

YOKK KEGION PA 9601 ISLINGTON AVENUE WOODBRIDGE, ONTARIO L4H 3G7

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RE-ISSUED FOR TENDER: 07MAY21

YORK REGION PARAMEDIC SERVICES

LIST OF DRAWINGS - PROJECT #20-1025 INTERIOR DESIGN DRAWINGS:

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I-100	DEMOLITION PLAN
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I-101	PARTITION PLAN
I-101 1	PARTITION TYPES

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MECHANICAL DRAWINGS:

M-1.0	MECHANICAL LEGEND, DETAILS AND SPECIFICATION
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:

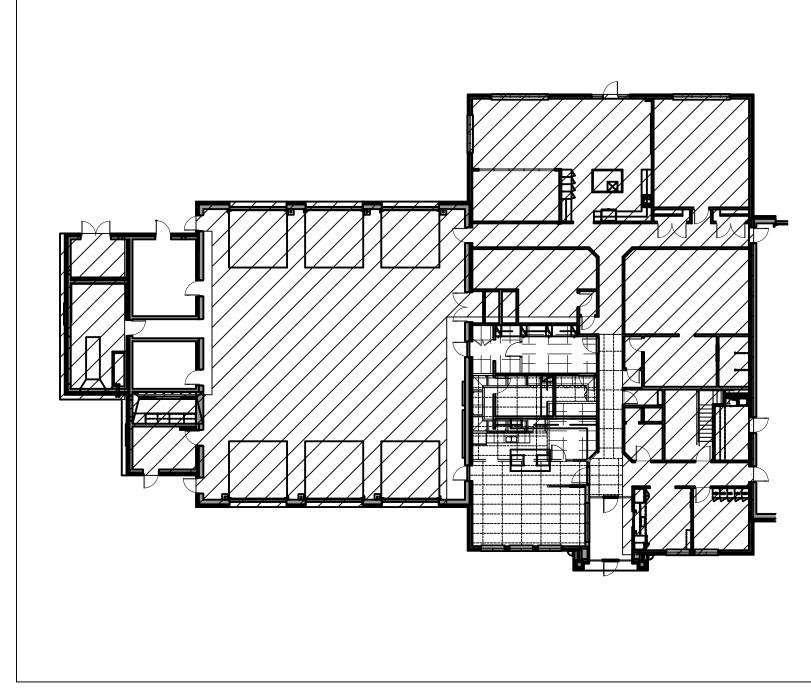
- E-1.0 ELECTRICAL LEGEND AND SPECIFICATIONS E-2.0 REFLECTED CEILING PLAN E-3.0 POWER AND SYSTEMS PLAN

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

ABBREVIATIONS

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

Key plan (n.t.s)

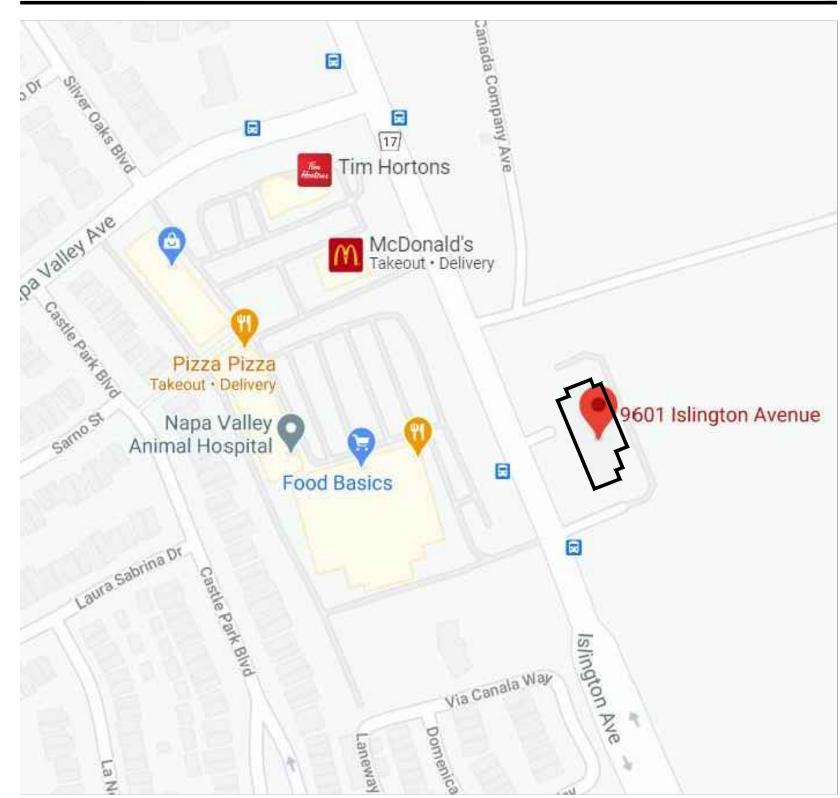


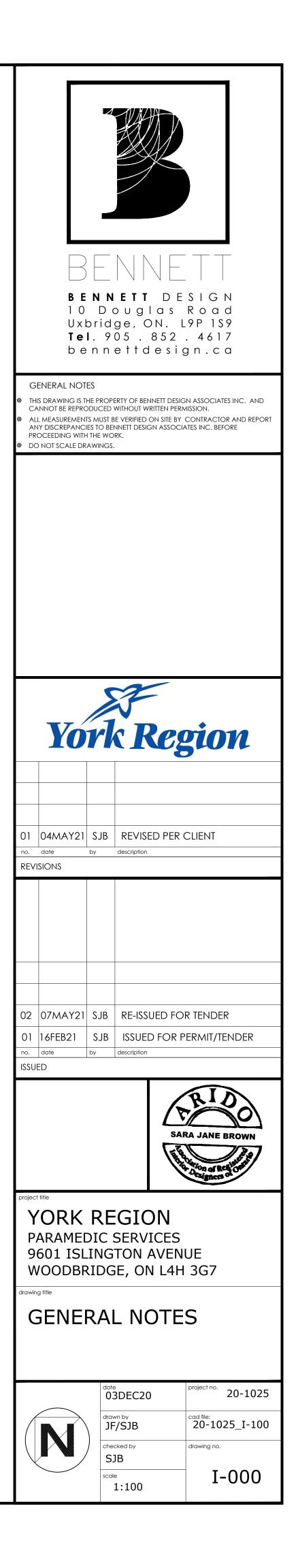
ONTARIO BUILDING CODE CLASSIFICATION 2012 O.B.C. 3.2.2 GROUP D SPRINKLERED

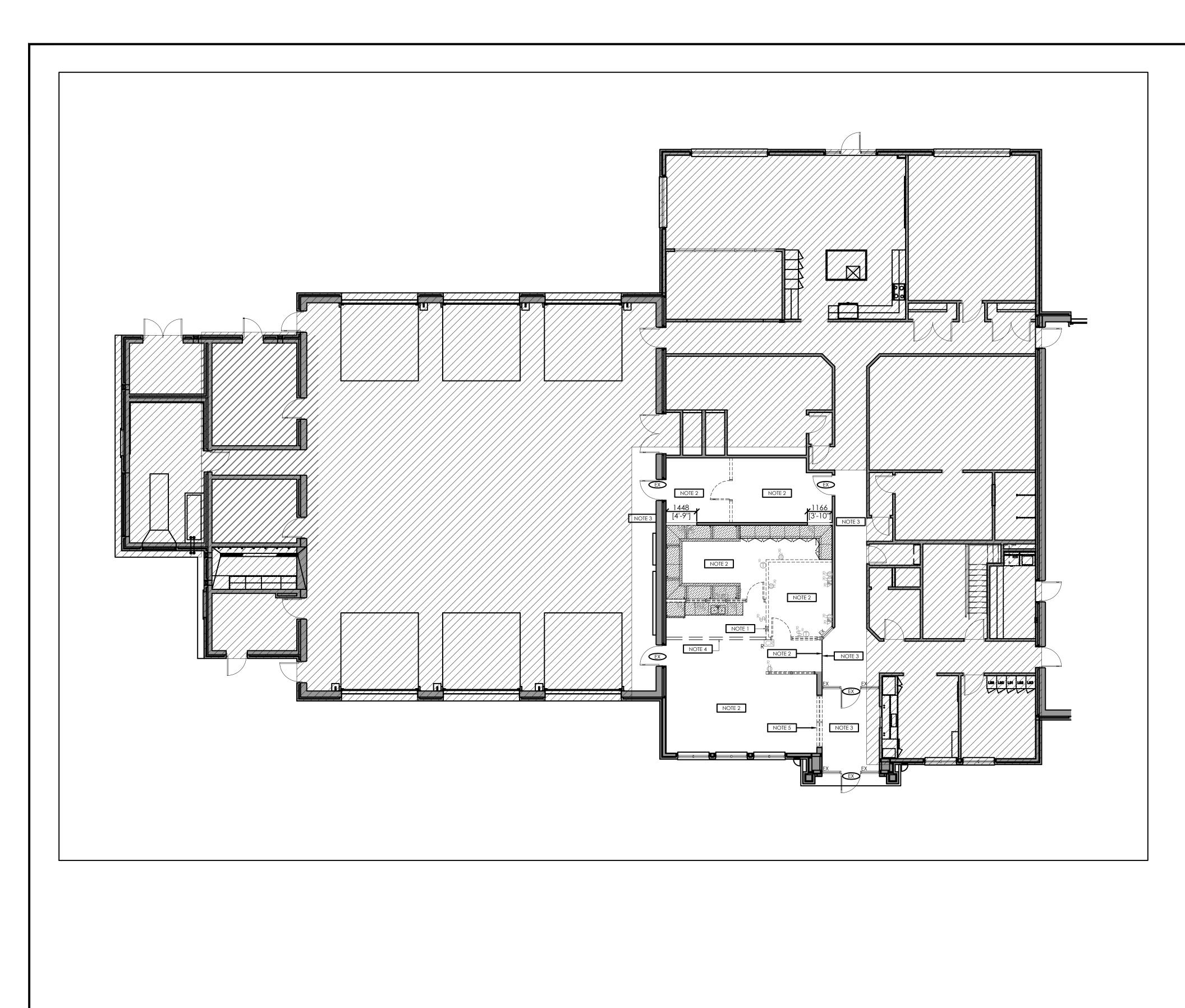
<u>AREA OF RENOVATIONS</u> PART GROUND FLOOR, 107 SQ.M. (1,155 SQ. FT.)

AREAS OF RENOVATION N.I.C

SITE PLAN (N.T.S)





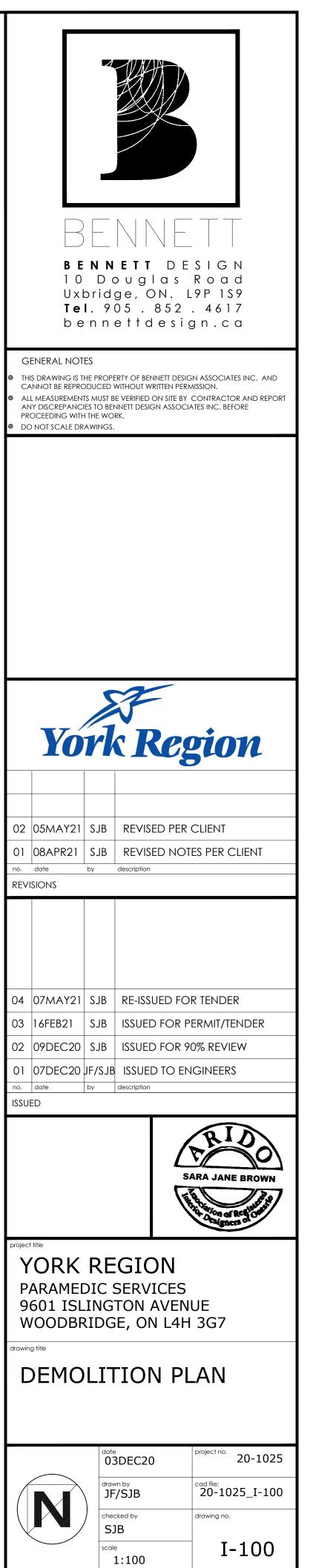


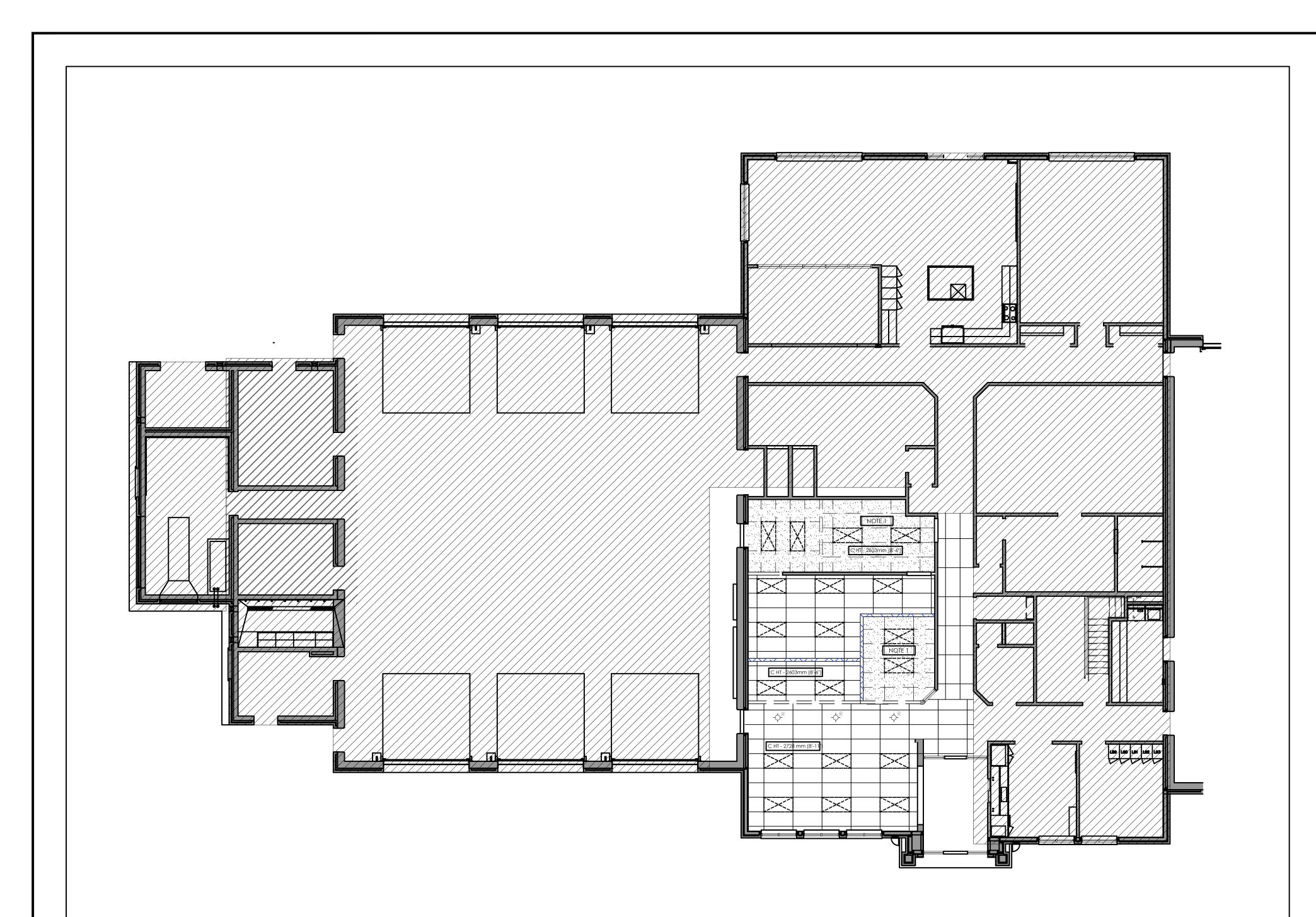
DEMOLITION LEGEND		
SYMBOL	DESCRIPTION	
	DENOTES EXISTING PARTITION TO REMAIN	
	DENOTES EXISTING PARTITION TO BE REMOVED	
	denotes existing door and frame to remain	
	denotes existing door and frame to be removed	
EX	DENOTES EXISTING SCREEN/SIDELIGHT AND FRAME TO REMAIN	
(88888888888888888	DENOTES EXISTING SCREEN/SIDELIGHT AND FRAME TO BE REMOVED	
	DENOTES EXISTING MILLWORK TO BE REMOVED	
⇔ ^R	DENOTES EXISTING WALL MOUNTED DUPLEX OUTLET TO BE REMOVED	
\mathbf{V}^{R}	DENOTES EXISTING WALL MOUNTED VOICE/DATA OUTLET TO BE REMOVED	
R [CR	DENOTES EXISTING CARD READER TO BE REMOVED AND RETAINED FOR RE-USE	
R	DENOTES EXISTING WALL MOUNTED THERMOSTAT TO BE REMOVED	
R HA	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	
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





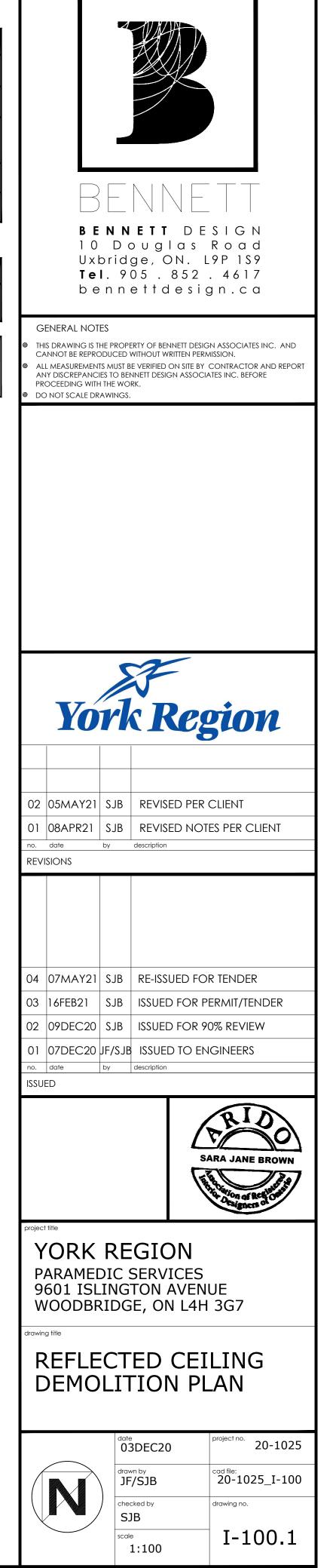
CEILING DEMOLITION LEGEND

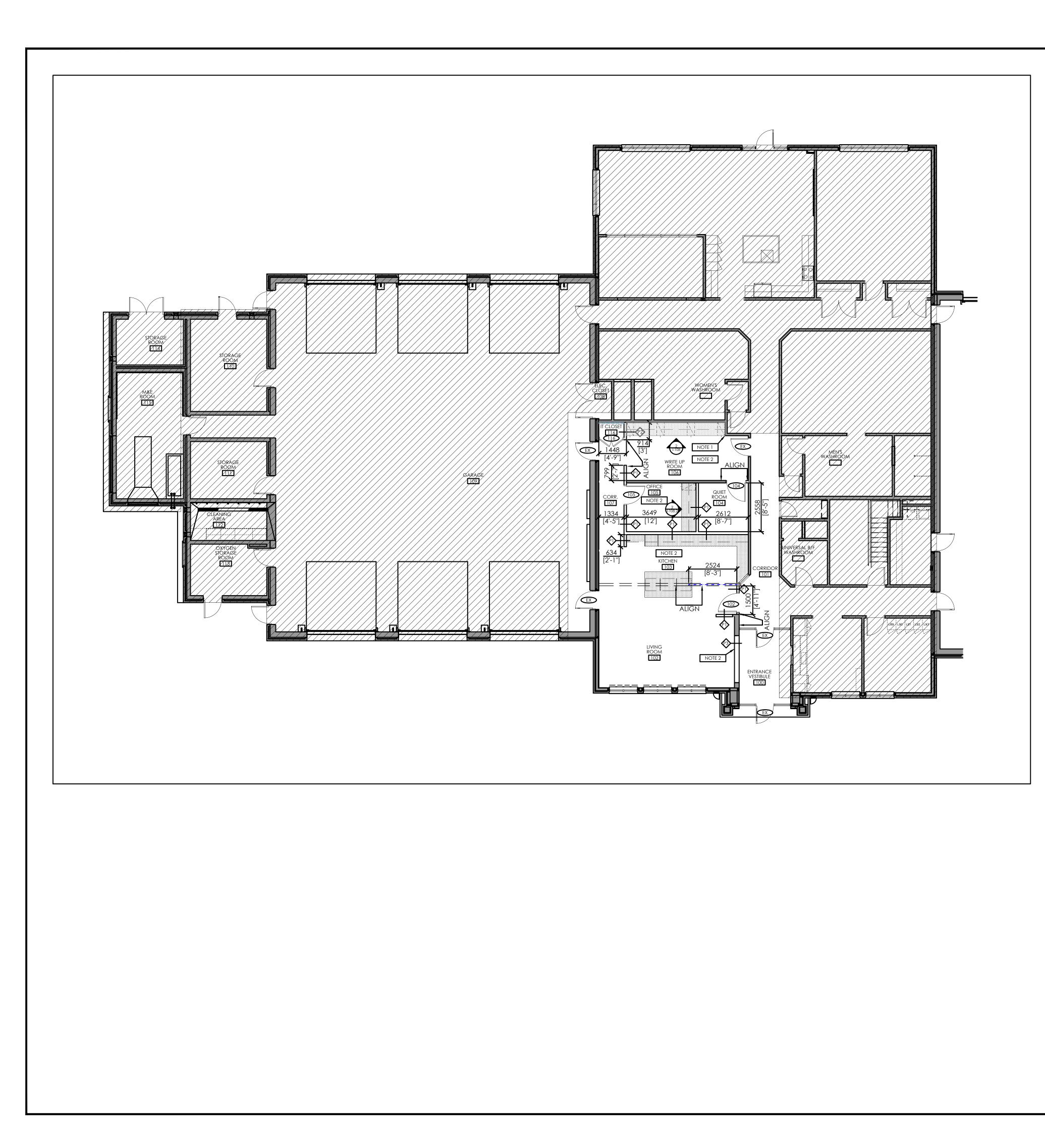
SYMBOL	DESCRIPTION
	DENOTES EXISTING BASE BUILDING STANDARD LUMINARIES TO BE REMOVED
	DENOTES AREA OF EXISTING T-BAR CEILING TO BE REMOVED
	INDICATES AREA OF EXISTING T-BAR CEILING TO BE PATCHED AND REPAIRED TO MAKE GOOD WHERE PARTITION WAS REMOVED. REFER TO REFLECTED CEILING PLAN
	DENOTES EXISTING RECESSED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

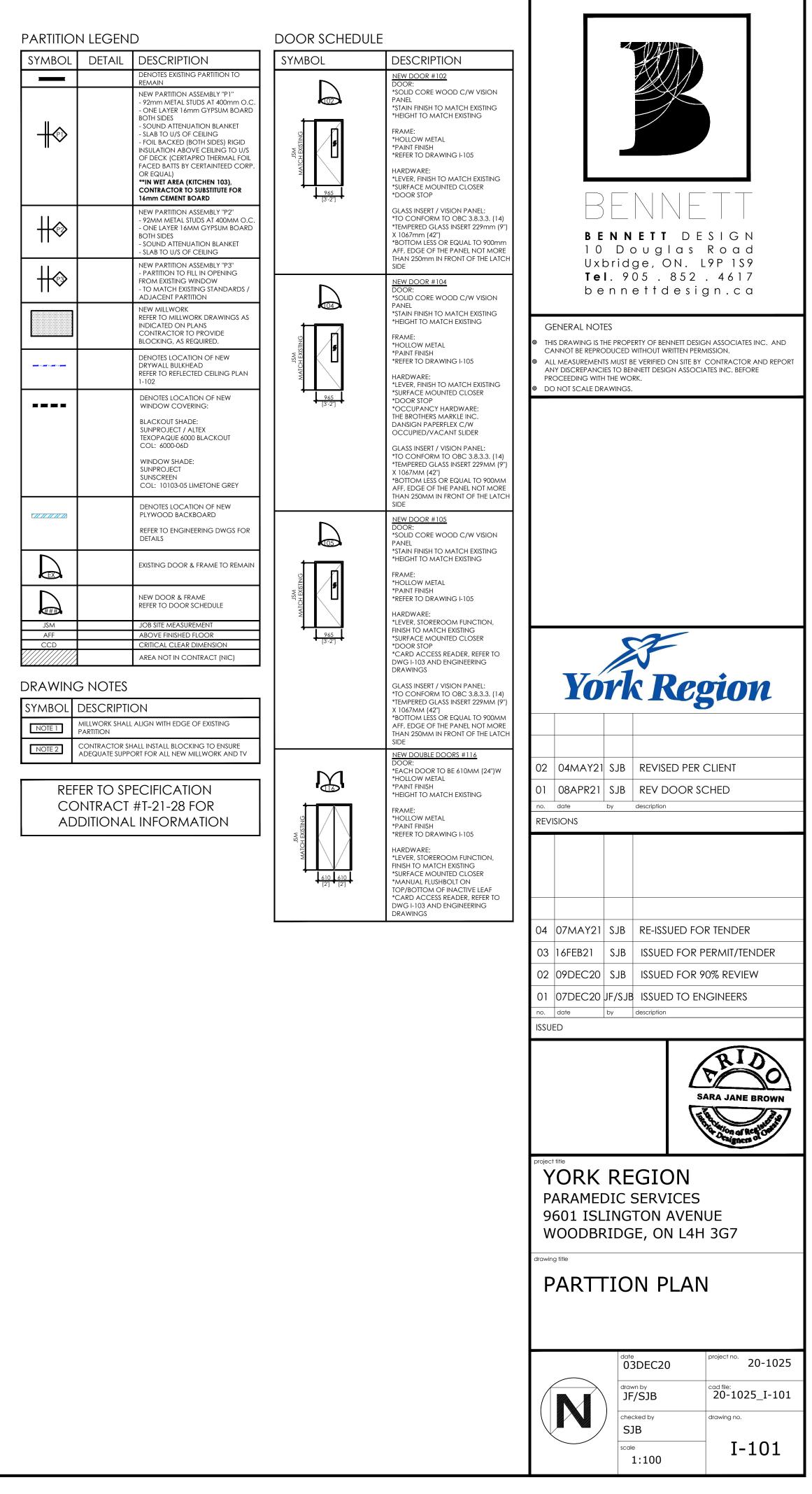
DRAWING NOTES

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

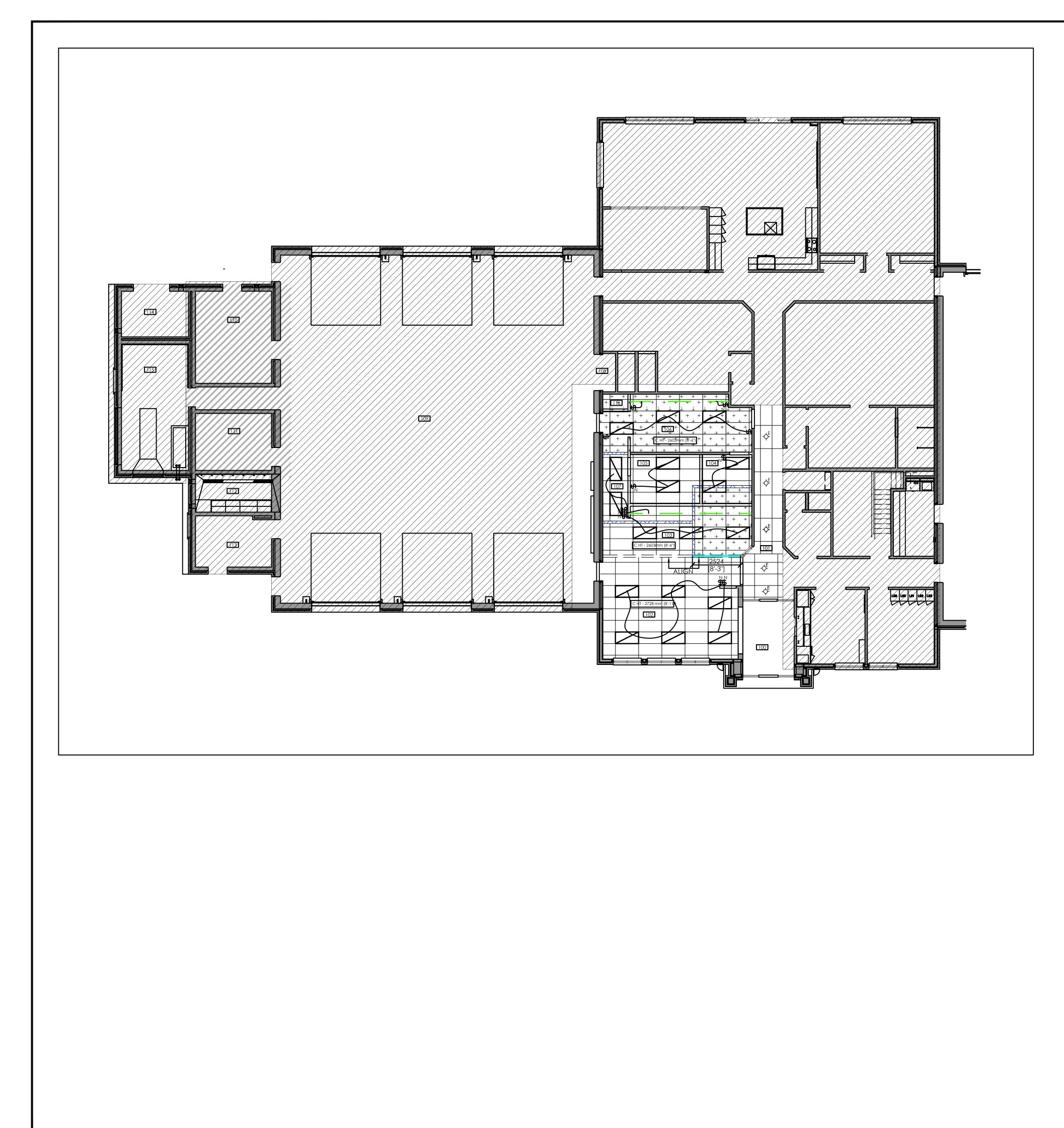
REFER TO SPECIFICATION	
CONTRACT #T-21-28 FOR	
ADDITIONAL INFORMATION	







REFER
CONT
ADDIT



LIGHTING LEGEND		
Symbol	DESCRIPTION	
	DENOTES EXISTING PARTITION TO REMAIN	
	DENOTES NEW PARTITION	
- \$ _E	EXISTING RECESSED INCANDESCENT DOWN LIGHT TO REMAIN	
	NEW 2' X 4' LED LIGHT FIXTURE (RECESSED IN CEILING GRID) MANUFACTURER: LITELINE SERIES: FORUM LED PANEL LIGHT SIZE: 2' X 4' FINISH: WHITE LUMENS: 6000 LUMEN COLOUR TEMPERATURE: 4000K LIGHT SOURCE: LED, 120V, 0-10V DIMMING, MAX 50 WATTS CODE: LEDP-24-WH-40-50-1 OR EQUIVALENT	
	NEW LED STRIP LIGHT (UNDER MILLWORK) MANUFACTURER: COOPER SIZE: 4' FINISH: WHITE LUMENS: 3000 LUMEN COLOUR TEMPERATURE: 4000K LIGHT SOURCE: LED, 120V, ON/OFF, MAX 20 WATTS CODE: 4SNLED-LD4-30SL-LN-UNV-L840-1 CONTACT: COOPER LIGHTING SOLUTIONS OR EQUIVALENT	
\$	EXISTING SINGLE POLE SWITCH TO REMAIN NON-DIMMABLE SWITCHES TO BE REPLACED WITH DIMMABLE SWITCHES	
\$ ⁿ	NEW DIMMABLE SINGLE POLE SWITCH, TO BE MOUNTED WITH THE CENTRELINE NO MORE THAN 1067mm (3'-6") AFF, AND WITHIN THE RANGE OF 900mm (3'-0") AFF TO 1100mm (3'-7") AFF, IN ACCORDANCE WITH OBC 3.8.1.5.(1)(c).	
	AREA NOT IN CONTRACT (NIC)	

CEILING LEGEND

Symbol	DESCRIPTION
	EXISTING T-BAR CEILING AND ACOUSTICAL TILES TO REMAIN. CONTRACTOR TO PATCH & REPAIR TO MAKE GOOD AND SUPPLY NEW AS REQUIRED TO MATCH EXISTING STANDARD
	<u>AREA OF NEW T-BAR CEILING AND ACOUSTICAL TILES</u> TO MATCH EXISTING STANDARD
	INDICATES AREA OF NEW GWB BULKHEAD TO ALIGN WITH EXISTING BULKHEAD
	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

DRAWING NOTES

Symbol	DESCRIPTION
NOTE 1	REFER TO DRAWING #I-100.1 FOR REFLECTED CEILING DEMOLITION PLAN

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

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drawn by JF/SJB	cad file: 20-1025_I-102
checked by SJB	drawing no.
scale 1:100	I-102

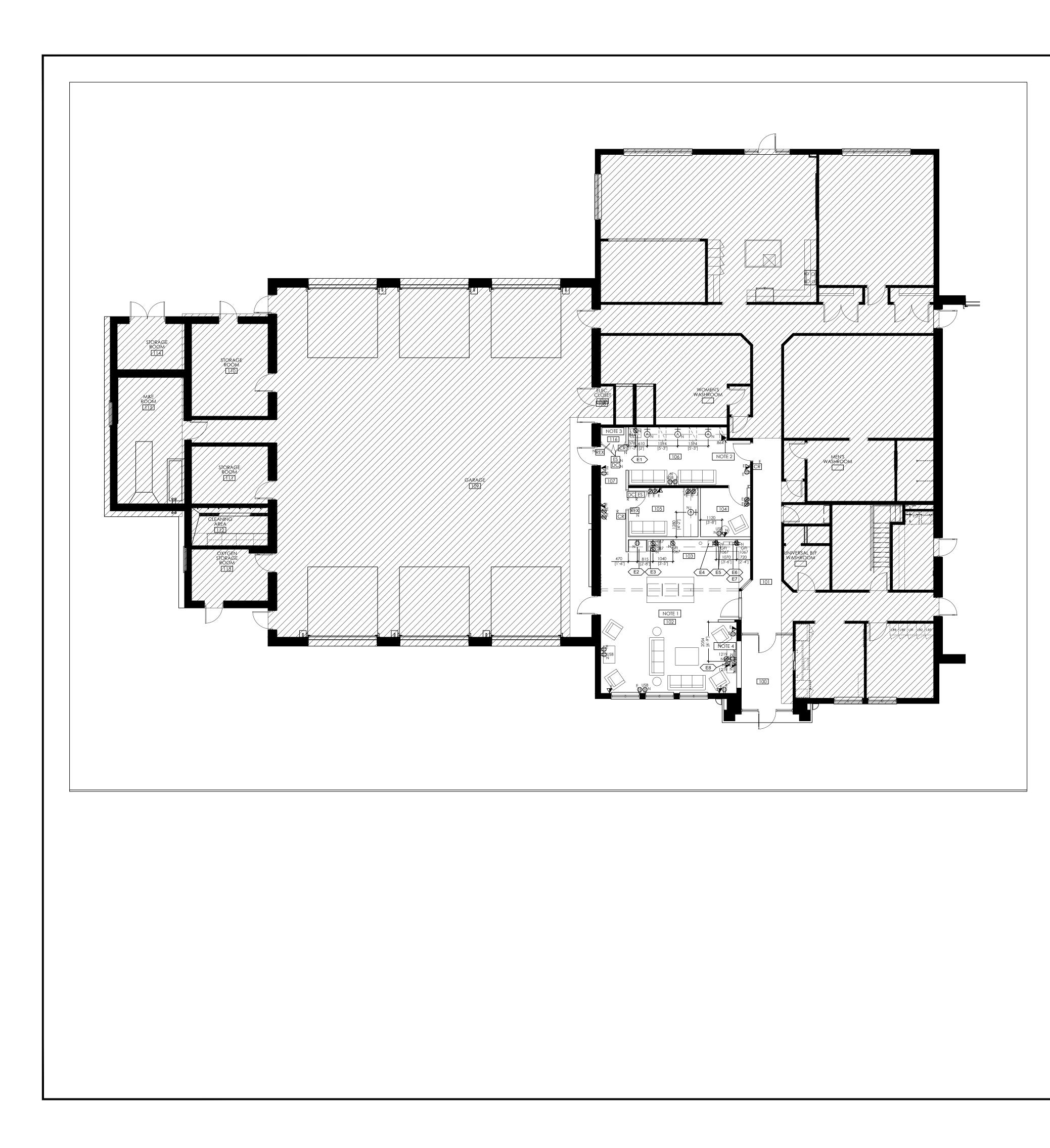
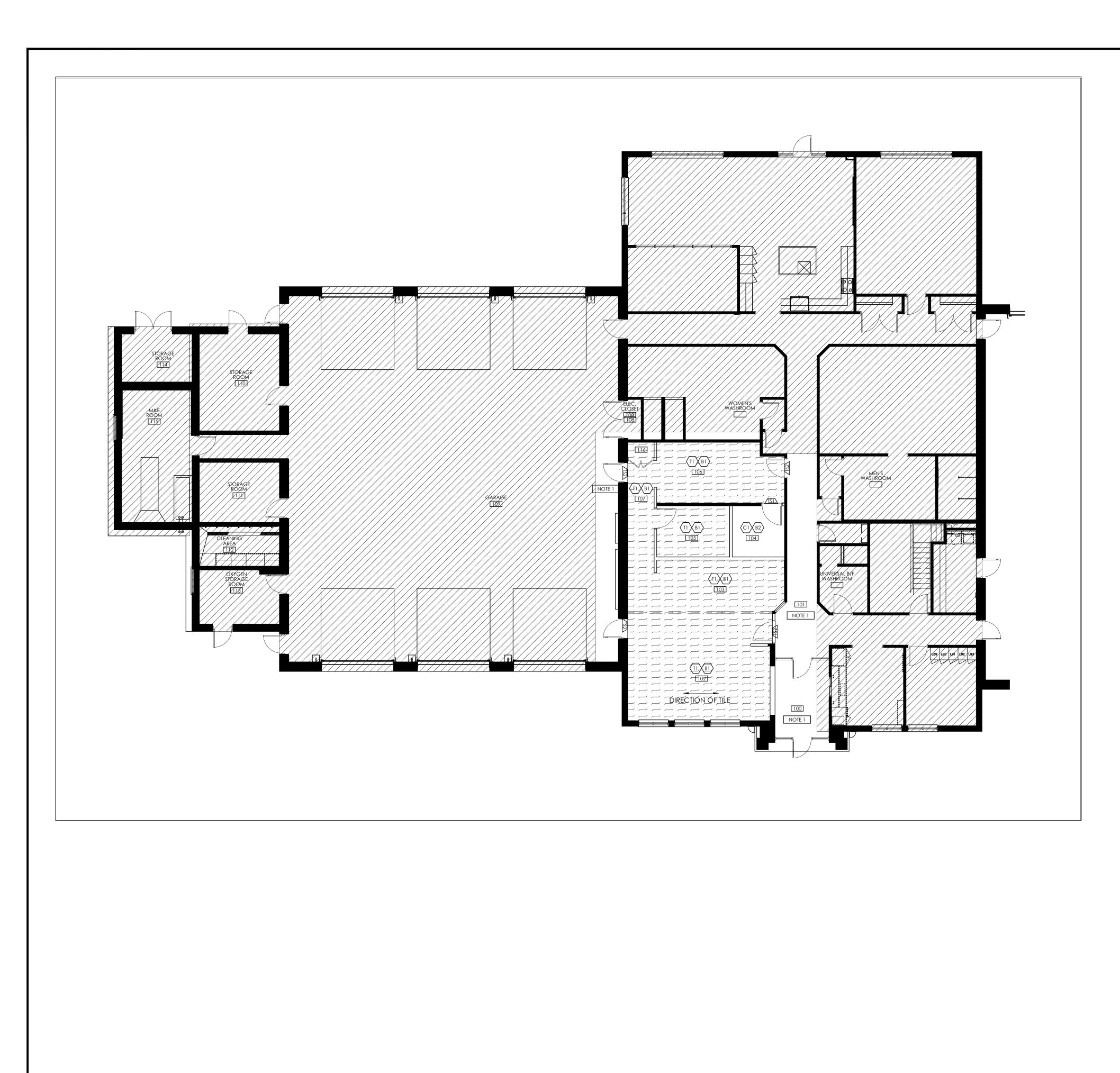


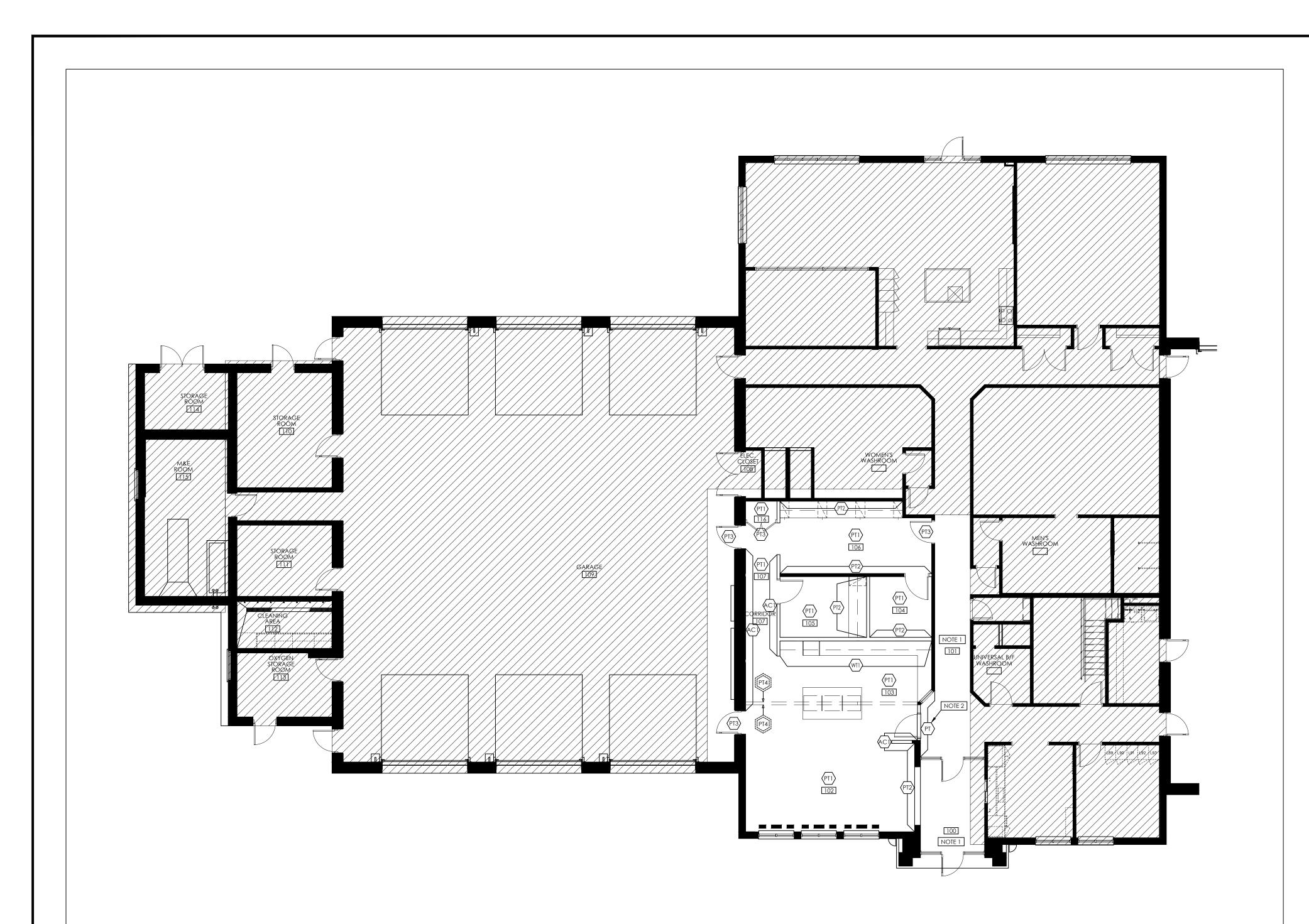
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YMBOL DESCRIPTION E1 PRINTER SUPPLIED & INSTALLED BY YR E2 PRIDCE MATTAG ME72538FEZ, SIZE: 35-5/87 W X 70-1/87H X 35-1/27D SUPPLIED & INSTALLED BY YR E3 MICROWAYE WIRLPOOL YWAC30514HZ, SIZE: 21-3/47W X 13'H X 17-1/47D SUPPLIED & INSTALLED BY YR E4 SUPPLIED & INSTALLED BY YR E5 COFFEE MAKER SUPPLIED & INSTALLED BY YR E6 TOASTER OVEN SUPPLIED & INSTALLED BY YR E7 TOASTER OVEN SUPPLIED & INSTALLED BY YR E7 TOASTER SUPPLIED & INSTALLED BY YR E8 S5'T V SUPPLIED & INSTALLED BY YR E8 S5'T V SUPPLIED & INSTALLED BY YR E9 SO'T V SUPPLIED & INSTALLED BY YR E9 S5'T V SUPPLIED & INSTALLED BY YR E9 S5'T V SUPPLIED & INSTALLED BY YR E9 S5'T V SUPPLIED & INSTALLED BY YR C10 LOCATION OF NEW FIRE BELL TO BE DETERMINED, REFER TO ENGINEERING DRAWINGS FOR DETAILS INOTE 1 LOCATION OF NEW FIRE BELL TO BE DETERMINED, REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS INOTE 3 REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS INOTE 4 ALL CABLING BEHIND TY SHALL BE CONCEALED IN CONDUIT, REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS INOTE 5 ALL CABLING GAR		
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E1 PRINTER SUPPLIED & INSTALLED BY YR E2 FRIDCE MAYTAG MFP25SBFEZ, SIZE: 35-5/B'W X 70-1/B'H X 35-1/2'D SUPPLIED & INSTALLED BY YR E3 MICROWAVE WHRRPOOL YWACSOSIGHZ, 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 E6 TOASTER OVEN SUPPLIED & INSTALLED BY YR E7 TOASTER OVEN SUPPLIED & INSTALLED BY YR E8 S5' TV SUPPLIED & INSTALLED BY YR E8 S5' TV SUPPLIED & INSTALLED BY YR E9 S0' TV SUPPLIED & INSTALLED BY YR E9 S1' DASTER MDTE 1 LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO ENGINEERING DRAWINGS FOR TICLOSET REQUIREMENTS INOTE 2 LOCATION OF NEW TELEPHONE OUTLET TO BE DETERMINED BY REGION INOTE 4 ALL CABLING BEHIND TV SHALL BE CONCEALED IN CONDUIT, REFER TO ENGINEERING DRAWINGS INOTE 5 A		
E SUPPLIED & INSTALLED BY YR E2 FRIDCE MATTAG MF2558FEZ, SJZE: 35-5/8"W X 70-1/8"H X 35-1/2"D SUPPLIED & INSTALLED BY YR E3 MCROWAVE WHIRLPOOL YWMC30514H2, SJZE: 21-3/4"W X 13"H X 17-1/4"D SUPPLIED & INSTALLED BY YR E4 KETLE SUPPLIED & INSTALLED BY YR E5 COFFEE MAKER SUPPLIED & INSTALLED BY YR E6 IOASTER OVEN SUPPLIED & INSTALLED BY YR E6 IOASTER OVEN SUPPLIED & INSTALLED BY YR E7 TOASTER SUPPLIED & INSTALLED BY YR E8 SOPPLIED & INSTALLED BY YR E8 SUPPLIED & INSTALLED BY YR E9 S5" TV SUPPLIED & INSTALLED BY YR CAWING NOTES YMBOL DESCRIPTION INOTE 1 LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO ENGINEERING DRAWINGS FOR DETAILS INOTE 2 LOCATION OF NEW TELEPHONE OUTLET TO BE DETERMINED BY REGION INOTE 3 REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS INOTE 4 ALL CABLING BEHIND TV SHALL BE CONCEALED IN CONDUIT, REFER TO ENGINEERING DRAWINGS INOTE 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		
E2 MATTAG MEP2SSEE2. 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 SUPPLIED & INSTALLED BY YR E7 TOASTER SUPPLIED & INSTALLED BY YR E8 SUPPLIED & INSTALLED BY YR E8 SUPPLIED & INSTALLED BY YR E9 SUPPLIED & INSTALLED BY YR E10 LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO<		
E3 WHIRLPOOL YWAC30516H2, SIZE: 21-3/4"W X 13"H X 17-1/4"D SUPPLIED & INSTALLED BY YR E4 KETTE E5 COFFEE MAKER SUPPLIED & INSTALLED BY YR E5 COFFEE MAKER SUPPLIED & INSTALLED BY YR E6 TOASTER OVEN SUPPLIED & INSTALLED BY YR E7 SUPPLIED & INSTALLED BY YR E8 SS"TV SUPPLIED & INSTALLED BY YR E9 SS"TV SUPPLIED & INSTALLED BY YR CAWING NOTES YMBOL DESCRIPTION NOTE 1 LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS 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. CO		
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SUFFLIED & INSTALLED BY TR Image: State of the state of t		
Image: Superior of New Fire Bell to be determined. Refer to Engineering drawings for details Imote 1 Location of New Fire Bell to be determined. Refer to Engineering drawings for details Imote 2 Location of New Telephone outlet to be determined by region Imote 3 Refer to Engineering drawings for it closet requirements Imote 4 All Cabling Behind tv shall be concealed in Conduit, Refer to Engineering drawings Imote 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		
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CONTRACT #T-21-28 FOR		UED FOR PERMIT/TENDER
CONTRACT #T-21-28 FOR	02 09DEC20 SJB ISS	UED FOR 90% REVIEW
	01 07DEC20JF/SJB ISS	
ADDITIONAL INFORMATION	no. date by descrip	tion
		SARA JANE BROWN
	Project fille YORK REGI PARAMEDIC SERV	VICES AVENUE ON L4H 3G7
	9601 ISLINGTON WOODBRIDGE, C drawing title POWER & C PLAN	
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	WOODBRIDGE, C drawing title POWER & C PLAN	C20 20-102

scale 1:100

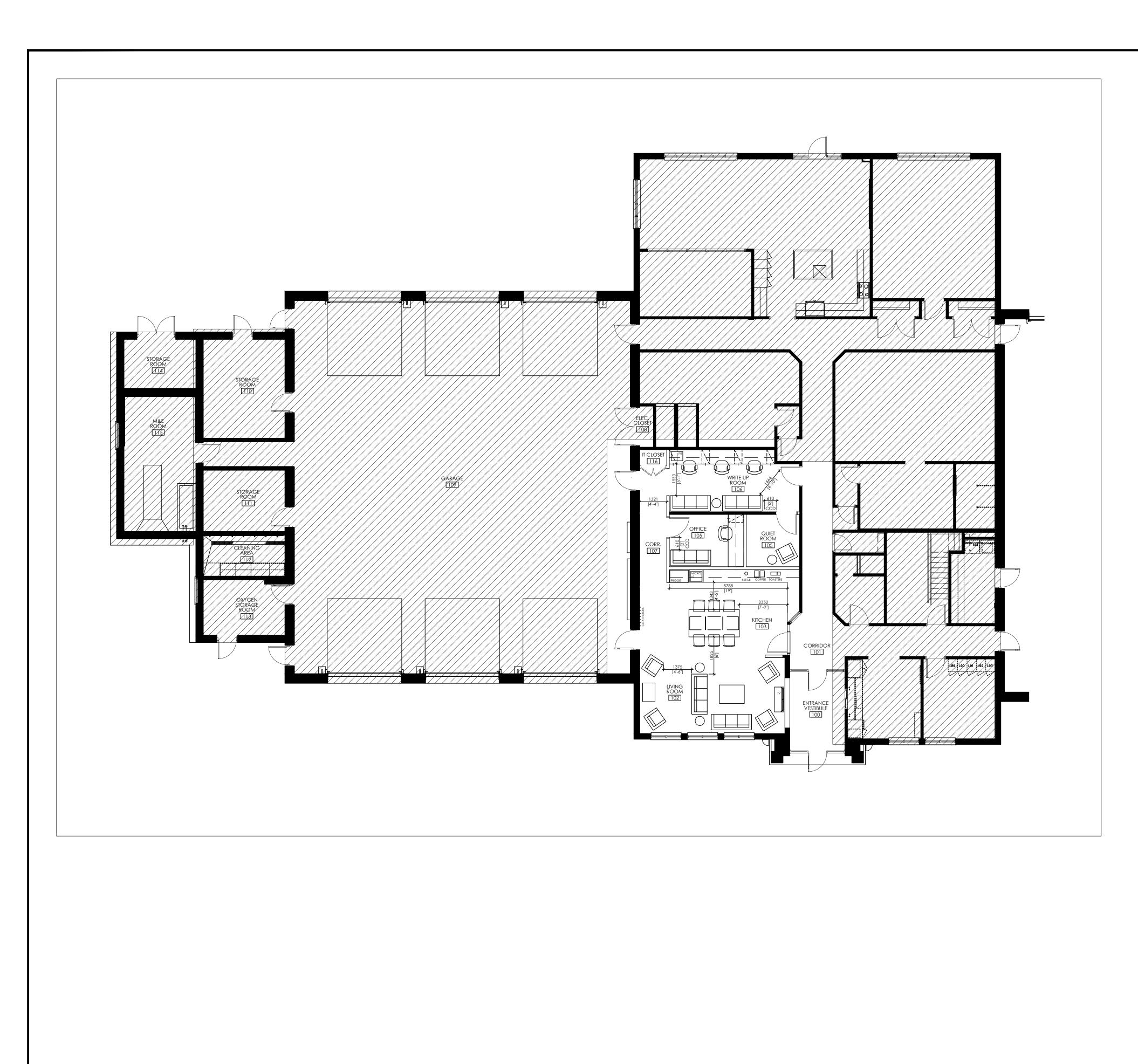
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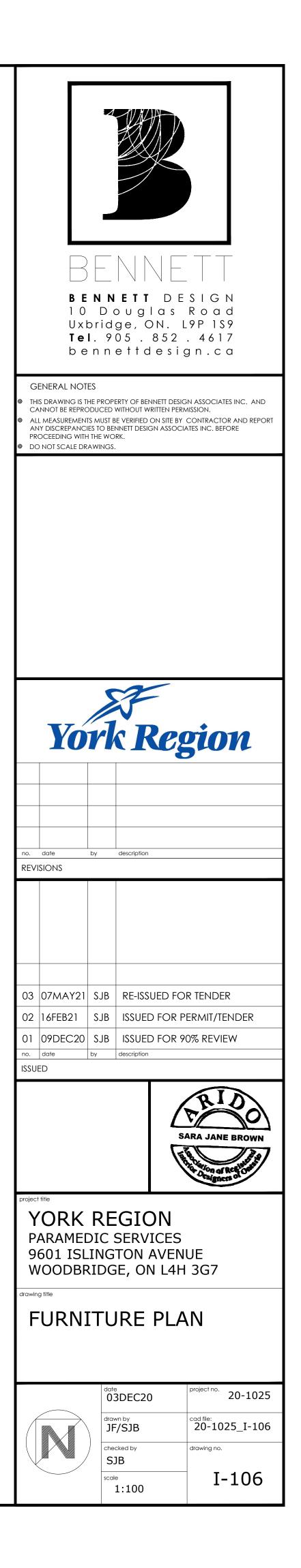


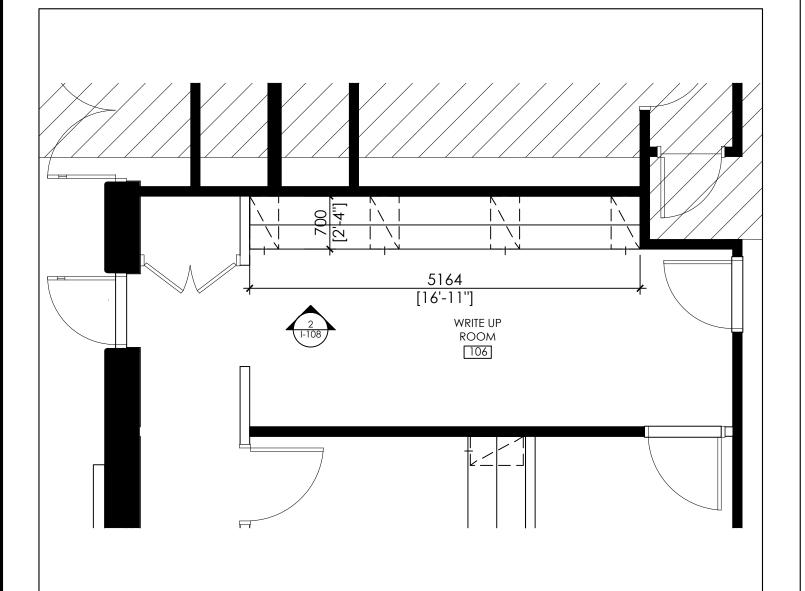
Symbol	DESCRIPTION	
	DENOTES EXISTING PARTITION TO REMAIN	
	PORCELAIN TILE: T1 MANUFACTURER: STONE TILE SERIES: SOLID	
	COLOUR: ASH NATURAL SIZE: 300mm X 600mm GROUT SPEC: MAPEI, 107 IRON	
	INSTALL METHOD: 1/4" RUNNING BOND, 25% OVERLAP SUPPLIER/TEL: NANCY BRENNER 416-515-9000 EXT. 232 NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT	
	CARPET TILE: C1 MANUFACTURER: SHAW COMMERCIAL	
CI	SERIES: SURROUND 5T125 COLOUR: LIMESTONE 17530 SIZE: 24" X 24"	BENNETT DESIGN 10 Douglas Road
	INSTALL METHOD: MONOLITHIC OR EQUIVALENT	Uxbridge, ON. L9P 1S9 Tel . 905. 852. 4617
	AREA NOT IN CONTRACT (NIC)	bennettdesign.ca
ASE TYPE	LEGEND	GENERAL NOTES
Symbol	DESCRIPTION	THIS DRAWING IS THE PROPERTY OF BENNETT DESIGN ASSOCIATES INC. ANE CANNOT BE REPRODUCED WITHOUT WRITTEN PERMISSION.
	PORCELAIN TILE WALL BASE: B1 MANUFACTURER: STONE TILE SERIES: SOLID	ALL MEASUREMENTS MUST BE VERIFIED ON SITE BY CONTRACTOR AND REPORT ANY DISCREPANCIES TO BENNETT DESIGN ASSOCIATES INC. BEFORE PROCEEDING WITH THE WORK.
BI	COLOUR: ASH NATURAL SIZE: 102mm (4") GROUT SPEC: MAPEI, 107 IRON	DO NOT SCALE DRAWINGS.
	CONDITION: PORCELAIN TILE NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT	
	VINYL WALL BASE: B2 MANUFACTURER: TARKETT/JOHNSONITE	
B2	SERIES: TRADITIONAL / COVE BASE COLOUR: 20 CHARCOAL SIZE: 4" CONDITION: CARPET	
	OR EQUIVALENT	
	n strip legend	- I
Symbol	DESCRIPTION TRANSITION STRIP: TS 1	- 1
<u> </u>	COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CARPET OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANT' AND/OR REGION'S APPROVAL	'S
<u>/TS2</u>	TRANSITION STRIP: TS2 COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CONCRETE OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANT' AND/OR REGION'S APPROVAL	rs
DTE: THE INSTALLE	R SHALL VERIFY TRANSITION WITH CONSULTANT'S AND/OR REGION	
RAWING	NOTES	York Region
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	01 04MAY21 SJB REVISED PER CLIENT
	OF CONSTRUCTION	no. date by description
	REFER TO SPECIFICATION	no. date by description REVISIONS
C		
C	REFER TO SPECIFICATION CONTRACT #T-21-28 FOR	
C	REFER TO SPECIFICATION CONTRACT #T-21-28 FOR	
C	REFER TO SPECIFICATION CONTRACT #T-21-28 FOR	REVISIONS
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C	REFER TO SPECIFICATION CONTRACT #T-21-28 FOR	REVISIONS 03 07MAY21 SJB RE-ISSUED FOR TENDER 02 16FEB21 SJB ISSUED FOR PERMIT/TENDER 01 09DEC20 SJB ISSUED FOR 90% REVIEW no. date by description ISSUED
C	REFER TO SPECIFICATION CONTRACT #T-21-28 FOR	REVISIONS Image: Stress of the stre
C	REFER TO SPECIFICATION CONTRACT #T-21-28 FOR	REVISIONS 03 07MAY21 SJB 03 07MAY21 SJB 02 16FEB21 SJB 01 09DEC20 SJB ISSUED ISSUED FOR 90% REVIEW no. date by description
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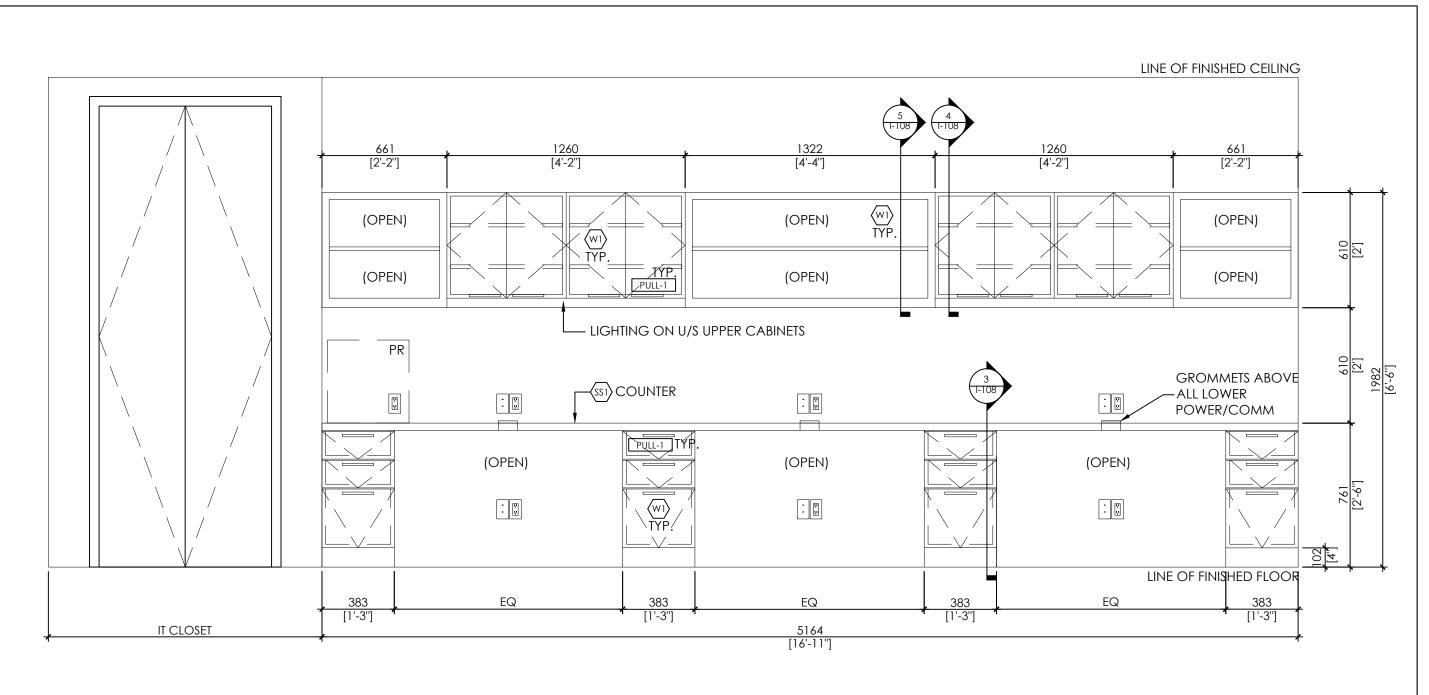
Constrained on the second of the second	ALL FINIS	DESCRIPTION	
	(PTI)	MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: EGGSHELL	
 	(PT2)	MANUFACTURER: SHERWIN WILLIAMS COLOUR: SW 7604 SMOKY BLUE FINISH: EGGSHELL NOTE: MINIMUM 3 TOP COATS	
Image: Contract with white Contread with white Contract with white Contract	(PT3)	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	10 Douglas Road Uxbridge, ON. L9P 1S9 Tel . 905 . 852 . 4617
Multiple of interesting in the interesting intere	(PT4)	(WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: FLAT	THIS DRAWING IS THE PROPERTY OF BENNETT DESIGN ASSOCIATES INC. AND
Image: Second	(WTI)	MANUFACTURER: OLYMPIA TILE SERIES: COLOUR & DIMENSIONS COLOUR: BLACK, MATTE SIZE: 100 X 400 GROUT SPEC: MAPEI #38 AVALANCHE INSTALL METHOD: STACK BOND	ALL MEASUREMENTS MUST BE VERIFIED ON SITE BY CONTRACTOR AND REPORT ANY DISCREPANCIES TO BENNETT DESIGN ASSOCIATES INC. BEFORE PROCEEDING WITH THE WORK.
		MANUFACTURER: CONSTRUCTION SPECIALITIES SERIES: ACROVYN SOLID COLORS COLOUR: #949 WHITE SIZE: 1067MM (42") AFF	
Relevant Information Constructionality Add And THE CONSTRUCTION Information	(PT#)→	BULKHEADS TO BE PAINTED AS PER WALL FINISH PLAN	
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drawn by JF/SJB 20-1025_I-1 checked by drawing no.	NOTE 3	PARTITIONS CONTRACTOR TO SUPPLY AND INSTALL 2" WIDE, BEVELED, STAINLESS STEEL CORNER GUARDS ON ALL CORNERS THRU-OUT EFER TO SPECIFICATION ONTRACT #T-21-28 FOR	Image: Constraint of the second se
	NOTE 3	PARTITIONS CONTRACTOR TO SUPPLY AND INSTALL 2" WIDE, BEVELED, STAINLESS STEEL CORNER GUARDS ON ALL CORNERS THRU-OUT EFER TO SPECIFICATION ONTRACT #T-21-28 FOR	Image: Constraint of the second of the se



