CONTRACT SPECIFICATIONS

"Executed Contract Documents"

DEPARTMENT OF TRANSPORTATION &
PUBLIC WORKS
CAPITAL IMPROVEMENTS DIVISION

BID DOCUMENTS

UPGRADE CHILLER UNIT AT

CENTRAL ADMINISTRATION BUILDING

CONTRACT NO. CICC 7360 PLAN

RPQ NO.: TP-0000037594

PROJECT NO.: IRP374

VOLUME II OF II SOLICITATION DOCUMENTS

June 2026

RPQ NO.: TP-0000037594

CENTRAL BUS ADMINISTRATION BUILDING
CHILLER + AHU REPLACEMENT

PROJECT LOCATION
3300 NW 32nd AVE
MIAMI, FL 33142

CLIENT INFORMATION
MAIMI DADE COUNTY DEPARTMENT OF
TRANSPORTATION AND PUBLIC WORKS
6601 NW 72 AVENUE
MIAMI, FLORIDA 33166

ESI PROJECT NO.
25-020728

CLIENT PROJECT NO.
EDP-MT-IRP374

CONSULTING ENGINEERS

ESI CONSULTING ENGINEERS, INC.
1315 NW 98th CT, UNIT 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION NO.: 26243

STRUCTURAL ENGINEERING CONSULTANT
GARCIA MULLIN GROUP
7900 NW 155TH ST. #108
MIAMI LAKES, FL 33016

SCOPE OF WORK

THE SCOPE OF THE PROJECT INCLUDES THE INSTALLATION OF A NEW AIR-COOLED CHILLER RATED AT 92.25 TON IN THE OLD COOLING TOWER COURTYARD, WITH ITS CORRESPONDING SUPPORTS (REFER TO STRUCTURAL DRAWINGS). NEW CHILLED WATER PIPING WILL BE EXTENDED FROM THE NEW CHILLER COURTYARD UP TO THE OLD CHILLER ROOM AND AT THE POINT OF CONNECTION AS SHOWN AND DEPICTED ON THE SUBMITTED DRAWINGS. A NEW AIR SEPARATOR, EXPANSION TANK, AND CHEMICAL POT FEEDER HAVE BEEN SPECIFIED ACCORDINGLY. CHILLER SYSTEM WILL REMAIN STAND-ALONE; NO CONTROLS ARE PART OF THIS SCOPE OF WORK. POWER CONNECTIONS ARE TO BE PROVIDED FOR THE NEW CHILLER FROM EXISTING PANEL "MDP2" AS DEPICTED ON DRAWINGS.

A NEW VERTICAL FLOOR MOUNTED AHU HAS BEEN SPECIFIED. EXISTING CEILING MOUNTED AHU-1 SHALL BE REMOVED. SCOPE OF WORK INCLUDES THE DEMOLITION, CHILLED WATER AND DUCTWORK MODIFICATIONS (INCLUSIVE OF NEW ADDED O/A SUPPLY IN-LINE FAN) AND RELATED CEILING WORK AS DEPICTED ON DRAWINGS. NEW AHU-1 SHALL BE POWERED FROM THE EXISTING AHU POWER FEEDER AND NEW SF-1 SHALL BE POWERED FROM EXISTING PANEL "ILC" AS DEPICTED ON DRAWINGS.

