PIPE,
2.2.1.B. METALLURGICAL ANALYSIS OF EXISTING PIPING,
2.2.2. AFTER TESTING REQUIREMENTS ARE DETERMINED, PROVIDE A PROPOSED SCHEDULE FOR TIE-IN CONNECTIONS AND REQUIRED EXISTING SERVICE SHUT-DOWN PERIODS, FOR APPROVAL PRIOR TO COMMENCING WORK.
2.3. WELD QUALITY
2.3.1. WELDS TO BE SOLID HOMOGENEOUS PART OF METALS JOINED AND FREE FROM PITS AND INCORPORATED SLAG AND SCALE.
2.3.2. WELD SURFACES TO BE SMOOTH AND REGULAR AND WELD METAL DEPOSITION TO ACHIEVE FULL PENETRATION WITH GROOVE FILLED WITH WELD METAL, FUSED TO THE BASE METAL THROUGHOUT JOINT THICKNESS.
2.3.3. CONDUCT VISUAL EXAMINATION OF WELDS IN ACCORDANCE WITH THE APPLICABLE PIPING STANDARD AND SUBMIT COPY OF EXAMINATION REPORT FOR REVIEW. FOR REGISTERED PRESSURE PIPING SYSTEMS, INCLUDE COPIES OF TSSA FIELD INSPECTION REPORTS.
2.4. RADIOGRAPHY
2.4.1. ARRANGE AND PAY FOR SERVICES OF AN INSPECTION COMPANY SPECIALIZING IN MAKING AND INTERPRETING X-RAYS OF PIPE WELDS.
2.4.2. SUBMIT COPY OF RADIOGRAPH FOR EVERY WELD EXAMINED.
2.4.3. RADIOGRAPHY TO BE IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 PARA. UW-51, "TECHNIQUE FOR RADIOGRAPHIC EXAMINATION OF WELDED JOINTS".
2.4.4. WELDS ARE UNACCEPTABLE WITH IMPERFECTIONS AS DETAILED IN PARA. UW-51, CLAUSE (a)1 TO (a)4 INCLUSIVE OF SAME CODE.
2.4.5. REPAIRS TO BE CARRIED OUT AS PROVIDED IN PARA. UW-38 OF SAME CODE.

HEATING AND COOLING PIPING SYSTEMS GENERAL
23 05 01

1. SCOPE
1.1. PROVIDE HEATING AND COOLING PIPING SYSTEMS
1.2. HOT WATER HEATING SYSTEM
1.2.1. PIPING DESIGN CODE:
1.2.1.A. TO ASME B31.9 BUILDING SERVICE PIPING
1.2.2. SYSTEM INCLUDES:
1.2.2.A. BOILERS
1.2.2.B. HEAT EXCHANGERS
1.2.2.C. PUMPS
1.2.2.D. EXPANSION TANKS
1.2.2.E. CONVECTORS
1.2.2.F. RADIATORS
1.2.2.G. RADIANT PANELS
1.2.2.H. FINNED RADIATION
1.2.2.I. UNIT HEATERS
1.2.2.J. HEATING COILS
1.2.2.K. CONTROLS
1.2.3. SYSTEM DESIGN CRITERIA
1.2.3.A. CONSTANT TEMPERATURE SYSTEM
1.2.3.A.A. SUPPLY TEMPERATURE: [93°C (200°F)][87°C (190°F)]
1.2.3.A.B. RETURN TEMPERATURE: [77°C (170°F)][71°C (160°F)]
1.2.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.2.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.2.3.B. SCHEDULED TEMPERATURE SYSTEM
1.2.3.B.A. MAXIMUM WORKING PRESSURE : 900 KPA (125 PSI)
1.2.3.B.B. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.2.3.C. LOW TEMPERATURE SYSTEM (CONDENSER WATER HEAT RECOVERY)
1.2.3.C.A. SUPPLY TEMPERATURE: 40.5 °C (105 °F)
1.2.3.C.B. RETURN TEMPERATURE: 32 °C (90 °F)
1.2.3.C.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.2.3.C.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.3. COOLING WATER SYSTEMS
1.3.1. PIPING DESIGN CODE:
1.3.1.A. TO ASME B31.9 BUILDING SERVICE PIPING
1.3.2. SYSTEM INCLUDES:
1.3.2.A. REFRIGERATION MACHINES
1.3.2.B. THERMAL STORAGE TANKS
1.3.2.C. ICE BUILDERS
1.3.2.D. CIRCULATING PUMPS
1.3.2.E. PLATE HEAT EXCHANGERS
1.3.2.F. EXPANSION TANK
1.3.2.G. EVAPORATIVE or DRY COOLERS
1.3.2.H. COOLING TOWERS
1.3.2.I. INDOOR CONDENSER WATER BASIN
1.3.2.J. CONDENSER WATER FILTERS
1.3.2.K. COOLING COILS
1.3.2.L. FAN COIL UNITS
1.3.2.M. SERVER ROOM COOLING UNITS
1.3.2.N. CONTROLS
1.3.3. SYSTEM DESIGN CRITERIA
1.3.3.A. CHILLED WATER SYSTEM
1.3.3.A.A. SUPPLY TEMPERATURE: 5.5° C (42° F)
1.3.3.A.B. RETURN TEMPERATURE: 14.4° C (58° F)
1.3.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.3.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.3.3.B. SECONDARY CHILLED WATER SYSTEM
1.3.3.B.A. SUPPLY TEMPERATURE: 13°C (55°F)
1.3.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.3.3.B.C. DESIGN PRESSURE: 1030 KPA (125 PSI)
1.3.3.C. CONDENSER WATER SYSTEM
1.3.3.C.1. SUPPLY TEMPERATURE – SUMMER: 29.5°C (85°F)
1.3.3.C.2. RETURN TEMPERATURE – SUMMER: 35°C (95°F)
1.3.3.C.3. SUPPLY TEMPERATURE – WINTER: 4°C (40°F)
1.3.3.C.4. MAXIMUM WORKING PRESSURE: 700 KPA (100 PSI)
1.3.3.C.5. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.4. GLYCOL SYSTEM
1.4.1. PIPING DESIGN CODE:
1.4.1.A. TO ASME B31.9 BUILDING SERVICE PIPING
1.4.2. SYSTEM INCLUDES:
1.4.2.A. FILLING PUMP
1.4.2.B. REFRIGERATION MACHINES
1.4.2.C. BOILERS
1.4.2.D. [EVAPORATIVE][DRY] COOLERS
1.4.2.E. HEAT EXCHANGERS
1.4.2.F. MIXING TANK
1.4.2.G. CIRCULATING PUMP
1.4.2.H. EXPANSION TANK
1.4.2.I. COILS
1.4.2.J. CONTROLS
1.4.3. SYSTEM DESIGN CRITERIA
1.4.3.A. GLYCOL COOLING SYSTEM
1.4.3.A.A. SUPPLY TEMPERATURE: 2°C (36°F)
1.4.3.A.B. RETURN TEMPERATURE: 15.5°C (60°F)
1.4.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.4.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.4.3.A.E. GLYCOL TYPE: PROPYLENE
1.4.3.A.F. GLYCOL / WATER MIXTURE BY VOLUME: 40 % GLYCOL
1.4.3.A.G. WATER – CITY OF TORONTO
1.4.3.A.G.A. CACO3 = [9 GRAINS]
1.4.3.A.G.B. 32 PPM CHLORIDE IONS
1.4.3.A.G.C. 26 PPM SULPHATE IONS
1.4.3.B. GLYCOL [HEATING][HEAT RECLAIM] SYSTEM
1.4.3.B.A. SUPPLY TEMPERATURE[:][TO HEAT RECLAIM COILS:] –1°C (30°F)
1.4.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
1.4.3.B.C. DESIGN PRESSURE: 1030 KPA (150 PSI)
1.4.3.B.D. GLYCOL TYPE: PROPYLENE
1.4.3.B.E. GLYCOL / WATER MIXTURE BY VOLUME: 40 % GLYCOL
1.4.3.B.F. WATER – CITY OF TORONTO
1.4.3.B.F.A. CACO3 = [9 GRAINS]
1.4.3.B.F.B. 32 PPM CHLORIDE IONS
1.4.3.B.F.C. 26 PPM SULPHATE IONS

2. PRODUCTS
2.1. GLYCOL
2.1.1. INDUSTRIAL TYPE COOLANT FORMULATED WITH CORROSION INHIBITORS.
2.1.2. PROPYLENE GLYCOL
2.1.3. ETHYLENE GLYCOL
STANDARD OF ACCEPTANCE: DOW – DOWFROST, UNION CARBIDE, INTERSTATE CHEMICAL – INTERCOOL HOUGHTON CHEMICAL – SAFE-T-THERM

3. EXECUTION
3.1. PIPE INSTALLATION
3.1.1. GENERAL LAYOUT OF MAINS, RISERS, RUN-OUTS AND CONNECTION DETAILS OF PIPING SYSTEMS ARE SHOWN.
3.1.2. PROVIDE BENDS, EXPANSION LOOPS, HOSES OR JOINTS TO COMPENSATE FOR PIPE EXPANSION AND CONTRACTION.
3.1.3. ANCHOR, GUIDE AND LATERALLY SUPPORT VERTICAL AND HORIZONTAL PIPING TO SUPPORT FILLED WEIGHT AND ABSORB THRUST UNDER OPERATING CONDITIONS.
3.1.4. ERECT PIPING SO THAT EXPANSION FORCES, GRAVITY FORCES AND THRUST FROM CHANGES IN DIRECTION DO NOT STRESS CONNECTIONS TO APPARATUS.
3.1.5. MECHANICAL GROOVED PIPE, COUPLINGS, FITTINGS AND VALVES MAY BE USED FOR WATER AND GLYCOL PIPING SYSTEMS IN PLACE OF WELDED, FLANGED OR THREADED PIPE JOINTING METHODS.
3.1.6. SEPARATE COPPER PIPE AND FITTING MATERIALS FROM CONTACT WITH FERROUS MATERIAL WITH DI-ELECTRIC COUPLINGS.
3.1.7. INSTALL DRAIN VALVES AT LOW POINTS IN WATER PIPING SYSTEMS AND IN VALVED RUN-OUTS FROM RISERS SO THAT SYSTEM OR ISOLATED PARTS OF SYSTEM CAN BE DRAINED.
3.1.8. DO NOT USE GALVANIZED MATERIALS IN CONTACT WITH GLYCOLS.
3.2. FILLING OF GLYCOL SYSTEMS
3.2.1. DELIVER GLYCOL TO SITE IN MANUFACTURER'S SEALED CONTAINERS.
3.2.2. AFTER SYSTEM HAS BEEN CLEANED AND TESTED FOR LEAKS, FILL WITH WATER THROUGH TEMPORARY WATER METER TO OBTAIN TOTAL SYSTEM VOLUME.
3.2.3. DRAIN WATER FROM SYSTEM AND EITHER FILL WITH PRE-MIXED GLYCOL SOLUTION, OR FIRST WITH CALCULATED VOLUME OF CONCENTRATED GLYCOL AND THEN MAKE UP TO SYSTEM VOLUME WITH WATER.
3.2.4. CIRCULATE SOLUTION FOR ONE WEEK AND THEN TAKE SAMPLES FOR TESTING FOR PERCENTAGE CONCENTRATION BY SPECIFIC GRAVITY METHOD, IN GLYCOL SUPPLIER'S LABORATORY.
3.2.5. SUBMIT RESULTS OF ANALYSIS.
3.2.5.A. IF CORRECTION OF CONCENTRATION IS REQUIRED, AMOUNT OF MIXTURE TO BE DRAWN FROM SYSTEM TO BE CALCULATED AND DRAINED INTO ORIGINAL CONTAINERS. TO THIS ADD WATER OR GLYCOL IN CALCULATED AMOUNTS TO CORRECT CONCENTRATION IN SYSTEM, AND RECHARGED SYSTEM.
3.2.5.B. PROVIDE 24 HOURS NOTICE BEFORE DRAINING AND REFILLING TO CORRECT CONCENTRATION.
3.2.5.C. CIRCULATE AFTER CORRECTING CONCENTRATION FOR A FURTHER 24 HOURS AND RETEST CONCENTRATION.
3.2.6. SUBMIT FINAL REPORT WITH HISTORICAL DATA SHOWING DATES AND TIMES, RESULTS OF EACH ANALYSIS, CALCULATIONS AND CORRECTIONS MADE, AND FINAL CONCENTRATION.
3.2.7. SUPPLY TWO 170 LITRE DRUMS OF 100% INHIBITED GLYCOL.

WATER SPECIALTIES – HEATING AND COOLING
23 21 11

1. SCOPE
1.1. PROVIDE WATER SPECIALTIES IN ACCORDANCE WITH THIS SECTION FOR SYSTEMS WHERE WORKING TEMPERATURES ARE IN RANGE OF –12C TO 120C (10◦F TO 248F) AND WORKING PRESSURE UP TO 1035 KPA (150 PSI).
1.2. THIS SECTION COVERS SPECIALITIES FOR:
1.2.1. HOT WATER AND LOW TEMPERATURE HEATING SYSTEM
1.2.2. EXTERIOR ZONE HEATING AND COOLING SYSTEM
1.2.3. WATER SYSTEM RELIEF VALVE VENTS & OVERFLOWS
1.2.4. GLYCOL HEATING AND COOLING SYSTEMS
1.2.5. CONDENSER WATER SYSTEM
1.2.6. CHILLED WATER SYSTEM
1.3. SHOP DRAWINGS
1.3.1. SUBMIT MANUFACTURERS DATA SHEETS FOR:
1.3.1.A. EXPANSION TANKS, AIR VENTS SEPARATORS STRAINERS PRESSURE REDUCING VALVES PRESSURE RELIEF VALVES, WATER MAKE-UP ASSEMBLIES, PUMP SUCTION DIFFUSERS AND GLYCOL MAKE-UP UNIT AND MIXING TANK.

2. PRODUCTS
2.1. CLOSED EXPANSION TANK
2.1.1. CONSTRUCTION: WELDED CONSTRUCTION CONFORMING TO ASME SECTION VIII FOR UNFIRED PRESSURE VESSELS, CSA B-51, AND PROVINCIAL REGULATIONS
2.1.2. MATERIAL: MANUFACTURED FROM ASTM A516 PRESSURE VESSEL CARBON STEEL PLATE WITH DISHED EDS, ASME CODE RATED FOR 860 KPA (125 PSI) TEST PRESSURE WITH ASME STAMP AND CERTIFICATION
2.1.3. GLYCOL SERVICE: BLACK STEEL FOR GLYCOL SERVICE PRIMED ON EXTERIOR SURFACE ONLY.
2.1.4. NOZZLES AND COUPLINGS
2.1.4.A. NPS 1 EXPANSION PIPE CONNECTION AT BOTTOM
2.1.4.B. NPS 1 MAKE-UP CONNECTION AT BOTTOM
2.1.4.C. NPS 1 DRAIN CONNECTION AT BOTTOM
2.1.4.D. NPS 1 VENT CONNECTION AT TOP
2.1.4.E. RELIEF VALVE CONNECTION NEAR BOTTOM
2.1.4.F. SCHRAEDER VALVE CONNECTION FOR COMPRESSED AIR AT TOP
2.1.5. ACCESSORIES
2.1.5.A. MANHOLE 275 MM X 375 MM (11 IN X 15 IN)
2.1.5.B. STRUCTURAL STEEL SADDLES FOR HORIZONTAL TANKS
2.1.5.C. THREE STRUCTURAL STEEL LEGS FOR VERTICAL TANKS SO THAT BOTTOM OF TANK IS 300 MM (12 IN) OFF FLOOR;
2.2. BLADDER TYPE EXPANSION TANKS
2.2.1. CONSTRUCTION
2.2.1.A. CYLINDRICAL, PRESSURIZED TYPE WITH ELASTOMER BLADDER, SUITABLE FOR 115°C (240°F) OPERATING TEMPERATURE
2.2.1.B. WELDED CONSTRUCTION CONFORMING TO ASME SECTION VIII FOR UNFIRED PRESSURE VESSELS, CSA B-51, AND PROVINCIAL REGULATIONS
2.2.1.C. MANUFACTURED FROM ASTM A516 PRESSURE VESSEL CARBON STEEL PLATE WITH DISHED ENDS
2.2.1.D. FINISH: PRIMED ON OUTSIDE
2.2.1.E. ASME CODE RATED FOR 860 KPA (125 PSI) WORKING PRESSURE WITH ASME STAMP AND CERTIFICATION
2.2.1.F. ANNULAR BASE MOUNT FOR VERTICAL INSTALLATION
2.3. AUTOMATIC AIR VENTS
2.3.1. FLOAT OPERATED WITH BRASS OR CAST IRON BODY
2.3.2. DESIGN PRESSURE: [690 KPA (100 PSI)][1035 KPA (150 PSI)][2070 KPA (300 PSI)] WORKING PRESSURE

STANDARD OF ACCEPTANCE: MAID-O-MIST, TACO, AMTROL NO., SPIRAX SARCO, ITT BELL & GOSSETT

2.4. AUTOMATIC RADIATOR AIR VENTS
2.4.1. FLOAT OPERATED WITH BRASS BODY
2.4.2. DESIGN PRESSURE: [690 KPA (100 PSI)][1035 KPA (150 PSI)][2070 KPA (300 PSI)]
2.5. AIR SEPARATOR–BOILER MOUNTED
2.5.1. DIP TUBE TYPE
2.5.1.A. DESIGN PRESSURE: 860 KPA (125 PSI)
2.6. AIR SEPARATOR (IN–LINE)
2.6.1. SCOOP SEPARATION TYPE
2.6.1.A. DESIGN PRESSURE: 860 KPA (125 PSI)
2.6.2. CENTRIFUGAL SEPARATION TYPE
2.6.2.A. DESIGNED AS UNFIRED PRESSURE VESSEL
2.6.2.B. DESIGN PRESSURE: 860 KPA (125 PSI)
2.7. WATER MAKE–UP ASSEMBLIES
2.7.1. IRON BODY WATER PRESSURE REGULATOR WITH INTEGRAL CHECK, AND FAST FILL /PURGE LEVER
2.7.1.A. STAINLESS STEEL STRAINER
2.7.1.B. IRON BODY DIAPHRAGM OPERATED RELIEF VALVE
2.8. HYDRONIC SYSTEM PRESSURE SAFETY RELIEF VALVES
2.8.1. BRASS OR IRON BODY TO ASME SECTION IV
2.8.1.A. ADJUSTABLE PRESSURE SETTING FROM 55 TO 172 KPA (8 TO 25 PSI)
2.8.1.B. OPERATING DIFFERENTIAL PRESSURE FROM OPEN TO CLOSE NOT MORE THAN 20 KPA (3 PSI)
2.9. STRAINERS
2.9.1. "Y" PATTERN
2.9.1.A. NPS 3 AND SMALLER, WOG SERVICE:
2.9.1.A.A. BRONZE, CAST IRON OR STEEL BODIES
2.9.1.A.B. DESIGN PRESSURE: 1030 KPA (CLASS 150)
2.9.1.A.C. FITTINGS: SCREWED OR FLANGED TO MATCH SPECIFICATION FOR FITTINGS IN SECTION OF PIPING SYSTEM WHERE STRAINER IS TO BE INSTALLED
2.9.1.A.D. BASKET: STAINLESS STEEL, 0.8 MM (1/32 IN) DIAMETER PERFORATIONS
2.10. WATER PRESSURE REDUCING VALVES
2.10.1. CONSTRUCTION
2.10.1.A. SELF–CONTAINED HYDRAULIC PILOT CONTROLLED TYPE
2.10.1.B. SINGLE SEATED WITH RESILIENT DISC IN IRON BODY
2.10.1.C. BRONZE SEAT FOR PRESSURE DROPS BELOW 480 KPA (70 PSI)
2.10.1.D. STAINLESS STEEL SEAT FOR 480 KPA (70 PSI) AND OVER
2.10.1.E. DIAPHRAGM SUITABLE FOR 120◦C (250◦F) SERVICE
2.11. GLYCOL MAKE–UP UNIT AND MIXING TANK
2.11.1. CONSTRUCTION
2.11.1.A. 210 LITRE (55 GALLON) OPEN CYLINDRICAL TANK
2.11.1.B. MATERIAL: POLYPROPLENE, STRUCTURALLY FORMED TANK OR WITH CHANNEL REINFORCED BOTTOM AND SUPPORT STAND
2.11.1.C. ENCLOSED, VENTED TANK, OR HINGED GASKETTED COVER WITH COUNTERWEIGHT BALANCED HOLD–OPEN MECHANISM
2.11.2. FITTINGS AND ACCESSORIES:
2.11.2.A. OVERFLOW, INLET AND SUCTION CONNECTIONS
2.11.2.B. PUMP MOUNTING ARRANGEMENT
2.11.2.C. SUCTION AND DISCHARGE PIPING WITH ISOLATION VALVES AND CHECK VALVES
2.11.3. GLYCOL TRANSFER PUMP
2.11.3.A. SINGLE CLOSE–COUPLED IRON FITTED CENTRIFUGAL FEED PUMP WITH MECHANICAL SEAL, MOUNTED TO MIXING TANK, AND PRE–PIPED TO SUCTION STRAINER
2.11.3.B. RATED FOR [0.63 L/S AT 210 KPA (10 GPM AT 30 PSI).][0.31 L/S AT 420 KPA (5 GPM AT 60 PSI).],
2.11.3.C. LOW WATER LEVEL CUT–OUT SWITCH
2.11.3.D. HIGH WATER LEVEL ALARM
2.11.3.E. SYSTEM LOW PRESSURE PUMP START SWITCH
2.11.3.F. REMOTE ANNUNCIATION CONTACTS FOR LOW LIQUID LEVEL, HIGH LIQUID LEVEL