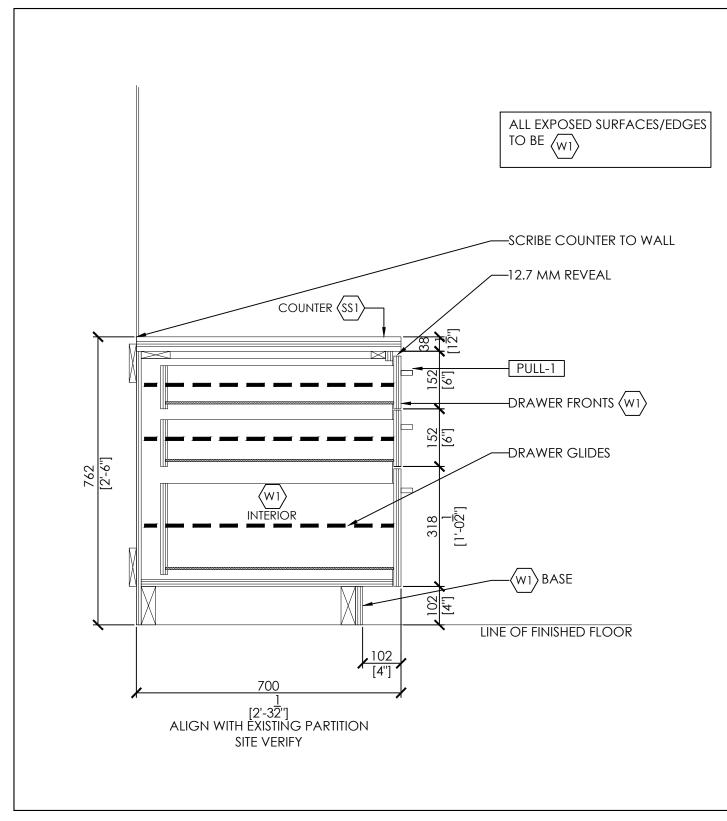




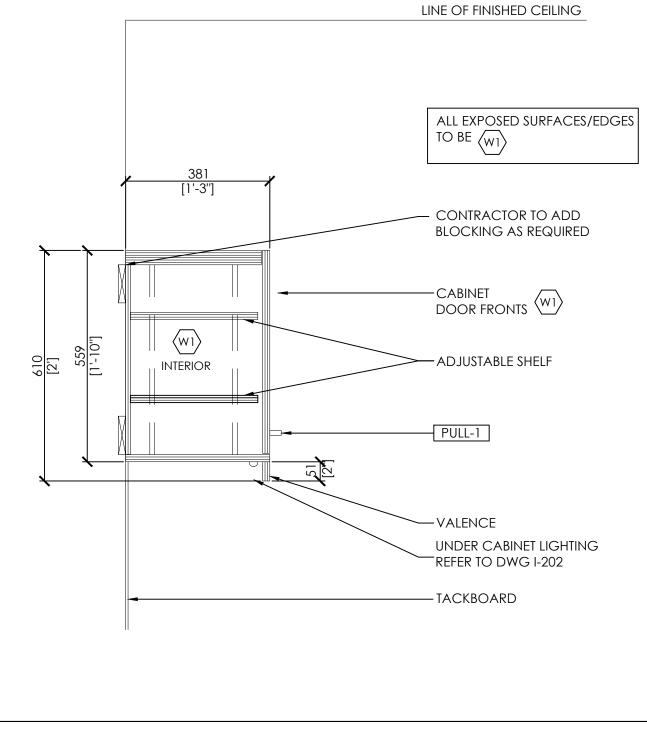




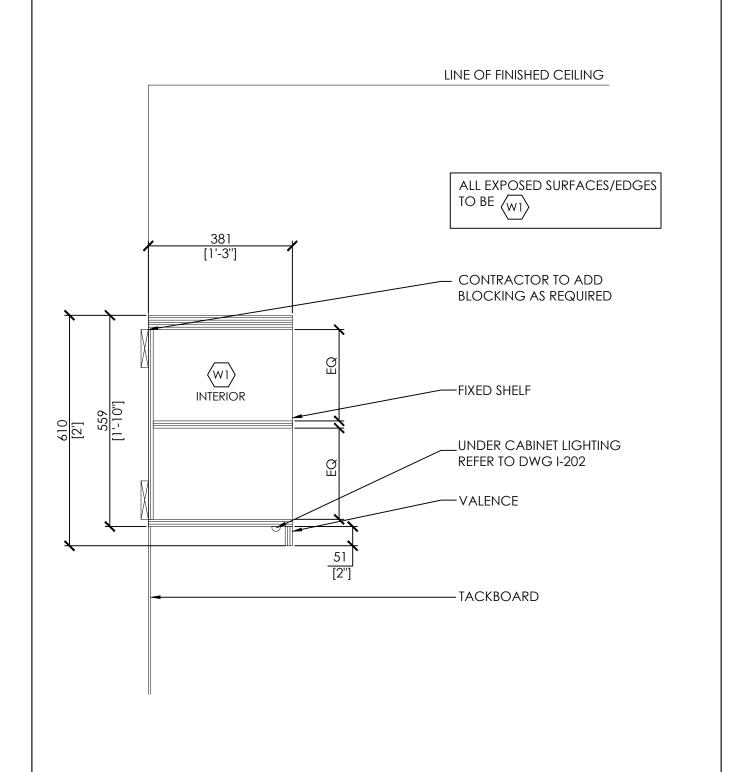




3 SECTION: THRU LOWER DRAWERS

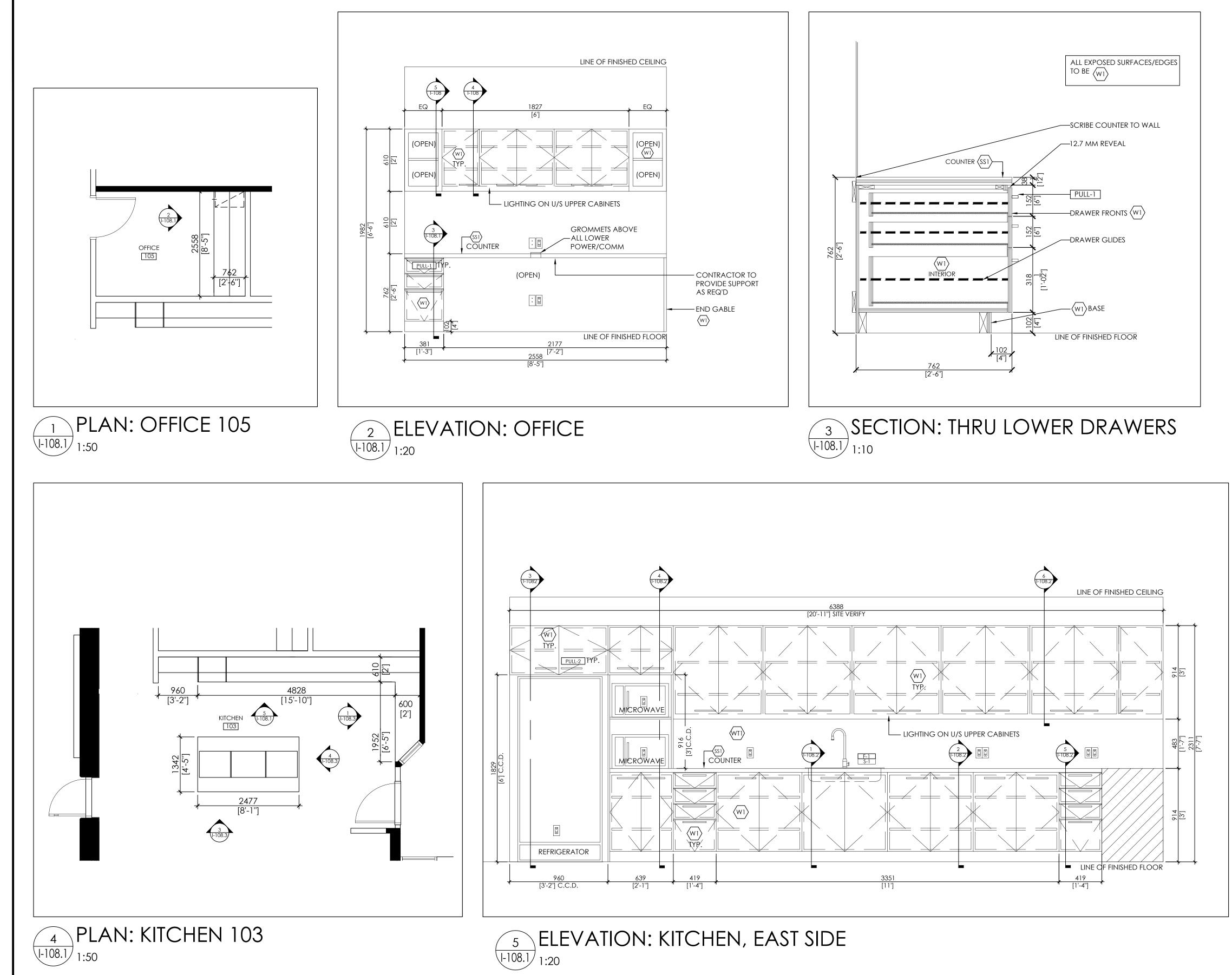




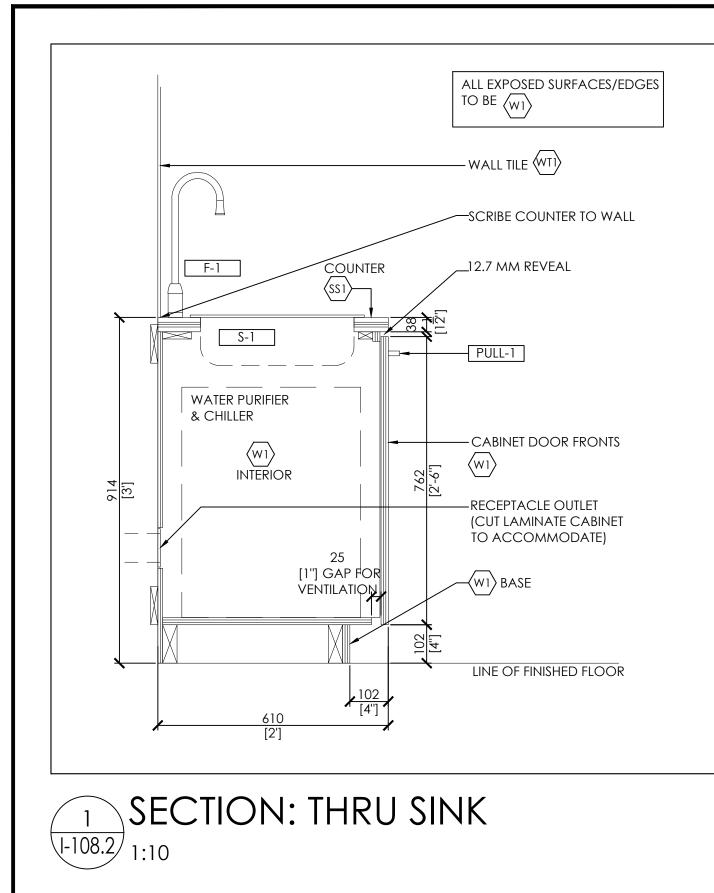


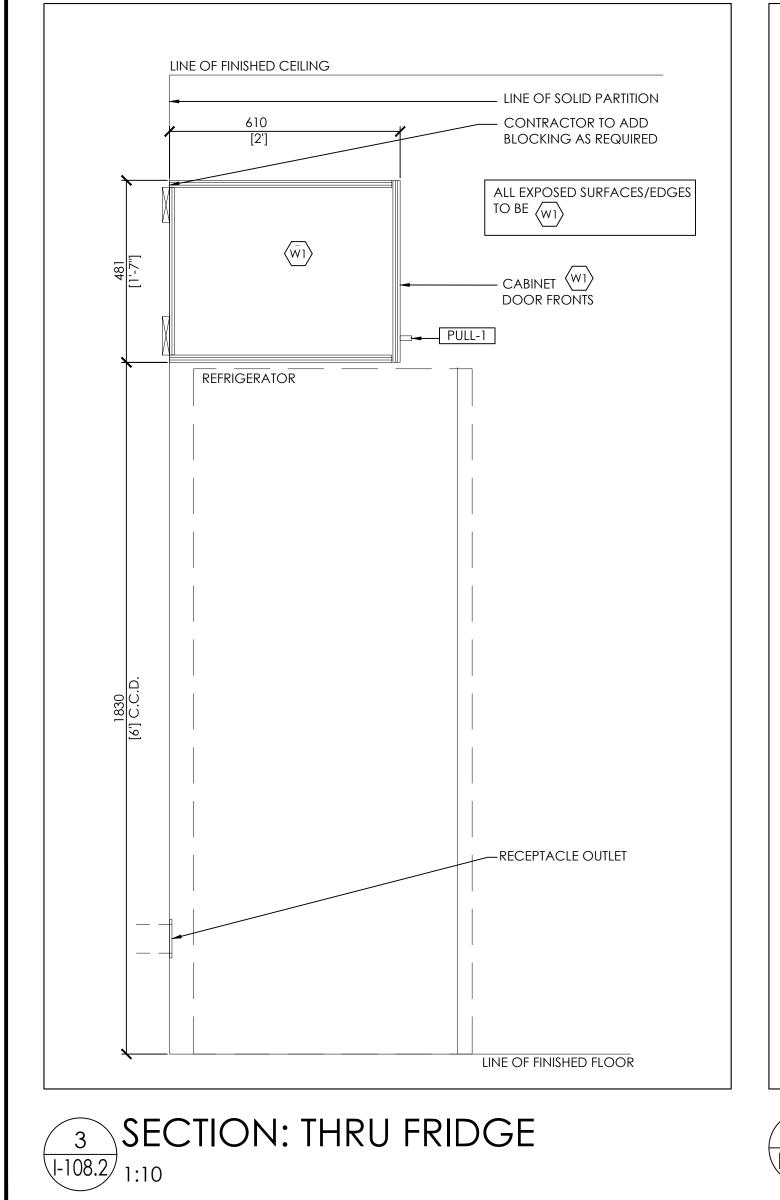
5 SECTION: THRU OPEN UPPER CABINET

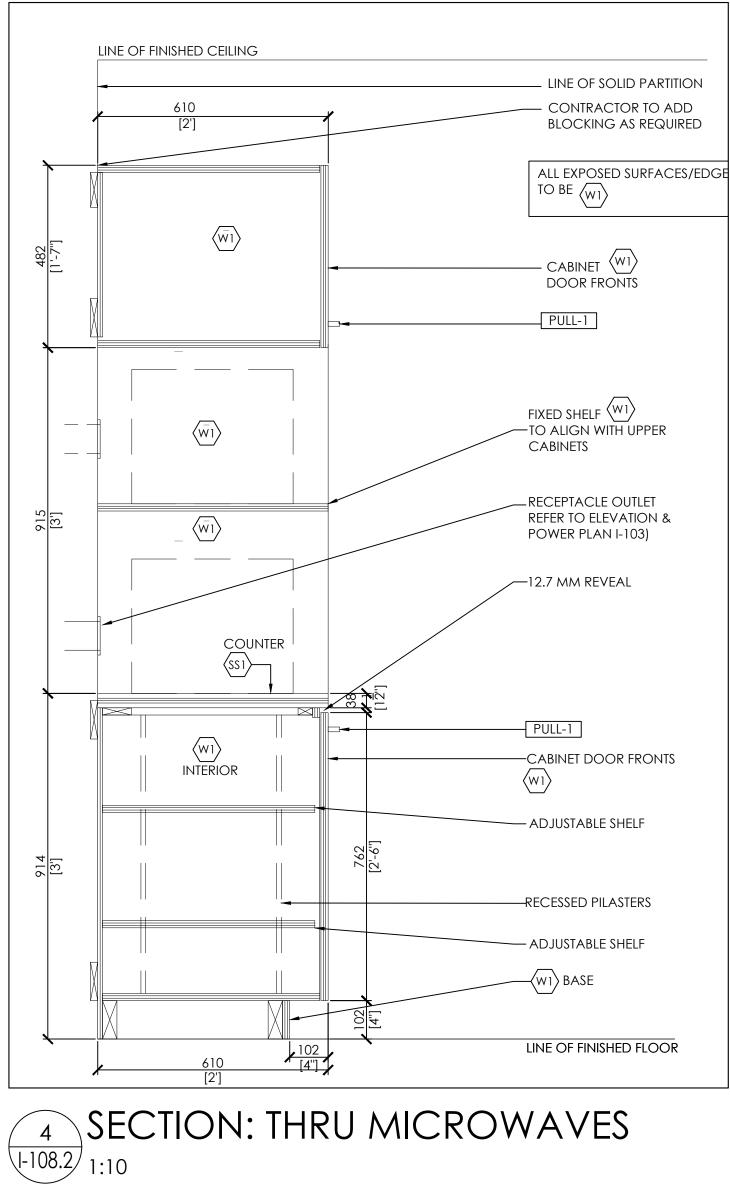
	rk finishes legend						
<u>(551)</u>	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD						
	RK HARDWARE LEGEND						
,	DESCRIPTION						
	HINGES (ALL CUPBOARDS) MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT					NETT DE Douglas	ESIGN
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE			UxI	bri	dge, ON. 905.852	L9P 1S9
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT		G	b e		nettdesi	gn.ca
	NICAL SPECIFICATIONS LEGE	ND	C/ Ø Al	annot be repro .l measuremen'	dduc Ts ml	ED WITHOUT WRITTEN PEI IST BE VERIFIED ON SITE B	Y CONTRACTOR AND REPORT
Symbol	DESCRIPTION SINK #1		PR	NY DISCREPANC CCEEDING WITH NOT SCALE DR	1 THE		CIATES INC. BEFORE
<u>S-1</u>	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-T	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						
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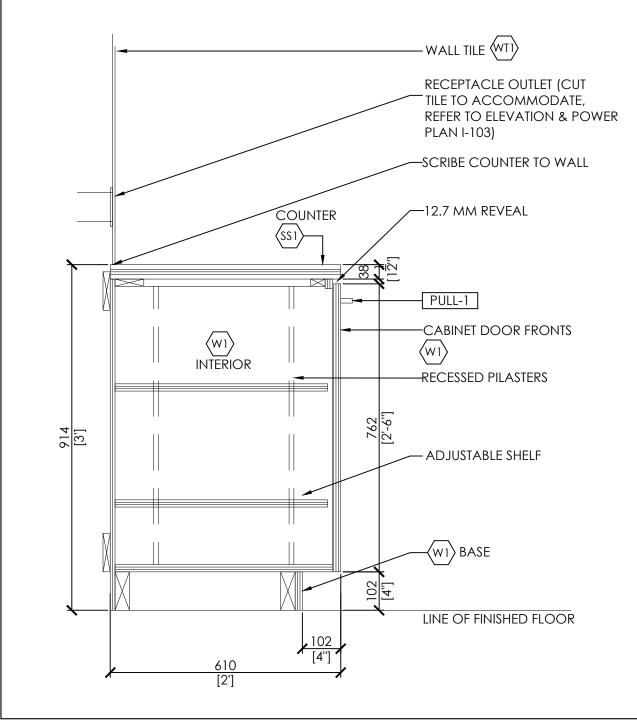


MILLWO	rk finishes legend					
Symbol	DESCRIPTION ALL CABINET INTERIORS AND EXTERIORS INCL.					
<u>(W1</u>)	DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT					
(SSI)	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT					
MILLWO	RK HARDWARE LEGEND					
	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				ETT DE	SIGN
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE		Uxk	orid	ge, ON. L	.9P 1S9
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL				05.852 ettdesig	
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SYMBOL	NICAL SPECIFICATIONS LEGEN DESCRIPTION	A Pl	NY DISCREPANCI ROCEEDING WITH	ES TO BEN I THE WOR	INETT DESIGN ASSOCIA	CONTRACTOR AND REPORT ATES INC. BEFORE
<u>S-1</u>	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	^w U	o not scale dr.	AWINGS.		
1-1	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					
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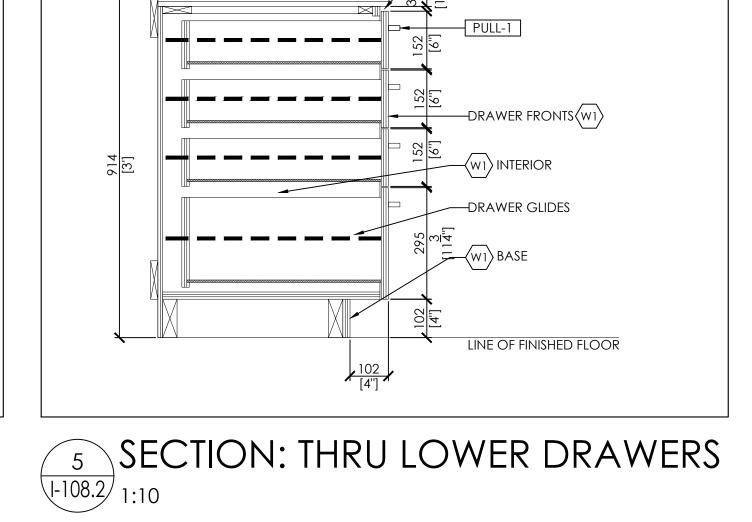








2 SECTION: THRU LOWER CABINET 1-108.2 1:10



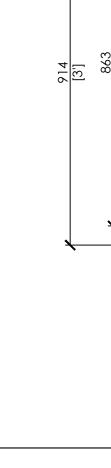
(SS 1)

ALL EXPOSED SURFACES/EDGES

-SCRIBE COUNTER TO WALL

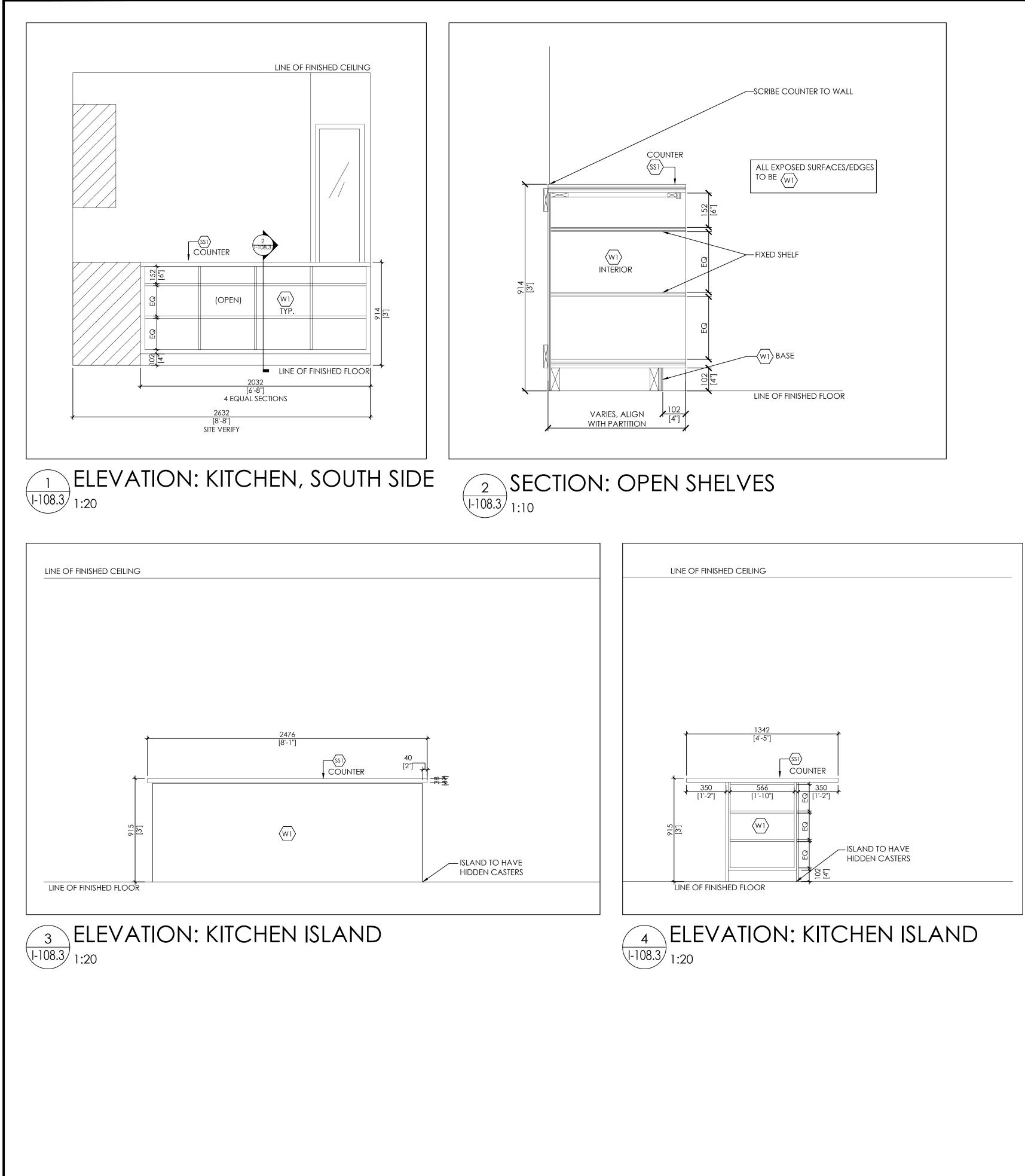
— WALL TILE (WTI)

-12.7 MM REVEAL

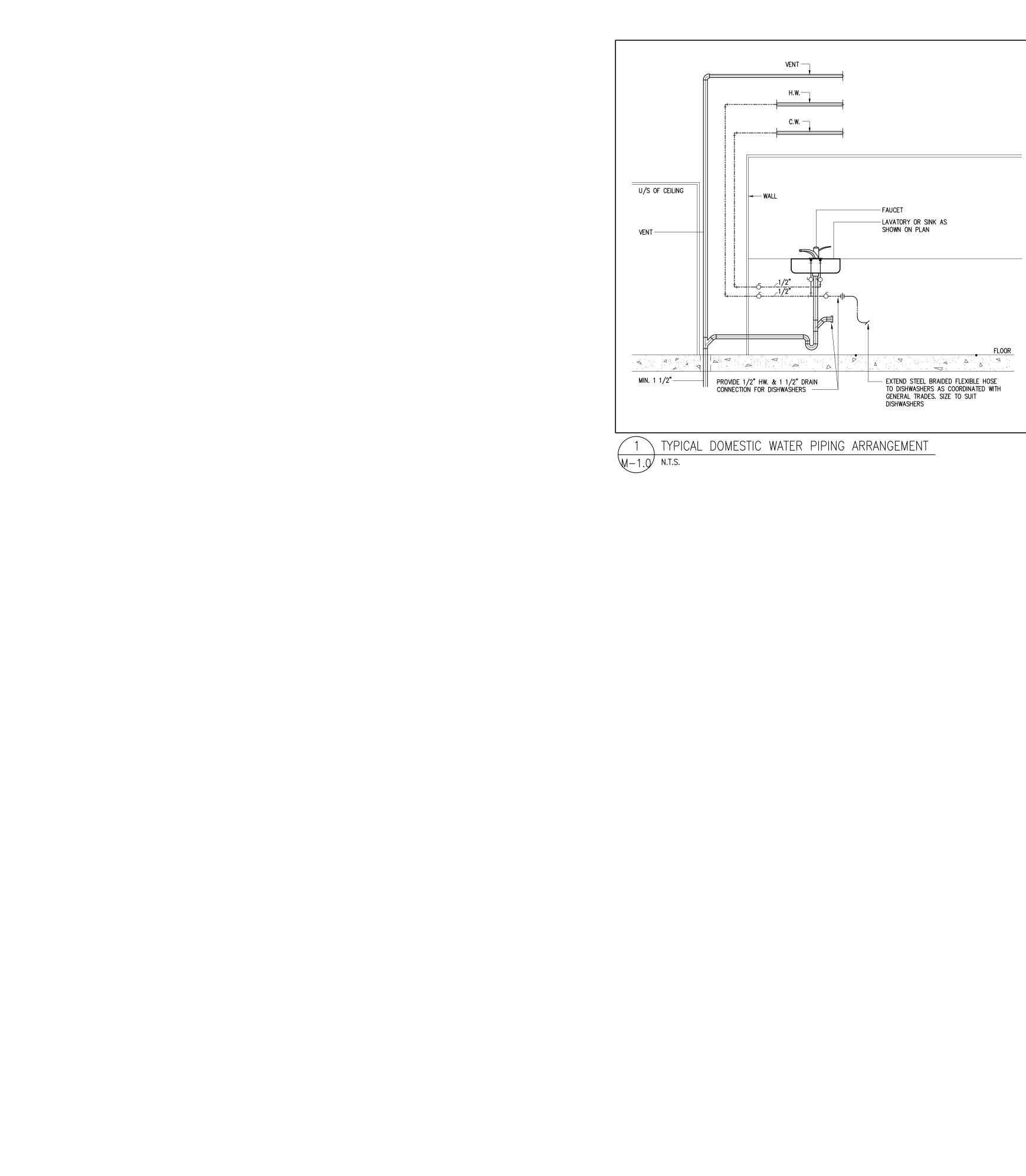




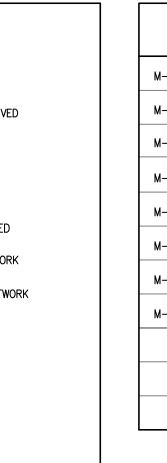
	MILLWO	RK FINISHES LEGEND			
	Symbol	DESCRIPTION			
	<u>(w1)</u>	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT			
	< <u>551</u>	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT			
	<u>MILLW</u> O				
	Symbol				
		MANUFACTURER: RICHELIEU MODEL: HINGE W/ 120 GRADE OPENING MODEL: HINGE W/ 125 GRADE OPENING SECTION 3/MODEL B MANUFACTURER: BLUM DISTRIBUTOR: RICHELIEU OR EQUIVALENT		NNETT DE Douglas	SIGN
		GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE	Uxb Tel	ridge, ON. . 905 . 852	L9P 1S9 . 4617
	PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT	b e i General notes	nnettdesi	gn.ca
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		SINK #1 MANUFACTURER: FRANKE COMMERCIAL	PROCEEDING WITH T DO NOT SCALE DRAY		
		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			
		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 BUITONS 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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Symbol	DESCRIPTION ALL CABINET INTERIORS AND EXTERIORS INCL.	
<u>(W1)</u>	DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT SOLID SURFACE #1	
< <u>551</u> >	MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT	
MILLWO	RK HARDWARE LEGEND	
Symbol		
	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	BENNETT BENNETT DESIGN 10 Douglas Road
	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE	Uxbridge, ON. L9P 1S9 Tel . 905. 852. 4617
PULL-1	MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT	bennettdesign.ca GENERAL NOTES
MECHAN Symbol	NICAL SPECIFICATIONS LEGI	ALL MEASUREMENTS MUST BE VERIFIED ON STIE BT CONTRACTOR AND REPORT ANY DISCREPANCIES TO BENNETT DESIGN ASSOCIATES INC. BEFORE
S-1	SINK #1 MANUFACTURER: FRANKE COMMERCIAL	PROCEEDING WITH THE WORK. DO NOT SCALE DRAWINGS.
	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	
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		ISSUED
		ISSUED



EXISTING MECHANICAL SERVICE/EQUIPMENT TO BE REMOVED OR RELOCATED. REFER TO PLAN DRAWINGS FOR FURTHER DETAIL. EXISTING RIGID DUCTWORK 1 EXISTING ROUND RIGID DUCTWORK EXISTING SERVICE TO BE CAPPED ______ ____ NEW ACOUSTICALLY LINED DUCTWORK NEW THERMALLY INSULATED DUCTWORK NEW ROUND RIGID DUCTWORK <u>ب____</u> NEW FLEXIBLE DUCTWORK NEW BALANCING DAMPER FD NEW FIRE DAMPER EXISTING SUPPLY AIR DIFFUSER TO E CFM CFM NEW SUPPLY AIR DIFFUSER. STANDARD \square GRILLE. R - [] GRILLE. 'B' ____ NOTED. INSTALL SOUND BAFFLE IN PERIMETER AP $(T)^{R}$ \bigcirc ^N \bigcirc FE WALL MOUNTED FIRE EXTINGUISHER ____DCW_____ DOMESTIC HOT WATER RECIRC -----DHWR----— — V— — — — SANITARY VENT C.O.I −Ţ− _____ CD _____ SHUT OFF VALVE ______ _____ CDS _____ _____ CDR _____ CHILLED WATER RETURN ———— FSP ——— N 🖸 F.D. FHC N \$



REMAIN. BALANCE TO CFM NOTED. RELOCATED SUPPLY AIR DIFFUSER. BALANCE TO CFM NOTED.

MECHANICAL LEGEND

BALANCE TO CFM NOTED. NEW DIFFUSER TO MATCH BASE BUILDING

EXISTING EGG CRATE RETURN AIR

RELOCATED EGG CRATE RETURN AIR

NEW EGG CRATE RETURN AIR GRILLE.

NEW EXHAUST GRILLE BALANCE TO CFM

NEW 12"x12" AIR TRANSFER DUCT UNLESS NOTED OTHERWISE

CONNECT TO EXISTING SERVICE

NEW ACCESS DOOR IN DRYWALL CEILING

EXISTING THERMOSTAT TO REMAIN

EXISTING RELOCATED THERMOSTAT

NEW THERMOSTAT

DOMESTIC COLD WATER

DOMESTIC HOT WATER

SANITARY DRAIN WITH CLEAN OUT

RUNNING TRAP

CONDENSATE DRAIN

MODULATING CONTROL VALVE

CONDENSER WATER SUPPLY

CONDENSER WATER RETURN

CHILLED WATER SUPPLY

NEW FIRE STANDPIPE WATER SUPPLY

SPRINKLER MAIN

EXISTING SPRINKLER HEAD TO BE REMOVED

EXISTING SPRINKLER HEAD TO REMAIN

NEW PENDANT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING

NEW UPRIGHT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING

NEW CONCEALED TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC. PROVIDE CUSTOM COLOUR TO SUIT CEILING FINISH WHERE NOTED.

NEW SIDEWALL TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC.

FLOOR DRAIN

NEW FIRE HOSE CABINET

NEW EXHAUST FAN SWITCH/SPEED CONTROLLER

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

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

<u>TYPE 'B' RETURN GRILLE</u>

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

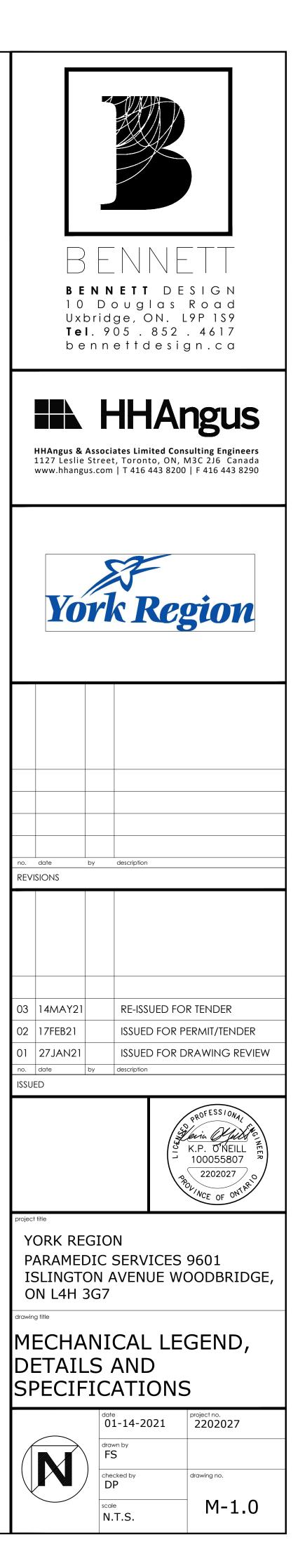
TYPE 'C' RETURN GRILLE

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				
INLET SIZE				
6"ø				
8"ø				
10"ø				
12 " ø				
14"ø				

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



MECHANICAL GENERAL REQUIREMENTS 20 01 01	8.1.2. ROUTE PIPES, DUCTS, CONDUITS AND OTHER SERVICES TO AVOID INTERFERENCE WITH EXISTING INSTALLATION.
 GENERAL REQUIREMENTS 1.1. EXAMINATION 1.1.1. EXAMINE ANY EXISTING BUILDINGS, LOCAL CONDITIONS, BUILDING SITE, 	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
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	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
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.	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
 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 	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.
1.2.1. MATERIALS AND EQUIPMENT: 1.2.1.A. OF CANADIAN MANUFACTURE WHERE OBTAINABLE, 1.2.1.B. STANDARD PRODUCTS OF APPROVED MANUFACTURE.	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
 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; 	AREAS. RECONNECT TO PERMANENT SERVICES, AT LATER DATE, WHEN NEW DISTRIBUTION SYSTEMS ARE AVAILABLE. 9. RECORD DRAWINGS
1.2.1.D.A.DESIGN,1.2.1.D.B.PERFORMANCE CHARACTERISTICS, AND1.2.1.D.C.METHODS OF CONSTRUCTION AND INSTALLATION.	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
 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 	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
CONSTRUCTION AND WORKMANSHIP. 1.2.2.A. WHERE MANUFACTURERS OR MANUFACTURERS PRODUCTS ARE IDENTIFIED IN LISTS WITH THE PHRASE "STANDARD OF ACCEPTANCE", THESE ARE	AN ELEVATION WHICH WILL BE PROVIDED. 9.1.3. RETAIN THESE DRAWINGS AND MAKE AVAILABLE TO CONSULTANT FOR PERIODIC REVIEW.
MANUFACTURERS AND/OR PRODUCTS WHICH MEET REQUIRED STANDARDS WITH REGARD TO PERFORMANCE, QUALITY OF MATERIAL AND WORKMANSHIP.	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
1.2.2.B. MANUFACTURERS AND OR PRODUCTS USED ARE TO BE CHOSEN FROM THESE LISTS.	AS-BUILT CONDITION. OBTAIN A CURRENT SET OF CAD FILES FROM THE CONSULTANT.
1.2.2.C. SELECT MATERIALS AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.	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.
 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 	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
PROPERLY SELECTED AND APPROVED MATERIALS. 2. SUBMITTALS 2.1. SHOP DRAWINGS AND PRODUCT DATA SHEETS	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.
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	9.2.3. SHOW ON MECHANICAL AS-BUILT DRAWINGS FINAL LOCATION OF PIPING, DUCTWORK, SWITCHES, STARTERS, MOTOR CONTROL CENTRES, THERMOSTATS, AND EQUIPMENT.
 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; 	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,
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	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
DRAWINGS SUBMITTED IN HARDCOPY FORMAT. 2.4. SUBMIT A SHOP DRAWING FOR EACH ITEM OF EQUIPMENT: 2.4.1. PLUMBING FIXTURES,	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
2.4.2. PUMPS, 2.4.3. AIR–MOVING UNITS,	(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
2.4.4. HEATING UNITS, 2.4.5. COILS, 2.4.6. MOTOR CONTROL CENTRES,	FOR CONSULTANTS' REVIEW. 9.2.8. ONCE "AS BUILT DRAWINGS" WHITE PRINTS ARE REVIEWED, TRANSFER CONSULTANTS' COMMENTS TO THE CAD FILES. RETURN AUTOCAD DRAWINGS
 2.4.7. MOTOR STARTERS, AND 2.4.8. SPECIAL SYSTEMS. 3. REFERENCE CODES, STANDARDS, AND REGULATIONS 	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.
 3.1. PERMITS, TESTS, AND CERTIFICATES 3.1.1. ARRANGE AND PAY FOR PERMITS, TESTS, AND CERTIFICATES OF INSPECTION REQUIRED BY AUTHORITIES HAVING JURISDICTION. 	 OPERATING AND MAINTENANCE INSTRUCTIONS 10.1. START-UP AND TESTING 10.1.1. SUPPLY SERVICES OF SKILLED MECHANIC, TO START SYSTEMS IN PROPER
3.1.2. SUBMIT APPLICATIONS REQUIRING OWNER'S SIGNATURE BEFORE COMMENCING WORK.3.1.3. OBTAIN AND SUBMIT INSPECTION CERTIFICATES.	SEQUENCE, AND TEST AND CALIBRATE CONTROLS, PRV'S, INSTRUMENTATION AND RELIEF VALVES AND DAMPERS AND TO SET-UP SYSTEMS. 10.2. TRAINING
 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 	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.
4.1. MANUFACTURERS NAMEPLATES 4.1.1. PROVIDE METAL NAMEPLATE WITH RAISED OR RECESSED LETTERING, MOUNTED ON EACH PIECE OF EQUIPMENT.	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
 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. 	BACK, THREE—RING COVERS. 10.3.1.A. ORGANIZE MATERIAL IN VOLUMES GENERALLY GROUPED BY TRADE SECTION; SITE SERVICES, PLUMBING, FIRE PROTECTION, HEATING AND
 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, 	COOLING PLANT AND DISTRIBUTION, AIR HANDLING, AND CONTROLS AND INSTRUMENTATION. 10.3.1.B. TITLE SHEET IN EACH VOLUME TO BE LABELED "OPERATING AND
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	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.
COMPLETED, CLEAN RUST AND OIL FROM EXPOSED IRON AND STEEL WORK PROVIDED UNDER THIS DIVISION, WHETHER OR NOT IT HAS BEEN FACTORY PRIME PAINTED.	11. CONSULTANT REVIEWS 11.1. SITE REVIEWS
 OFFICE, STORAGE AND TOOLS 5.1. OFFICE AND STORAGE 5.1.1. PROVIDE TEMPORARY OFFICE, WORKSHOP AND TOOLS AND MATERIAL STORAGE 	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
SPACE. 5.1.2. ASSUME RESPONSIBILITY FOR SECURITY OF THESE FACILITIES AND PROVIDE HEAT, LIGHT AND TELEPHONE.	OTHERWISE SHOWN. 12. CORRECTION AFTER COMPLETION 12.1. GENERAL 12.1. SUBJUT SIMILAD CHARANTEE FOR ONE YEAR FROM DATE OF ACCEPTANCE FOR
 5.2. APPLIANCES AND TOOLS 5.2.1. PROVIDE TOOLS, EQUIPMENT, SCAFFOLDING, EXTENSION CORDS, LAMPS AND MISCELLANEOUS CONSUMABLE MATERIALS REQUIRED TO CARRY OUT WORK. 	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.
 CO-ORDINATION GENERAL GENERAL CONSULTANT DRAWINGS ARE DIAGRAMMATIC AND ILLUSTRATE THE GENERAL 	12.2. FINAL REVIEW 12.2.1. AT PROJECT COMPLETION, SUBMIT WRITTEN REQUEST FOR FINAL REVIEW OF MECHANICAL AND ELECTRICAL SYSTEMS.
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	BASIC MATERIALS AND METHODS 20 05 01
CASE SUCH DRAWINGS ARE NOT REPRESENTED AS FABRICATION OR INSTALLATION DRAWINGS. 6.1.2. LOCATION OF PIPES, DUCTWORK, RACEWAYS AND EQUIPMENT MAY BE ALTERED	1. GENERAL 1.1. SCOPE 1.1.1. ARTICLES THAT ARE OF A GENERAL NATURE, APPLICABLE TO EACH SECTION OF DIVISION 20 AND 26.
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.	 ACCESS DOORS PROVIDE ACCESS DOORS TO BE INSTALLED AT LOCATIONS WHERE EQUIPMENT REQUIRING INSPECTION, SERVICE, MAINTENANCE OR ADJUSTMENT IS "BUILT-IN" TO WORK OF OTHER TRADES.
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	 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
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	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
7.1. GENERAL7.1.1. PROTECT THIS WORK AND WORK OF OTHER TRADES FROM DAMAGE.7.1.2. COVER FLOORS WITH TARPAULINS AND PROVIDE PLYWOOD AND OTHER	CYLINDER LOCKS WITH SIMILAR KEYS. 3. SLEEVES 3.1. GENERAL
 TEMPORARY PROTECTION. 7.1.3. ASSUME RESPONSIBILITY FOR REPAIRING DAMAGE TO FLOOR AND WALL SURFACES RESULTING FROM FAILURE TO PROVIDE ADEQUATE PROTECTION. 	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
7.1.4. PROTECT EQUIPMENT, PIPE AND DUCT OPENINGS FROM DIRT, DUST AND OTHER FOREIGN MATERIALS.	RATED WALLS, FLOORS AND PARTITIONS. 3.2. FLOOR AND WALL SLEEVES

- ND DUGT OFENINGS FROM DIRT, DUST AND OTHER FORFIGN MATERIALS 8. WORK IN EXISTING BUILDING
- 8.1. GENERAL 8.1.1. .1 WORK INCLUDES CHANGES TO EXISTING BUILDING
- 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 SIZED TO CLEAR CONDUITS, BARE PIPES, AND BARE DUCTS BY 6 MM 3.2.2.B. (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
- FI OORS 3.1.4.A. 1.6 MM (16 GA) MINIMUM SHEET METAL, LAPPED AND SPOT WELDED WITH 20 MM $(\frac{34}{4}$ 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 SUPPLIED, 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.

- 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 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. PROTECTED AGAINST ACCIDENTAL BREAKAGE OF THE GLASS INDICATOR. 2.1.1.C.
- 2.1.1.D. IN-LINE TYPE FOR PIPE SIZES UP TO NPS 11/2. 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 \pm 1% OF READING OVER MINIMUM OF 10:1 TURNDOWN. 2.2.2.B. REPEATABILITY OF \pm 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 FSTING
- 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
- 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
- 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 TRERICE 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, 1/2% 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.
- EXECUTION 3.1. METERING DEVICES

3

- 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.

- 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 ARTICI F 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 I FVFR HANDI F 5.2.4. BUTTERFLY VALVES NPS 21/2 AND OVER, GROOVED JOINT STYLE
- 5.2.4.A. 1200 KPA (175 PSI), CAST IRON BODY, EPDM COATED OR BRASS DISC, EPDM SEAT, "OPEN/SHUT" INDICATOR, WITH SUPERVISORY SWITCH
- 5.2.5. SWING CHECK VALVES NPS 21/2 AND OVER, FLANGED 5.2.5.A. 1200 KPA (175 PSI),TO ASTM A216 CLASS B, 175 CWP, CAST IRON BODY WITH FLAT FACED FLANGES, REGRIND, RENEW BRONZE DISC AND SEAT RING, BOLTED COVER. 5.3. DOMESTIC WATER VALVES
- 5.3.1. GATE VALVES NPS 2 AND UNDER, SOLDERED 5.3.1.A. 1000 KPA (150 PSI), TO MSS SP-80, CLASS 150, BRONZE BODY. SOLID WEDGE BRONZE DISC, RISING STEM, SCREW IN, OR UNION BONNET.
- 5.3.2. GLOBE VALVES NPS 2 AND UNDER, SOLDERED 5.3.2.A. 850 KPA (125 PSI), TO MSS SP-80, 300 CWP, BRONZE BODY, RENEWABLE COMPOSITION PTFE DISC, THREADED OVER BONNET, LOCK SHIELD HANDLES AS INDICATED.
- 5.3.3. GLOBE VALVES NPS 2 AND UNDER, THREADED 5.3.3.A. 1000 KPA (150 PSI), TO MSS SP-80, CLASS 150, BRONZE BODY, RENEWABLE COMPOSITION PTFE DISC, UNION BONNET, LOCK SHIELD
- HANDLES AS INDICATED. 5.3.4. SWING CHECK VALVES NPS 2 AND UNDER, SOLDERED 5.3.4.A. 850 KPA (125 PSI), TO MSS SP-80, BRONZE BODY, BRONZE SWING DISC, REGRINDABLE SEAT, SCREW-IN CAP,
- 5.3.5. SWING CHECK VALVES NPS 2 AND UNDER, THREADED 5.3.5.A. 850 KPA (125 PSI), TO MSS SP-80, CLASS 125, BRONZE BODY,
- BRONZE SWING DISC, REGRINDABLE SEAT, SCREW-IN CAP 5.3.6. BALL VALVES UP TO NPS 2: 5.3.6.A. 1000 KPA (150 PSI), TWO PIECE BRONZE BODY AND CHROME PLATED
- BRONZE BALL, PTFE SEAT RINGS, SOLDER JOINT OR NPT TO COPPER ADAPTERS, FULL PORT. 5.3.7. DOUBLE REGULATING VALVES (DRV), NPS 2 AND UNDER, THREADED 1000 KPA (150 PSI) COPPER ALLOY BODY. PLUG TYPE STEM WITH 5.3.7.A.
- FLOW MEASUREMENT PORTS AND TAMPER-PROOF SETTING. 5.3.8. FLOW METER FOR DRVS DIRECT DIGITAL FLOW READOUT TYPE COMPUTERIZED METER WITH
- 5.3.8.A. HOSES AND FITTINGS. 5.4. HEATING AND COOLING WATER VALVES
- 5.4.1. GATE VALVES NPS 2 AND UNDER, SOLDERED
- 5.4.2. GLOBE VALVES NPS 2 AND UNDER, THREADED 5.4.3. BALL VALVES NPS 2 AND UNDER, SOLDERED
- 5.4.4. BUTTERFLY VALVES NPS 21/2 TO 12, FOR GROOVED END PIPE: 5.4.5. PLUG VALVES NPS 2 AND UNDER, THREADED
- 5.4.6. SWING CHECK VALVES NPS 2 AND UNDER, SOLDERED
- 5.4.7. SILENT CHECK VALVES NPS 2, FOR GROOVED END PIPE 5.4.8. DOUBLE REGULATING VALVES (DRV), NPS 2 AND UNDER, THREADED
- 5.4.9. FLOW METER FOR DRVS STANDARD OF ACCEPTANCE: KITZ, CRANE, JENKINS, NIBCO
- EXECUTION 6.1. VALVE INSTALLATION
- 6.1.1. INSTALL SHUT OFF VALVES AT: 6.1.1.A. BRANCH TAKE-OFFS,
- 6.1.1.B. TO ISOLATE PIPING TO EACH PIECE OF EQUIPMENT, AND
- 6.1.1.C. IN LOCATIONS SHOWN. 6.1.1.D. INSTALL VALVES IN UPRIGHT POSITION WITH STEM ABOVE HORIZONTAL

HANGERS AND SUPPORTS <u>20 05 29</u>

- 1. SCOPE 1.1. PROVIDE HANGERS AND SUPPORTS FOR PIPING AND CONDUITS.
- 1.2. SHOP DRAWINGS
- 1.2.1. SUBMIT DETAILS FOR SUPPORTS, GUIDES, AND ANCHORS FOR GLASS, FIBRE-REINFORCED PLASTIC, AND PLASTIC PIPING SYSTEMS. 1.3. APPLICABLE CODES AND STANDARDS;
- 1.3.1. ASME B31.9 BUILDING SERVICE PIPING
- 1.3.2. MANUFACTURERS STANDARDIZATION SOCIETY OF VALVE AND FITTINGS INDUSTRY (MSS) 1.3.2.A. MSS SP-58 PIPE HANGERS AND SUPPORTS - MATERIALS DESIGN AND
- MANUFACTURE
- 1.3.2.B. MSS SP-69 PIPE HANGERS AND SUPPORTS SELECTION AND

APPLICATION 1.3.2.C. THE ONTARIO BUILDING CODE

2. PRODUCTS

EXECUTION

1. GENERAL

1.1. SCOPE

2.1. GENERAL

2.1.1. HANGERS, SUPPORTS, SWAY BRACES, TO BE MADE UP FROM STOCK OR PRODUCTION PARTS. MANUFACTURED AND FABRICATED IN ACCORDANCE WITH ASME B31.1 AND MSS SP-58, SP-69, AND SP-90. 2.1.2. SELECT ELEMENTS OF PIPE SUPPORT SYSTEMS TO PROVIDE ADEQUATE FACTORS OF SAFETY UNDER LOADS APPLIED BY GRAVITY, BY TEMPERATURE INDUCED EXPANSION AND CONTRACTION, BY INTERNAL PRESSURE IN MECHANICALLY JOINTED PLAIN END PIPE, BY CHANGE OF MOMENTUM IN FLUID FLOW.

2.2. PRODUCT IDENTIFICATION 2.2.1. PIPE SUPPORT PRODUCTS TO BE SELECTED FROM MANUFACTURERS STANDARD PRODUCT LINE

2.3. UPPER ATTACHMENTS

2.3.1. CAST-IN-PLACE CONCRETE: 2.3.1.A. SINGLE OR DOUBLE PIPE RUNS UP TO AND INCLUDING 300 MM (12 IN) DIAMETER:

2.3.1.A.A. GALVANIZED WEDGE INSERTS TO MSS SP-58, TYPE 18. 2.3.1.A.B. ULC LISTED FOR PIPE NPS ³/₄ THROUGH NPS 8.

2.3.1.B. PIPE RUNS OF THREE OR MORE PIPES:

2.3.1.B.A. MULTIPLE INSERTS, SPACED TO SUIT SMALLEST PIPE IN GROUP. 2.3.1.C. PIPES RUNS 350 MM (14 IN) DIAMETER AND OVER USE SPECIAL INSERTS.

2.3.2. SURFACE MOUNT ON CONCRETE: 2.3.2.A. CARBON STEEL PLATE WITH CLEVIS AND MALLEABLE IRON SOCKET AND EXPANSION CASE AND BOLT WITH MINIMUM OF TWO EXPANSION CASES AND BOLTS FOR EACH HANGER.

2.3.2.B. DO NOT USE EXPLOSIVE DRIVE PINS IN ANY SECTION OF WORK WITHOUT OBTAINING PRIOR APPROVAL.

2.3.3. PIPING OR EQUIPMENT SUPPORTED FROM EXISTING CONCRETE CONSTRUCTION: 2.3.3.A. DRILL AND INSTALL THREADED INSERTS. 2.3.4. STEEL FRAMED CONSTRUCTION:

2.3.4.A. STEEL BEAM (BOTTOM FLANGE) AND COLD PIPING NPS 2 AND UNDER: 2.3.4.A.A. BEAM CLAMP TO MSS SP-58, TYPE 30, ULC LISTED. 2.3.4.B. STEEL BEAM (BOTTOM FLANGE) AND COLD PIPING NPS 2½ AND LARGER AND HOT PIPING:

2.3.4.A.A. HEAVY BEAM CLAMP ASSEMBLY TO MSS SP-58, TYPE 28 OR 29,

2.3.4.A.B. FABRICATED EQUIVALENT, ULC LISTED. 2.3.4.B. STEEL BEAM (TOP FLANGE) AND COLD PIPING AND HOT PIPING NPS 2 AND UNDER:

2.3.4.A.A. STEEL JAW, HOOK ROD WITH NUT, SPRING WASHER AND PLAIN WASHER, TO MSS SP-58, TYPE 25, ULC LISTED. 2.3.4.A.B. STEEL JOISTS AND COLD PIPING NPS 2 AND UNDER, STEEL WASHER PLATE WITH DOUBLE LOCKING NUTS, STEEL JOISTS AND COLD PIPING NPS 21/6 AND LARGER AND HOT PIPING. STEEL WASHER PLATES WITH DOUBLE LOCKING NUT, CARBON STEEL CLEVIS AND MALLEABLE IRON

SOCKET. 2.4. HANGER ROD 2.4.1. CARBON STEEL THREADED ROD;

2.4.1.A. ELECTRO-GALVANIZED FINISH IN MECHANICAL ROOMS AND OUTDOORS. 2.4.1.B. BLACK STEEL FINISH IN OTHER AREAS. 2.5. HORIZONTAL PIPE SUPPORT – SUSPENDED

2.5.1. HOT OR COLD SUSPENDED PIPING, INCLUDING CONDUITS, WHERE HORIZONTAL MOVEMENT IS 25 MM (1 IN) OR LESS AND HANGER ROD IS LONGER THAN 300 MM (12 IN).

2.5.1.A. STEEL OR CAST IRON PIPING: 2.5.1.A.A. ADJUSTABLE CLEVIS TO MSS SP-58, TYPE 1, ULC LISTED, SIZED FOR OUTSIDE DIMENSION OF PIPE AND INSULATION.

2.5.1.B. COPPER PIPING: 2.5.1.B.A. ADJUSTABLE CLEVIS TO MSS SP-58, TYPE 1, COPPER PLATED. 2.5.2. SUSPENDED HOT STEEL OR COPPER PIPING HAVING HORIZONTAL MOVEMENT IN EXCESS OF 25 MM (1 IN) OR HOT STEEL PIPING WITH HANGER ROD 300 MM (12 IN) OR LESS:

2.5.2.A. TRAPEZE OR YOKE STYLE PIPE ROLLER TO MSS SP-58, TYPE 43. 3.1. HANGER INSTALLATION

3.1.1. SUPPORT PIPING AND CONDUIT DIRECTLY FROM OR ON STRUCTURAL BUILDING ELEMENTS. DO NOT SUPPORT PIPE OR CONDUIT DIRECTLY FROM OTHER SERVICES EXCEPT AS DESCRIBED BELOW.

3.1.2. THE HANGER ROD SIZE AND SPACING IN THE FOLLOWING ARTICLES IS BASED ON SUPPORTING A SINGLE PIPE DIRECTLY FROM THE STRUCTURE. 3.1.3. INSTALL HANGERS FOR CAST IRON SOIL PIPE WITH HANGER SPACING AND HANGER ROD DIAMETER IN ACCORDANCE WITH TABLE 3.

3.1.3.A. IN ADDITION, PROVIDE A HANGER AT OR ADJACENT TO EACH HUB OR JOINT 3.1.4. HANGER SPACING AND HANGER ROD DIAMETER FOR STEEL OR COPPER FLEXIBLE JOINT ROLL GROOVE PIPE TO BE AS SHOWN IN TABLE ABOVE FOR

APPROPRIATE PIPE MATERIAL WITH NOT LESS THAN ONE HANGER BETWEEN JOINTS AND WITH ANCHORS AND GUIDES LOCATED TO MAINTAIN PIPING TRUE TO LINE AND GRADE. 3.1.5. IN STEEL FRAMED CONSTRUCTION, SUPPORT PIPING FROM STRUCTURAL

MEMBERS. WHERE STRUCTURAL MEMBERS ARE NOT SUITABLY LOCATED FOR UPPER HANGER ATTACHMENTS AND INSERTS OF ADEQUATE CAPACITY CAN NOT BE INSTALLED IN FLOOR SLABS OVER, PROVIDE SUPPLEMENTARY STEEL FRAMING MFMBFRS:

3.1.6. OFFSET HANGERS SO THAT RODS ARE VERTICAL IN OPERATING POSITION. 3.1.7. PROVIDE HANGER WITHIN 300 MM (12 IN) OF EACH HORIZONTAL ELBOW AND

3.2. SADDLES AND SHIELDS 3.2.1. ON COLD INSULATED PIPING, PROVIDE INSULATION SHIELDS BETWEEN INSULATION AND PIPE SUPPORT

3.2.2. ON HOT INSULATED PIPING, WELD PROTECTIVE SADDLES TO PIPE AT PIPE SUPPORT LOCATIONS 3.2.3. NO SADDLES OR SHIELDS ARE REQUIRED ON UN-INSULATED PIPING.

3.3. LOAD NUT RETENTION REQUIREMENTS 3.3.1. ADHERE FASTENING NUTS, INCLUDING TOP AND BOTTOM LOAD NUTS, AND

CLEVIS BOLT NUTS, TO THREADED RODS OR FITTINGS WITH LOCTITE 266. 3.4. SET-UP AFTER INSTALLATION 3.4.1. ADJUST HANGERS TO EQUALIZE HANGER LOADS. TO SUPPORT PIPING TRUE TO

LINE AND GRADE, AND TO MINIMIZE LOADS TRANSFERRED THROUGH CONNECTIONS TO EQUIPMENT AND OUTLETS.



1.1.1. WELD OR BRAZE PIPE AND FITTINGS FOR WORK OF DIVISION 20. 1.1.2. IN THIS SECTION. THE TERM "WELD, WELDER, WELDING" OR SIMILAR WORD OR PHRASE IS AN EXPRESSION WHICH INCLUDES BOTH WELDING OR BRAZING. 1.2. REGISTRATION AND INSPECTION

1.2.1. BEFORE COMMENCING WORK, MAKE ARRANGEMENTS AND PAY FOR REGISTRATION AND INSPECTION BY TECHNICAL STANDARDS & SAFETY AUTHORITY (TSSA), FOR THE FOLLOWING PRESSURE PIPING SYSTEMS: 1.2.1.A. SERVICE WATER PIPING FOR BUILDING HOT WATER HEATING SYSTEMS.