DRAWINGS INDEX

PERMIT SET
03/03/2026

MECHANICAL ABBREVIATIONS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
A/E	ARCHITECT/ENGINEER	LAT	LEAVING AIR TEMPERATURE
ABV	ABOVE	LF	LINEAL FOOT
AC	AIR CONDITIONING	LVG	LEAVING
AD	ACCESS DOOR	LVR	LOUVER
ADD'L	ADDITIONAL	LWT	LEAVING WATER TEMPERATURE
AFF	ABOVE FINISHED FLOOR	MA	MAKE-UP FOR SMOKE EVACUATION MODE
AFMS	AIRFLOW MEASURING STATION	MAX	MAXIMUM
AFMD	AIRFLOW MEASURING DAMPER	MBH	THOUSAND BTU PER HOUR
AHU	AIR HANDLING UNIT	MCC	MOTOR CONTROL CENTER
ALT	ALTERNATE	MECH	MECHANICAL
AMB	AMBIENT	MFR	MANUFACTURER
AP	ACCESS PANEL	MIN	MINIMUM
ARCH	ARCHITECT, ARCHITECTURAL	MOD	MOTOR OPERATED DAMPER
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION AND AIR-CONDITIONING ENGINEERS	MVD	MANUAL VOLUME DAMPER
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	NA, N/A	NOT APPLICABLE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	NC	NORMALLY CLOSED; NOISE CRITERIA
AUTO	AUTOMATIC	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
AWS	AMERICAN WELDING SOCIETY	NIC	NOT IN CONTRACT
BAL	BALANCE	NO	NORMALLY OPEN
BDD	BACKDRAFT DAMPER	NPS	NATIONAL PIPE STANDARD
BFV	BUTTERFLY VALVE	NPSH	NET POSITIVE SUCTION HEAD
BHP	BRAKE HORSEPOWER	NTS	NOT TO SCALE
BLW	BELOW	OAU	OUTSIDE AIR UNIT
BOD	BOTTOM OF DUCT	O/A	OUTSIDE AIR FOR NORMAL MODE
BOP	BOTTOM OF PIPE	OBD	OPPOSED BLADE DAMPER
BOT	BOTTOM	OPNG	OPENING
BTU	BRITISH THERMAL UNIT	OS & Y	OUTSIDE SCREW AND YOKE
CAP	CAPACITY	OV	OUTLET VELOCITY
CFM	CUBIC FEET PER MINUTE	PERF	PERFORATED
CHW	CHILLED WATER	PRV	PRESSURE REDUCING VALVE
CHWP	CHILLED WATER PUMP	PSI	POUNDS PER SQUARE INCH
CHWR	CHILLED WATER RETURN	PSIA	POUNDS PER SQUARE INCH ABSOLUTE
CHWS	CHILLED WATER SUPPLY	PSIG	POUNDS PER SQUARE INCH GAGE
CLNG	CEILING	QTY	QUANTITY
CONC	CONCRETE	R	RADIUS/RADII; THERMAL RESISTANCE
COND	CONDENSER/CONDENSATE	R/A	RETURN AIR
CONN	CONNECTION/CONNECT	REG	REGISTER
CR	CONCENTRIC REDUCER	REQ'D	REQUIRED
CU	CONDENSING UNIT	RET	RETURN
CV	CONTROL VALVE	RFGT	REFRIGERANT
DB	DRY BULB	RH	RELATIVE HUMIDITY
DEMO	DEMOLITION	RL	REFRIGERANT LIQUID
DET	DETECTOR	RM	ROOM
DIFF	DIFFUSER	RPM	REVOLUTIONS PER MINUTE
DIM(S)	DIMENSION(S)	RS	REFRIGERANT SUCTION
DIST	DISTANCE	RTU	ROOFTOP UNIT
DISTR	DISTRIBUTE, DISTRIBUTION	S/A	SUPPLY AIR
DMPR	DAMPER	SA	SOUND ATTENUATOR
DN	DOWN	SF	SUPPLY FAN
DP	DEW POINT	SH	SENSIBLE HEAT
DR	DRIVE	SHR	SENSIBLE HEAT RATIO
DWG	DRAWING	SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTOR'S ASSOCIATION
DX	DIRECT EXPANSION	SP	STATIC PRESSURE
E/A	EXHAUST AIR	SPD	SPLITTER DAMPER
EA	EACH	SPEC	SPECIFICATION
EAT	ENTERING AIR TEMPERATURE	SQ	SQUARE
EF	EXHAUST FAN	SQ FT	SQUARE FOOT
ELB	ELBOW	SQ IN	SQUARE INCH
ELEC	ELECTRICAL	SS, SST	STAINLESS STEEL
ELEV	ELEVATION	SUCT	SUCTION
ENGR	ENGINEER	SUSP	SUSPENDED
EQPM	EQUIPMENT	TB	TRANSFER BOOT
EQ	EQUAL	TD	TRANSFER DUCT; TEMPERATURE DIFFERENTIAL
ESP	EXTERNAL STATIC PRESSURE	TDH	TOTAL DYNAMIC HEAD
EST	ESTIMATE	TE	TOTALLY ENCLOSED
EWT	ENTERING WATER TEMPERATURE	TEMP	TEMPORARY
EXH	EXHAUST	THRU	THROUGH
EXIST	EXISTING	TP	TOTAL PRESSURE
FB	FILTER BOX	TYP	TYPICAL
FC	FLEXIBLE CONNECTION	UC	UNDERCUT
FCU	FAN COIL UNIT	UG	UNDERGROUND
FD	FIRE DAMPER	UH	UNIT HEATER
FEI	FAN ENERGY INDEX	UL	UNDERWRITER'S LABORATORY
FL	FLOOR	UON	UNLESS OTHERWISE NOTED
FM	FLOW METER, FACTORY MUTUAL	VAV	VARIABLE AIR VOLUME
FMS	FLOW MEASURING STATION; FACILITY MANAGEMENT SYSTEM	VD	VOLUME DAMPER
FPM	FEET PER MINUTE	VENT	VENTILATOR/VENTILATION
GA	GAGE	VFD	VARIABLE FREQUENCY DRIVE
GALV	GALVANIZED	VIB	VIBRATION
GPM	GALLONS PER MINUTE	VIV	VALVE IN VERTICAL
GV	GRAVITY VENTILATOR	VOL	VOLUME
HD	HEAD	W	WATT
HP	HORSEPOWER	W/	WITH
HVAC	HEATING, VENTILATION, AIR CONDITIONING	W/O	WITHOUT
HTR	HEATER	WB	WET BULB
INSUL	INSULATION	WG	WATER GAGE
IN WC	INCHES (WATER COLUMN)	XFR	TRANSFER
KPA	KILOPASCAL		
KW	KILOWATT		