3. EXECUTION
3.1. WATER SYSTEM EXPANSION TANK
3.1.1. PROVIDE DIAPHRAGM TYPE TYPE TANK.
3.1.2. INSTALL EQUALIZER LINE FROM PIPING SYSTEM TO BOTTOM OF TANK,.
3.1.3. PROVIDE DOMESTIC COLD WATER LINE WITH GLOBE VALVE, STRAINER, AND LINE SIZE BACKFLOW PREVENTER WITH ISOLATING VALVES CONNECTED TO EQUALIZER LINE.
3.1.4. PROVIDE WATER MAKE–UP ASSEMBLY ON DOMESTIC WATER LINE ON TANK SIDE OF BACKFLOW PREVENTER, WITH:
3.1.4.A. CODE RATED WATER SAFETY RELIEF VALVE, LOCATED IN PIPING NEAR BOTTOM OF TANK WITH RELIEF PRESSURES SET TO MAINTAIN 70 KPA (10 PSI) AT HIGHEST POINT IN SYSTEM WITH PUMPS OFF
3.1.4.B. RELIEF VALVE OF MINIMUM 20 MM (¾ IN) SIZE AND OF SAME MODEL AND SIZE AS RELIEF VALVE USED ON HEATING CONVERTOR, IF TANK IS CONNECTED TO STEAM GENERATED HOT WATER SYSTEM
3.1.4.C. RELIEF CONNECTION ON BACKFLOW PREVENTER, ON MAKE–UP ASSEMBLY, AND SAFETY RELIEF VALVE PIPED TO NEAREST OPEN DRAIN
3.1.4.D. PRESSURE GAUGE TO SHOW PRESSURE IN TANK
3.1.4.E. COMPRESSED AIR TO EACH TANK OR GROUP OF TANKS WITH GLOBE VALVE AND CHECK VALVE TERMINATING 1200 MM (4 FT) ABOVE FINISHED FLOOR NEAR TANKS WITH 6 M (20 FT) LENGTH OF HOSE AND HOSE END FITTING COMPATIBLE WITH SCHRAEDER CONNECTION ON TANK
3.2. GLYCOL SYSTEM EXPANSION TANK
3.2.1. PROVIDE:
3.2.1.A. CLOSED CYLINDRICAL TYPE
3.2.1.B. EQUALIZER LINE FROM [][AIR SEPARATOR IN] PIPING SYSTEM TO BOTTOM OF TANK,
3.2.1.C. GLYCOL MAKE–UP LINE FROM GLYCOL FILL SYSTEM, AND VALVED DRAIN LINE FROM BOTTOM OF TANK PIPED TO GLYCOL MIXING TANK
3.2.1.D. DOMESTIC COLD WATER LINE WITH GLOBE VALVE, STRAINER, AND LINE SIZE BACKFLOW PREVENTER
3.2.1.E. MANUAL AIR VENT VALVE NEAR TOP OF TANK AND CODE RATED WATER SAFETY RELIEF VALVE, LOCATED IN PIPING NEAR BOTTOM OF TANK WITH RELIEF PRESSURES SET TO MAINTAIN 70 KPA (10 PSI) AT HIGHEST POINT IN SYSTEM WITH SYSTEM CIRCULATING PUMPS OFF
3.2.1.F. RELIEF VALVE OF MINIMUM 20 MM (¾ IN) SIZE AND OF SAME MODEL AND SIZE AS RELIEF VALVE USED ON HEATING CONVERTOR, IF TANK IS CONNECTED TO STEAM GENERATED HOT WATER SYSTEM.,
3.2.1.G. RELIEF CONNECTION ON BACKFLOW PREVENTER PIPED TO NEAREST OPEN DRAIN
3.2.1.H. RELIEF VALVE AND VALVED DRAIN LINE FROM BOTTOM OF TANK PIPED TO GLYCOL MIXING TANK
3.2.1.I. PRESSURE GAUGE TO SHOW PRESSURE IN TANK
3.2.1.J. COMPRESSED AIR TO EACH TANK OR GROUP OF TANKS WITH GLOBE VALVE AND CHECK VALVE, TERMINATING 1200 MM (4 FT) ABOVE FINISHED FLOOR NEAR TANKS WITH 6 M (20 FT) LENGTH OF HOSE AND HOSE END FITTING COMPATIBLE WITH SCHRAEDER CONNECTION ON TANK
3.2.1.K. CONTROLS FOR MAKE–UP PUMP AND ALARM SYSTEM CONNECTED AND TESTED],
3.3. AIR VENTS
3.3.1. PROVIDE ISOLATING VALVES INSTALLED BETWEEN UNIT AND PIPING
3.3.2. INSTALL AIR VENTS AT HIGH POINTS, AND IN SECTIONS OF PIPING SUBJECT TO AIR BINDING, IN BOTH SUPPLY AND RETURN MAINS
3.3.3. PIPE VENT OUTLETS TO DISCHARGE TO DRAIN, OVER JANITORS SINKS, OVER FLOOR DRAINS IN MECHANICAL ROOMS AND OTHER SIMILAR VISIBLE LOCATIONS
3.4. AIR VENTS FOR RADIATORS
3.4.1. INSTALL RADIATOR AIR VENTS ON 20 MM (¾ IN) BY 50 MM (2 IN) LONG AIR CHAMBERS ON RETURN SIDE OF HOT WATER CONVECTOR–RADIATORS AND WALL FIN HEATERS CONNECTED TO TOP OF FLOW RISERS. PIPE VENT OUTLETS TO DRAIN IN VISIBLE LOCATIONS
3.4.2. FIT OTHER HOT WATER CONVECTOR–RADIATORS WITH 20 MM (¾ IN) BY 150 MM (6 IN) AIR CHAMBER WITH SCREWDRIVER OPERATED AIR VENT PIPED THROUGH FRONT OR SIDE OF CABINET. FIT SIMILAR AIR CHAMBER AND SCREWDRIVER OPERATED AIR VENT, THROUGH FRONT OR SIDE OF CABINET, ON HIGH POINTS OF OTHER WALL–FIN HEATING ELEMENTS EXCEPT THAT AIR CHAMBER TO BE AS LONG AS IS POSSIBLE TO INSTALL WITHIN WALL–FIN ENCLOSURE HEIGHT
3.4.3. INSTALL AIR VENT ASSEMBLIES CLEAR OF DAMPERS WITHIN HEATING UNITS
3.5. PRESSURE SAFETY RELIEF VALVES
3.5.1. INSTALL ON HOT WATER BOILERS, HEATING CONVERTORS, EXPANSION TANKS AND OTHER PRESSURE VESSELS IN ACCORDANCE WITH RELEVANT CODES
3.5.2. PIPE OUTLETS TO DRAIN
3.6. STRAINERS
3.6.1. INSTALL STRAINERS IN HORIZONTAL OR DOWN FLOW LINES WITH CLEARANCE FOR REMOVAL OF BASKET.
3.6.2. UP TO NPS 2 SIZE PROVIDE SCREWED BLIND CAPS
3.6.3. ON WATER AND GLYCOL SYSTEMS NPS 2½ AND OVER PROVIDE NPS 1 VALVED BLOWOUT CONNECTION, CONSISTING OF BALL VALVE WITH HOSE END AND CHAINED CAP. PIPE VALVED BLOWOUT CONNECTIONS FROM STRAINERS AT PUMPS TO OPEN DRAIN.
3.6.4. PROVIDE LINE SIZE STRAINER IN EACH OF FOLLOWING LOCATIONS
3.6.4.A. ON INLET SIDE OF WATER METERS
3.6.4.B. ON INLET SIDE OF CONTROL VALVES (EXCEPT AT REHEAT COILS WITH PIPING CONNECTIONS NPS ¾ OR LESS, RADIATION, OR RADIANT PANELS)
3.6.4.C. ON INLET SIDE OF PRESSURE REDUCING VALVES
3.6.4.D. ON SUCTION SIDE OF WATER CIRCULATING PUMPS
3.7. PRESSURE REDUCING VALVES
3.7.1. INSTALL PRESSURE REDUCING VALVE STATIONS WITH SHUT–OFF VALVE ON EITHER SIDE OF ASSEMBLY AND 115 MM (4½ IN) PRESSURE GAUGES ON UPSTREAM AND DOWNSTREAM SIDES OF STATION.

AIR DISTRIBUTION – GENERAL
23 31 01

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE LABOUR, MATERIALS AND EQUIPMENT FOR INSTALLATION, TESTING AND PUTTING INTO OPERATION VENTILATING AND AIR CONDITIONING SYSTEMS
1.2. QUALIFIED TRADESMEN
1.2.1. WORK TO BE DONE BY QUALIFIED TRADESMEN HOLDING CERTIFICATES OF COMPETENCY.
1.3. APPLICABLE STANDARDS
.1 THE ONTARIO BUILDING CODE
.2 REGULATIONS OF PROVINCE CITY, OR LOCAL AUTHORITY HAVING JURISDICTION.
2. EXECUTION
2.1. DUCTWORK
2.1.1. DUCTWORK SYSTEM ROUTING IS SHOWN DIAGRAMMATICALLY. DRAWINGS ARE NOT CONSIDERED TO BE FABRICATION OR INSTALLATION DRAWINGS.
2.1.2. LOCATE MAINS, RISERS AND RUNOUTS TO BE CONCEALED BEHIND FURRINGS OR ABOVE CEILINGS EXCEPT IN MECHANICAL EQUIPMENT ROOMS AND ACCESS SPACES WHERE DUCTWORK IS TO BE EXPOSED.
2.1.3. DETERMINE AREAS WITHOUT CEILINGS FROM ARCHITECTURAL DRAWINGS AND ROOM FINISH SCHEDULES, AND IN THESE AREAS KEEP DUCTWORK AS HIGH AS POSSIBLE.
2.1.4. ANCHOR, GUIDE AND SUPPORT VERTICAL AND HORIZONTAL RUNS OF DUCTWORK TO RESIST DEAD LOAD AND ABSORB THRUST.
2.2. AIR SUPPLY EQUIPMENT
2.2.1. INSTALL AND CONNECT AIR HANDLING UNITS, AND AIR CONDITIONING UNITS, AND BUILD CASING AND PLENUMS.
2.3. AIR EXHAUST EQUIPMENT
2.3.1. INSTALL AND CONNECT EXHAUST FANS, ROOF AND WALL EXHAUSTERS AND DUST AND FUME COLLECTORS.
2.4. TERMINALS DEVICES
2.4.1. LOCATE AND INSTALL TERMINAL BOXES, REGISTERS, DIFFUSERS, AND GRILLE
2.5. LIFE SAFETY
2.5.1. INSTALL FIRE DAMPERS, SMOKE DAMPERS, AND COMBINATION SMOKE AND FIRE DAMPERS TO PROTECT OPENINGS IN FIRE SEPARATIONS.
2.5.2. PROVIDE SMOKE STOPPING AROUND UNPROTECTED DUCTS PASSING THROUGH SMOKE SEPARATIONS.
2.6. AIR BALANCING
2.6.1. CO–OPERATE WITH AIR BALANCING AGENCY; INSTALL SUPPLEMENTARY DAMPERS, ACCESS OPENINGS AND ACCESS DOORS TO FACILITATE TESTING AND ADJUSTMENT.
2.6.2. MINIMUM SET POINT OF VAV BOXES SHALL BE 10% OF MAXIMUM SETTING.

FLEXIBLE DUCTWORK
23 31 16

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE FLEXIBLE DUCTWORK AS SHOWN.
1.2. REFERENCE STANDARDS
1.2.1. CONFORM TO;
1.2.1.A. ULC S110M–1986 – FIRE TESTS FOR AIR DUCTS.
1.2.1.B. ULC 181–1981 – FACTORY MADE AIR DUCTS AND CONNECTIONS.
1.2.1.C. NFPA 90A – INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS.
1.2.1.D. NFPA 90B – INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS.
1.2.1.E. SMACNA – FLEXIBLE DUCT INSTALLATION STANDARDS
2. PRODUCTS
2.1. FLEXIBLE DUCTWORK
2.1.1. GENERAL REQUIREMENTS:
2.1.1.A. FACTORY FABRICATED,
2.1.1.B. PRESSURE DROP COEFFICIENTS AS LISTED BELOW BASED ON SHEET METAL DUCT PRESSURE DROP COEFFICIENT OF 1.00,
2.1.1.C. FLAME SPREAD RATING NOT TO EXCEED 25 AND SMOKE DEVELOPED RATING NOT TO EXCEED 50.
2.2. METALLIC UN–INSULATED FLEXIBLE DUCTWORK
2.2.1. CONSTRUCTION:
2.2.1.A. SPIRAL WOUND FLEXIBLE ALUMINUM,
2.2.1.B. MINIMUM WORKING PRESSURE: 2.5 KPA (10 IN WG),
2.2.1.C. MAXIMUM PRESSURE DROP COEFFICIENT [3],
2.2.1.D. LEAKAGE RATE: IN ACCORDANCE WITH SMACNA
2.3. METALLIC INSULATED FLEXIBLE DUCTWORK
2.3.1. CONSTRUCTION:
2.3.1.A. SPIRAL WOUND FLEXIBLE ALUMINUM WITH FACTORY APPLIED FLEXIBLE GLASS FIBRE THERMAL INSULATION WITH VAPOUR BARRIER AND VINYL OR ALUMINUM JACKET,
2.3.1.B. MINIMUM WORKING PRESSURE: 2.5 KPA (10 IN WG),
2.3.1.C. MAXIMUM PRESSURE DROP COEFFICIENT 3,
2.3.1.D. LEAKAGE RATE: IN ACCORDANCE WITH SMACNA
3. EXECUTION
3.1. DUCT INSTALLATION
3.1.1. MAXIMUM LENGTH OF FLEXIBLE DUCT FEEDING CEILING OUTLET: 2 M (6 FT)
3.1.2. PROVIDE FLEXIBLE DUCT AND MAKE CONNECTIONS TO SUPPLY DIFFUSERS AND GRILLES [AND INDUCTION UNITS] AS SHOWN. DO NOT USE FLEXIBLE DUCT CONNECTORS ON RETURN OR EXHAUST A

2.6.1. MANUFACTURED PRODUCT:
2.6.1.A. POSITIVE SEAL,
2.6.1.B. LOCKING MECHANISM
2.6.1.C. 350 MM X 450 MM (14 IN X 17 IN) WHERE DUCT SIZE PERMITS

3. EXECUTION
3.1. CONSTRUCTION
3.1.1. CONSTRUCTION DETAILS, SHEET GAUGES, REINFORCING, AND BRACING TO BE TAKEN FROM SMACNA HVAC DUCT CONSTRUCTION STANDARDS (METAL AND FLEXIBLE).
3.1.2. RECTANGULAR DUCTWORK:
3.1.2.A. MAKE UP LONGITUDINAL SEAMS WITH PITTSBURGH LOCK, WITH SEALANT APPLIED PRIOR TO HAMMERING OF JOINT.
3.1.3. ROUND DUCTWORK, 500 PA (2 IN WG) PRESSURE CLASS AND HIGHER:
3.1.3.A. SPIRAL FLAT TYPE LONGTUDINAL SEAM, BUTTON PUNCHED.
3.2. BALANCING DAMPERS
3.2.1. PROVIDE SPLITTER DAMPERS WHERE BRANCH CONNECTIONS ARE TAKEN FROM SUPPLY MAINS.
3.2.2. PROVIDE SINGLE BLADE DAMPERS ON EACH BRANCH OF SUPPLY AIR SYSTEMS DOWNSTREAM OF TERMINAL BOXES.
3.2.3. PROVIDE OPPOSED BLADE DAMPERS (OBD) AT BRANCH AND MAIN CONNECTION ON EXHAUST AND RETURN AIR SYSTEMS.
3.3. WATERTIGHT DUCTS FOR DISHWASHERS, HUMIDIFIERS AND SHOWERS
3.3.1. CONSTRUCTION:
3.3.1.A. WITHOUT LONGITUDINAL SEAMS IN BOTTOM OF HORIZONTAL DUCTS,
3.3.1.B. WITH SOLDERED OR WELDED TRANSVERSE JOINTS BETWEEN BOTTOM SHEETS AND SIDE SHEETS, AND
3.3.1.C. WITH OTHER LONGITUDINAL AND TRANSVERSE JOINTS SEALED WITH TAPE AND DUCT SEALER.
3.3.2. DISHWASHER EXHAUST:
3.3.2.A. TYPE 304 STAINLESS STEEL, EXTENDED FROM STUB CONNECTIONS ON DISHWASHER TO INLET CONNECTION TO EXHAUST FAN,
3.3.2.B. BUILT AS A PAN,
3.3.2.C. SLOPPED BACK TO DRAIN INTO DISHWASHER CONNECTION STUBS WHERE HORIZONTAL RUN IS LESS THAN 3M (10 FT),
3.3.2.D. SLOPED TO BASE OF RISER WHERE HORIZONTAL RUN IS MORE THAN 3M (10 FT), WITH NPS ¾ DRAIN CONNECTION FROM LOW POINTS IN BOTTOM OF DUCT, TRAPPED AND PIPED TO DRAIN.
3.3.3. SHOWER EXHAUST DUCTS:
3.3.3.A. ALUMINUM, EXTENDED MINIMUM OF 1500 MM (5 FT) FROM SHOWER EXHAUST GRILLES AND SLOPED DOWN TO DRAIN BACK THROUGH EXHAUST GRILLES SERVED.
3.4. PROTECTION OF DUCT OPENINGS
3.4.1. CAP OFF ENDS OF UNFINISHED DUCTS WHILE PLASTERING, DRYWALL AND OTHER FINISHING OPERATIONS ARE IN PROGRESS,
3.4.2. COVER OPEN ENDS OR REGISTERS OF ACTIVE EXHAUST/RETURN DUCTS WITH 25 MM (1") THICK FILTER MEDIA SECURED WITH TAPE. MAINTAIN MEDIA UNTIL DUST PRODUCING FINISHING OPERATIONS ARE COMPLETED.
3.5. DUCT ACCESS DOORS:
3.5.1. PROVIDE FOR INSPECTION AND SERVICING OF DUCT MOUNTED COMPONENTS AND CLEANING OF DUCT SYSTEM;
3.5.1.A. LOCATED SUCH THAT ANY SECTION OF DUCT IS NOT MORE THAN 15 M (50 FT) FROM POINT OF ACCESS,
3.5.1.B. AT BASE OF EACH MAIN RISER
3.5.1.C. IN FRONT OF AND BEHIND TURNING VANES
3.5.1.D. AT FIRE, SMOKE, AND MOTORIZED DAMPERS
3.6. DUCT CLEANING
3.6.1. CLEANING TO BE PERFORMED BY AGENT SPECIALIZING IN THIS FIELD OF WORK, BE A MEMBER IN GOOD STANDING WITH NATIONAL AIR DUCT CLEANERS ASSOCIATION (NADCA), AND TO COMPLY WITH NADCA STANDARDS.
3.6.2. CLEAN NEW HORIZONTAL AND VERTICAL DUCTS (SUPPLY, RETURN, EXHAUST, TRANSFER), AS WELL AS, EXISTING SUPPLY AND RETURN DUCTWORK CONNECTED TO NEW FAN SYSTEMS.
3.6.3. CLEAN DUCTWORK USING HIGH POWERED VACUUM SYSTEM, HAND TOOLS AND MECHANICAL BRUSHING SYSTEMS SUCH THAT METAL SURFACES ARE VISIBLY CLEAN.
3.6.4. RESET BALANCING DAMPERS TO ORIGINAL SETTINGS IF MOVED DURING WORK. HAVE TAB AGENT CONFIRM DAMPER SETTINGS.
3.6.5. MAINTAIN SET OF DRAWINGS ON SITE, COLOURED EACH DAY DURING CLEANING TO INDICATE EXTENT OF DUCT CLEANING COMPLETED.
3.6.6. SUBMIT A WRITTEN REPORT, VERIFIED BY TAB AGENT, IDENTIFYING EXTENT OF DUCT SYSTEM CLEANING AND CERTIFYING THAT NADCA STANDARDS HAVE BEEN MET.

ACOUSTIC LINING (DUCTWORK)
23 32 48

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE ACOUSTIC LINING OF DUCTWORK.
2. PRODUCTS
2.1. DUCT LINER – GLASS FIBER
2.1.1. FIBROUS GLASS DUCT LINER DENSITY 24 KG/M3 (1.5 LB/CU FT) WITH ONE SIDE COATED WITH ACRYLIC COATING AND FLEXIBLE GLASS CLOTH REINFORCEMENT.
2.1.2. FLAME SPREAD RATING NOT TO EXCEED 25, SMOKE DEVELOPMENT RATING NOT TO EXCEED 50.
2.1.3. FOR RECTANGULAR DUCTWORK USE 25 MM (1 IN) RIGID LINER,
2.1.4. FOR PLENUMS AND CASINGS USE 50 MM (2 IN) OF FIBROUS GLASS RIGID BOARD DUCT LINER.
2.1.5. FOR ROUND OR OVAL DUCTWORK AND CURVED SURFACES USE 25 MM (1 IN) OF FIBROUS GLASS BLANKET LINER.
2.2. ADHESIVE
2.2.1. FLAME SPREAD RATING NOT TO EXCEED 25, SMOKE DEVELOPED RATING NOT TO EXCEED 50,
2.2.2. TEMPERATURE RANGE– 40°C TO 82°C (– 40°F TO 180°F),
2.2.3. MEET REQUIREMENTS OF NFPA 90A.
2.3. FASTENERS:
2.3.1. 2.0 MM (1/16 IN) DIAMETER WELD PINS,
2.3.2. LENGTH SELECTED TO SUIT THICKNESS OF INSULATION,
2.3.3. 32 MM (1¼ IN) SQUARE NYLON RETAINING CLIPS.
2.4. SEALER AND TAPE
2.4.1. ARMSTRONG WB ARMAFLEX FINISH, MANVILLE SUPERSEAL COATING, AND
2.4.2. POLYVINYL TREATED OPEN WEAVE FIBREGLASS MEMBRANE 50MM (2 IN) WIDE.
3. EXECUTION
3.1. INSTALLATION
3.1.1. DUCT SIZE INDICATED TO BE SIZE AS MEASURED INSIDE LINER
3.1.2. FASTEN LINER TO INTERIOR SHEET METAL SURFACE OF DUCT WITH 100% COVERAGE OF ADHESIVE, AND INSTALL WELD PINS AT 1 PIN PER 0.5M2 (5 SQ FT) BUT NOT LESS THAN 1 ROW ON EACH DUCT SIDE.
3.1.3. POSITION AND ADHERE SHEETS TO OVERLAP PREVIOUSLY INSTALLED SHEETS BY 4 MM (1/8 IN). AFTER BONDING OF SHEETS SPREAD BUTT JOINTS AND BRUSH APPLY ADHESIVE TO BOTH BUTT EDGES AND APPLY PRESSURE TO JOINT.
3.1.4. APPLY TAPE TO JOINTS, EXPOSED EDGES, WELD PINS AND CLIP PENETRATIONS AND DAMAGED AREAS OF LINER.
3.1.5. BED TAPE IN SEALER AND APPLY 2 COATS OF SEALER OVER TAPE.
OVER ACOUSTIC INSULATION IN ROUND OR OVAL DUCTWORK WHERE AIR VELOCITY EXCEEDS 10 M/SEC (2000 FPM)] APPLY PERFORATED METAL LINER AND SECURE WITH WELD PINS AND SPEED WASHERS.

DUCT ACCESSORIES
23 33 05

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE DUCT ACCESSORIES AS SHOWN.
1.2. SHOP DRAWINGS
1.2.1. SUBMIT PRODUCT DATA SHEETS FOR:
1.2.1.A. FLEXIBLE CONNECTIONS
1.2.1.B. SEALANTS
1.2.1.C. TAPES
1.2.1.D. DUCT ACCESS DOORS AND HARDWARE
1.2.1.E. INSTRUMENT TEST PORTS
2. PRODUCTS
2.1. FLEXIBLE CONNECTIONS
2.1.1. NEOPRENE:
2.1.1.A. GALVANIZED 0.66 MM (24 GA) SHEET METAL FRAME, WITH FABRIC CLENCHED WITH DOUBLE LOCKED SEAMS,
2.1.1.B. FIRE RESISTANT, SELF–EXTINGUISHING, NEOPRENE COATED GLASS FABRIC,
2.1.1.C. OPERATING TEMPERATURE: –40°C TO 90°C (–40°F TO 194°F),
2.1.1.D. DENSITY: 0.653 KG/M2 (0.13 LB/SQ FT) IN CONVENTIONAL SYSTEMS.
2.1.2. VINYL COATED, INSULATED:
2.1.2.A. FLAME RESISTANT, 0.56 MM (0.022 IN) THICK VINYL COATED FABRIC ENVELOPE, ENCLOSING 32MM (1¼ IN),12KG/M3 (0.75 LB/CU FT) FIBERGLASS INSULATION,
2.1.2.B. OPERATING TEMPERATURE: 82°C (180°F) CONTINUOUS AND 93°C (200°F) INTERMITTENT,
2.1.3. INSTALLED;
2.1.3.A. IN CONNECTIONS FOR INSULATED DUCT SYSTEMS,
2.1.3.B. IN CIRCULAR DUCT CONNECTIONS SUBJECT TO NEGATIVE PRESSURE WITH DIAMETER LESS THAN 250MM (10IN), AND
2.1.3.C. IN RECTANGULAR DUCT CONNECTIONS SUBJECT TO NEGATIVE PRESSURE WITH SMALLEST SIDE LESS THAT 300MM (12 IN)
2.2. SEALANT
2.2.1. WATER BASED POLYMER EMULSION TYPE FLAME RESISTANT DUCT SEALING COMPOUND.
2.2.2. OPERATING TEMPERATURE RANGE: –29°C TO 93°C (–20°F TO 200°F).
2.3. TAPE
2.3.1. POLYVINYL TREATED OPEN WEAVE GLASS FIBRE TAPE, 50MM (2") WIDE.
2.4. DUCT ACCESS DOORS
2.4.1. CONSTRUCTION – UNINSULATED DUCT OR PLENUM:
2.4.1.A. SHOP OR FIELD FABRICATED FROM SAME MATERIAL AS DUCT, ONE SHEET METAL THICKNESS HEAVIER BUT NOT LESS THAN 0.6MM (26GA.) THICK,
2.4.1.B. WITH GASKETED SHEET METAL ANGLE FRAME.
2.4.2. CONSTRUCTION – INSULATED DUCT OR PLENUM:
2.4.2.A. SHOP FABRICATED AS DOUBLE WALL INSULATED SANDWICH, OF SAME MATERIAL AS DUCT, ONE SHEET METAL THICKNESS HEAVIER BUT NOT LESS THAN 0.6MM (26GA) THICK,
2.4.2.B. WITH GASKETED SHEET METAL ANGLE FRAME AND 25 MM (1") THICK RIGID GLASS FIBRE INSULATION.
2.4.2.C. GASKETED WITH NEOPRENE OR FOAM RUBBER.
2.4.2.D. FITTED WITH HARDWARE AS FOLLOWS;
2.4.2.D.A. TWO SASH LOCKS FOR DOORS UP TO 300MM X 300MM (12" X 12").
2.4.2.D.B. FOUR SASH LOCKS FOR DOORS UP TO 301MM X 450MM (13" x 18").
2.4.1.D.C. PIANO HINGE AND MINIMUM 2 SASH LOCKS FOR DOORS UP TO 451MM X 1000MM (19" X 40")
2.4.1.D.D. PIANO HINGE AND 2 HANDLES OPERABLE FROM BOTH SIDES FOR DOORS OVER 1000MM (40") IN HEIGHT.
2.5. INSTRUMENT TEST PORTS
2.5.1. CONSTRUCTION:
2.5.1.A. .1 1.6MM (16GA.) THICK STEEL BODY ZINC PLATED AFTER MANUFACTURE,
2.5.1.B. .2 CHAIN SECURED NEOPRENE EXPANSION PLUG WITH CAM LOCK HANDLE,
2.5.1.C. .3 28MM (1") MINIMUM INSIDE DIAMETER, LENGTH TO SUIT INSULATION THICKNESS,
2.5.1.D. .4 NEOPRENE MOUNTING GASKET: FLAT FOR RECTANGULAR DUCT AND MOULDED FOR ROUND DUCT.
STANDARD OF ACCEPTANCE: BAKOR, RCD, 3M FASTBOND, DURO DYNE DWN (WATER BASED)
3. EXECUTION
3.1. FLEXIBLE CONNECTIONS
3.1.1. PROVIDE TO ISOLATE AIR HANDLING EQUIPMENT, FANS, DUCTWORK, AND AS SHOWN.
3.1.2. MINIMUM LENGTH: 75 MM (3") LENGTH OF FABRIC MEASURED IN DIRECTION OF AIR FLOW,
3.1.3. MINIMUM DISTANCE BETWEEN METAL PARTS WHEN SYSTEM IS IN OPERATION: 25 MM (1").
3.1.4. ANCHORED ON STATIC SIDE OF CONNECTION.
3.2. SEALANT AND TAPE
3.2.1. APPLY TO DUCTWORK JOINTS AND SEAMS AS DETAILED IN OTHER SECTIONS.
3.3. ACCESS DOORS
3.3.1. INSTALL IN DUCTWORK;
3.3.1.A. BEFORE AND AFTER REHEAT COILS, AND AT
3.3.1.B. FIRE DAMPERS,
3.3.1.C. DUCT SMOKE DETECTORS,
3.3.1.D. VOLUME CONTROL DEVICES, AND
3.3.1.E. CONTROL ELEMENTS.
3.3.2. WELD DOOR FRAMES IN PLACE FOR PLENUMS, CASINGS, AND HIGH VELOCITY DUCTWORK.
3.3.3. DOOR SIZES:
3.3.3.A. AS LARGE AS POSSIBLE, WITH 1:1.5 ASPECT RATIO, FOR DUCT SIDES UP TO AND INCLUDING 360 MM (14"),
3.3.3.B. 300 MM X 380 MM (12 IN X 15") FOR DUCT SIDES 380 MM (15") AND LARGER,
3.3.3.C. 1500 MM (60") HIGH BY 450 MM (18") WIDE IN CASINGS AND PLENUMS.
3.4. INSTRUMENT TEST PORTS
3.4.1. INSTALL FOR DUCT VELOCITY TRAVERSE READINGS AND FOR DUCT AIR TEMPERATURE READINGS.
3.4.2. LOCATE ACROSS DUCT OR PLENUM AT RIGHT ANGLES TO FLOW, AT NOT MORE THAN 250 MM (10") INTERVALS FOR TRAVERSES AND AT NOT MORE THAN 500 MM (20") FOR TEMPERATURE MEASUREMENTS.
3.4.3. INSTALL FOR VELOCITY TRAVERSES;
3.4.3.A. AT DUCTED INLETS TO ROOF AND WALL EXHAUSTERS,
3.4.3.B. AT INLET TO AND OUTLET FROM OTHER FAN SYSTEMS, AND
3.4.3.C. AT MAIN AND BRANCH WHERE BRANCH SERVES MORE THAN ONE OUTLET. PORTS IN MAIN TO BE UPSTREAM OF BRANCH IN BOTH DIVERGING AND CONVERGING FLOW.
3.4.3.D. INSTALL FOR TEMPERATURE MEASUREMENT;
3.4.3.D.A. AT OUTSIDE AIR INTAKES,
3.4.3.D.B. AT INLET AND OUTLET OF COILS, AND
3.4.3.D.C. DOWNSTREAM OF INTERSECTION OF CONVERGING AIR STREAMS OF DIFFERENT TEMPERATURES.