AT DESIGN TEMPERATURES ABOVE 121 C (250 F) OR AT DESIGN PRESSURES ABOVE 1070 KPA (160 PSIG), 1.2.1.B. CHILLED WATER, COOLING WATER, AND PROCESS WATER SYSTEMS, FOR

LIQUIDS NO MORE HAZARDOUS THAN WATER, AT DESIGN TEMPERATURES ABOVE 65 C (150 F) OR DESIGN PRESSURES ABOVE 1717 KPA (250PSIG). 1.3. APPLICABLE STANDARDS:



	BENNETT DESIGN BENNETT DESIGN 10 Douglas Road Uxbridge, ON. L9P 1S9 Tel. 905.852.4617 bennettdesign.ca						
HHAngus & Associates Limited Consulting Engineers 1127 Leslie Street, Toronto, ON, M3C 2J6 Canada www.hhangus.com T 416 443 8200 F 416 443 8290							
	Yó	r	Region				
o. EVI	_{date}	by	description				
3	14MAY21		RE-ISSUED FOR TENDER				
2	17FEB21		ISSUED FOR PERMIT/TENDER				
0 1 o.	27JAN21 date	by	ISSUED FOR DRAWING REVIEW				
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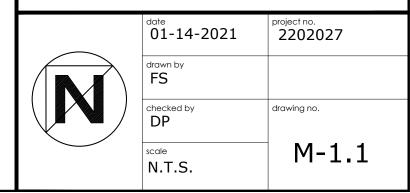


oject title

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

wing title

MECHANICAL SPECIFICATIONS -1 OF 5



 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. EXECUTION 2.1. WELDER QUALIFICATION AND WELDING PROCEDURES 3.4. ASME D31.9 CODE FOR BUILDING SERVICE PIPING. 	1.4.2.B. REFRIGERATION MACHINES 1.4.2.C. BOILERS
1.3.3.A. ASME B31.9 CODE FOR BUILDING SERVICE PIPING.	1.4.2.D. [EVAPORATIVE][DRY] COOLERS
2. EXECUTION 2.1. WELDER QUALIFICATION AND WELDING PROCEDURES	1.4.2.E. HEAT EXCHANGERS 1.4.2.F. MIXING TANK
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	1.4.2.G. CIRCULATING PUMP
APPROVED PROCEDURES BY WELDERS CERTIFIED FOR PRESSURE PIPING BY	1.4.2.H. EXPANSION TANK 1.4.2.I. COILS
TSSA. 2.1.2. WELDING, BOTH SHOP AND FIELD, TO BE ELECTRIC ARC IN ACCORDANCE WITH	1.4.2.J. CONTROLS
RECOMMENDATIONS OF CANADIAN WELDING BUREAU.	1.4.3.A. GLYCOL COOLING SYSTEM
AVAILABLE FOR INSPECTION DURING PIPE WELDING OPERATIONS. EACH WELD	1.4.3.A.A. SUPPLY TEMPERATURE: 2°C (36°F) 1.4.3.A.B. RETURN TEMPERATURE: 15.5°C (60°F)
TO BE STAMPED WITH WELDER'S IDENTIFYING NUMBER. 2.2. WELDED CONNECTIONS TO EXISTING PRESSURE PIPING SYSTEMS	1.4.3.A.B. RETURN TEMPERATURE: 15.5°C (60°F) 1.4.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
2.2.1. AT THE COMMENCEMENT OF THE WORK, REVIEW WITH	1.4.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI) 1.4.3.A.E. GLYCOL TYPE: PROPYLENE
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:	1.4.3.A.F. GLYCOL / WATER MIXTURE BY VOLUME: 40 % GLYCOL
INCLUDING BUT NOT LIMITED TO: 2.2.1.A. DIMENSIONAL MISALIGNMENT BETWEEN OLD AND NEW PIPE.	1.4.3.A.G. WATER – CITY OF TORONTO 1.4.3.A.G.A. CACO3 = [9 GRAINS]
 1ESTING 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. 2.3.1. WELDS TO BE SOLID HOMOGENEOUS PART OF METALS JOINED AND FREE FROM PITS AND INCORPORATED SLAG AND SCALE. 	1.4.3.A.G.B. 32 PPM CHLORIDE IONS
2.2.2. AFTER TESTING REQUIREMENTS ARE DETERMINED, PROVIDE A PROPOSED SCHEDULE FOR TIE-IN CONNECTIONS AND REQUIRED EXISTING SERVICE	1.4.3.A.G.C. 26 PPM SULPHATE IONS 1.4.3.B. GLYCOL [HEATING][HEAT RECLAIM] SYSTEM
SHUT-DOWN PERIODS, FOR APPROVAL PRIOR TO COMMENCING WORK. 2.3. WELD QUALITY	1.4.3.B.A. SUPPLY TEMPERATURE[:][TO HEAT RECLAIM COILS:] -1°C (30°F)
2.3.1. WELDS TO BE SOLID HOMOGENEOUS PART OF METALS JOINED AND FREE FROM	1.4.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI) 1.4.3.B.C. DESIGN PRESSURE: 1030 KPA (150 PSI)
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	
2.3.3. CONDUCT VISUAL EXAMINATION OF WELDS IN ACCORDANCE WITH THE APPLICABLE PIPING STANDARD AND SUBMIT COPY OF EXAMINATION REPORT FOR	1.4.3.B.F.A. CACO3 = [9 GRAINS] 1.4.3.B.F.B. 32 PPM CHLORIDE IONS
REVIEW. FOR REGISTERED PRESSURE PIPING SYSTEMS, INCLUDE COPIES OF	1.4.3.B.F.C. 26 PPM SULPHATE IONS
TSSA FIELD INSPECTION REPORTS. 2.4. RADIOGRAPHY	2. PRODUCTS 2.1. GLYCOL
2.4.1. ARRANGE AND PAY FOR SERVICES OF AN INSPECTION COMPANY SPECIALIZING IN MAKING AND INTERPRETING X-RAYS OF PIPE WELDS.	2.1.1. INDUSTRIAL TYPE COOLANT FORMULATED WITH CORROSION INHIBITORS.
 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". 	2.1.2. PROPYLENE GLYCOL 2.1.3. ETHYLENE GLYCOL
2.4.3. RADIOGRAPHY TO BE IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 PARA, UW-51, "TECHNIQUE FOR	STANDARD OF ACCEPTANCE: DOW - DOWFROST, UNION CARBIDE, INTERSTATE CHEMICAL -
RADIOGRAPHIC EXAMINATION OF WELDED JOINTS". 2.4.4. WELDS ARE UNACCEPTABLE WITH IMPERFECTIONS AS DETAILED IN PARA. UW-51,	INTERCOOL HOUGHTON CHEMICAL – SAFE-T-THERM 3. EXECUTION
CLAUSE (M)1 TO (M)4 INCLUSIVE OF SAME CODE.	3.1. PIPE INSTALLATION 3.1.1. GENERAL LAYOUT OF MAINS, RISERS, RUN-OUTS AND CONNECTION DETAILS OF
2.4.5. REPAIRS TO BE CARRIED OUT AS PROVIDED IN PARA. UW-38 OF SAME CODE.	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.
HEATING AND COOLING PIPING SYSTEMS GENERAL	3.1.4. ERECT PIPING SO THAT EXPANSION FORCES, GRAVITY FORCES AND THRUST
<u>23 05 01</u>	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.
1.1. PROVIDE HEATING AND COOLING PIPING SYSTEMS 1.2. HOT WATER HEATING SYSTEM	3.1.6. SEPARATE COPPER PIPE AND FITTING MATERIALS FROM CONTACT WITH FERROUS
1.2.1. PIPING DESIGN CODE:	MATERIAL WITH DI-ELECTRIC COUPLINGS. 3.1.7. INSTALL DRAIN VALVES AT LOW POINTS IN WATER PIPING SYSTEMS AND IN
1.2.1.A. TO ASME B31.9 BUILDING SERVICE PIPING 1.2.2. SYSTEM INCLUDES:	VALVED RUN-OUTS FROM RISERS SO THAT SYSTEM OR ISOLATED PARTS OF SYSTEM CAN BE DRAINED.
1.2.2.A. BOILERS 1.2.2.B. HEAT EXCHANGERS	3.1.8. DO NOT USE GALVANIZED MATERIALS IN CONTACT WITH GLYCOLS.
1.2.2.C. PUMPS	3.2. FILLING OF GLYCOL SYSTEMS 3.2.1. DELIVER GLYCOL TO SITE IN MANUFACTURER'S SEALED CONTAINERS.
1.2.2.D. EXPANSION TANKS 1.2.2.E. CONVECTORS	3.2.2. AFTER SYSTEM HAS BEEN CLEANED AND TESTED FOR LEAKS, FILL WITH WATER
1.2.2.F. RADIATORS	THROUGH TEMPORARY WATER METER TO OBTAIN TOTAL SYSTEM VOLUME. 3.2.3. DRAIN WATER FROM SYSTEM AND EITHER FILL WITH PRE-MIXED GLYCOL
1.2.2.G. RADIANT PANELS 1.2.2.H. FINNED RADIATION	SOLUTION, OR FIRST WITH CALCULATED VOLUME OF CONCENTRATED GLYCOL AND THEN MAKE UP TO SYSTEM VOLUME WITH WATER.
1.2.2.I. UNIT HEATERS	3.2.4. CIRCULATE SOLUTION FOR ONE WEEK AND THEN TAKE SAMPLES FOR TESTING
1.2.2.J. HEATING COILS 1.2.2.K. CONTROLS	FOR PERCENTAGE CONCENTRATION BY SPECIFIC GRAVITY METHOD, IN GLYCOL SUPPLIER'S LABORATORY.
1.2.3. SYSTEM DESIGN CRITERIA 1.2.3.A. CONSTANT TEMPERATURE SYSTEM	3.2.5. SUBMIT RESULTS OF ANALYSIS. 3.2.5.A. IF CORRECTION OF CONCENTRATION IS REQUIRED, AMOUNT OF MIXTURE
1.2.3.A.A. SUPPLY TEMPERATURE: [93°C (200°F)][87°C (190°F)]	TO BE DRAWN FROM SYSTEM TO BE CALCULATED AND DRAINED INTO ORIGINAL CONTAINERS. TO THIS ADD WATER OR GLYCOL IN CALCULATED
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)	AMOUNTS TO CORRECT CONCENTRATION IN SYSTEM, AND RECHARGED
1.2.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)	SYSTEM. 3.2.5.B. PROVIDE 24 HOURS NOTICE BEFORE DRAINING AND REFILLING TO
1.2.3.B. SCHEDULED TEMPERATURE SYSTEM 1.2.3.B.A. MAXIMUM WORKING PRESSURE : 900 KPA (125 PSI)	CORRECT CONCENTRATION. 3.2.5.C. CIRCULATE AFTER CORRECTING CONCENTRATION FOR A FURTHER 24
1.2.3.B.B. DESIGN PRESSURE: 1030 KPA (150 PSI)	HOURS AND RETEST CONCENTRATION.
1.2.3.C. LOW TEMPERATURE SYSTEM (CONDENSER WATER HEAT RECOVERY) 1.2.3.C.A. SUPPLY TEMPERATURE: 40.5 °C (105 °F)	3.2.6. SUBMIT FINAL REPORT WITH HISTORICAL DATA SHOWING DATES AND TIMES, RESULTS OF EACH ANALYSIS, CALCULATIONS AND CORRECTIONS MADE, AND
1.2.3.C.B. RETURN TEMPERATURE: 32 °C (90 °F)	FINAL CONCENTRATION. 3.2.7. SUPPLY TWO 170 LITRE DRUMS OF 100% INHIBITED GLYCOL.
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	WATER SPECIALTIES - HEATING AND COOLING
1.3.2. SYSTEM INCLUDES: 1.3.2.A. REFRIGERATION MACHINES	<u>23 21 11</u>
1.3.2.B. THERMAL STORAGE TANKS	1. SCOPE 1.1. PROVIDE WATER SPECIALTIES IN ACCORDANCE WITH THIS SECTION FOR SYSTEMS
1.3.2.C. ICE BUILDERS 1.3.2.D. CIRCULATING PUMPS	WHERE WORKING TEMPERATURES ARE IN RANGE OF −12C TO 120C (10□F TO 248F)
1.3.2.E. PLATE HEAT EXCHANGERS 1.3.2.F. EXPANSION TANK	AND WORKING PRESSURE UP TO 1035 KPA (150 PSI). 1.2. THIS SECTION COVERS SPECIALTIES FOR:
1.3.2.G. EVAPORATIVE or DRY COOLERS	1.2.1. HOT WATER AND LOW TEMPERATURE HEATING SYSTEM 1.2.2. EXTERIOR ZONE HEATING AND COOLING SYSTEM
1.3.2.H. COOLING TOWERS 1.3.2.I. INDOOR CONDENSER WATER BASIN	1.2.3. WATER SYSTEM RELIEF VALVE VENTS & OVERFLOWS
1.3.2.J. CONDENSER WATER FILTERS	1.2.4. GLYCOL HEATING AND COOLING SYSTEMS 1.2.5. CONDENSER WATER SYSTEM
1.3.2.K. COOLING COILS 1.3.2.L. FAN COIL UNITS	1.2.6. CHILLED WATER SYSTEM
1.3.2.M. SERVER ROOM COOLING UNITS	1.3. SHOP DRAWINGS 1.3.1. SUBMIT MANUFACTURERS DATA SHEETS FOR:
1.3.2.N. CONTROLS 1.3.3. SYSTEM DESIGN CRITERIA	1.3.1.A. EXPANSION TANKS, AIR VENTS SEPARATORS STRAINERS PRESSURE REDUCING VALVES PRESSURE RELIEF VALVES, WATER MAKE-UP
1.3.3.A. CHILLED WATER SYSTEM 1.3.3.A.A. SUPPLY TEMPERATURE: 5.5° C (42° F)	ASSEMBLIES, PUMP SUCTION DIFFUSERS AND GLYCOL MAKE-UP UNIT AND MIXING TANK.
1.3.3.A.B. RETURN TEMPERATURE: 14.4° C (58° F)	2. PRODUCTS
1.3.3.A.C.MAXIMUM WORKING PRESSURE:900 KPA (125 PSI)1.3.3.A.D.DESIGN PRESSURE:1030 KPA (150 PSI)	2.1. CLOSED EXPANSION TANK 2.1.1. CONSTRUCTION: WELDED CONSTRUCTION CONFORMING TO ASME SECTION VIII
1.3.3.B. SECONDARY CHILLED WATER SYSTEM	FOR UNFIRED PRESSURE VESSELS, CSA B-51, AND PROVINCIAL REGULATIONS
1.3.3.B.A. SUPPLY TEMPERATURE: 13°C (55°F) 1.3.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)	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
1.3.3.B.C. DESIGN PRESSURE: 1030 KPA (125 PŚI) 1.3.3.C. CONDENSER WATER SYSTEM	PRESSURE WITH ASME STAMP AND CERTIFICATION 2.1.3. GLYCOL SERVICE: BLACK STEEL FOR GLYCOL SERVICE PRIMED ON EXTERIOR
1.3.3.C.1. SUPPLY TEMPERATURE – SUMMER: 29.5°C (85°F)	SURFACE ONLY. 2.1.4. NOZZLES AND COUPLINGS
1.3.3.C.2. RETURN TEMPERATURE – SUMMER: 35°C (95°F) 1.3.3.C.3. SUPPLY TEMPERATURE – WINTER: 4°C (40°F)	2.1.4.A. NPS 1 EXPANSION PIPE CONNECTION AT BOTTOM
1.3.3.C.4. MAXIMUM WORKING PRESSURE: 700 KPA (100 PSI)	2.1.4.B. NPS 1 MAKE-UP CONNECTION AT BOTTOM 2.1.4.C. NPS 1 DRAIN CONNECTION AT BOTTOM
1.3.3.C.5. DESIGN PRESSURE: 1030 KPA (150 PSI) 1.4. GLYCOL SYSTEM	2.1.4.D. NPS 1 VENT CONNECTION AT TOP
1.4.1. PIPING DESIGN CODE: 1.4.1.A. TO ASME B31.9 BUILDING SERVICE PIPING	2.1.4.E. RELIEF VALVE CONNECTION NEAR BOTTOM 2.1.4.F. SCHRAEDER VALVE CONNECTION FOR COMPRESSED AIR AT TOP
TO THE TO THE DOTAD DOTEDING SERVICE FIFTING	

2.1.5. ACCESSORIES

1.4.2.A. FILLING PUMP

1.3.1. O.REG. 220/01 MADE UNDER THE TSSA ACT

1.4.2. SYSTEM INCLUDES:

- 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 (3/4 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 PRESSURE GAUGE TO SHOW PRESSURE IN TANK
- 3.1.4.D. 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
- 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
- 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 (3/4 IN) BY 150 MM (6 IN) AIR CHAMBER WITH SCREWDRIVER OPERATED AIR VENT PIPED THROUGH ÈRONT 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 RELIFE 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 21/2 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 (41/2 IN) PRESSURE GAUGES ON UPSTREAM AND DOWNSTREAM SIDES OF STATION.

AIR DISTRIBUTION - GENERAL <u>23 31 01</u>

- 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. GENERAL

1.3. APPLICABLE STANDARDS

POSSIBLE

2.2. AIR SUPPLY EQUIPMENT

2.3. AIR EXHAUST EQUIPMENT

2.4. TERMINALS DEVICES

2.5. LIFE SAFETY

2.6. AIR BALANCING

GENERAL

2. PRODUCTS

1.1. SCOPE

.1 THE ONTARIO BUILDING CODE .2 REGULATIONS OF PROVINCE CITY, OR LOCAL AUTHORITY HAVING JURISDICTION. 2. EXECUTION

2.1.2. LOCATE MAINS, RISERS AND RUNOUTS TO BE CONCEALED BEHIND FURRINGS OR

ABOVE CEILINGS EXCEPT IN MECHANICAL EQUIPMENT ROOMS AND ACCESS

ROOM FINISH SCHEDULES, AND IN THESE AREAS KEEP DUCTWORK AS HIGH AS

CONSIDERED TO BE FABRICATION OR INSTALLATION DRAWINGS.

2.1.3. DETERMINE AREAS WITHOUT CEILINGS FROM ARCHITECTURAL DRAWINGS AND

2.1.4. ANCHOR, GUIDE AND SUPPORT VERTICAL AND HORIZONTAL RUNS OF DUCTWORK

2.2.1. INSTALL AND CONNECT AIR HANDLING UNITS, AND AIR CONDITIONING UNITS, AND

2.3.1. INSTALL AND CONNECT EXHAUST FANS, ROOF AND WALL EXHAUSTERS AND

2.4.1. LOCATE AND INSTALL TERMINAL BOXES, REGISTERS, DIFFUSERS, AND GRILLE

DAMPERS TO PROTECT OPENINGS IN FIRE SEPARATIONS.

2.5.1. INSTALL FIRE DAMPERS, SMOKE DAMPERS, AND COMBINATION SMOKE AND FIRE

2.5.2. PROVIDE SMOKE STOPPING AROUND UNPROTECTED DUCTS PASSING THROUGH

2.6.1. CO-OPERATE WITH AIR BALANCING AGENCY; INSTALL SUPPLEMENTARY DAMPERS,

ACCESS OPENINGS AND ACCESS DOORS TO FACILITATE TESTING AND

2.6.2. MINIMUM SET POINT OF VAV BOXES SHALL BE 10% OF MAXIMUM SETTING.

FLEXIBLE DUCTWORK

<u>23 31 16</u>

1.2.1.B. ULC 181-1981 - FACTORY MADE AIR DUCTS AND CONNECTIONS.

1.2.1.D. NFPA 90B - INSTALLATION OF WARM AIR HEATING AND AIR

1.2.1.C. NFPA 90A - INSTALLATION OF AIR CONDITIONING AND VENTILATING

2.1.1.B. PRESSURE DROP COEFFICIENTS AS LISTED BELOW BASED ON SHEET

METAL DUCT PRESSURE DROP COEFFICIENT OF 1.00,

1.2.1.A. ULC S110M-1986 - FIRE TESTS FOR AIR DUCTS.

1.2.1.E. SMACNA – FLEXIBLE DUCT INSTALLATION STANDARDS

SPACES WHERE DUCTWORK IS TO BE EXPOSED.

TO RESIST DEAD LOAD AND ABSORB THRUST.

BUILD CASING AND PLENUMS.

DUST AND FUME COLLECTORS.

1.1.1. PROVIDE FLEXIBLE DUCTWORK AS SHOWN.

CONDITIONING SYSTEMS.

SYSTEMS

2.1.1.A. FACTORY FABRICATED,

SMOKE SEPARATIONS.

ADJUSTMENT.

1.2. REFERENCE STANDARDS

1.2.1. CONFORM TO:

2.1. FLEXIBLE DUCTWORK

2.1.1. GENERAL REQUIREMENTS:

2.1. DUCTWORK 2.1.1. DUCTWORK SYSTEM ROUTING IS SHOWN DIAGRAMMATICALLY. DRAWINGS ARE NOT

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

3.1. DUCT INSTALLATION

3. EXECUTION

1. GENERAL

1.1. SCOPE

1.2.4.B.

1.3.2.C.

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 AIR GRILLES UNLESS SHOWN. 3.1.3. USE SEALING COMPOUND AND TAPE AT CONNECTION POINTS BETWEEN SHEET METAL AND FLEXIBLE DUCT. MAKE A FURTHER MECHANICAL CONNECTION USING SHEET METAL SCREWS. 3.1.4. CENTRE-LINE RADIUS OF BENDS IN FLEXIBLE DUCTWORK TO BE GREATER THAN ONE DUCT DIAMETER.

3.1.5. DO NOT INSTALL FLEXIBLE DUCTWORK THROUGH FLOORS, PARTITIONS OR MASONRY WALLS.

DUCTWORK 23 31 13

1.1.1. PROVIDE METAL AND PVC DUCTWORK SYSTEMS AS SHOWN.

1.2. APPLICABLE CODES AND STANDARDS 1.2.1. CONFORM TO;

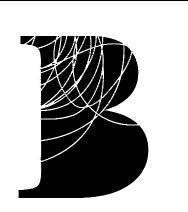
- 1.2.1.A. NFPA 90A INSTALLATION OF AIR CONDITIONING AND VENTILATING
- SYSTEMS. 1.2.1.B. NFPA 90B - INSTALLATION OF WARM AIR HEATING AND AIR
- CONDITIONING SYSTEMS. 1.2.1.C. NFPA 96 VENTILATION CONTROL AND FIRE PROTECTION OF COMMERCIAL
- COOKING OPERATIONS 1.2.2. LETTER AND NUMBER DESIGNATIONS, SHOWN AS "CR3-16" ETC., ARE TAKEN
- FROM ASHRAE DUCT FITTING DATA BASE. (DFDB) 1.2.3. CONSTRUCTION DETAILS:
- 1.2.3.A. SMACNA HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE. (SMACNA HVAC)
- 1.2.4. MATERIALS: 1.2.4.A. ASTM A525 SPECIFICATION FOR GENERAL REQUIREMENTS FOR STEEL SHEET, ZINC COATING (HOT DIPPED GALVANIZED) ASTM A480 SPECIFICATION FOR GENERAL REQUIREMENTS FOR FLAT
- ROLLED PLATE, SHEET, AND STRIP 1.2.4.C. ASTM A621 SPECIFICATION FOR STEEL SHEET AND STRIP CARBON HOT
- ROLLED DRAWING QUALITY 1.2.4.D. ASTM D1784 STANDARD SPECIFICATION FOR RIGID POLY (VINY)
 - CHLORIDE) (PVC) COMPOUNDS AND CHLORINATED POLY (VINYL CHLORIDE) (CPVC) COMPOUNDS.
- 1.2.4.E. ASTM D1927 SPECIFICATION FOR RIGID POLY (VINYL CHLORIDE) PLASTIC SHEET (WITHDRAWN 1994)
- 1.3. SHOP DRAWINGS AND APPLICATION DETAILS 1.3.1. SUBMIT MANUFACTURER'S CATALOGUE LITERATURE FOR;
 - 1.3.1.A. PROPRIETARY JOINTS,
- 1.3.1.B. HARDWARE. 1.3.2. SUBMIT FIELD/FABRICATION DRAWINGS AT 1:50 (1/4 INCH=1 FOOT) OR LARGER SCALE, WITH PIPING, DUCTWORK, AND FITTINGS IN DOUBLE LINE FORMAT, TO
- 1.3.2.A. ARRANGEMENTS IN CONGESTED AREAS, 1.3.2.B. WHERE INSTALLATION PROPOSED DEVIATES SUBSTANTIALLY FROM LAYOUT SHOWN, AND
 - WHERE INSTALLATION REQUIRES JOINTS FOR FIELD ASSEMBLY IN WELDED DUCT CONSTRUCTION.
- 1.3.3. FOR GREATER CLARITY, DO NOT SUBMIT FIELD/FABRICATION DRAWINGS FOR
 - OTHER AREAS OF THE WORK.
- 1.3.4. SUBMIT SCHEDULES AND DETAILS TO SHOW; 1.3.4.A. FABRICATION DETAILS OF
- 1.3.4.A.A. CONNECTIONS TO RISERS IN DUCT SHAFTS
- 1.3.4.A.B. BALANCING DAMPER CONSTRUCTION,
- 1.3.4.A.C. FITTINGS WHERE GEOMETRY CONTEMPLATED IS DIFFERENT FROM THAT SPECIFIED.
- 1.3.4.A. IN CHART FORM
- 1.3.4.A.A. DUCT SYSTEM PRESSURE CLASS,
- 1.3.4.A.B. DUCT SHEET GAUGES,
- 1.3.4.A.C. JOINT TYPES AND APPLICATION CRITERIA, 1.3.4.A.D. LOCATION CRITERIA AND DIMENSIONS FOR BRACING, STIFFENERS AND
- BALANCING DAMPERS 1.3.4.A.E. DUCT LEAKAGE CLASS, AND
- 1.4. RECORD DRAWINGS 1.4.1. AS WORK PROGRESSES, MARK-UP FIELD DRAWINGS AND SUBMIT AS PART OF
- RECORD OF "AS-BUILT" CONDITIONS. 1.5. QUALIFICATIONS
- 1.5.1. DUCTWORK SYSTEMS TO BE PROVIDED BY FIRM HAVING AN ESTABLISHED REPUTATION IN THIS FIELD.

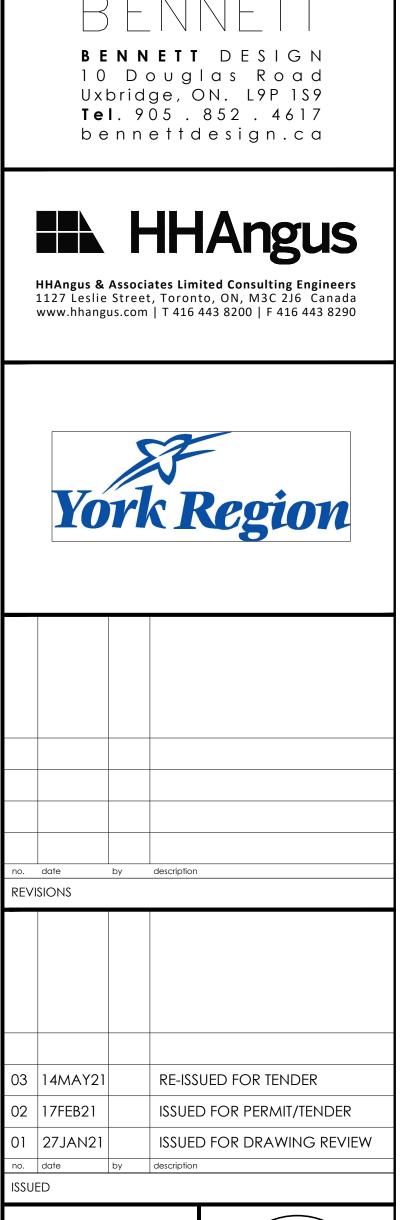
2.1. BASIC MATERIAL 2.1.1. GALVANIZED STEEL:

2. PRODUCTS

2.1.1.A. LOCK FORMING QUALITY TO ASTM A525, G90 ZINC COATING.

- 2.1.2. ALUMINUM: 2.1.2.A. TYPE 3003-H-14 SHEET MATERIAL.
- 2.2. FIRE RATED DUCT WRAP INSULATION
- 2.2.1. FIRE RATING: 2 HRS OR AS SHOWN.
- 2.2.2. ULC/WARNOCK HERSEY/ETI LISTED:
- 2.2.2.A. MAXIMUM FLAME SPREAD AND SMOKE DEVELOPMENT RATING: 25/50, TO ULC-S102. 2.2.2.B. 2 HR VENTILATION DUCT: CAN/ISO 6944, OR CAN/ULC-S101
- 2.2.2.C. MATERIAL: FOIL ENCAPSULATED, FIREPROOF INSULATION BLANKET 2.3. PROPRIETARY MANUFACTURED FLANGED DUCT JOINTS
- 2.3.1. MATERIAL TO MATCH THAT OF DUCTWORK BEING JOINED. 2.4. SEALANT AND TAPE
- 2.4.1. AS SPECIFIED IN DUCT ACCESSORIES SECTION 23 33 05. 2.5. HANGERS AND SUPPORTS
- 2.5.1. UPPER HANGER ATTACHMENTS;
- 2.5.1.A. IN NEW CONCRETE: MANUFACTURED CONCRETE INSERTS. 2.5.1.B. FOR STEEL JOIST: GALVANIZED JOIST CLAMPS OR STEEL PLATE WASHER.
- 2.5.2. UPPER HANGERS AND SUPPORTS 2.5.2.A. IN NEW CONCRETE: MANUFACTURED CONCRETE INSERTS.
- 2.5.2.B. FOR STEEL JOIST: GALVANIZED JOIST CLAMPS OR STEEL PLATE WASHER. 2.5.2.C. FOR STEEL BEAMS: GALVANIZED BEAM CLAMPS. STANDARD OF ACCEPTANCE: ANVIL, MYATT
- 2.6. DUCT ACCESS DOORS





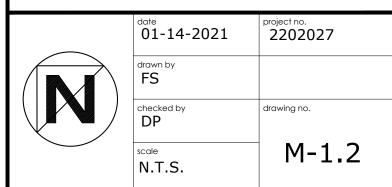


oject title

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

wing title

MECHANICAL SPECIFICATIONS -2 OF 5



- 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 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

- FI FXIBI F).
- 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 LONGITUDINAL 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), SLOPED TO BASE OF RISER WHERE HORIZONTAL RUN IS MORE THAN 3.3.2.D. 3M (10 FT), WITH NPS 3/4 DRAIN CONNECTION FROM LOW POINTS IN BOTTOM OF DUCT, TRAPPED AND PIPED TO DRAIN.
- 3.3.3. SHOWER EXHAUST DUCTS: 3.3.3.A. ALUMINIUM, 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
- 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 FACH 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 MFT.

<u>23 32 48</u>

<u>ACOUSTIC LINING (DUCTWORK)</u>

- 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
- 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 <u>23 33 05</u> 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 2.1. 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 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 (11/4 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.

1. GENERAL

2. PRODUCTS

1.1. SCOPE

- 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.)
- 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; TWO SASH LOCKS FOR DOORS UP TO 300MM X 300MM (12" X 2.4.2.D.A.
- 2.4.2.D.B. FOUR SASH LOCKS FOR DOORS UP TO 301MM X 450MM (13" x
- 2.4.1.D.C. PIANO HINGE AND MINIMUM 2 SASH LOCKS FOR DOORS UP TO 451MM X 1000MM (19" X 40")
- PIANO HINGE AND 2 HANDLES OPERABLE FROM BOTH SIDES FOR 2.4.1.D.D. 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 HANDI F
- 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
- 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,

AND LARGER.

PLENUMS.

TEMPERATURE READINGS.

3.4.3. INSTALL FOR VELOCITY TRAVERSES;

3.4. INSTRUMENT TEST PORTS

3.4.3.D.C.

- 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")

3.3.3.C. 1500 MM (60") HIGH BY 450 MM (18") WIDE IN CASINGS AND

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

OUTLET. PORTS IN MAIN TO BE UPSTREAM OF BRANCH IN BOTH

DOWNSTREAM OF INTERSECTION OF CONVERGING AIR STREAMS OF

3.4.1. INSTALL FOR DUCT VELOCITY TRAVERSE READINGS AND FOR DUCT AIR

3.4.3.A. AT DUCTED INLETS TO ROOF AND WALL EXHAUSTERS,

DIVERGING AND CONVERGING FLOW.

3.4.3.D. INSTALL FOR TEMPERATURE MEASUREMENT;

3.4.3.D.B. AT INLET AND OUTLET OF COILS, AND

DIFFERENT TEMPERATURES.

3.4.3.D.A. AT OUTSIDE AIR INTAKES,

3.4.3.B. AT INLET TO AND OUTLET FROM OTHER FAN SYSTEMS, AND

HIGH PRESSURE INDUCTION UNITS AND HOT WATER RADIATORS

<u>23 82 26</u>

3.4.3.C. AT MAIN AND BRANCH WHERE BRANCH SERVES MORE THAN ONE

MM (20") FOR TEMPERATURE MEASUREMENTS.

- 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 <u>23 33 15</u>

- 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.
- 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,

CAULKED JOINTS, AND RETAINING ANGLES,

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,

- 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.

2.4.1.E. ENCLOSURE: TYPE A AND B

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. "STATIC" - IN AIR HANDLING SYSTEMS DESIGNED TO SHUT-DOWN ON 3.2.1.C. 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 DAMPFR. 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.

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GENERAL

2. PRODUCTS

2.1. LOUVRES

DIMENSIONS.

2.1.1.B. CONSTRUCTION:

2.1.1.B.G. SCREEN:

2.1.1. PERFORMANCE:

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

2.1.1.A. FREE AREA NOT LESS THAN 40% OF NOMINAL SIZE,

2.1.1.B.A. MATERIAL: EXTRUDED ALUMINUM ALLOY [6063-T5],

2.1.1.B.C. STORM PROOF PATTERN BLADE WITH CENTRE WATERSHED,

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

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,

REINFORCING BOSSES AND MAXIMUM BLADE

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

2.1.1.B.B. EXPOSED JOINTS GROUND FLUSH AND SMOOTH,

LENGTH OF 1500 MM (60 IN),

NUMBERS, DESIGN DATA, SUPPORT AND ANCHOR DETAILS AND OUTLINE

- 2 MM (14 GA) WIRE IN FORMED U-FRAME, - EXHAUST LOUVRES: 12 MM (1/2 IN) MESH,

- INTAKE LOUVRES: 25 MM (1 IN) MESH. 2.1.1.B.H. FINISH: CLEAR ANODIZED SATIN.

EXECUTION

1. SCOPF

2. PRODUCTS

EXECUTION

1. GENERAL

2. PRODUCTS

2.1. GENERAL

1.1. SCOPE

3.1. LAYOUT

2.1. GENERAL

STANDARD OF ACCEPTANCE: CONSTRUCTION SPECIALTIES - MODEL 6110, AIROLITE - CB638 ALUMAVENT - AL-445-5, CARNES, K.N. CROWDER - CANADIAN LOUVRES 411S

3.1. INSTALLATION 3.1.1. CONFIRM OPENING SIZE AND CO-ORDINATE LOCATION OF LOUVRES WITH OTHER 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

<u>GRILLES, REGISTERS AND DIFFUSERS</u> <u>23 37 13</u>

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.

2.1.1. GRILLES, REGISTERS AND DIFFUSERS:

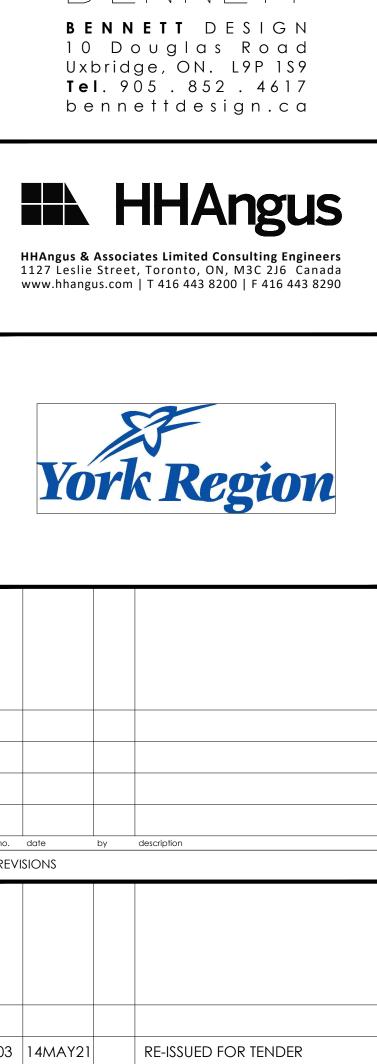
- 2.1.1.A. PRODUCT OF ONE MANUFACTURER WHERE SAME MODEL OR TYPE IDENTIFICATION IS USED. 2.1.1.B. STANDARD CATALOGUE PRODUCTS SELECTED TO MEET CAPACITY, THROW,
- AND NOISE LEVEL. 2.1.1.C. PRIME COATED. STAMPED OR COLD ROLLED STEEL MATERIAL WITH MITRED CORNERS AND EXPOSED JOINTS WELDED AND GROUND SMOOTH. 2.1.1.D. EXTRUDED SATIN FINISH, CLEAR ANODIZED ALUMINUM MATERIAL WITH MITRED CORNERS AND MECHANICAL FASTENERS
- FRAMES WITH FULL PERIMETER GASKETS, PLASTER STOPS WHERE SET INTO PLASTER OR GYPSUM BOARD, AND CONCEALED FASTENERS. 2.2. TYPE DESIGNATIONS
- 2.2.1. DIFFUSER, REGISTER AND GRILLE SCHEDULE IDENTIFIES MODEL OR TYPE IDENTIFIERS USED ON FLOOR PLANS WITH MODEL NUMBERS TAKEN FROM LISTED MANUFACTURER'S CATALOGUE.
- 2.2.2. WHERE SEVERAL MANUFACTURER'S MODEL NUMBERS ARE GIVEN, THESE ARE ACCEPTABLE ALTERNATIVES. 2.2.3. WHERE ONLY ONE MANUFACTURER'S MODEL NUMBER IS GIVEN, PROVIDE DESIGNATED ITEM.
- 2.3. SUPPLY REGISTERS 2.3.1. DOUBLE DEFLECTION STYLE WITH FACE BARS VERTICAL AND REAR BARS HORIZONTAL,
- 2.3.2. PERIMETER BORDER WITH GASKET,
- 2.3.3. OF STEEL OR ALUMINUM MATERIAL 2.4. RETURN AND EXHAUST GRILLES
- 2.4.1. SINGLE DEFLECTION TYPE, WITH HORIZONTAL FACE BARS, 20 MAXIMUM TURN 2.4.2. PERIMETER BORDER WITH GASKET,
- 2.4.3. OF STEEL OR ALUMINUM MATERIAL
- 2.5. DIFFUSERS 2.5.1. CIRCULAR OR SQUARE MULTIPLE CONE OR SQUARE PLAQUE FACE TYPE, WITH ADJUSTABLE PATTERN CONTROL, 2.5.2. OF STEEL OR ALUMINUM MATERIAL
- 2.6. LINEAR GRILLES 2.6.1. ALUMINUM BAR CORE TYPE WITH MARGIN AS INDICATED, PATTERN ADJUSTMENT, PLASTER FRAMES, SEALING STRIPS, END CAPS, MITRED CORNERS AND ALIGNMENT KEY STRIPS FOR MULTIPLE SECTIONS. 2.6.2. CAPABLE OF SUPPORTING {90KG}{200LB} POINT LOADS WHERE INSTALLED AS
 - FLOOR GRILLES.
- 3.1.1. DRAWINGS SHOWING POSITION OF AIR DISTRIBUTION OUTLETS ARE ESSENTIALLY DIAGRAMMATIC. COORDINATE EXACT LOCATION OF DIFFUSERS WITH OTHER ELEMENTS IN CEILING AND SHOWN ON REFLECTED CEILING DRAWINGS AND SELECT TRIM TO SUIT CEILING MATERIALS LISTED IN FINISH SCHEDULES. 3.2. SPECIAL INSTALLATIONS
- 3.2.1. GRILLES, REGISTERS AND DIFFUSERS PENETRATING FIRE WALLS AND FIRE PARTITIONS, TO HAVE STEEL SLEEVES SECURED TO STRUCTURE IN ACCORDANCE WITH NFPA 90A-1985.
- 3.3. INSTALLATION OF GRILLES AND REGISTERS 3.3.1. INSTALL SUPPLY REGISTERS WITH FACE BARS VERTICAL AND EXHAUST AND RETURN REGISTERS WITH FACE BARS HORIZONTAL.
- 3.3.2. .2 INSTALL REGISTERS AND GRILLES WITH OVAL HEAD CADMIUM PLATED SCREWS IN COUNTERSUNK HOLES WHERE FASTENINGS ARE VISIBLE. 3.4. INSTALLATION OF DIFFUSERS
- 3.4.1. DIFFUSERS TO BE INSTALLED WITH CONCEALED FASTENINGS. 3.4.2. ROUND, SQUARE AND RECTANGULAR DIFFUSERS TO BE PROVIDED WITH EQUALIZING DEFLECTORS. MOUNTED IN NECK. ACCESSIBLE FROM DIFFUSER FACE, WITH BLADES ORIENTED AT RIGHT ANGLES TO DIRECTION FROM WHICH
- AIR IS FLOWING. 3.4.3. EXCEPT FOR LAST DIFFUSER ON BRANCH, EACH DIFFUSER INSTALLED IN UNDERSIDE OF SUPPLY DUCT TO HAVE EXTRACT VOLUME CONTROL DAMPER

TERMINAL BOXES <u>23 36 13</u>

1.1.1. PROVIDE TERMINAL BOXES AS SHOWN.

- 1.2. SHOP DRAWINGS 1.2.1. SUBMIT MANUFACTURER'S DATA SHEETS WITH EQUIPMENT MODEL NUMBERS, PERFORMANCE AND DESIGN DATA, OUTLINE DIMENSIONS, ENCLOSURE DETAILS, SUPPORT AND CONNECTION ARRANGEMENTS AND ELECTRICAL POWER
 - REQUIREMENTS WHERE APPLICABLE.
- 1.3. APPLICABLE CODES AND STANDARDS 1.3.1. ARI STANDARD 880 STANDARD FOR AIR TERMINALS
- 1.3.2. ARI STANDARD 885 STANDARD FOR ESTIMATING OCCUPIED SPACE SOUND LEVELS IN THE APPLICATION OF AIR TERMINALS AND AIR OUTLETS. 1.3.3. ASHRAE STANDARD 180 METHODS OF TESTING FOR RATING DUCTED AIR TERMINAL UNITS
- 2.1.1. SELECTION OF UNITS TO MEET AIR QUANTITIES SHOWN TO BE BASED ON; 2.1.1.A. MAXIMUM INLET AIR PRESSURE; 750 PA (3 IN WG),
- 2.1.1.B. MINIMUM INLET AIR PRESSURE: 75 PA (0.3 IN WG). 2.1.1.C. MAXIMUM ROOM NC SOUND PRESSURE LEVEL (2 X 10-4 MICROBAR REFERENCE) AT MAXIMUM INLET PRESSURE TO BE LESS THAN 40 AT DISCHARGE AND 42 RADIATED FOR BOX WITH ATTENUATOR MOUNTED EXPOSED (WITHOUT CEILING).
- 2.1.2. WHERE SIZES, MODEL NUMBERS AND UNIT TYPES ARE INDICATED, SELECTIONS ARE TAKEN FROM E.H. PRICE CATALOGUE. 2.2. TERMINAL BOX
- 2.2.1. CONSTRUCTION: 2.2.1.A. PRESSURE INDEPENDENT TYPE WITH VELOCITY SENSOR. DAMPER ASSEMBLY, FACTORY CALIBRATED CONTROLLER AND ACTUATOR WITH





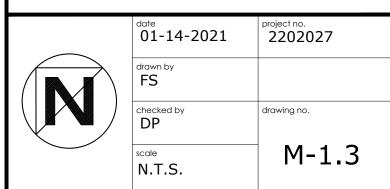
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YORK REGION PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7

MECHANICAL SPECIFICATIONS -3 OF 5



- 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 Z 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 (11/4 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 <u>23 37 16</u>

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 (1/2 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
- PFRMS. 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. CORRUGATED STAINLESS STEEL NOT LESS THAN 0.25 MM (0.010 IN) 2.4.3.A.B.
- 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 (1/2 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
- 2.5.1.E. NONCOMBUSTIBLE. 2.5.1.F. THERMAL PERFORMANCE: $R = 0.74 \text{ M2 °C/W} \otimes 24 \text{ C} (4.2 \text{ BTU FT2})$ 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 EMPERATURE (EQUIPMENT CONTACT) UP TO 232 C (450 F).
- 2.5.2.C. RIGID FOR FLAT SURFACES OR, SCORED BOARD FOR CURVED SURFACES 250 MM (10 IN) DIA AND 2.5.2.D.
- 2.5.2.E. JACKET OF KRAFT BONDED TO ALUMINUM FOIL REINFORCED WITH GLASS FIBRE YARN.
- THERMAL PERFORMANCE: 0.033 W/M/C @ 24 C (0.23 BTU/HR/IN/SQ 2.5.2.F. 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),

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

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

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

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.C. CONDITIONED AIR SUPPLY DUCTS INCLUDING DOWNSTREAM OF REHEAT

PLENUMS, FREE-STANDING SUPPLY FANS, AND SUPPLY AIR DUCTS AND

PLENUMS UP TO THE SPACE SERVED BUT NOT IN THE SPACE ITSELF,

FOR NON-RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT

SHEET METAL BLANK-OFF PLATES BEHIND UNUSED SECTIONS OF AIR

COOLING COILS, TERMINATE PLENUM OR CASING INSULATION 300 MM

COILS, TERMINATE OUTSIDE AIR INTAKE INSULATION 300 MM (12 IN)

3.1.1.B. CONDITIONED AIR WITH HEATING ONLY: SUPPLY UNIT CASING AND

3.1.1.D. UN-CONDITIONED SUPPLY AIR DUCTS AND PLENUMS THAT PASS

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

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

DISCHARGE TO OUTSIDE OF BUILDING,

OUTSIDE AIR INTAKE DUCTS AND PLENUMS;

DOWNSTREAM OF MIXING PLENUM,

3.1.2. EXTERNALLY INSULATE DUCTWORK LOCATED OUTDOORS:

3.1.2.D.A. EXCLUDING FAN DISCHARGE DUCT,

3.1.2.E.A. EXCLUDING FAN DISCHARGE DUCT.

3.1.3. EXTERNAL INSULATION IS NOT REQUIRED ON:

RETURN AIR DUCTS AND PLENUMS IN UNHEATED SPACES,

3.1.1.H. EXHAUST AIR DUCTS BETWEEN EXHAUST AIR DAMPER AND POINT OF

(12 IN) DOWNSTREAM OF FINAL HEATING COIL,

3.1.1.J.A. FOR RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT COOLING

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

INSULATION, EXCEPT AS DESCRIBED ABOVE,

3.1.3.A. CASINGS, DUCTS OR PLENUMS WHICH HAVE BEEN LINED WITH ACOUSTIC

THROUGH UNHEATED ROOMS OR SPACES,

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

3.1.1. EXTERNALLY INSULATE AIR HANDLING SYSTEM COMPONENTS:

2.5.4.C. RIGID FOR FLAT SURFACES,

FT/F° @ 50°F),

ASTM E84.

COILS.

DUCTWORK.

3.1.1.J. MIXED AIR PLENUMS AND DUCTS;

INTAKE LOUVRES.

3.1.2.B. CONDITIONED SUPPLY DUCTS.

DUCT ON ROOF.

3.1.2.A. SUPPLY DUCTS.

3.1.2.C. RETURN DUCTS,

3.1.2.D. EXHAUST DUCTS,

3. EXECUTION

3.1. INSULATION LIMITS

3.1.1.F.

3.1.1.l.

3.1.1.K.

3.1.1.I.A.

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.
GENERAL RE	QUIREMENTS
2.1. INSULAT	E 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				
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)	

$\begin{array}{c c c c c c c c c c c c c c c c c c c $				
SURFACE TEMPERATUREEQUIPMENT DESCRIPTIONINSULATION TYPEINSULATION TYPEAMBIENT TO 65°C (AMBIENT TO 150°F)PLENUMS AND CASINGS – AIR INTAKED2TWO LAYERS EACH 50D475 (3)D475 (3)PLENUMS AND CASINGS – EXHAUSTD250 (2)RECTANGULAR – OUTDOOR – SUPPLYD250 (2)RECTANGULAR – OUTDOOR – RETURN RECTANGULAR – OUTDOOR – EXHAUSTD238 (1-1/2)	TABLE	2: DUCTWORK AND PLENUM INSULATION	I TYPE AND	THICKNESS MM (IN)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	SURFACE	EQUIPMENT DESCRIPTION		INSULATION THICKNESS
$\frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{5}}{D_{5}} = \frac{D_{5}}{D$		PLENUMS AND CASINGS – AIR INTAKE	D2	TWO LAYERS EACH 50 (2
PLENOMS AND CASINGS - EXHAUST D4 38 (1-1/2) RECTANGULAR - OUTDOOR - SUPPLY D2 50 (2) RECTANGULAR - OUTDOOR - RETURN RECTANGULAR - OUTDOOR - EXHAUST D2 38 (1-1/2)	(AMBIENT TO 150°F)		D4	75 (3)
D438 (1-1/2)RECTANGULAR - OUTDOOR - SUPPLYD250 (2)RECTANGULAR - OUTDOOR - RETURN RECTANGULAR - OUTDOOR - EXHAUSTD238 (1-1/2)		DIENTING AND CASINGS - EXHAUST	D2	50 (2)
RECTANGULAR – OUTDOOR – RETURN RECTANGULAR – OUTDOOR – EXHAUST D2 38 (1–1/2)			D4	38 (1-1/2)
RECTANGULAR – OUTDOOR – EXHAUST D2 38 (1–1/2)		RECTANGULAR – OUTDOOR – SUPPLY	D2	50 (2)
ROUND – OUTDOOR D3 TWO LAYERS EACH 25			D2	38 (1-1/2)
		ROUND - OUTDOOR	D3	TWO LAYERS EACH 25 (1)
DRAIN PANS D3 20 (3/4) D3 20 (3/4)		DRAIN PANS D3 20 (3/4)	D3	20 (3/4)

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

<u>PLUMBING GENERAL</u> <u>22 05 01</u>

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.

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
- 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 MFTFR. 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

3.5.2.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 GASKETTED 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

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

3.4.1.B. VALVES

EQUIPMENT.

3.5.2. FITTINGS;

3.5. DRAINAGE

3.4.1.C. ZONE OR EQUIPMENT BACKFLOW PROTECTION.

AND OTHER EQUIPMENT REQUIRING HOT WATER.

3.4.2. PROVIDE COLD WATER CONNECTIONS TO HOT WATER TANK, WITH SHUT-OFF

3.5.1. PROVIDE WASTE AND VENT CONNECTIONS TO PLUMBING FIXTURES AND

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

- 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 <u>22 14 19</u>

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

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 <u>22 33 13</u>

- 1. GENERAL 1.1. SCOPE
- 1.1.1. PROVIDE DOMESTIC HOT WATER HEATERS AS SHOWN

MATERIALS AND ASSEMBLIES

- 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 2.1.3.B. TO NPS 3: THREADED 2.1.3.A. REPLACEABLE MACRESIUM ANODE, 2.1.3.A. REPLACEABLE MACRESIUM ANODE, 2.1.3.A. REPLACEABLE MACRESIUM ANODE, 2.1.3.B. 50 MM (2 N) MINERAL WOOL INSULATION, 2.1.3.C. EMAWELLD STEEL LACKET, 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.A. COPPER SHEATHED IMMERSION ELEMENTS ARRANGED FOR FLIP-FLOP OPERATION 2.2.2.B. CLOSE TOLERANCE POSITIVE SNAP ACTION THERNOSTATS 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 3.1.1. INSTANLTANEOUS HEATERS. SET ANCHOR BOLTS THROUGH FEET OF VERTICAL TANKS. HAND SON USE STAND SOLATION BOLTS THROUGH FEET OF VERTICAL TANKS. 3.1.2. INSTANLTANEOUS HEATERS. SET ANCHOR BOLTS THROUGH FEET OF VERTICAL TANKS. 3.1.2. INSTANLTANEOUS HEATERS. SET ANCHOR BOLTS THROUGH FEET OF VERTICAL TANKS. 3.1.2. INSTANTIANEOUS HEATERS. SET ANCHOR BOLTS THROUGH FEET OF VERTICAL TANKS. 3.1.3. CONNECT TOR SUND. FOR HORIZONTAL TANKS PROVIDE DIELECTRIC PAOS BERVERN TANK AND SADDLES, AND FOR VERTICAL TANKS MIN LECS, PROVIDE DIELETRIC PROVIDE DIELETRIC PAOS BOUND. FOR HORIZONTAL TANKS PROVIDE DIELECTRIC PAOS BERVERN TANK AND SADDLES, AND FOR VERTICAL TANKS MIN LECS, PROVIDE DIELETRIC PROVIDE MELTER SUPPLY LINES AND DOMESTIC HOT WATER SUPPLY AND SADDLES, AND FOR VERTICAL TANKS MIN LECS, PROVIDE DIELETRIC PROVIDE MELTERS WITH X00MM (12 IN) LONG, LINE SIZE FLEXIBLE CONNECTIONS. 3.1.4. INSTRUMENTS WITH JOOMM (12 IN) LONG, LINE SIZE FLEXIBLE CONNECTIONS. 3.1.4. INSTRUMENTS WITH EXTERNAL ELECTRIC WIRING TO BE ISOLATED FROM HEATERS AND TANKS WITH DIELECTRIC BUSHINGS OR DIELECTRIC UNIONS 3.1.4.	10 Uxbr Tel. ben HHAngus & Ass 1127 Leslie Str	NETT DE NETT DE NETT DE Douglas idge, ON. L 905.852 nettdesig HHA	R o a d 9P 1S9 . 4617 gn.ca 1905 Sulting Engineers M3C 2J6 Canada
3.1.6. PROVIDE VALVED DRAIN FROM EACH TANK PIPED TO NEAREST FUNNEL OR HUB DRAIN.			
3.1.7. AT EACH HOT WATER HEATER REQUIRING ELECTRIC POWER PROVIDE SUITABLY SIZED FUSED DISCONNECT SWITCH AND WIRE FROM SWITCH TO HEATER.			
PLUMBING SPECIALTIES & ACCESSORIES 22 05 23 1. GENERAL		N	
 GENERAL SCOPE PROVIDE PLUMBING SPECIALTIES AND ACCESSORIES. PRODUCT DATA	Yor	k Reg	gion
PREVENTION DEVICES/MANUAL FOR THE MAINTENANCE AND FIELD TESTING OF BACKFLOW PREVENTION DEVICES 1.3.5. CSA B79 FLOOR, AREA, AND SHOWER DRAINS AND CLEANOUTS FOR RESIDENTIAL CONSTRUCTION 1.3.6. PLUMBING AND DRAINAGE INSTITUTE (PDI) STANDARD PDI-WH201.WATER HAMMER ARRESTERS 1.3.7. PDI-G101 TESTING AND RATING PROCEDURE FOR GREASE INTERCEPTORS WITH APPENDIX OF SIZING AND INSTALLATION DATA. 2. PRODUCTS			
 2.1. GENERAL 2.1.1. FLOOR, AREA, COMBINATION AND ROOF DRAINS AND CLEANOUTS TO CONFORM TO CSA B79 AND TO BE PRODUCTS OF ONE MANUFACTURER. STANDARD OF ACCEPTANCE: JAY R. SMITH, MIFAB, ZURN 			
2.2. FLOOR DRAINS 2.2.1. CONSTRUCTION: 2.2.1.A. CAST IRON BODY			
2.2.1.B. INTEGRAL DOUBLE DRAINAGE OPENINGS, FLASHING RING AND CLAMPING DEVICE.	no. date by REVISIONS	description	
 2.2.1.C. POLISHED NICKEL BRONZE ADJUSTABLE STRAINER. 2.2.1.D. INTEGRAL FLANGE TO RECEIVE THE FLOOR FINISH. 2.2.1.E. ADJUSTABLE GALVANIZED DUCTILE IRON TRACTOR GRATES IN MECHANICAL EQUIPMENT ROOMS AND FAN ROOMS. 2.3. COMBINATION DRAINS 2.3.1. AS SPECIFIED FOR FLOOR DRAINS WITH ADJUSTABLE NICKEL BRONZE STRAINER 			
AND NICKEL BRONZE OVAL WASTE FUNNEL. 2.4. CLEANOUTS 2.4.1. IN FLOORS: 2.4.1.A. LINE SIZE FOR NPS 2, NPS 3 AND NPS 4 AND NPS 4 IN LARGER			
LINES. 2.4.1.B. SEAL AND TEST PLUG	03 14MAY21	RE-ISSUED FO	R TENDER
2.4.1.C. CAST IRON BODY WITH CLAMP AND COLLAR, 2.4.1.D. IN UNFINISHED FLOOR AREAS, 2.4.1.D.A. CAST IRON FRAME HEAVY DUTY SCORIATED CAST IRON ROUND OR	02 17FEB21		ERMIT/TENDER
SQUARE TRACTOR COVER AND INTERNAL PLUG, AND 2.4.1.E. IN FINISHED FLOOR AREAS, 2.4.1.E.A. NICKEL BRONZE FRAME AND ROUND OR SQUARE NICKEL BRONZE	01 27JAN21	ISSUED FOR D	RAWING REVIEW
ADJUSTABLE ACCESS COVER, 2.4.1.E.B. RECESSED FOR TILE INFILL IN TILED AREAS, 2.4.1.E.C. RECESSED FOR CARPET INFILL IN CARPETED AREAS,	ISSUED		
2.4.1.E.D. DEEPLY RECESSED FOR TERRAZZO INFILL IN TERRAZZO FINISHED AREAS, AND WITH 2.4.1.E.E. EXTENDED FLANGE AROUND FRAME IN AREAS WITH MONOLITHIC			PROFESSIONAL
FLOOR FINISHES. 2.4.2. IN EXPOSED AREAS, CEILING SPACES AND ACCESSIBLE PIPE CHASES,		LT LT	Enia () (128 ° K.P. O'NEILL (100055807 (100055807
2.4.2.A. CAST IRON CAULKING FERRULE WITH NEOPRENE JACKET AND PLUG SECURED TO BODY WITH CAP SCREWS. 2.5. WATER HAMMER ARRESTERS			
 2.5.1. STAINLESS STEEL CONSTRUCTION WITH PRECHARGED AIR CHAMBER OF NESTING BELLOWS. 2.5.2. SELECTED IN ACCORDANCE WITH PLUMBING AND DRAINAGE INSTITUTE STANDARD 			2202027 O
PD1-WH201. 2.6. TRAP SEAL PRIMERS	Project title	ION	
 2.6.1. SERVING 1 OR 2 DRAINS: 2.6.1.A. DIAPHRAGM OPERATED PRIMER WITH DISTRIBUTION UNIT, 2.6.1.B. AUTOMATICALLY OPERATED BY A PRESSURE DROP OF 35 TO 70 KPA (5 TO 10 PSI) IN SUPPLY LINE TO FIXTURE. 2.6.2. SERVING 3 TO 30 DRAINS: 2.6.2.A. ELECTRIC, MANIFOLDED UNITS, 	PARAMEDI	C SERVICES NAVENUE WO	9601 DODBRIDGE,
2.6.2.B. COMPONENTS FACTORY ASSEMBLED IN 1.5 MM (16 GA) RECESSED METAL CABINET WITH HINGED STAINLESS STEEL LOCKABLE ACCESS DOOR,	drawing title		
2.6.2.C. ATMOSPHERIC VACUUM BREAKER, 2.6.2.D. PRESET 24 HR CLOCK, 2.6.2.E. MANUAL OVER RIDE SWITCH, 2.6.2.F. 120 VOLT SOLENOID VALVE,	MECHAN SPECIFI	IICAL CATIONS	5 -
 2.6.2.G. NPS ? OR NPS ½ VALVED INLET WATER CONNECTION, 2.6.2.H. CALIBRATED WATER DISTRIBUTION MANIFOLD, 2.6.2.I. NPS ½ OUTLET COMPRESSION FITTINGS. 	4 OF 5		
2.0.2.1. NPS ½ OUTLET COMPRESSION FITTINGS. 2.7. BACK—FLOW PREVENTERS — REDUCED PRESSURE PRINCIPLE (RP) 2.7.1. CONFORMING TO CSA B.64.4		^{date} 01-14-2021	project no. 2202027
2.7.2. NPS 3/4 AND LARGER: 2.7.2.A. TWO INDEPENDENT CHECK VALVES WITH INTERMEDIATE RELIEF VALVE, 2.7.2.B. OS&Y ULC LISTED RESILIENT SEATED GATE VALVES,		drawn by FS	
		checked by DP	drawing no.
		^{scale} N.T.S.	M-1.4

1. GENERAL

1.1. SCOPE

<u>22 13 16</u>

- 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

2.7.2.C. BALL TEST COCKS, AND

- 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 (1/2 IN X 0.037 IN) BANDS OF THE SAME MATERIAL SPOT WELDED TO BASKETS.
- 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 <u>COPPER 22 11 16</u>

- 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 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 21/2: 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.

- 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 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 1.3.1.0. 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 (CISPF) 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

1.2.1. FIRE PROTECTION WORK TO CONFORM TO STANDARDS OF NATIONAL FIRE

1.3.1. PROVIDE WATER FLOW TEST ON MUNICIPAL WATER SERVICE IN PROXIMITY TO

1.3.2. OBTAIN MUNICIPAL APPROVAL AND PAY FEES ASSOCIATED WITH TESTING.

TO NPS 2, GROOVED OR SCREWED.

2.1.2.A. UL/ULC LISTED FOR FIRE PROTECTION, AND

2.1.2.B. SWIVEL RING HANGER TYPE OR

STEEL FOR NPS 2 1/2 TO NPS 10, WELDED.

2.1.1.A.A. GALVANIZED WHERE SPECIFIED.

PREVENTION ASSOCIATION (NFPA) AND RELEVANT SECTIONS OF THE ONTARIO

BUILDING CONNECTION. IN ACCORDANCE WITH NEPA 14 AND NEPA 291. FLOW

TEST MUST BE CONDUCTED WITHIN ONE (1) YEAR PRIOR TO SYSTEM DESIGN.

SUBMIT RECORD OF TEST INCLUDING STATIC PRESSURE, AND RESIDUAL

2.1.1.A. ASTM A53 GRADE B, SCHEDULE 40 CONTINUOUS WELD STEEL TO UP

2.1.1.B. ASTM A53-63R GRADE B, SCHEDULE 40 ELECTRIC RESISTANCE WELD

2.1.1.C. NPS 21/2 AND OVER ASTM A53-72A SCHEDULE 10 THIN WALL, ROLLED

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.

GENERAL 1.1. SCOPE

2. PRODUCTS

2.1.1. PIPE:

BUILDING CODE.

PRESSURE AND FLOW.

GROOVED

1.3. WATER SUPPLY TEST RESULTS

2.1. PIPE, HANGERS AND GASKETS

2.1.2. PIPE HANGERS:

- 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

- 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 21/2 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 21/2 AND OVER.
- 2.3.2. FITTINGS: 2.3.2.A. MALLEABLE IRON OR DUCTILE IRON TO NPS 21/2 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 21/2
- 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.
- 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

GENERAL 1.1. SCOPE

1.1.1. PROVIDE EXTINGUISHERS IN SERVICE ROOMS, KITCHENS AND FIRE HOSE CABINETS.

<u>21 12 29</u>

- 1.2. APPLICABLE STANDARDS
- 1.2.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 10 STANDARD FOR PORTABLE FIRE EXTINGUISHERS. 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
- 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

<u>21 12 13</u>

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. 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 21/2 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 (1/4 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 11/2 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 11/2 CHROME PLATED PRESSURE REGULARITY 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 TYPE: WH, ULC, OR UL CLASSIFIED INORGANIC MATERIAL, NON-COMBUSTIBLE, 2.9.2.C.
- 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 EXECUTION

PROTECTION

1.2. QUALIFIED SUBCONTRACTORS

1.3. APPLICABLE CODES AND STANDARDS

1.3.3. ONTARIO BUILDING CODE

1.4. SHOP DRAWINGS AND PRODUCT DATA

EACH ZONE AS DETAILED.

INSTALLED IN SYSTEM.

1.6. MAINTENANCE MATERIALS

1.3.4. ONTARIO FIRE CODE

OF SPRINKLER SYSTEMS

REQUIRE PROTECTION.

1.1.1. PROVIDE WET PIPE AUTOMATIC SPRINKLER SYSTEMS.

WATER-BASED FIRE PROTECTION SYSTEMS

ZINC-COATED, WELDED AND SEAMLESS

1.3.6. CSA B64 – BACKFLOW PREVENTERS AND VACUUM BREAKERS

TO OWNERS INSURERS FOR REVIEW AND ACCEPTANCE.

CALCULATIONS, MAY BE SUBMITTED FOR APPROVAL.

ACCORDANCE WITH DIVISION 1 PROCEDURES.

3.1. INSTALLATION

GENERAL

1.1. SCOPE

1.5. SAMPLES

- 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

APPROVED AUTOMATIC SPRINKLER) HOSE CONNECTIONS ON THE SAME

FLOOR. "SYSTEM FOR LATERAL PIPING SERVING CLASS I AND III 65MM

- SHAFTS OR FIRE RATED SERVICE SPACES. LATERAL PIPING SERVING CLASS I AND CLASS III 65MM (21/2 THE SAME 3.2.2.C.
- 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

(2½) HOSE VALVES / FIRE HOSE CABINETS ONLY"

WET PIPE SPRINKLER SYSTEM

<u>21 13 13</u>

1.1.2. PROVIDE INSTALLATION DRAWINGS AND HYDRAULIC CALCULATIONS, DESIGNED AND SEALED

1.3.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 13 - STANDARD FOR THE INSTALLATION

BY A PROFESSIONAL ENGINEER LICENCED IN THE PROVINCE OF ONTARIO.

1.2.1. SPRINKLER WORK TO BE UNDERTAKEN BY SPECIALIST AUTOMATIC SPRINKLER

1.3.2. NFPA 25 - STANDARD FOR THE INSPECTION, TESTING AND MAINTENANCE OF

1.3.5. ASTM A53 STANDARD SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT-DIPPED,

1.4.1. PREPARE SHOP DRAWINGS AND FORWARD THREE COPIES WITH HYDRAULIC CALCULATIONS

THESE STAMPED SHOP DRAWINGS AND PRODUCT DATA SHEETS FOR REVIEW IN

1.5.2. HYDRAULIC CALCULATIONS ARE BASED ON WATER SUPPLY TEST RESULTS, DOWN-RATED

1.5.3. CHANGES TO PIPE SIZES OR HEAD LAYOUTS ACCOMPANIED WITH MODIFIED HYDRAULIC

1.6.1. PROVIDE CABINET, CONTAINING SPECIAL SPRINKLER WRENCH, AND SPARE STOCK OF

CLASSIFICATION DETERMINED UNDER NFPA DESIGN DENSITIES AND DESIGN AREAS FOR

IN ACCORDANCE WITH REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AS SHOWN.

SPRINKLERS. INCLUDE AT LEAST ONE HEAD OF EACH TYPE AND TEMPERATURE RATING

1.4.2. AFTER SHOP DRAWINGS ARE ACCEPTED BY REVIEWING AUTHORITY SUBMIT COPIES OF

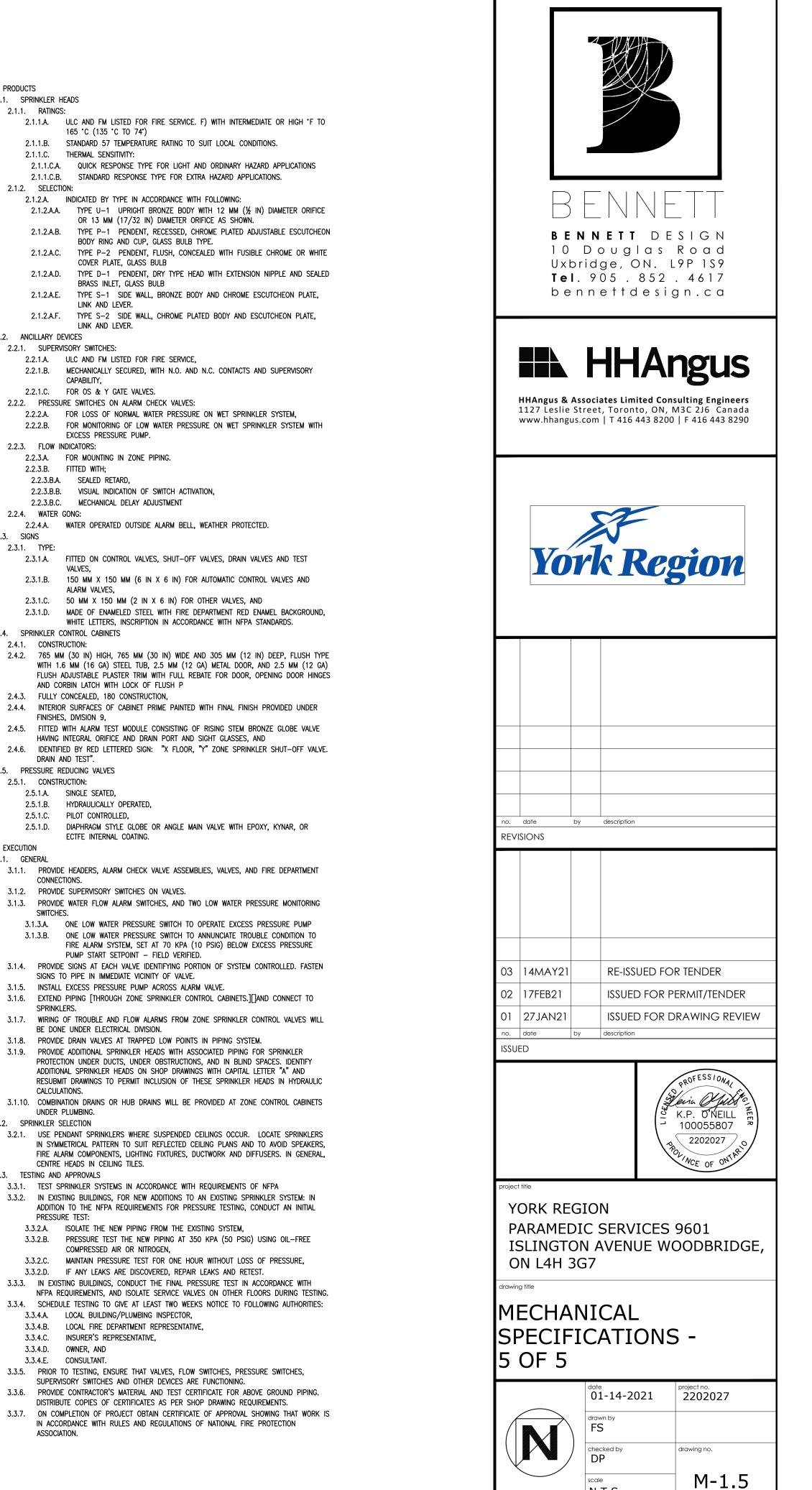
1.5.1. SYSTEM IS DESIGNED TO NFPA 13 USING HYDRAULIC METHOD FOR HAZARD

INSTALLATION FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD.