SCOPE OF WORK

THE SCOPE OF WORK CONSISTS OF THE INSTALLATION OF A NEW AIR COOLED CHILLER AND THE REPLACEMENT OF AN EXISTING AIR HANDLING UNIT (AHU-1).
THE ELECTRICAL WORK INCLUDES THE FOLLOWING:

- INSTALLATION OF NEW AIR-COOLED CHILLER.
- NEW AIR SEPARATOR, EXPANSION TANK, AND CHEMICAL POT FEEDER INSTALLATION.
- EXTENDING NEW CHW PIPING FROM CHILLER COURTYARD TO POINT OF CONNECTION SHOWN HEREIN.
- INSTALLATION OF AUDITORIUM AIR-HANDLER (AHU-1) AND ALL NECESSARY CHILLED WATER PIPING, VALVES, APPURTENANCES.
- DUCTWORK MODIFICATIONS TO INSTALL NEW VERTICAL AHU-1.
- NEW ADDED O/A SUPPLY INLINE FAN INSTALLATION.

PIPE SUPPORT SPACING

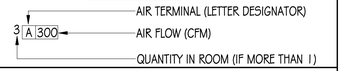
PIPE MATERIAL	MAX. HORIZONTAL SPACING (FT)	MAX. VERTICAL SPACING (FT)
COPPER OR COPPER-ALLOY PIPE	12	10
COPPER OR COPPER-ALLOY TUBING	8	10
PVC	4	10
STEEL TUBING	8	10
STEEL PIPE	12	15

NOTE:
MAXIMUM SPACING AS PER SCHEDULE UNLESS OTHERWISE NOTED OR INDICATED ON PLANS. REFER TO STRUCTURAL DRAWINGS AS APPLICABLE.

MECHANICAL SYMBOLS LEGEND

SYMBOL	DESCRIPTION
	POINT OF CONNECTION TO EXISTING
	POINT OF DEMOLITION FROM EXISTING
T	THERMOSTAT
T	REMOTE THEMPERATURE SENSOR
SD	DUCT MOUNTED SMOKE DETECTOR
	DIRECTION OF AIRFLOW MOVEMENT
20x12	NEW DUCTWORK (FIRST DIMENSION IS SIZE OF DUCT SIDE IN VIEW)
	EXISTING DUCTWORK TO REMAIN
	EXISTING TO BE REMOVED
	EXISTING TO BE RELOCATED
	DUCT WITH CAPPED END
	TRANSITION: CONCENTRIC REDUCER
	TRANSITION: ECCENTRIC REDUCER
	TRANSITION: RECTANGULAR TO ROUND
M	MOTOR OPERATED CONTROL DAMPER (ULTRA LOW LEAKAGE)
AFMS	AIRFLOW MEASURING STATION
	SUPPLY DUCT/OUTSIDE AIR DUCT IN SECTION
	RETURN DUCT/EXHAUST DUCT IN SECTION
	EXISTING EQUIPMENT
	NEW EQUIPMENT
	SUPPLY DIFFUSER: NEW
	SUPPLY DIFFUSER: EXISTING OR NEW BELOW DUCT
	RETURN GRILLE: NEW
	RETURN GRILLE: EXISTING OR NEW BELOW DUCT
	EXHAUST GRILLE: NEW
	EXHAUST GRILLE: EXISTING OR NEW BELOW DUCT
M	2-WAY PRESSURE INDEPENDENT CONTROL VALVE, OR AS NOTED ON FLOOR PLAN
CHWR	NEW CHILLED WATER RETURN
CHWS	NEW CHILLED WATER SUPPLY
CWR	NEW CONDENSER WATER RETURN
CWS	NEW CONDENSER WATER SUPPLY
	PIPE TURNING UP
	PIPE TURNING DOWN
	TOP TAKE-OFF
	BOTTOM TAKE-OFF