HIGH PRESSURE INDUCTION UNITS AND HOT WATER RADIATORS
23 82 26

1. GENERAL
1.1. SCOPE
1.1.1. INSPECT PERFORMANCE AND CLEAN INDUCTION UNITS OR RADIATORS SHOWN ON FLOOR PLAN BEFORE COMPLETION OF PROJECT.
1.2. CLEANING KIT
1.2.1. HIGH PRESSURE PORTABLE ELECTRIC BLOWER WITH FLEXIBLE HOSE AND ATTACHMENTS FOR CLEANING NOZZLES AND COILS.
2. EXECUTION
2.1. COMPLETION
2.1.1. REMOVE TEMPORARY PROTECTION, CLEAN COILS REMOVE DEBRIS FROM BASE CABINET AND COMB FINS STRAIGHT.
2.1.2. SUPPLY OWNERS OPERATING STAFF WITH TWO CLEANING KITS.

DAMPERS – FIRE AND SMOKE
23 33 15

1. SCOPE
1.1. PROVIDE FIRE AND SMOKE DAMPERS AS SHOWN.
1.2. SHOP DRAWINGS AND PRODUCT DATA
1.2.1. SUBMIT MANUFACTURERS PRODUCT SHEETS WITH INSTALLATION DATA FOR:
1.2.1.A. FIRE DAMPERS.
1.2.1.B. SMOKE DAMPERS.
1.2.1.C. COMBINATION SMOKE AND FIRE DAMPERS.
1.3. APPLICABLE CODES AND STANDARDS
1.3.1. GENERAL:
1.3.1.A. AMCA 500 LABORATORY METHODS OF TESTING DAMPERS FOR RATINGS.
1.3.1.B. AMCA 503 FIRE CEILING (RADIATION), SMOKE, AND FIRE/SMOKE DAMPERS APPLICATION MANUAL.
1.3.2. FIRE DAMPERS:
1.3.2.A. TESTED IN ACCORDANCE WITH APPROPRIATE PROVISIONS OF;
1.3.2.A.A. CAN/ULC – S112 STANDARD METHOD OF FIRE TEST OF FIRE DAMPER ASSEMBLIES
1.3.2.A.B. UL–555 FIRE DAMPERS OR UL–555C CEILING DAMPERS, INCLUDING TESTS TO DEMONSTRATE CLOSURE UNDER DYNAMIC CONDITIONS.
1.3.2.B. LISTINGS:
1.3.2.B.A. LISTED BY AND BEARING LABEL OF ULC
1.3.2.B.B. CLASSIFIED BY AND BEARING LABEL OF UL, LABELLED BY WARNOCK HERSEY OR OTHER APPROVED TESTING AGENCY.
1.3.2.C. IN COMPLIANCE WITH REQUIREMENTS OF ONTARIO BUILDING CODE.
1.3.3. SMOKE DAMPERS:
1.3.3.A. TESTED IN ACCORDANCE WITH APPROPRIATE PROVISIONS OF;
1.3.3.A.A. CAN/ULC – S112.1 STANDARD FOR LEAKAGE RATED DAMPERS FOR USE IN SMOKE CONTROL SYSTEMSUL–555S SMOKE DAMPERS.
1.3.3.B. LISTINGS:
1.1.3.B.A. LISTED BY AND BEARING LABEL OF ULC
1.1.3.B.B. CLASSIFIED BY AND BEARING LABEL OF UL, LABELLED BY WARNOCK HERSEY OR OTHER APPROVED TESTING AGENCY AND MEETING REQUIREMENTS FOR CLASS I LEAKAGE RATING AT 250°C (350°F).
1.1.4. COMBINATION SMOKE AND FIRE DAMPERS:
1.1.4.A. TESTED AND LISTED BY ULC
1.1.4.B. AS SPECIFIED ABOVE FOR BOTH FIRE AND SMOKE DAMPERS.
2. PRODUCTS
2.1. FIRE DAMPERS – GENERAL
2.1.1. TYPE:
2.1.1.A. "STATIC": RATED ONLY TO CLOSE WITH ESSENTIALLY NO AIRFLOW THROUGH DAMPER.
2.1.1.B. "DYNAMIC": RATED TO CLOSE WITH AIR FLOW THROUGH DAMPER.
2.1.2. STYLEP
2.1.3. AS PER SMACNA:
2.1.3.A. TYPE A: BLADES AND FRAMES IN AIRSTREAM,
2.1.3.B. TYPE B: BLADES OUT OF AIRSTREAM,
2.1.3.C. TYPE C: BLADES AND FRAME OUT OF AIRSTREAM, RECTANGULAR, ROUND AND FLAT OVAL DUCTWORK.
2.1.4. RATINGS, EACH DYNAMIC DAMPER;
2.1.4.A. AIR VELOCITY, MAXIMUM: 10 M/S (2000 FPM)
2.1.4.B. DIFFERENTIAL PRESSURE, MAXIMUM:1000 PA (4 IN WC.)
2.2. FIRE DAMPERS – CURTAIN TYPE
2.2.1. CONSTRUCTION:
2.2.1.A. FRAME: G60 ROLL FORMED GALVANIZED STEEL FRAME,
2.2.1.B. BLADES: CURTAIN TYPE, INTERLOCKING BLADES, G60 GALVANIZED STEEL,
2.2.1.C. SLEEVE: SAME MATERIAL AS DAMPER FRAME, LENGTH TO SUIT APPLICATION WITH STEEL ENCLOSURE AND TRANSITION COLLARS, AND RETAINING ANGLES. FOR TYPE B DAMPERS, TOP OF SLEEVE IS FORMED CLOSELY AROUND TOP OF DAMPER; SLEEVE CONSTRUCTION THAT LEAVES THE BLADE PACK IN THE AIRSTREAM IS NOT PERMITTED.
2.2.1.D. DAMPER ENCLOSURE: TYPE A, B, AND C.
2.2.1.E. FUSIBLE LINK: 74°C (165°F) UNLESS OTHERWISE SHOWN.
2.2.1.F. NOTWITHSTANDING THE ABOVE, FRAME, SLEEVE, AND BLADES TO BE STAINLESS STEEL WHERE DAMPER IS INSTALLED IN A DUCT SYSTEM WHICH IS STAINLESS STEEL.
2.2.2. DYNAMIC DAMPERS:
2.2.2.A. AS ABOVE, AND
2.2.2.B. FITTED WITH STAINLESS STEEL CLOSURE SPRING,
2.2.2.C. STATIC DAMPERS:
2.2.2.C.A. AS ABOVE, AND
2.2.2.C.B. MOUNTING IN VERTICAL PLANE: FITTED WITH STAINLESS STEEL CLOSURE SPRING.
2.2.2.C.C. MOUNTING IN HORIZONTAL PLANE: FITTED WITH STAINLESS STEEL CLOSURE SPRING.
2.3. FIRE DAMPERS – DYNAMIC TYPE
2.3.1. CONSTRUCTION
2.3.1.A. FRAME: G60 GALVANIZED STEEL HAT CHANNEL,
2.3.1.B. LINKAGE: CONCEALED IN FRAME (OUT OF AIRSTREAM),
2.3.1.C. JACKSHAFT: WITH INTERNAL LOCKING QUADRANT, FOR USE AS A BALANCING DAMPER,
2.3.1.D. SLEEVE: SAME MATERIAL AS DAMPER FRAME, LENGTH TO SUIT APPLICATION WITH STEEL ENCLOSURE AND TRANSITION COLLARS, AND RETAINING ANGLES,
2.3.1.E. ENCLOSURE: TYPE A AND B
2.3.1.F. FUSIBLE LINK: HIGH TORQUE SPRING/FUSIBLE LINK, 74°C (165°F) UNLESS OTHERWISE SHOWN.
2.3.1.G. NOTWITHSTANDING THE ABOVE, FRAME, SLEEVE, AND BLADES TO BE STAINLESS STEEL WHERE DAMPER IS INSTALLED IN A DUCT SYSTEM WHICH IS STAINLESS STEEL.
2.3.2. OPERATOR, ELECTRIC:
2.3.2.A. WHERE REQUIRED BY LISTING, FOR MULTIPLE DAMPER INSTALLATIONS:
2.3.2.A.A. FACTORY INSTALLED ELECTRIC TWO POSITION, FAIL CLOSE, OPERATOR, 120 VAC MOTOR,
2.3.2.A.B. ELECTRIC RESETTABLE LINK: 121°C (250°F), WITH MANUAL RESET BUTTON,
2.3.2.A.C. CONTROLLED RATE SPRING CLOSURE.
2.4. SMOKE DAMPERS – DYNAMIC TYPE
2.4.1. CONSTRUCTION
2.4.1.A. FRAME: G60 GALVANIZED STEEL HAT CHANNEL, WITH STAINLESS STEEL JAMB SEALS,
2.4.1.B. BLADES: , PARALLEL ACTION, INTERLOCKING BLADES, 6063–T5 EXTRUDED ALUMINUM, WITH SILICONE BLADE SEALS,
2.4.1.C. LINKAGE: EXTERIOR SIDE OF FRAME (OUT OF AIRSTREAM),
2.4.1.D. SLEEVE: SAME MATERIAL AS DAMPER FRAME, LENGTH TO SUIT APPLICATION WITH STEEL ENCLOSURE AND TRANSITION COLLARS, CAULKED JOINTS, AND RETAINING ANGLES,
2.4.1.E. ENCLOSURE: TYPE A AND B
2.4.1.F. FUSIBLE LINK: HIGH TORQUE SPRING/FUSIBLE LINK, 74°C (165°F) UNLESS OTHERWISE SHOWN.
2.4.1.G. NOTWITHSTANDING THE ABOVE, FRAME, SLEEVE, AND BLADES TO BE STAINLESS STEEL WHERE DAMPER IS INSTALLED IN A DUCT SYSTEM WHICH IS STAINLESS STEEL.
2.4.2. OPERATOR, ELECTRIC:
2.4.2.A. FACTORY INSTALLED ELECTRIC TWO POSITION, FAIL CLOSE, OPERATOR, 120 VAC MOTOR,
2.4.2.B. ELECTRIC RESETTABLE LINK: 121°C (250°F), WITH MANUAL RESET BUTTON,
2.4.2.C. CONTROLLED RATE SPRING CLOSURE.
2.4.2.D. MAXIMUM POWER: 25 VA OPENING, 12 VA HOLDING.
2.4.3. DAMPER POSITION SWITCH:
2.4.3.A. FACTORY INSTALLED, DAMPER POSITION CONTACT SWITCHES,
2.4.3.A.A. PROVE DAMPER OPEN,
2.4.3.A.B. PROVE DAMPER CLOSED.
3. EXECUTION
3.1. FIRE DAMPERS AND FIRE STOP FLAPS
3.1.1. INSTALL FIRE DAMPERS AND FIRE STOP FLAPS THROUGHOUT SUPPLY, RETURN AND EXHAUST AIR SYSTEMS..
3.1.2. INSTALL FIRE DAMPERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, WITH SLEEVE, DUCT CONNECTIONS AND ANGLE SUPPORTS TO COMPLY WITH TERMS AND CONDITIONS OF LISTING OR CLASSIFICATION AND MAINTAIN INTEGRITY OF FIRE WALL AND/OR FIRE SEPARATION.
3.2. FIRE DAMPER SELECTION
3.2.1. SELECT DAMPER TYPES AS FOLLOWS:
3.2.1.A. "DYNAMIC" – ALL LOCATIONS,
3.2.1.B. "STATIC" – RESTRICTED TO UNDUCTED, TRANSFER AIR OPENINGS ONLY.
3.2.1.C. "STATIC" – IN AIR HANDLING SYSTEMS DESIGNED TO SHUT–DOWN ON FIRE ALARM AND NOT USED FOR SMOKE VENTING OR CONTROL SYSTEMS.
3.2.2. SELECT DAMPER STYLES AS FOLLOWS:
3.2.2.A. DYNAMIC DAMPER:
3.2.2.A.A. REQUIREMENT IN EACH COLUMN MUST BE MET.
3.2.2.A.B. WIDTH IS DUCT DIMENSION PARALLEL TO BLADES, HEIGHT IS DUCT DIMENSION PERPENDICULAR TO BLADES.
3.2.2.B. STATIC DAMPERS:
3.2.2.B.A. REQUIREMENT IN EACH COLUMN MUST BE MET.
3.2.2.B.B. WIDTH IS DUCT DIMENSION PARALLEL TO BLADES, HEIGHT IS DUCT DIMENSION PERPENDICULAR TO BLADES.
3.2.3. INSTALL INDIVIDUAL DAMPERS AND/OR ASSEMBLIES OF INDIVIDUAL DAMPERS WITHIN LIMITATIONS OF LISTING OR CLASSIFICATION;
3.2.3.A. USE CURTAIN DAMPERS IN SINGLE DAMPER INSTALLATIONS;
3.2.3.A.A. FOR GREATER CLARITY, DO NOT USE CURTAIN DAMPERS IN MULTIPLE DAMPER ASSEMBLIES, WITH OR WITHOUT MULLIONS.
3.2.3.B. WHERE DUCT SIZE EXCEEDS ABOVE REQUIREMENTS FOR CURTAIN DAMPERS, USE MULTIBLADE FIRE DAMPERS,
3.2.3.C. WHERE LISTING REQUIRES MULTIPLE DAMPER ASSEMBLIES, USE MULTIBLADE FIRE DAMPERS,
3.2.3.D. WHERE DUCT SIZE EXCEEDS ALLOWABLE DIMENSIONS FOR LISTED OR CLASSIFIED MULTIBLADE FIRE DAMPER ASSEMBLIES, USE COMBINATION FIRE AND SMOKE DAMPERS.
3.2.4. INSTALL STAINLESS STEEL DAMPERS IN STAINLESS STEEL DUCT SYSTEMS AND/OR WHEREVER DUCTWORK IS SPECIFIED TO BE WATERTIGHT CONSTRUCTION.
3.2.5. INSTALL FIRE STOP FLAPS IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS TO COMPLY WITH TERMS AND CONDITIONS OF LISTING OR CLASSIFICATION. POSITION SUPPLIED THERMAL BLANKETS TO COVER CEILING DIFFUSERS.
3.3. FIRE DAMPER SLEEVES
3.3.1. FABRICATE FIRE DAMPER SLEEVES IN ACCORDANCE WITH DAMPER LISTING REQUIREMENTS, AND AS DESCRIBED UNDER PRODUCTS HEREIN.
3.3.1.A. FOR TYPE 'B' DAMPERS, FABRICATE THE SLEEVE TO KEEP THE FOLDED–BLADE STACK OUT OF THE AIR STREAM, BY FORMING THAT PORTION OF THE SLEEVE TO WRAP–AROUND THE BLADE STACK TO ELIMINATE AIR POCKETS ON THE ENTERING AND LEAVING SIDE OF THE DAMPER.
3.4. SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS
3.4.1. INSTALL SMOKE DAMPERS AND COMBINATION SMOKE AND FIRE DAMPERS, WITH LEAKAGE CLASS AS INDICATED, THROUGHOUT SUPPLY, RETURN AND EXHAUST AIR SYSTEMS AS SHOWN. PROVIDE LOW PRESSURE LOSS DAMPERS WHERE INDICATED.
3.4.2. INSTALL INDIVIDUAL DAMPERS AND/OR ASSEMBLIES OF INDIVIDUAL DAMPERS WITHIN LIMITATIONS OF LISTING OR CLASSIFICATION.
3.4.3. WHERE COMBINATION SMOKE AND FIRE DAMPERS ARE SHOWN IN STAINLESS STEEL OR WATERTIGHT DUCT SYSTEMS, INSTALL STAINLESS STEEL INTERLOCKING BLADE FIRE DAMPER AND SEPARATE SMOKE DAMPER CONSTRUCTED TO LISTED OR CLASSIFIED LEAKAGE RATING, BUT WITH STAINLESS STEEL BLADES.
3.4.4. INSTALL AND CONNECT DAMPER OPERATORS TO ACHIEVE SMOKE CONTROL AND SMOKE VENTING SEQUENCES AS SHOWN.
3.5. POWER FOR SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS
3.5.1. POWER WIRE AND CONDUIT PROVIDED BY DIVISION 26 UP TO JUNCTION BOX ADJACENT TO DAMPER.
3.5.2. PROVIDE WIRE AND CONDUIT BETWEEN JUNCTION BOX AND DAMPER ACTUATOR.
3.6. DAMPER ACCESS
3.6.1. POSITION DUCT ACCESS DOOR AT EACH FIRE DAMPER, TO PERMIT VISUAL INSPECTION AND REPLACEMENT OF FUSIBLE LINK.
3.6.2. POSITION DUCT ACCESS DOOR AT EACH COMBINATION FIRE AND SMOKE DAMPER, TO PERMIT VISUAL INSPECTION AND SERVICE OF DETECTION/ACTUATION MECHANISM.
3.6.3. PROVIDE SIMILAR ACCESS DOOR UPSTREAM OR DOWNSTREAM OF EACH SMOKE DAMPER FOR VISUAL INSPECTION.

LOUVRES
23 33 63

1. GENERAL
1.1. SCOPE
1.1.1. LOUVRES ARE PROVIDED UNDER GENERAL TRADES SCOPE OF WORK. PROVIDE LOUVRES AS SHOWN.
1.2. SHOP DRAWINGS
1.2.1. SUBMIT MANUFACTURER'S DATA SHEETS FOR WALL LOUVRES WITH MODEL NUMBERS, DESIGN DATA, SUPPORT AND ANCHOR DETAILS AND OUTLINE DIMENSIONS.
2. PRODUCTS
2.1. LOUVRES
2.1.1. PERFORMANCE:
2.1.1.A. FREE AREA NOT LESS THAN 40% OF NOMINAL SIZE,
2.1.1.B. CONSTRUCTION:
2.1.1.B.A. MATERIAL: EXTRUDED ALUMINUM ALLOY [6063–T5],
2.1.1.B.B. EXPOSED JOINTS GROUND FLUSH AND SMOOTH,
2.1.1.B.C. STORM PROOF PATTERN BLADE WITH CENTRE WATERSHED, REINFORCING BOSSES AND MAXIMUM BLADE LENGTH OF 1500 MM (60 IN),
2.1.1.B.D. FRAME, HEAD, SILL AND JAMB: 150 MM (6 IN) DEEP ONE PIECE EXTRUSIONS, MINIMUM 3 MM (C IN) THICK WITH INTEGRAL CAULKING SLOT,
2.1.1.B.E. MULLIONS: AT 1500 MM (60 IN) MAXIMUM CENTRES.
2.1.1.B.F. FASTENERS: STAINLESS STEEL TO (SOCIETY OF AUTOMOTIVE ENGINEERS) SAE–194–AF WITH SAE–194–SFB NUTS AND RESILIENT NEOPRENE WASHERS BETWEEN ALUMINUM AND HEAD OF BOLT OR BETWEEN NUT, STAINLESS STEEL WASHER AND ALUMINUM BODY,
2.1.1.B.G. SCREEN:
– 2 MM (14 GA) WIRE IN FORMED U–FRAME,
– EXHAUST LOUVRES: 12 MM (½ IN) MESH,
– INTAKE LOUVRES: 25 MM (1 IN) MESH.
2.1.1.B.H. FINISH: CLEAR ANODIZED SATIN.
STANDARD OF ACCEPTANCE: CONSTRUCTION SPECIALTIES – MODEL 6110, AIROLITE – CB638 ALUMAVENT – AL–445–5, CARNES, K.N. CROWDER – CANADIAN LOUVRES 411S
3. EXECUTION
3.1. INSTALLATION
3.1.1. CONFIRM OPENING SIZE AND CO–ORDINATE LOCATION OF LOUVRES WITH OTHER TRADES.
3.1.2. WHERE BLANK–OFF OPENINGS AT BACK OF LOUVRE ARE OVERSIZED, INSTALL 1.2 MM (18 GA) REINFORCED GALVANIZED SHEET STEEL BLANK–OFFS, SEALED WITH FIRE RESISTANT MASTIC BETWEEN GALVANIZED STEEL AND ALUMINUM.

GRILLES, REGISTERS AND DIFFUSERS
23 37 13

1. SCOPE
1.1. PROVIDE GRILLES, REGISTERS, AND DIFFUSERS AS SHOWN.
1.2. SHOP DRAWINGS
1.2.1. SUBMIT MANUFACTURER'S DATA SHEETS WITH EQUIPMENT MODEL NUMBERS, PERFORMANCE AND DESIGN DATA, OUTLINE DIMENSIONS, SUPPORT RECOMMENDATIONS AND CONNECTION DETAILS.
2. PRODUCTS
2.1. GENERAL
2.1.1. GRILLES, REGISTERS AND DIFFUSERS:
2.1.1.A. PRODUCT OF ONE MANUFACTURER WHERE SAME MODEL OR TYPE IDENTIFICAT

ADJUSTABLE MINIMUM STOP

2.2.1.B. DAMPER ARRANGED "NORMALLY OPEN" FOR MORNING WARM–UP.

2.2.1.C. CONTROLLER CAPABLE OF MAINTAINING AIR QUANTITY WITHIN ±5% OF SET VALUE BETWEEN ZERO AND STIPULATED RATED AIR FLOW,

2.2.1.D. SOUND LEVEL BELOW SPECIFIED VALUES WHEN OPERATING FROM MINIMUM TO MAXIMUM INLET STATIC PRESSURE.

2.2.2. SILENCER/ATTENUATOR:

2.2.2.A. ON BOX DISCHARGE, ACOUSTICALLY TREATED OPEN END OR MULTIPLE OUTLET ATTENUATOR 900MM (30 IN) LONG ON BOXES UP TO SIZE 10 AND 1.5M (5 FT) LONG ON BOXES SIZE 12 AND LARGER

2.2.2.B. ACOUSTIC LINING – FIBREGLASS:

2.2.2.B.A. 20MM (13/16 IN) THICK, 64KG/M3 (4 LB/SQ FT) DENSITY, RIGID FIBREGLASS WITH FIRE RESISTIVE REINFORCED ALUMINUM FOIL–SCRIM–KRAFT (FSK) FACING,

2.2.2.B.B. FLAME SPREAD RATING NOT TO EXCEED 25, SMOKE DEVELOPMENT RATING NOT TO EXCEED 50,

2.2.2.B.C. FASTENED TO INTERIOR SHEET METAL SURFACE WITH 100% COVERAGE OF ADHESIVE, AND FASTENERS AT 1 PIN PER 0.2M2 (2 SQ FT) BUT NOT LESS THAN 1 ROW ON EACH DUCT SIDE.

2.2.2.B.D. EDGES CONCEALED BY METAL NOSINGS AT INLET AND DISCHARGE, WITH NOTCH AND TUCK FABRICATION AND SEAMS PROTECTED BY 2 STRIPS

STANDARD OF ACCEPTANCE: STERI–LINER DUCT LINER FASTENERS: 2.0 MM (1/16 IN) DIAMETER PINS, LENGTH SELECTED TO SUIT THICKNESS OF INSULATION, 32 MM (1¼ IN) SQUARE NYLON RETAINING CLIPS.

2.3. CONTROLLERS

2.3.1. DIRECT DIGITAL CONTROLLERS (DDC) INCLUDING ACTUATORS TO BE SUPPLIED BY A LANDLORD APPROVED CONTROLS CONTRACTOR AND MOUNTED ON THE TERMINAL BOX IN THE FIELD.

2.3.2. AIR FLOW SENSOR TO BE PROVIDED BY TERMINAL BOX MANUFACTURER.

2.3.3. .3 120 VAC TO 24 VAC TRANSFORMER FOR DDC CONTROLLER TO BE SUPPLIED BY APPROVED CONTROLS CONTRACTOR AND FACTORY INSTALLED BY THE TERMINAL BOX MANUFACTURER.

2.3.4. FOR PNEUMATIC CONTROL SYSTEMS PLEASE SEEK CLARIFICATION ON SCOPE OF WORK BEFORE PRICING.

3. EXECUTION

3.1. BOX INSTALLATION

3.1.1. SUPPORT TERMINAL BOXES FROM BUILDING STRUCTURE WITH ANGLES, HANGERS AND SUPPLEMENTARY STEEL BEFORE INSTALLATION OF PIPING AND CONNECTING DUCTWORK.