3.2.4. FOR GREATER CLARITY, LATERAL PIPING SERVING CLASS II 11/2 DO NOT REQUIRE

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



N.T.S.

2.1. SPRINKLER HEADS 2.1.1. RATINGS:

2.1.2.A.B.

2.1.2.A.C.

2.2.1.B.

2.3. SIGNS

2.3.1. TYPE:

2.3.1.A.

2.3.1.B.

2.3.1.D.

2.5.1.D.

3. EXECUTION

3.1. GENERAL

PRODUCTS

2.1.1.A. ULC AND FM LISTED FOR FIRE SERVICE. F) WITH INTERMEDIATE OR HIGH 'F TO 165 °C (135 °C TO 74°) 2.1.1.B. STANDARD 57 TEMPERATURE RATING TO SUIT LOCAL CONDITIONS.

2.1.1.C. THERMAL SENSITIVITY: 2.1.1.C.A. QUICK RESPONSE TYPE FOR LIGHT AND ORDINARY HAZARD APPLICATIONS 2.1.1.C.B. STANDARD RESPONSE TYPE FOR EXTRA HAZARD APPLICATIONS.

2.1.2. SELECTION: 2.1.2.A. INDICATED BY TYPE IN ACCORDANCE WITH FOLLOWING:

2.1.2.A.A. TYPE U-1 UPRIGHT BRONZE BODY WITH 12 MM (1/2 IN) DIAMETER ORIFICE OR 13 MM (17/32 IN) DIAMETER ORIFICE AS SHOWN. TYPE P-1 PENDENT, RECESSED, CHROME PLATED ADJUSTABLE ESCUTCHEON BODY RING AND CUP. GLASS BULB TYPE.

COVER PLATE, GLASS BULB 2.1.2.A.D. TYPE D-1 PENDENT, DRY TYPE HEAD WITH EXTENSION NIPPLE AND SEALED BRASS INLET, GLASS BULB

2.1.2.A.E. TYPE S-1 SIDE WALL, BRONZE BODY AND CHROME ESCUTCHEON PLATE, LINK AND LEVER. 2.1.2.A.F. TYPE S-2 SIDE WALL, CHROME PLATED BODY AND ESCUTCHEON PLATE,

LINK AND LEVER. 2.2 ANCILLARY DEVICES

2.2.1. SUPERVISORY SWITCHES: 2.2.1.A. ULC AND FM LISTED FOR FIRE SERVICE,

MECHANICALLY SECURED, WITH N.O. AND N.C. CONTACTS AND SUPERVISORY CAPABILITY. 2.2.1.C. FOR OS & Y GATE VALVES.

2.2.2. PRESSURE SWITCHES ON ALARM CHECK VALVES:

2.2.2.A. FOR LOSS OF NORMAL WATER PRESSURE ON WET SPRINKLER SYSTEM, 2.2.2.B. FOR MONITORING OF LOW WATER PRESSURE ON WET SPRINKLER SYSTEM WITH EXCESS PRESSURE PUMP.

2.2.3. FLOW INDICATORS: 2.2.3.A. FOR MOUNTING IN ZONE PIPING.

2.2.3.B. FITTED WITH:

2.2.3.B.A. SEALED RETARD, 2.2.3.B.B. VISUAL INDICATION OF SWITCH ACTIVATION,

2.2.3.B.C. MECHANICAL DELAY ADJUSTMENT 2.2.4. WATER GONG:

2.2.4.A. WATER OPERATED OUTSIDE ALARM BELL, WEATHER PROTECTED.

FITTED ON CONTROL VALVES, SHUT-OFF VALVES, DRAIN VALVES AND TEST VALVES.

ALARM VALVES.

2.3.1.C. 50 MM X 150 MM (2 IN X 6 IN) FOR OTHER VALVES, AND MADE OF ENAMELED STEEL WITH FIRE DEPARTMENT RED ENAMEL BACKGROUND, WHITE LETTERS, INSCRIPTION IN ACCORDANCE WITH NFPA STANDARDS. 2.4. SPRINKLER CONTROL CABINETS

2.4.1. CONSTRUCTION:

2.4.2. 765 MM (30 IN) HIGH, 765 MM (30 IN) WIDE AND 305 MM (12 IN) DEEP, FLUSH TYPE WITH 1.6 MM (16 GA) STEEL TUB, 2.5 MM (12 GA) METAL DOOR, AND 2.5 MM (12 GA) FLUSH ADJUSTABLE PLASTER TRIM WITH FULL REBATE FOR DOOR, OPENING DOOR HINGES AND CORBIN LATCH WITH LOCK OF FLUSH P 2.4.3. FULLY CONCEALED, 180 CONSTRUCTION,

2.4.4. INTERIOR SURFACES OF CABINET PRIME PAINTED WITH FINAL FINISH PROVIDED UNDER FINISHES, DIVISION 9,

2.4.5. FITTED WITH ALARM TEST MODULE CONSISTING OF RISING STEM BRONZE GLOBE VALVE HAVING INTEGRAL ORIFICE AND DRAIN PORT AND SIGHT GLASSES, AND 2.4.6. IDENTIFIED BY RED LETTERED SIGN: "X FLOOR, "Y" ZONE SPRINKLER SHUT-OFF VALVE. DRAIN AND TEST".

2.5. PRESSURE REDUCING VALVES 2.5.1 CONSTRUCTION:

> 2.5.1.A. SINGLE SEATED, 2.5.1.B. HYDRAULICALLY OPERATED.

2.5.1.C. PILOT CONTROLLED.

DIAPHRAGM STYLE GLOBE OR ANGLE MAIN VALVE WITH EPOXY, KYNAR, OR ECTFE INTERNAL COATING.

3.1.1. PROVIDE HEADERS, ALARM CHECK VALVE ASSEMBLIES, VALVES, AND FIRE DEPARTMENT CONNECTIONS.

3.1.2. PROVIDE SUPERVISORY SWITCHES ON VALVES.

SWITCHES. 3.1.3.A. ONE LOW WATER PRESSURE SWITCH TO OPERATE EXCESS PRESSURE PUMP 3.1.3.B. ONE LOW WATER PRESSURE SWITCH TO ANNUNCIATE TROUBLE CONDITION TO FIRE ALARM SYSTEM, SET AT 70 KPA (10 PSIG) BELOW EXCESS PRESSURE PUMP START SETPOINT - FIELD VERIFIED.

3.1.4. PROVIDE SIGNS AT EACH VALVE IDENTIFYING PORTION OF SYSTEM CONTROLLED. FASTEN SIGNS TO PIPE IN IMMEDIATE VICINITY OF VALVE.

3.1.5. INSTALL EXCESS PRESSURE PUMP ACROSS ALARM VALVE. 3.1.6. EXTEND PIPING [THROUGH ZONE SPRINKLER CONTROL CABINETS.][]AND CONNECT TO SPRINKLERS.

3.1.7. WIRING OF TROUBLE AND FLOW ALARMS FROM ZONE SPRINKLER CONTROL VALVES WILL BE DONE UNDER ELECTRICAL DIVISION.

3.1.8. PROVIDE DRAIN VALVES AT TRAPPED LOW POINTS IN PIPING SYSTEM. 3.1.9. PROVIDE ADDITIONAL SPRINKLER HEADS WITH ASSOCIATED PIPING FOR SPRINKLER PROTECTION UNDER DUCTS, UNDER OBSTRUCTIONS, AND IN BLIND SPACES, IDENTIFY ADDITIONAL SPRINKLER HEADS ON SHOP DRAWINGS WITH CAPITAL LETTER "A" AND RESUBMIT DRAWINGS TO PERMIT INCLUSION OF THESE SPRINKLER HEADS IN HYDRAULIC

CALCULATIONS. 3.1.10. COMBINATION DRAINS OR HUB DRAINS WILL BE PROVIDED AT ZONE CONTROL CABINETS UNDER PLUMBING

3.2. SPRINKLER SELECTION 3.2.1. USE PENDANT SPRINKLERS WHERE SUSPENDED CEILINGS OCCUR. LOCATE SPRINKLERS IN SYMMETRICAL PATTERN TO SUIT REFLECTED CEILING PLANS AND TO AVOID SPEAKERS, FIRE ALARM COMPONENTS, LIGHTING FIXTURES, DUCTWORK AND DIFFUSERS. IN GENERAL, CENTRE HEADS IN CEILING TILES.

3.3. TESTING AND APPROVALS 3.3.1. TEST SPRINKLER SYSTEMS IN ACCORDANCE WITH REQUIREMENTS OF NFPA 3.3.2. IN EXISTING BUILDINGS, FOR NEW ADDITIONS TO AN EXISTING SPRINKLER SYSTEM: IN ADDITION TO THE NFPA REQUIREMENTS FOR PRESSURE TESTING, CONDUCT AN INITIAL PRESSURE TEST:

3.3.2.A. ISOLATE THE NEW PIPING FROM THE EXISTING SYSTEM, PRESSURE TEST THE NEW PIPING AT 350 KPA (50 PSIG) USING OIL-FREE COMPRESSED AIR OR NITROGEN,

MAINTAIN PRESSURE TEST FOR ONE HOUR WITHOUT LOSS OF PRESSURE, 3.3.2.D. IF ANY LEAKS ARE DISCOVERED, REPAIR LEAKS AND RETEST. 3.3.3. IN EXISTING BUILDINGS, CONDUCT THE FINAL PRESSURE TEST IN ACCORDANCE WITH

NFPA REQUIREMENTS, AND ISOLATE SERVICE VALVES ON OTHER FLOORS DURING TESTING. 3.3.4. SCHEDULE TESTING TO GIVE AT LEAST TWO WEEKS NOTICE TO FOLLOWING AUTHORITIES:

3.3.4.A. LOCAL BUILDING/PLUMBING INSPECTOR, 3.3.4.B. LOCAL FIRE DEPARTMENT REPRESENTATIVE,

INSURER'S REPRESENTATIVE,

3.3.4.D. OWNER, AND 3.3.4.E. CONSULTANT

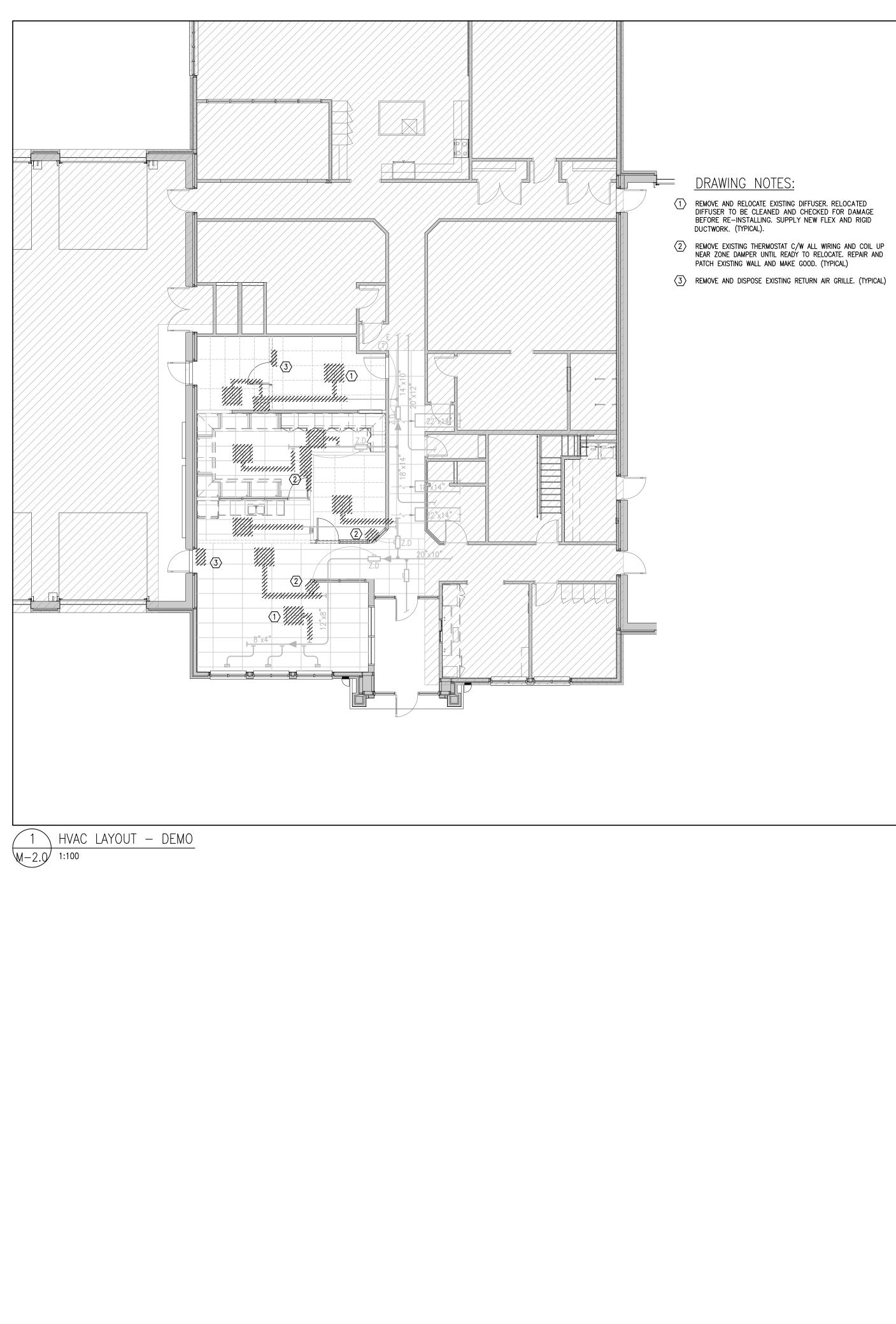
3.3.2.B.

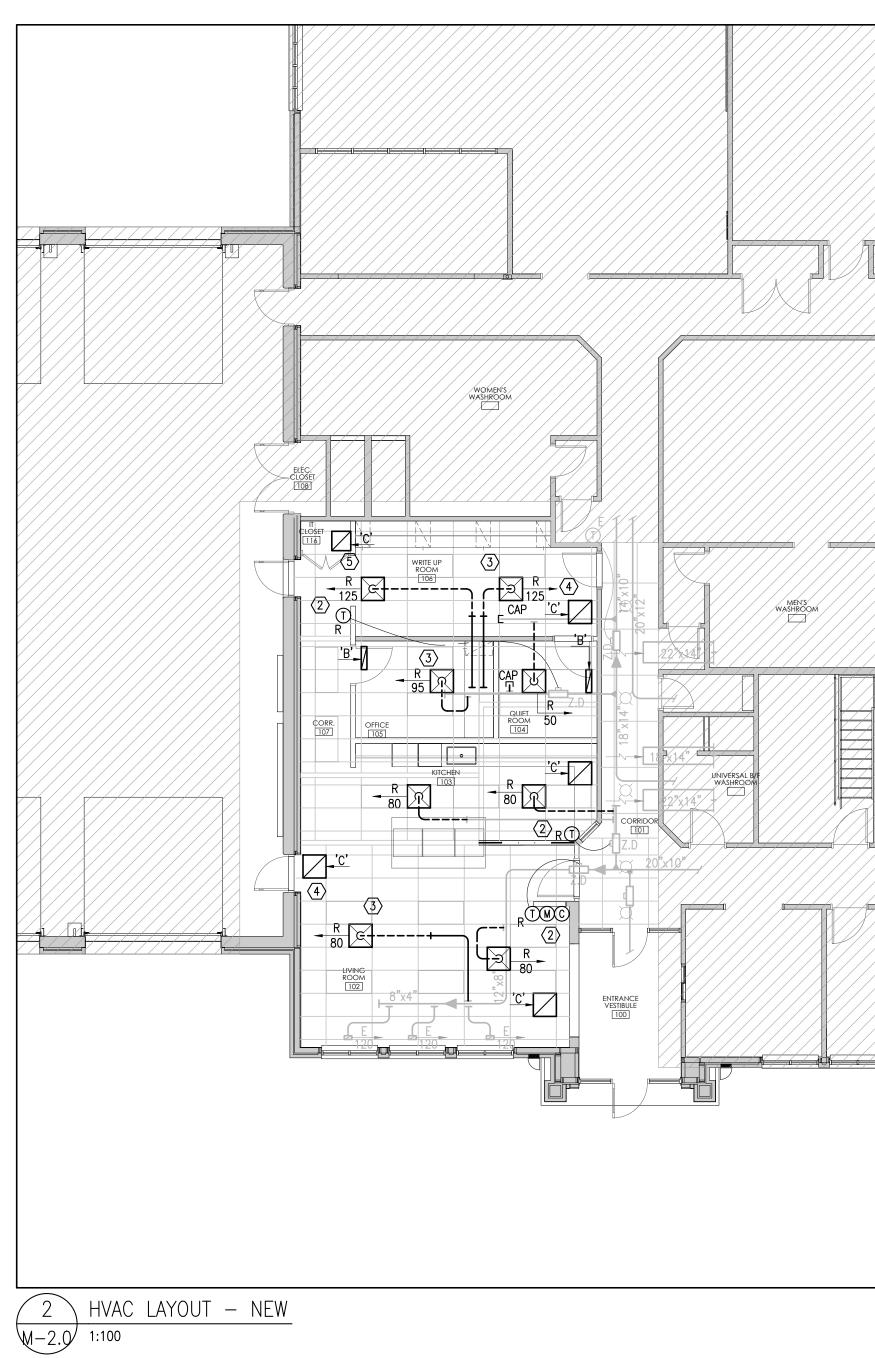
3.3.2.C.

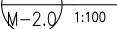
3.3.4.C.

ASSOCIATION.

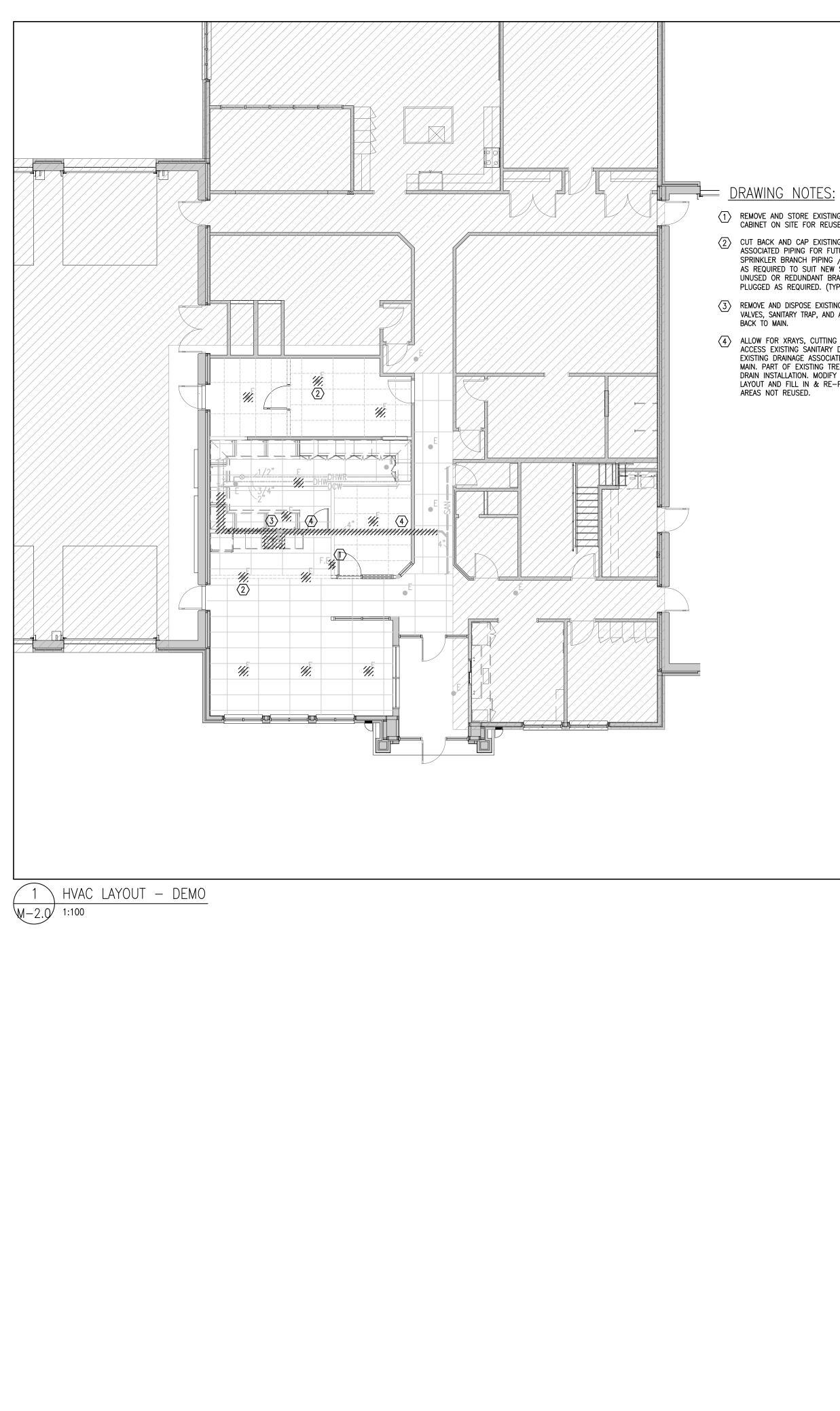
3.3.5. PRIOR TO TESTING, ENSURE THAT VALVES, FLOW SWITCHES, PRESSURE SWITCHES, SUPERVISORY SWITCHES AND OTHER DEVICES ARE FUNCTIONING. 3.3.6. PROVIDE CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR ABOVE GROUND PIPING. DISTRIBUTE COPIES OF CERTIFICATES AS PER SHOP DRAWING REQUIREMENTS. 3.3.7. ON COMPLETION OF PROJECT OBTAIN CERTIFICATE OF APPROVAL SHOWING THAT WORK IS IN ACCORDANCE WITH RULES AND REGULATIONS OF NATIONAL FIRE PROTECTION







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 OF NELOCATED THERMOSTAT. CONTRACTOR TO CONFIRM EXACT LOCATION OF STEL (TYPICAL) (3) BALANCE DIFFUSER TO NEW AIR FLOW IN CFM. (TYPICAL) (4) NEW EGGRATE TYPE RETURN AIR GRILLE. SEE SCHEDULE FOR	BENNETT DESIGN 10 Douglas Road Uxbridge, ON. L9P 1S9 Tel. 905.852.4617 bennettdesign.ca
SIZING. (TYPICAL)	HHAngus & Associates Limited Consulting Engineers 127 Leslie Street, Toronto, ON, M3C 2J6 Canada www.hhangus.com T 416 443 8200 F 416 443 8290
	Nork Region Image: Im
REFER TO SPECIFICATIONS CONTRACT #T-21-28 FOR ADDITIONAL INFORMATION.	03 14MAY21 RE-ISSUED FOR TENDER 02 17FEB21 ISSUED FOR PERMIT/TENDER 01 27JAN21 ISSUED FOR DRAWING REVIEW no. date by ISSUED ISSUED
	project tille YORK REGION PARAMEDIC SERVICES 9601 ISLINGTON AVENUE WOODBRIDGE, ON L4H 3G7 drawing tille HVAC LAYOUT
	date 01-14-2021 project no. 2202027 drawn by FS checked by DP scale 1:100 drawing no. M-2.0

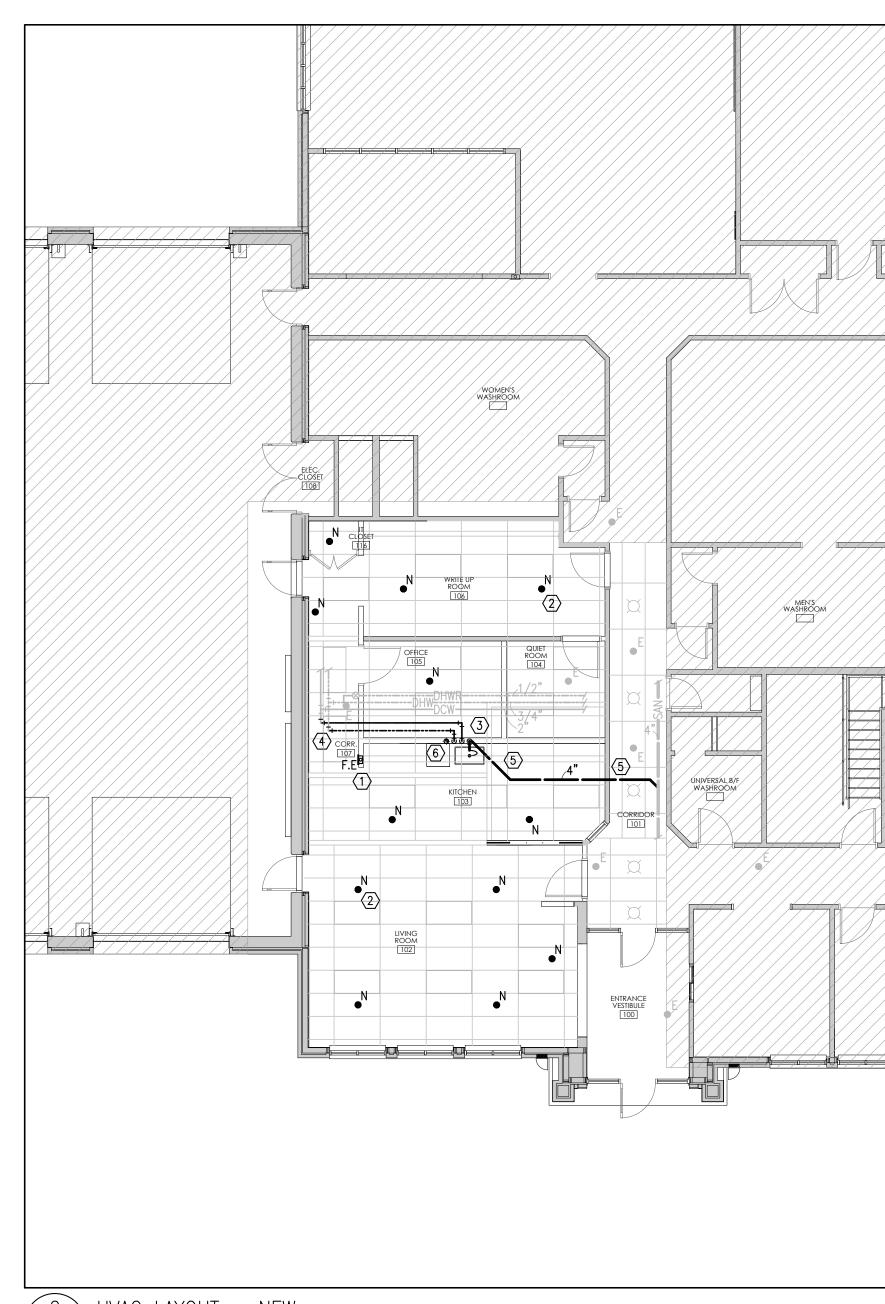


(1) REMOVE AND STORE EXISTING FIRE EXTINGUISHER AND CABINET ON SITE FOR REUSE.

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)

REMOVE AND DISPOSE EXISTING SINK C/W FAUCET, SHUT-OFF VALVES, SANITARY TRAP, AND ALL ASSOCIATED PIPING AND CAP BACK TO MAIN.

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.



2 HVAC LAYOUT - NEW M-2.0 1:100

	 DRAWING NOTES: NEW LOCATION OF RELOCATED R AND CABINET. CONFIRM EXACT L PRIOR TO INSTALLATION. CONNECT TO EXISTING SPRINKLE BRANCH PIPE, PROVIDE NEW SP (TYPICAL) 1/2" CW & 1/2" HW. & VENT & DISHWASHER, 1-1/2" WASTE PROVIDE 1/2" VALVED DCW. PR 1-1/2" DRAIN CONNECTIONS UN DISHWASHERS. INSTALL DISHWASJ OWNER. ALLOW SUFFICIENT CLEA ACCESS. CONTRACTOR TO INVEST COMMENCING WORK. SEE DETAIL CONNECT NEW PLUMBING TO EXIS PROVIDE NEW SHUTOFF VALVE ON HOT WATER LINES. CONFIRM EXACI S NEW 4" DRAIN LINE UNDER SLAB. INCLUDE FOR REPAIR AND PATCHIN (6) NEW VENT SHALL USE EXISTING MODIFY AND CONNECT NEW VEN SPRINKLER HEAD DISCH HAZARD CLASSIFICATIONS LIGHT HAZARD OFFICE ORDINARY HAZARD (GROUP 1) MECHANICAL SERVICE AREAS COMMUNICATION ROOMS <u>NOTE:</u> DURING CONSTRUCTION, CONTRACTO FIRE PROTECTION SYSTEM IN OPERATION C PROVIDE A FIRE WATCH. FIRE WATCH THE ONTARIO FIRE CODE SECTION S 	ACATION WITH ARCHITECT R MAIN WITH MINIMUM 1" RINKLER HEAD AS SHOWN. DOWN IN WALL TO SINK S–1 DOWN THROUGH FLOOR SLAB. DVIDE 1/2" VALVED DHW. & IDER COUNTER FOR HERS AS SUPPLIED BY RANCE FOR SINK DRAIN TRAP TIGATE SITE PRIOR TO 1/M–1.0. TING EXISTING CONNECTIONS. DOMESTIC COLD WATER AND F ROUTING OF PIPING ON SITE. CONNECT TO NEAREST 4" MAIN. NG OF SLAB AND MAKE GOOD. OPENING THROUGH ROOF. T. HARGE DENSITIES DESIGN DENSITY (U.S. gpm/ft/sq) 0.1 0.15 R IS TO KEEP EXISTING TION AT ALL TIMES. CONTRACTOR IS TO H SHALL COMPLY WITH	HHA 1127 www	B E N 1 0 I Uxbri Tel. b e n	ociates Limit eet, Toronto om T 416 4	D E a s N. L 8 5 2 . e s i g Ar ted Cons o, ON, N 43 8200	SIGN Road 9P1S9 . 4617
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DRAWING	LIST

DRAWING TITLE

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.

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SYMBOL

ELECTRICAL LEGEND

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-LD4-30SL-LN-UNV-L840-1 CONTACT: CÖOPER LIGHTING SOLUTIONS

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.

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' CLUSTER CONFIGURATION. EACH TO RECEIVE: (2) VOICE/DATA, (2) COMBINATION DUPLEX/USB RECEPTACLE. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.

'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.

CARD READER.

ELECTRIC STRIKE.

DOOR CONTACT.

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.

EXISTING CEILING MOUNTED NITROGEN DIOXIDE DETECTOR.

EXISTING DOOR CHIME/BUZZER.

EXISTING FIRE ALARM MIRCOM FA1000 PANEL.

NEW FIRE RATED PLYWOOD.

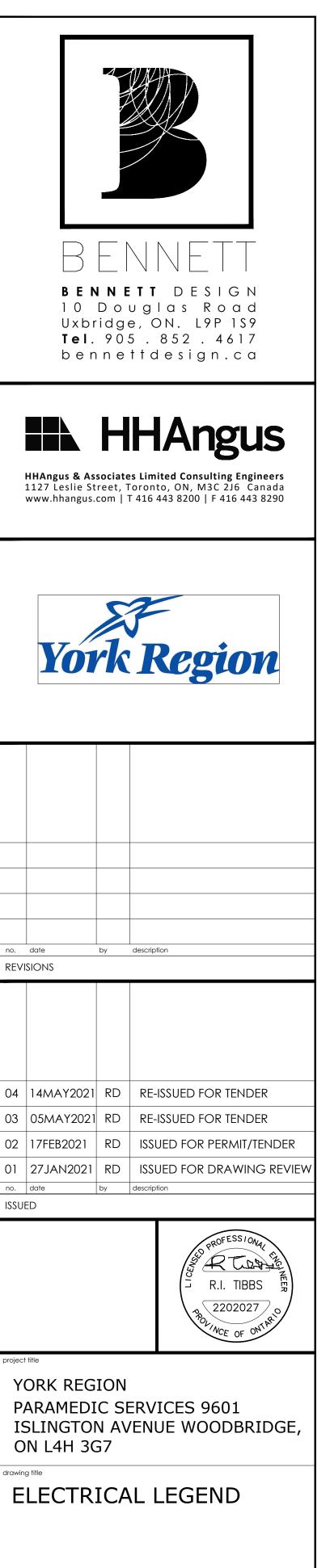
DENOTES EXISTING ITEM TO REMAIN.

DENOTES EXISTING ITEM TO BE REMOVED.

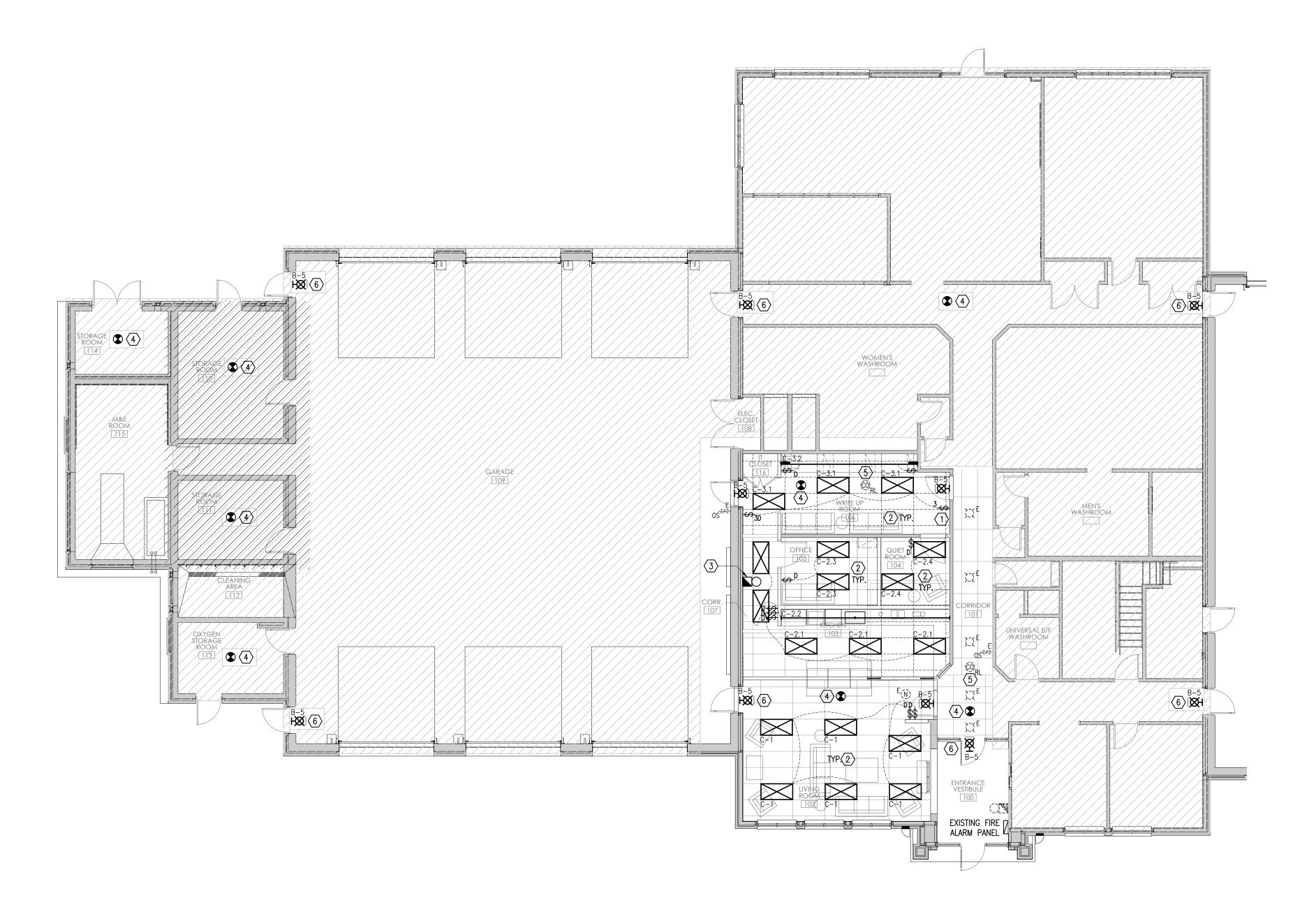
DENOTES EXISTING ITEM IN RELOCATED POSITION. REUSE EXISTING ITEMS, UNLESS OTHERWISE NOTED.

DENOTES EXISTING ITEM TO BE REMOVED AND REINSTALLED/RELOCATED IN SAME POSITION OR VICINITY.

DENOTES TYPICAL THROUGHOUT.



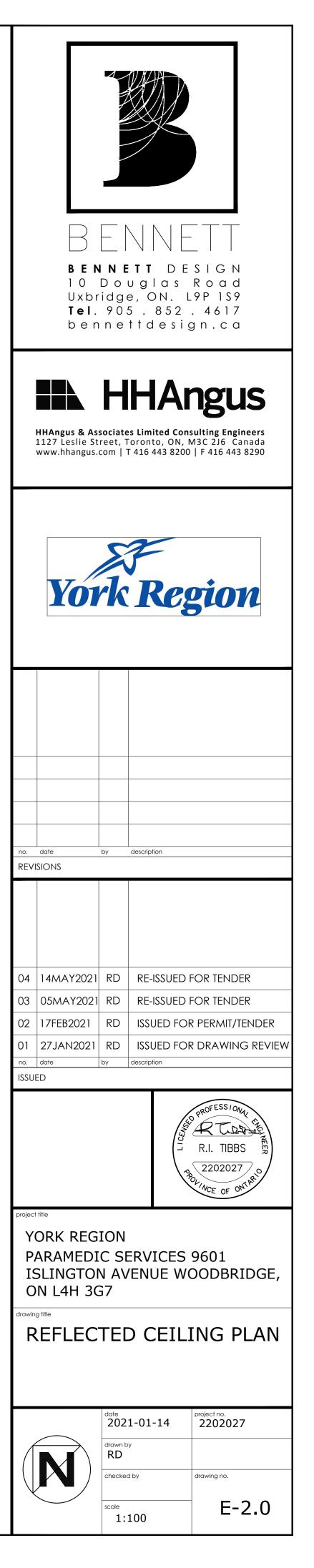
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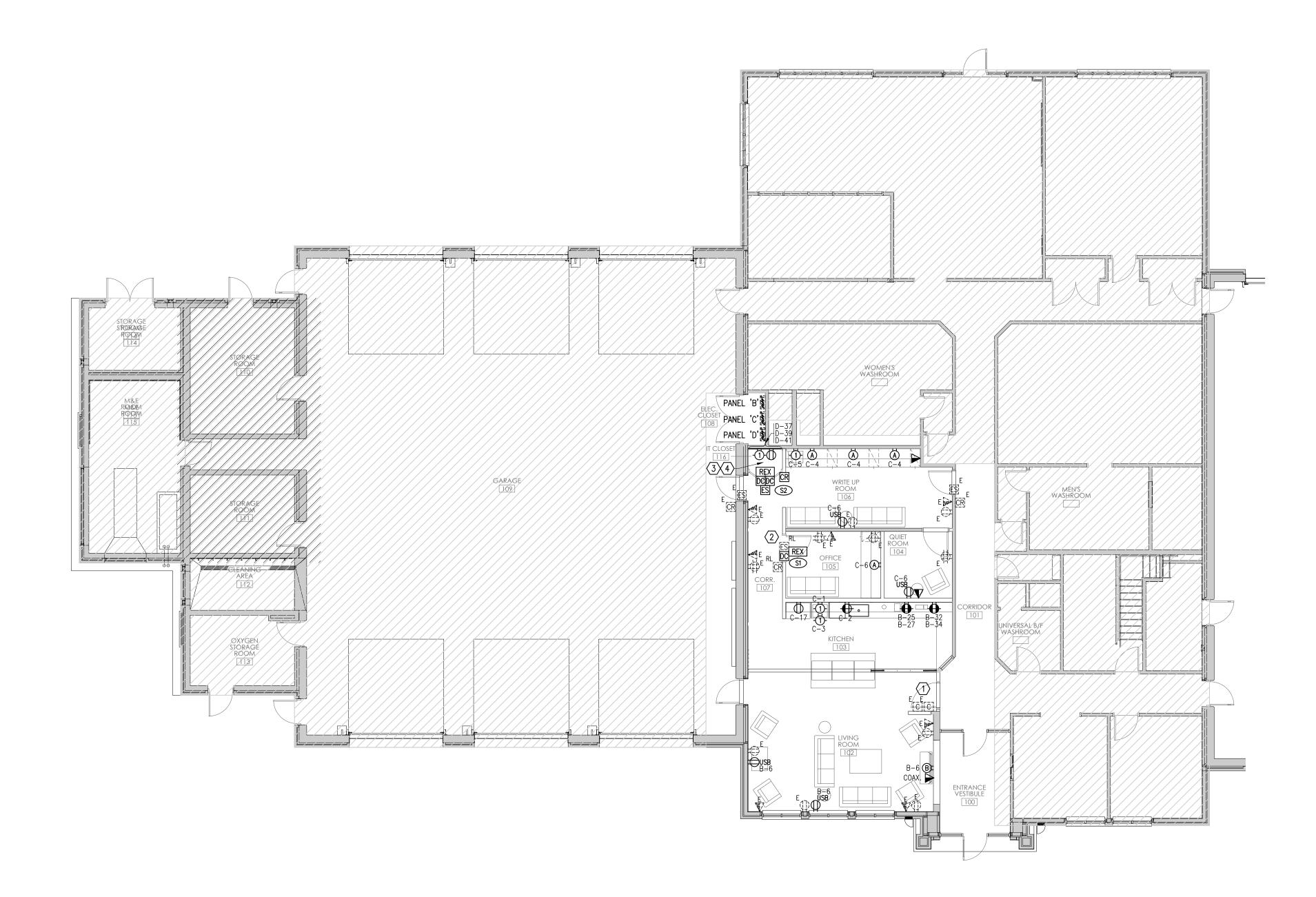


DRAWING NOTES:

- $\langle 1 \rangle$ 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.
- $\langle 2 \rangle$ 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.
- A 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.

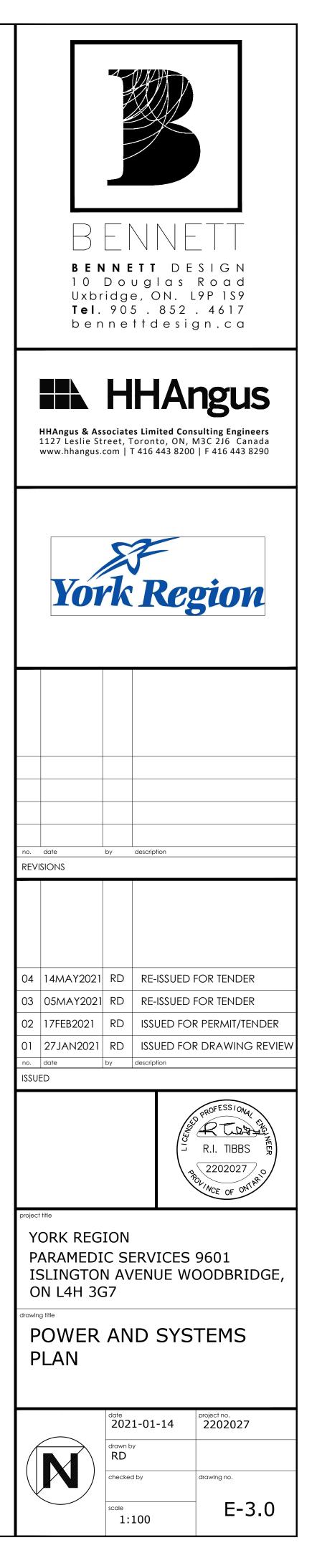


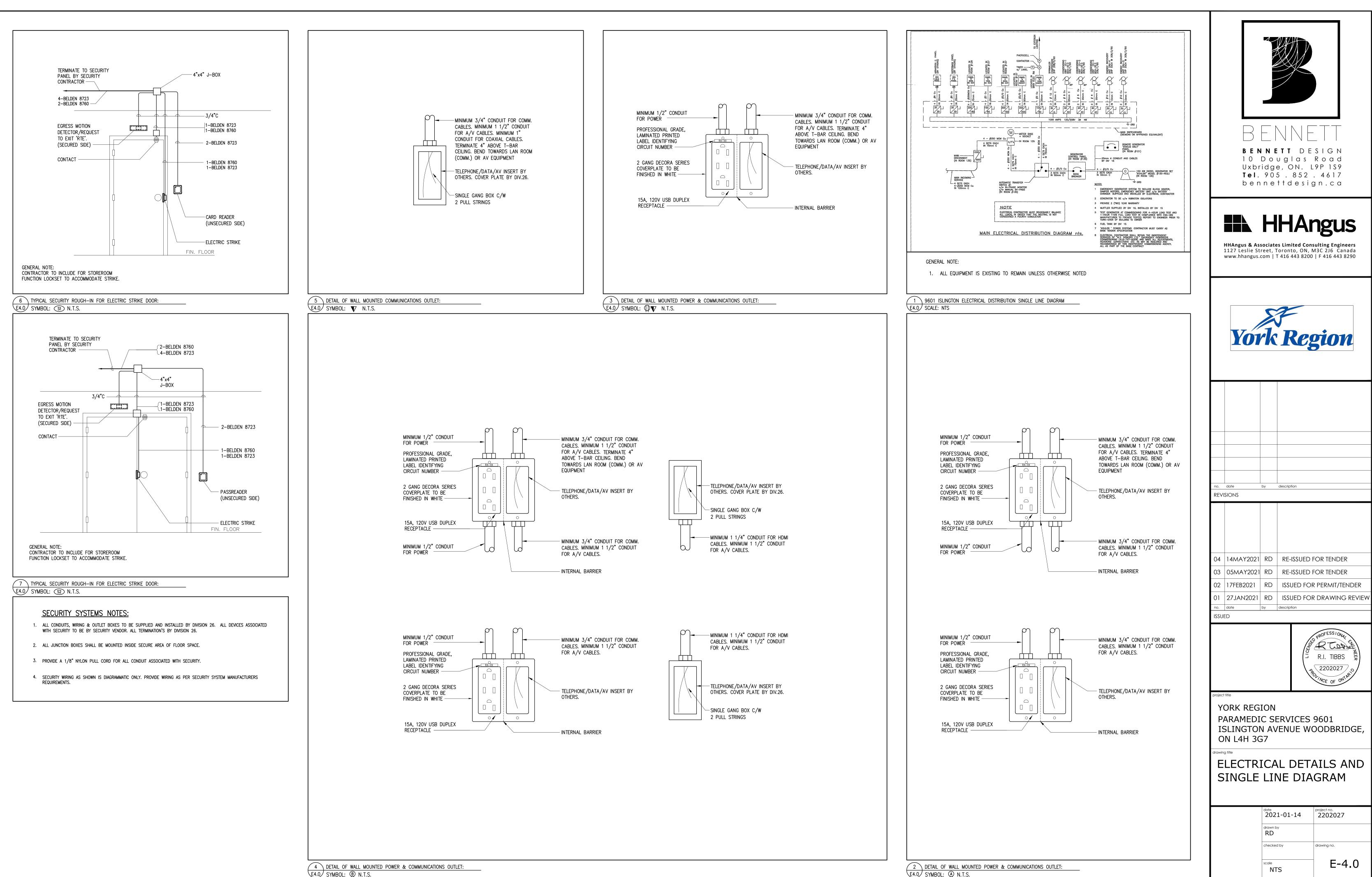


DRAWING NOTES:

- (1) EXISTING FRONT DOOR CHIME AND BACK DOOR BUZZER FINAL LOCATION TO BE DETERMINED ON SITE. RELOCATE AS NECESSARY.
- 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.
- $\langle 3 \rangle$ 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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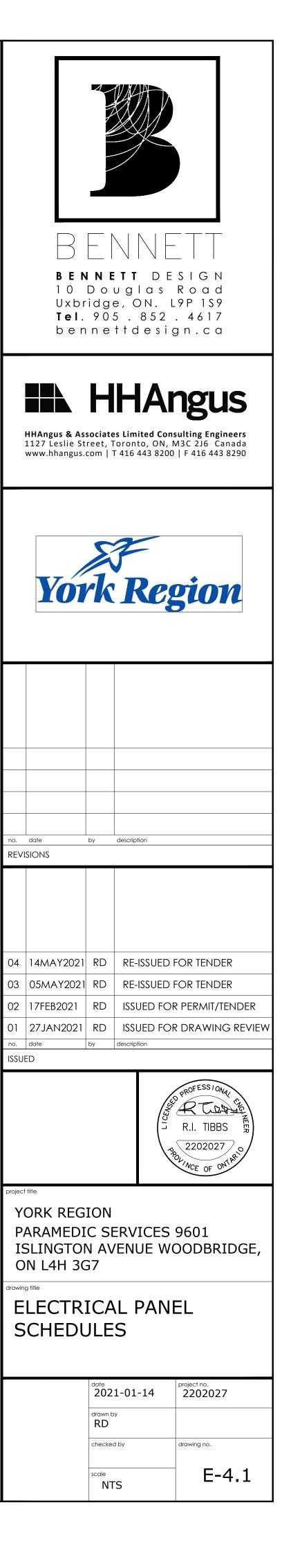
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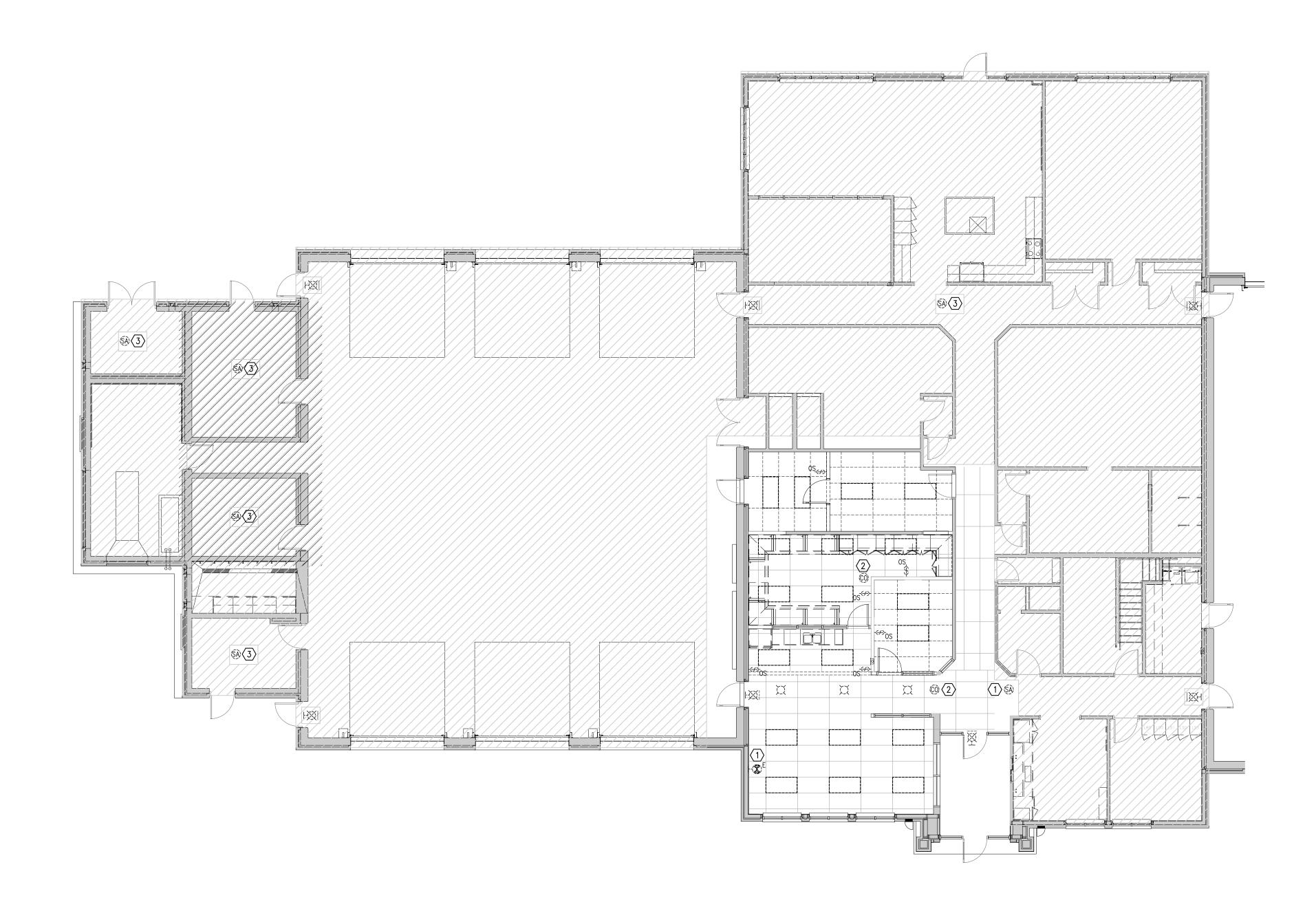
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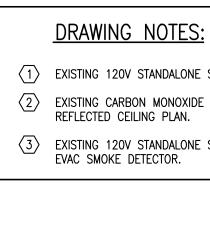
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P.A. SYSTEM AMP. 15A 41 41 42 SPACE				EXIG		40	•		39	20A		2200	NPC 2
				SPACE		42	•		41	15A	I AMP.	SYSTEM	'.A. S
ED: FLUSH MOUNTED: * DENOTES NEW BREAKER		AKER	NEW BREAKE	DENOTES	* [NTED:	H MOUN	FLUS	\bowtie	:D:
IEW: EXISTING: X								\mathbf{X}	STING:	EXIS			EW:



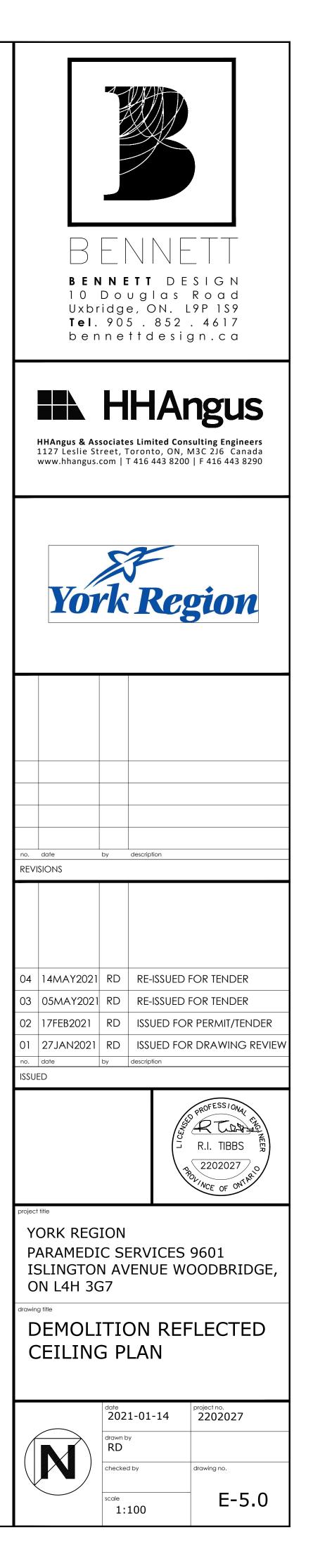


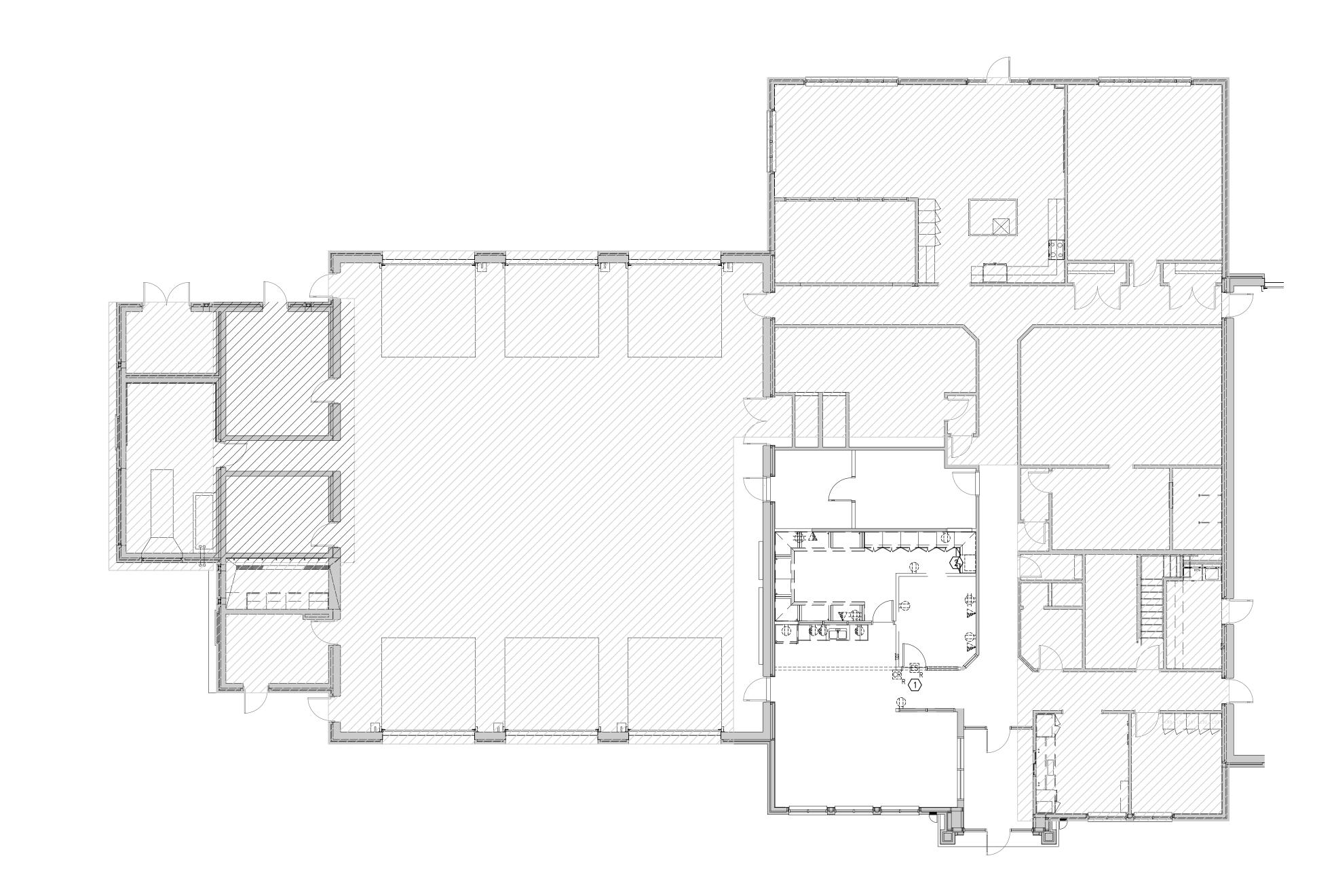


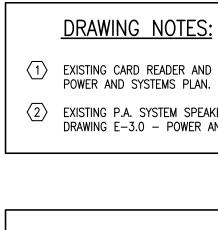
(1) EXISTING 120V STANDALONE SMOKE ALARM TO BE REMOVED. WIRING AND CONDUIT TO BE CUT BACK TO SOURCE. $\langle 2 \rangle$ Existing Carbon monoxide detector to be removed and relocated as shown on drawing E-2.0 – Reflected ceiling plan.

 $\langle 3 \rangle$ 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.

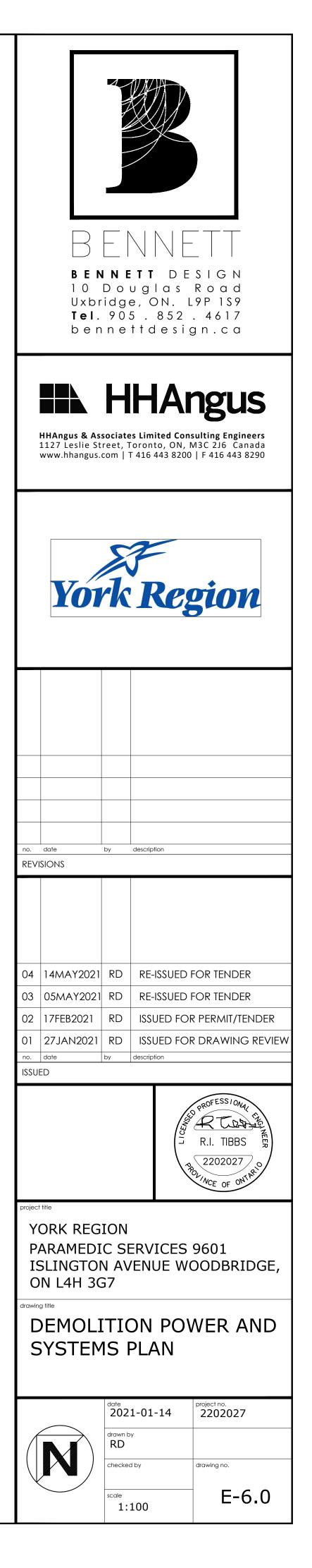






 $\langle 1 \rangle$ Existing CARD READER AND ELECTRIC STRIKE TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-3.0 – POWER AND SYSTEMS PLAN. $\langle 2 \rangle$ existing p.a. system speaker amplifier for e.m.s. station to be removed and relocated as shown on drawing E-3.0 – power and systems plan.