AIR TERMINAL MARK



NOTE:
NOT ALL SYMBOLS AND ABBREVIATIONS LISTED APPLY TO THIS PROJECT. REFER TO CONSTRUCTION DOCUMENTS FOR SCOPE OF WORK.

CODE COMPLIANCE

MECHANICAL WORK SHALL COMPLY WITH THE FOLLOWING STANDARDS & CODES AS APPLICABLE:
2023 FLORIDA BUILDING CODE, BUILDING (8TH EDITION)
2023 FLORIDA BUILDING CODE, MECHANICAL (8TH EDITION)
2023 FLORIDA BUILDING CODE, ENERGY CONSERVATION (8TH EDITION)
2023 FLORIDA FIRE PREVENTION CODE (8TH EDITION)
- 2021 NFPA 1 - FIRE CODE
- 2021 NFPA 101 - LIFE SAFETY CODE

2021 NFPA 90A -STANDARD FOR THE INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS
2021 NFPA 99 - HEALTH CARE FACILITIES CODE

LATEST ASHRAE STANDARDS

CONSTRUCTION NOTES

BEFORE CONSTRUCTION BEGINS, CONTRACTOR SHALL FOCUS ON ISOLATING THE WORK AREA AND AS A MINIMUM, PLAN THE FOLLOWING:

A. WORK SHALL BE SCHEDULED AND PERFORMED PER PLANS.

B. BARRIER SYSTEM: AREA UNDER CONSTRUCTION SHALL BE ISOLATED AND MAINTAINED AT NEGATIVE PRESSURE WITH RESPECT TO THE ADJACENT AREAS NOT UNDER CONSTRUCTION. CONTRACTOR SHALL SEPARATE CONSTRUCTION AREA FROM ANY OTHER AREA WITH THE USE OF TEMPORARY PARTITIONS AND VISQUEEN BARRIERS PER THE ARCHITECTURAL DRAWINGS.

C. TRAFFIC CONTROL (REFER TO ARCHITECTURAL ROUTING PLANS): CONTRACTOR SHALL DESIGNATE, IN CONJUNCTION WITH OWNER PERSONNEL, ENTRY & EXIT ROUTES AND PROCEDURES.

D. DEMOLITION: DEBRIS SHALL BE REMOVED IN CARTS THAT HAVE TIGHTLY FITTED COVERS, USING DESIGNATED TRAFFIC ROUTES.

E. DUCT SEALING: ALL SUPPLY, RETURN, AND EXHAUST DUCT OPENINGS SHALL BE TEMPORARILY TIGHTLY SEALED WITH SOLID MATERIALS UNTIL RECONNECTED.

F. VIBRATION: CORE DRILLING OR OTHER SOURCE OF VIBRATION SHALL BE MAINTAINED TO A MINIMUM.

G. CLEANUP: ALL CLEANUPS SHALL BE DONE BY VACUUMING WITH A HEPA-FILTERED FAN DEVICE. THE WORK SITE SHALL BE CLEANED ROUTINELY.

H. POST-CONSTRUCTION CLEANUP: CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING UP THE PROJECT, INCLUDING WORKSITE CLEARANCE, CLEANING, WIPING DOWN, AND DECONTAMINATION. ALL FILTERS SHALL BE REPLACED.

IDENTIFICATION & LABELING

A. ALL PIPING EXPOSED OR CONCEALED IN ACCESSIBLE SPACES AND CEILINGS SHALL BE PROVIDED WITH COLOR BANDS, LEGENDS AND FLOW ARROWS IN ACCORDANCE WITH ANSI A13.1. THESE SHALL BE PLACED ON LINES; INTERVALS AS DIRECTED NOT EXCEEDING 25FT, AT THE BEGINNING AND TERMINATION OF EACH RUN AND AT EACH SIDE OF A WALL OR PARTITION THROUGH WHICH THE PIPE PASSES.