3.1.2. PROVIDE ACCESS DOOR IN DUCTWORK DOWNSTREAM OF REHEAT COIL.

3.2. DUCTWORK CONNECTIONS

3.2.1. CONNECT INLET DUCTWORK WITH SPIRAL FLAT SEAM ROUND DUCT OF SAME DIAMETER AS TERMINAL BOX INLET

3.2.2. SUPPORT OUTLET DUCTWORK INDEPENDENT FROM BOX.

3.2.3. PROVIDE SCREW DRIVER AIR VENT AT HIGH POINT OF PIPING TO EACH COIL.

3.3. ELECTRICAL CONNECTIONS

3.3.1. ELECTRICAL WILL PROVIDE 120 VOLT, SINGLE PHASE POWER SUPPLY WITH A JUNCTION BOX FOR EACH GROUP OF TERMINAL BOXES WITH MAXIMUM OF 12 TERMINAL BOX CONTROLS FED FROM ONE JUNCTION BOX. EXTEND POWER SUPPLY FROM THESE JUNCTION BOXES AND CONNECT TO TERMINAL UNITS.

3.4. LEAKAGE TESTING

3.4.1. TERMINAL BOXES AND ATTENUATORS TO BE INCLUDED IN DUCTWORK LEAKAGE TESTING.

DUCTWORK INSULATION
23 37 16

1. GENERAL

1.1. SCOPE

1.1.1. INSULATE AND FINISH DUCTS, CASING, AND PLENUMS;

1.1.2. PROVIDE INSULATION, SEALER COATINGS, FINISHES, AND MECHANICAL PROTECTION.

1.1.3. INSULATION IS NOT REQUIRED ON FACTORY INSULATED AND/OR AND ACOUSTICALLY LINED DUCTWORK EXCEPT AS OTHERWISE SHOWN.

1.2. QUALITY

1.2.1. MANUFACTURERS AND PRODUCTS ARE LISTED IN THIS SECTION TO ESTABLISH QUALITY AND MANUFACTURING STANDARDS. PRODUCTS FROM OTHER MANUFACTURERS WITH EXPLICITLY SIMILAR CHARACTERISTICS MAY BE ACCEPTABLE BUT MUST BE SUBMITTED AS AN ALTERNATIVE PRODUCT SUBMISSION.

1.3. QUALIFICATIONS

1.3.1. PROVIDE INSULATION AND COVERING BY RECOGNIZED SPECIALIST APPLICATOR WITH AN ESTABLISHED REPUTATION FOR THIS TYPE OF WORK.

STANDARD OF ACCEPTANCE: CUSTOM INSULATION SYSTEMS, GUARANTEED INSULATION LTD, WHITE & GREER CO LTD, DEWPOINT INSULATION SYSTEMS.

1.4. SAMPLE BOARDS

1.4.1. SUBMIT SAMPLE ASSEMBLY OF EACH TYPE OF INSULATION AND COVERING.

1.5. MATERIAL TEST CRITERIA

1.5.1. INSULATION, ADHESIVES, COATINGS, FINISHES, SEALERS, AND TAPES:

1.5.1.A. MAXIMUM FLAME SPREAD RATING OF 25 TO CAN/ULC–S102,

1.5.1.B. MAXIMUM SMOKE DEVELOPED RATING OF 50 TO CAN/ULC–S102.

1.5.1.B.A. EXCEPTION: VAPOR BARRIER MASTICS INSTALLED OUTSIDE OF BUILDING.

1.6. APPLICABLE CODES AND STANDARDS

1.6.1. MATERIAL AND METHOD OF APPLICATION TO COMPLY WITH OR BE TESTED IN ACCORDANCE WITH FOLLOWING STANDARDS;

1.6.1.A. THERMAL INSULATION ASSOCIATION OF CANADA (TIAC) NATIONAL INSULATION STANDARD, EXCLUDING SECTION 12

1.6.1.B. NFPA 90–A INSTALLATION OF AIR–CONDITIONING AND VENTILATING SYSTEMS

1.6.1.C. ASHRAE/IES 90.1 ENERGY STANDARD FOR BUILDINGS EXCEPT LOW–RISE RESIDENTIAL BUILDINGS

1.6.1.D. NFPA 255 TEST OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS

1.6.1.E. CAN/ULC–S102 STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF FLOORING, FLOOR COVERING, AND MISCELLANEOUS MATERIALS AND ASSEMBLIES

2. PRODUCTS

2.1. ADHESIVES, FASTENERS, AND TAPE

2.1.1. CONTACT BOND CEMENT:

2.1.1.1. FOR QUICK SETTING FOR METAL SURFACES.

2.1.2. WATERPROOF VAPOUR RETARDER:

2.1.2.A. FOR FLEXIBLE ELASTOMERIC CLOSED CELL FOAM:

2.1.3. LAP SEAL ADHESIVE:

2.1.3.A. FOR JOINTS AND LAP SEALING OF VAPOUR BARRIERS.

2.1.4. CONTACT ADHESIVE:

2.1.4.A. FOR FIBROUS INSULATION.

2.1.5. VAPOUR BARRIER TAPE:

2.1.5.A. COLOUR MATCHED AND FOIL FACED

2.1.5.B. UL 181A LISTED.

2.1.6. WELD PINS, STUDS AND CLIPS

2.1.7. STAPLES

2.1.7.A. MONEL, FLARE TYPE, MINIMUM SIZE 12 MM (½ IN).

2.1.8. TIE WIRE

2.1.8.A. 1.6 MM (16 GA) STAINLESS STEEL WITH TWISTED ENDS.

2.1.9. CAULKING

2.1.9.A. FAST–DRYING COLOUR MATCHED FLEXIBLE BUTYL ELASTOMER BASED VAPOUR BARRIER SEALANT.

2.2. COATINGS AND MEMBRANES

2.2.1. REINFORCING MEMBRANE:

2.2.1.A. SYNTHETIC FIBRE:

2.2.1.A.A. LENO WEAVE,

2.2.1.A.B. INDOOR AND OUTDOOR USE.

2.2.1.B. GLASS–FIBRE FABRIC:

2.2.1.B.A. INDOOR USE.

2.2.1.C. GLASS–FIBRE FABRIC FOR USE WITH ELASTOMERIC CLOSED CELL FOAM:

2.2.1.C.A. INDOOR USE.

2.2.2. BREATHER COATING – INDOORS:

2.2.2.A. FOR BREATHER COATINGS AND LAGGING ADHESIVE,

2.2.2.B. WHITE IN COLOUR,

2.2.2.C. FOR INSULATION EXCEPT ELASTOMERIC CLOSED CELL FOAM.

2.2.2.D. FOR USE WITH ELASTOMERIC CLOSED CELL FOAM.

2.3. INSULATION CEMENT

2.3.1. HYDRAULIC–SETTING FINISHING TYPE.

2.4. FIELD APPLIED FINISHES

2.4.1. PVC (POLYVINYL CHLORIDE) FINISH JACKET:

2.4.1.A. MINIMUM 20 MIL THICKNESS WITH PERMEABILITY NOT MORE THAN 0.09 PERMS,

2.4.1.B. FLEXIBLE FLAT–SHEET,

2.4.1.C. PRESSURE SENSITIVE, COLOUR MATCHING VINYL TAPE.

2.4.2. FABRIC FINISH JACKET:

2.4.2.A. ULC LISTED PLAIN WEAVE COTTON FABRIC AT 220 G/M2 (6 OZ/SQ YD), TREATED WITH FIRE RETARDANT LAGGING ADHESIVE, OR

2.4.2.B. RE–WETABLE FIBERGLASS LAGGING FABRIC WITH WATER ACTIVATED SELF–ADHESIVE.

2.4.2.C. SUITABLE FOR FIELD PAINTING.

2.4.3. METAL FINISH JACKET:

2.4.3.A. EQUIPMENT:

2.4.3.A.A. STUCCO EMBOSSED ALUMINUM NOT LESS THAN 0.45 MM (0.016 IN) THICK SHEET OR,

2.4.3.A.B. CORRUGATED STAINLESS STEEL NOT LESS THAN 0.25 MM (0.010 IN) THICK SHEET.

2.4.3.B. FITTINGS:

2.4.3.B.A. CUSTOM MADE SWAGED RING OR LOBSTER BACK COVERS ON BENDS AND DIE SHAPED FITTING COVERS OVER FITTING, VALVES, STRAINERS, FLANGES, AND GROOVED COUPLINGS.

2.4.3.C. BANDS:

2.4.3.C.A. 12 MM (½ IN) WIDE STAINLESS STEEL WITH MECHANICAL FASTENERS.

2.4.3.D. PROTECTIVE FINISH FOR ELASTOMERIC CELLULAR FOAM INSULATION.

2.5. DUCTWORK INSULATION

2.5.1. TYPE D–1 GLASS FIBRE BLANKET:

2.5.1.A. TO ASTM C1290

2.5.1.B. SERVICE TEMPERATURE: UP TO 121°C (250 F)

2.5.1.C. FLEXIBLE BLANKET,

2.5.1.D. FSK JACKET OF KRAFT BONDED TO ALUMINUM FOIL REINFORCED WITH GLASS FIBRE YARN, MAXIMUM 0.02 PERMS TO ASTM E96 PROCEDURE A.

2.5.1.E. NONCOMBUSTIBLE,

2.5.1.F. THERMAL PERFORMANCE: R = 0.74 M2 °C/W @ 24 C (4.2 BTU °FT2 F/BTU @ 75 F)

2.5.1.G. DENSITY: 12 KG/M3 (0.75 PCF)

2.5.1.H. VAPOR TRANSMISSION : MAXIMUM 0.02 PERMS

2.5.2. TYPE D–2 GLASS FIBRE BOARD :

2.5.2.A. TO ASTM C612,

2.5.2.B. SERVICE TEMPERATURE: UP TO JACKET SURFACE TEMPERATURE (AIR CONTACT) UP TO 66 C (150 F) AND UN–JACKETED SURFACE TEMPERATURE (EQUIPMENT CONTACT) UP TO 232 C (450 F).

2.5.2.C. RIGID FOR FLAT SURFACES OR,

2.5.2.D. SCORED BOARD FOR CURVED SURFACES 250 MM (10 IN) DIA AND OVER,

2.5.2.E. JACKET OF KRAFT BONDED TO ALUMINUM FOIL REINFORCED WITH GLASS FIBRE YARN,

2.5.2.F. THERMAL PERFORMANCE: 0.033 W/M/C @ 24 C (0.23 BTU/HR/IN/SQ FT/F @ 75 F),

2.5.2.G. VAPOR TRANSMISSION: MAXIMUM 0.02 PERMS

2.5.2.H. DENSITY: 48 KG/M3 (3.0 LB/CU FT),

2.5.2.I. SUITABLE FOR JACKET SURFACE TEMPERATURE (AIR CONTACT) UP TO 66 C (150 F) AND UN–JACKETED SURFACE TEMPERATURE (EQUIPMENT CONTACT) UP TO 232 C (450 F).

2.5.3. TYPE D–3 FLEXIBLE ELASTOMERIC CLOSED CELL FOAM:

2.5.3.A. TO ASTM C534,

2.5.3.B. SERVICE TEMPERATURE: UP TO 82 C (180 F).

2.5.3.C. SHEET SELF–ADHERING, ROLL TYPE,

2.5.3.D. THERMAL PERFORMANCE: 0.04 W/M/C @ 24 C (0.28 BTU/HR/IN/SQ FT/F @ 75 F),

2.5.3.E. MANUFACTURER SPECIFIC SEALER/ADHESIVE.

2.5.4. TYPE D–4 LOW TEMPERATURE PHENOLIC BOARD:

2.5.4.A. TO ASTM C1126 (GR.1),

2.5.4.B. SERVICE TEMPERATURE: –73°C TO+121 °C (–100°F TO 250°F).

2.5.4.C. RIGID FOR FLAT SURFACES,

2.5.4.D. MEETING 25/50 FLAME SPREAD/SMOKE DEVELOPMENT WHEN TESTED TO ASTM E84,

2.5.4.E. THERMAL PERFORMANCE: 0.021 W/M/C°@ 10°C (0.145 BTU/HR/IN/SQ FT/F° @ 50°F),

2.5.4.F. DENSITY: 37 KG/M3 (2.3 IB/CUFT),

3. EXECUTION

3.1. INSULATION LIMITS

3.1.1. EXTERNALLY INSULATE AIR HANDLING SYSTEM COMPONENTS:

3.1.1.A. CONDITIONED AIR WITH COOLING COILS : SUPPLY UNIT CASINGS AND PLENUMS, AND FREE STANDING SUPPLY FANS FOR BOTH RECIRCULATING AND NON RECIRCULATING TYPE SYSTEMS,

3.1.1.B. CONDITIONED AIR WITH HEATING ONLY: SUPPLY UNIT CASING AND PLENUMS, FREE–STANDING SUPPLY FANS, AND SUPPLY AIR DUCTS AND PLENUMS UP TO THE SPACE SERVED BUT NOT IN THE SPACE ITSELF,

3.1.1.C. CONDITIONED AIR SUPPLY DUCTS INCLUDING DOWNSTREAM OF REHEAT COILS,

3.1.1.D. UN–CONDITIONED SUPPLY AIR DUCTS AND PLENUMS THAT PASS THROUGH UNHEATED ROOMS OR SPACES,

3.1.1.E. THE FIRST 300 MM (12 IN) LENGTH OF ACOUSTICALLY LINED DUCTWORK,

3.1.1.F. RETURN AIR DUCTS AND PLENUMS IN UNHEATED SPACES,

3.1.1.G. EXHAUST AIR DUCTS AND PLENUMS IN UNHEATED SPACES,

3.1.1.H. EXHAUST AIR DUCTS BETWEEN EXHAUST AIR DAMPER AND POINT OF DISCHARGE TO OUTSIDE OF BUILDING,

3.1.1.I. OUTSIDE AIR INTAKE DUCTS AND PLENUMS;

3.1.1.I.A. FOR NON–RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT COOLING COILS, TERMINATE PLENUM OR CASING INSULATION 300 MM (12 IN) DOWNSTREAM OF FINAL HEATING COIL,

3.1.1.J. MIXED AIR PLENUMS AND DUCTS;

3.1.1.J.A. FOR RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT COOLING COILS, TERMINATE OUTSIDE AIR INTAKE INSULATION 300 MM (12 IN) DOWNSTREAM OF MIXING PLENUM,

3.1.1.K. SHEET METAL BLANK–OFF PLATES BEHIND UNUSED SECTIONS OF AIR INTAKE LOUVRES.

3.1.2. EXTERNALLY INSULATE DUCTWORK LOCATED OUTDOORS:

3.1.2.A. SUPPLY DUCTS.

3.1.2.B. CONDITIONED SUPPLY DUCTS.

3.1.2.C. RETURN DUCTS,

3.1.2.D. EXHAUST DUCTS,

3.1.2.D.A. EXCLUDING FAN DISCHARGE DUCT,

3.1.2.E. KITCHEN EXHAUST DUCTS WITH MORE THAN 3 M (10 FT) LENGTH OF DUCT ON ROOF.

3.1.2.E.A. EXCLUDING FAN DISCHARGE DUCT.

3.1.3. EXTERNAL INSULATION IS NOT REQUIRED ON:

3.1.3.A. CASINGS, DUCTS OR PLENUMS WHICH HAVE BEEN LINED WITH ACOUSTIC INSULATION, EXCEPT AS DESCRIBED ABOVE,

3.1.3.B. FREE STANDING UNCONDITIONED SUPPLY FANS, SUPPLY DUCTS AND PLENUMS,

3.1.3.C. PORTIONS OF INTAKE DUCTS OR PLENUMS, UNIT CASINGS AND CONDITIONED AIR PLENUMS WHICH ARE OF DOUBLE WALL INSULATED CONSTRUCTION,

3.1.3.D. PRE–INSULATED FLEXIBLE DUCTS.

3.1.3.E. FACTORY INSULATED AIR HANDLING UNITS.

3.2. GENERAL REQUIREMENTS

3.2.1. INSULATE DUCTWORK IN ACCORDANCE WITH TABLE 1 AT THE END OF THIS SECTION.

3.2.2. STORE AND USE ADHESIVES, MASTICS, AND INSULATION CEMENTS AT AMBIENT TEMPERATURES AND CONDITIONS RECOMMENDED BY PRODUCT MANUFACTURERS.

3.2.3. SURFACES TO BE CLEAN AND DRY BEFORE APPLICATION OF INSULATION. APPLY INSULATION AFTER PRESSURE AND LEAKAGE TESTING IS COMPLETED AND ACCEPTED.

3.2.4. PLACE INSULATION WITH JOINTS STAGGERED AND TIGHTLY BUTTED, WITH NO VISIBLE GAPS.

3.2.5. NEATLY FINISH INSULATION AT SUPPORTS, PROTRUSIONS, AND INTERRUPTIONS.

3.2.6. SEAL EXPOSED INSULATION WITH REINFORCED VAPOR BARRIER OR BREATHER COATING/MASTIC AS SHOWN.

3.2.7. FINISH DUCTWORK WITH FIELD INSTALLED FINISH JACKETS AS SHOWN.

TABLE 1 : DUCTWORK AND PLENUM INSULATION TYPE AND THICKNESS MM (IN)

NOMINAL SURFACE TEMPERATURE	EQUIPMENT DESCRIPTION	INSULATION TYPE	INSULATION THICKNESS
5°C TO 65°C (40°F TO 150°F)	SUPPLY UNIT CASINGS AND PLENUMS FREE STANDING SUPPLY FANS RECTANGULAR, EXPOSED RECTANGULAR, CONCEALED	D–2	25 (1)
	RECTANGULAR, CONCEALED ROUND AND OVAL, EXPOSED ROUND AND OVAL, CONCEALED	D–1	38 (1–1/2) NOTE (1)

TABLE 2: DUCTWORK AND PLENUM INSULATION TYPE AND THICKNESS MM (IN)

NOMINAL SURFACE TEMPERATURE	EQUIPMENT DESCRIPTION	INSULATION TYPE	INSULATION THICKNESS
AMBIENT TO 65°C (AMBIENT TO 150°F)	PLENUMS AND CASINGS – AIR INTAKE	D2	TWO LAYERS EACH 50 (2)
		D4	75 (3)
	PLENUMS AND CASINGS – EXHAUST	D2	50 (2)
		D4	38 (1–1/2)
	RECTANGULAR – OUTDOOR – SUPPLY	D2	50 (2)
	RECTANGULAR – OUTDOOR – RETURN RECTANGULAR – OUTDOOR – EXHAUST	D2	38 (1–1/2)
	ROUND – OUTDOOR	D3	TWO LAYERS EACH 25 (1)
	DRAIN PANS D3 20 (3/4)	D3	20 (3/4)

NOTE (1) : THICKNESS IS "OUT OF BOX" BEFORE INSTALLATION

PLUMBING GENERAL
22 05 01

1. GENERAL

1.1. SCOPE

1.1.1. PROVIDE LABOUR, MATERIALS AND EQUIPMENT FOR INSTALLATION, TESTING AND PUTTING INTO OPERATION PLUMBING AND DRAINAGE SYSTEMS.

1.2. QUALIFIED TRADESMEN

1.2.1. WORK TO BE DONE BY QUALIFIED AND RECOGNIZED FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD USING TRADESMEN HOLDING CERTIFICATES OF COMPETENCY.

1.3. APPLICABLE CODES AND STANDARDS

1.3.1. ONTARIO BUILDING CODE

1.3.2. REGULATIONS OF PROVINCE CITY, OR LOCAL AUTHORITY HAVING JURISDICTION.

1.3.3. AWWA C651, DISINFECTING WATER MAINS.

1.3.4. CSA B149.1 NATURAL GAS AND PROPANE INSTALLATION CODE

1.4. QUALIFICATIONS

1.4.1. CONTRACTORS PERFORMING WORK ON NATURAL GAS OR PROPANE SYSTEMS TO BE LICENSED AS A GAS AND PROPANE INSTALLER UNDER O.REG. 215/01, BY THE TECHNICAL STANDARDS AND SAFETY AUTHORITY.

2. PRODUCTS

2.1. WATER SERVICE METER

2.1.1. COMPOUND TYPE, TO APPROVAL OF AUTHORITIES.

2.1.2. SUITABLE FOR FUTURE INSTALLATION OF REMOTE READER. PROVIDE CONDUIT FOR FUTURE WIRING FROM METER TO REMOTE READER.

2.1.3. PAY CALIBRATION AND TRANSPORTATION CHARGES IN CONNECTION WITH METER. WATER METER TO READ IN CUBIC METERS (M3) AND GALLONS PER MINUTE.

3. INSTALLATION

3.1. PIPING

3.1.1. PIPING SYSTEM ROUTING IS SHOWN DIAGRAMMATICALLY. LOCATE MAINS, RISERS AND RUNOUTS CONCEALED BEHIND FURRINGS OR ABOVE CEILINGS EXCEPT IN MECHANICAL EQUIPMENT ROOMS AND ACCESS SPACES WHERE PIPING IS TO BE EXPOSED.

3.1.2. DETERMINE AREAS WITHOUT CEILINGS FROM ARCHITECTURAL DRAWINGS AND ROOM FINISH SCHEDULES, AND IN THESE AREAS KEEP PIPING AS HIGH AS POSSIBLE.

3.1.3. ANCHOR, GUIDE AND SUPPORT VERTICAL AND HORIZONTAL RUNS OF PIPING TO RESIST DEAD LOAD AND ABSORB THRUST.

3.2. WATER SERVICE

3.2.1. INSTALL WATER METER IN ACCORDANCE WITH LOCAL AUTHORITY STANDARDS AND PROVIDE THREE–VALVE BY–PASS ARRANGEMENT WITH STRAINER ON STREET SIDE AND DRAIN VALVE ON BUILDING SIDE OF METER.

3.2.2. MOUNT METER;

3.2.2.A. 150 MM (6") CLEAR OF FLOOR,

3.2.2.B. MOUNT VALVES IN UPRIGHT POSITION,

3.2.2.C. LOCATE BY–PASS TO PROVIDE 500 MM (20 IN) CLEAR ABOVE TOP OF METER,

3.2.2.D. LOCATE ASSEMBLY SO THAT METER IS AT LEAST 600 MM (24 IN) FROM BACK WALL AND WITH 1050MM (42 IN) CLEAR IN FRONT.

3.2.3. METER BY–PASS LINE:

3.2.3.A. SAME SIZE AS INCOMING LINE FOR TURBINE OR PROTECTUS METER,

3.2.3.B. ONE PIPE SIZE SMALLER THAN INCOMING LINE FOR COMPOUND METER,

3.3. DOMESTIC COLD WATER SYSTEM DISTRIBUTION

3.3.1. EXTEND EXISTING DOMESTIC COLD WATER SYSTEM WITH

3.3.1.A. DISTRIBUTION PIPE AND FITTINGS,

3.3.1.B. VALVES,

3.3.1.C. PREMISES BACKFLOW ISOLATION,

3.3.1.D. ZONE OR EQUIPMENT BACKFLOW PROTECTION.

3.3.2. MINIMUM WATER PRESSURE AT STREET LEVEL: APPROXIMATELY 500 KPA (70 PSI).

3.3.3. PROVIDE VALVED CONNECTIONS FROM SUPPLY SYSTEM, TO FIXTURES AND OTHER EQUIPMENT REQUIRING COLD WATER.

3.4. DOMESTIC HOT WATER SYSTEM DISTRIBUTION

3.4.1. PROVIDE DOMESTIC HOT WATER SYSTEM WITH

3.4.1.A. DISTRIBUTION PIPE AND FITTINGS

3.4.1.B. VALVES

3.4.1.C. ZONE OR EQUIPMENT BACKFLOW PROTECTION.

3.4.2. PROVIDE COLD WATER CONNECTIONS TO HOT WATER TANK, WITH SHUT–OFF AND CHECK VALVE ON SUPPLY AND VALVED DRAIN AT BOTTOM OF TANK. DRILL CHECK VALVE DISC WITH 1.6 MM (1/16 IN) HOLE IN ITS CENTRE.

3.4.3. PROVIDE VALVED CONNECTIONS FROM HOT WATER SUPPLY SYSTEM TO FIXTURES AND OTHER EQUIPMENT REQUIRING HOT WATER.

3.5. DRAINAGE

3.5.1. PROVIDE WASTE AND VENT CONNECTIONS TO PLUMBING FIXTURES AND EQUIPMENT.

3.5.2. FITTINGS;

3.5.2.A. DO NOT USE DOUBLE HUBS, STRAIGHT CROSSES, DOUBLE T'S, OR DOUBLE TY'S IN SOIL OR WASTE PIPE BELOW ANY FIXTURE.

3.5.2.B. DO NOT USE BRANCH FITTINGS OTHER THAN FULL "Y" OR "Y" AND AN EIGHTH BEND, ON SOIL OR WASTE PIPE RUNNING IN HORIZONTAL DIRECTION.

3.5.2.C. DO NOT USE QUARTER BEND PLACED ON ITS SIDE.

3.5.2.D. DO NOT USE INVERTED JOINTS BELOW FIXTURES.

3.5.2.E. DO NOT INSTALL CLEANOUTS ABOVE FOOD PREPARATION OR PATIENT TREATMENT AREAS. IN THESE AREAS CARRY RODDING CONNECTION UP TO FLOOR CLEANOUT FITTED WITH ADJUSTABLE GASKETED ACCESS COVER AND PLUG, WITH CLEANOUT BODY CAST IN FLOOR SLAB ABOVE.

3.5.2.F. DRAINAGE FITTINGS TO MATCH CONNECTED PIPING FOR QUALITY AND WALL THICKNESS.