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





BENNETT DESIGN BENNETT DESIGN 10 Douglas Road Uxbridge, ON. L9P 1S9 Tel. 905.852.4617 bennettdesign.ca

YORK REGION PARAMEDIC SERVICES 111 RACCO PARKWAY VAUGHAN, ON 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
1 107	

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

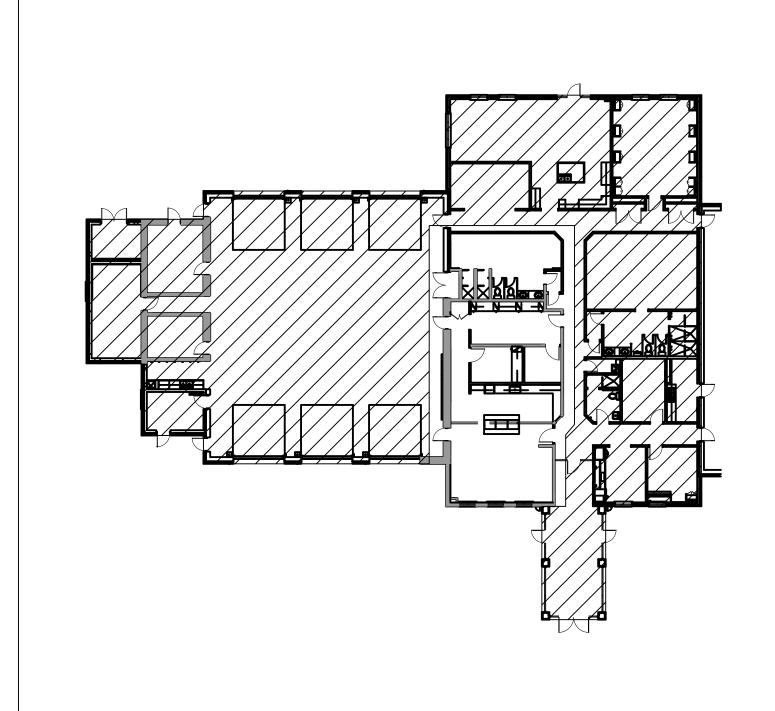
ELECTRICAL DRAWINGS:

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

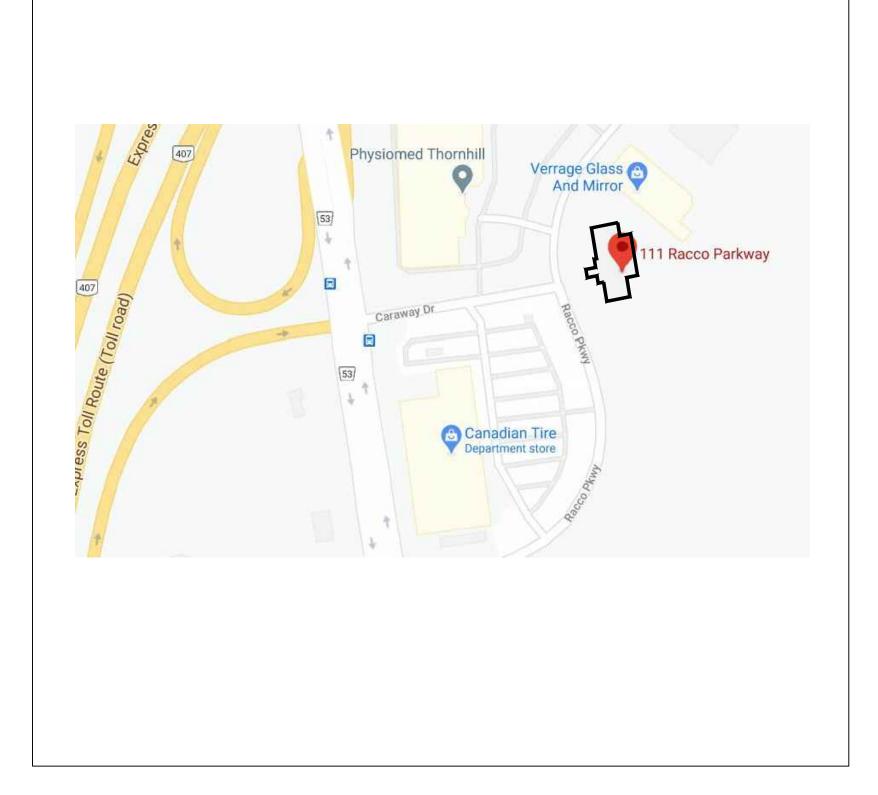
KEY PLAN (N.T.S)



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

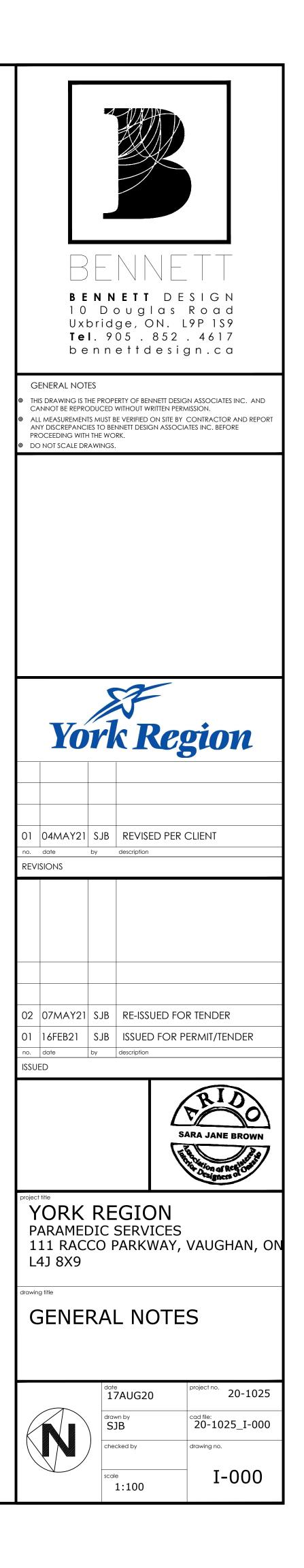
AREA OF RENOVATIONS PART GROUND FLOOR, 106 SQ. M. (1,141 SQ. FT.)

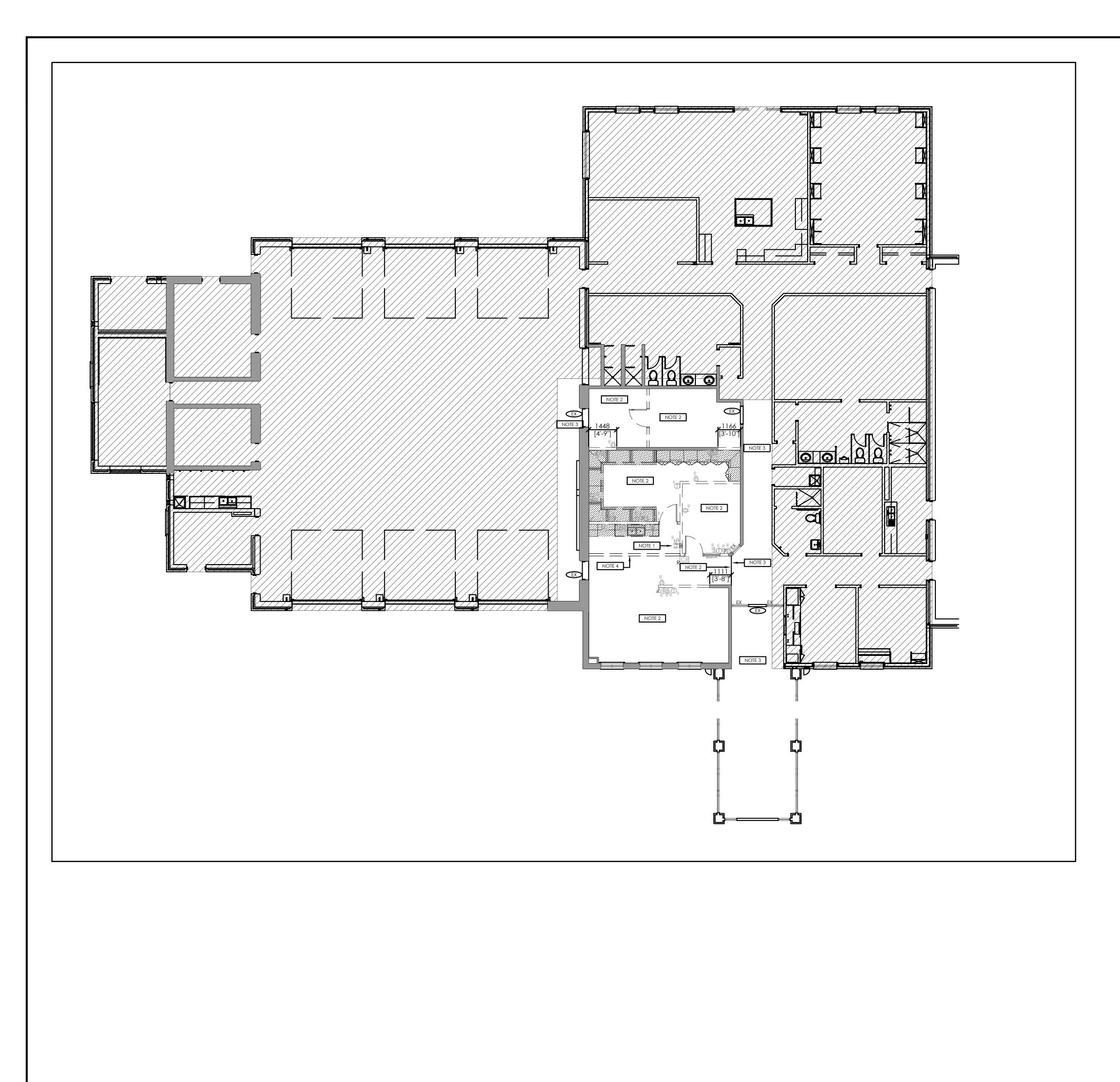
SITE PLAN (N.T.S)

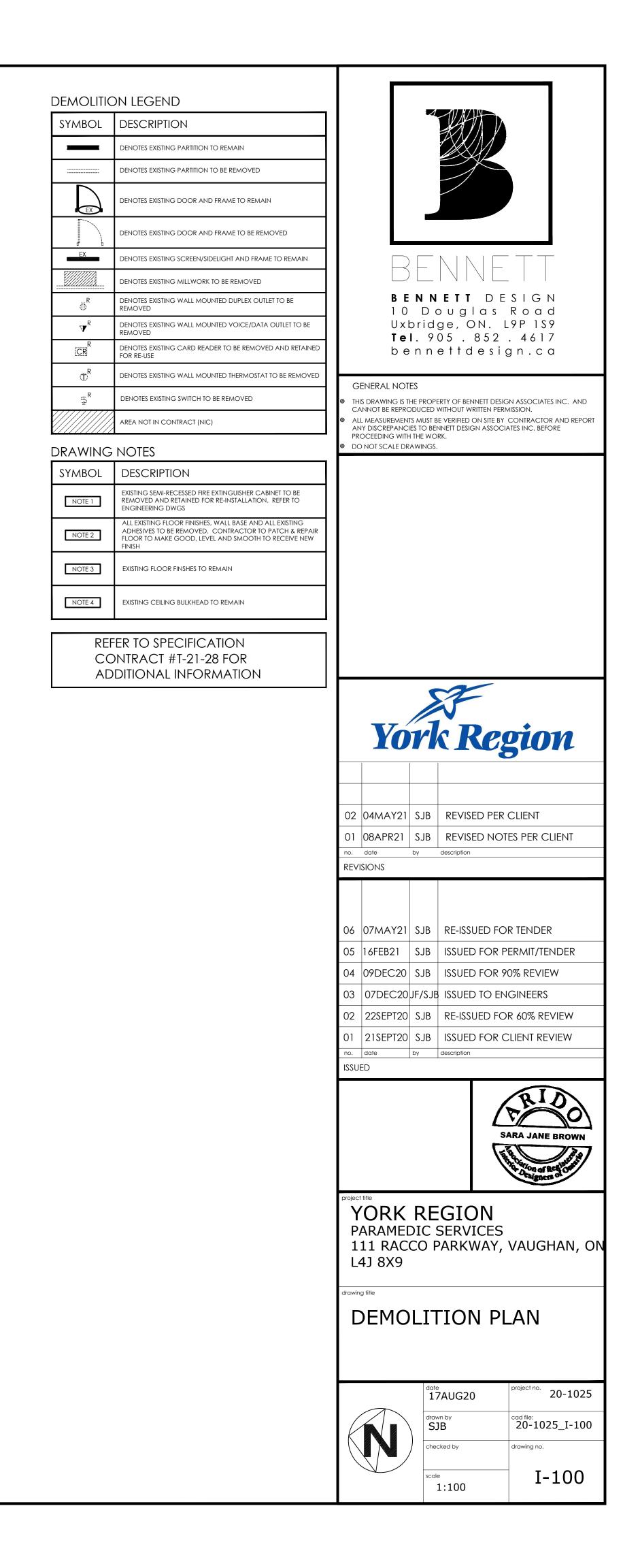


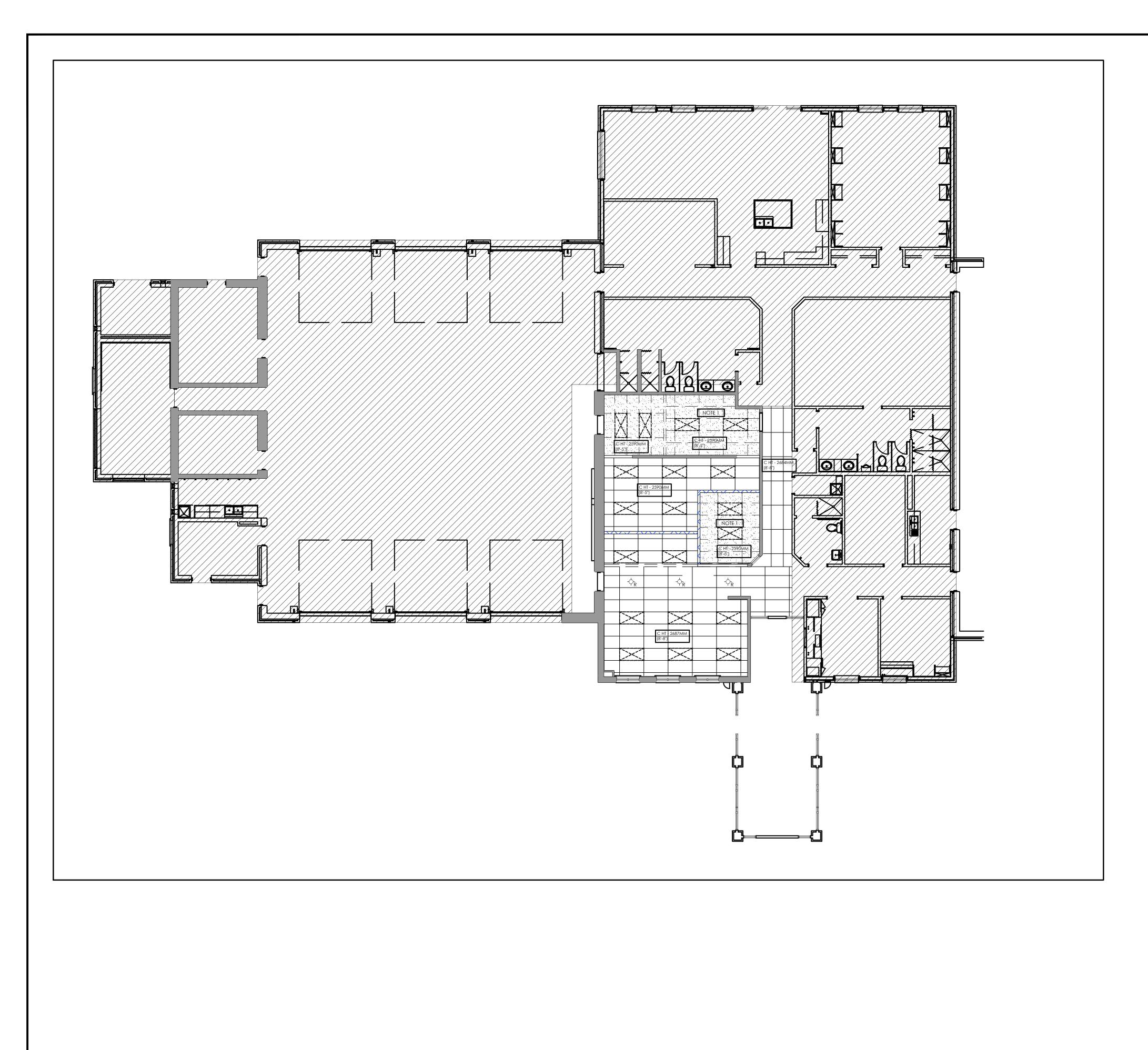
AREAS OF RENOVATION

N.I.C

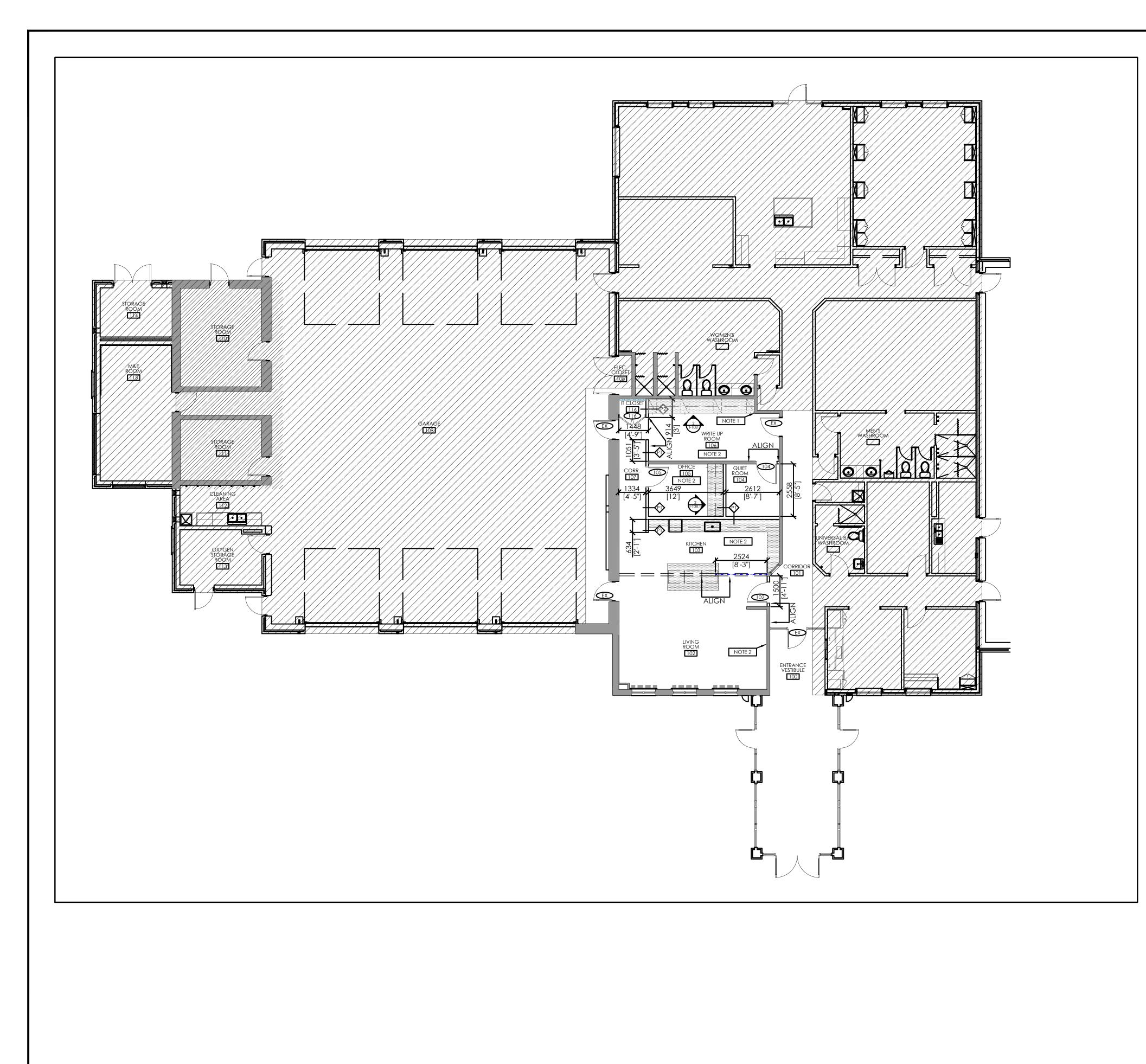


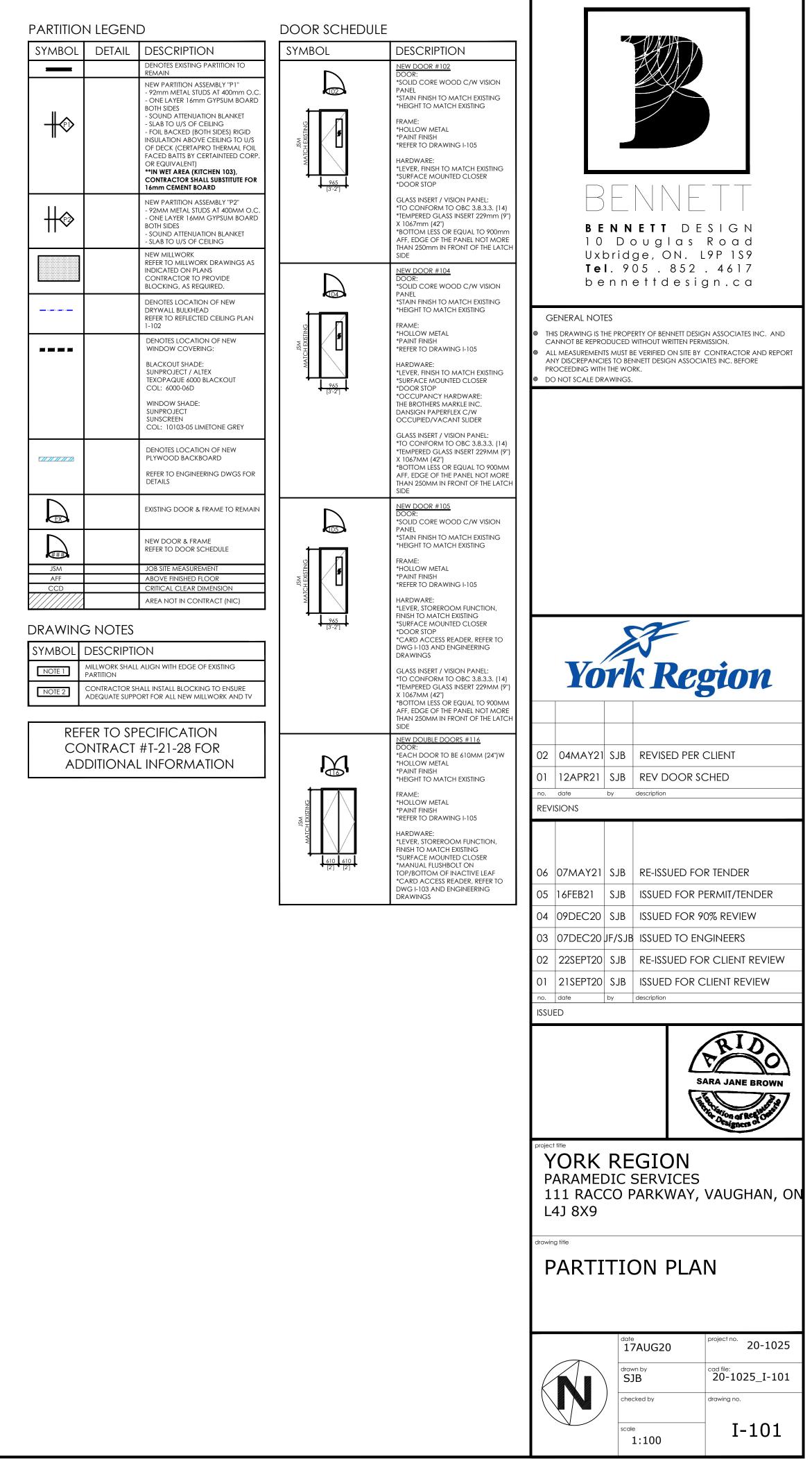




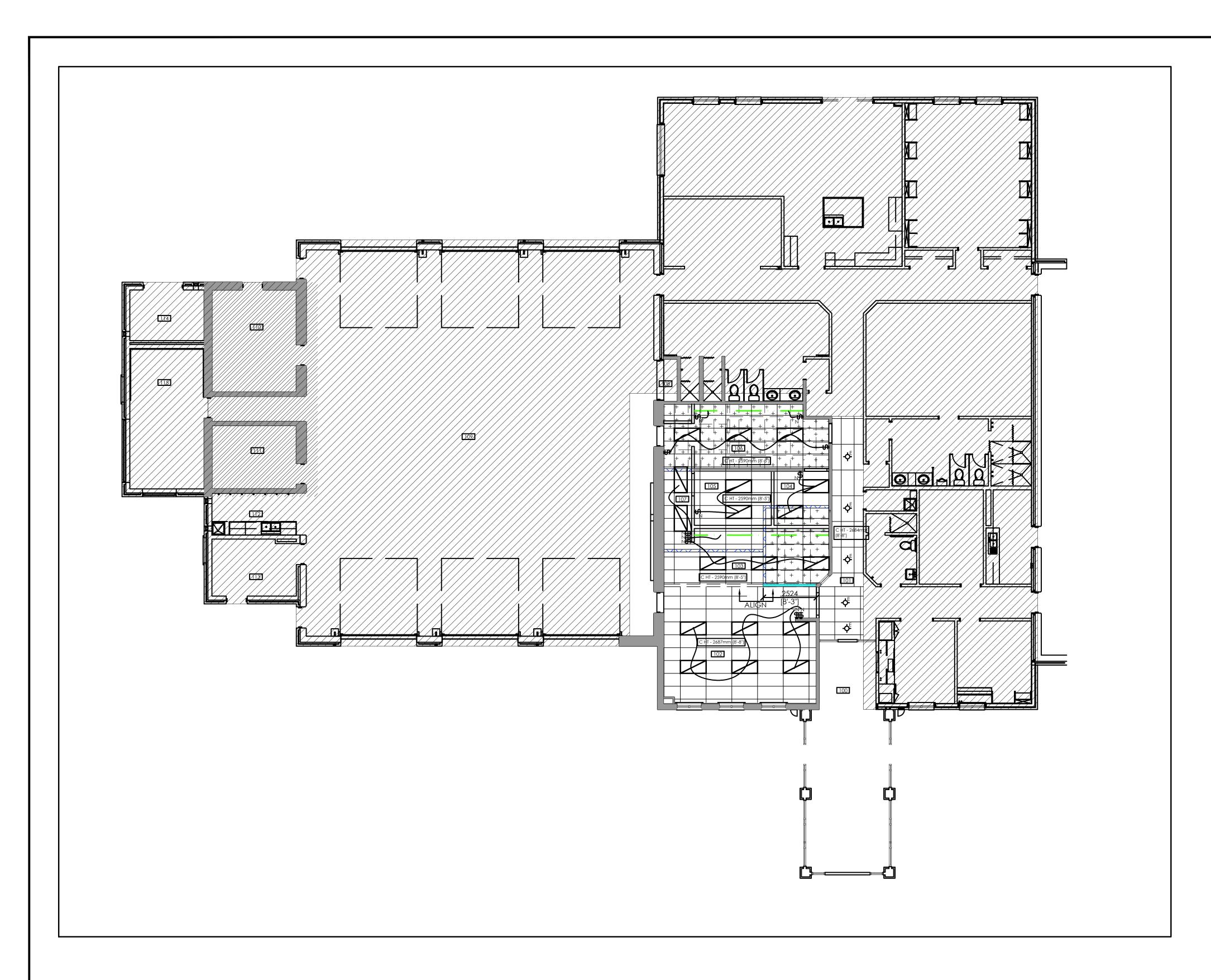


SYMBOL	DEMOLITION LEGEND DESCRIPTION DENOTES EXISTING BASE BUILDING STANDARD LUMINARIES TO BE REMOVED DENOTES AREA OF EXISTING T-BAR CEILING TO BE REMOVED INDICATES AREA OF EXISTING T-BAR CEILING TO BE PATCHED AND REPAIRED TO MAKE GOOD. ALIGN WITH EXISTING T-BAR CEILING GRID IN ADJACENT AREAS DENOTES EXISTING RECESSED INCANDESCENT DOWN LIGHT TO BE REMOVED AREA NOT IN CONTRACT (NIC) NOTES DESCRIPTION		B E 1 O U x k	N N D brid	NNETT ETT DESIGN ouglas Road ge, ON. L9P 159
NOTE 1	EXISTING T-BAR CEILING TO BE REMOVED. CONTRACTOR TO MAKE GOOD TO RECEIVE NEW T-BAR CEILING, REFER TO DWG I-102		Te	I. 9	05.852.4617 ettdesign.ca
CO	FER TO SPECIFICATION ONTRACT #T-21-28 FOR ODITIONAL INFORMATION	 TH C/ AL AN PR 	ANNOT BE REPRC	HE PROP DDUCED TS MUST E IES TO BE I THE WC	
			Yó	r	k Region
		01 no.	04MAY21 08APR21 date ISIONS	SJB SJB by	REVISED PER CLIENT REVISED NOTES PER CLIENT description
		04 03 02 01 no.	22SEPT20 21SEPT20 date	SJB SJB JF/SJE SJB	RE-ISSUED FOR TENDER ISSUED FOR PERMIT/TENDER ISSUED FOR 90% REVIEW ISSUED TO ENGINEERS RE-ISSUED FOR 60% REVIEW ISSUED FOR CLIENT REVIEW description
		P 1 L drawir	YORK ARAMEE 11 RAC 4J 8X9		GION SERVICES PARKWAY, VAUGHAN, ON
		Ŕ	N) dran S. che	7AUG20 20-1025 wn by JB cad file: 20-1025_I-100 ecked by drawing no.





REFER
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ADDIT



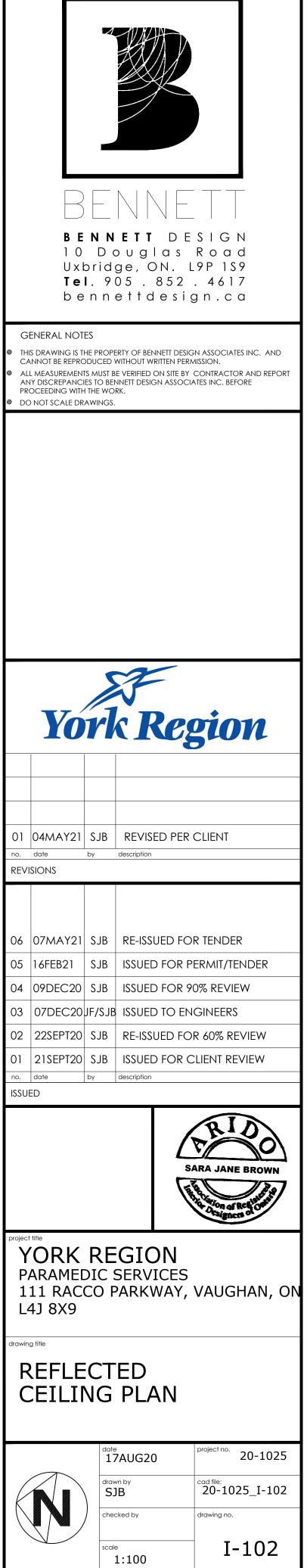
DENOTES EXISTING PARTITION TO REMAIN DENOTES NEW PARTITION NEW 2' X 4' LED LIGHT FIXTURE (RECESSED IN CEILING GR MANUFACTURER: LITELINE SERIES: FORUM LED PANEL LIGHT SIZE: 2' X 4' FINISH: WHITE NEW LED STRIP LIGHT (UNDER MILLWORK) MANUFACTURER: COOPER SIZE: 4' FINISH: WHITE	
EXISTING RECESSED INCANDESCENT DOWN LIGHT TO REMAIN Image: Constraint of the second	
YE TO REMAIN Image: Series of the	
MANUFACTURER: LITELINE SERIES: FORUM LED PANEL LIGHT SIZE: 2' X 4' FINISH: WHITE LUMENS: 6000 LUMEN COLOUR TEMPERATURE: 4000K LIGHT SOURCE: LED, 120V, 0-10V DIMMING, MAX 50 WA CODE: LEDP-24-WH-40-50-1 OR EQUIVALENT NEW LED STRIP LIGHT (UNDER MILLWORK) MANUFACTURER: COOPER SIZE: 4'	
MANUFACTURER: COOPER SIZE: 4'	
LUMENS: 3000 LUMEN COLOUR TEMPERATURE: 4000K LIGHT SOURCE: LED, 120V, ON/OFF, MAX 20 WATTS CODE: 4SNLED-LD4-30SL-LN-UNV-L840-1 CONTACT: COOPER LIGHTING SOLUTIONS OR EQUIVALENT	
 EXISTING SINGLE POLE SWITCH TO REMAIN NON-DIMMABLE SWITCHES TO BE REPLACED WITH DIMM SWITCHES 	ABLE 🛛
 NEW DIMMABLE SINGLE POLE SWITCH, TO BE MOUNTED CENTRELINE NO MORE THAN 1067mm (3'-6") AFF, AND N RANGE OF 900mm (3'-0") AFF TO 1100mm (3'-7") AFF, IN ACCORDANCE WITH OBC 3.8.1.5.(1)(c). 	

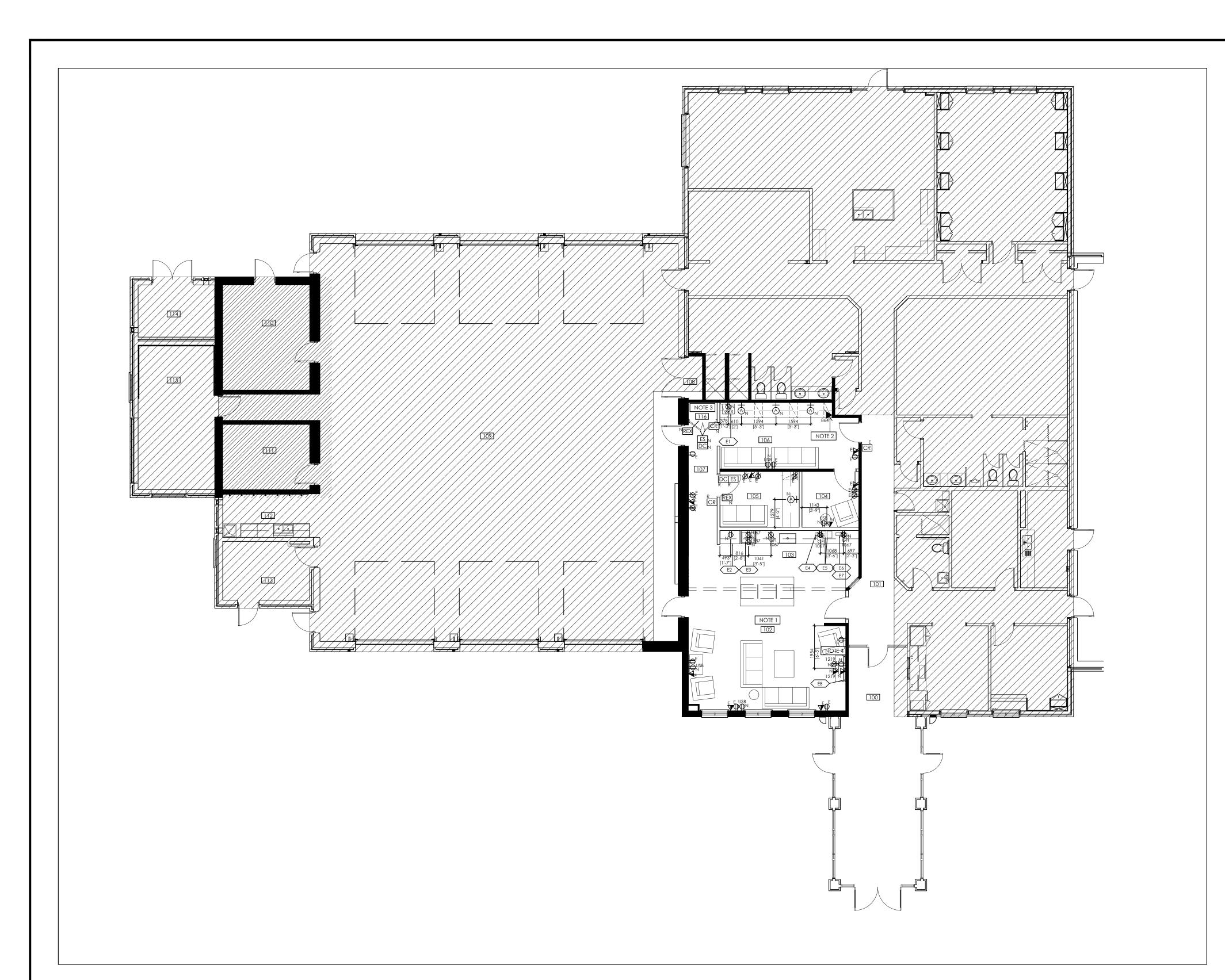
CEILING LEGEND

SYMBOL	DESCRIPTION
	EXISTING T-BAR CEILING AND ACOUSTICAL TILES TO REMAIN. CONTRACTOR TO PATCH & REPAIR TO MAKE GOOD AND SUPPLY NEW AS REQUIRED TO MATCH EXISTING STANDARD
	AREA OF NEW T-BAR CEILING AND ACOUSTICAL TILES TO MATCH EXISTING STANDARD
	INDICATES AREA OF NEW GWB BULKHEAD TO ALIGN WITH EXISTING BULKHEAD
	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

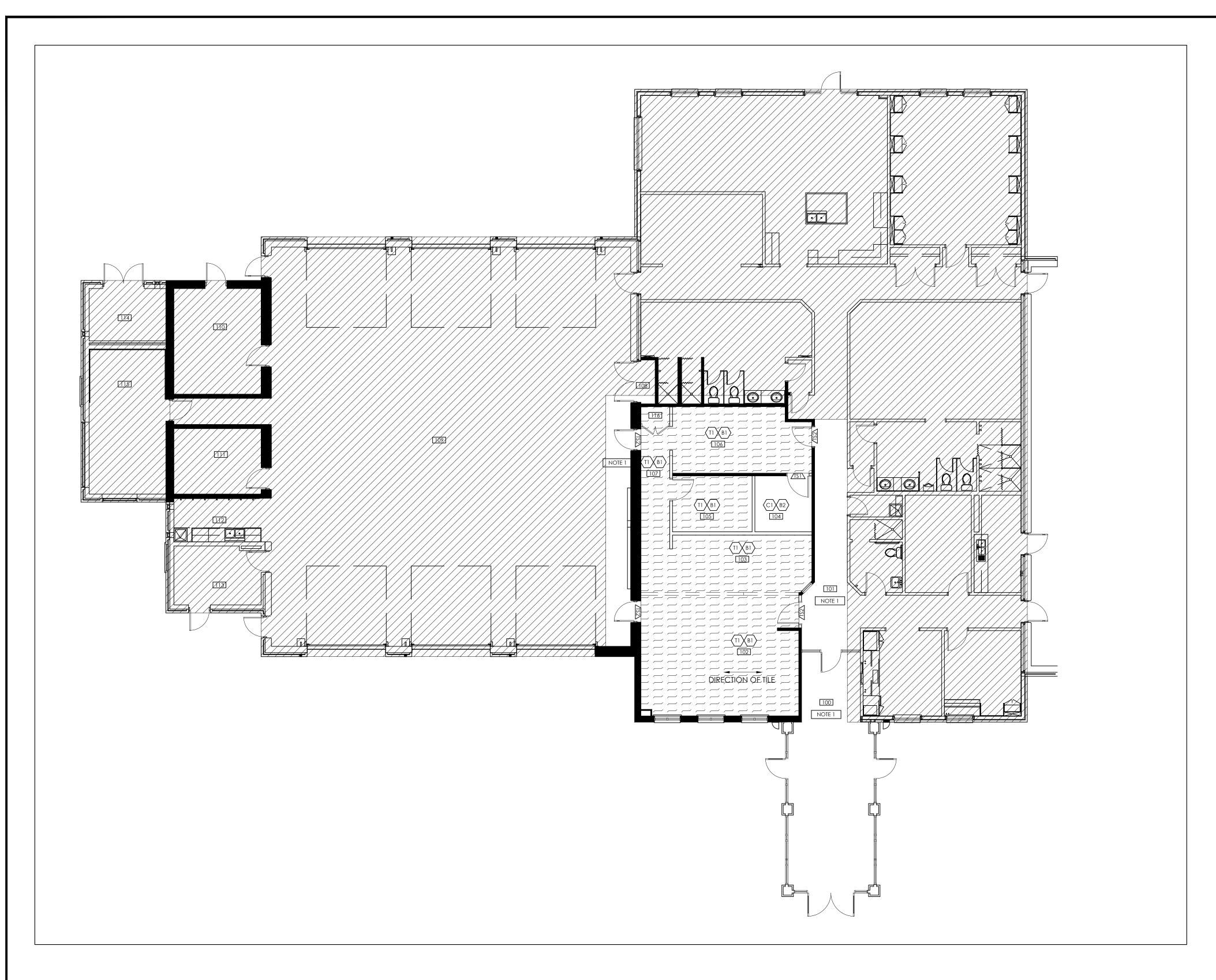
DRAWING	NOTES
Symbol	DESCRIPTION
NOTE 1	REFER TO DRAWING #I-100.1 FOR REFLECTED CEILING DEMOLITION PLAN

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

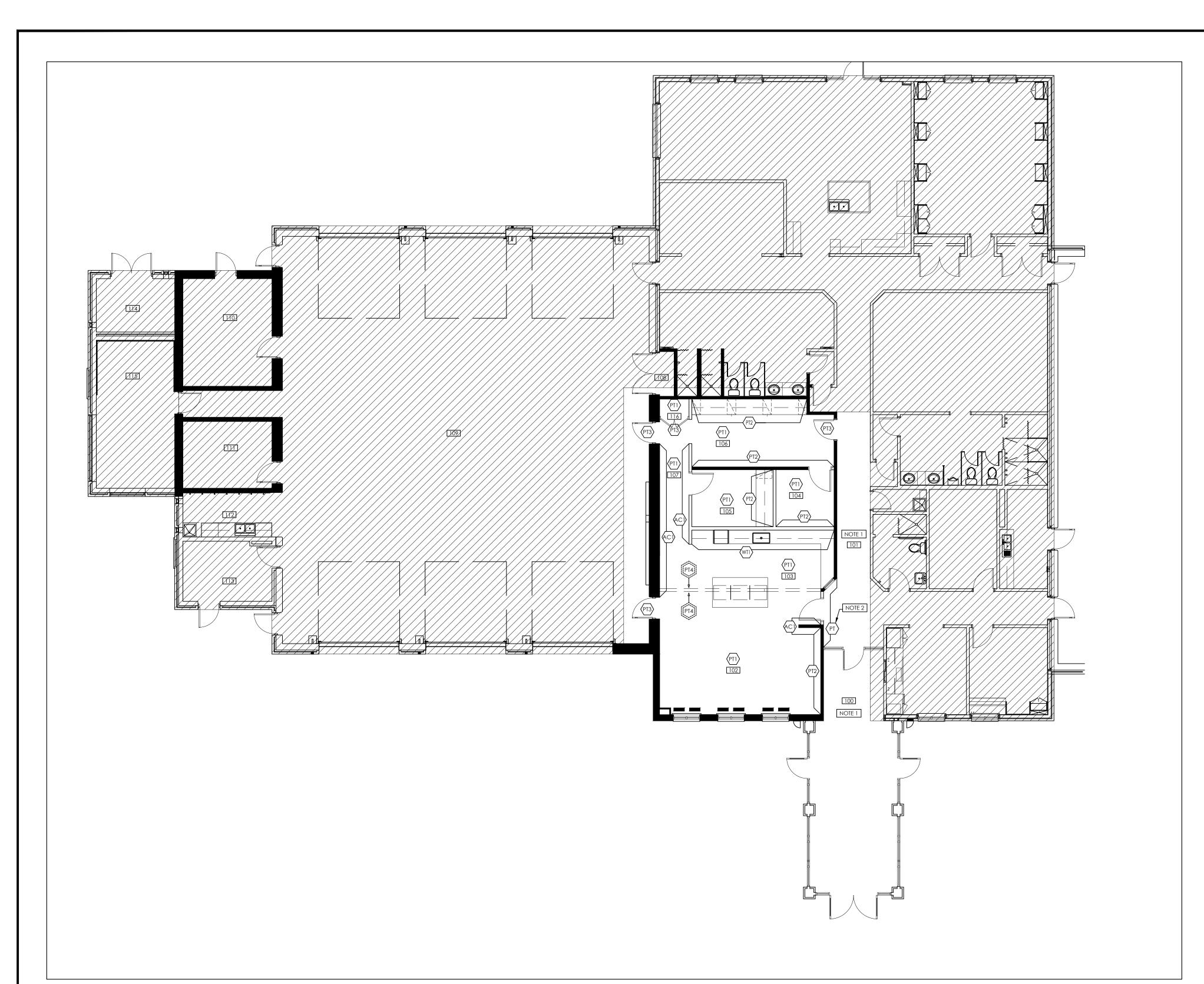




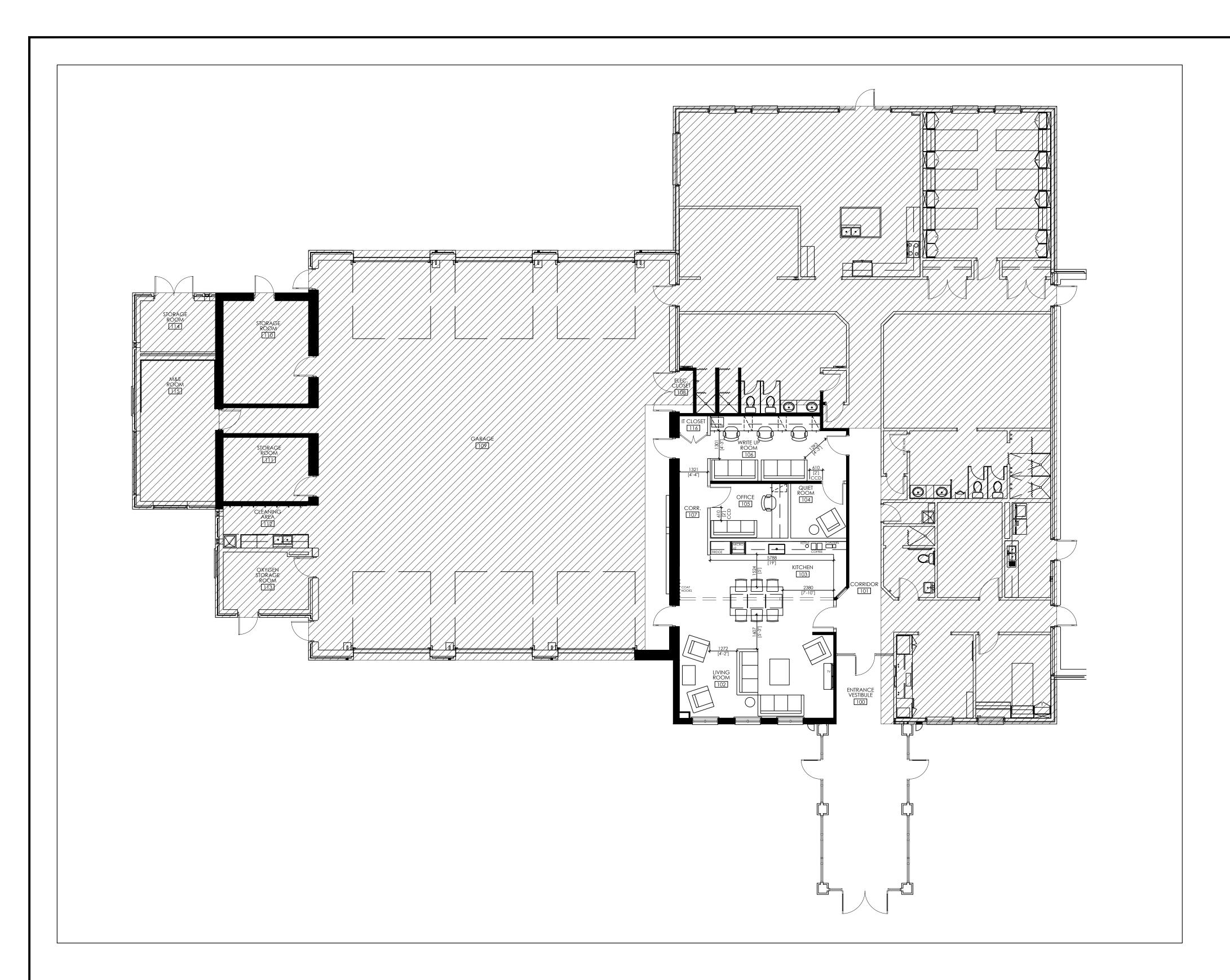
YMBOL	DESCRIPTION				
Φ	WALL MOUNTED DUPLEX RECEPTACLE				
¢ ××	WALL MOUNTED DUPLEX RECEPTACLE AT XX MM ABOVE FINISHED FLOOR				
$\Phi_{^{\text{NRB}}}$	WALL MOUNTED COMBINATION DUPLEX / USB RECEPTACLE				
#	WALL MOUNTED QUAD RECEPTACLE (TO MATCH EXISTING HEIGHT OR 305 MM AFF)				
Xxx	WALL MOUNTED TELEPHONE OUTLET AT 864 MM ABOVE FINISHED FLOOR				
V	WALL MOUNTED COMBINATION VOICE / DATA OUTLET				
×××	WALL MOUNTED COMBINATION VOICE/DATA OUTLET AT XX MM ABOVE FINISHED FLOOR		\square		
4	TV CABLE OUTLET				ETT DESIGN
+⊗	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		U x T e	brid I. 9	ouglas Road ge, ON. L9P 1S9 05 . 852 . 4617 ettdesign.ca
ES	ELECTRIC STRIKE REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION		SENERAL NOT	Ē	
CR	CARD READER REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION	© T⊦	HIS DRAWING IS T	HE PROPI	ERTY OF BENNETT DESIGN ASSOCIATES INC. AND
DC REX	CONCEALED DOOR CONTACT REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION REQUEST TO EXIT MOTION DETECTOR REFER TO ENGINEERING DRAWINGS FOR COMPLETE SPECIFICATION	Ø A A Pf	LL MEASUREMEN	ts must e Ies to bei 1 the Wo	
GFI	GROUND FAULT INTERRUPTER				
E	DENOTES EXISTING ELECTRICAL EQUIPMENT TO REMAIN				
Ν	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.				
	ENT NOTES				
(MBOL					
E1	PRINTER SUPPLIED & INSTALLED BY YR FRIDGE				
E2	MAYTAG MFF2558FEZ, SIZE: 35-5/8"W X 70-1/8"H X 35-1/2"D SUPPLIED & INSTALLED BY YR MICROWAVE				
E3	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			5	A
E5	COFFEE MAKER SUPPLIED & INSTALLED BY YR				V
E6	TOASTER OVEN SUPPLIED & INSTALLED BY YR		Vó	7	Region
E7	TOASTER SUPPLIED & INSTALLED BY YR		LU		1.5.011
E8	55" TV SUPPLIED & INSTALLED BY YR				
	, G NOTES				
	DESCRIPTION				
_	LOCATION OF NEW FIRE BELL TO BE DETERMINED. REFER TO	01	04MAY21	SJB	REVISED PER CLIENT
NOTE 1	ENGINEERING DRAWINGS FOR DETAILS	no. REV	date /ISIONS	by	description
NOTE 2	LOCATION OF NEW TELEPHONE OUTLET TO BE DETERMINED BY REGION				
NOTE 3	REFER TO ENGINEERING DRAWINGS FOR IT CLOSET REQUIREMENTS				
NOTE 4		06	07MAY21	SJB	RE-ISSUED FOR TENDER
	REFER TO ENGINEERING DRAWINGS	05	16FEB21	SJB	ISSUED FOR PERMIT/TENDER
NOTE 5	ALL EXISTING CARD READERS/ELECTRIC STRIKES TO BE RE-USED WHERE POSSIBLE. CONTRACTOR TO PROVIDE NEW WHERE RE-USE IS NOT POSSIBLE	04	09DEC20	SJB	ISSUED FOR 90% REVIEW
	1	00			
		03	07DEC20	JF/SJE	ISSUED FOR 90% REVIEW
	EFER TO SPECIFICATION	03	07DEC20 22SEPT20		
С	CONTRACT #T-21-28 FOR			SJB	ISSUED TO ENGINEERS
С		02	22SEPT20 21SEPT20 date	SJB	ISSUED TO ENGINEERS RE-ISSUED FOR 60% REVIEW
С	CONTRACT #T-21-28 FOR	02 01 no. ISSL Projec P 1 L drawi	22SEPT20 21SEPT20 date JED VED VARAMEI 11 RAC 4J 8X9	SJB SJB by RE DIC S CO F	SSUED TO ENGINEERS RE-ISSUED FOR 60% REVIEW ISSUED FOR CLIENT REVIEW description
С	CONTRACT #T-21-28 FOR	02 01 no. ISSL Projec P 1 L drawi	22SEPT20 21SEPT20 date JED VED VARAMEI 11 RAC 4J 8X9	SJB SJB by by RE DIC S CO F	ISSUED TO ENGINEERS RE-ISSUED FOR 60% REVIEW ISSUED FOR CLIENT REVIEW description
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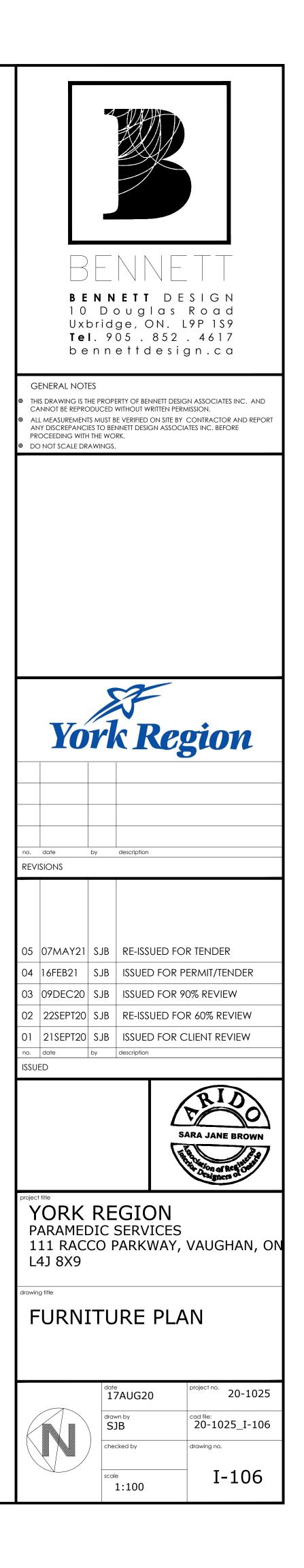


Symbol	DESCRIPTION	
	DENOTES EXISTING PARTITION TO REMAIN	
	DENOTES NEW PARTITION	
	PORCELAIN TILE: T1 MANUFACTURER: STONE TILE	
	SERIES: SOLID COLOUR: ASH NATURAL SIZE: 300mm X 600mm	
	GROUT SPEC: MAPEI, 107 IRON INSTALL METHOD: 1/4" RUNNING BOND, 25% OVERLAP SUPPLIER/TEL: NANCY BRENNER 416-515-9000 EXT, 232	
	NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT	
	CARPET TILE: C1 MANUFACTURER: SHAW COMMERCIAL	BENNEI I
Cl	SERIES: SURROUND 5T125 COLOUR: LIMESTONE 17530 SIZE: 24" X 24"	BENNETT DESIGN
	INSTALL METHOD: MONOLITHIC OR EQUIVALENT	10 Douglas Road Uxbridge, ON. L9P 1S9
	AREA NOT IN CONTRACT (NIC)	Tel . 905 . 852 . 4617 bennettdesign.ca
ASE TYPE	LEGEND	
Symbol	DESCRIPTION	GENERAL NOTESTHIS DRAWING IS THE PROPERTY OF BENNETT DESIGN ASSOCIATES INC. AND
	PORCELAIN TILE WALL BASE: B1 MANUFACTURER: STONE TILE	 CANNOT BE REPRODUCED WITHOUT WRITTEN PERMISSION. ALL MEASUREMENTS MUST BE VERIFIED ON SITE BY CONTRACTOR AND REPORT ANY DISCREPANCIES TO BENNETT DESIGN ASSOCIATES INC. BEFORE
BI	SERIES: SOLID COLOUR: ASH NATURAL SIZE: 102mm (4'')	 PROCEEDING WITH THE WORK. DO NOT SCALE DRAWINGS.
	grout spec: mapei, 107 iron Condition: porcelain tile	
	NOTE: C/W ZINC TERMINATING STRIP AT EXPOSED EDGES OR EQUIVALENT	
~	VINYL WALL BASE: B2 MANUFACTURER: TARKETT/JOHNSONITE SERIES: TRADITIONAL / COVE BASE	
B2	COLOUR: 20 CHARCOAL SIZE: 4" CONDITION: CARPET	
	OR EQUIVALENT	
Symbol		
<u>TS1</u>	COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CARPET OR EQUIVALENT	
	NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANT'S AND/OR REGION'S APPROVAL	
<u>TS2</u>	TRANSITION STRIP: TS2 COLOUR: STAINLESS STEEL CONDITION: PORCELAIN TILE TO CONCRETE	
	OR EQUIVALENT NOTE: THE CONTRACTOR SHALL PROVIDE SPEC FOR CONSULTANT'S AND/OR REGION'S APPROVAL	SZ -
DTE: THE INSTALLER	SHALL VERIFY TRANSITION WITH CONSULTANT'S AND/OR REGION	
RAWING	NOTES	York Region
Symbol	DESCRIPTION	
NOTE 1	EXISTING FLOOR FINISHES TO REMAIN	
	CONTRACTOR SHALL ENSURE EXISTING SLAB IS FULLY CLEANED,	
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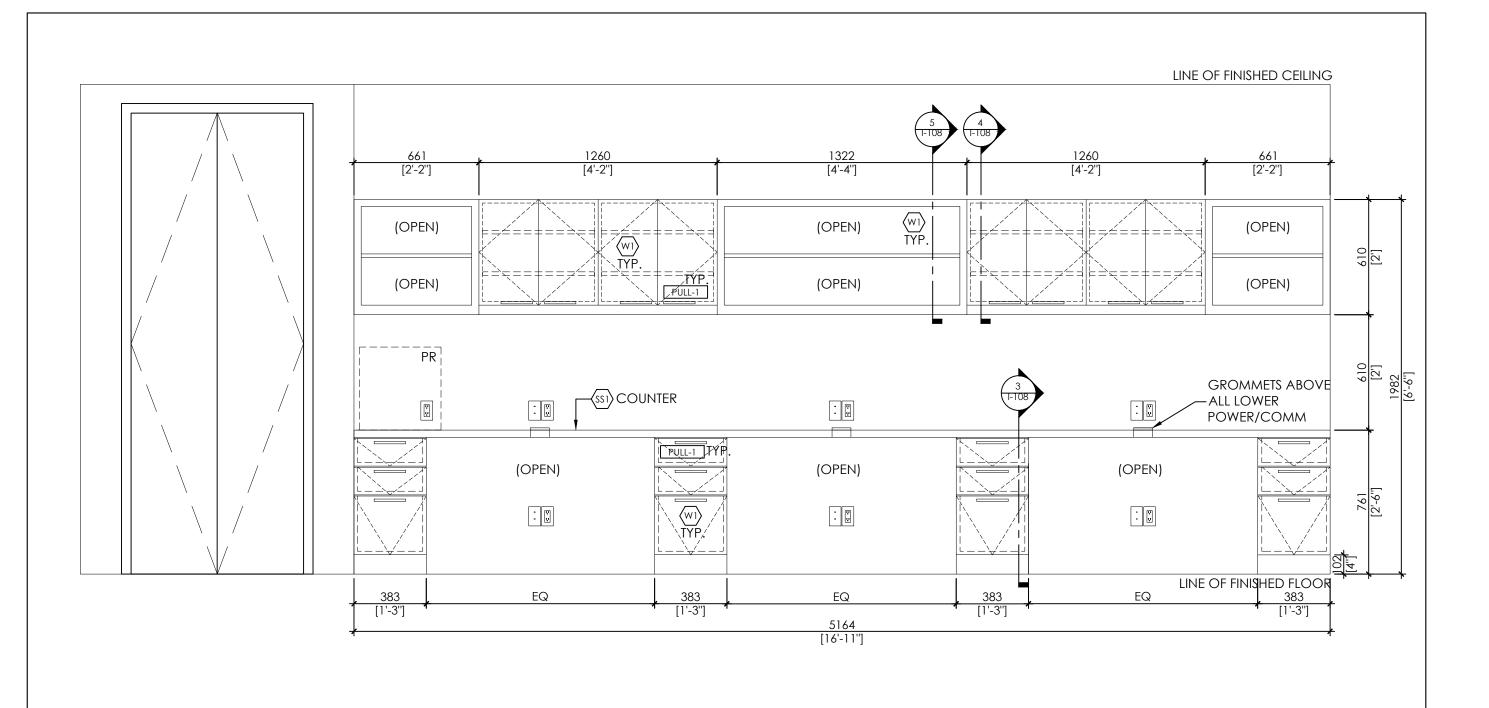


WALL FINIS							
STMBOL	DESCRIPTION DENOTES EXISTING PARTITION TO REMAIN				× X	\mathcal{N}	
	DENOTES NEW PARTITION					\leq	
(PTI)	FIELD PAINT: PT1 (WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: EGGSHELL OR EQUIVALENT						'
(PT2)	ACCENT PAINT: PT2 (BLUE) MANUFACTURER: SHERWIN 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		B E 1 0 U x T e	D D bric	NETT ougl lge, O 905.8	D E as N. L 352	SIGN Road 9P1S9 . 4617 gn.ca
(PT4)	CEILING PAINT (GWB CEILING UNLESS NOTED OTHERWISE): PT4 (WHITE) MANUFACTURER: BENJAMIN MOORE COLOUR: SIMPLY WHITE OC-117 FINISH: FLAT OR EQUIVALENT	© T⊦	ENERAL NO	T ES THE PRO	PERTY OF BENN	iett desig	GN ASSOCIATES INC. AND
(VT)	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	A		ts must ies to b h the w	BE VERIFIED OI ENNETT DESIGN ORK.	N SITE BY	AISSION. CONTRACTOR AND REPOR ATES INC. BEFORE
(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				5	-	
NOTE 2	PAINT COLOUR TO MATCH EXISTING FINISH ON SURROUNDING PARTITIONS		Yo	11	k R	e	gion
NOTE 3	CONTRACTOR TO SUPPLY AND INSTALL 2" WIDE, BEVELED, STAINLESS STEEL CORNER GUARDS ON ALL CORNERS THRU-OUT						
С	EFER TO SPECIFICATION ONTRACT #T-21-28 FOR DDITIONAL INFORMATION	01 no. REV	04MAY21 date ISIONS	SJB by	description	D PER (CLIENT
		05 04 03 02 01 no. ISSL	07MAY21 16FEB21 09DEC20 22SEPT20 21SEPT20 date	SJB SJB SJB	ISSUED ISSUED RE-ISSU	FOR P FOR 9 ED FO	R TENDER ERMIT/TENDER 0% REVIEW R 60% REVIEW CLIENT REVIEW
						S THE	ARA JANE BROWN
		P 1 L	ORK	DIC CO	SERVI PARKW	CES /AY,	VAUGHAN, C
		\vdash			TAUG20		project no. 20-1025
		K			awn by		cad file: 20-1025_I-105 drawing no.
				/	ale 1:100		I-105





700 [2]-4"] 5164 [16'-11''] WRITE UP ROOM [106] $\frac{2}{1-108}$



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

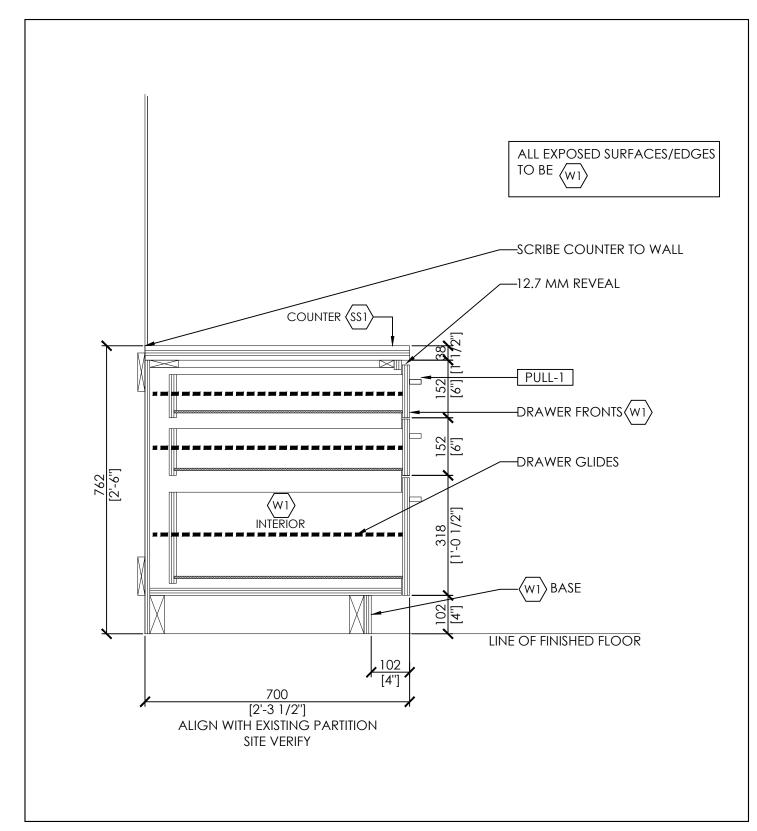
ELEVATION: WRITE UP ROOM

[1'-3'']

559 |'-10"]

610 [2[']]