B. ALL EQUIPMENT SHALL BE IDENTIFIED WITH THE SAME DESIGNATION SHOWN ON THE DRAWINGS. IDENTIFICATION SHALL BE WITH ENGRAVED PLASTIC NAMEPLATES USING 1" LETTERS ON EQUIPMENT HAVING CABINETS AND WITH BRASS TAGS WHERE CABINETS DO NOT EXIST. NAMEPLATES SHALL BE MINIMUM 2" X 4" SIZE FOR AIR HANDLING UNITS.

HVAC DESIGN REQUIRES:

	YES	NO
DUCT SMOKE DETECTOR	X	
FIRE DAMPER(S)		X
FIRE / SMOKE DAMPER(S)		X
FIRE RATED ENCLOSURE		X
FIRE RATED ROOF/FLOOR CEILING ASSEMBLY		X
FIRE STOPPING		X

NOTE TO CONTRACTOR:
ALL DUCTWORK CROSSING FIRE RATED WALLS AND/OR FLOORS WITH A 1-HOUR OR MORE RATING SHALL BE FURNISHED WITH A FIRE DAMPER AS REQUIRED BY THE 2023 FLORIDA MECHANICAL CODE, SECTION 607.

MECHANICAL DRAWING INDEX

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
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STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

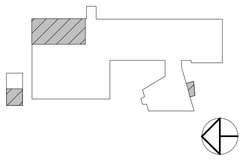
Project No.: 25-020728

Issue	Date
PERMIT SET	03/03/2026

Revisions

No.	Description	Date

Key Plan



Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56096

Sheet Title

MECHANICAL ABBREVIATION, LEGENDS, SYMBOLS, & GENERAL NOTES

Drawing No.