3.6. FLUSHING AND CLEANING – BUILDING WATER DISTRIBUTION PIPING

3.6.1. CONDUCT FIRST FILL AND PRESSURE TESTING OF BUILDING DISTRIBUTION PIPING ONLY AFTER COMPLETION OF FLUSHING AND DISINFECTION OF WATER SERVICE PIPE.

3.6.2. COMPLETE PIPING PRESSURE TESTS PRIOR TO FLUSHING AND CLEANING OPERATIONS.

3.6.3. FLUSH WATER DISTRIBUTION PIPING THROUGH AVAILABLE OUTLETS WITH SUFFICIENT FLOW TO PRODUCE VELOCITY OF 1.5 M/S, WITHIN PIPE FOR 10 MINUTES, OR UNTIL FOREIGN MATERIALS HAVE BEEN REMOVED AND FLUSHED WATER IS CLEAR.

3.6.3.A. DRAIN DOWN SYSTEM TO REMOVE FLUSHING WATER,

3.6.3.B. INTRODUCE CHLORINE CLOSE TO POINT OF RE–FILLING OF SYSTEM, AND EVENLY ADD TO WATER AS SYSTEM IS REFILLING, TO PROVIDE AN INITIAL CONCENTRATION OF 50 MG/L,

3.6.3.C. OPERATE VALVES, HYDRANTS, AND APPURTENANCES WHILE MAIN CONTAINS CHLORINE SOLUTION.

3.6.3.D. FLUSH LINE TO REMOVE CHLORINE SOLUTION AFTER 24 HOURS CONTACT TIME.

3.6.3.E. ARRANGE AND PAY FOR LABORATORY TESTING OF WATER SAMPLES TAKEN FROM NEWLY DISINFECTED MAIN.

3.6.3.F. WHERE SAMPLES DO NOT MEET LABORATORY TEST STANDARD FOR POTABLE WATER, DISINFECTION PROCEDURE AND TESTING IS TO BE REPEATED UNTIL SATISFACTORY RESULTS ARE ACHIEVED.

PIPING INSULATION
22 14 19

1. 1 GENERAL

1.1. SCOPE

1.1.1. INSULATE AND FINISH PIPING, VALVES, FITTINGS, AND PIPELINE ACCESSORIES.

1.1.1.A. PROVIDE INSULATION, COATINGS, FINISHES, AND MECHANICAL PROTECTION.

1.1.2. PROVIDE FIRE RATED INSULATION ON PIPING AS SHOWN, INCLUDING FIRE PROTECTION STANDPIPES.

1.1.2.A. COORDINATE WITH THE CONTRACTOR UNDER DIVISION 21 FOR LOCATION AND EXTENT OF STANDPIPES TO BE PROTECTED.

1.2. RELATED WORK

1.2.1. THE FOLLOWING WORK IS SPECIFIED IN OTHER SECTION OF DIVISION 20:

1.2.1.A. SUPPLY OF INSULATION SHIELDS FOR COLD AND DUAL TEMPERATURE PIPING:

1.2.2. PROVISION OF WELDED SADDLES FOR HOT PIPING.

1.2.3. INSULATION OF UNDERGROUND PIPING: SECTION 20 07 21.

1.3. QUALITY

1.3.1. MANUFACTURERS AND PRODUCTS ARE LISTED IN THIS SECTION TO ESTABLISH QUALITY AND MANUFACTURING STANDARDS. PRODUCTS FROM OTHER MANUFACTURERS WITH EXPLICITLY SIMILAR CHARACTERISTICS MAY BE ACCEPTABLE BUT MUST BE SUBMITTED AS AN ALTERNATIVE PRODUCT SUBMISSION.

1.4. QUALIFICATIONS

1.4.1. PROVIDE INSULATION AND COVERING BY RECOGNIZED SPECIALIST APPLICATOR WITH AN ESTABLISHED REPUTATION FOR THIS TYPE OF WORK.

1.5. 1.5MATERIAL TEST CRITERIA

1.5.1. INSULATION, ADHESIVES, COATINGS, FINISHES, SEALERS, AND TAPES:

1.5.1.A. MAXIMUM FLAME SPREAD RATING OF 25 TO CAN/ULC–S102,

1.5.2. MAXIMUM SMOKE DEVELOPED RATING OF 50 TO CAN/ULC–S102..

1.5.2.A. EXCEPTION: VAPOR BARRIER MASTICS INSTALLED OUTSIDE OF BUILDING.

1.6. APPLICABLE CODES AND STANDARDS

1.6.1. MATERIAL AND METHOD OF APPLICATION TO COMPLY WITH OR BE TESTED IN ACCORDANCE WITH FOLLOWING STANDARDS;

1.6.1.A. THERMAL INSULATION ASSOCIATION OF CANADA (TIAC) NATIONAL INSULATION STANDARD, EXCLUDING SECTION 12

1.6.1.B. NFPA 90–A INSTALLATION OF AIR–CONDITIONING AND VENTILATING SYSTEMS

1.6.1.C. ASHRAE/IES 90.1 ENERGY STANDARD FOR BUILDINGS EXCEPT LOW–RISE RESIDENTIAL BUILDINGS

1.6.1.D. NFPA 255 TEST OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS

1.6.1.E. CAN/ULC–S102 STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF FLOORING, FLOOR COVERING, AND MISCELLANEOUS MATERIALS AND ASSEMBLIES

2. PRODUCTS

2.1. GENERAL

2.1.1. NEW DOMESTIC HOT, COLD, HOT WATER RE–CIRCULATING LINES, HORIZONTAL SANITARY DRAINS AND VALVES AND FITTINGS, CONDENSER WATER PIPING AND VALVES AND FITTINGS AND CONDENSATE DRAIN PIPING AND FITTINGS FOR FIRST 15 FT. FROM COIL DRAIN PAN TO BE INSULATED WITH 1 IN STANDARD MOULDED SECTIONAL RIGID GLASS FIBRE PIPE INSULATION WITH VAPOUR BARRIER JACKET HAVING MOISTURE TRANSMISSION OF .02 PERM.

2.1.2. NEW INDUCTION UNIT VALVES, PIPING & FITTINGS TO BE INSULATED WITH 5/8" ARMAFLEX INSULATION.

2.1.3. RECOVER EXPOSED INSULATED PIPING WITH PVC JACKETING.

2.1.4. ACCEPTABLE MANUFACTURERS OF INSULATION AND VAPOUR BARRIER:MANSON INSULATION INC. FIBERGLAS CANADA KNAUF FIBER GLASS MANVILLE CANADA INC.

2.1.5. ACCEPTABLE MANUFACTURERS OF PVC JACKETING: ACWIL INSULATIONS LTD.

DOMESTIC WATER HEATERS
22 33 13

1. GENERAL

1.1. SCOPE

1.1.1. PROVIDE DOMESTIC HOT WATER HEATERS AS SHOWN

1.2. SHOP DRAWINGS

1.2.1. SUBMIT SHOP DRAWINGS FOR EACH HEATER WITH MODEL NUMBER, OUTLINE DIMENSIONS, FUEL OR POWER REQUIREMENTS, INLET AND OUTLET CONNECTION DETAILS AND CAPACITY.

1.3. APPLICABLE CODES AND STANDARDS

1.3.1. CSA C22.2 NO. 110 CONSTRUCTION AND TEST OF ELECTRIC STORAGE–TANK WATER HEATERS

1.3.2. CSA C191 PERFORMANCE OF ELECTRIC STORAGE TANK WATER HEATERS FOR HOUSEHOLD SERVICE

2. PRODUCTS

2.1. GENERAL

2.1.1. DESIGN CONDITIONS:

2.1.1.A. DESIGN PRESSURE: [860 KPA (125 PSI)] [1035 KPA (150 PSI)]

2.1.1.B. DESIGN TEMPERATURE: 60°C (180°F).

2.1.2. PIPING CONNECTIONS:

2.1.2.A. UP TO NPS 3: THREADED

2.1.2.B. NPS 3 AND OVER: FLANGED.

2.1.3. FITTINGS, ALL HEATERS:

2.1.3.A. REPLACEABLE MAGNESIUM ANODE,

2.1.3.B. 50 MM (2 IN) MINERAL WOOL INSULATION,

2.1.3.C. ENAMELLED STEEL JACKET,

2.1.3.D. HOSE THREADED DRAIN VALVE,

2.1.3.E. ASME RATED TEMPERATURE AND PRESSURE RELIEF VALVE

2.2. ELECTRIC HOT WATER HEATERS

2.2.1. CONFORM TO CSA C22.2 NO. 110 AND CSA C191

2.2.2. FACTORY ASSEMBLED AND TESTED, GLASS LINED STEEL TANK UNITS, WITH;

2.2.2.A. COPPER SHEATHED IMMERSION ELEMENTS ARRANGED FOR FLIP–FLOP OPERATION

2.2.2.B. CLOSE TOLERANCE POSITIVE SNAP ACTION THERMOSTATS

2.2.2.C. MANUAL RESET HIGH TEMPERATURE LIMIT SWITCH.

2.2.2.D. BUILT–IN AND FACTORY PRE–WIRED CONTROLS INCLUDING CONTACTORS.

3. EXECUTION

3.1. INSTALLATION

3.1.1. PROVIDE SU

2.7.2.C. BALL TEST COCKS, AND
2.7.2.D. AIR GAP DRAIN.
2.7.3. NPS ¼ AND ½:
2.8. STRAINERS
2.8.1. "Y" PATTERN WITH ;
2.8.1.A. BRONZE, CAST IRON OR STEEL BODIES ,
2.8.1.B. SCREWED OR FLANGED TO MATCH PRESSURE CLASS AND SIZE RESTRICTIONS SPECIFIED FOR GLOBE VALVES IN SECTION OF PIPING SYSTEM WHERE STRAINER IS TO BE INSTALLED,
2.8.1.C. STAINLESS STEEL BASKETS WITH;
2.1.1.C.A. 0.8 MM (1/32 IN) DIAMETER PERFORATIONS FOR STRAINERS UP TO NPS 3 SIZE AND
2.1.1.C.B. 3.2 MM (C IN) DIAMETER PERFORATIONS FOR STRAINERS NPS 4 AND LARGER,
2.1.1.C.C. BASKETS WITH 3.2 MM (C IN) DIAMETER PERFORATIONS TO BE MADE FROM 0.9 MM (0.037 IN) STOCK REINFORCED WITH 13 MM X 0.9 MM (½ IN X 0.037 IN) BANDS OF THE SAME MATERIAL SPOT WELDED TO BASKETS.

3. EXECUTION
3.1. INSTALLATION GENERAL
3.1.1. INSTALL TO CONFORM WITH CANADIAN PLUMBING CODE, PROVINCIAL CODES, AND LOCAL AUTHORITY HAVING JURISDICTION.
3.2. CLEANOUTS
3.2.1. INSTALL AT BASE OF SOIL AND WASTE STACKS, AND RAINWATER LEADERS AND AT CHANGES IN DIRECTION .
3.2.2. EXTEND CLEANOUTS FLUSH TO WALL OR FINISHED FLOOR UNLESS SERVICEABLE FROM BELOW FLOOR.
3.2.3. INSTALL CLEANOUTS LOCATED IN FLOORS CLEAR OF OBSTRUCTIONS.
3.3. WATER HAMMER ARRESTERS
3.3.1. SELECT AND INSTALL IN ACCORDANCE WITH PDI–WH 201 ON BRANCH SUPPLIES TO EACH FIXTURE OR GROUP OF FIXTURES.
3.4. TRAP SEAL PRIMERS
3.4.1. SELECT AND INSTALL TO PRIME FLOOR AND FUNNEL DRAIN TRAPS.
3.4.2. 120V 1PH 60 HZ SUPPLY WILL BE BROUGHT TO ELECTRIC MANIFOLDED UNITS UNDER DIVISION 26 AND CONNECTED UNDER DIVISION 22.
3.5. BACK–FLOW PREVENTERS AND VACUUM BREAKERS
3.5.1. INSTALL IN ACCORDANCE WITH CSA B64.10.
3.5.2. INSTALL BACKFLOW PREVENTERS HORIZONTALLY, IN ACCORDANCE WITH MANUFACTURERS RECCOMENDATIONS, BUT NOT LESS THAN 300MM (12") AND NOT GREATER THAN 1500MM (60") ABOVE THE FLOOR.
3.5.3. PIPE DISCHARGE FROM BACKFLOW PREVENTER, WITH AIR GAP, TO NEAREST DRAIN OR SERVICE SINK.

DOMESTIC WATER SUPPLY PIPING COPPER 22 11 16

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE COPPER PIPE AND FITTINGS FOR POTABLE DOMESTIC WATER PIPING, ABOVE GROUND.
1.2. APPLICABLE CODES AND STANDARDS
1.2.1. ASTM B88 STANDARD SPECIFICATION FOR SEAMLESS COPPER WATER TUBE
1.2.2. ASME B16.15 CAST BRONZE THREADED FITTINGS, CLASSES 125 AND 250
1.2.3. ASME B16.18 CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS
1.2.4. ASME B16.22 WROUGHT COPPER AND COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS
1.2.5. ASTM B828 STANDARD PRACTICE FOR MAKING CAPILLARY JOINTS BY SOLDERING OF COPPER AND COPPER ALLOY TUBE AND FITTINGS.
1.2.6. CSA B242 GROOVE AND SHOULDERED TYPE MECHANICAL COUPLINGS
1.2.7. AWS A5.8 BRAZING FILLER METAL.
1.2.8. AWWA C606 GROOVED AND SHOULDERED JOINTS
1.2.9. ASTM A307 STANDARD SPECIFICATION FOR CARBON STEEL BOLTS AND STUDS 60,000PSI TENSILE STRENGTH
1.2.10. ASTM A563 STANDARD SPECIFICATION FOR CARBON AND ALLOY STEEL NUTS
1.2.11. ASTM B–32 SPECIFICATION FOR SOLDER METAL
2. PRODUCTS
2.1. DOMESTIC HOT, COLD AND RECIRCULATING PIPING, WITHIN BUILDING
2.1.1. COPPER TUBE: TO ASTM B88.
2.1.1.A. HARD DRAWN, TYPE K ABOVE GROUND.
2.1.1.B. SOFT ANNEALED, TYPE K BELOW GROUND.
2.1.2. TUBE TO HAVE CERTIFICATION MARKINGS MADE BY TESTING AGENCY ACCREDITED BY STANDARDS COUNCIL OF CANADA.
2.2. FITTINGS
2.2.1. BRASS OR BRONZE FLANGES AND FLANGED FITTINGS: TO ASME B16.24.
2.2.2. BRASS OR BRONZE THREADED FITTINGS: TO ASME B16.15.
2.2.3. SOLDER/BRAZED FITTINGS: CAST BRONZE TO ASME B16.18, OR WROUGHT COPPER AND BRONZE TO ASME B16.22.
2.2.4. ROLL GROOVE FULL FLOW STANDARD RADIUS CAST BRONZE FITTINGS FOR SIZES NPS 2 1/2 AND LARGER: TO AWWA C606.
2.3. JOINTS
2.3.1. FLANGED JOINTS:
2.3.1.A. MADE UP WITH RUBBER GASKETS 1.6 MM (1/16 IN) THICK TO AWWA C111 AND
2.3.1.B. HEAVY SERIES BOLTS, HEXAGONAL HEAD PATTERN TO ASTM A307, NUTS TO ASTM 563, AND WASHERS.
2.3.2. SOLDER : TIN ANTIMONY SOLDER, 95:5 TO ASTM B–32 .
2.3.3. SILVER BRAZING ALLOY AWS CLASSIFICATION BCUP–5
2.3.4. ROLL GROOVED PIPING:
2.3.4.A. MADE UP WITH ROLL GROOVE POSITIVE CLAMP GASKETTED COUPLINGS OR ROLL GROOVE FLANGE ADAPTERS FOR COPPER PIPING TO CSA B242 OR AWWA C606.
3. EXECUTION
3.1. INSTALLATION
3.1.1. ISOLATE EQUIPMENT, FIXTURES AND BRANCHES WITH GATE, BALL OR BUTTERFLY VALVES.
3.1.2. USE GLOBE, DRVS, BALL OR BUTTERFLY VALVES FOR THROTTLING SERVICE.
3.1.3. INSTALL PIPING CLOSE TO BUILDING STRUCTURE TO MINIMIZE FURRING AND CONSERVE HEADROOM. GROUP PIPING AND RUN PARALLEL TO WALLS AND CEILINGS.
3.1.4. CUT TUBE SQUARE, REAM TUBE ENDS AND CLEAN TUBING AND TUBE ENDS BEFORE JOINT ASSEMBLY.
3.1.5. PREPARE ROLL GROOVE JOINTS IN SHOP OR FIELD USING GROOVE ROLLING MACHINE.
3.1.6. ASSEMBLE ROLL GROOVE JOINTS USING DRY LUBRICATED GASKETS.
3.1.7. ANCHORS, GUIDE AND SUPPORT ROLL GROOVED PIPING IN ACCORDANCE WITH COUPLING MANUFACTURERS INSTRUCTIONS.
3.1.8. BEFORE ASSEMBLING SOLDER OR BRAZED JOINTS, REMOVE WORKING PARTS OF VALVES, CLEAN INSIDE OF SOLDER FITTINGS AND OUTSIDE OF MATING PIPE WITH EMERY PAPER AND COAT WITH FLUX.
3.1.9. SOLDER OR BRAZE JOINTS WITH BLOW TORCH OR OXY–ACETYLENE FLAME.
3.1.10. JOINT CONSTRUCTION, BURIED:
3.1.10.A. ALL SIZES: BRAZED.
3.1.11. JOINT CONSTRUCTION, ABOVE GROUND:
3.1.11.A. UP TO NPS 2½: SOLDERED IN ALL LOCATIONS
3.1.11.B. NPS 3 AND LARGER: BRAZED IN ALL LOCATIONS
3.1.11.C. NPS 3 AND LARGER: GROOVED JOINT IN EXPOSED AREAS ONLY.
3.1.11.C.A. FOR GREATER CLARITY, 'EXPOSED AREAS'?INCLUDE INSIDE SERVICE ROOMS AND ABOVE LAY–IN TILE CEILINGS, BUT EXCLUDES VERTICAL AND HORIZONTAL SERVICE SHAFTS, ABOVE ANY OTHER CEILING CONSTRUCTION, AND INSIDE WALLS AND PARTITIONS.
3.2. TESTING AND BALANCING
3.2.1. PRESSURE TEST PIPING BEFORE INSULATION IS APPLIED. CUT–OUT AND REPLACE LEAKING SOLDERED OR BRAZED FITTINGS AND RETEST.
3.2.2. BALANCE SUPPLY SYSTEMS USING LOCK SHIELD GLOBE VALVES OR DVR.

DRAINAGE & VENT PIPING CAST IRON & COPPER 22 13 16

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE CAST IRON PIPE & FITTINGS &/OR COPPER TUBE & FITTINGS FOR DRAIN, WASTE & VENT SERVICES.
1.1.1.A. FOR ABOVEGROUND SERVICES.
1.2. RELATED SECTIONS
1.2.1. 22 13 21 : DRAINAGE PIPING – PUMPED
1.3. APPLICABLE CODES & STANDARDS
1.3.1. STANDARDS:
1.3.1.A. CSA B70 CAST IRON SOIL PIPE, FITTINGS, & MEANS OF JOINING
1.3.1.B. CSA–B125 PLUMBING FITTINGS.
1.3.1.C. CSA B158.1 CAST BRASS SOLDER JOINT DRAINAGE, WASTE, & VENT FITTINGS
1.3.1.D. CSA B602 MECHANICAL COUPLINGS FOR DRAIN, WASTE, & VENT PIPE & SEWER PIPE.
1.3.1.E. ASTM A74 STANDARD SPECIFICATION FOR CAST IRON SOIL PIPE & FITTINGS
1.3.1.F. ASTM A888 STANDARD SPECIFICATION FOR HUBLESS CAST IRON PIPE & FITTINGS FOR SANITARY & STORM DRAIN, WASTE & VENT PIPING APPLICATIONS
1.3.1.G. ASME B16.29 WROUGHT COPPER & WROUGHT COPPER ALLOY SOLDER JOINT DRAINAGE FITTINGS DWV
1.3.1.H. ASTM B32 SPECIFICATION FOR SOLDER METAL
1.3.1.I. STM B306 STANDARD SPECIFICATION FOR COPPER DRAINAGE TUBE (DWV)
1.3.1.J. ASTM C564– SPECIFICATION FOR RUBBER GASKETS FOR CAST IRON SOIL PIPE & FITTINGS.
1.3.1.K. ASTM C1540 STANDARD SPECIFICATION FOR HEAVY DUTY SHIELDED COUPLINGS JOINING HUBLESS CAST IRON SOIL PIPE & FITTINGS.
1.3.1.L. ASTM B828 STANDARD PRACTICE FOR MAKING CAPILLARY JOINTS BY SOLDERING OF COPPER & COPPER ALLOY TUBE & FITTINGS.
1.3.1.M. CANADIAN PIPE INSTITUTE STANDARD SPECIFICATION
1.3.1.N. CAST IRON SOIL PIPE INSTITUTE (CISPI) TECHNICAL MANUAL
1.3.1.O. CISPI 301 STANDARD SPECIFICATION FOR HUBLESS CAST IRON PIPE & FITTINGS FOR SANITARY & STORM DRAIN, WASTE & VENT PIPING APPLICATIONS
1.3.1.P. CISPI 310 SPECIFICATION FOR COUPLINGS FOR USE IN CONNECTION WITH HUBLESS CAST IRON SOIL PIPE & FITTINGS FOR SANITARY & STORM DRAIN, WASTE & VENT PIPING APPLICATIONS
2. PRODUCTS
2.1. PIPE; COPPER VENT PIPE & FITTINGS, WITHIN BUILDING
2.1.1. COPPER DWV TUBE, TO ASTM B306
2.1.2. CERTIFICATION MARKINGS BY TESTING AGENCY ACCREDITED BY STANDARDS COUNCIL OF CANADA.
2.2. FITTINGS:
2.2.1. CAST BRASS TO CSA B158.1
2.2.2. WROUGHT COPPER TO ANSI B16.29
2.3. SOLDER: TIN–ANTIMONY 95/5, TO ASTM B32 ALLOY SB5.
2.4. CAST IRON PIPE & FITTINGS FOR DRAIN WASTE & VENT SERVICES
2.4.1. PIPE & FITTINGS: CAST TO CSA B70, ASTM A74 OR ASTM A888
2.4.2. WITH HEAVY BITUMINOUS COATING FOR BURIED SERVICE.
2.4.3. JOINTS BELOW GRADE:
2.4.3.A. PLAIN END MADE UP USING MECHANICAL SLEEVE JOINTS TO CSA B602 & ASTM C1540 WITH NEOPRENE OR BUTYL RUBBER COMPRESSION GASKETS TO ASTM C564, WITH STAINLESS STEEL SLEEVE & NOT LESS THAN FOUR STAINLESS STEEL DRIVE CLAMPS WITH STAINLESS STEEL WORM GEARS.
3. EXECUTION
3.1. INSTALLATION GENERAL
3.1.1. INSTALL SUSPENDED PIPING TO GRADE, PARALLEL & CLOSE TO WALLS & CEILINGS TO CONSERVE HEADROOM & SPACE.
3.1.2. INSTALL PIPING CLOSE TO BUILDING STRUCTURE TO MINIMIZE FURRING. GROUP PIPING & RUN PARALLEL TO WALLS & CEILINGS.
3.2. CAST IRON PIPING
3.2.1. INSTALL CAST IRON DRAINAGE PIPING IN ACCORDANCE WITH CAST IRON SOIL PIPE & FITTINGS (CISPI') TECHNICAL MANUAL.
3.2.2. FOR SUSPENDED PIPING, PROVIDE HANGERS WITHIN 450 MM (18 IN) OF EACH JOINT, AT EACH CHANGE OF DIRECTION, & WITHIN 450 MM (18 IN) OF THE TERMINAL END OF EACH PIPE RUN.
3.2.3. ASSEMBLE & TIGHTEN MECHANICAL SLEEVE JOINTS TO COUPLING MANUFACTURERS RECOMMENDED TORQUE VALUE WITH TORQUE WRENCH.
3.2.4. PROVIDE BRACES OR TIE–RODS ON HORIZONTAL PIPING NPS 5 & LARGER:
3.2.4.A. AT EACH BRANCH OPENING OR CHANGE OF DIRECTION,
3.2.4.B. AT EACH PIPE RUN COUPLING.
3.2.5. PROVIDE SWAY BRACING ON ALL HORIZONTAL PIPING WHERE THE HANGER LENGTH IS GREATER THAN 450MM (18 IN) FROM THE TOP OF THE PIPE TO THE CONNECTING POINT ON THE STRUCTURE.
3.3. COPPER TUBING
3.3.1. CUT COPPER TUBE SQUARE, REAM TUBE ENDS & CLEAN TUBING & TUBE ENDS BEFORE JOINT ASSEMBLY.
3.3.2. BEFORE ASSEMBLING SOLDER JOINTS, CLEAN INSIDE OF SOLDER FITTINGS & OUTSIDE OF MATING PIPE WITH EMERY PAPER & COAT WITH FLUX.
3.3.3. SOLDER JOINTS IN COPPER PIPE WITH BLOW TORCH OR OXY–ACETYLENE FLAME.
3.4. TESTING
3.4.1. TEST BEFORE PIPING IS CONCEALED.
3.4.2. CUT–OUT & REPLACE LEAKING SOLDERED FITTINGS, REMAKE JOINTS IN CAST IRON PIPING, & RETEST.