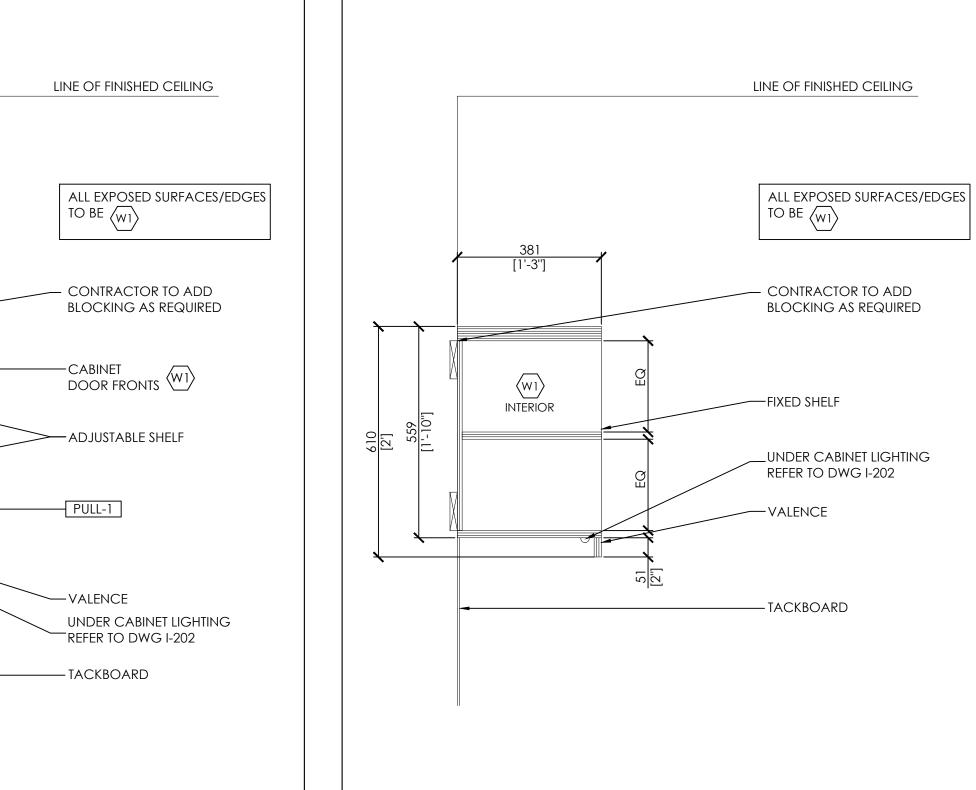
INTERIOR



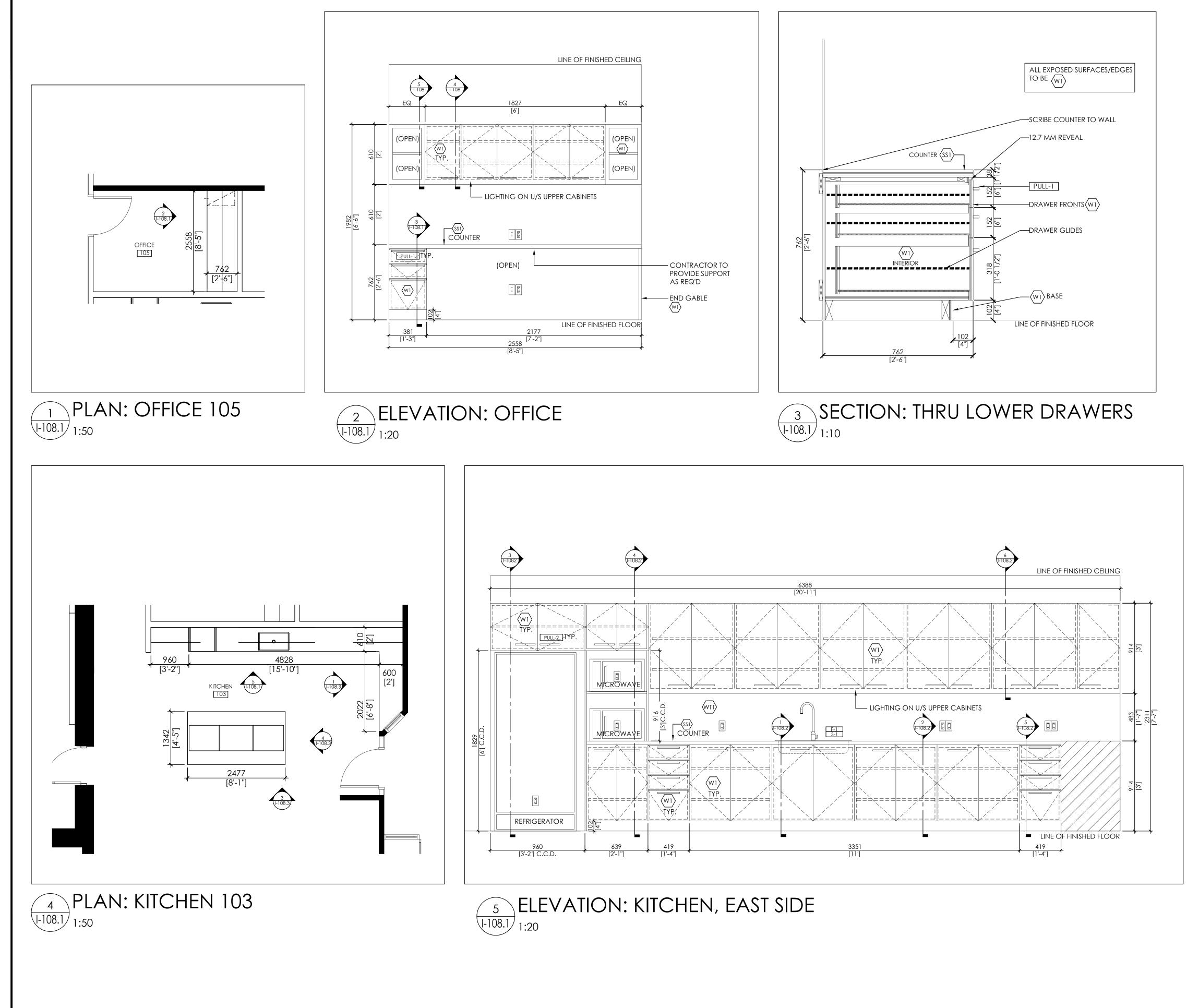
3 SECTION: THRU LOWER DRAWERS



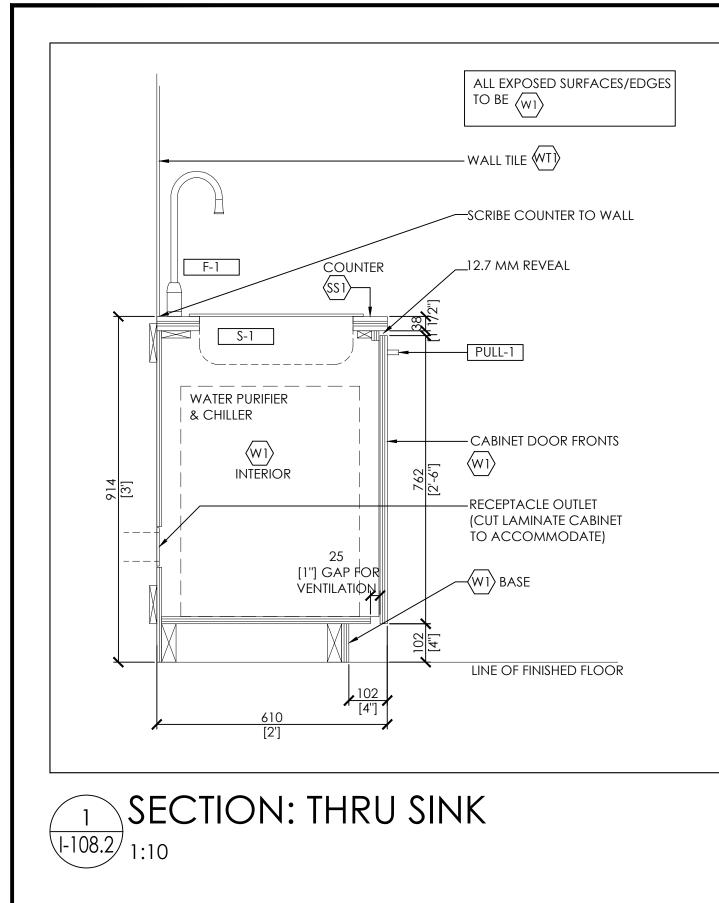
-VALENCE UNDER CABINET LIGHTING REFER TO DWG I-202 — TACKBOARD 5 SECTION: THRU OPEN UPPER CABINET

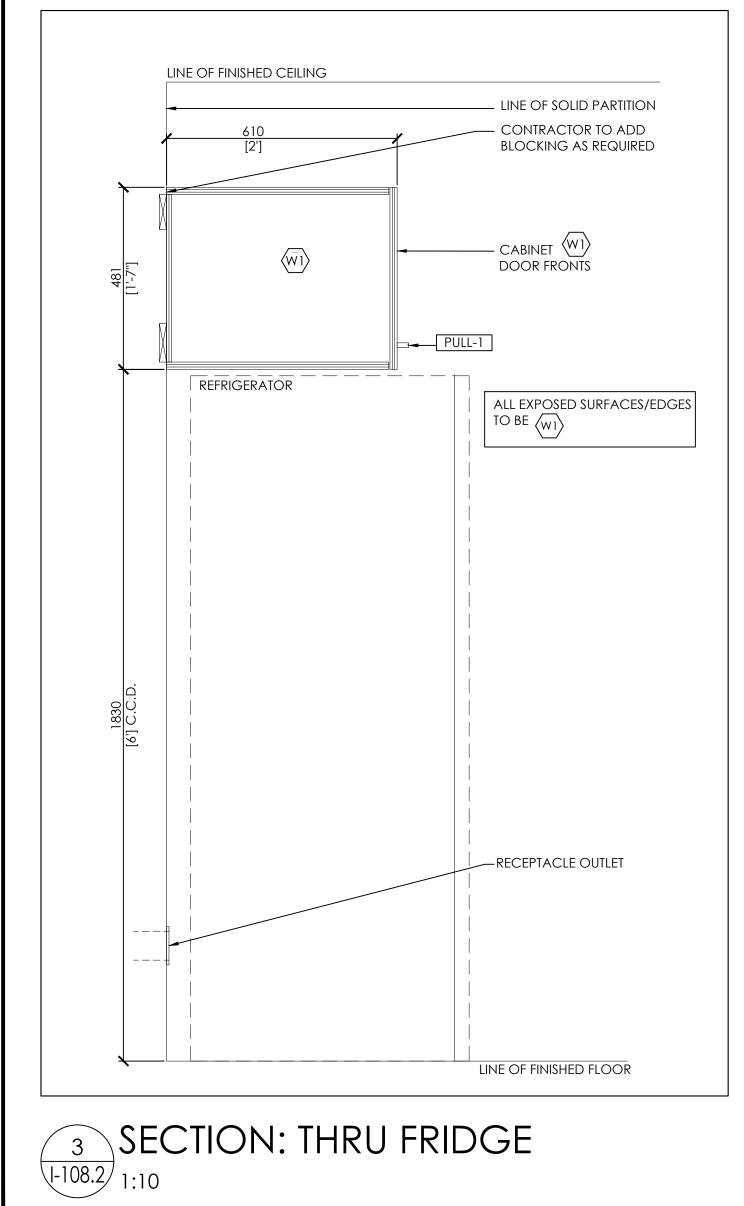


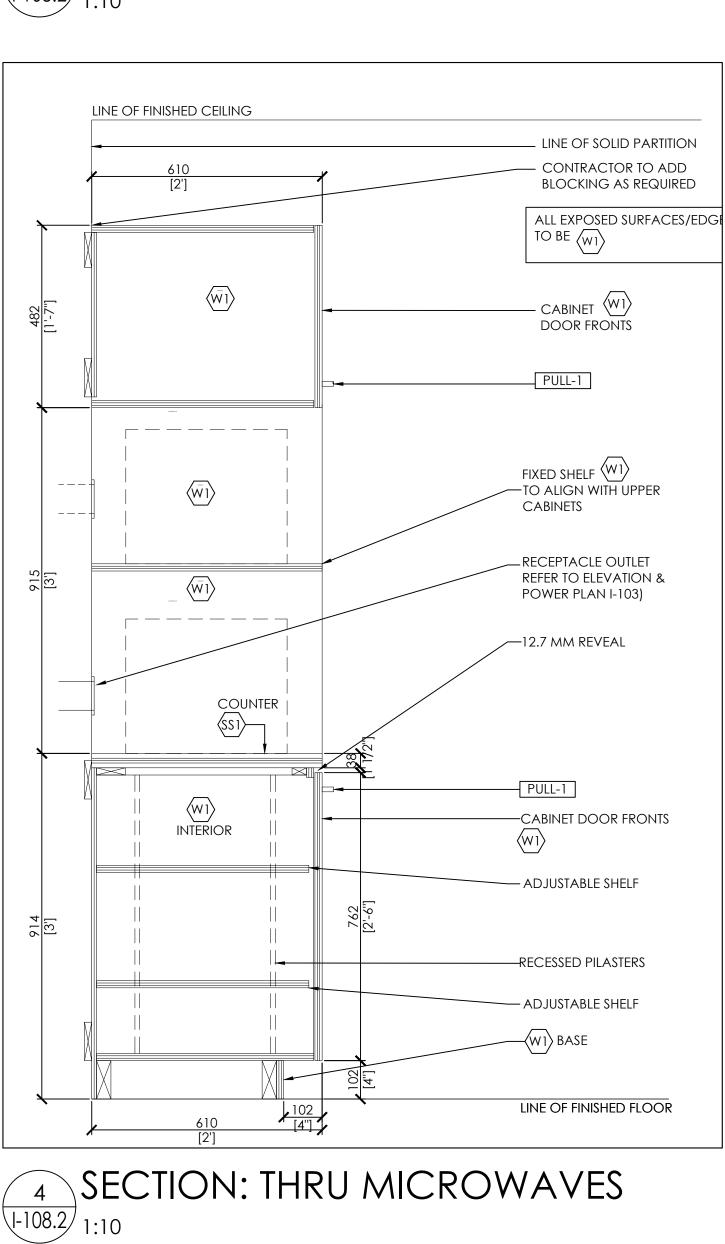
(w1) (551)	DESCRIPTION ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED	
	COLOUR: #2141 BLIZZARD OR EQUIVALENT	
	DRK HARDWARE LEGEND	
	HINGES (ALL CUPBOARDS) 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	BENNETT DESIGN 10 Douglas Road Uxbridge, ON. L9P 1S9 Tel. 905.852.4617
PULL-1	DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT	bennettdesign.ca GENERAL NOTES
<u>aecha</u> symbol	NICAL SPECIFICATIONS LEG	 THIS DRAWING IS THE PROPERTY OF BENNETT DESIGN ASSOCIATES INC. AND CANNOT BE REPRODUCED WITHOUT WRITTEN PERMISSION. ALL MEASUREMENTS MUST BE VERIFIED ON SITE BY CONTRACTOR AND REPORT ANY DISCREPANCIES TO BENNETT DESIGN ASSOCIATES INC. BEFORE PROCEEDING WITH THE WORK.
<u>S-1</u>	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" TAILPIECI 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, F 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	
CC	ER TO SPECIFICATION NTRACT #T-21-28 FOR DITIONAL INFORMATION	York Region
		01 04MAY21 SJB REVISED PER CLIENT no. date by description REVISIONS
		0607MAY21SJBRE-ISSUED FOR TENDER0516FEB21SJBISSUED FOR PERMIT/TENDER0409DEC20SJBISSUED FOR 90% REVIEW0307DEC20JF/SJBISSUED TO ENGINEERS0222SEPT20SJBRE-ISSUED FOR 60% REVIEW0121SEPT20SJBISSUED FOR CLIENT REVIEWno.datebydescriptionISSUEDSUEDSUEDdescription
		project title
		YORK REGION PARAMEDIC SERVICES 111 RACCO PARKWAY, VAUGHAN, O L4J 8X9
		MILLWORK DETAILS
		date 17AUG20 drawn by SJB cad file: 20-1025_I-108

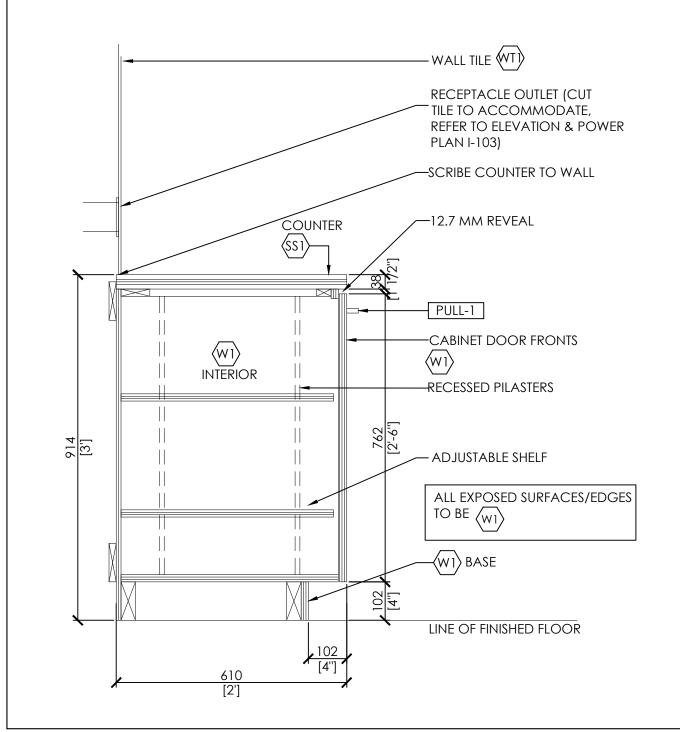


	RK FINISHES LEGEND DESCRIPTION	
(W1)	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT	
<u><551</u> >	SOLID SURFACE #1 MANUFACTURER: CAESARSTONE SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT	
	RK HARDWARE LEGEND	
	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	BENNETT DESIGN 10 Douglas Road
PULL-1	GLIDES (ALL DRAWERS) STANDARD FULL EXTENSION DRAWER SLIDE DOOR PULL #1 MANUFACTURER: RICHELIEU MODEL: 'D' PULL SIZE: 185mm ENVIOL GTANU FOR CITEL	Uxbridge, ON. L9P 1S9 Tel . 905 . 852 . 4617 bennettdesign.ca
	NICAL SPECIFICATIONS LEG	GENERAL NOTES THIS DRAWING IS THE PROPERTY OF BENNETT DESIGN ASSOCIATES INC. AND CANNOT BE REPRODUCED WITHOUT WRITTEN PERMISSION.
	DESCRIPTION	 ALL MEASUREMENTS MUST BE VERIFIED ON SITE BY CONTRACTOR AND REPORT ANY DISCREPANCIES TO BENNETT DESIGN ASSOCIATES INC. BEFORE PROCEEDING WITH THE WORK. DO NOT SCALE DRAWINGS.
<u><u>S-1</u></u>	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	
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	DITIONAL INFORMATION	York Region
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		no. date by description REVISIONS
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		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
		ISSUED
		project fille
		PARAMEDIC SERVICES 111 RACCO PARKWAY, VAUGHAN, O L4J 8X9
		drawing title
		drawing title MILLWORK DETAILS



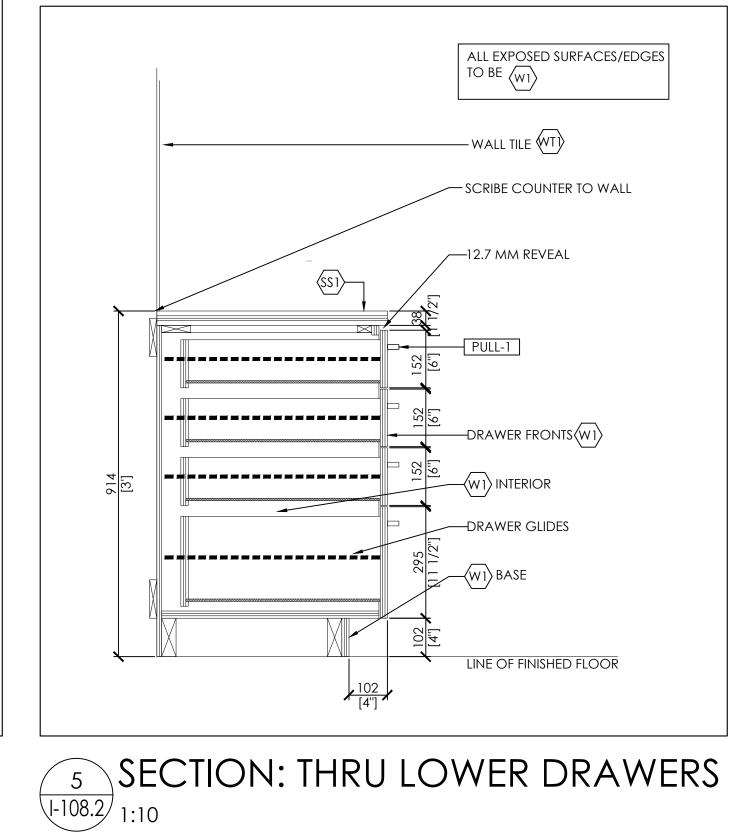


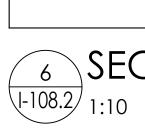




2 SECTION: THRU LOWER CABINET 1:10



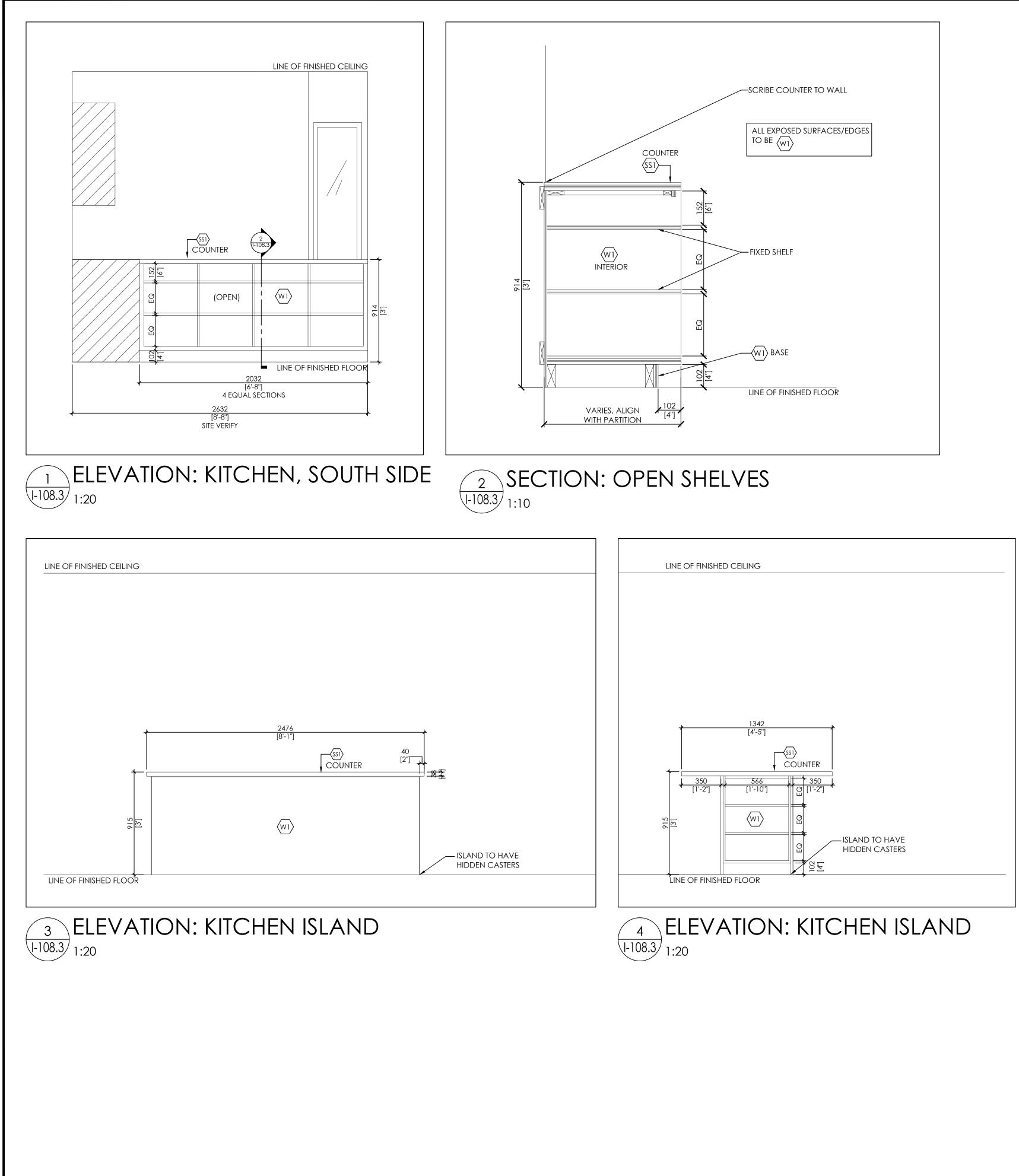




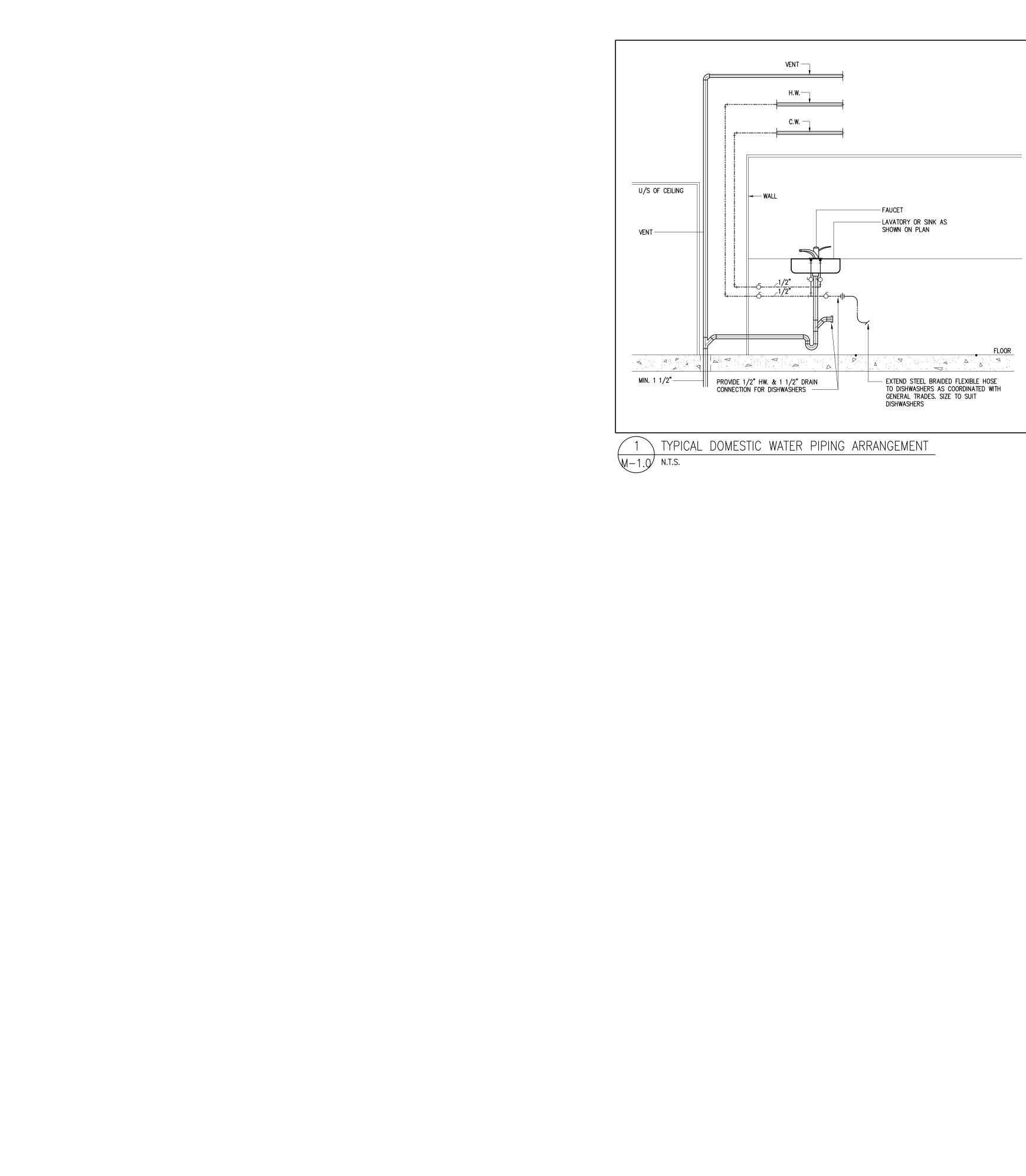
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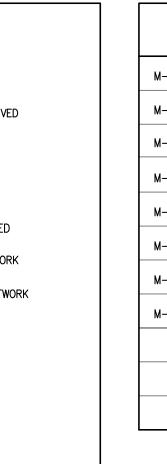
		RK FINISHES LEGEND		Г			
SYM (w	_	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS					
	_	OR EQUIVALENT SOLID SURFACE #1 MANUFACTURER: CAESARSTONE					
<u> </u>	<u>'</u>	SERIES: POLISHED COLOUR: #2141 BLIZZARD OR EQUIVALENT					
MILL SYM		RK HARDWARE LEGEND 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 DOOR PULL #1 MANUFACTURER: RICHELIEU		10 Uxk Te	D orid I.9	IETT DE ouglas ge, ON. 1 05.852 ettdesig	SIGN Road _9P1S9 . 4617
PULI	<u>L-1</u>	MODEL: 'D' PULL SIZE: 185mm FINISH: STAINLESS STEEL OR EQUIVALENT	G	ENERAL NOTI			-
		NICAL SPECIFICATIONS LEGEN	CA AL	NNOT BE REPRC	duced S must	WITHOUT WRITTEN PER	CONTRACTOR AND REPORT
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	CO	ER TO SPECIFICATION NTRACT #T-21-28 FOR DITIONAL INFORMATION		Yó	r	k Reg	gion
			no.	04MAY21 date SIONS	SJB	REVISED PER description	CLIENT
381 [1'-3"]	L	INE OF FINISHED CEILING	05	07MAY21 16FEB21 09DEC20 07DEC20	SJB SJB	RE-ISSUED FOR F ISSUED FOR F ISSUED FOR 9 B ISSUED TO EN	PERMIT/TENDER 20% REVIEW
		- CONTRACTOR TO ADD BLOCKING AS REQUIRED	02 01	22SEPT20 21SEPT20			R 60% REVIEW
		-CABINET DOOR FRONTS WI - ADJUSTABLE SHELF ALL EXPOSED SURFACES/EDGES TO BE W1	no. ISSU	ED	by	description	ARA JANE BROWN
		- PULL-1	Υ Ρ. 1	ORK	DIC	EGION SERVICES PARKWAY,	VAUGHAN, ON
		– VALENCE UNDER CABINET LIGHTING TREFER TO DWG I-202 – WALL TILE (WT)		-	VO	RK DET	AILS
				\bigwedge		7AUG20	project no. 20-1025
CTION: THRU UPF	Σ	RCARINIET	K		S	iwn by JB ecked by	cad file: 20-1025_I-108 drawing no.
	L				sco	ale 1:100	I-108.2



(W1)	ALL CABINET INTERIORS AND EXTERIORS INCL. DIVIDERS, RAILS, EXPOSED PANELS, TOE KICKS, DRAWERS AND DOORS TO BE 20mm BIRCH PANELS OR EQUIVALENT					
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<u>aechai</u> symbol	NICAL SPECIFICATIONS LEGE		ANNOT BE REPRO	duced is must e es to be	WITHOUT WRITTEN PER <i>I</i> BE VERIFIED ON SITE BY NNETT DESIGN ASSOCI.	CONTRACTOR AND REPORT
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		01 no. REV	04MAY21 date ISIONS	SJB	description	CLIENT
		06	07MAY21	SJB	RE-ISSUED FC	PR TENDER
		05	16FEB21	SJB	ISSUED FOR F	PERMIT/TENDER
			09DEC20	SJB	ISSUED FOR 9	
		03	07DEC20 22SEPT20		RE-ISSUED FO	R 60% REVIEW
		01	21SEPT20			
		no. ISSU	date ED	by	description	
		projec				ARA JANE BROWN
		P. 1	ARAMEI 11 RAC 4J 8X9	DIC	GION SERVICES PARKWAY,	VAUGHAN, O
			1ILLV	VO	RK DET	AILS
				drav S.	e 7AUG20 wn by JB	project no. 20-1025 cad file: 20-1025_I-108 drawing no.



EXISTING MECHANICAL SERVICE/EQUIPMENT TO BE REMOVED OR RELOCATED. REFER TO PLAN DRAWINGS FOR FURTHER DETAIL. EXISTING RIGID DUCTWORK 1 EXISTING ROUND RIGID DUCTWORK EXISTING SERVICE TO BE CAPPED ______ ____ NEW ACOUSTICALLY LINED DUCTWORK NEW THERMALLY INSULATED DUCTWORK NEW ROUND RIGID DUCTWORK <u>ب____</u> NEW FLEXIBLE DUCTWORK NEW BALANCING DAMPER FD NEW FIRE DAMPER EXISTING SUPPLY AIR DIFFUSER TO E CFM CFM CFM CFM NEW SUPPLY AIR DIFFUSER. STANDARD \square GRILLE. R - [] GRILLE. 'B' ____ NOTED. INSTALL SOUND BAFFLE IN PERIMETER AP $(T)^{R}$ \bigcirc ^N \bigcirc FE WALL MOUNTED FIRE EXTINGUISHER ____DCW_____ DOMESTIC HOT WATER RECIRC -----DHWR----— — V— — — — SANITARY VENT C.O.I −Ţ− _____ CD _____ SHUT OFF VALVE _____ CDS _____ _____ CDR _____ CHILLED WATER SUPPLY CHILLED WATER RETURN ——— FSP ——— N _ ◀` 🖸 F.D. FHC N \$



REMAIN. BALANCE TO CFM NOTED. RELOCATED SUPPLY AIR DIFFUSER. BALANCE TO CFM NOTED.

MECHANICAL LEGEND

BALANCE TO CFM NOTED. NEW DIFFUSER TO MATCH BASE BUILDING

EXISTING EGG CRATE RETURN AIR

RELOCATED EGG CRATE RETURN AIR

NEW EGG CRATE RETURN AIR GRILLE.

NEW EXHAUST GRILLE BALANCE TO CFM

NEW 12"x12" AIR TRANSFER DUCT UNLESS NOTED OTHERWISE

CONNECT TO EXISTING SERVICE

NEW ACCESS DOOR IN DRYWALL CEILING

EXISTING THERMOSTAT TO REMAIN

EXISTING RELOCATED THERMOSTAT

NEW THERMOSTAT

DOMESTIC COLD WATER

DOMESTIC HOT WATER

SANITARY DRAIN WITH CLEAN OUT

RUNNING TRAP

CONDENSATE DRAIN

MODULATING CONTROL VALVE

CONDENSER WATER SUPPLY

CONDENSER WATER RETURN

NEW FIRE STANDPIPE WATER SUPPLY

SPRINKLER MAIN

EXISTING SPRINKLER HEAD TO BE REMOVED

EXISTING SPRINKLER HEAD TO REMAIN

NEW PENDANT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING

NEW UPRIGHT SPRINKLER HEAD TO MATCH EXISTING BASE BUILDING

NEW CONCEALED TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC. PROVIDE CUSTOM COLOUR TO SUIT CEILING FINISH WHERE NOTED.

NEW SIDEWALL TYPE SPRINKLER HEAD TO MATCH BASE BLDG. SPEC.

FLOOR DRAIN

NEW FIRE HOSE CABINET

NEW EXHAUST FAN SWITCH/SPEED CONTROLLER

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

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

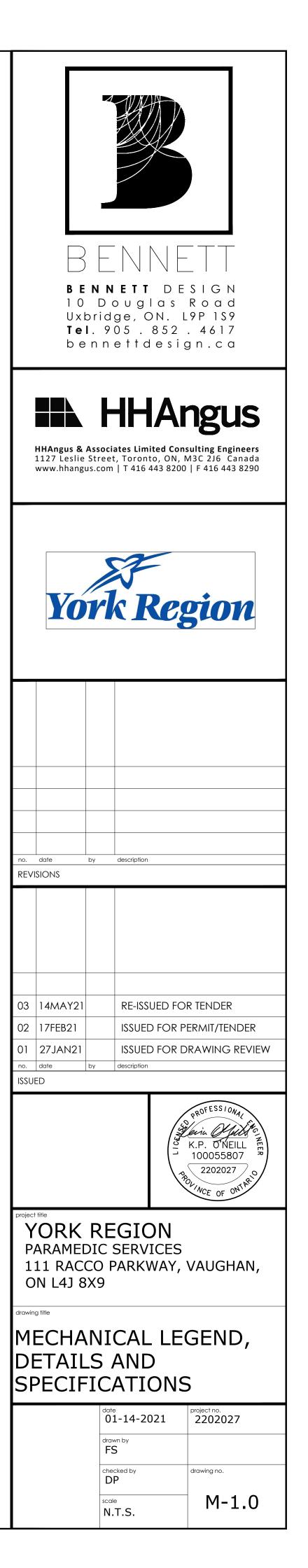
<u>TYPE 'B' RETURN GRILLE</u>

- E.H PRICE TYPE 80 CORE ONLY FOR LAY-IN APPLICATION, ALUMINIUM EGGCRATE 1/2"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.

<u>DUCT SIZING</u>

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 SPE	CIFICATIONS	CONTRACT	#T-21-28
			11 21 20
FOR ADDITIONA	l informati	ION.	



MECHANICAL GENERAL REQUIREMENTS 20 01 01	8.1.2. ROUTE PIPES, DUCTS, CONDUITS AND OTHER SERVICES TO AVOID INTERFERENCE WITH EXISTING INSTALLATION.
 GENERAL REQUIREMENTS 1.1. EXAMINATION 1.1.1. EXAMINE ANY EXISTING BUILDINGS, LOCAL CONDITIONS, BUILDING SITE, 	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
SPECIFICATIONS, AND DRAWINGS AND REPORT ANY CONDITION, DEFECT OR	SUIT NEW INSTALLATION WORK.
INTERFERENCE THAT WOULD PREVENT EXECUTION OF THE WORK.	8.1.4. REMOVE EXISTING PLUMBING FIXTURES, LIGHTING FIXTURES, PIPING, DUCTWORK,
1.1.2. NO ALLOWANCE WILL BE MADE FOR ANY EXPENSE INCURRED THROUGH FAILURE	WIRING, AND EQUIPMENT TO SUIT NEW CONSTRUCTION. CUT BACK AND CAP
TO MAKE THESE EXAMINATIONS OF THE SITE AND THE DOCUMENTS PRIOR TO	DRAIN, VENT AND WATER OUTLETS, CONDUITS AND ELECTRICAL OUTLETS, NOT
TENDER OR ON ACCOUNT OF ANY CONDITIONS ON SITE OR ANY GROWTH OR	BEING USED.
ITEM EXISTING THERE WHICH WAS VISIBLE OR KNOWN TO EXIST AT TIME OF	8.1.5. PLUMBING FIXTURES, PIPING, DUCTWORK, CONDUIT AND WIRING SHOWN TO BE
TENDER.	REMOVED AND NOT SHOWN RELOCATED, TO BECOME PROPERTY OF CONTRACTOR
1.1.3. EXAMINE WORK OF OTHER DIVISIONS BEFORE COMMENCING THIS WORK, AND REPORT ANY DEFECT OR INTERFERENCE.	AND TO BE TAKEN FROM SITE. 8.1.6. LIGHTING FIXTURES SHOWN TO BE REMOVED WILL REMAIN OWNER'S PROPERTY
 1.2. STANDARD OF MATERIAL AND EQUIPMENT 1.2.1. MATERIALS AND EQUIPMENT: 1.2.1.A. OF CANADIAN MANUFACTURE WHERE OBTAINABLE, 	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
 1.2.1.B. STANDARD PRODUCTS OF APPROVED MANUFACTURE. 1.2.1.C. LABELLED OR LISTED AS REQUIRED BY CODE AND/OR INSPECTION AUTHORITIES, 	SYSTEMS, MAKE TEMPORARY CONNECTIONS TO EXISTING SERVICES IN THESE AREAS. RECONNECT TO PERMANENT SERVICES, AT LATER DATE, WHEN NEW DISTRIBUTION SYSTEMS ARE AVAILABLE.
1.2.1.D. IN COMPLIANCE WITH STANDARDS AND REGULATIONS WITH RESPECT TO;	9. RECORD DRAWINGS
1.2.1.D.A. DESIGN,	9.1. SITE RECORDS
1.2.1.D.B. PERFORMANCE CHARACTERISTICS, AND	9.1.1. A SET OF DESIGN DRAWINGS IN AUTOCAD 2008 ON CD OR DVD ROM WILL BE
1.2.1.D.C. METHODS OF CONSTRUCTION AND INSTALLATION.	PROVIDED BY THE CONSULTANT. MAKE SETS P
1.2.1.E. IDENTICAL UNITS OF EQUIPMENT TO BE OF SAME MANUFACTURE.	9.1.2. OF WHITE PRINTS FOR EACH PHASE OF WORK, AND AS WORK PROGRESSES
1.2.1.F. IDENTICAL COMPONENT PARTS OF SAME MANUFACTURE IN SIMILAR UNITS	AND CHANGES OCCUR MARK WHITE PRINTS IN COLOURED INKS TO SHOW
OF EQUIPMENT, BUT VARIOUS COMPONENT PARTS OF EACH UNIT NEED	REVISIONS. DIMENSION LOCATIONS OF DRAINS, PIPES, DUCTWORK, CONDUIT,
NOT BE FROM ONE MANUFACTURER.	MANHOLES, FOUNDATIONS AND SIMILAR BURIED ITEMS WITHIN THE BUILDING,
1.2.2. MATERIALS AND EQUIPMENT ARE DESCRIBED TO ESTABLISH STANDARDS OF	WITH RESPECT TO BUILDING COLUMN CENTRES. MARK LEVEL WITH RESPECT TO
CONSTRUCTION AND WORKMANSHIP.	AN ELEVATION WHICH WILL BE PROVIDED.
1.2.2.A. WHERE MANUFACTURERS OR MANUFACTURERS PRODUCTS ARE IDENTIFIED	9.1.3. RETAIN THESE DRAWINGS AND MAKE AVAILABLE TO CONSULTANT FOR PERIODIC
IN LISTS WITH THE PHRASE "STANDARD OF ACCEPTANCE", THESE ARE	REVIEW.
MANUFACTURERS AND/OR PRODUCTS WHICH MEET REQUIRED	9.2. AS-BUILT DRAWINGS
STANDARDS WITH REGARD TO PERFORMANCE, QUALITY OF MATERIAL AND	9.2.1. PRIOR TO TESTING, BALANCING AND ADJUSTING, TRANSFER SITE RECORD
WORKMANSHIP.	DRAWING INFORMATION TO AUTOCAD 2008 (CAD) FILES, TO RECORD FINAL
1.2.2.B. MANUFACTURERS AND OR PRODUCTS USED ARE TO BE CHOSEN FROM	AS—BUILT CONDITION. OBTAIN A CURRENT SET OF CAD FILES FROM THE
THESE LISTS.	CONSULTANT.
1.2.2.C. SELECT MATERIALS AND EQUIPMENT IN ACCORDANCE WITH	9.2.1.A. DRAWINGS ARE TO REMAIN SET TO AND FOLLOW CONSULTANTS
MANUFACTURER'S RECOMMENDATIONS AND INSTALL IN ACCORDANCE WITH	AUTOCAD STANDARDS. DO NOT ALTER DRAWING SCALES, X-REFS,
MANUFACTURER'S INSTRUCTIONS.	COLOURS, LAYERS OR TEXT STYLES.
 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 	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
PROPERLY SELECTED AND APPROVED MATERIALS.	CHANGED FROM CONTRACT DRAWINGS, THESE REVISIONS, AND PLACE THESE
2. SUBMITTALS	ANNOTATIONS "BUBBLE" REVISE THE CAD FILES TO RECORD THESE CHANGES.
2.1. SHOP DRAWINGS AND PRODUCT DATA SHEETS	ON A SEPARATE AND EASILY IDENTIFIED DRAWING LAYER.
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.	9.2.3. SHOW ON MECHANICAL AS-BUILT DRAWINGS FINAL LOCATION OF PIPING, DUCTWORK, SWITCHES, STARTERS, MOTOR CONTROL CENTRES, THERMOSTATS,
2.1.2. SUBMIT SHOP DRAWINGS BY EMAIL TO: SHOPDRAWINGS@HHANGUS.COM	AND EQUIPMENT.
2.2. INCLUDE A H.H. ANGUS SHOP DRAWING COVER SHEET PREPARED FOR EACH ITEM	9.2.4. SHOW ON SITE SERVICES AS—BUILT DRAWINGS SURVEY INFORMATION PROVIDED
ON THIS PROJECT AS A SEPARATE PDF.	BY ONTARIO LAND SURVEYOR (OLS) MONITORING SERVICES INSTALLATION.
2.3. SUBMIT SHOP DRAWINGS IN PDF FORMAT;	9.2.5. SHOW ON ELECTRICAL AS-BUILT DRAWINGS FINAL LOCATION OF CONDUIT,
2.3.1. IF SUBMITTED IN HARDCOPY FORMAT, SUBMIT IN 8.5 X 11 OR 11 X 17 SIZE,	OUTLETS, PANELS, BRANCH WIRING, SYSTEM WIRING, PULL BOXES, BUS DUCTS,
BLACK AND WHITE ORIGINALS OF GRAPHIC QUALITY SUITABLE FOR	AND EQUIPMENT.
PHOTOCOPYING. ALLOW ONE ADDITIONAL WEEK FOR PROCESSING OF SHOP DRAWINGS SUBMITTED IN HARDCOPY FORMAT.	9.2.6. IDENTIFY EACH DRAWING IN LOWER RIGHT HAND CORNER IN LETTERS AT LEAST 12 MM ($\frac{1}{2}$ IN) HIGH AS FOLLOWS: "AS-BUILT DRAWINGS. THIS DRAWING HAS
2.4. SUBMIT A SHOP DRAWING FOR EACH ITEM OF EQUIPMENT:	BEEN RÉVISED TO SHOW SYSTEMS AS INSTALLED" (SIGNATURE OF
2.4.1. PLUMBING FIXTURES,	CONTRACTOR) (DATE). THE SITE SERVICES DRAWINGS ARE TO INCLUDE
2.4.2. PUMPS,	(SIGNATURE AND STAMP OF OLS) ATTACHED TO NOTE.
2.4.3. AIR–MOVING UNITS,	9.2.7. SUBMIT ONE (1) SET OF WHITE PRINTS OF THE DRAFT AS-BUILT CAD FILES
2.4.4. HEATING UNITS,	FOR CONSULTANTS' REVIEW.
2.4.5. COILS,	9.2.8. ONCE "AS BUILT DRAWINGS" WHITE PRINTS ARE REVIEWED, TRANSFER
2.4.6. MOTOR CONTROL CENTRES,	CONSULTANTS' COMMENTS TO THE CAD FILES. RETURN AUTOCAD DRAWINGS
2.4.7. MOTOR STARTERS, AND	MODIFIED TO "AS BUILT" CONDITION TO CONSULTANTS ON CD OR DVD ROM.
2.4.8. SPECIAL SYSTEMS.	9.2.9. SUBMIT THREE (3) SETS OF WHITE PRINTS AND THREE (3) COPIES OF CAD
3. REFERENCE CODES, STANDARDS, AND REGULATIONS	FILES WITH OPERATING AND MAINTENANCE MANUALS.
3.1. PERMITS, TESTS, AND CERTIFICATES	10. OPERATING AND MAINTENANCE INSTRUCTIONS
3.1.1. ARRANGE AND PAY FOR PERMITS, TESTS, AND CERTIFICATES OF INSPECTION	10.1. START-UP AND TESTING
REQUIRED BY AUTHORITIES HAVING JURISDICTION.	10.1.1. SUPPLY SERVICES OF SKILLED MECHANIC, TO START SYSTEMS IN PROPER
3.1.2. SUBMIT APPLICATIONS REQUIRING OWNER'S SIGNATURE BEFORE COMMENCING	SEQUENCE, AND TEST AND CALIBRATE CONTROLS, PRV'S, INSTRUMENTATION AND
WORK.	RELIEF VALVES AND DAMPERS AND TO SET-UP SYSTEMS.
3.1.3. OBTAIN AND SUBMIT INSPECTION CERTIFICATES.	10.2. TRAINING
3.1.4. CERTIFICATES TO BE RENEWED AS TO REMAIN IN FORCE FOR GUARANTEE	10.2.1. DURING THIS PROCEDURE THOROUGHLY EXPLAIN OPERATION AND MAINTENANCE
PERIOD.	OF EACH SYSTEM, INCORPORATING SPECIALIZED INSTRUCTION BY
3.1.5. CO-ORDINATE AND PERFORM TESTING REQUIRED BY AUTHORITIES HAVING	MANUFACTURERS AS DESCRIBED UNDER OTHER SECTIONS IN THESE DIVISIONS.
JURISDICTION IN ACCORDANCE WITH CLAUSE TESTING IN THIS SECTION.	10.2.2. ARRANGE SUITABLE TIME FOR INSTRUCTIONS WITH OWNER'S OPERATING AND
4. EQUIPMENT	MAINTENANCE PERSONNEL.
 4.1. MANUFACTURERS NAMEPLATES 4.1.1. PROVIDE METAL NAMEPLATE WITH RAISED OR RECESSED LETTERING, MOUNTED ON EACH PIECE OF EQUIPMENT. 	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
 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. 	BACK, THREE-RING COVERS. 10.3.1.A. ORGANIZE MATERIAL IN VOLUMES GENERALLY GROUPED BY TRADE SECTION; SITE SERVICES, PLUMBING, FIRE PROTECTION, HEATING AND
 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. 	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 MAKE PROJECT
4.4.1. AFTER EQUIPMENT HAS BEEN INSTALLED AND PIPING AND INSULATION IS COMPLETED, CLEAN RUST AND OIL FROM EXPOSED IRON AND STEEL WORK	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.
PROVIDED UNDER THIS DIVISION, WHETHER OR NOT IT HAS BEEN FACTORY PRIME PAINTED.	11. CONSULTANT REVIEWS 11.1. SITE REVIEWS
 OFFICE, STORAGE AND TOOLS 5.1. OFFICE AND STORAGE 5.1.1. PROVIDE TEMPORARY OFFICE, WORKSHOP AND TOOLS AND MATERIAL STORAGE 	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
SPACE.	OTHERWISE SHOWN.
5.1.2. ASSUME RESPONSIBILITY FOR SECURITY OF THESE FACILITIES AND PROVIDE	12. CORRECTION AFTER COMPLETION
HEAT, LIGHT AND TELEPHONE.	12.1. GENERAL
5.2. APPLIANCES AND TOOLS	12.1.1. SUBMIT SIMILAR GUARANTEE FOR ONE YEAR FROM DATE OF ACCEPTANCE FOR
5.2.1. PROVIDE TOOLS, EQUIPMENT, SCAFFOLDING, EXTENSION CORDS, LAMPS AND	ANY PART OF WORK ACCEPTED BY OWNER, BEFORE COMPLETION OF WHOLE
MISCELLANEOUS CONSUMABLE MATERIALS REQUIRED TO CARRY OUT WORK.	WORK.
6. CO-ORDINATION	12.2. FINAL REVIEW
6.1. GENERAL	12.2.1. AT PROJECT COMPLETION, SUBMIT WRITTEN REQUEST FOR FINAL REVIEW OF
6.1.1. 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	MECHANICAL AND ELECTRICAL SYSTEMS.
OF THE WORK. WHERE THEY ARE DONE SO EITHER 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	BASIC MATERIALS AND METHODS 20 05 01 1.1. SCOPE
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	 ARTICLES THAT ARE OF A GENERAL NATURE, APPLICABLE TO EACH SECTION OF DIVISION 20 AND 26. ACCESS DOORS ACCESS DOORS ACCESS DOORS
OBTAINED, IN ADVANCE OF INSTALLATION OF ITEMS INVOLVED. CHANGES WILL BE	2.1. PROVIDE ACCESS DOORS TO BE INSTALLED AT LOCATIONS WHERE EQUIPMENT
AUTHORIZED BY SITE INSTRUCTIONS AND ARE TO BE SHOWN ON RECORD	REQUIRING INSPECTION, SERVICE, MAINTENANCE OR ADJUSTMENT IS "BUILT-IN" TO
DRAWINGS.	WORK OF OTHER TRADES.
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	2.2. SUBMIT SHOP DRAWINGS SHOWING ACCESS DOOR SIZE, TYPE AND LOCATION.2.3. CONSTRUCTION:2.3.1. CONSTRUCTED OF STEEL, PRIME COATED
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	 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
RELOCATION UP TO 3 M (10 FT) REDUCES MATERIAL AND LABOUR. 7. PROTECTION OF WORK AND PROPERTY	SUBJECT TO SECURITY RISKS (PUBLIC CORRIDORS, PSYCHIATRIC PATIENT AREAS, PUBLIC WASHROOMS). IN THESE AREAS DOORS TO BE FITTED WITH KEYED
7.1. GENERAL7.1.1. PROTECT THIS WORK AND WORK OF OTHER TRADES FROM DAMAGE.7.1.2. COVER FLOORS WITH TARPAULINS AND PROVIDE PLYWOOD AND OTHER	CYLINDER LOCKS WITH SIMILAR KEYS. 3. SLEEVES 3.1. GENERAL
TEMPORARY PROTECTION.	3.1.1. SLEEVE PIPES, DUCTS AND CONDUITS PASSING THROUGH MASONRY WALLS,
7.1.3. ASSUME RESPONSIBILITY FOR REPAIRING DAMAGE TO FLOOR AND WALL	CONCRETE FLOORS, AND FIRE RATED GYPSUM BOARD CEILINGS AND PARTITIONS.
SURFACES RESULTING FROM FAILURE TO PROVIDE ADEQUATE PROTECTION. 7.1.4. PROTECT EQUIPMENT, PIPE AND DUCT OPENINGS FROM DIRT, DUST AND OTHER FOREIGN MATERIALS.	 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

- DUCT OPENINGS FROM DIRT, DUST AND OTHER FORFIGN MATERIALS 8. WORK IN EXISTING BUILDING
- 8.1. GENERAL 8.1.1. .1 WORK INCLUDES CHANGES TO EXISTING BUILDING
- 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 SIZED TO CLEAR CONDUITS, BARE PIPES, AND BARE DUCTS BY 6 MM 3.2.2.B. (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
- FI OORS 3.1.4.A. 1.6 MM (16 GA) MINIMUM SHEET METAL, LAPPED AND SPOT WELDED WITH 20 MM $(\frac{34}{4}$ 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 SUPPLIED, 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.

- 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 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. PROTECTED AGAINST ACCIDENTAL BREAKAGE OF THE GLASS INDICATOR. 2.1.1.C.
- 2.1.1.D. IN-LINE TYPE FOR PIPE SIZES UP TO NPS 11/2. 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 \pm 1% OF READING OVER MINIMUM OF 10:1 TURNDOWN. 2.2.2.B. REPEATABILITY OF \pm 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 FSTING
- 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
- 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
- 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 TRERICE 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, 1/2% 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.
- EXECUTION 3.1. METERING DEVICES

3

- 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.

<u>VALVES</u> 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 ARTICI F 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 I FVFR HANDI F 5.2.4. BUTTERFLY VALVES NPS 2½ AND OVER, GROOVED JOINT STYLE
- 5.2.4.A. 1200 KPA (175 PSI), CAST IRON BODY, EPDM COATED OR BRASS DISC, EPDM SEAT, "OPEN/SHUT" INDICATOR, WITH SUPERVISORY SWITCH
- 5.2.5. SWING CHECK VALVES NPS 21/2 AND OVER, FLANGED 5.2.5.A. 1200 KPA (175 PSI),TO ASTM A216 CLASS B, 175 CWP, CAST IRON BODY WITH FLAT FACED FLANGES, REGRIND, RENEW BRONZE DISC AND SEAT RING, BOLTED COVER. 5.3. DOMESTIC WATER VALVES
- 5.3.1. GATE VALVES NPS 2 AND UNDER, SOLDERED 5.3.1.A. 1000 KPA (150 PSI), TO MSS SP-80, CLASS 150, BRONZE BODY. SOLID WEDGE BRONZE DISC, RISING STEM, SCREW IN, OR UNION BONNET.
- 5.3.2. GLOBE VALVES NPS 2 AND UNDER, SOLDERED 5.3.2.A. 850 KPA (125 PSI), TO MSS SP-80, 300 CWP, BRONZE BODY, RENEWABLE COMPOSITION PTFE DISC, THREADED OVER BONNET., LOCK SHIELD HANDLES AS INDICATED.
- 5.3.3. GLOBE VALVES NPS 2 AND UNDER, THREADED 5.3.3.A. 1000 KPA (150 PSI).TO MSS SP-80, CLASS 150, BRONZE BODY. RENEWABLE COMPOSITION PTFE DISC, UNION BONNET, LOCK SHIELD
- HANDLES AS INDICATED. 5.3.4. SWING CHECK VALVES NPS 2 AND UNDER, SOLDERED 5.3.4.A. 850 KPA (125 PSI), TO MSS SP-80, BRONZE BODY, BRONZE SWING DISC, REGRINDABLE SEAT, SCREW-IN CAP,
- 5.3.5. SWING CHECK VALVES NPS 2 AND UNDER, THREADED 850 KPA (125 PSI), TO MSS SP-80, CLASS 125, BRONZE BODY, 5.3.5.A.
- BRONZE SWING DISC, REGRINDABLE SEAT, SCREW-IN CAP 5.3.6. BALL VALVES UP TO NPS 2: 5.3.6.A. 1000 KPA (150 PSI), TWO PIECE BRONZE BODY AND CHROME PLATED BRONZE BALL, PTFE SEAT RINGS, SOLDER JOINT OR NPT TO COPPER
- ADAPTERS, FULL PORT 5.3.7. DOUBLE REGULATING VALVES (DRV), NPS 2 AND UNDER, THREADED 1000 KPA (150 PSI) COPPER ALLOY BODY. PLUG TYPE STEM WITH 5.3.7.A.
- FLOW MEASUREMENT PORTS AND TAMPER-PROOF SETTING. 5.3.8. FLOW METER FOR DRVS DIRECT DIGITAL FLOW READOUT TYPE COMPUTERIZED METER WITH
- 5.3.8.A. HOSES AND FITTINGS. 5.4. HEATING AND COOLING WATER VALVES
- 5.4.1. GATE VALVES NPS 2 AND UNDER, SOLDERED
- 5.4.2. GLOBE VALVES NPS 2 AND UNDER, THREADED 5.4.3. BALL VALVES NPS 2 AND UNDER, SOLDERED
- 5.4.4. BUTTERFLY VALVES NPS 21/2 TO 12, FOR GROOVED END PIPE: 5.4.5. PLUG VALVES NPS 2 AND UNDER, THREADED
- 5.4.6. SWING CHECK VALVES NPS 2 AND UNDER, SOLDERED
- 5.4.7. SILENT CHECK VALVES NPS 2, FOR GROOVED END PIPE 5.4.8. DOUBLE REGULATING VALVES (DRV), NPS 2 AND UNDER, THREADED
- 5.4.9. FLOW METER FOR DRVS STANDARD OF ACCEPTANCE: KITZ, CRANE, JENKINS, NIBCO
- EXECUTION 6.1. VALVE INSTALLATION
- 6.1.1. INSTALL SHUT OFF VALVES AT: 6.1.1.A. BRANCH TAKE-OFFS,
- 6.1.1.B. TO ISOLATE PIPING TO EACH PIECE OF EQUIPMENT, AND
- 6.1.1.C. IN LOCATIONS SHOWN. 6.1.1.D. INSTALL VALVES IN UPRIGHT POSITION WITH STEM ABOVE HORIZONTAL

HANGERS AND SUPPORTS <u>20 05 29</u>

- 1. SCOPE 1.1. PROVIDE HANGERS AND SUPPORTS FOR PIPING AND CONDUITS.
- 1.2. SHOP DRAWINGS
- 1.2.1. SUBMIT DETAILS FOR SUPPORTS, GUIDES, AND ANCHORS FOR GLASS, FIBRE-REINFORCED PLASTIC, AND PLASTIC PIPING SYSTEMS. 1.3. APPLICABLE CODES AND STANDARDS;
- 1.3.1. ASME B31.9 BUILDING SERVICE PIPING
- 1.3.2. MANUFACTURERS STANDARDIZATION SOCIETY OF VALVE AND FITTINGS INDUSTRY (MSS) 1.3.2.A. MSS SP-58 PIPE HANGERS AND SUPPORTS - MATERIALS DESIGN AND
- MANUFACTURE
- 1.3.2.B. MSS SP-69 PIPE HANGERS AND SUPPORTS SELECTION AND

APPLICATION 1.3.2.C. THE ONTARIO BUILDING CODE

2. PRODUCTS

EXECUTION

1. GENERAL

1.1. SCOPE

2.1. GENERAL

2.1.1. HANGERS, SUPPORTS, SWAY BRACES, TO BE MADE UP FROM STOCK OR PRODUCTION PARTS, MANUFACTURED AND FABRICATED IN ACCORDANCE WITH ASME B31.1 AND MSS SP-58, SP-69, AND SP-90. 2.1.2. SELECT ELEMENTS OF PIPE SUPPORT SYSTEMS TO PROVIDE ADEQUATE FACTORS OF SAFETY UNDER LOADS APPLIED BY GRAVITY, BY TEMPERATURE INDUCED EXPANSION AND CONTRACTION, BY INTERNAL PRESSURE IN MECHANICALLY JOINTED PLAIN END PIPE, BY CHANGE OF MOMENTUM IN FLUID FLOW.

2.2. PRODUCT IDENTIFICATION 2.2.1. PIPE SUPPORT PRODUCTS TO BE SELECTED FROM MANUFACTURERS STANDARD PRODUCT LINE

2.3. UPPER ATTACHMENTS

2.3.1. CAST-IN-PLACE CONCRETE: 2.3.1.A. SINGLE OR DOUBLE PIPE RUNS UP TO AND INCLUDING 300 MM (12 IN) DIAMETER:

2.3.1.A.A. GALVANIZED WEDGE INSERTS TO MSS SP-58, TYPE 18. 2.3.1.A.B. ULC LISTED FOR PIPE NPS ³/₄ THROUGH NPS 8.

2.3.1.B. PIPE RUNS OF THREE OR MORE PIPES:

2.3.1.B.A. MULTIPLE INSERTS, SPACED TO SUIT SMALLEST PIPE IN GROUP. 2.3.1.C. PIPES RUNS 350 MM (14 IN) DIAMETER AND OVER USE SPECIAL INSERTS.

2.3.2. SURFACE MOUNT ON CONCRETE: 2.3.2.A. CARBON STEEL PLATE WITH CLEVIS AND MALLEABLE IRON SOCKET AND EXPANSION CASE AND BOLT WITH MINIMUM OF TWO EXPANSION CASES AND BOLTS FOR EACH HANGER.

2.3.2.B. DO NOT USE EXPLOSIVE DRIVE PINS IN ANY SECTION OF WORK WITHOUT OBTAINING PRIOR APPROVAL.

2.3.3. PIPING OR EQUIPMENT SUPPORTED FROM EXISTING CONCRETE CONSTRUCTION: 2.3.3.A. DRILL AND INSTALL THREADED INSERTS. 2.3.4. STEEL FRAMED CONSTRUCTION:

2.3.4.A. STEEL BEAM (BOTTOM FLANGE) AND COLD PIPING NPS 2 AND UNDER: 2.3.4.A.A. BEAM CLAMP TO MSS SP-58, TYPE 30, ULC LISTED. 2.3.4.B. STEEL BEAM (BOTTOM FLANGE) AND COLD PIPING NPS 2½ AND LARGER AND HOT PIPING:

2.3.4.A.A. HEAVY BEAM CLAMP ASSEMBLY TO MSS SP-58, TYPE 28 OR 29,

2.3.4.A.B. FABRICATED EQUIVALENT, ULC LISTED. 2.3.4.B. STEEL BEAM (TOP FLANGE) AND COLD PIPING AND HOT PIPING NPS 2 AND UNDER:

2.3.4.A.A. STEEL JAW, HOOK ROD WITH NUT, SPRING WASHER AND PLAIN WASHER, TO MSS SP-58, TYPE 25, ULC LISTED. 2.3.4.A.B. STEEL JOISTS AND COLD PIPING NPS 2 AND UNDER, STEEL WASHER PLATE WITH DOUBLE LOCKING NUTS, STEEL JOISTS AND COLD PIPING NPS 21/3 AND LARGER AND HOT PIPING. STEEL WASHER PLATES WITH DOUBLE LOCKING NUT, CARBON STEEL CLEVIS AND MALLEABLE IRON

SOCKET. 2.4. HANGER ROD

2.4.1. CARBON STEEL THREADED ROD; 2.4.1.A. ELECTRO-GALVANIZED FINISH IN MECHANICAL ROOMS AND OUTDOORS. 2.4.1.B. BLACK STEEL FINISH IN OTHER AREAS.

2.5. HORIZONTAL PIPE SUPPORT – SUSPENDED 2.5.1. HOT OR COLD SUSPENDED PIPING, INCLUDING CONDUITS, WHERE HORIZONTAL MOVEMENT IS 25 MM (1 IN) OR LESS AND HANGER ROD IS LONGER THAN 300 MM (12 IN).

2.5.1.A. STEEL OR CAST IRON PIPING: 2.5.1.A.A. ADJUSTABLE CLEVIS TO MSS SP-58, TYPE 1, ULC LISTED, SIZED FOR OUTSIDE DIMENSION OF PIPE AND INSULATION.

2.5.1.B. COPPER PIPING: 2.5.1.B.A. ADJUSTABLE CLEVIS TO MSS SP-58, TYPE 1, COPPER PLATED. 2.5.2. SUSPENDED HOT STEEL OR COPPER PIPING HAVING HORIZONTAL MOVEMENT IN EXCESS OF 25 MM (1 IN) OR HOT STEEL PIPING WITH HANGER ROD 300 MM (12 IN) OR LESS:

2.5.2.A. TRAPEZE OR YOKE STYLE PIPE ROLLER TO MSS SP-58, TYPE 43.

3.1. HANGER INSTALLATION 3.1.1. SUPPORT PIPING AND CONDUIT DIRECTLY FROM OR ON STRUCTURAL BUILDING ELEMENTS. DO NOT SUPPORT PIPE OR CONDUIT DIRECTLY FROM OTHER SERVICES EXCEPT AS DESCRIBED BELOW.

3.1.2. THE HANGER ROD SIZE AND SPACING IN THE FOLLOWING ARTICLES IS BASED ON SUPPORTING A SINGLE PIPE DIRECTLY FROM THE STRUCTURE. 3.1.3. INSTALL HANGERS FOR CAST IRON SOIL PIPE WITH HANGER SPACING AND HANGER ROD DIAMETER IN ACCORDANCE WITH TABLE 3.

3.1.3.A. IN ADDITION, PROVIDE A HANGER AT OR ADJACENT TO EACH HUB OR JOINT 3.1.4. HANGER SPACING AND HANGER ROD DIAMETER FOR STEEL OR COPPER

FLEXIBLE JOINT ROLL GROOVE PIPE TO BE AS SHOWN IN TABLE ABOVE FOR APPROPRIATE PIPE MATERIAL WITH NOT LESS THAN ONE HANGER BETWEEN JOINTS AND WITH ANCHORS AND GUIDES LOCATED TO MAINTAIN PIPING TRUE TO LINE AND GRADE.

3.1.5. IN STEEL FRAMED CONSTRUCTION, SUPPORT PIPING FROM STRUCTURAL MEMBERS. WHERE STRUCTURAL MEMBERS ARE NOT SUITABLY LOCATED FOR UPPER HANGER ATTACHMENTS AND INSERTS OF ADEQUATE CAPACITY CAN NOT BE INSTALLED IN FLOOR SLABS OVER, PROVIDE SUPPLEMENTARY STEEL FRAMING MFMBFRS:

3.1.6. OFFSET HANGERS SO THAT RODS ARE VERTICAL IN OPERATING POSITION. 3.1.7. PROVIDE HANGER WITHIN 300 MM (12 IN) OF EACH HORIZONTAL ELBOW AND

3.2. SADDLES AND SHIELDS 3.2.1. ON COLD INSULATED PIPING, PROVIDE INSULATION SHIELDS BETWEEN INSULATION AND PIPE SUPPORT

3.2.2. ON HOT INSULATED PIPING, WELD PROTECTIVE SADDLES TO PIPE AT PIPE SUPPORT LOCATIONS 3.2.3. NO SADDLES OR SHIELDS ARE REQUIRED ON UN-INSULATED PIPING.

3.3. LOAD NUT RETENTION REQUIREMENTS 3.3.1. ADHERE FASTENING NUTS, INCLUDING TOP AND BOTTOM LOAD NUTS, AND

CLEVIS BOLT NUTS, TO THREADED RODS OR FITTINGS WITH LOCTITE 266. 3.4. SET-UP AFTER INSTALLATION 3.4.1. ADJUST HANGERS TO EQUALIZE HANGER LOADS. TO SUPPORT PIPING TRUE TO

LINE AND GRADE, AND TO MINIMIZE LOADS TRANSFERRED THROUGH CONNECTIONS TO EQUIPMENT AND OUTLETS.



1.1.1. WELD OR BRAZE PIPE AND FITTINGS FOR WORK OF DIVISION 20. 1.1.2. IN THIS SECTION. THE TERM "WELD, WELDER, WELDING" OR SIMILAR WORD OR PHRASE IS AN EXPRESSION WHICH INCLUDES BOTH WELDING OR BRAZING. 1.2. REGISTRATION AND INSPECTION

1.2.1. BEFORE COMMENCING WORK, MAKE ARRANGEMENTS AND PAY FOR REGISTRATION AND INSPECTION BY TECHNICAL STANDARDS & SAFETY AUTHORITY (TSSA), FOR THE FOLLOWING PRESSURE PIPING SYSTEMS: 1.2.1.A. SERVICE WATER PIPING FOR BUILDING HOT WATER HEATING SYSTEMS.

AT DESIGN TEMPERATURES ABOVE 121 C (250 F) OR AT DESIGN PRESSURES ABOVE 1070 KPA (160 PSIG), 1.2.1.B. CHILLED WATER, COOLING WATER, AND PROCESS WATER SYSTEMS, FOR

LIQUIDS NO MORE HAZARDOUS THAN WATER, AT DESIGN TEMPERATURES ABOVE 65 C (150 F) OR DESIGN PRESSURES ABOVE 1717 KPA (250PSIG). 1.3. APPLICABLE STANDARDS:



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:	1127 Leslie	Associa Street	HAngus tes Limited Consulting Engineers , Toronto, ON, M3C 2J6 Canada T 416 443 8200 F 416 443 8290
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2	17FEB21		ISSUED FOR PERMIT/TENDER
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YORK REGION PARAMEDIC SERVICES 111 RACCO PARKWAY, VAUGHAN, ON L4J 8X9

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MECHANICAL SPECIFICATIONS -1 OF 5

o1-14-2021	project no. 2202027
drawn by FS	
checked by DP	drawing no.
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 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. EXECUTION 2.1. WELDER QUALIFICATION AND WELDING PROCEDURES 3.4. ASME D31.9 CODE FOR BUILDING SERVICE PIPING. 	1.4.2.B. REFRIGERATION MACHINES 1.4.2.C. BOILERS
1.3.3.A. ASME B31.9 CODE FOR BUILDING SERVICE PIPING.	1.4.2.D. [EVAPORATIVE][DRY] COOLERS
2. EXECUTION 2.1. WELDER QUALIFICATION AND WELDING PROCEDURES	1.4.2.E. HEAT EXCHANGERS 1.4.2.F. MIXING TANK
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	1.4.2.G. CIRCULATING PUMP
APPROVED PROCEDURES BY WELDERS CERTIFIED FOR PRESSURE PIPING BY	1.4.2.H. EXPANSION TANK 1.4.2.I. COILS
TSSA. 2.1.2. WELDING, BOTH SHOP AND FIELD, TO BE ELECTRIC ARC IN ACCORDANCE WITH	1.4.2.J. CONTROLS
RECOMMENDATIONS OF CANADIAN WELDING BUREAU.	1.4.3.A. GLYCOL COOLING SYSTEM
AVAILABLE FOR INSPECTION DURING PIPE WELDING OPERATIONS. EACH WELD	1.4.3.A.A. SUPPLY TEMPERATURE: 2°C (36°F) 1.4.3.A.B. RETURN TEMPERATURE: 15.5°C (60°F)
TO BE STAMPED WITH WELDER'S IDENTIFYING NUMBER. 2.2. WELDED CONNECTIONS TO EXISTING PRESSURE PIPING SYSTEMS	1.4.3.A.B. RETURN TEMPERATURE: 15.5°C (60°F) 1.4.3.A.C. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)
2.2.1. AT THE COMMENCEMENT OF THE WORK, REVIEW WITH	1.4.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI) 1.4.3.A.E. GLYCOL TYPE: PROPYLENE
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:	1.4.3.A.F. GLYCOL / WATER MIXTURE BY VOLUME: 40 % GLYCOL
INCLUDING BUT NOT LIMITED TO: 2.2.1.A. DIMENSIONAL MISALIGNMENT BETWEEN OLD AND NEW PIPE.	1.4.3.A.G. WATER – CITY OF TORONTO 1.4.3.A.G.A. CACO3 = [9 GRAINS]
 1ESTING 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. 2.3.1. WELDS TO BE SOLID HOMOGENEOUS PART OF METALS JOINED AND FREE FROM PITS AND INCORPORATED SLAG AND SCALE. 	1.4.3.A.G.B. 32 PPM CHLORIDE IONS
2.2.2. AFTER TESTING REQUIREMENTS ARE DETERMINED, PROVIDE A PROPOSED SCHEDULE FOR TIE-IN CONNECTIONS AND REQUIRED EXISTING SERVICE	1.4.3.A.G.C. 26 PPM SULPHATE IONS 1.4.3.B. GLYCOL [HEATING][HEAT RECLAIM] SYSTEM
SHUT-DOWN PERIODS, FOR APPROVAL PRIOR TO COMMENCING WORK. 2.3. WELD QUALITY	1.4.3.B.A. SUPPLY TEMPERATURE[:][TO HEAT RECLAIM COILS:] -1°C (30°F)
2.3.1. WELDS TO BE SOLID HOMOGENEOUS PART OF METALS JOINED AND FREE FROM	1.4.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI) 1.4.3.B.C. DESIGN PRESSURE: 1030 KPA (150 PSI)
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	
2.3.3. CONDUCT VISUAL EXAMINATION OF WELDS IN ACCORDANCE WITH THE APPLICABLE PIPING STANDARD AND SUBMIT COPY OF EXAMINATION REPORT FOR	1.4.3.B.F.A. CACO3 = [9 GRAINS] 1.4.3.B.F.B. 32 PPM CHLORIDE IONS
REVIEW. FOR REGISTERED PRESSURE PIPING SYSTEMS, INCLUDE COPIES OF	1.4.3.B.F.C. 26 PPM SULPHATE IONS
TSSA FIELD INSPECTION REPORTS. 2.4. RADIOGRAPHY	2. PRODUCTS 2.1. GLYCOL
2.4.1. ARRANGE AND PAY FOR SERVICES OF AN INSPECTION COMPANY SPECIALIZING IN MAKING AND INTERPRETING X-RAYS OF PIPE WELDS.	2.1.1. INDUSTRIAL TYPE COOLANT FORMULATED WITH CORROSION INHIBITORS.
 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". 	2.1.2. PROPYLENE GLYCOL 2.1.3. ETHYLENE GLYCOL
2.4.3. RADIOGRAPHY TO BE IN ACCORDANCE WITH ASME BOILER AND PRESSURE VESSEL CODE, SECTION VIII, DIVISION 1 PARA, UW-51, "TECHNIQUE FOR	STANDARD OF ACCEPTANCE: DOW - DOWFROST, UNION CARBIDE, INTERSTATE CHEMICAL -
RADIOGRAPHIC EXAMINATION OF WELDED JOINTS". 2.4.4. WELDS ARE UNACCEPTABLE WITH IMPERFECTIONS AS DETAILED IN PARA. UW-51,	INTERCOOL HOUGHTON CHEMICAL – SAFE-T-THERM 3. EXECUTION
CLAUSE (M)1 TO (M)4 INCLUSIVE OF SAME CODE.	3.1. PIPE INSTALLATION 3.1.1. GENERAL LAYOUT OF MAINS, RISERS, RUN-OUTS AND CONNECTION DETAILS OF
2.4.5. REPAIRS TO BE CARRIED OUT AS PROVIDED IN PARA. UW-38 OF SAME CODE.	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.
HEATING AND COOLING PIPING SYSTEMS GENERAL	3.1.4. ERECT PIPING SO THAT EXPANSION FORCES, GRAVITY FORCES AND THRUST
<u>23 05 01</u>	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.
1.1. PROVIDE HEATING AND COOLING PIPING SYSTEMS 1.2. HOT WATER HEATING SYSTEM	3.1.6. SEPARATE COPPER PIPE AND FITTING MATERIALS FROM CONTACT WITH FERROUS
1.2.1. PIPING DESIGN CODE:	MATERIAL WITH DI-ELECTRIC COUPLINGS. 3.1.7. INSTALL DRAIN VALVES AT LOW POINTS IN WATER PIPING SYSTEMS AND IN
1.2.1.A. TO ASME B31.9 BUILDING SERVICE PIPING 1.2.2. SYSTEM INCLUDES:	VALVED RUN-OUTS FROM RISERS SO THAT SYSTEM OR ISOLATED PARTS OF SYSTEM CAN BE DRAINED.
1.2.2.A. BOILERS 1.2.2.B. HEAT EXCHANGERS	3.1.8. DO NOT USE GALVANIZED MATERIALS IN CONTACT WITH GLYCOLS.
1.2.2.C. PUMPS	3.2. FILLING OF GLYCOL SYSTEMS 3.2.1. DELIVER GLYCOL TO SITE IN MANUFACTURER'S SEALED CONTAINERS.
1.2.2.D. EXPANSION TANKS 1.2.2.E. CONVECTORS	3.2.2. AFTER SYSTEM HAS BEEN CLEANED AND TESTED FOR LEAKS, FILL WITH WATER
1.2.2.F. RADIATORS	THROUGH TEMPORARY WATER METER TO OBTAIN TOTAL SYSTEM VOLUME. 3.2.3. DRAIN WATER FROM SYSTEM AND EITHER FILL WITH PRE-MIXED GLYCOL
1.2.2.G. RADIANT PANELS 1.2.2.H. FINNED RADIATION	SOLUTION, OR FIRST WITH CALCULATED VOLUME OF CONCENTRATED GLYCOL AND THEN MAKE UP TO SYSTEM VOLUME WITH WATER.
1.2.2.I. UNIT HEATERS	3.2.4. CIRCULATE SOLUTION FOR ONE WEEK AND THEN TAKE SAMPLES FOR TESTING
1.2.2.J. HEATING COILS 1.2.2.K. CONTROLS	FOR PERCENTAGE CONCENTRATION BY SPECIFIC GRAVITY METHOD, IN GLYCOL SUPPLIER'S LABORATORY.
1.2.3. SYSTEM DESIGN CRITERIA 1.2.3.A. CONSTANT TEMPERATURE SYSTEM	3.2.5. SUBMIT RESULTS OF ANALYSIS. 3.2.5.A. IF CORRECTION OF CONCENTRATION IS REQUIRED, AMOUNT OF MIXTURE
1.2.3.A.A. SUPPLY TEMPERATURE: [93°C (200°F)][87°C (190°F)]	TO BE DRAWN FROM SYSTEM TO BE CALCULATED AND DRAINED INTO ORIGINAL CONTAINERS. TO THIS ADD WATER OR GLYCOL IN CALCULATED
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)	AMOUNTS TO CORRECT CONCENTRATION IN SYSTEM, AND RECHARGED
1.2.3.A.D. DESIGN PRESSURE: 1030 KPA (150 PSI)	SYSTEM. 3.2.5.B. PROVIDE 24 HOURS NOTICE BEFORE DRAINING AND REFILLING TO
1.2.3.B. SCHEDULED TEMPERATURE SYSTEM 1.2.3.B.A. MAXIMUM WORKING PRESSURE : 900 KPA (125 PSI)	CORRECT CONCENTRATION. 3.2.5.C. CIRCULATE AFTER CORRECTING CONCENTRATION FOR A FURTHER 24
1.2.3.B.B. DESIGN PRESSURE: 1030 KPA (150 PSI)	HOURS AND RETEST CONCENTRATION.
1.2.3.C. LOW TEMPERATURE SYSTEM (CONDENSER WATER HEAT RECOVERY) 1.2.3.C.A. SUPPLY TEMPERATURE: 40.5 °C (105 °F)	3.2.6. SUBMIT FINAL REPORT WITH HISTORICAL DATA SHOWING DATES AND TIMES, RESULTS OF EACH ANALYSIS, CALCULATIONS AND CORRECTIONS MADE, AND
1.2.3.C.B. RETURN TEMPERATURE: 32 °C (90 °F)	FINAL CONCENTRATION. 3.2.7. SUPPLY TWO 170 LITRE DRUMS OF 100% INHIBITED GLYCOL.
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	WATER SPECIALTIES - HEATING AND COOLING
1.3.2. SYSTEM INCLUDES: 1.3.2.A. REFRIGERATION MACHINES	<u>23 21 11</u>
1.3.2.B. THERMAL STORAGE TANKS	1. SCOPE 1.1. PROVIDE WATER SPECIALTIES IN ACCORDANCE WITH THIS SECTION FOR SYSTEMS
1.3.2.C. ICE BUILDERS 1.3.2.D. CIRCULATING PUMPS	WHERE WORKING TEMPERATURES ARE IN RANGE OF −12C TO 120C (10□F TO 248F)
1.3.2.E. PLATE HEAT EXCHANGERS 1.3.2.F. EXPANSION TANK	AND WORKING PRESSURE UP TO 1035 KPA (150 PSI). 1.2. THIS SECTION COVERS SPECIALTIES FOR:
1.3.2.G. EVAPORATIVE or DRY COOLERS	1.2.1. HOT WATER AND LOW TEMPERATURE HEATING SYSTEM 1.2.2. EXTERIOR ZONE HEATING AND COOLING SYSTEM
1.3.2.H. COOLING TOWERS 1.3.2.I. INDOOR CONDENSER WATER BASIN	1.2.3. WATER SYSTEM RELIEF VALVE VENTS & OVERFLOWS
1.3.2.J. CONDENSER WATER FILTERS	1.2.4. GLYCOL HEATING AND COOLING SYSTEMS 1.2.5. CONDENSER WATER SYSTEM
1.3.2.K. COOLING COILS 1.3.2.L. FAN COIL UNITS	1.2.6. CHILLED WATER SYSTEM
1.3.2.M. SERVER ROOM COOLING UNITS	1.3. SHOP DRAWINGS 1.3.1. SUBMIT MANUFACTURERS DATA SHEETS FOR:
1.3.2.N. CONTROLS 1.3.3. SYSTEM DESIGN CRITERIA	1.3.1.A. EXPANSION TANKS, AIR VENTS SEPARATORS STRAINERS PRESSURE REDUCING VALVES PRESSURE RELIEF VALVES, WATER MAKE-UP
1.3.3.A. CHILLED WATER SYSTEM 1.3.3.A.A. SUPPLY TEMPERATURE: 5.5° C (42° F)	ASSEMBLIES, PUMP SUCTION DIFFUSERS AND GLYCOL MAKE-UP UNIT AND MIXING TANK.
1.3.3.A.B. RETURN TEMPERATURE: 14.4° C (58° F)	2. PRODUCTS
1.3.3.A.C.MAXIMUM WORKING PRESSURE:900 KPA (125 PSI)1.3.3.A.D.DESIGN PRESSURE:1030 KPA (150 PSI)	2.1. CLOSED EXPANSION TANK 2.1.1. CONSTRUCTION: WELDED CONSTRUCTION CONFORMING TO ASME SECTION VIII
1.3.3.B. SECONDARY CHILLED WATER SYSTEM	FOR UNFIRED PRESSURE VESSELS, CSA B-51, AND PROVINCIAL REGULATIONS
1.3.3.B.A. SUPPLY TEMPERATURE: 13°C (55°F) 1.3.3.B.B. MAXIMUM WORKING PRESSURE: 900 KPA (125 PSI)	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
1.3.3.B.C. DESIGN PRESSURE: 1030 KPA (125 PŚI) 1.3.3.C. CONDENSER WATER SYSTEM	PRESSURE WITH ASME STAMP AND CERTIFICATION 2.1.3. GLYCOL SERVICE: BLACK STEEL FOR GLYCOL SERVICE PRIMED ON EXTERIOR
1.3.3.C.1. SUPPLY TEMPERATURE – SUMMER: 29.5°C (85°F)	SURFACE ONLY. 2.1.4. NOZZLES AND COUPLINGS
1.3.3.C.2. RETURN TEMPERATURE – SUMMER: 35°C (95°F) 1.3.3.C.3. SUPPLY TEMPERATURE – WINTER: 4°C (40°F)	2.1.4.A. NPS 1 EXPANSION PIPE CONNECTION AT BOTTOM
1.3.3.C.4. MAXIMUM WORKING PRESSURE: 700 KPA (100 PSI)	2.1.4.B. NPS 1 MAKE-UP CONNECTION AT BOTTOM 2.1.4.C. NPS 1 DRAIN CONNECTION AT BOTTOM
1.3.3.C.5. DESIGN PRESSURE: 1030 KPA (150 PSI) 1.4. GLYCOL SYSTEM	2.1.4.D. NPS 1 VENT CONNECTION AT TOP
1.4.1. PIPING DESIGN CODE: 1.4.1.A. TO ASME B31.9 BUILDING SERVICE PIPING	2.1.4.E. RELIEF VALVE CONNECTION NEAR BOTTOM 2.1.4.F. SCHRAEDER VALVE CONNECTION FOR COMPRESSED AIR AT TOP
TO THE TO THE DOTAD DOTEDING SERVICE FIFTING	

2.1.5. ACCESSORIES

1.4.2.A. FILLING PUMP

1.3.1. O.REG. 220/01 MADE UNDER THE TSSA ACT

1.4.2. SYSTEM INCLUDES:

- 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
- 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 (3/4 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
- 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
- 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 (3/4 IN) BY 150 MM (6 IN) AIR CHAMBER WITH SCREWDRIVER OPERATED AIR VENT PIPED THROUGH ÈRONT 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 RELIFE 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 21/2 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 (41/2 IN) PRESSURE GAUGES ON UPSTREAM AND DOWNSTREAM SIDES OF STATION.

AIR DISTRIBUTION - GENERAL <u>23 31 01</u>

- 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. GENERAL

1.3. APPLICABLE STANDARDS

POSSIBLE

2.2. AIR SUPPLY EQUIPMENT

2.3. AIR EXHAUST EQUIPMENT

2.4. TERMINALS DEVICES

2.5. LIFE SAFETY

2.6. AIR BALANCING

GENERAL

2. PRODUCTS

1.1. SCOPE

.1 THE ONTARIO BUILDING CODE .2 REGULATIONS OF PROVINCE CITY, OR LOCAL AUTHORITY HAVING JURISDICTION. 2. EXECUTION

2.1.2. LOCATE MAINS, RISERS AND RUNOUTS TO BE CONCEALED BEHIND FURRINGS OR

2.1.4. ANCHOR, GUIDE AND SUPPORT VERTICAL AND HORIZONTAL RUNS OF DUCTWORK

2.2.1. INSTALL AND CONNECT AIR HANDLING UNITS, AND AIR CONDITIONING UNITS, AND

2.3.1. INSTALL AND CONNECT EXHAUST FANS, ROOF AND WALL EXHAUSTERS AND

2.4.1. LOCATE AND INSTALL TERMINAL BOXES, REGISTERS, DIFFUSERS, AND GRILLE

DAMPERS TO PROTECT OPENINGS IN FIRE SEPARATIONS.

2.5.1. INSTALL FIRE DAMPERS, SMOKE DAMPERS, AND COMBINATION SMOKE AND FIRE

2.5.2. PROVIDE SMOKE STOPPING AROUND UNPROTECTED DUCTS PASSING THROUGH

2.6.1. CO-OPERATE WITH AIR BALANCING AGENCY; INSTALL SUPPLEMENTARY DAMPERS,

ACCESS OPENINGS AND ACCESS DOORS TO FACILITATE TESTING AND

2.6.2. MINIMUM SET POINT OF VAV BOXES SHALL BE 10% OF MAXIMUM SETTING.

FLEXIBLE DUCTWORK

<u>23 31 16</u>

1.2.1.B. ULC 181-1981 - FACTORY MADE AIR DUCTS AND CONNECTIONS.

1.2.1.D. NFPA 90B - INSTALLATION OF WARM AIR HEATING AND AIR

1.2.1.C. NFPA 90A - INSTALLATION OF AIR CONDITIONING AND VENTILATING

2.1.1.B. PRESSURE DROP COEFFICIENTS AS LISTED BELOW BASED ON SHEET

METAL DUCT PRESSURE DROP COEFFICIENT OF 1.00,

1.2.1.A. ULC S110M-1986 - FIRE TESTS FOR AIR DUCTS.

1.2.1.E. SMACNA – FLEXIBLE DUCT INSTALLATION STANDARDS

ABOVE CEILINGS EXCEPT IN MECHANICAL EQUIPMENT ROOMS AND ACCESS

ROOM FINISH SCHEDULES, AND IN THESE AREAS KEEP DUCTWORK AS HIGH AS

CONSIDERED TO BE FABRICATION OR INSTALLATION DRAWINGS.

2.1.3. DETERMINE AREAS WITHOUT CEILINGS FROM ARCHITECTURAL DRAWINGS AND

SPACES WHERE DUCTWORK IS TO BE EXPOSED.

TO RESIST DEAD LOAD AND ABSORB THRUST.

BUILD CASING AND PLENUMS.

DUST AND FUME COLLECTORS.

1.1.1. PROVIDE FLEXIBLE DUCTWORK AS SHOWN.

CONDITIONING SYSTEMS.

SYSTEMS

2.1.1.A. FACTORY FABRICATED,

SMOKE SEPARATIONS.

ADJUSTMENT.

1.2. REFERENCE STANDARDS

1.2.1. CONFORM TO:

2.1. FLEXIBLE DUCTWORK

2.1.1. GENERAL REQUIREMENTS:

2.1. DUCTWORK 2.1.1. DUCTWORK SYSTEM ROUTING IS SHOWN DIAGRAMMATICALLY. DRAWINGS ARE NOT

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

3.1. DUCT INSTALLATION

3. EXECUTION

1. GENERAL

1.1. SCOPE

1.2.4.B.

1.3.2.C.

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 AIR GRILLES UNLESS SHOWN. 3.1.3. USE SEALING COMPOUND AND TAPE AT CONNECTION POINTS BETWEEN SHEET METAL AND FLEXIBLE DUCT. MAKE A FURTHER MECHANICAL CONNECTION USING SHEET METAL SCREWS. 3.1.4. CENTRE-LINE RADIUS OF BENDS IN FLEXIBLE DUCTWORK TO BE GREATER THAN ONE DUCT DIAMETER.

3.1.5. DO NOT INSTALL FLEXIBLE DUCTWORK THROUGH FLOORS, PARTITIONS OR MASONRY WALLS.

DUCTWORK 23 31 13

1.1.1. PROVIDE METAL AND PVC DUCTWORK SYSTEMS AS SHOWN.

1.2. APPLICABLE CODES AND STANDARDS 1.2.1. CONFORM TO;

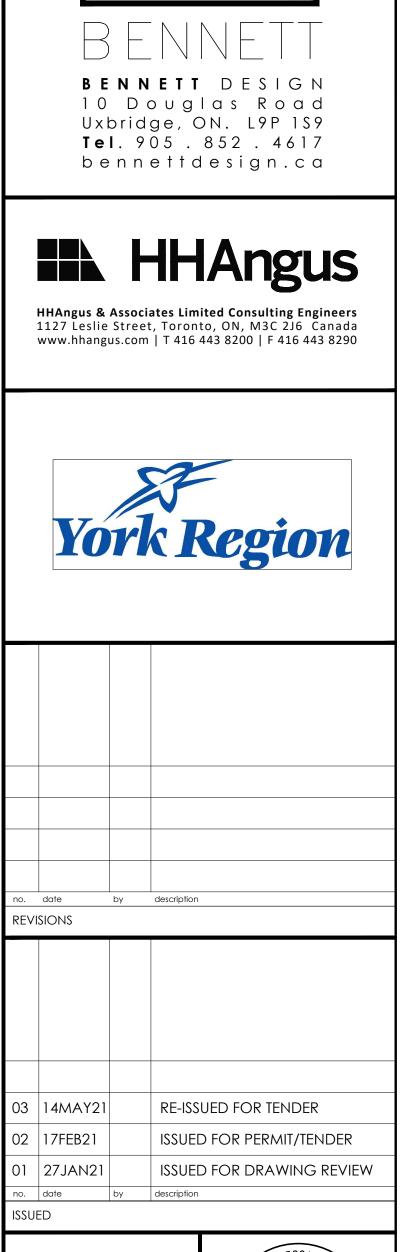
- 1.2.1.A. NFPA 90A INSTALLATION OF AIR CONDITIONING AND VENTILATING
- SYSTEMS. 1.2.1.B. NFPA 90B - INSTALLATION OF WARM AIR HEATING AND AIR
- CONDITIONING SYSTEMS. 1.2.1.C. NFPA 96 VENTILATION CONTROL AND FIRE PROTECTION OF COMMERCIAL
- COOKING OPERATIONS 1.2.2. LETTER AND NUMBER DESIGNATIONS, SHOWN AS "CR3-16" ETC., ARE TAKEN FROM ASHRAE DUCT FITTING DATA BASE. (DFDB)
- 1.2.3. CONSTRUCTION DETAILS: 1.2.3.A. SMACNA HVAC DUCT CONSTRUCTION STANDARDS, METAL AND FLEXIBLE.
- (SMACNA HVAC) 1.2.4. MATERIALS:
- 1.2.4.A. ASTM A525 SPECIFICATION FOR GENERAL REQUIREMENTS FOR STEEL SHEET, ZINC COATING (HOT DIPPED GALVANIZED) ASTM A480 SPECIFICATION FOR GENERAL REQUIREMENTS FOR FLAT ROLLED PLATE, SHEET, AND STRIP
- 1.2.4.C. ASTM A621 SPECIFICATION FOR STEEL SHEET AND STRIP CARBON HOT ROLLED DRAWING QUALITY
- 1.2.4.D. ASTM D1784 STANDARD SPECIFICATION FOR RIGID POLY (VINY) CHLORIDE) (PVC) COMPOUNDS AND CHLORINATED POLY (VINYL
- CHLORIDE) (CPVC) COMPOUNDS. 1.2.4.E. ASTM D1927 SPECIFICATION FOR RIGID POLY (VINYL CHLORIDE) PLASTIC SHEET (WITHDRAWN 1994)
- 1.3. SHOP DRAWINGS AND APPLICATION DETAILS 1.3.1. SUBMIT MANUFACTURER'S CATALOGUE LITERATURE FOR;
 - 1.3.1.A. PROPRIETARY JOINTS,
- 1.3.1.B. HARDWARE. 1.3.2. SUBMIT FIELD/FABRICATION DRAWINGS AT 1:50 (1/4 INCH=1 FOOT) OR LARGER SCALE, WITH PIPING, DUCTWORK, AND FITTINGS IN DOUBLE LINE FORMAT, TO
- 1.3.2.A. ARRANGEMENTS IN CONGESTED AREAS, 1.3.2.B. WHERE INSTALLATION PROPOSED DEVIATES SUBSTANTIALLY FROM LAYOUT
 - SHOWN, AND WHERE INSTALLATION REQUIRES JOINTS FOR FIELD ASSEMBLY IN
- WELDED DUCT CONSTRUCTION. 1.3.3. FOR GREATER CLARITY, DO NOT SUBMIT FIELD/FABRICATION DRAWINGS FOR
 - OTHER AREAS OF THE WORK.
- 1.3.4. SUBMIT SCHEDULES AND DETAILS TO SHOW;
- 1.3.4.A. FABRICATION DETAILS OF 1.3.4.A.A. CONNECTIONS TO RISERS IN DUCT SHAFTS
- 1.3.4.A.B. BALANCING DAMPER CONSTRUCTION,
- 1.3.4.A.C. FITTINGS WHERE GEOMETRY CONTEMPLATED IS DIFFERENT FROM THAT SPECIFIED.
- 1.3.4.A. IN CHART FORM
- 1.3.4.A.A. DUCT SYSTEM PRESSURE CLASS, 1.3.4.A.B. DUCT SHEET GAUGES,
- 1.3.4.A.C. JOINT TYPES AND APPLICATION CRITERIA,
- 1.3.4.A.D. LOCATION CRITERIA AND DIMENSIONS FOR BRACING, STIFFENERS AND BALANCING DAMPERS 1.3.4.A.E. DUCT LEAKAGE CLASS, AND
- 1.4. RECORD DRAWINGS 1.4.1. AS WORK PROGRESSES, MARK-UP FIELD DRAWINGS AND SUBMIT AS PART OF
- RECORD OF "AS-BUILT" CONDITIONS. 1.5. QUALIFICATIONS 1.5.1. DUCTWORK SYSTEMS TO BE PROVIDED BY FIRM HAVING AN ESTABLISHED
 - REPUTATION IN THIS FIELD.

2.1. BASIC MATERIAL 2.1.1. GALVANIZED STEEL:

2. PRODUCTS

- 2.1.1.A. LOCK FORMING QUALITY TO ASTM A525, G90 ZINC COATING.
- 2.1.2. ALUMINUM:
- 2.1.2.A. TYPE 3003-H-14 SHEET MATERIAL. 2.2. FIRE RATED DUCT WRAP INSULATION
- 2.2.1. FIRE RATING: 2 HRS OR AS SHOWN. 2.2.2. ULC/WARNOCK HERSEY/ETI LISTED:
- 2.2.2.A. MAXIMUM FLAME SPREAD AND SMOKE DEVELOPMENT RATING: 25/50, TO ULC-S102.
- 2.2.2.B. 2 HR VENTILATION DUCT: CAN/ISO 6944, OR CAN/ULC-S101 2.2.2.C. MATERIAL: FOIL ENCAPSULATED, FIREPROOF INSULATION BLANKET
- 2.3. PROPRIETARY MANUFACTURED FLANGED DUCT JOINTS 2.3.1. MATERIAL TO MATCH THAT OF DUCTWORK BEING JOINED.
- 2.4. SEALANT AND TAPE 2.4.1. AS SPECIFIED IN DUCT ACCESSORIES SECTION 23 33 05.
- 2.5. HANGERS AND SUPPORTS
- 2.5.1. UPPER HANGER ATTACHMENTS; 2.5.1.A. IN NEW CONCRETE: MANUFACTURED CONCRETE INSERTS.
- 2.5.1.B. FOR STEEL JOIST: GALVANIZED JOIST CLAMPS OR STEEL PLATE WASHER. 2.5.2. UPPER HANGERS AND SUPPORTS 2.5.2.A. IN NEW CONCRETE: MANUFACTURED CONCRETE INSERTS.
- 2.5.2.B. FOR STEEL JOIST: GALVANIZED JOIST CLAMPS OR STEEL PLATE WASHER. 2.5.2.C. FOR STEEL BEAMS: GALVANIZED BEAM CLAMPS. STANDARD OF ACCEPTANCE: ANVIL, MYATT
- 2.6. DUCT ACCESS DOORS





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

MECHANICAL SPECIFICATIONS -2 OF 5

^{date} 01-14-2021	project no. 2202027
drawn by FS	
checked by DP	drawing no.
^{scale} N.T.S.	M-1.2

- 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 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

- FI FXIBI F).
- 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 LONGITUDINAL 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), SLOPED TO BASE OF RISER WHERE HORIZONTAL RUN IS MORE THAN 3.3.2.D. 3M (10 FT), WITH NPS 3/4 DRAIN CONNECTION FROM LOW POINTS IN BOTTOM OF DUCT, TRAPPED AND PIPED TO DRAIN.
- 3.3.3. SHOWER EXHAUST DUCTS: 3.3.3.A. ALUMINIUM, 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
- 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 FACH 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 MFT.

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<u>ACOUSTIC LINING (DUCTWORK)</u>

- 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- $40 \Box C$ TO $82 \Box C$ (- $40 \Box F$ TO $180 \Box F$),
- 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
- 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 <u>23 33 05</u> 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 2.1. 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 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 (11/4 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.

1. GENERAL

2. PRODUCTS

1.1. SCOPE

- 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.)
- 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; TWO SASH LOCKS FOR DOORS UP TO 300MM X 300MM (12" X 2.4.2.D.A.
- 2.4.2.D.B. FOUR SASH LOCKS FOR DOORS UP TO 301MM X 450MM (13" x
- 2.4.1.D.C. PIANO HINGE AND MINIMUM 2 SASH LOCKS FOR DOORS UP TO 451MM X 1000MM (19" X 40")
- PIANO HINGE AND 2 HANDLES OPERABLE FROM BOTH SIDES FOR 2.4.1.D.D. 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 HANDI F
- 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
- 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,

AND LARGER.

PLENUMS.

TEMPERATURE READINGS.

3.4.3. INSTALL FOR VELOCITY TRAVERSES;

3.4. INSTRUMENT TEST PORTS

3.4.3.D.C.

- 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")

3.3.3.C. 1500 MM (60") HIGH BY 450 MM (18") WIDE IN CASINGS AND

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

OUTLET. PORTS IN MAIN TO BE UPSTREAM OF BRANCH IN BOTH

DOWNSTREAM OF INTERSECTION OF CONVERGING AIR STREAMS OF

3.4.1. INSTALL FOR DUCT VELOCITY TRAVERSE READINGS AND FOR DUCT AIR

3.4.3.A. AT DUCTED INLETS TO ROOF AND WALL EXHAUSTERS,

DIVERGING AND CONVERGING FLOW.

3.4.3.D. INSTALL FOR TEMPERATURE MEASUREMENT;

3.4.3.D.B. AT INLET AND OUTLET OF COILS, AND

DIFFERENT TEMPERATURES.

3.4.3.D.A. AT OUTSIDE AIR INTAKES,

3.4.3.B. AT INLET TO AND OUTLET FROM OTHER FAN SYSTEMS, AND

HIGH PRESSURE INDUCTION UNITS AND HOT WATER RADIATORS

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3.4.3.C. AT MAIN AND BRANCH WHERE BRANCH SERVES MORE THAN ONE

MM (20") FOR TEMPERATURE MEASUREMENTS.

- 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 <u>23 33 15</u>

- 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.
- 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,

CAULKED JOINTS, AND RETAINING ANGLES,

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,

- 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.

2.4.1.E. ENCLOSURE: TYPE A AND B

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. "STATIC" - IN AIR HANDLING SYSTEMS DESIGNED TO SHUT-DOWN ON 3.2.1.C. 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 DAMPFR. 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.

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GENERAL

2. PRODUCTS

2.1. LOUVRES

DIMENSIONS.

2.1.1.B. CONSTRUCTION:

2.1.1.B.G. SCREEN:

2.1.1. PERFORMANCE:

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

2.1.1.A. FREE AREA NOT LESS THAN 40% OF NOMINAL SIZE,

2.1.1.B.A. MATERIAL: EXTRUDED ALUMINUM ALLOY [6063-T5],

2.1.1.B.C. STORM PROOF PATTERN BLADE WITH CENTRE WATERSHED,

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

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,

REINFORCING BOSSES AND MAXIMUM BLADE

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

2.1.1.B.B. EXPOSED JOINTS GROUND FLUSH AND SMOOTH,

LENGTH OF 1500 MM (60 IN),

NUMBERS, DESIGN DATA, SUPPORT AND ANCHOR DETAILS AND OUTLINE

- 2 MM (14 GA) WIRE IN FORMED U-FRAME, - EXHAUST LOUVRES: 12 MM (1/2 IN) MESH,
- INTAKE LOUVRES: 25 MM (1 IN) MESH. 2.1.1.B.H. FINISH: CLEAR ANODIZED SATIN.

EXECUTION

1. SCOPF

2. PRODUCTS

EXECUTION

1. GENERAL

2. PRODUCTS

2.1. GENERAL

1.1. SCOPE

3.1. LAYOUT

2.1. GENERAL

STANDARD OF ACCEPTANCE: CONSTRUCTION SPECIALTIES - MODEL 6110, AIROLITE - CB638 ALUMAVENT - AL-445-5, CARNES, K.N. CROWDER - CANADIAN LOUVRES 411S

3.1. INSTALLATION 3.1.1. CONFIRM OPENING SIZE AND CO-ORDINATE LOCATION OF LOUVRES WITH OTHER 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

<u>GRILLES, REGISTERS AND DIFFUSERS</u> <u>23 37 13</u>

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.

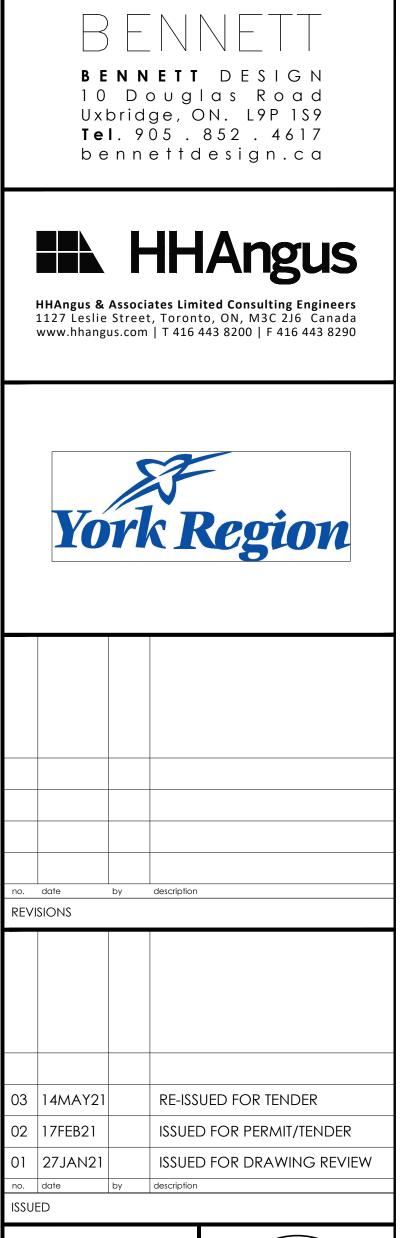
2.1.1. GRILLES, REGISTERS AND DIFFUSERS:

- 2.1.1.A. PRODUCT OF ONE MANUFACTURER WHERE SAME MODEL OR TYPE IDENTIFICATION IS USED. 2.1.1.B. STANDARD CATALOGUE PRODUCTS SELECTED TO MEET CAPACITY, THROW,
- AND NOISE LEVEL. 2.1.1.C. PRIME COATED. STAMPED OR COLD ROLLED STEEL MATERIAL WITH MITRED CORNERS AND EXPOSED JOINTS WELDED AND GROUND SMOOTH. 2.1.1.D. EXTRUDED SATIN FINISH, CLEAR ANODIZED ALUMINUM MATERIAL WITH MITRED CORNERS AND MECHANICAL FASTENERS
- FRAMES WITH FULL PERIMETER GASKETS, PLASTER STOPS WHERE SET INTO PLASTER OR GYPSUM BOARD, AND CONCEALED FASTENERS. 2.2. TYPE DESIGNATIONS
- 2.2.1. DIFFUSER, REGISTER AND GRILLE SCHEDULE IDENTIFIES MODEL OR TYPE IDENTIFIERS USED ON FLOOR PLANS WITH MODEL NUMBERS TAKEN FROM LISTED MANUFACTURER'S CATALOGUE.
- 2.2.2. WHERE SEVERAL MANUFACTURER'S MODEL NUMBERS ARE GIVEN, THESE ARE ACCEPTABLE ALTERNATIVES. 2.2.3. WHERE ONLY ONE MANUFACTURER'S MODEL NUMBER IS GIVEN, PROVIDE DESIGNATED ITEM.
- 2.3. SUPPLY REGISTERS 2.3.1. DOUBLE DEFLECTION STYLE WITH FACE BARS VERTICAL AND REAR BARS HORIZONTAL,
- 2.3.2. PERIMETER BORDER WITH GASKET, 2.3.3. OF STEEL OR ALUMINUM MATERIAL
- 2.4. RETURN AND EXHAUST GRILLES
- 2.4.1. SINGLE DEFLECTION TYPE, WITH HORIZONTAL FACE BARS, 20 MAXIMUM TURN 2.4.2. PERIMETER BORDER WITH GASKET,
- 2.4.3. OF STEEL OR ALUMINUM MATERIAL
- 2.5. DIFFUSERS 2.5.1. CIRCULAR OR SQUARE MULTIPLE CONE OR SQUARE PLAQUE FACE TYPE, WITH ADJUSTABLE PATTERN CONTROL, 2.5.2. OF STEEL OR ALUMINUM MATERIAL
- 2.6. LINEAR GRILLES 2.6.1. ALUMINUM BAR CORE TYPE WITH MARGIN AS INDICATED, PATTERN ADJUSTMENT, PLASTER FRAMES, SEALING STRIPS, END CAPS, MITRED CORNERS AND ALIGNMENT KEY STRIPS FOR MULTIPLE SECTIONS. 2.6.2. CAPABLE OF SUPPORTING {90KG}{200LB} POINT LOADS WHERE INSTALLED AS
 - FLOOR GRILLES.
- 3.1.1. DRAWINGS SHOWING POSITION OF AIR DISTRIBUTION OUTLETS ARE ESSENTIALLY DIAGRAMMATIC. COORDINATE EXACT LOCATION OF DIFFUSERS WITH OTHER ELEMENTS IN CEILING AND SHOWN ON REFLECTED CEILING DRAWINGS AND SELECT TRIM TO SUIT CEILING MATERIALS LISTED IN FINISH SCHEDULES. 3.2. SPECIAL INSTALLATIONS
- 3.2.1. GRILLES, REGISTERS AND DIFFUSERS PENETRATING FIRE WALLS AND FIRE PARTITIONS, TO HAVE STEEL SLEEVES SECURED TO STRUCTURE IN ACCORDANCE WITH NFPA 90A-1985.
- 3.3. INSTALLATION OF GRILLES AND REGISTERS 3.3.1. INSTALL SUPPLY REGISTERS WITH FACE BARS VERTICAL AND EXHAUST AND RETURN REGISTERS WITH FACE BARS HORIZONTAL.
- 3.3.2. .2 INSTALL REGISTERS AND GRILLES WITH OVAL HEAD CADMIUM PLATED SCREWS IN COUNTERSUNK HOLES WHERE FASTENINGS ARE VISIBLE.
- 3.4. INSTALLATION OF DIFFUSERS 3.4.1. DIFFUSERS TO BE INSTALLED WITH CONCEALED FASTENINGS. 3.4.2. ROUND, SQUARE AND RECTANGULAR DIFFUSERS TO BE PROVIDED WITH EQUALIZING DEFLECTORS. MOUNTED IN NECK. ACCESSIBLE FROM DIFFUSER
- FACE, WITH BLADES ORIENTED AT RIGHT ANGLES TO DIRECTION FROM WHICH AIR IS FLOWING. 3.4.3. EXCEPT FOR LAST DIFFUSER ON BRANCH, EACH DIFFUSER INSTALLED IN UNDERSIDE OF SUPPLY DUCT TO HAVE EXTRACT VOLUME CONTROL DAMPER

TERMINAL BOXES <u>23 36 13</u>

- 1.1.1. PROVIDE TERMINAL BOXES AS SHOWN.
- 1.2. SHOP DRAWINGS 1.2.1. SUBMIT MANUFACTURER'S DATA SHEETS WITH EQUIPMENT MODEL NUMBERS, PERFORMANCE AND DESIGN DATA, OUTLINE DIMENSIONS, ENCLOSURE DETAILS, SUPPORT AND CONNECTION ARRANGEMENTS AND ELECTRICAL POWER
 - REQUIREMENTS WHERE APPLICABLE.
- 1.3. APPLICABLE CODES AND STANDARDS 1.3.1. ARI STANDARD 880 STANDARD FOR AIR TERMINALS
- 1.3.2. ARI STANDARD 885 STANDARD FOR ESTIMATING OCCUPIED SPACE SOUND LEVELS
- IN THE APPLICATION OF AIR TERMINALS AND AIR OUTLETS. 1.3.3. ASHRAE STANDARD 180 METHODS OF TESTING FOR RATING DUCTED AIR TERMINAL UNITS
- 2.1.1. SELECTION OF UNITS TO MEET AIR QUANTITIES SHOWN TO BE BASED ON; 2.1.1.A. MAXIMUM INLET AIR PRESSURE; 750 PA (3 IN WG),
- 2.1.1.B. MINIMUM INLET AIR PRESSURE: 75 PA (0.3 IN WG). 2.1.1.C. MAXIMUM ROOM NC SOUND PRESSURE LEVEL (2 X 10-4 MICROBAR REFERENCE) AT MAXIMUM INLET PRESSURE TO BE LESS THAN 40 AT DISCHARGE AND 42 RADIATED FOR BOX WITH ATTENUATOR MOUNTED EXPOSED (WITHOUT CEILING). 2.1.2. WHERE SIZES, MODEL NUMBERS AND UNIT TYPES ARE INDICATED, SELECTIONS
- ARE TAKEN FROM E.H. PRICE CATALOGUE. 2.2. TERMINAL BOX 2.2.1. CONSTRUCTION:
 - 2.2.1.A. PRESSURE INDEPENDENT TYPE WITH VELOCITY SENSOR. DAMPER ASSEMBLY, FACTORY CALIBRATED CONTROLLER AND ACTUATOR WITH







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

MECHANICAL **SPECIFICATIONS** -3 OF 5

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checked by DP	drawing no.
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- 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 Z 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 (11/4 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 <u>23 37 16</u>

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. EXCEPTION: VAPOR BARRIER MASTICS INSTALLED OUTSIDE OF 1.5.1.B.A. 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 (1/2 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
- PFRMS. 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, CORRUGATED STAINLESS STEEL NOT LESS THAN 0.25 MM (0.010 IN) 2.4.3.A.B.
- 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 (1/2 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
- 2.5.1.E. NONCOMBUSTIBLE, 2.5.1.F. THERMAL PERFORMANCE: $R = 0.74 \text{ M2 °C/W} \oplus 24 \text{ C} (4.2 \text{ BTU FT2})$ 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 EMPERATURE (EQUIPMENT CONTACT) UP TO 232 C (450 F).
- 2.5.2.C. RIGID FOR FLAT SURFACES OR, SCORED BOARD FOR CURVED SURFACES 250 MM (10 IN) DIA AND 2.5.2.D. OVER.
- 2.5.2.E. JACKET OF KRAFT BONDED TO ALUMINUM FOIL REINFORCED WITH GLASS FIBRE YARN.
- THERMAL PERFORMANCE: 0.033 W/M/C @ 24 C (0.23 BTU/HR/IN/SQ 2.5.2.F. 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),

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

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

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

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,

PLENUMS. FREE-STANDING SUPPLY FANS. AND SUPPLY AIR DUCTS AND

PLENUMS UP TO THE SPACE SERVED BUT NOT IN THE SPACE ITSELF,

CONDITIONED AIR SUPPLY DUCTS INCLUDING DOWNSTREAM OF REHEAT

FOR NON-RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT

SHEET METAL BLANK-OFF PLATES BEHIND UNUSED SECTIONS OF AIR

COOLING COILS, TERMINATE PLENUM OR CASING INSULATION 300 MM

COILS, TERMINATE OUTSIDE AIR INTAKE INSULATION 300 MM (12 IN)

3.1.1.B. CONDITIONED AIR WITH HEATING ONLY: SUPPLY UNIT CASING AND

3.1.1.D. UN-CONDITIONED SUPPLY AIR DUCTS AND PLENUMS THAT PASS

RETURN AIR DUCTS AND PLENUMS IN UNHEATED SPACES,

3.1.1.H. EXHAUST AIR DUCTS BETWEEN EXHAUST AIR DAMPER AND POINT OF

(12 IN) DOWNSTREAM OF FINAL HEATING COIL,

3.1.1.J.A. FOR RECIRCULATING TYPE VENTILATION SYSTEMS WITHOUT COOLING

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

INSULATION, EXCEPT AS DESCRIBED ABOVE,

3.1.3.A. CASINGS, DUCTS OR PLENUMS WHICH HAVE BEEN LINED WITH ACOUSTIC

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

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

DISCHARGE TO OUTSIDE OF BUILDING,

3.1.1.J. MIXED AIR PLENUMS AND DUCTS;

INTAKE LOUVRES.

3.1.2.B. CONDITIONED SUPPLY DUCTS.

DUCT ON ROOF

3.1.2.A. SUPPLY DUCTS.

3.1.2.C. RETURN DUCTS,

3.1.2.D. EXHAUST DUCTS,

OUTSIDE AIR INTAKE DUCTS AND PLENUMS;

DOWNSTREAM OF MIXING PLENUM,

3.1.2. EXTERNALLY INSULATE DUCTWORK LOCATED OUTDOORS:

3.1.2.D.A. EXCLUDING FAN DISCHARGE DUCT,

3.1.2.E.A. EXCLUDING FAN DISCHARGE DUCT.

3.1.3. EXTERNAL INSULATION IS NOT REQUIRED ON:

THROUGH UNHEATED ROOMS OR SPACES,

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

3.1.1. EXTERNALLY INSULATE AIR HANDLING SYSTEM COMPONENTS:

2.5.4.C. RIGID FOR FLAT SURFACES,

FT/F° @ 50°F),

ASTM E84.

COILS.

DUCTWORK.

3. EXECUTION

3.1. INSULATION LIMITS

3.1.1.C.

3.1.1.F.

3.1.1.l.

3.1.1.K.

3.1.1.I.A.

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.
GENERAL RE	QUIREMENTS
2.1. INSULAT	E 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 TY	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)

$\begin{array}{c c c c c c c c c c c c c c c c c c c $				
SURFACE TEMPERATUREEQUIPMENT DESCRIPTIONINSULATION TYPEINSULATION TYPEAMBIENT TO 65°C (AMBIENT TO 150°F)PLENUMS AND CASINGS – AIR INTAKED2TWO LAYERS EACH 50D475 (3)D475 (3)PLENUMS AND CASINGS – EXHAUSTD250 (2)RECTANGULAR – OUTDOOR – SUPPLYD250 (2)RECTANGULAR – OUTDOOR – RETURN RECTANGULAR – OUTDOOR – EXHAUSTD238 (1-1/2)	TABLE	2: DUCTWORK AND PLENUM INSULATION	I TYPE AND	THICKNESS MM (IN)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	SURFACE	EQUIPMENT DESCRIPTION		INSULATION THICKNESS
$\frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{4}}{D_{5}} = \frac{D_{5}}{D_{5}} = \frac{D_{5}}{D$			D2	TWO LAYERS EACH 50 (2
PLENOMS AND CASINGS - EXHAUST D4 38 (1-1/2) RECTANGULAR - OUTDOOR - SUPPLY D2 50 (2) RECTANGULAR - OUTDOOR - RETURN RECTANGULAR - OUTDOOR - EXHAUST D2 38 (1-1/2)	(AMBIENT TO 150°F)		D4	75 (3)
D438 (1-1/2)RECTANGULAR - OUTDOOR - SUPPLYD250 (2)RECTANGULAR - OUTDOOR - RETURN RECTANGULAR - OUTDOOR - EXHAUSTD238 (1-1/2)		PLENLIMS AND CASINGS - EXHAUST	D2	50 (2)
RECTANGULAR – OUTDOOR – RETURN RECTANGULAR – OUTDOOR – EXHAUST D2 38 (1–1/2)			D4	38 (1-1/2)
RECTANGULAR – OUTDOOR – EXHAUST D2 38 (1–1/2)		RECTANGULAR – OUTDOOR – SUPPLY	D2	50 (2)
ROUND – OUTDOOR D3 TWO LAYERS EACH 25			D2	38 (1-1/2)
		ROUND - OUTDOOR	D3	TWO LAYERS EACH 25 (1)
DRAIN PANS D3 20 (3/4) D3 20 (3/4)		DRAIN PANS D3 20 (3/4)	D3	20 (3/4)

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

<u>PLUMBING GENERAL</u> <u>22 05 01</u>

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.

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
- 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 MFTFR
- 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

3.5.2.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 GASKETTED ACCESS COVER AND PLUG, WITH CLEANOUT BODY CAST IN FLOOR SLAB ABOVE. 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

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

3.4.1.B. VALVES

EQUIPMENT.

3.5. DRAINAGE

3.5.2. FITTINGS;

3.4.1.C. ZONE OR EQUIPMENT BACKFLOW PROTECTION.

AND OTHER EQUIPMENT REQUIRING HOT WATER.

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.

3.5.1. PROVIDE WASTE AND VENT CONNECTIONS TO PLUMBING FIXTURES AND

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

- 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. ARRANGE AND PAY FOR LABORATORY TESTING OF WATER SAMPLES 3.6.3.E. TAKEN FROM NEWLY DISINFECTED MAIN.
- 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 <u>22 14 19</u>

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 CAN/ULC-S102 STANDARD METHOD OF TEST FOR SURFACE BURNING CHARACTERISTICS OF FLOORING, FLOOR COVERING, AND MISCELLANEOUS

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.

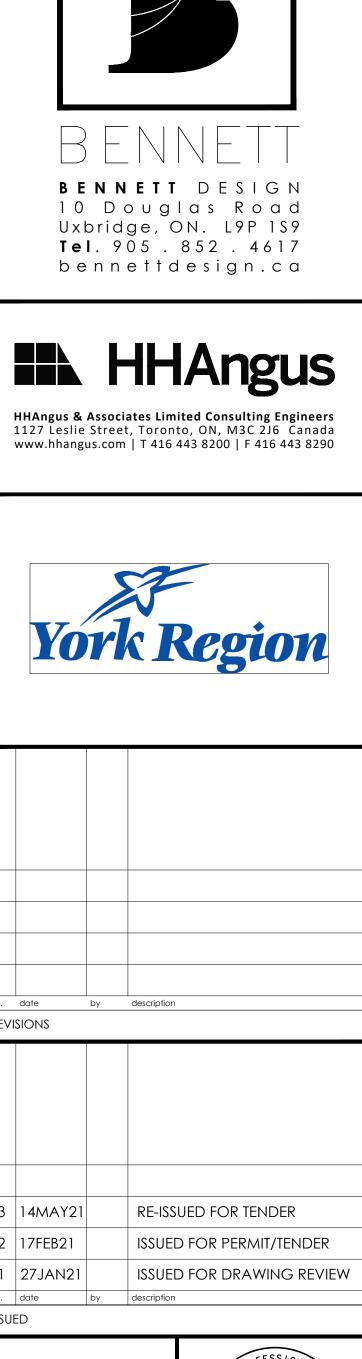
DOMESTIC WATER HEATERS <u>22 33 13</u>

- 1. GENERAL 1.1. SCOPE
- 1.1.1. PROVIDE DOMESTIC HOT WATER HEATERS AS SHOWN

MATERIALS AND ASSEMBLIES

- 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 OPFRATION 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. EXECUTION 3.1. INSTALLATION 3.1.1. PROVIDE SUPPORTING STRUCTURAL STEEL FOR HORIZONTAL MOUNTED TANKS AND FOR INSTANTANEOUS HEATERS. SET ANCHOR BOLTS THROUGH FEET OF VERTICAL TANKS 3.1.2. ISOLATE TANKS FROM GROUND. FOR HORIZONTAL TANKS PROVIDE DIELECTRIC PADS BETWEEN TANK AND SADDLES, AND FOR VERTICAL TANKS WITH LEGS, PROVIDE DIELECTRIC PADS UNDER FEET, AND ISOLATION WASHERS AND SLEEVES AT EACH ANCHOR BOLT. 3.1.3. CONNECT UP TO COLD WATER SUPPLY LINES AND DOMESTIC HOT WATER DISTRIBUTION PIPING WITH 300MM (12 IN) LONG, LINE SIZE FLEXIBLE CONNECTIONS 3.1.4. INSTRUMENTS WITH EXTERNAL ELECTRIC WIRING TO BE ISOLATED FROM HEATERS AND TANKS WITH DIELECTRIC BUSHINGS OR DIELECTRIC UNIONS 3.1.5. PROVIDE TEMPERATURE AND PRESSURE RELIEF VALVE FOR WATER SIDE OF EACH HEATER PIPED TO NEAREST FUNNEL OR HUB DRAIN. 3.1.6. PROVIDE VALVED DRAIN FROM EACH TANK PIPED TO NEAREST FUNNEL OR HUB 3.1.7. AT EACH HOT WATER HEATER REQUIRING ELECTRIC POWER PROVIDE SUITABLY SIZED FUSED DISCONNECT SWITCH AND WIRE FROM SWITCH TO HEATER. PLUMBING SPECIALTIES & ACCESSORIES <u>22 05 23</u> 1. GENERAL 1.1. SCOPE 1.1.1. PROVIDE PLUMBING SPECIALTIES AND ACCESSORIES. 1.2. PRODUCT DATA 1.2.1. SUBMIT PRODUCT DATA SHEETS FOR; 1.2.1.A. FLOOR DRAINS, CLEANOUTS, WATER HAMMER ARRESTERS, BACK FLOW PREVENTERS, BACK WATER VALVES, STRAINERS AND TRAPS. 1.3. APPLICABLE CODES AND STANDARDS 1.3.1. CSA-B125 PLUMBING FITTINGS. 1.3.2. CSA B.64.1.1 VACUUM BREAKERS, ATMOSPHERIC TYPE 1.3.3. CSA B.64.4 BACKFLOW PREVENTERS, REDUCED PRESSURE PRINCIPLE TYPE 1.3.4. CSA B64.10 MANUAL FOR THE SELECTION AND INSTALLATION OF BACKFLOW PREVENTION DEVICES/MANUAL FOR THE MAINTENANCE AND FIELD TESTING OF BACKFLOW PREVENTION DEVICES 1.3.5. CSA B79 FLOOR, AREA, AND SHOWER DRAINS AND CLEANOUTS FOR RESIDENTIAL CONSTRUCTION 1.3.6. PLUMBING AND DRAINAGE INSTITUTE (PDI) STANDARD PDI-WH201.WATER HAMMER ARRESTERS 1.3.7. PDI-G101 TESTING AND RATING PROCEDURE FOR GREASE INTERCEPTORS WITH APPENDIX OF SIZING AND INSTALLATION DATA. 2. PRODUCTS 2.1. GENERAL 2.1.1. FLOOR, AREA, COMBINATION AND ROOF DRAINS AND CLEANOUTS TO CONFORM TO CSA B79 AND TO BE PRODUCTS OF ONE MANUFACTURER. STANDARD OF ACCEPTANCE: JAY R. SMITH, MIFAB, ZURN 2.2. FLOOR DRAINS 2.2.1. CONSTRUCTION: 2.2.1.A. CAST IRON BODY 2.2.1.B. INTEGRAL DOUBLE DRAINAGE OPENINGS, FLASHING RING AND CLAMPING date by description REVISIONS 2.2.1.C. POLISHED NICKEL BRONZE ADJUSTABLE STRAINER. 2.2.1.D. INTEGRAL FLANGE TO RECEIVE THE FLOOR FINISH. 2.2.1.E. ADJUSTABLE GALVANIZED DUCTILE IRON TRACTOR GRATES IN MECHANICAL EQUIPMENT ROOMS AND FAN ROOMS. 2.3. COMBINATION DRAINS 2.3.1. AS SPECIFIED FOR FLOOR DRAINS WITH ADJUSTABLE NICKEL BRONZE STRAINER AND NICKEL BRONZE OVAL WASTE FUNNEL 2.4. CLEANOUTS 2.4.1. IN FLOORS: 2.4.1.A. LINE SIZE FOR NPS 2, NPS 3 AND NPS 4 AND NPS 4 IN LARGER LINES 2.4.1.B. SEAL AND TEST PLUG)3 |14MAY21 2.4.1.C. CAST IRON BODY WITH CLAMP AND COLLAR, 2.4.1.D. IN UNFINISHED FLOOR AREAS,)2 |17FEB21 2.4.1.D.A. CAST IRON FRAME HEAVY DUTY SCORIATED CAST IRON ROUND OR SQUARE TRACTOR COVER AND INTERNAL PLUG, AND 1 27JAN21 2.4.1.E. IN FINISHED FLOOR AREAS, 2.4.1.E.A. NICKEL BRONZE FRAME AND ROUND OR SQUARE NICKEL BRONZE date description ADJUSTABLE ACCESS COVER, SSUED 2.4.1.E.B. RECESSED FOR TILE INFILL IN TILED AREAS, 2.4.1.E.C. RECESSED FOR CARPET INFILL IN CARPETED AREAS, 2.4.1.E.D. DEEPLY RECESSED FOR TERRAZZO INFILL IN TERRAZZO FINISHED AREAS. AND WITH 2.4.1.E.E. EXTENDED FLANGE AROUND FRAME IN AREAS WITH MONOLITHIC FLOOR FINISHES. 2.4.2. IN EXPOSED AREAS, CEILING SPACES AND ACCESSIBLE PIPE CHASES, 2.4.2.A. CAST IRON CAULKING FERRULE WITH NEOPRENE JACKET AND PLUG SECURED TO BODY WITH CAP SCREWS. 2.5. WATER HAMMER ARRESTERS 2.5.1. STAINLESS STEEL CONSTRUCTION WITH PRECHARGED AIR CHAMBER OF NESTING BELLOWS 2.5.2. SELECTED IN ACCORDANCE WITH PLUMBING AND DRAINAGE INSTITUTE STANDARD PD1-WH201. YORK REGION 2.6. TRAP SEAL PRIMERS 2.6.1. SERVING 1 OR 2 DRAINS: PARAMEDIC SERVICES 2.6.1.A. DIAPHRAGM OPERATED PRIMER WITH DISTRIBUTION UNIT, 2.6.1.B. AUTOMATICALLY OPERATED BY A PRESSURE DROP OF 35 TO 70 KPA (5 TO 10 PSI) IN SUPPLY LINE TO FIXTURE. ON L4J 8X9 2.6.2. SERVING 3 TO 30 DRAINS: 2.6.2.A. ELECTRIC, MANIFOLDED UNITS, 2.6.2.B. COMPONENTS FACTORY ASSEMBLED IN 1.5 MM (16 GA) RECESSED METAL CABINET WITH HINGED STAINLESS STEEL LOCKABLE ACCESS MECHANICAL 2.6.2.C. ATMOSPHERIC VACUUM BREAKER, 2.6.2.D. PRESET 24 HR CLOCK, 2.6.2.E. MANUAL OVER RIDE SWITCH, 2.6.2.F. 120 VOLT SOLENOID VALVE, 2.6.2.G. NPS ? OR NPS ½ VALVED INLET WATER CONNECTION, 4 OF 5 2.6.2.H. CALIBRATED WATER DISTRIBUTION MANIFOLD, 2.6.2.I. NPS ½ OUTLET COMPRESSION FITTINGS. 2.7. BACK-FLOW PREVENTERS - REDUCED PRESSURE PRINCIPLE (RP) 2.7.1. CONFORMING TO CSA B.64.4 2.7.2. NPS 3/4 AND LARGER: 2.7.2.A. TWO INDEPENDENT CHECK VALVES WITH INTERMEDIATE RELIEF VALVE, 2.7.2.B. OS&Y ULC LISTED RESILIENT SEATED GATE VALVES,





111 RACCO PARKWAY, VAUGHAN,

SPECIFICATIONS -

01-14-2021	project no. 2202027
drawn by FS	
checked by DP	drawing no.
scale N.T.S.	M-1.4

1. GENERAL

1.1. SCOPE

<u>22 13 16</u>

- 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

2.7.2.C. BALL TEST COCKS, AND

- 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 (1/2 IN X 0.037 IN) BANDS OF THE SAME MATERIAL SPOT WELDED TO BASKETS.
- 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 <u>COPPER 22 11 16</u>

- 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 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 21/2: 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.