FIRE PROTECTION GENERAL 21 05 01

1. GENERAL
1.1. SCOPE
1.1.1. FIRE PROTECTION WORK INCLUDES;
1.1.1.A. STANDPIPE & HOSE SYSTEMS
1.1.1.B. FIRE EXTINGUISHERS
1.1.1.C. WET PIPE SPRINKLER SYSTEM
1.2. APPLICABLE CODES AND STANDARDS
1.2.1. FIRE PROTECTION WORK TO CONFORM TO STANDARDS OF NATIONAL FIRE PREVENTION ASSOCIATION (NFPA) AND RELEVANT SECTIONS OF THE ONTARIO BUILDING CODE.
1.3. WATER SUPPLY TEST RESULTS
1.3.1. PROVIDE WATER FLOW TEST ON MUNICIPAL WATER SERVICE IN PROXIMITY TO BUILDING CONNECTION, IN ACCORDANCE WITH NFPA 14 AND NFPA 291. FLOW TEST MUST BE CONDUCTED WITHIN ONE (1) YEAR PRIOR TO SYSTEM DESIGN. SUBMIT RECORD OF TEST INCLUDING STATIC PRESSURE, AND RESIDUAL PRESSURE AND FLOW.
1.3.2. OBTAIN MUNICIPAL APPROVAL AND PAY FEES ASSOCIATED WITH TESTING.
2. PRODUCTS
2.1. PIPE, HANGERS AND GASKETS
2.1.1. PIPE:
2.1.1.A. ASTM A53 GRADE B, SCHEDULE 40 CONTINUOUS WELD STEEL TO UP TO NPS 2, GROOVED OR SCREWED.
2.1.1.A.A. GALVANIZED WHERE SPECIFIED.
2.1.1.B. ASTM A53–63R GRADE B, SCHEDULE 40 ELECTRIC RESISTANCE WELD STEEL FOR NPS 2 ½ TO NPS 10, WELDED.
2.1.1.C. NPS 2½ AND OVER ASTM A53–72A SCHEDULE 10 THIN WALL, ROLLED GROOVED.
2.1.1.D. ASTM A53–63R GRADE B ELECTRIC RESISTANCE WELD STEEL 9.53 MM (0.375 IN) WALL THICKNESS FOR NPS 12 AND OVER, WELDED.
2.1.2. PIPE HANGERS:
2.1.2.A. UL/ULC LISTED FOR FIRE PROTECTION, AND
2.1.2.B. SWIVEL RING HANGER TYPE OR
2.1.2.C. AS SPECIFIED IN SECTION 20 05 29 HANGERS AND SUPPORTS.
2.1.3. GASKETS FOR FLANGED JOINTS:
2.1.3.A. RED RUBBER SHEET 1.6 MM (1/16 IN) THICK.
2.2. FITTINGS, AND VALVES UP TO 1200 KPA (175 PSI) WORKING PRESSURE
2.2.1. FITTINGS:
2.2.1.A. 1035 KPA (150 #) BLACK MALLEABLE IRON SCREWED UP TO NPS 2.
2.2.1.B. FORGED STEEL, BUTT WELDING SCHEDULE 40 FOR NPS 2½ AND OVER.
2.2.2. UNIONS:
2.2.2.A. 1035 KPA (150 #) BLACK MALLEABLE GROUND JOINT UNION, BRONZE TO IRON SEAT UP TO NPS 2.
2.2.3. FLANGES:
2.2.3.A. 1035 KPA (150 #) FORGED STEEL, SLIP–ON OR WELD NECK, RAISED FACE STYLE.
2.2.4. VALVES:
2.2.4.A. ULC AND FM LISTED FOR FIRE PROTECTION SERVICE.
2.3. FITTINGS FOR GROOVED PIPE TO 1200 KPA (175 PSI)
2.3.1. COUPLINGS:
2.3.1.A. MALLEABLE OR DUCTILE IRON NPS 2½ AND OVER.
2.3.2. FITTINGS:
2.3.2.A. MALLEABLE IRON OR DUCTILE IRON TO NPS 2½ TO NPS 12.
2.3.2.B. FABRICATED STEEL NPS 14 AND OVER.
2.3.3. FLANGES:
2.3.3.A. CAST IRON, RAISED FACE FLANGE WITH COUPLING GROOVE NPS 2½ AND OVER.
2.3.4. GASKETS FOR GROOVED COUPLINGS:
2.3.4.A. EPDM GRADE "E", DRY LUBRICATED.
2.4. BACKFLOW PREVENTER
2.4.1. ULC AND FM LISTED FOR FIRE SERVICE,
2.4.2. DOUBLE CHECK VALVE FOR FIRE SYSTEMS (DCVAF) ASSEMBLIES, TO CSA STANDARD B64.5.1–01
2.4.3. REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLIES FOR FIRE SYSTEMS (RPF) TO CSA STANDARD B64.4.1–01.
3. EXECUTION
3.1. WATER SERVICE CONNECT TO STANDPIPE, SPRINKLER, AND DOMESTIC WATER SYSTEM AS SHOWN.
3.2. PIPING INSTALLATION
3.2.1. GENERAL LAYOUT OF MAINS, RISERS, RUN–OUTS AND CONNECTION DETAILS OF PIPING SYSTEMS ARE SHOWN.
3.2.2. PROVIDE BENDS, EXPANSION LOOPS, HOSES OR JOINTS TO COMPENSATE FOR PIPE SEISMIC MOVEMENT.
3.2.3. ANCHOR, GUIDE AND LATERALLY SUPPORT VERTICAL AND HORIZONTAL PIPING TO SUPPORT FILLED WEIGHT AND ABSORB THRUST UNDER OPERATING CONDITIONS.
3.2.4. ERECT PIPING SO THAT GRAVITY FORCES AND THRUST FROM CHANGES IN DIRECTION DO NOT STRESS CONNECTIONS TO APPARATUS.
3.2.5. SEPARATE COPPER PIPE AND FITTING MATERIALS FROM CONTACT WITH FERROUS MATERIAL WITH DI–ELECTRIC COUPLINGS.
3.2.6. INSTALL DRAIN VALVES AT LOW POINTS IN WATER PIPING SYSTEMS AND IN VALVED RUN–OUTS FROM RISERS SO THAT SYSTEM OR ISOLATED PARTS OF SYSTEM CAN BE DRAINED.
3.3. PREMISES BACKFLOW PROTECTION
3.3.1. PROVIDE A PREMISES BACKFLOW PREVENTION IN ACCORDANCE WITH THE ONTARIO BUILDING CODE.

FIRE EXTINGUISHERS 21 12 29

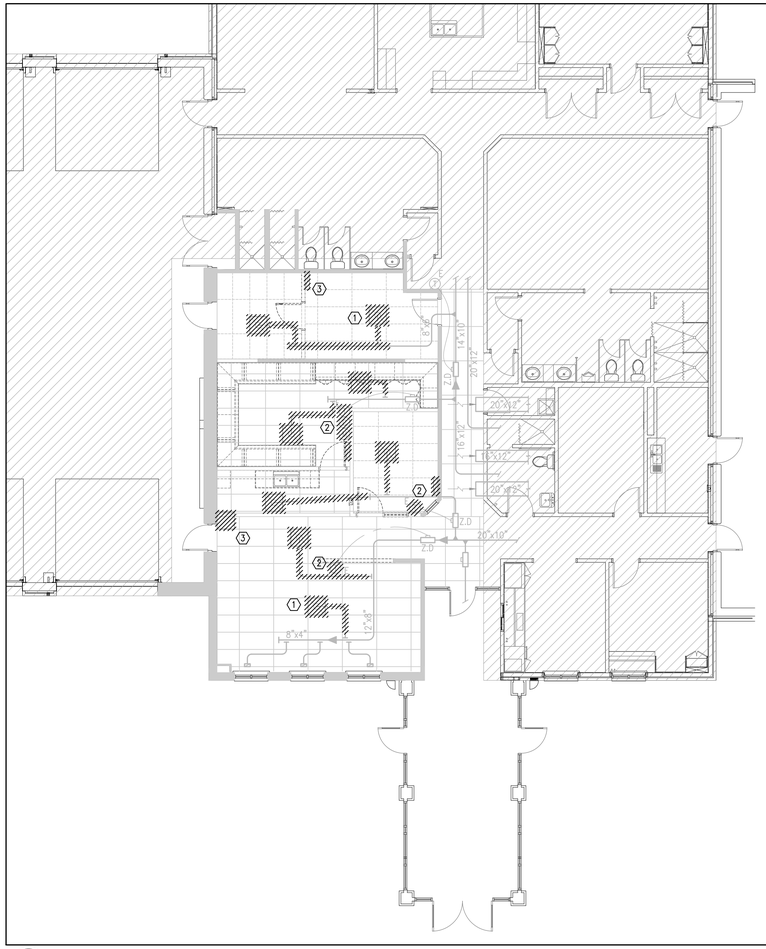
1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE EXTINGUISHERS IN SERVICE ROOMS, KITCHENS AND FIRE HOSE CABINETS.
1.2. APPLICABLE STANDARDS
1.2.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 10 STANDARD FOR PORTABLE FIRE EXTINGUISHERS.
2. PRODUCTS
2.1. PRESSURIZED WATER EXTINGUISHERS (TO MATCH EXISTING)
2.1.1. STORED PRESSURE TYPE, SQUEEZE–GRIP OPERATED OF STAINLESS STEEL CONSTRUCTION, ULC LABELED, 9.1 L (2 GAL) SIZE, 2–A RATING.
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LTD. – MODEL WBDL–W2.5, FLAG FIRE EQUIPMENT LTD – MODEL PWS–25–F
2.2. MULTIPURPOSE DRY CHEMICAL EXTINGUISHERS (IN ALL SERVICE ROOMS)
2.2.1. STORED PRESSURE RECHARGEABLE TYPE WITH HOSE AND SHUT–OFF NOZZLE, ULC LABELED FOR A, B AND C CLASS PROTECTION, RED ENAMEL FINISH. SIZES 2.25 KG (5 LB).
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LIMITED – ABC, FLAG FIRE EQUIPMENT LIMITED – ABC
2.3. ORDINARY DRY CHEMICAL EXTINGUISHERS
2.3.1. STORED PRESSURE TYPE WITH HOSE AND SHUT–OFF NOZZLE, ULC LABELED FOR B AND C CLASS PROTECTION, GLOSSY ENAMEL FINISH. SIZES 2.25 KG (5 LB).
2.3.2. PROVIDE 1.25 KG (2 ? LB) SIZE IF NOT OTHERWISE SHOWN.
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LIMITED – PDC, FLAG FIRE EQUIPMENT LIMITED – PDC
2.4. IDENTIFICATION OF EXTINGUISHERS
2.4.1. INCLUDE BILINGUAL TAG OR LABEL ATTACHED TO EXTINGUISHERS, IN ACCORDANCE WITH RECOMMENDATIONS OF NFPA 10, INDICATING MONTH AND YEAR OF INSTALLATION, WITH SPACE FOR SERVICE DATES.
STANDARD OF ACCEPTANCE: NATIONAL FIRE EQUIPMENT LIMITED – FB–6078, FLAG FIRE EQUIPMENT LIMITED.
3. EXECUTION
3.1. MOUNT CABINETS AND BRACKETS.

STANDPIPE AND HOSE SYSTEMS 21 12 13

1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE STANDPIPE AND HOSE SYSTEMS AS SHOWN WITH HEADER ASSEMBLY, PIPING, SUPERVISED VALVES, FIREHOSE CABINETS, HOSE AND FIRE EXTINGUISHERS.
1.1.2. PROVIDE FIRE RATED PIPE INSULATION ON STANDPIPE RISERS AS SHOWN.
1.1.2.A. FOR GREATER CLARITY, THE CONTRACTOR UNDER THIS SECTION OF THE WORK IS RESPONSIBLE FOR PROVIDING THE STANDPIPE FIRE PROTECTION SYSTEM, INCLUDING ANY SUB–CONTRACTING OF ALL OR A PORTION OF THE WORK TO ANOTHER TRADE.
1.2. APPLICABLE CODES AND STANDARDS
1.2.1. ONTARIO BUILDING CODE
1.2.2. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 14 – STANDARD FOR THE INSTALLATION OF STANDPIPE, PRIVATE HYDRANTS, AND HOSE SYSTEMS
1.2.3. NFPA 25 – STANDARD FOR THE INSPECTION, TESTING AND MAINTENANCE OF WATER–BASED FIRE PROTECTION SYSTEMS
1.2.4. ONTARIO FIRE CODE
1.2.5. ASTM A53 STANDARD SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT–DIPPED, ZINC–COATED, WELDED AND SEAMLESS
1.2.6. COMPONENTS TO BE ULC OR FM LISTED FOR FIRE PROTECTION SERVICE.
1.3. ENGINEERING DATA
1.3.1. STAND PIPE SYSTEM:
1.3.2. HYDRAULICALLY SIZED TO NFPA 14 USING WATER SUPPLY FLOW TEST DATA
1.4. SHOP DRAWINGS AND PRODUCT DATA.
1.4.1. SUBMIT PRODUCT DATA SHEETS FOR:
1.4.1.A. FIRE HOSE CABINETS,
1.4.2. PREPARE AND SUBMIT SHOP DRAWINGS AND HYDRAULIC CALCULATIONS TO AUTHORITIES HAVING JURISDICTION AND OBTAIN APPROVAL BEFORE COMMENCING WORK.
2. PRODUCTS
2.1. GENERAL
2.1.1. PROVIDE FIREHOSE CABINETS, HOSE RACKS, HOSE FITTINGS, FIRE EXTINGUISHERS AND SIAMESE CONNECTIONS, FROM ONE MANUFACTURER/SUPPLIER. PRODUCT MODEL NUMBERS OF NATIONAL FIRE EQUIPMENT LTD. HAVE BEEN USED TO INDICATE CONSTRUCTION FEATURES AND QUALITY STANDARDS NOT OTHERWISE DESCRIBED.
2.2. PIPE, VALVES AND FITTINGS
2.2.1. PIPE AND FITTINGS : TO SECTION 21 05 01
2.2.2. VALVES: TO SECTION 20 05 23
2.3. CABINETS
2.3.1. FLUSH MOUNTED IN FINISHED AREAS, AND SURFACE MOUNTED IN SERVICE AREAS, UNLESS OTHERWISE SHOWN.
2.3.2. ACCOMMODATE ANGLE VALVE, HOSE AND RACK, FIRE HOSE NOZZLE AND SPANNER, FIRE EXTINGUISHER, AND NPS 2½ FIRE DEPARTMENT VALVE.
2.3.3. 1.4 MM (18 GA) STEEL TUB, GLASS CHANNEL DOOR, 2 MM (14 GA) FLUSH ADJUSTABLE PLASTER TRIM WITH DOOR FRAME WITH ROLLED EDGES. FULL REBATE FOR DOOR.
2.3.4. DOOR WITH 6 MM (¼ IN) PLATE GLASS VIEWING PANEL 90% AREA OF DOOR AND THREE FULLY CONCEALED 180 OPENING DOOR HINGES AND CORBIN CATCH OF FLUSH CAST CONSTRUCTION. DOOR FRAME WITH ROLLED EDGES.
2.3.5. STAINLESS STEEL PRESSURIZED WATER FIRE EXTINGUISHER.
2.4. HOSE RACKS FOR CABINETS
2.4.1. MOUNTING AS INDICATED.
2.4.2. SEMIAUTOMATIC OPEN TYPE WITH WATER STOP SIZED FOR [30 M (100 FT)][23 M (75 FT)] OF NPS 1½ HOSE.
2.5. WATER STOP
2.5.1. DESIGNED FOR ONE MAN OPERATION OF HOSE BY HOLDING BACK WATER FLOW UNTIL LAST FOLD OF HOSE IS PULLED FREE FROM RACK.
2.6. FIRE HOSE AND NOZZLE
2.6.1. HOSE: 38 MM (NPS 1½) NOMINAL DIAMETER, [30 M (100 FT)][23 M (75 FT)] LONG, POLYURETHANE LINED 100%%% SYNTHETIC TWISTED POLYESTER FILAMENT TYPE COUPLED WITH CHROME PLATED FORGED BRASS COUPLINGS WITH SPANNER LUGS ON BOTH MALE AND FEMALE ENDS.
2.6.2. NOZZLE TO BE ULC LISTED, 38 MM (NPS 1½) NOMINAL DIAMETER, CHROME PLATED MERLON T–70, ADJUSTABLE COMBINATION FOG–STRAIGHT STREAM WITH SHUT–OFF.
2.7. FIRST AID STREAM ANGLE VALVES
2.7.1. NPS 1½ SIZE, CAST OR FORGED CHROME PLATED BRASS 2070 KPA (300 PSI) WITH HAND WHEEL AND INTEGRAL HYDROLATOR.
2.7.2. NPS 1 ½ SIZE, ADJUSTABLE CHROME PLATED PRESSURE RESTRICTING ANGLE VALVE WITH HAND WHEEL AND INTEGRAL HYDROLATOR CONTROLLING MAXIMUM OUTLET PRESSURE TO 550 KPA (80 PSI), WHERE WATER PRESSURE EXCEEDS 690 KPA (90 PSI).
2.7.3. WHERE WATER PRESSURE EXCEEDS 1050 KPA (150 PSIG) NPS 1½ CHROME PLATED PRESSURE REGUARITY VALVE TO CONTROL OUTLET PRESSURE TO 550 KPA (80 PSIG).
2.8. FIRE DEPARTMENT VALVES
2.8.1. NPS 2 ½ ANGLE, MALE OUTLET, UNDERWRITERS' APPROVED, CHROME PLATED VALVE WITH HANDWHEEL, CAP AND CHAIN MOUNTED IN CABINET UNDER RACK.
2.8.2. VALVE THREAD COMPATIBLE WITH LOCAL FIRE DEPARTMENT HOSE.
2.9. FINISHES
2.9.1. FINISHED AREAS;
2.9.1.A. FIRE HOSE CABINET: PRIME COATED,
2.9.1.B. DOOR AND FRAME: **[NO.4 SATIN FINISH STAINLESS STEEL] [PRIME PAINTED]**
2.9.1.C. VALVES, NOZZLE, FITTINGS, HOSE RACK AND SPANNER: CHROME PLATED.
2.9.2. IN PARKING GARAGES, MECHANICAL AREAS, BOILER ROOMS, PENTHOUSE MECHANICAL ROOMS, AND FAN ROOMS;
2.9.2.A. FIRE HOSE CABINETS: PRIME PAINTED,
2.9.2.B. VALVES, NOZZLE, FITTINGS, HOSE RACK AND SPANNER: BRASS. 2.10 FIRE RATED PIPE INSULATION
2.9.2.C. TYPE: WH; ULC, OR UL CLASSIFIED INORGANIC MATERIAL, NON–COMBUSTIBLE, LISTED FOR PROTECTION OF METALLIC PIPING,
2.9.2.C.A. MEETING ASTM C518,
2.9.2.C.B. FLEXIBLE BLANKET, 1 HOUR FIRE RATING,
2.9.2.C.C. FOIL ENCAPSULATED, F). °F TO 2300 °C (–280 °C TO 1260
2.9.2.C.D. SUITABLE FOR SERVICE BETWEEN:–173
3. EXECUTION
3.1. INSTALLATION
3.1.1. INSTALL WATER PIPING AND FIRE PROTECTION HEADER AS SHOWN. PROVIDE SUPERVISED ISOLATING VALVES AND RUN PIPING TO FIRE HOSE CABINETS.
3.2. PROTECTION OF STANDPIPE RISERS
3.2.1. INSTALL STANDPIPE RISERS IN EXIT STAIR WELLS, FIRE RATED SERVICE SPACES, OR PROVIDE FIRE RATED PIPE INSULATION.
3.2.2. PROVIDE 1 HR FIRE–RATED PIPE INSULATION OF PIPING AND HANGERS FOR THE FOLLOWING:
3.2.2.A. STANDPIPE RISERS, ORIENTED IN THE VERTICAL, HORIZONTAL OR AT AN ANGLE, WHICH ARE NOT LOCATED IN EITHER AN EXIT STAIR OR SERVICE SPACES WHICH ARE CONSTRUCTED WITH A FIRE RESISTANCE RATING EQUIVALENT TO A VERTICAL SERVICE SPACE.
3.2.2.B. HORIZONTAL OFFSETS OF STANDPIPES NOT ENCLOSED IN EXIT STAIR SHAFTS OR FIRE RATED SERVICE SPACES.
3.2.2.C. LATERAL PIPING SERVING CLASS I AND CLASS III 65MM (2½ THE SAME FLOOR LEVEL.
3.2.2.D. WRAP PIPE HANGERS IN ACCORDANCE WITH THE FIRE–RATED INSULATION MANUFACTURER LISTED INSTALLATION INSTRUCTIONS.
3.2.3. EXCEPTION FOR SPRINKLERED BUILDINGS:
3.2.3.A. FIRE RATED PIPE INSULATION IS NOT REQUIRED IN BUILDINGS WITH AN APPROVED AUTOMATIC SPRINKLER) HOSE CONNECTIONS ON THE SAME FLOOR. "SYSTEM FOR LATERAL PIPING SERVING CLASS I AND III 65MM (2½) HOSE VALVES / FIRE HOSE CABINETS ONLY"
3.2.4. FOR GREATER CLARITY, LATERAL PIPING SERVING CLASS II 1½ DO NOT REQUIRE PROTECTION.
3.2.5. FOR GREATER CLARITY, FEED MAIN PIPING, FROM THE ENTRY TO THE BUILDING AND UP TO THE SERVICE VALVE ISOLATING A STANDPIPE RISER, DOES NOT REQUIRE PROTECTION.

WET PIPE SPRINKLER SYSTEM 21 13 13

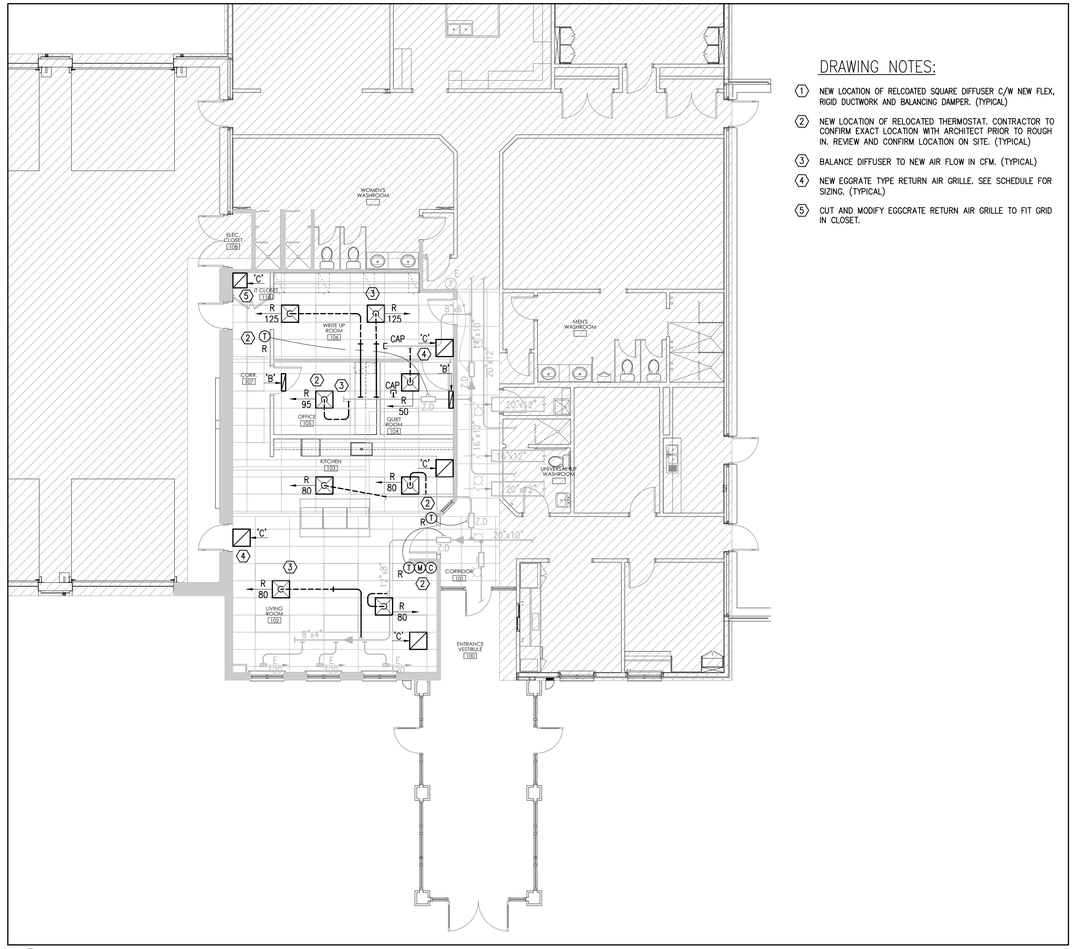
1. GENERAL
1.1. SCOPE
1.1.1. PROVIDE WET PIPE AUTOMATIC SPRINKLER SYSTEMS.
1.1.2. PROVIDE INSTALLATION DRAWINGS AND HYDRAULIC CALCULATIONS, DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENCED IN THE PROVINCE OF ONTARIO.
1.2. QUALIFIED SUBCONTRACTORS
1.2.1. SPRINKLER WORK TO BE UNDERTAKEN BY SPECIALIST AUTOMATIC SPRINKLER INSTALLATION FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD.
1.3. APPLICABLE CODES AND STANDARDS
1.3.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 13 – STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS
1.3.2. NFPA 25 – STANDARD FOR THE INSPECTION, TESTING AND MAINTENANCE OF WATER–BASED FIRE PROTECTION SYSTEMS
1.3.3. ONTARIO BUILDING CODE
1.3.4. ONTARIO FIRE CODE
1.3.5. ASTM A53 STANDARD SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT–DIPPED, ZINC–COATED, WELDED AND SEAMLESS
1.3.6. CSA B64 – BACKFLOW PREVENTERS AND VACUUM BREAKERS
1.4. SHOP DRAWINGS AND PRODUCT DATA
1.4.1. PREPARE SHOP DRAWINGS AND FORWARD THREE COPIES WITH HYDRAULIC CALCULATIONS TO OWNERS INSURERS FOR REVIEW AND ACCEPTANCE.
1.4.2. AFTER SHOP DRAWINGS ARE ACCEPTED BY REVIEWING AUTHORITY SUBMIT COPIES OF THESE STAMPED SHOP DRAWINGS AND PRODUCT DATA SHEETS FOR REVIEW IN ACCORDANCE WITH DIVISION 1 PROCEDURES.
1.5



DRAWING NOTES:

1. REMOVE AND RELOCATE EXISTING DIFFUSER. RELOCATED DIFFUSER TO BE CLEANED AND CHECKED FOR DAMAGE BEFORE RE-INSTALLING. SUPPLY NEW FLEX AND RIGID DUCTWORK. (TYPICAL).
2. REMOVE EXISTING THERMOSTAT C/W ALL WIRING AND COIL UP NEAR ZONE DAMPER UNTIL READY TO RELOCATE. REPAIR AND PATCH EXISTING WALL AND MAKE GOOD. (TYPICAL)
3. REMOVE AND DISPOSE EXISTING RETURN AIR GRILLE. (TYPICAL)

1 M-2.0 HVAC LAYOUT – DEMO
1:100



DRAWING NOTES:

1. NEW LOCATION OF RELCOATED SQUARE DIFFUSER C/W NEW FLEX, RIGID DUCTWORK AND BALANCING DAMPER. (TYPICAL)
2. NEW LOCATION OF RELOCATED THERMOSTAT. CONTRACTOR TO CONFIRM EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. REVIEW AND CONFIRM LOCATION ON SITE. (TYPICAL)
3. BALANCE DIFFUSER TO NEW AIR FLOW IN CFM. (TYPICAL)
4. NEW EGGRATE TYPE RETURN AIR GRILLE. SEE SCHEDULE FOR SIZING. (TYPICAL)
5. CUT AND MODIFY EGGCRATE RETURN AIR GRILLE TO FIT GRID IN CLOSET.

2 M-2.0 HVAC LAYOUT – NEW
1:100

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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York Region

no.	date	by	description

REVISIONS

03	14MAY21		RE-ISSUED FOR TENDER
02	17FEB21		ISSUED FOR PERMIT/TENDER
01	27JAN21		ISSUED FOR DRAWING REVIEW
no.	date	by	description

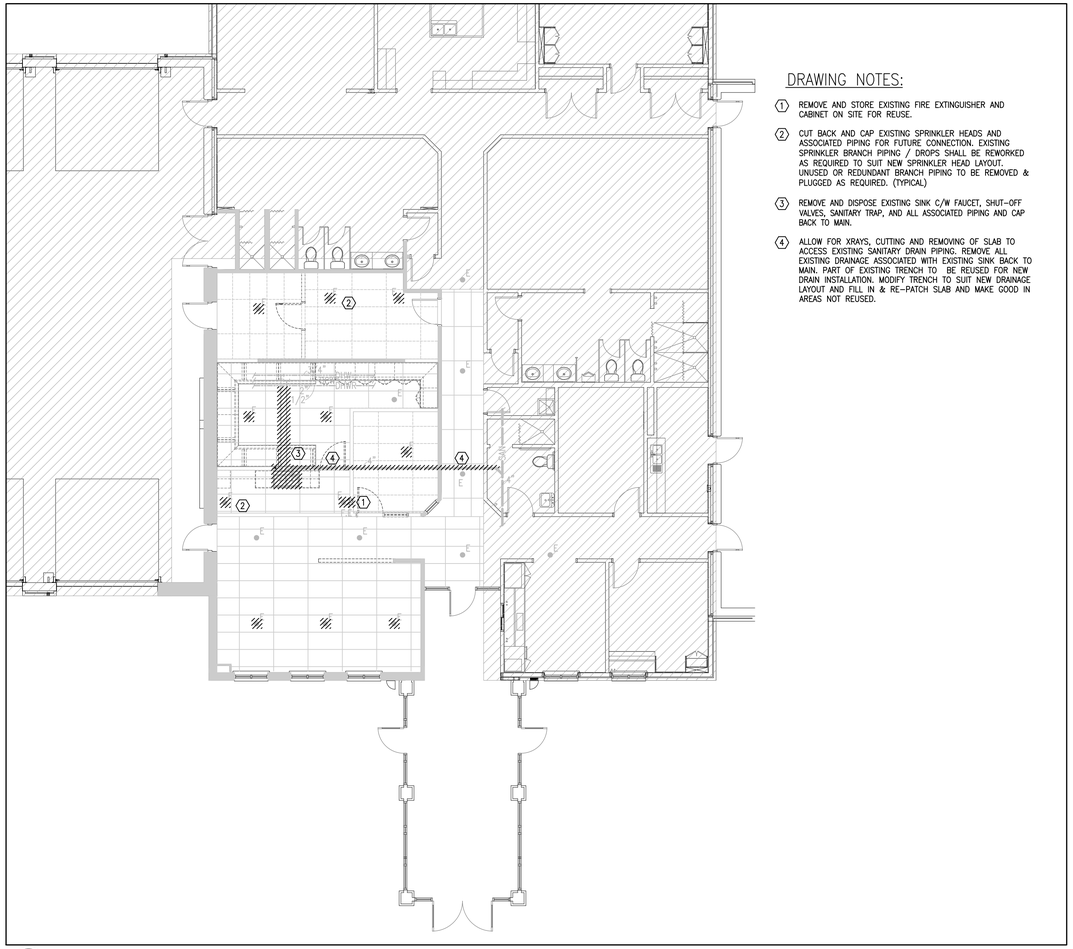
ISSUED

LICENSED PROFESSIONAL ENGINEER
K.P. O'NEILL
100055807
2202027
PROVINCE OF ONTARIO

project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
HVAC LAYOUT

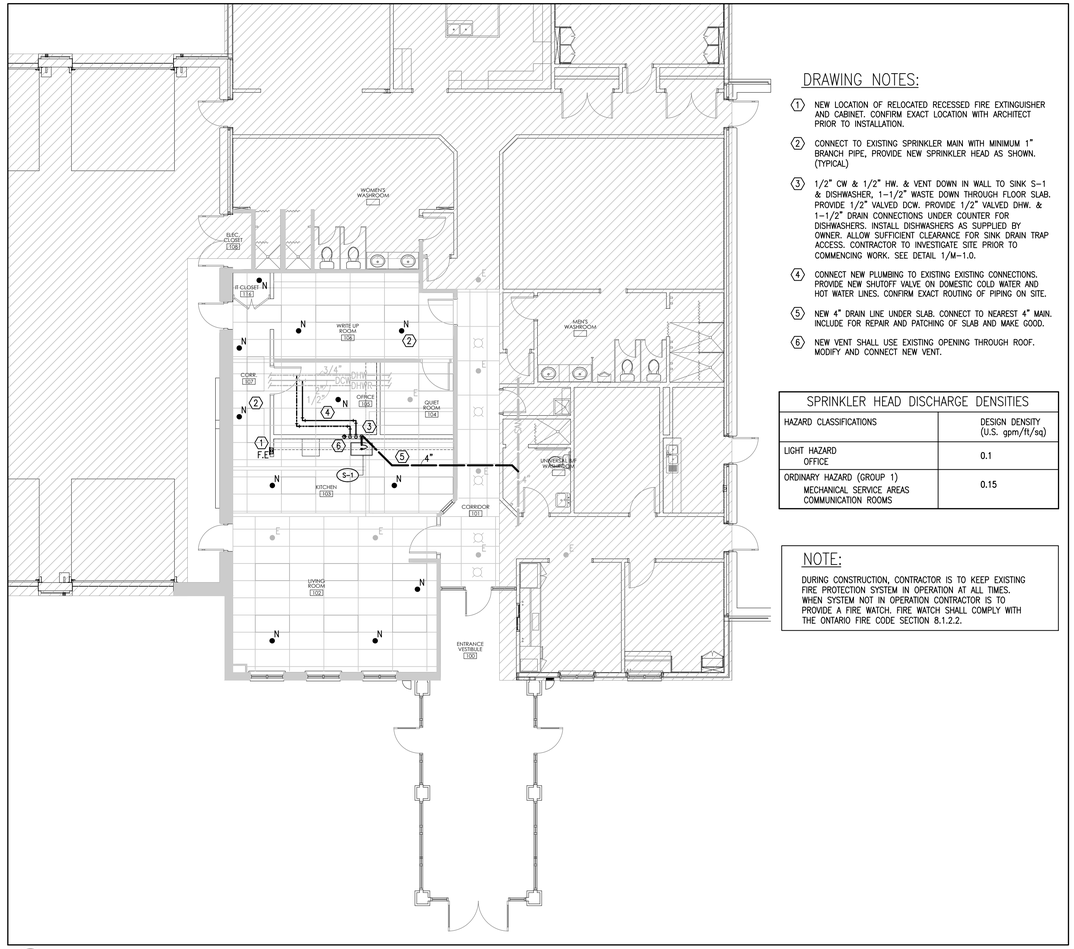
date 01-14-2021		project no. 2202027
drawn by FS		
checked by DP		drawing no. M-2.0
scale 1:100		



DRAWING NOTES:

1. REMOVE AND STORE EXISTING FIRE EXTINGUISHER AND CABINET ON SITE FOR REUSE.
2. CUT BACK AND CAP EXISTING SPRINKLER HEADS AND ASSOCIATED PIPING FOR FUTURE CONNECTION. EXISTING SPRINKLER BRANCH PIPING / DROPS SHALL BE REWORKED AS REQUIRED TO SUIT NEW SPRINKLER HEAD LAYOUT. UNUSED OR REDUNDANT BRANCH PIPING TO BE REMOVED & PLUGGED AS REQUIRED. (TYPICAL)
3. REMOVE AND DISPOSE EXISTING SINK C/W FAUCET, SHUT-OFF VALVES, SANITARY TRAP, AND ALL ASSOCIATED PIPING AND CAP BACK TO MAIN.
4. ALLOW FOR XRAYS, CUTTING AND REMOVING OF SLAB TO ACCESS EXISTING SANITARY DRAIN PIPING. REMOVE ALL EXISTING DRAINAGE ASSOCIATED WITH EXISTING SINK BACK TO MAIN. PART OF EXISTING TRENCH TO BE REUSED FOR NEW DRAIN INSTALLATION. MODIFY TRENCH TO SUIT NEW DRAINAGE LAYOUT AND FILL IN & RE-PATCH SLAB AND MAKE GOOD IN AREAS NOT REUSED.

1 M-3.0 PLUMBING & FIRE PROTECTION LAYOUT – DEMO
1:100



DRAWING NOTES:

1. NEW LOCATION OF RELOCATED RECESSED FIRE EXTINGUISHER AND CABINET. CONFIRM EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.
2. CONNECT TO EXISTING SPRINKLER MAIN WITH MINIMUM 1" BRANCH PIPE, PROVIDE NEW SPRINKLER HEAD AS SHOWN. (TYPICAL)
3. 1/2" CW & 1/2" HW. & VENT DOWN IN WALL TO SINK S-1 & DISHWASHER, 1-1/2" WASTE DOWN THROUGH FLOOR SLAB. PROVIDE 1/2" VALVED DCW. PROVIDE 1/2" VALVED DHW. & 1-1/2" DRAIN CONNECTIONS UNDER COUNTER FOR DISHWASHERS. INSTALL DISHWASHERS AS SUPPLIED BY OWNER. ALLOW SUFFICIENT CLEARANCE FOR SINK DRAIN TRAP ACCESS. CONTRACTOR TO INVESTIGATE SITE PRIOR TO COMMENCING WORK. SEE DETAIL 1/M-1.0.
4. CONNECT NEW PLUMBING TO EXISTING EXISTING CONNECTIONS. PROVIDE NEW SHUTOFF VALVE ON DOMESTIC COLD WATER AND HOT WATER LINES. CONFIRM EXACT ROUTING OF PIPING ON SITE.
5. NEW 4" DRAIN LINE UNDER SLAB. CONNECT TO NEAREST 4" MAIN. INCLUDE FOR REPAIR AND PATCHING OF SLAB AND MAKE GOOD.
6. NEW VENT SHALL USE EXISTING OPENING THROUGH ROOF. MODIFY AND CONNECT NEW VENT.

SPRINKLER HEAD DISCHARGE DENSITIES	
HAZARD CLASSIFICATIONS	DESIGN DENSITY (U.S. gpm/ft/sq)
LIGHT HAZARD OFFICE	0.1
ORDINARY HAZARD (GROUP 1) MECHANICAL SERVICE AREAS COMMUNICATION ROOMS	0.15

NOTE:

DURING CONSTRUCTION, CONTRACTOR IS TO KEEP EXISTING FIRE PROTECTION SYSTEM IN OPERATION AT ALL TIMES. WHEN SYSTEM NOT IN OPERATION CONTRACTOR IS TO PROVIDE A FIRE WATCH. FIRE WATCH SHALL COMPLY WITH THE ONTARIO FIRE CODE SECTION 8.1.2.2.

2 M-3.0 PLUMBING & FIRE PROTECTION LAYOUT – NEW
1:100

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
PLUMBING & FIRE PROTECTION LAYOUT

date: 01-14-2021	project no.: 2202027
drawn by: FS	
checked by: DP	drawing no.: M-3.0
scale: 1:100	

DRAWING LIST

DRAWING No.	DRAWING TITLE
E-1.0	ELECTRICAL LEGEND
E-2.0	REFLECTED CEILING PLAN
E-3.0	POWER AND SYSTEMS PLAN
E-4.0	ELECTRICAL DETAILS, AND SINGLE LINE DIAGRAM
E-4.1	ELECTRICAL PANEL SCHEDULES
E-5.0	DEMOLITION REFLECTED CEILING PLAN
E-6.0	DEMOLITION POWER AND SYSTEMS PLAN

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	EXISTING BASE BUILDING LUMINAIRE TO REMOVED AND/OR RELOCATED.
	NEW 2' x 4' 120V LED LIGHT FIXTURE, 4000K, 0-10V DIMMING, MAX 50 WATTS, 6000 LUMEN. LITELINE - FORUM LED PANEL LIGHT #LEDP-24-WH-40-50-1 CONTACT: LITELINE / 416-996-1856
	NEW 4' 120V LED STRIP LIGHT, 4000K, MAX 20 WATTS, 3000 LUMENS. COOPER - #4SNLED-L04-305L-LN-UNV-L840-1 CONTACT: COOPER LIGHTING SOLUTIONS

NEW	EXISTING	DESCRIPTION
		CEILING MOUNTED RECESSED EDGE LIT GREEN RUNNING MAN EXIT SIGN. FACES AND DIRECTIONAL ARROWS SHALL BE CONFIRMED ON SITE. MATCH NEW BASE BUILDING STANDARD. LED SERIES FLUSH MOUNTED.
		SAME AS ABOVE EXCEPT WALL MOUNTED.
		RECESSED INCANDESCENT DOWNLIGHT FIXTURE.
		120V WALL MOUNTED LIGHT SWTICH. 'D' DENOTES DIMMER. CONTRACTOR TO ENSURE COMPATIBILITY OF SWITCH WITH DRIVER WITH MANUFACTURE PRIOR TO INSTALLATION. '3' DENOTES 3-WAY SWITCH.
		WALL MOUNTED 120V, 15A GROUNDED DUPLEX RECEPTACLE.
USB	USB	WALL MOUNTED 120V, 15A GROUNDED DUPLEX RECEPTACLE WITH USB. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A T-SLOT GROUNDED DUPLEX RECEPTACLE WITH USB. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A T-SLOT GROUNDED DUPLEX RECEPTACLE WITH USB.
		WALL MOUNTED 120V, 15A GROUNDED DUPLEX RECEPTACLE AT NON-STANDARD HEIGHT. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 15A GROUNDED QUAD DUPLEX RECEPTACLE AT NON-STANDARD HEIGHT. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A GFCI RECEPTACLE. ALL GFCI RECEPTACLES TO BE SEPARATE CIRCUIT AND HAVE 20A CIRCUIT BREAKER IN PANEL. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED 120V, 20A GFCI QUAD RECEPTACLE. ALL GFCI RECEPTACLES TO BE SEPARATE CIRCUIT AND HAVE 20A CIRCUIT BREAKER IN PANEL. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
A	A	'A' CLUSTER CONFIGURATION. EACH TO RECEIVE: (2) VOICE/DATA, (2) COMBINATION DUPLEX/USB RECEPTACLE. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
B	B	'B' CLUSTER CONFIGURATION. EACH TO RECEIVE: (2) VOICE/DATA, (2) COMBINATION DUPLEX/USB RECEPTACLE, (2) BACK BOX FOR HDMI CABLING. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.
		WALL MOUNTED VOICE/DATA OUTLET.
		ELECTRICAL PANEL.
CR	CR	CARD READER.
ES	ES	ELECTRIC STRIKE.
DC	DC	DOOR CONTACT.
REX	REX	REQUEST TO EXIT.
		FIRE ALARM BELL.
		NEW FIRE ALARM CEILING MOUNTED SMOKE DETECTOR.
		EXISTING WALL MOUNTED AND CEILING MOUNTED STANDALONE SMOKE ALARM.
		EXISTING WALL MOUNTED AND CEILING MOUNTED CARBON MONOXIDE DETECTOR.
C		EXISTING DOOR CHIME/BUZZER.
		EXISTING FIRE ALARM MIRCOM FA1000 PANEL.
		NEW FIRE RATED PLYWOOD.
1 / E4		DETAIL 1, DRAWING E-4 } REFER TO DETAIL 1, ON DRAWING #E-4. (EXAMPLE).
E		DENOTES EXISTING ITEM TO REMAIN.
R		DENOTES EXISTING ITEM TO BE REMOVED.
RL		DENOTES EXISTING ITEM IN RELOCATED POSITION. REUSE EXISTING ITEMS, UNLESS OTHERWISE NOTED.
RR		DENOTES EXISTING ITEM TO BE REMOVED AND REINSTALLED/RELOCATED IN SAME POSITION OR VICINITY.
TYP		DENOTES TYPICAL THROUGHOUT.
NL		DENOTES NIGHT LIGHT.

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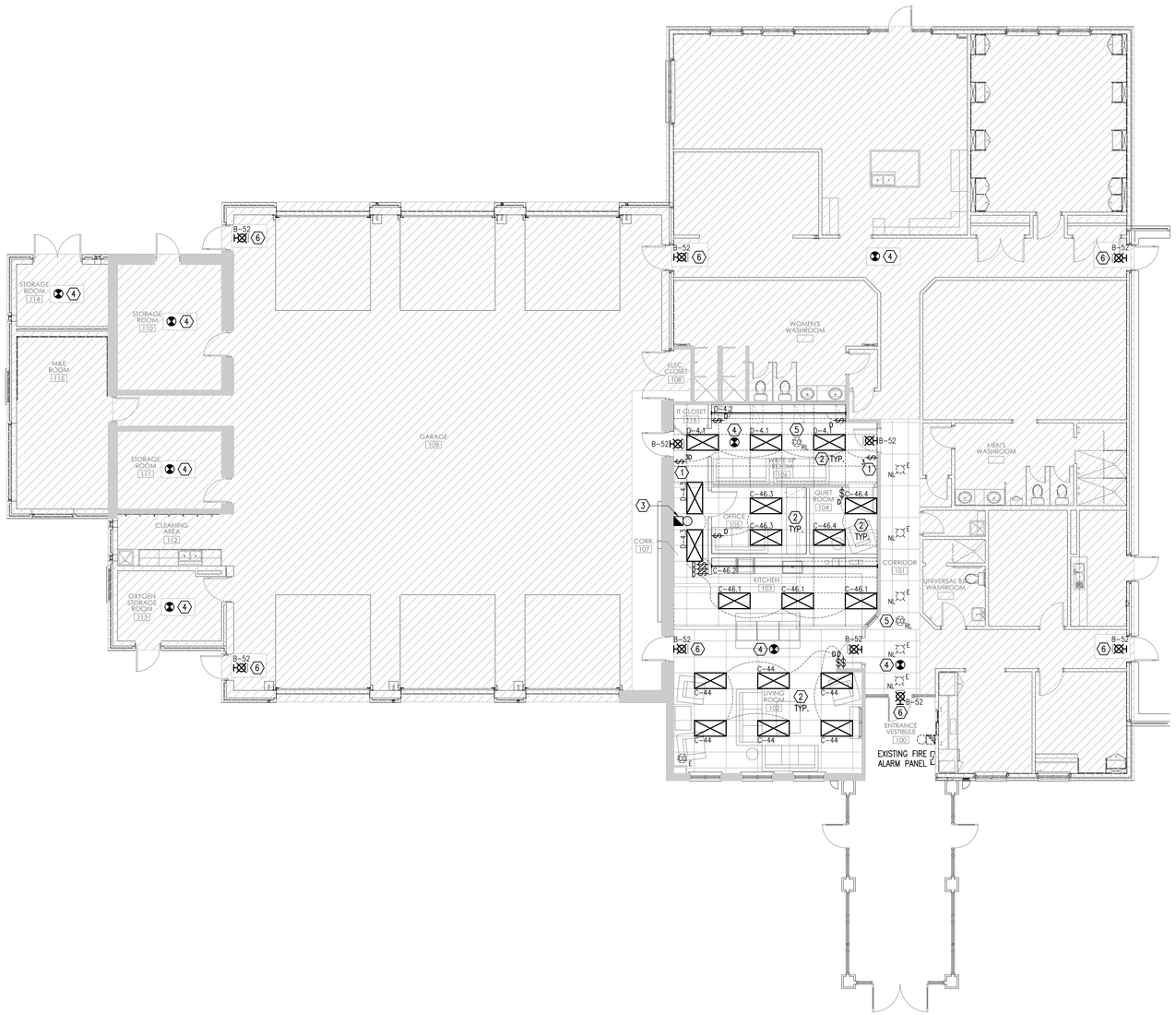
ISSUED

LICENSED PROFESSIONAL ENGINEER
R.I. TIBBS
2202027
PROVINCE OF ONTARIO

project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
ELECTRICAL LEGEND

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-1.0
scale: NTS	



DRAWING NOTES:

1. NEW 3-WAY LIGHTING SWITCHES TO CONTROL AND SUIT NEW LED LIGHTING FIXTURE LAYOUT IN WRITE UP ROOM 106. ONE (1) OF THE TWO (2) NEW 3-WAY SWITCHES TO HAVE DIMMING CAPABILITIES AS SHOWN.
2. REUSE EXISTING 120V LIGHTING CIRCUITS FROM DEMOLITION FOR NEW LED LIGHTING FIXTURE LAYOUT. TYPICAL.
3. NEW FIRE ALARM BELL TO BE INSTALLED AND CONNECTED TO EXISTING MIRCOM FA1000 FIRE ALARM PANEL LOCATED IN MAIN ENTRANCE. NEW FIRE ALARM BELL TO MATCH EXISTING BASE BUILDING BELLS.
4. NEW SMOKE DETECTORS TO BE INSTALLED AND CONNECTED TO EXISTING MIRCOM FA1000 FIRE ALARM PANEL LOCATED IN MAIN ENTRANCE.
5. EXISTING CARBON MONOXIDE DETECTOR SHOWN IN PROPOSED LOCATION. FINAL LOCATION TO BE COORDINATED ON SITE.
6. EXISTING RED EXIT SIGNAGE TO BE REMOVED AND REPLACED WITH NEW GREEN PICTOGRAM RUNNING MAN EXIT SIGN. CIRCUIT TO BE REUSED.