- 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 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 1.3.1.0. 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 (CISPF) 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

1.2.1. FIRE PROTECTION WORK TO CONFORM TO STANDARDS OF NATIONAL FIRE

1.3.1. PROVIDE WATER FLOW TEST ON MUNICIPAL WATER SERVICE IN PROXIMITY TO

1.3.2. OBTAIN MUNICIPAL APPROVAL AND PAY FEES ASSOCIATED WITH TESTING.

TO NPS 2, GROOVED OR SCREWED.

2.1.2.A. UL/ULC LISTED FOR FIRE PROTECTION, AND

2.1.2.B. SWIVEL RING HANGER TYPE OR

STEEL FOR NPS 2 1/2 TO NPS 10, WELDED.

2.1.1.A.A. GALVANIZED WHERE SPECIFIED.

PREVENTION ASSOCIATION (NFPA) AND RELEVANT SECTIONS OF THE ONTARIO

BUILDING CONNECTION. IN ACCORDANCE WITH NEPA 14 AND NEPA 291. FLOW

TEST MUST BE CONDUCTED WITHIN ONE (1) YEAR PRIOR TO SYSTEM DESIGN.

SUBMIT RECORD OF TEST INCLUDING STATIC PRESSURE, AND RESIDUAL

2.1.1.A. ASTM A53 GRADE B, SCHEDULE 40 CONTINUOUS WELD STEEL TO UP

2.1.1.B. ASTM A53-63R GRADE B, SCHEDULE 40 ELECTRIC RESISTANCE WELD

2.1.1.C. NPS 21/2 AND OVER ASTM A53-72A SCHEDULE 10 THIN WALL, ROLLED

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.

GENERAL 1.1. SCOPE

2. PRODUCTS

2.1.1. PIPE:

BUILDING CODE.

PRESSURE AND FLOW.

GROOVED

1.3. WATER SUPPLY TEST RESULTS

2.1. PIPE, HANGERS AND GASKETS

2.1.2. PIPE HANGERS:

- 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

- 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 21/2 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 21/2 AND OVER.
- 2.3.2. FITTINGS: 2.3.2.A. MALLEABLE IRON OR DUCTILE IRON TO NPS 21/2 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 21/2
- 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.
- 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

GENERAL 1.1. SCOPE

1.1.1. PROVIDE EXTINGUISHERS IN SERVICE ROOMS, KITCHENS AND FIRE HOSE CABINETS.

<u>21 12 29</u>

- 1.2. APPLICABLE STANDARDS
- 1.2.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 10 STANDARD FOR PORTABLE FIRE EXTINGUISHERS. 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
- 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

<u>21 12 13</u>

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. 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 21/2 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 (1/4 IN) PLATE GLASS VIEWING PANEL 90% AREA OF DOOR AND THREE

PRODUCTS

2.1. SPRINKLER HEADS

2.1.1. RATINGS:

2.1.2. SELECTION:

2.1.2.A.B.

2.1.2.A.C.

2.2 ANCILLARY DEVICES

2.2.1.B.

2.2.4. WATER GONG:

2.3. SIGNS

2.3.1. TYPE:

2.3.1.A.

2.3.1.B.

2.3.1.D.

2.4.1. CONSTRUCTION:

2.5.1 CONSTRUCTION:

2.5.1.D.

CONNECTIONS.

SWITCHES.

SPRINKLERS.

CALCULATIONS.

PRESSURE TEST:

3.3.2.B.

3.3.2.C.

3.3.4.C.

ASSOCIATION.

3. EXECUTION

3.1. GENERAL

- 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 11/2 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 11/2 CHROME PLATED PRESSURE REGULARITY 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 TYPE: WH, ULC, OR UL CLASSIFIED INORGANIC MATERIAL, NON-COMBUSTIBLE, 2.9.2.C.
- 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 EXECUTION

PROTECTION

1.2. QUALIFIED SUBCONTRACTORS

1.3. APPLICABLE CODES AND STANDARDS

1.3.3. ONTARIO BUILDING CODE

1.4. SHOP DRAWINGS AND PRODUCT DATA

EACH ZONE AS DETAILED.

INSTALLED IN SYSTEM.

1.6. MAINTENANCE MATERIALS

1.3.4. ONTARIO FIRE CODE

OF SPRINKLER SYSTEMS

REQUIRE PROTECTION.

1.1.1. PROVIDE WET PIPE AUTOMATIC SPRINKLER SYSTEMS.

WATER-BASED FIRE PROTECTION SYSTEMS

ZINC-COATED, WELDED AND SEAMLESS

1.3.6. CSA B64 – BACKFLOW PREVENTERS AND VACUUM BREAKERS

TO OWNERS INSURERS FOR REVIEW AND ACCEPTANCE.

ACCORDANCE WITH DIVISION 1 PROCEDURES.

CALCULATIONS, MAY BE SUBMITTED FOR APPROVAL.

3.1. INSTALLATION

GENERAL

1.1. SCOPE

1.5. SAMPLES

- 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

APPROVED AUTOMATIC SPRINKLER) HOSE CONNECTIONS ON THE SAME

FLOOR. "SYSTEM FOR LATERAL PIPING SERVING CLASS I AND III 65MM

- SHAFTS OR FIRE RATED SERVICE SPACES. LATERAL PIPING SERVING CLASS I AND CLASS III 65MM (2½ THE SAME 3.2.2.C.
- 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

(2½) HOSE VALVES / FIRE HOSE CABINETS ONLY"

WET PIPE SPRINKLER SYSTEM

<u>21 13 13</u>

1.1.2. PROVIDE INSTALLATION DRAWINGS AND HYDRAULIC CALCULATIONS, DESIGNED AND SEALED

1.3.1. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 13 - STANDARD FOR THE INSTALLATION

BY A PROFESSIONAL ENGINEER LICENCED IN THE PROVINCE OF ONTARIO.

1.2.1. SPRINKLER WORK TO BE UNDERTAKEN BY SPECIALIST AUTOMATIC SPRINKLER

1.3.2. NFPA 25 - STANDARD FOR THE INSPECTION, TESTING AND MAINTENANCE OF

1.3.5. ASTM A53 STANDARD SPECIFICATION FOR PIPE, STEEL, BLACK AND HOT-DIPPED,

1.4.1. PREPARE SHOP DRAWINGS AND FORWARD THREE COPIES WITH HYDRAULIC CALCULATIONS

THESE STAMPED SHOP DRAWINGS AND PRODUCT DATA SHEETS FOR REVIEW IN

CLASSIFICATION DETERMINED UNDER NFPA DESIGN DENSITIES AND DESIGN AREAS FOR

IN ACCORDANCE WITH REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AS SHOWN.

SPRINKLERS. INCLUDE AT LEAST ONE HEAD OF EACH TYPE AND TEMPERATURE RATING

1.5.2. HYDRAULIC CALCULATIONS ARE BASED ON WATER SUPPLY TEST RESULTS, DOWN-RATED

1.5.3. CHANGES TO PIPE SIZES OR HEAD LAYOUTS ACCOMPANIED WITH MODIFIED HYDRAULIC

1.6.1. PROVIDE CABINET, CONTAINING SPECIAL SPRINKLER WRENCH, AND SPARE STOCK OF

1.4.2. AFTER SHOP DRAWINGS ARE ACCEPTED BY REVIEWING AUTHORITY SUBMIT COPIES OF

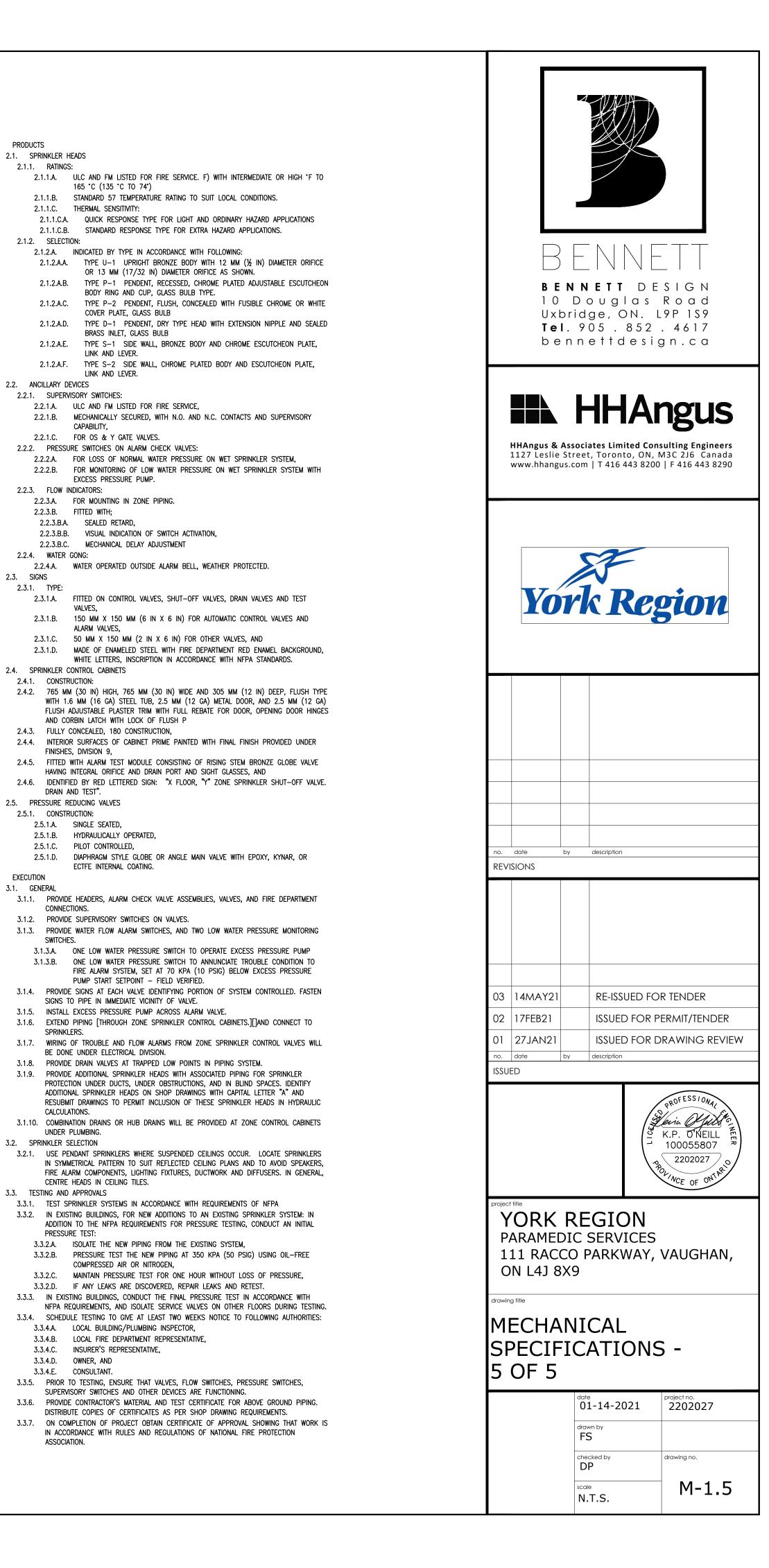
1.5.1. SYSTEM IS DESIGNED TO NFPA 13 USING HYDRAULIC METHOD FOR HAZARD

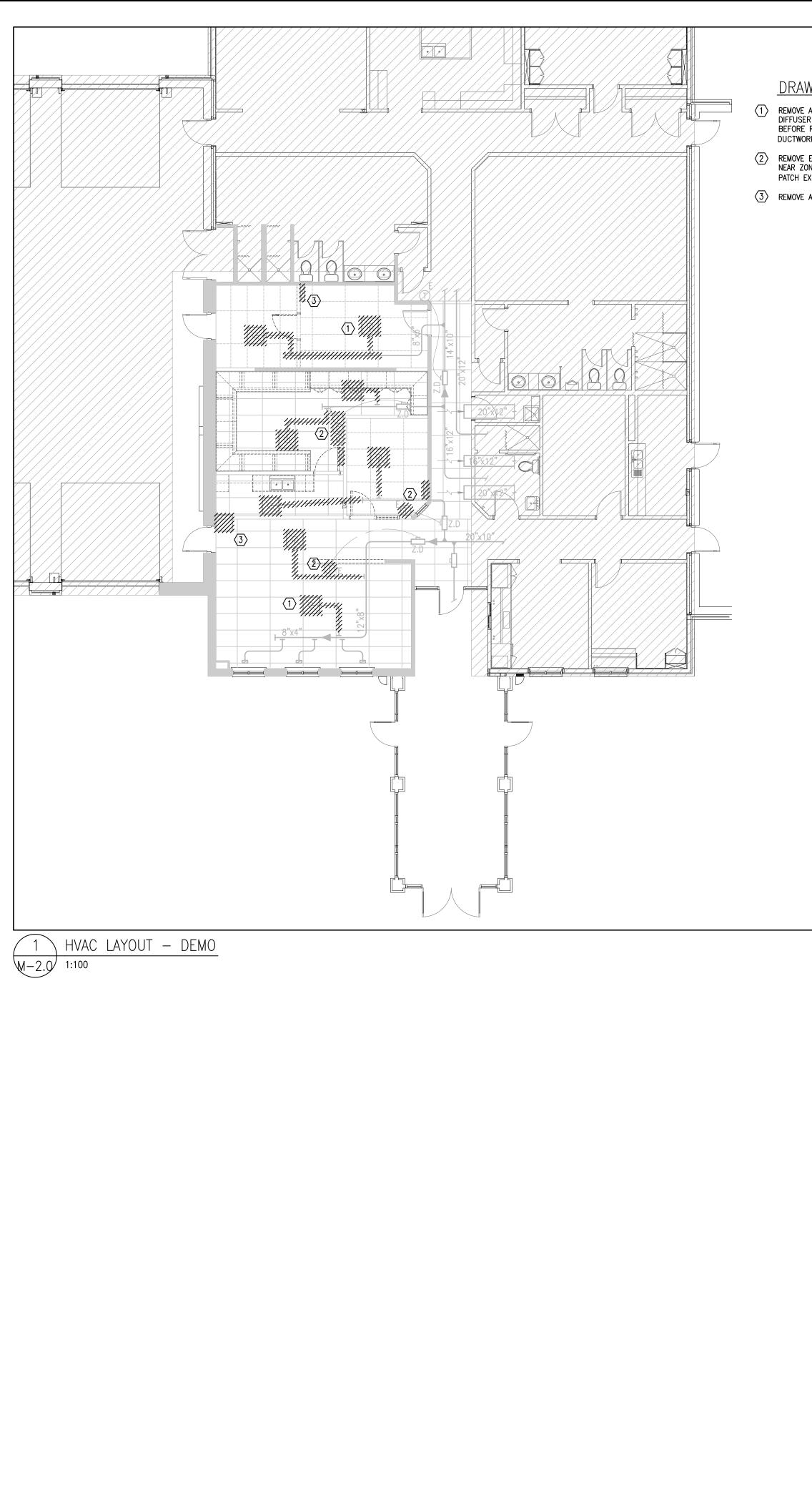
INSTALLATION FIRM WITH AN ESTABLISHED REPUTATION IN THIS FIELD.

3.2.4. FOR GREATER CLARITY, LATERAL PIPING SERVING CLASS II 11/2 DO NOT REQUIRE

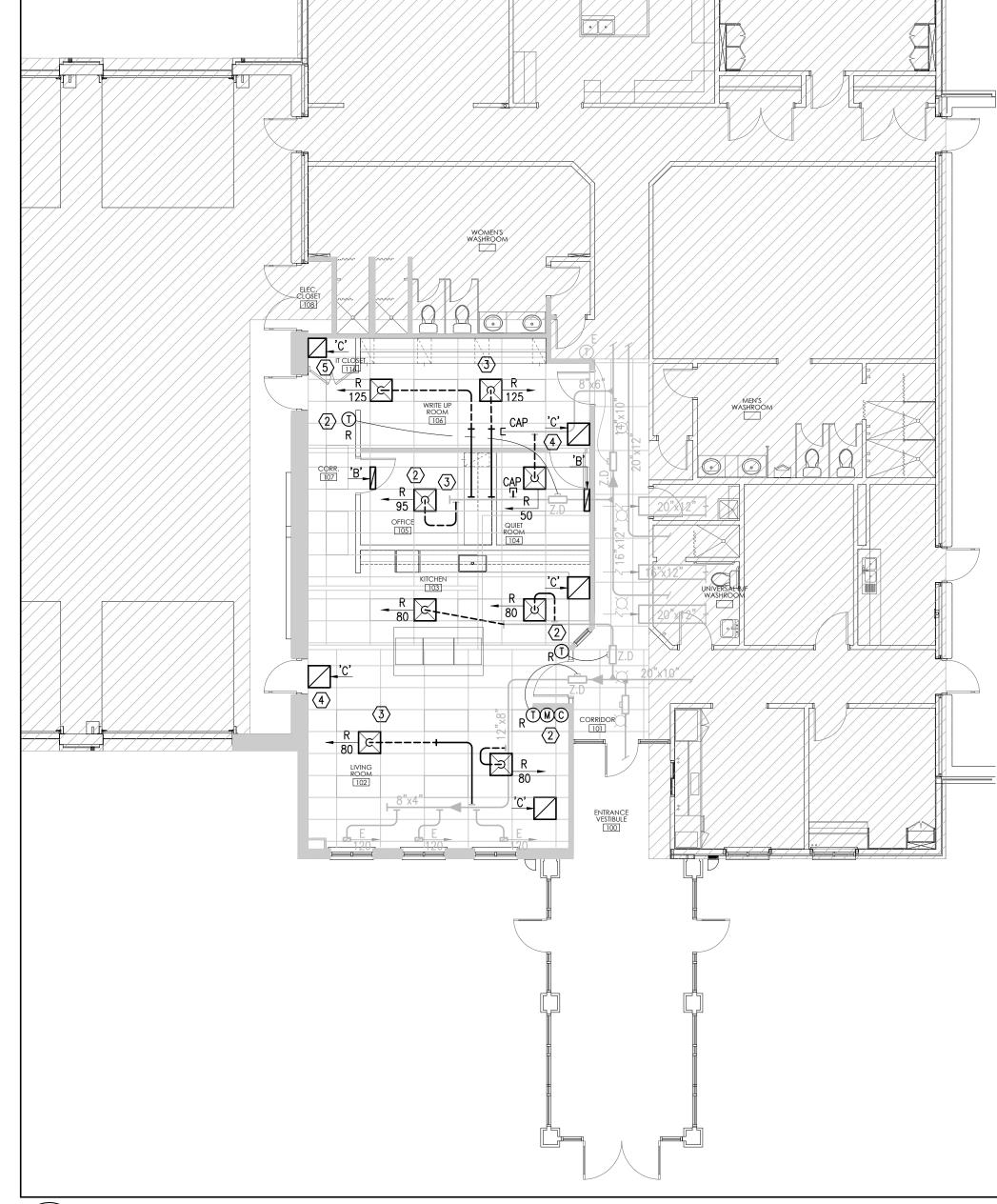
3.2.5. FOR GREATER CLARITY, FEED MAIN PIPING, FROM THE ENTRY TO THE BUILDING

AND UP TO THE SERVICE VALVE ISOLATING A STANDPIPE RISER, DOES NOT





- 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) $\overline{\langle 3 \rangle}$ remove and dispose existing return air grille. (Typical)

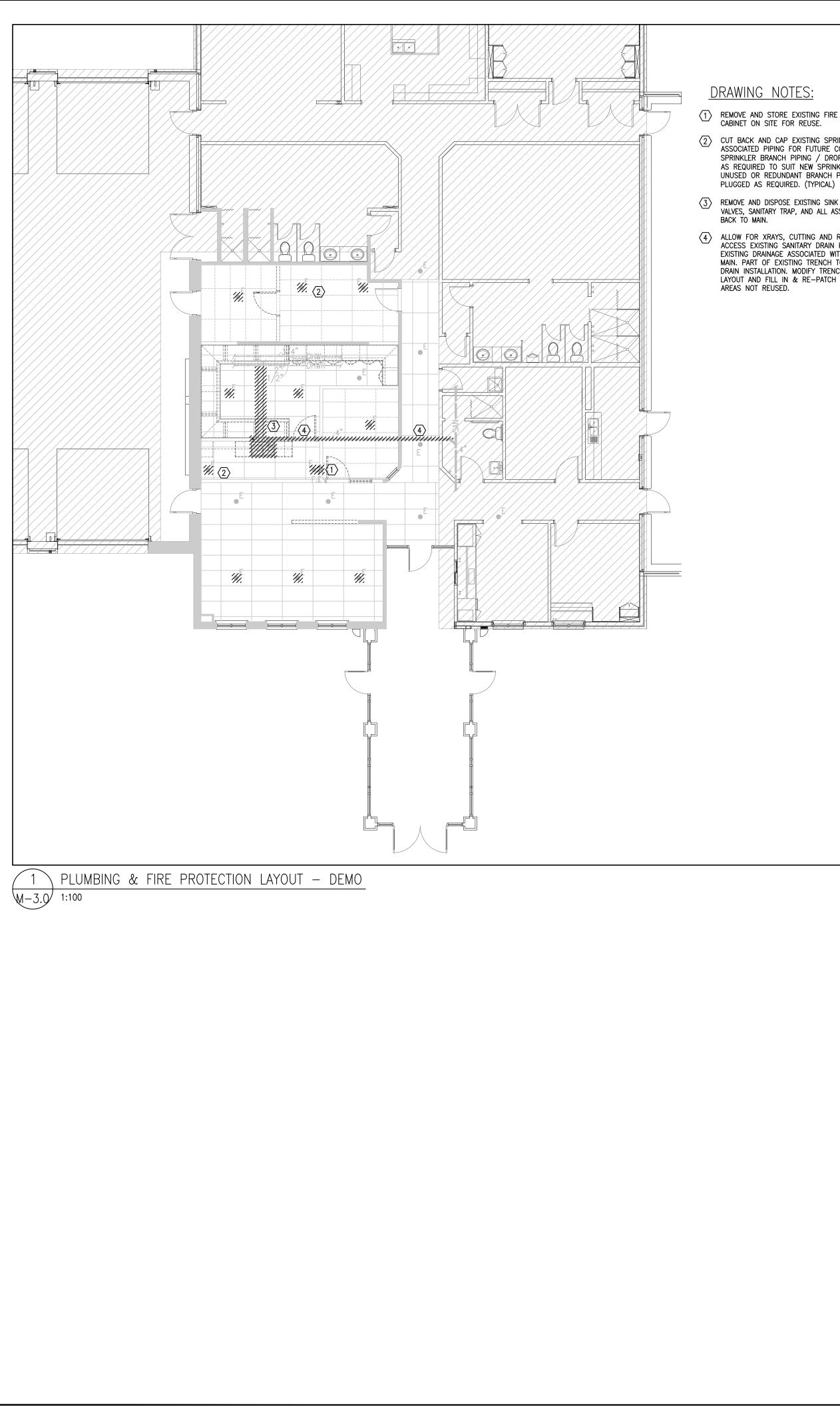


2 HVAC LAYOUT - NEW M-2.0 1:100

DRAWING NOTES:

- $\langle 1 \rangle$ NEW LOCATION OF RELCOATED SQUARE DIFFUSER C/W NEW FLEX, RIGID DUCTWORK AND BALANCING DAMPER. (TYPICAL)
- NEW LOCATION OF RELOCATED THERMOSTAT. CONTRACTOR TO CONFIRM EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH IN. REVIEW AND CONFIRM LOCATION ON SITE. (TYPICAL)
- $\overline{(3)}$ balance diffuser to new air flow in CFM. (typical)
- (4) NEW EGGRATE TYPE RETURN AIR GRILLE. SEE SCHEDULE FOR SIZING. (TYPICAL)
- $\overline{5}$ CUT AND MODIFY EGGCRATE RETURN AIR GRILLE TO FIT GRID IN CLOSET.

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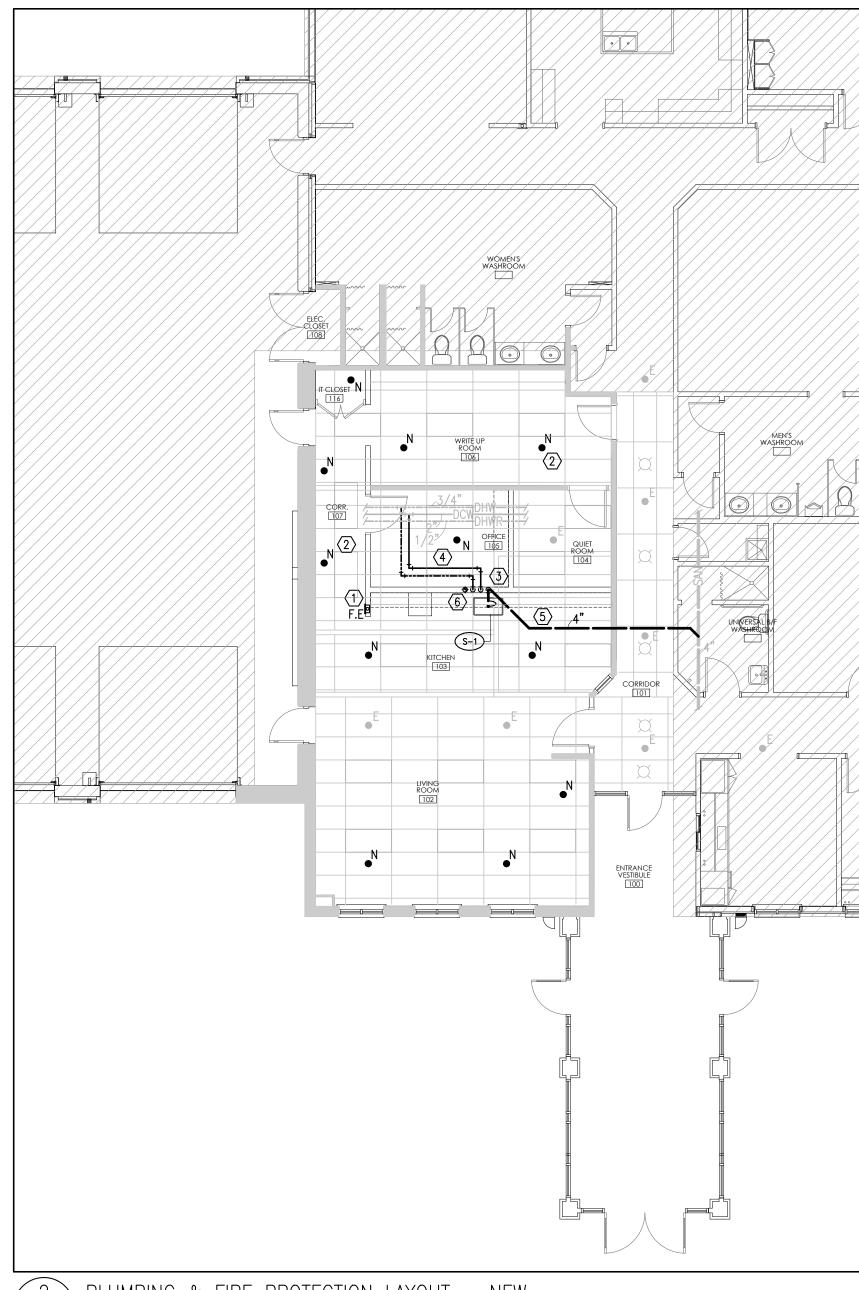


 $\langle 1 \rangle$ REMOVE AND STORE EXISTING FIRE EXTINGUISHER AND

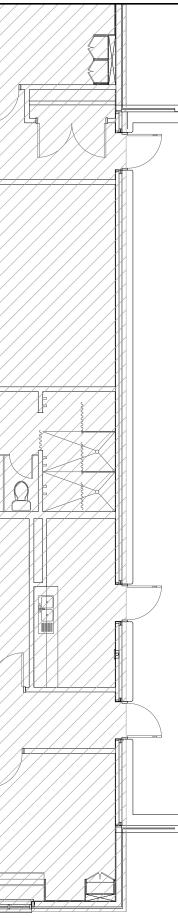
2 CUT BACK AND CAP EXISTING SPRINKLER HEADS AND ASSOCIATED PIPING FOR FUTURE CONNECTION. EXISTING SPRINKLER BRANCH PIPING / DROPS SHALL BE REWORKED AS REQUIRED TO SUIT NEW SPRINKLER HEAD LAYOUT. UNUSED OR REDUNDANT BRANCH PIPING TO BE REMOVED &

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



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



DRAWING NOTES:

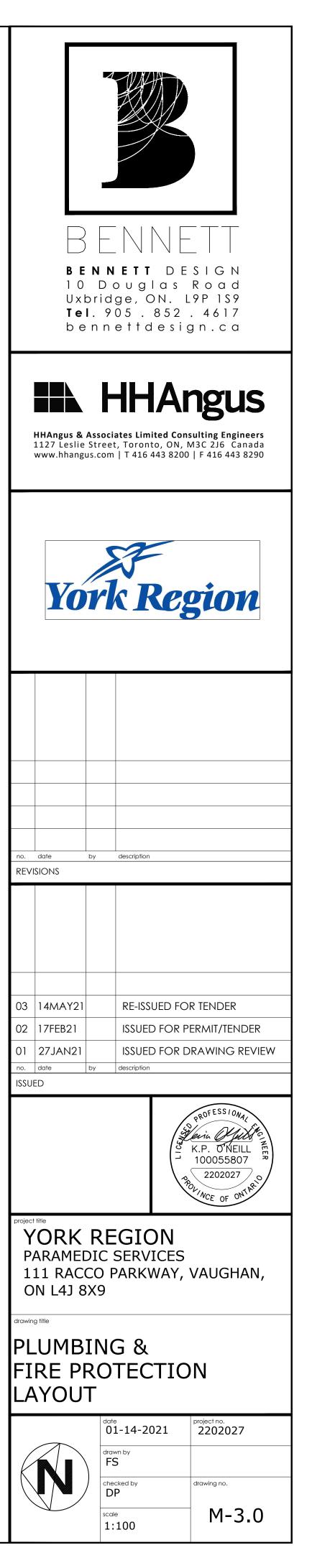
- 1 NEW LOCATION OF RELOCATED RECESSED FIRE EXTINGUISHER AND CABINET. CONFIRM EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.
- (2) CONNECT TO EXISTING SPRINKLER MAIN WITH MINIMUM 1" BRANCH PIPE, PROVIDE NEW SPRINKLER HEAD AS SHOWN. (TYPICAL)
- (3) 1/2" CW & 1/2" HW. & VENT DOWN IN WALL TO SINK 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.
- 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 DISCH	IARGE DENSITIES
HAZARD CLASSIFICATIONS	DESIGN DENSITY (U.S. gpm/ft/sq)
LIGHT HAZARD OFFICE	0.1
ORDINARY HAZARD (GROUP 1) MECHANICAL SERVICE AREAS	0.15

NOTE:

COMMUNICATION ROOMS

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.





DRAWING LIST

DRAWING TITLE

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.

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SYMBOL

ELECTRICAL LEGEND

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-LD4-30SL-LN-UNV-L840-1 CONTACT: CÖOPER LIGHTING SOLUTIONS

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.

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' CLUSTER CONFIGURATION. EACH TO RECEIVE: (2) VOICE/DATA, (2) COMBINATION DUPLEX/USB RECEPTACLE. REFER TO INTERIOR DESIGNER PLANS FOR MOUNTING HEIGHTS.

'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.

CARD READER.

ELECTRIC STRIKE.

DOOR CONTACT.

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.

EXISTING DOOR CHIME/BUZZER.

EXISTING FIRE ALARM MIRCOM FA1000 PANEL.

NEW FIRE RATED PLYWOOD.

 \longrightarrow DETAIL 1, \longrightarrow DRAWING E-4 REFER TO DETAIL 1, ON DRAWING #E-4. (EXAMPLE).

DENOTES EXISTING ITEM TO REMAIN.

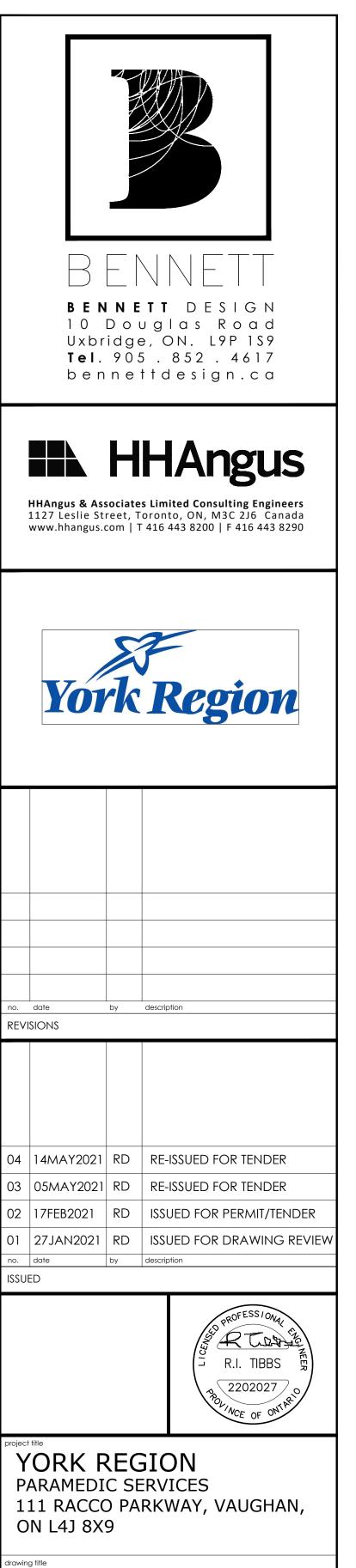
DENOTES EXISTING ITEM TO BE REMOVED.

DENOTES EXISTING ITEM IN RELOCATED POSITION. REUSE EXISTING ITEMS, UNLESS OTHERWISE NOTED.

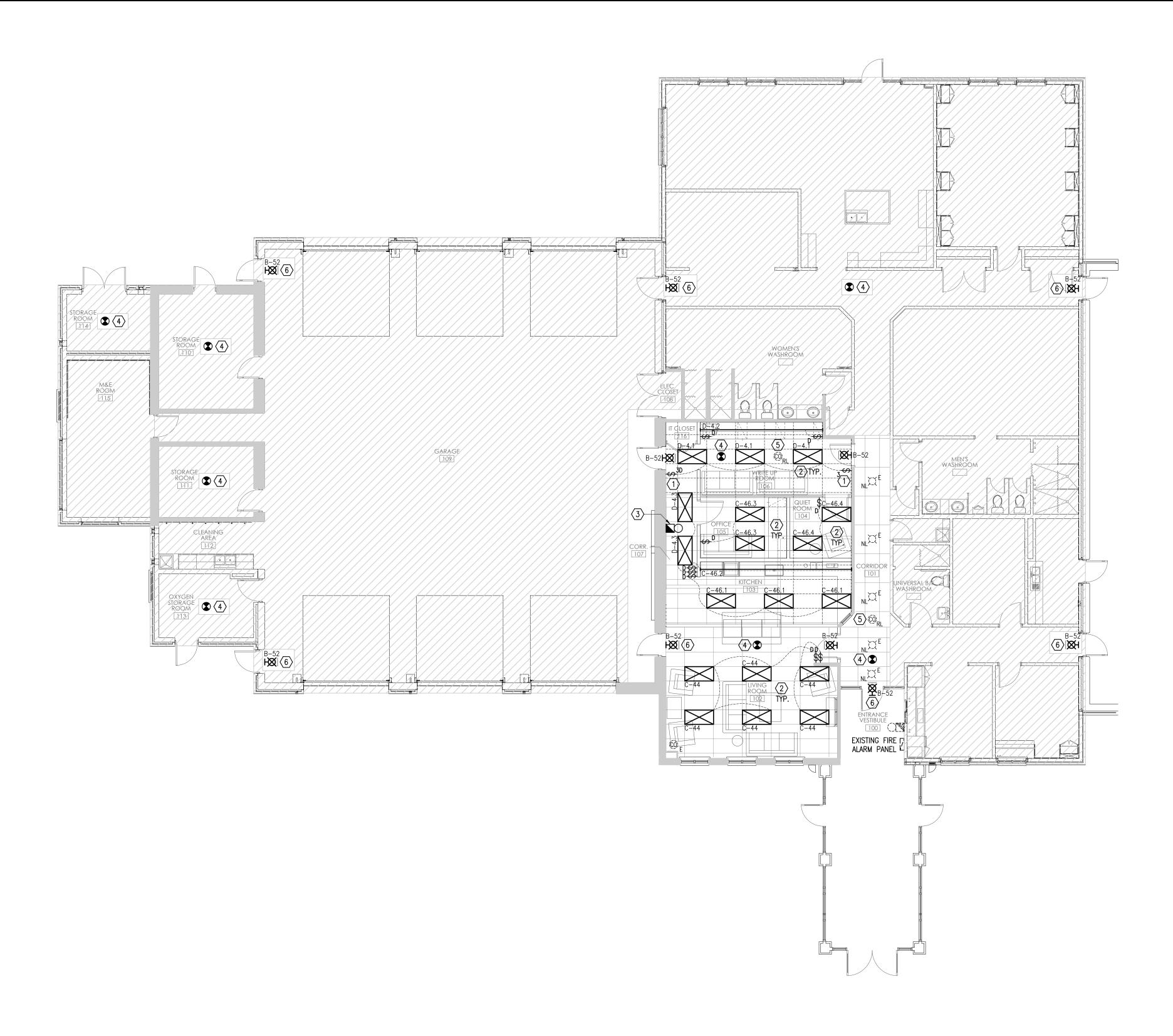
DENOTES EXISTING ITEM TO BE REMOVED AND REINSTALLED/RELOCATED IN SAME POSITION OR VICINITY.

DENOTES TYPICAL THROUGHOUT.

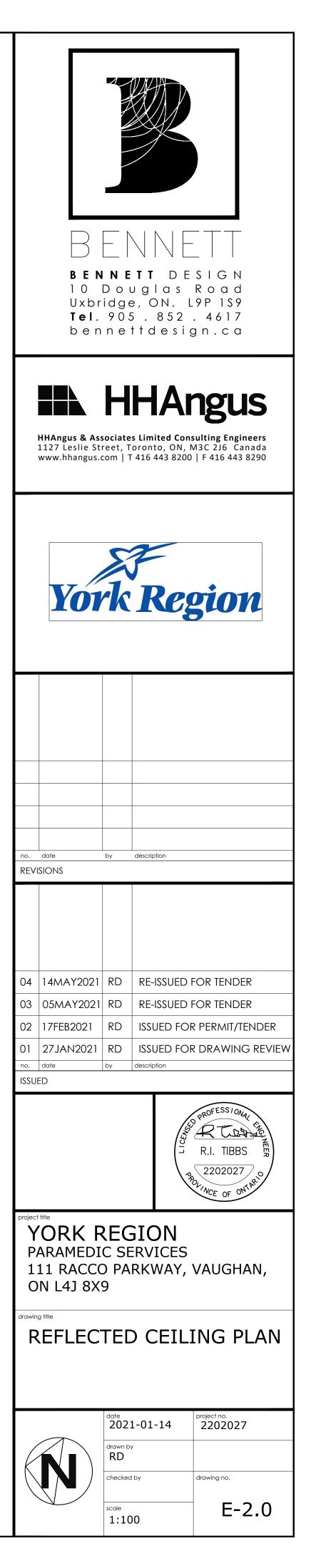
DENOTES NIGHT LIGHT.

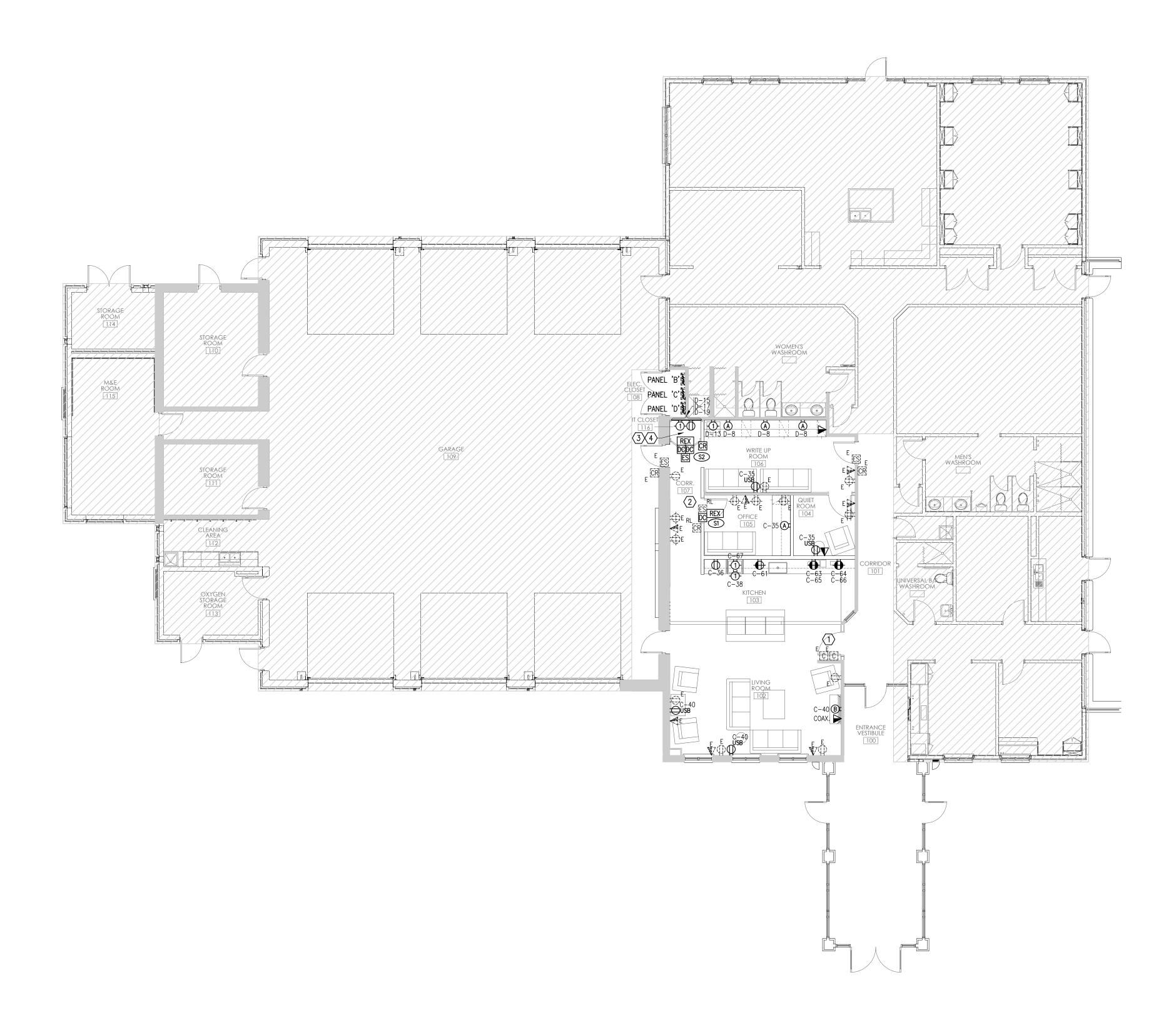


^{date} 2021-01-14	project no. 2202027
drawn by RD	
checked by	drawing no.
scale NTS	E-1.0

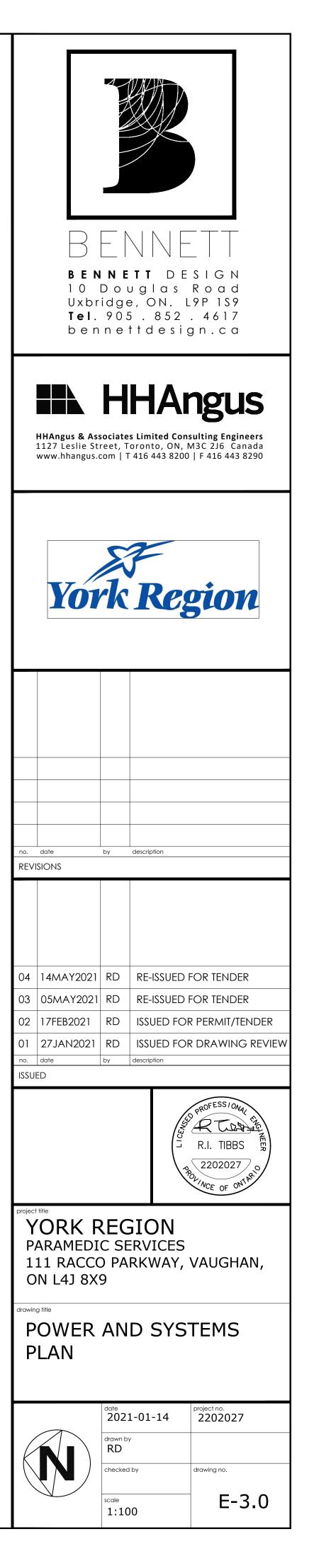


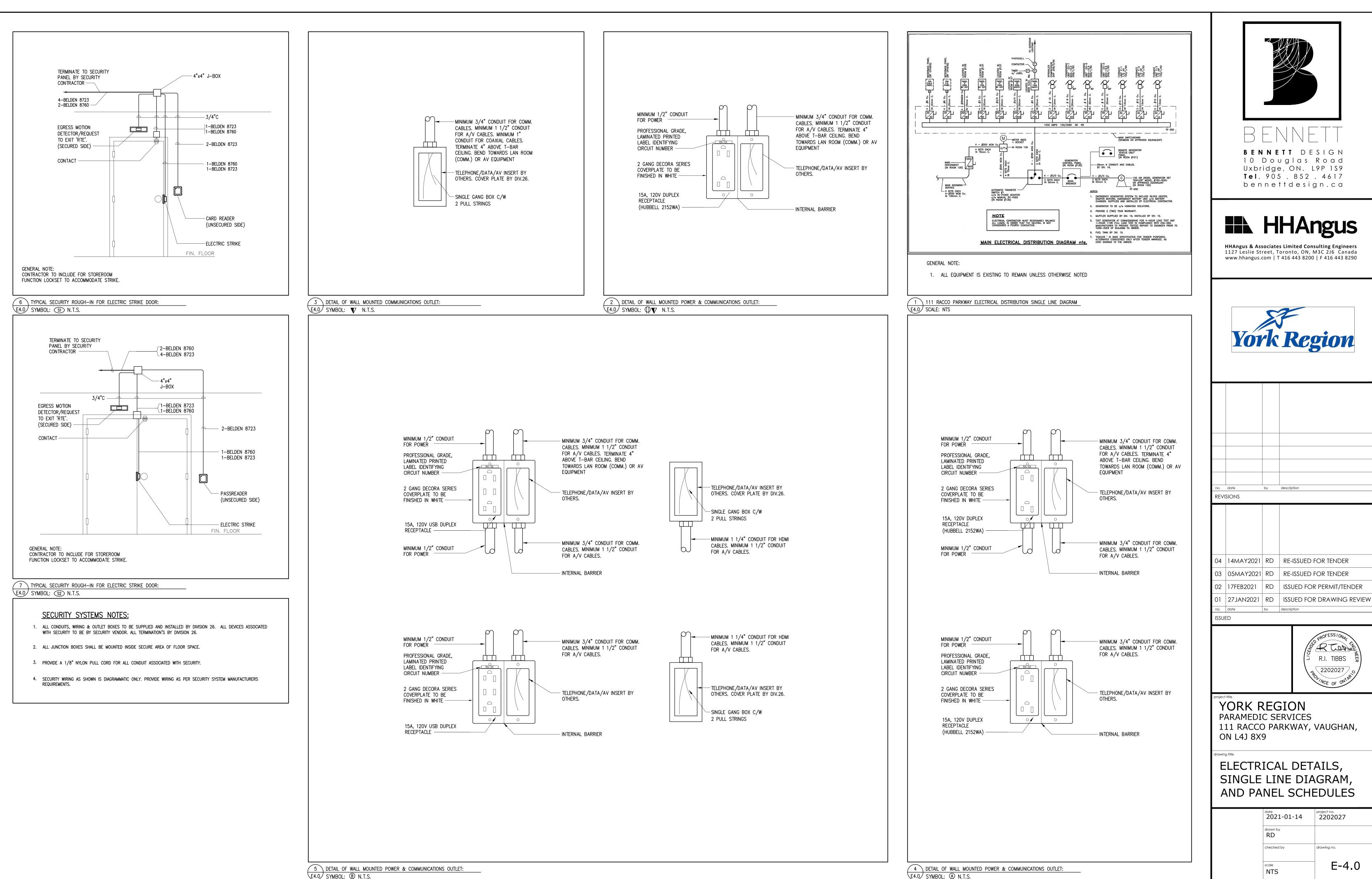
- 1 NEW 3-WAY LIGHTING SWITCHES TO CONTROL AND SUIT NEW LED LIGHTING FIXTURE LAYOUT IN WRITE UP ROOM 106. ONE (1) OF THE TWO (2) NEW 3-WAY SWITCHES TO HAVE DIMMING CAPABILITIES AS SHOWN.
- $\langle 2 \rangle$ reuse existing 120V lighting circuits from demolition for NeW Led Lighting fixture layout. Typical.
- 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.
- NEW SMOKE DETECTORS TO BE INSTALLED AND CONNECTED TO EXISTING MIRCOM FA1000 FIRE ALARM PANEL LOCATED IN MAIN ENTRANCE.
 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.





- $\fbox{1}$ Existing front door chime and back door buzzer final location to be determined on site. Relocate as necessary.
- 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.





E4.0 SYMBOL: (N.T.S.



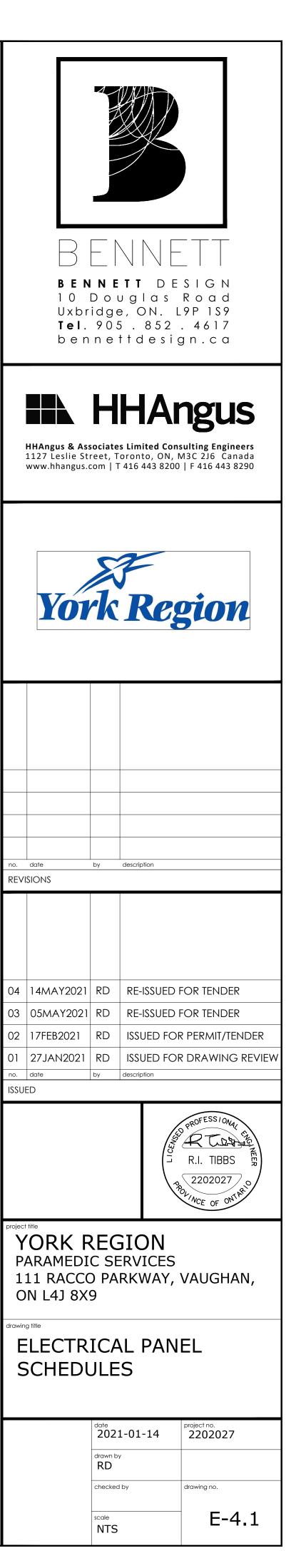
JOB No. 2202027 CAL	CULATED BY: RD	DA	TE: FEB 2021	2021 MAINS: 100A VOLTAGE: 120/208V, 3ø, 4W		: 100A VOLTAGE: 120/208V, 3ø, 4W	JOB No. 2202027
LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PHASE A B C	CCT. No.	BRKR SIZE	LOAD DESCRIPTION	LO DESCR
EXISTING CCT	40A	1	•	2	15A	EXISTING CCT	EXISTING CCT
		3	•	4	15A	EXISTING CCT	
EXISTING CCT	40A	5	+ +	6	15A	EXISTING CCT	EXISTING CCT
		7	•	8	15A	PLUGS RM 106/107	EXISTING CCT
	40A	9		10	15A	EXISTING CCT	EXISTING CCT
EXISTING CCT		11	+ + +	12	15A	EXISTING CCT	EXISTING CCT
PRINTER/COPIER 106	20A	13	$ \bullet +$	14	15A	EXISTING CCT	EXISTING CCT
IT CLOSET 106 MOH EQUIPME	ENT 15A	15	+ + +	16	15A	EXISTING CCT	EXISTING CCT
IT CLOSET 106 APC 2200	20A	17	+ + +	18	15A	EXISTING CCT	EXISTING CCT
IT CLOSET 106 P.A. SYSTEM	AMP. 15A	19	$ \bullet +$	20	15A	EXISTING CCT	EXISTING CCT
SPARE	15A	21	+ + +	22	15A	EXISTING CCT	EXISTING CCT
SPARE	15A	23		24	15A	EXISTING CCT	EXISTING CCT
SPARE	15A	25	•	26	15A	EXISTING CCT	EXISTING CCT
SPARE	15A	27	•	28	15A	EXISTING CCT	EXISTING CCT
SPARE	15A	29		- 30		SPACE	EXISTING CCT
SPACE		31	•	32		SPACE	EXISTING CCT
SPACE		33	•	34		SPACE	EXISTING CCT
SPACE		35	+ +	36		SPACE	PLUGS RM 104/1
SPACE		37	•	- 38		SPACE	EXISTING CCT
SPACE		39	+ +	40		SPACE	EXISTING CCT
SPACE		41	$ + + \neq$	42		SPACE	EXISTING CCT
					* [DENOTES NEW BREAKER	EXISTING CCT
SURFACE MOUNTED:					EXISTING CCT		
NEW: EXISTING:				EXISTING CCT			
							EXISTING CCT

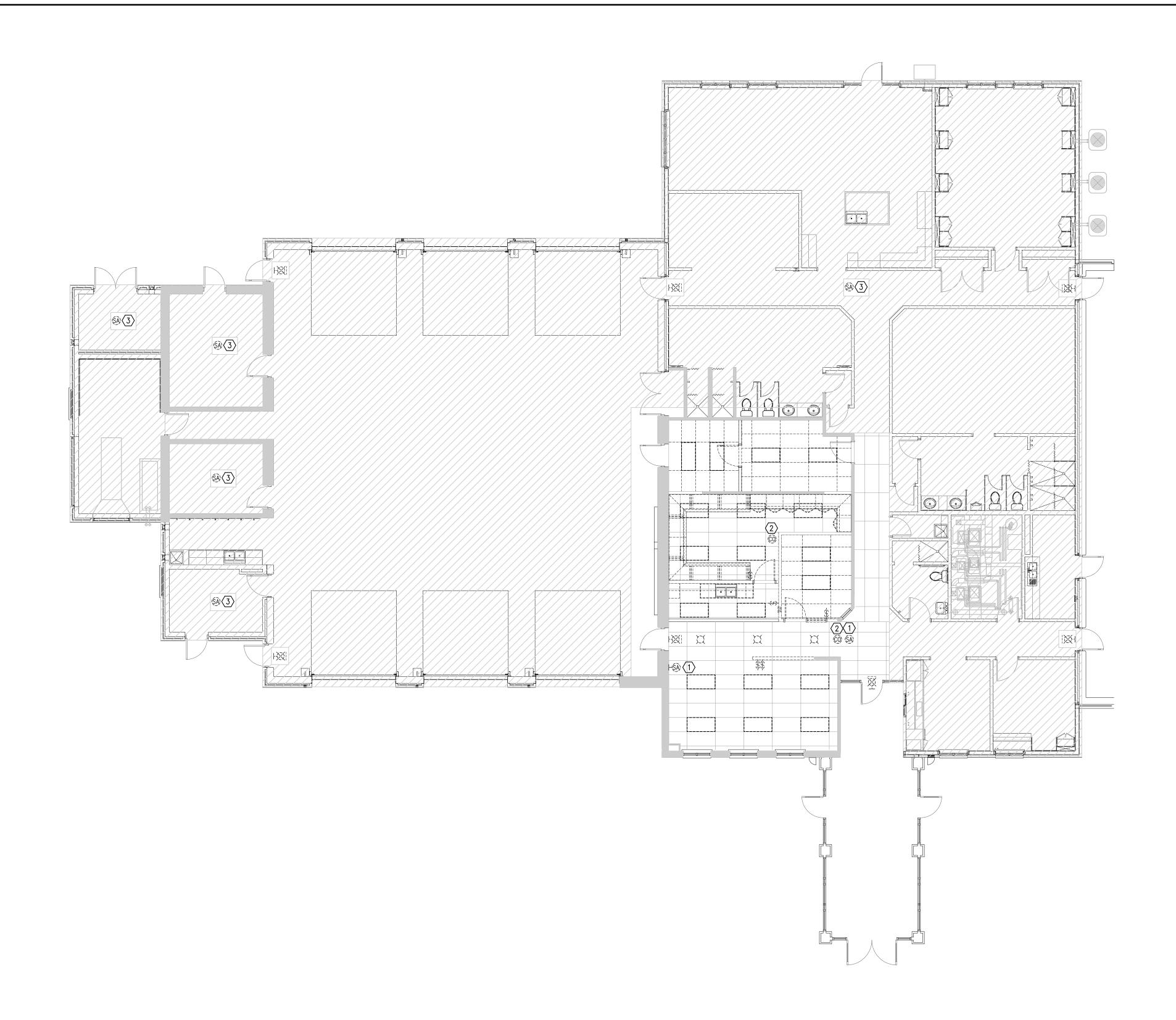
EXISTING CCT

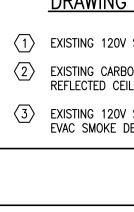
* KITCHEN GFCI 103

- * KITCHEN GFCI 103
- * KITCHEN GFCI 103
- * MICROWAVE 103 SPACE
- SPACE

HARGES & ASSOCIATES LIMITED CONSULING Engineers STATUS A SASOCIATES LIMITED CONSULING Engineers STATUS DESIGNATION: PANEL C							PROJECT NAME: YORK REGION PARAMEDIC SERVICES – 111 RACCO PKWY		
JOB No. 2202027 CALCULA	TED BY: RD	DA	TE: FE	B 20	21		MAINS:	200A VOLTAGE: 120/208V, 3ø, 4W	
LOAD DESCRIPTION	BRKR SIZE	CCT. No.	PI A	HASE B	С	CCT. No.	BRKR SIZE	LOAD DESCRIPTION	
EXISTING CCT	40A	1	•	•		2 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	25A	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	_		\bullet	48	15A	EXISTING CCT	
EXISTING CCT	15A	49	•		_	50	15A	EXISTING CCT	
EXISTING CCT	15A	51	_	-		52	15A	EXISTING CCT	
		53	_		•	54	15A	EXISTING CCT	
EXISTING CCT	20A	55	•		_	56	15A	EXISTING CCT	
EXISTING CCT	30A	57 59		•		58	30A	EXISTING CCT	
	204					60 62			
KITCHEN GFCI 103	20A	61	Ţ			62	204	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 70		SPACE	
SPACE		69 71						SPACE	
SPACE		71			•	72		SPACE	
SURFACE MOUNTED: * DENOTES NEW BREAKER									

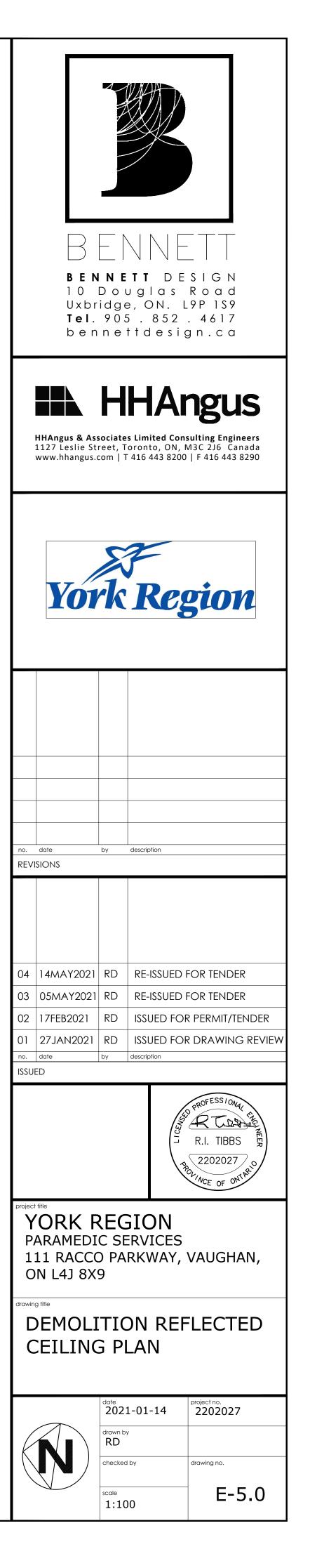


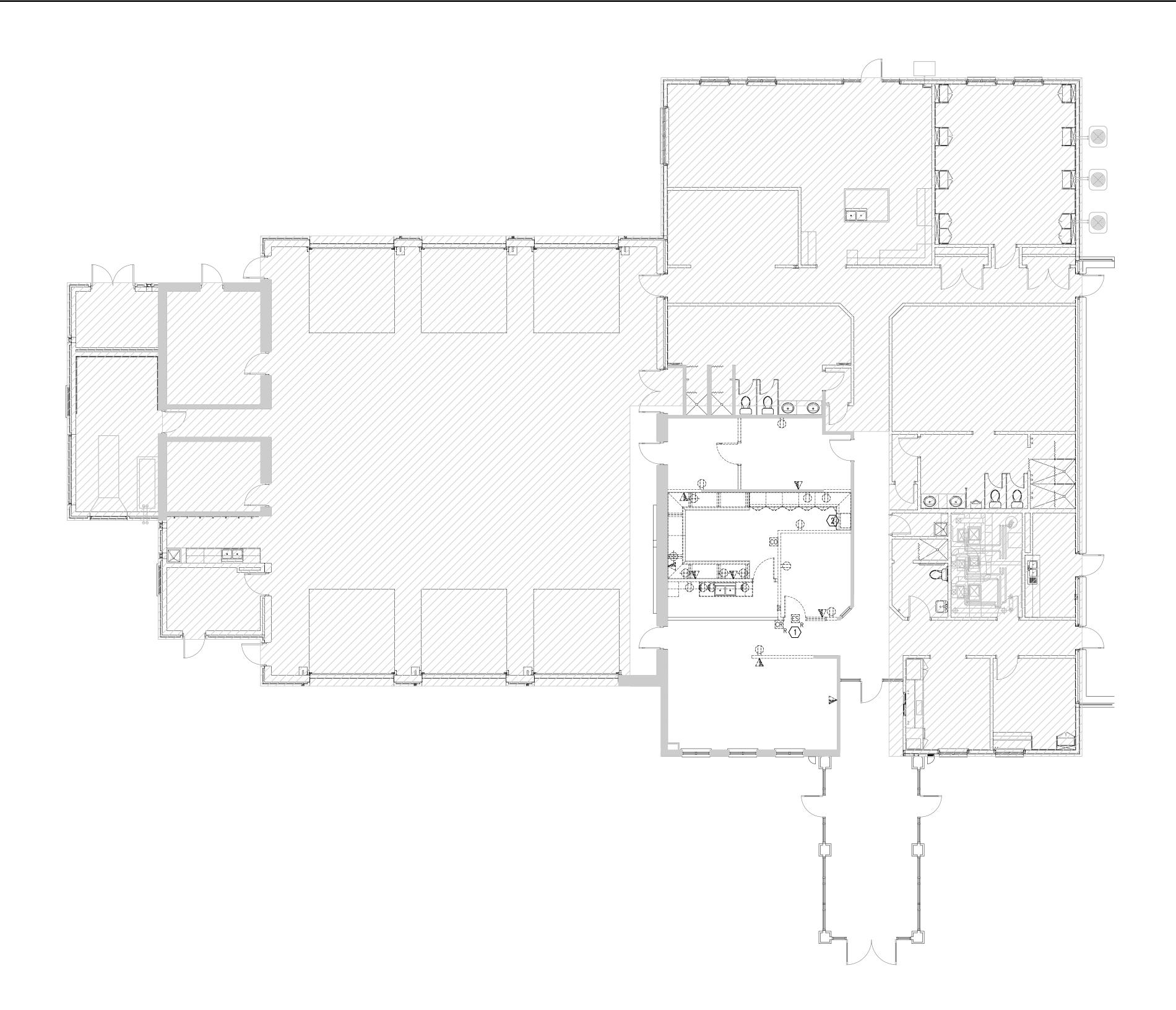


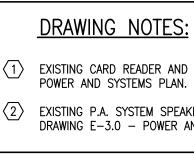


(1) EXISTING 120V STANDALONE SMOKE ALARM TO BE REMOVED. WIRING AND CONDUIT TO BE CUT BACK TO SOURCE. $\langle 2 \rangle$ Existing Carbon monoxide detector to be removed and relocated as shown on drawing E-2.0 – Reflected ceiling plan.

 $\langle 3 \rangle$ existing 120V standalone smoke alarm to be removed and replaced with ceiling mounted fire alarm evac smoke detector.







 $\langle 1 \rangle$ Existing CARD READER AND ELECTRIC STRIKE TO BE REMOVED AND RELOCATED AS SHOWN ON DRAWING E-3.0 – POWER AND SYSTEMS PLAN. $\langle 2 \rangle$ 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.