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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project title
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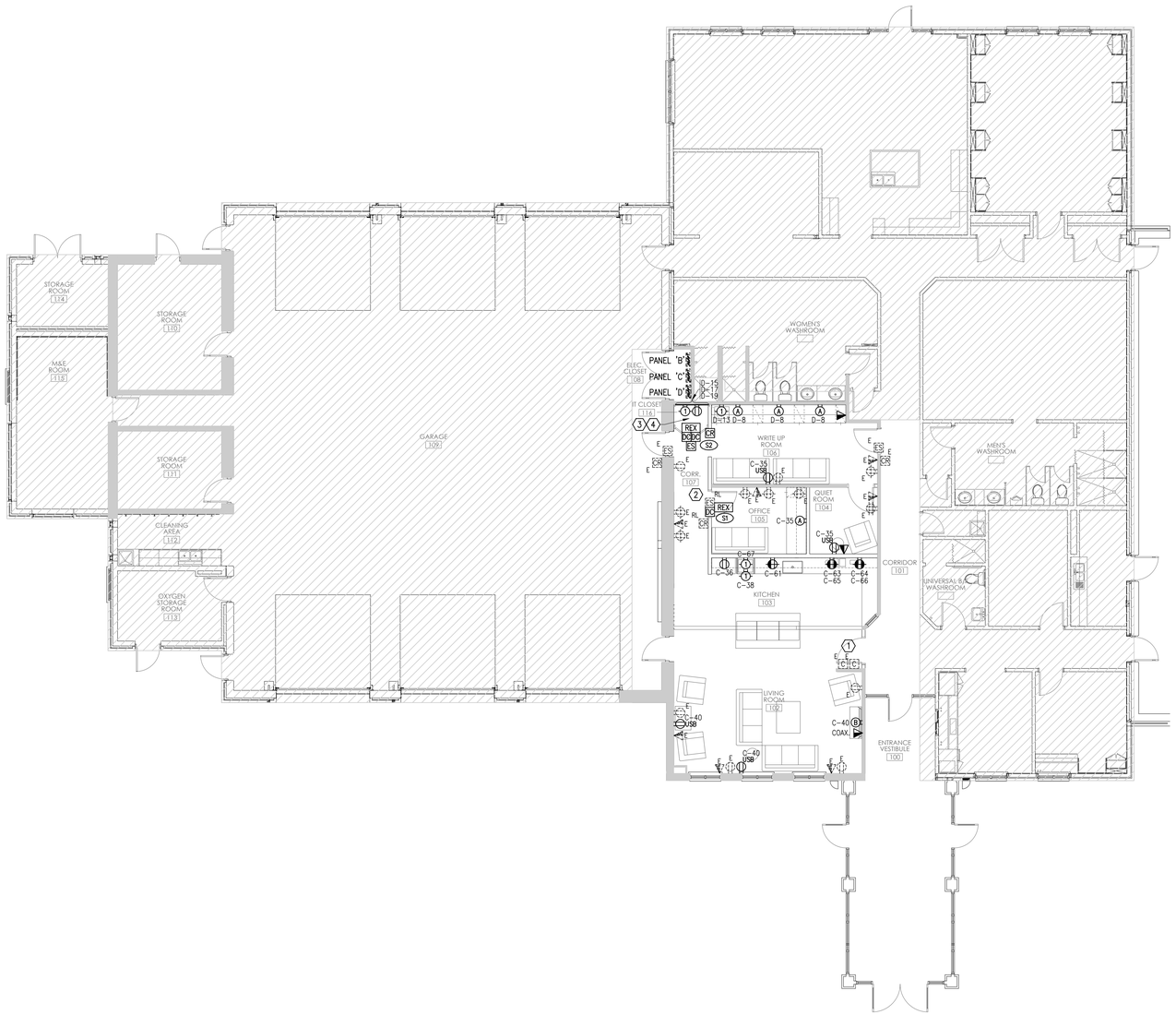
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
REFLECTED CEILING PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-2.0
scale: 1:100	



DRAWING NOTES:

1. EXISTING FRONT DOOR CHIME AND BACK DOOR BUZZER FINAL LOCATION TO BE DETERMINED ON SITE. RELOCATE AS NECESSARY.
2. CARD READER AND ELECTRIC STRIKE SHOWN IN PROPOSED LOCATION. FINAL LOCATION TO BE COORDINATED ON SITE.

   CONTRACTOR TO PROVIDE ITEMIZED PRICE FOR NEW ELECTRIC STRIKE TO SUIT NEW DOOR HARDWARE IN OFFICE 105.
3. IT CLOSET TO INCLUDE DEDICATED 15A CIRCUIT FOR MOH EQUIPMENT, AND L20-5R RECEPTACLE FOR APC 2200 COMPLETE WITH FIRE RATED PLYWOOD ON WALL.
4. CONTRACTOR TO INSTALL TELECOMMUNICATION GROUND BAR IN IT CLOSET. FINAL LOCATION TO BE DETERMINED ON SITE PRIOR TO INSTALLATION.

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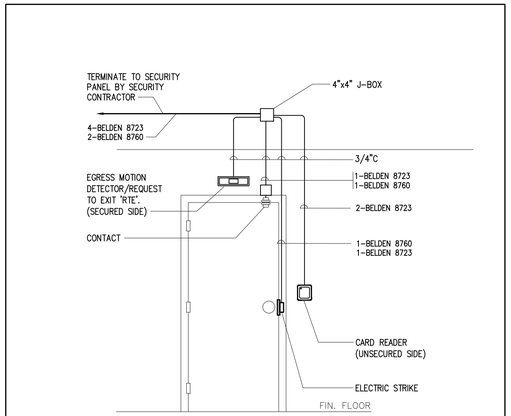
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

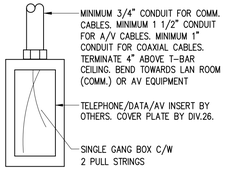
drawing title
POWER AND SYSTEMS PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-3.0
scale: 1:100	

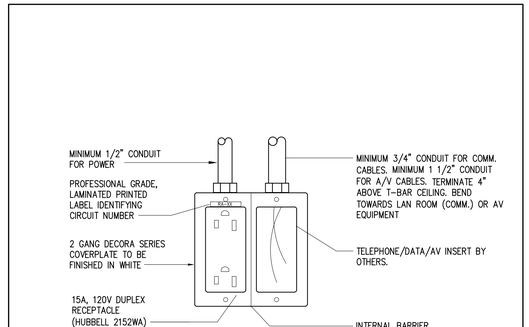


GENERAL NOTE:
CONTRACTOR TO INCLUDE FOR STOREROOM FUNCTION LOCKSET TO ACCOMMODATE STRIKE.

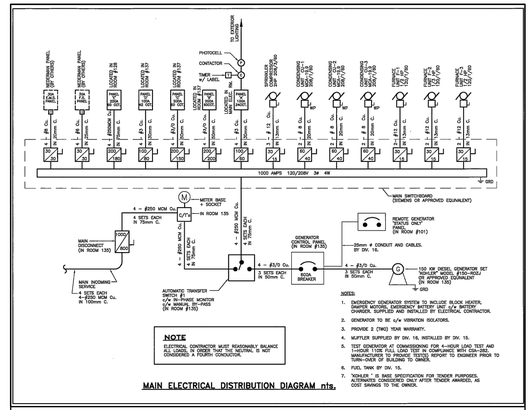
6 / E4.0 TYPICAL SECURITY ROUGH-IN FOR ELECTRIC STRIKE DOOR:
SYMBOL: (S1) N.T.S.



3 / E4.0 DETAIL OF WALL MOUNTED COMMUNICATIONS OUTLET:
SYMBOL: ▽ N.T.S.



2 / E4.0 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET:
SYMBOL: ▽ N.T.S.

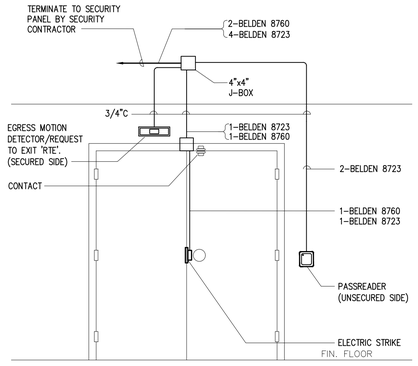


NOTE
ELECTRICAL CONTRACTOR MUST ROUGHLY BALANCE PHASE LOADS. NEUTRAL CONDUCTOR SHALL BE NOT CONSIDERED A FOURTH CONDUCTOR.

MAIN ELECTRICAL DISTRIBUTION DIAGRAM nts.

GENERAL NOTE:
1. ALL EQUIPMENT IS EXISTING TO REMAIN UNLESS OTHERWISE NOTED

1 / E4.0 111 RACCO PARKWAY ELECTRICAL DISTRIBUTION SINGLE LINE DIAGRAM
SCALE: NTS

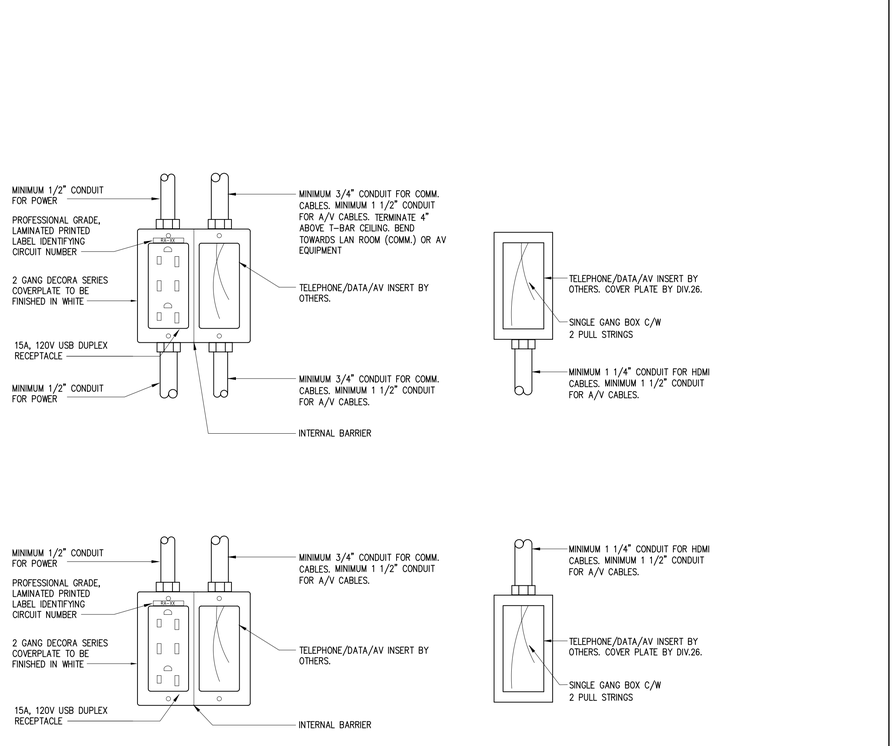


GENERAL NOTE:
CONTRACTOR TO INCLUDE FOR STOREROOM FUNCTION LOCKSET TO ACCOMMODATE STRIKE.

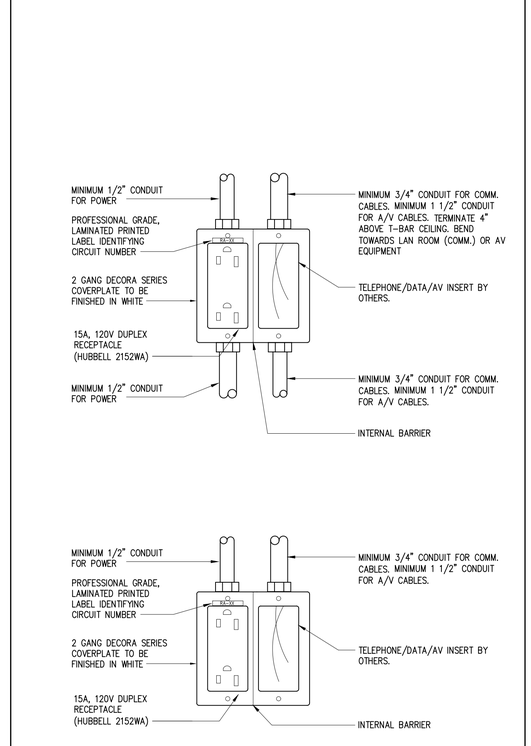
7 / E4.0 TYPICAL SECURITY ROUGH-IN FOR ELECTRIC STRIKE DOOR:
SYMBOL: (S2) N.T.S.

SECURITY SYSTEMS NOTES:

1. ALL CONDUITS, WIRING & OUTLET BOXES TO BE SUPPLIED AND INSTALLED BY DIVISION 26. ALL DEVICES ASSOCIATED WITH SECURITY TO BE BY SECURITY VENDOR. ALL TERMINATION'S BY DIVISION 26.
2. ALL JUNCTION BOXES SHALL BE MOUNTED INSIDE SECURE AREA OF FLOOR SPACE.
3. PROVIDE A 1/8" NYLON PULL CORD FOR ALL CONDUIT ASSOCIATED WITH SECURITY.
4. SECURITY WIRING AS SHOWN IS DIAGRAMMATIC ONLY. PROVIDE WIRING AS PER SECURITY SYSTEM MANUFACTURERS REQUIREMENTS.



5 / E4.0 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET:
SYMBOL: (8) N.T.S.



4 / E4.0 DETAIL OF WALL MOUNTED POWER & COMMUNICATIONS OUTLET:
SYMBOL: (A) N.T.S.

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LICENSED PROFESSIONAL ENGINEER
R.I. TIBBS
2202027
PROVINCE OF ONTARIO

project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
ELECTRICAL DETAILS, SINGLE LINE DIAGRAM, AND PANEL SCHEDULES

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-4.0
scale: NTS	

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PANEL DESIGNATION: PANEL D

PROJECT NAME: YORK REGION PARAMEDIC SERVICES – 111 RACCO PKWY

JOB No. **2202027** | CALCULATED BY: RD | DATE: FEB 2021 | MAINS: 100A | VOLTAGE: 120/208V, 3ø, 4W

LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PHASE A	PHASE B	PHASE C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION
EXISTING CCT	40A	1	●			2	15A	EXISTING CCT
		3		●		4	15A	EXISTING CCT
EXISTING CCT	40A	5			●	6	15A	EXISTING CCT
		7	●			8	15A	PLUGS RM 106/107
EXISTING CCT	40A	9		●		10	15A	EXISTING CCT
		11			●	12	15A	EXISTING CCT
* PRINTER/COPIER 106	20A	13	●			14	15A	EXISTING CCT
IT CLOSET 106 MOH EQUIPMENT	15A	15		●		16	15A	EXISTING CCT
* IT CLOSET 106 APC 2200	20A	17			●	18	15A	EXISTING CCT
IT CLOSET 106 P.A. SYSTEM AMP.	15A	19	●			20	15A	EXISTING CCT
SPARE	15A	21		●		22	15A	EXISTING CCT
SPARE	15A	23			●	24	15A	EXISTING CCT
SPARE	15A	25	●			26	15A	EXISTING CCT
SPARE	15A	27		●		28	15A	EXISTING CCT
SPARE	15A	29			●	30		SPACE
SPACE		31	●			32		SPACE
SPACE		33		●		34		SPACE
SPACE		35			●	36		SPACE
SPACE		37	●			38		SPACE
SPACE		39		●		40		SPACE
SPACE		41			●	42		SPACE

SURFACE MOUNTED: ☒ FLUSH MOUNTED: ☐ * DENOTES NEW BREAKER

NEW: ☐ EXISTING: ☒

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PANEL DESIGNATION: PANEL C

PROJECT NAME: YORK REGION PARAMEDIC SERVICES – 111 RACCO PKWY

JOB No. **2202027** | CALCULATED BY: RD | DATE: FEB 2021 | MAINS: 200A | VOLTAGE: 120/208V, 3ø, 4W

LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PHASE A	PHASE B	PHASE C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION
EXISTING CCT	40A	1	●			2		
		3		●		4	15A	EXISTING CCT
EXISTING CCT	15A	5			●	6		
EXISTING CCT	15A	7	●			8	15A	EXISTING CCT
EXISTING CCT	15A	9		●		10	15A	EXISTING CCT
EXISTING CCT	15A	11			●	12	15A	EXISTING CCT
EXISTING CCT	15A	13	●			14	15A	EXISTING CCT
EXISTING CCT	15A	15		●		16	15A	EXISTING CCT
EXISTING CCT	15A	17			●	18	15A	EXISTING CCT
EXISTING CCT	15A	19	●			20	20A	EXISTING CCT
EXISTING CCT	15A	21		●		22	15A	EXISTING CCT
EXISTING CCT	15A	23			●	24	15A	EXISTING CCT
EXISTING CCT	15A	25	●			26		SPACE
EXISTING CCT	15A	27		●		28	15A	EXISTING CCT
EXISTING CCT	15A	29			●	30	15A	EXISTING CCT
EXISTING CCT	15A	31	●			32	15A	EXISTING CCT
EXISTING CCT	15A	33		●		34	15A	EXISTING CCT
PLUGS RM 104/105	15A	35			●	36	15A	FRIDGE 103
EXISTING CCT	15A	37	●			38	20A	MICROWAVE 103 *
EXISTING CCT	15A	39		●		40	15A	PLUGS RM 102
EXISTING CCT	15A	41			●	42	15A	EXISTING CCT
EXISTING CCT	15A	43	●			44	15A	EXISTING CCT
EXISTING CCT	15A	45		●		46	15A	EXISTING CCT
EXISTING CCT	15A	47			●	48	15A	EXISTING CCT
EXISTING CCT	15A	49	●			50	15A	EXISTING CCT
EXISTING CCT	15A	51		●		52	15A	EXISTING CCT
EXISTING CCT	20A	53			●	54	15A	EXISTING CCT
		55	●			56	15A	EXISTING CCT
EXISTING CCT	30A	57		●		58	30A	EXISTING CCT
		59			●	60		
* KITCHEN GFCI 103	20A	61	●			62		SPACE
* KITCHEN GFCI 103	20A	63		●		64	20A	KITCHEN GFCI 103 *
* KITCHEN GFCI 103	20A	65			●	66	20A	KITCHEN GFCI 103 *
* MICROWAVE 103	20A	67	●			68		SPACE
SPACE		69		●		70		SPACE
SPACE		71			●	72		SPACE

SURFACE MOUNTED: ☒ FLUSH MOUNTED: ☐ * DENOTES NEW BREAKER

NEW: ☐ EXISTING: ☒

BENNETT

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1127 Leslie Street, Toronto, ON, M3C 2J6 Canada
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York Region

no.	date	by	description

REVISIONS

no.	date	by	description
04	14MAY2021	RD	RE-ISSUED FOR TENDER
03	05MAY2021	RD	RE-ISSUED FOR TENDER
02	17FEB2021	RD	ISSUED FOR PERMIT/TENDER
01	27JAN2021	RD	ISSUED FOR DRAWING REVIEW

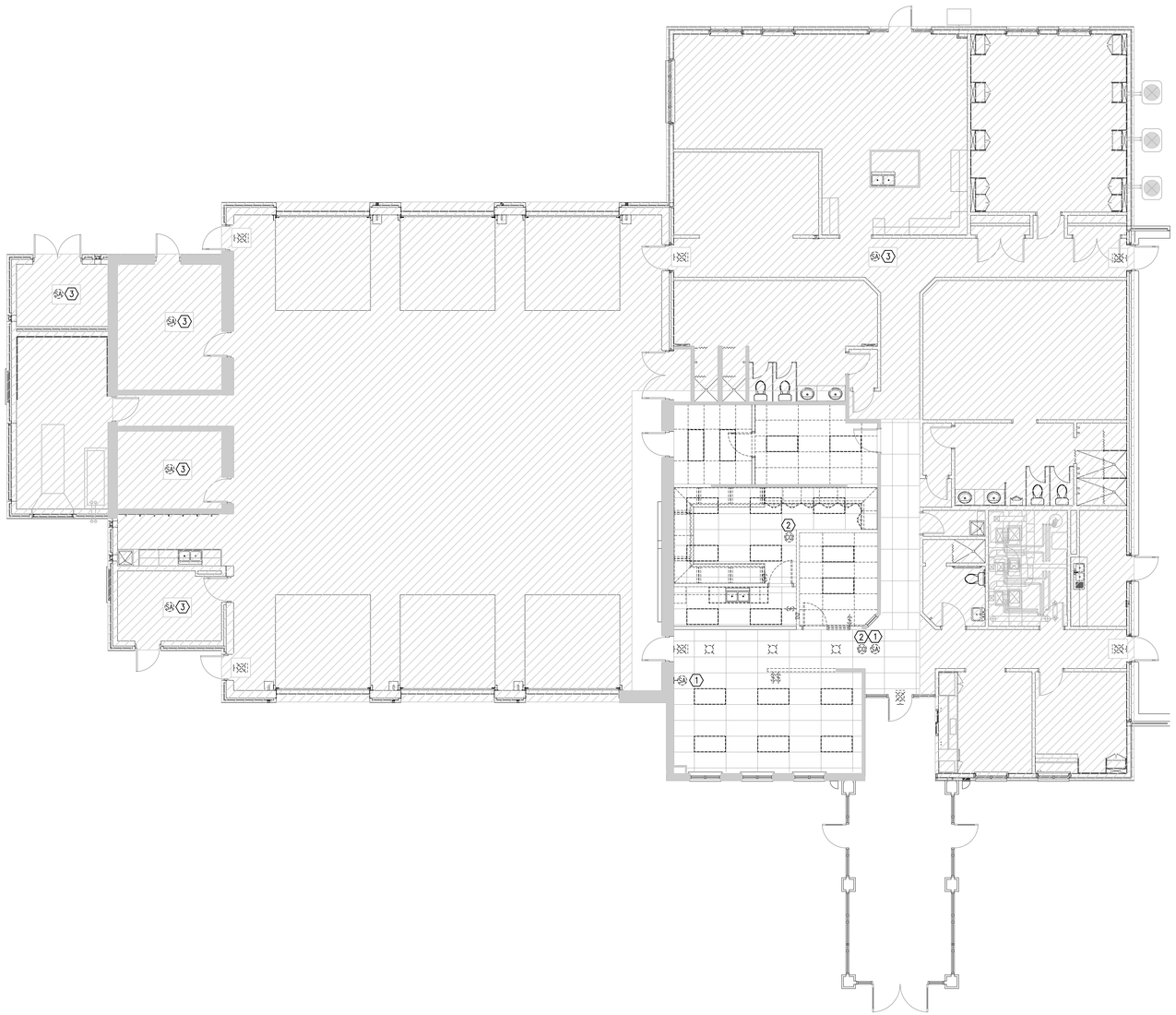
ISSUED

LICENSED PROFESSIONAL ENGINEER
R.I. TIBBS
2202027
PROVINCE OF ONTARIO

project title
YORK REGION
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title
ELECTRICAL PANEL SCHEDULES

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-4.1
scale: NTS	



DRAWING NOTES:

1. EXISTING 120V STANDALONE SMOKE ALARM TO BE REMOVED. WIRING AND CONDUIT TO BE CUT BACK TO SOURCE.
2. EXISTING CARBON MONOXIDE DETECTOR TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-2.0 – REFLECTED CEILING PLAN.
3. EXISTING 120V STANDALONE SMOKE ALARM TO BE REMOVED AND REPLACED WITH CEILING MOUNTED FIRE ALARM EVAC SMOKE DETECTOR.

REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.

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2202027
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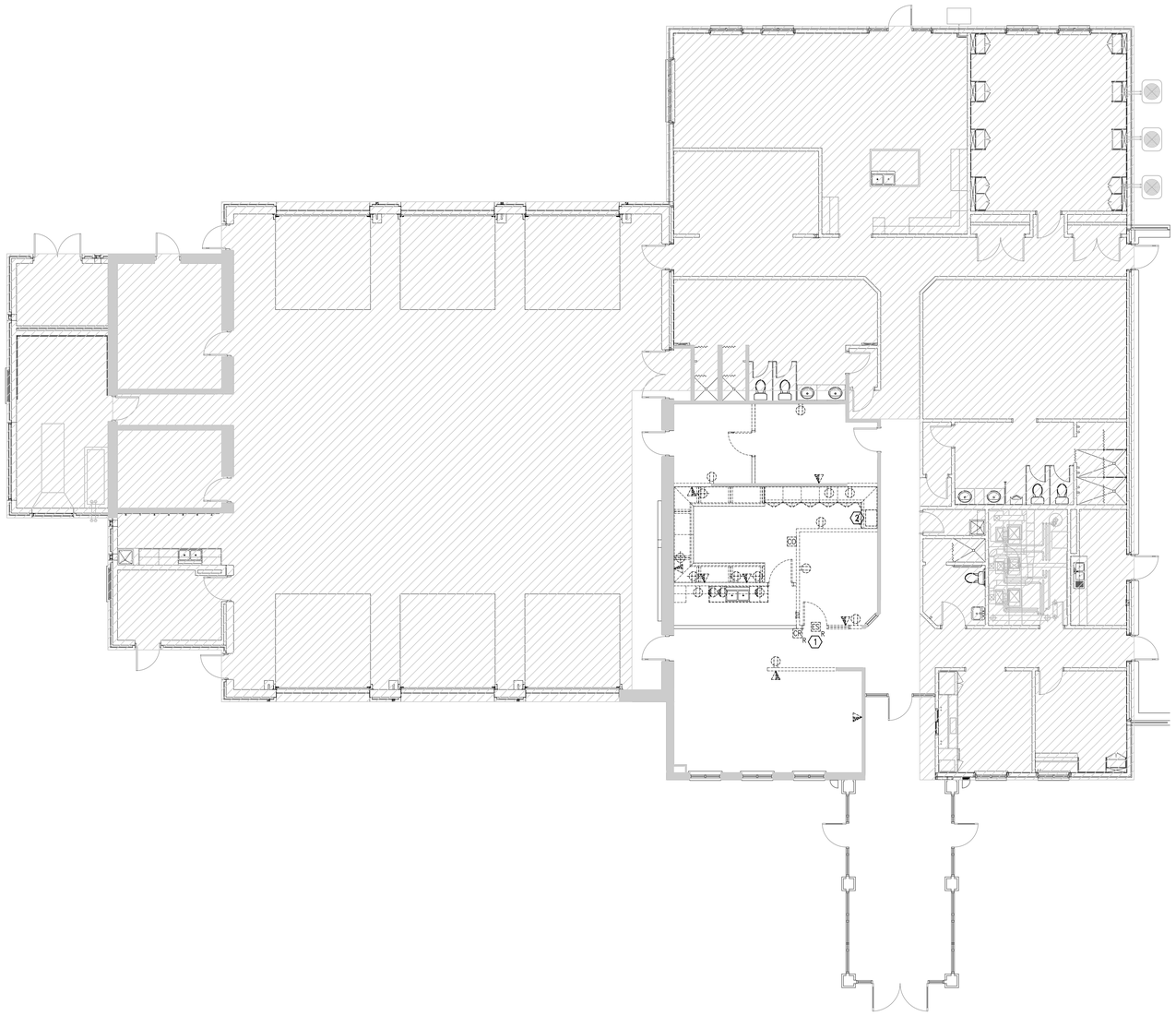
PARAMEDIC SERVICES
111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

drawing title

DEMOLITION REFLECTED CEILING PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-5.0
scale: 1:100	



DRAWING NOTES:

1. EXISTING CARD READER AND ELECTRIC STRIKE TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-3.0 – POWER AND SYSTEMS PLAN.
2. EXISTING P.A. SYSTEM SPEAKER AMPLIFIER FOR E.M.S. STATION TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-3.0 – POWER AND SYSTEMS PLAN.

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drawing title

DEMOLITION POWER AND SYSTEMS PLAN

date: 2021-01-14	project no.: 2202027
drawn by: RD	
checked by:	drawing no.: E-6.0
scale: 1:100	