M0.01

GENERAL NOTES

1. THE WORK THAT IS TO BE DONE UNDER THIS HEADING INCLUDES THE FURNISHING OF ALL LABOR, MATERIALS AND EQUIPMENT, PERMITS, FEES, INSPECTIONS, TEST, INSURANCE, ETC., REQUIRED FOR THE COMPLETION OF THE WORK DESCRIBED HEREIN.
2. DRAWINGS ARE DIAGRAMMATIC IN NATURE AND REPRESENT EXISTING CONDITIONS BASED ON DRAWINGS AND SITE OBSERVATIONS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF ALL ACTUAL CONDITIONS INCLUDING, DUCTWORK AND PIPING LOCATION AND SIZES.DRAWINGS DO NOT SHOW EVERY BEND, OFF-SET, ELBOW, OR OTHER FITTINGS WHICH MAY BE REQUIRED FOR THE INSTALLATION IN THE SPACE ALLOCATED, OR FOR COORDINATION WITH OTHER TRADES.
3. DRAWINGS ARE NOT TO BE SCALED. UNLESS SPECIFIC DIMENSIONS ARE SHOWN, THE SITE CONDITIONS SHALL GOVERN THE EXACT LOCATION OF MECHANICAL EQUIPMENT AND APPURTENANCES.
4. THE NATURE OF THIS CONTRACT INVOLVES REMODELING OF EXISTING FACILITIES. REPLACING OF EXISTING AC CHILLER UNIT, RELATED COMPONENTS AND ONE AIR HANDLER. THE CONTRACTOR SHALL VISIT AND CAREFULLY EXAMINE THOSE PORTIONS OF THE BUILDING AFFECTED BY THIS WORK BEFORE SUBMITTING PROPOSALS SO AS TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT EXECUTION OF WORK.
5. REFER TO ALL CONSTRUCTION DOCUMENTS FOR COORDINATION OF THE HVAC WORK AND TO DETERMINE SCOPE OF WORK.
6. CONTRACTOR SHALL VERIFY SPACE CONDITIONS AND DIMENSIONS AT JOB SITE AND SHALL COORDINATE WORK WITH ALL OTHER TRADES SUCH AS ELECTRICAL, STRUCTURAL, PLUMBING, FIRE SPRINKLERS, LIGHT FIXTURES, CEILING CONSTRUCTION AND SUPPORTS PRIOR TO ORDERING, FABRICATING AND INSTALLING DUCTWORK/EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FULL COORDINATION OF THIS WORK WITH THAT OF ALL OTHER TRADES. ANY CONFLICTS SHALL BE REPORTED IMMEDIATELY TO THE ARCHITECT/ENGINEER PRIOR TO BEGINNING OF CONSTRUCTION.
7. ALL SERVICES INTERRUPTION AND ALL REMOVAL & DISPOSAL WORK SHALL BE SCHEDULED AND COORDINATED WITH THE AUTHORIZED REPRESENTATIVE OF THE FACILITIES DEPARTMENT. MECHANICAL SYSTEMS SHALL REMAIN OPERATIONAL DURING BUILDING'S NORMAL HOURS OF OPERATION. COORDINATE DEMOLITION WORK TO CAUSE MINIMUM DOWNTIME OF ANY BUILDING SERVICE.
8. ALL EQUIPMENT IN SERVICEABLE CONDITIONS REMOVED UNDER THIS CONTRACT SHALL BE PROTECTED AND STORED AT THE JOB SITE FOR DELIVERY BY THE CONTRACTOR TO A LOCATION DESIGNATED BY THE OWNER. ALL OTHERS, INCLUDING DUCTWORK AND ACCESSORIES, SHALL BE PHYSICALLY REMOVED AND DISPOSED OF BY CONTRACTOR, UNLESS OTHERWISE INDICATED. CONTRACTOR SHALL COORDINATE WITH OWNER FOR FINAL ARRANGEMENTS.
9. ANY EQUIPMENT OR DEVICE TO REMAIN THAT MIGHT HAVE TO BE DISCONNECTED BECAUSE OF THE REMOVAL OF ANY OTHER DEVICE MUST BE RECONNECTED AND TIED BACK TO THE EXISTING BUILDING SYSTEMS AND TESTED FOR CORRECT OPERATION.
10. PROTECT SURROUNDING UTILITIES, WALLS, FLOORS AND CEILING FROM DAMAGE DURING CONSTRUCTION. THE CONTRACTOR SHALL BEAR ALL EXPENSE FOR REPAIR OR REPLACEMENT OF UTILITIES OR OTHER PROPERTY DAMAGED DURING CONSTRUCTION.
11. ALL FINISHES AND SURFACES TO REMAIN WHICH ARE DAMAGED DURING CONSTRUCTION WORK OR AFFECTED BY THE REMOVAL, RELOCATION, INSTALLATION OF ANY PIECE OF EQUIPMENT SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
12. WORK CONSIDERED NECESSARY FOR THE COMPLETION OF THE WORK IN PROPER MANNER NOT SHOWN ON THE PLANS OR NOTES SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER/ENGINEER IN WRITING FOR APPROVAL.
13. SUBMIT A COMPLETE "AS-BUILT" RECORD SET TO OWNER.
14. CUT ALL OPENINGS, CHASES, TRENCHES, ETC. REQUIRED TO ACCOMMODATE THE WORK UNDER THIS DIVISION AND REPAIR ALL WALLS, ROOF, ETC. DAMAGED BY SUCH CUTTINGS. ALL WORK DONE UNDER THIS HEADING MUST CONFORM IN EVERY RESPECT TO FINISH AND QUALITY OF MATERIALS AND WORKMANSHIP SPECIFIED UNDER APPROPRIATE SECTIONS FOR THIS BUILDING.
15. VERIFY ALL VOLTAGES WITH ELECTRICAL CONTRACTOR BEFORE ORDERING ANY EQUIPMENT.
16. SUBMIT SHOP DRAWINGS OF ALL MATERIALS, DUCTWORK, PIPING AND EQUIPMENT FOR REVIEW BY ENGINEER PRIOR TO ORDERING, FABRICATION, AND/OR INSTALLATION.
17. OBTAIN FULL INFORMATION REGARDING PECULIARITIES AND LIMITATIONS OF SPACE AVAILABLE FOR INSTALLATION OF THE EQUIPMENT AND MATERIALS UNDER THIS CONTRACT, AND PROVIDE READY ACCESSIBILITY TO DAMPERS, VALVES AND OTHER APPARATUS, INCLUDING ANY PART OF SYSTEM REQUIRED TO BE REACHED FOR MAINTENANCE AND OPERATIONS.
18. FLEXIBLE DUCTWORK: FLEXIBLE DUCTS SHALL COMPLY WITH FBC SECTIONS 449.3.6.4 THROUGH 449.3.6.4.4 AND LISTED BY UNDERWRITERS LABORATORIES, INC., UNDER UL STANDARD 181 AS A CLASS 1 FLEXIBLE AIR DUCT AND COMPLYING WITH NFPA STANDARDS 90A AND 90B.
    A. DUCTS SHALL BE FACTORY MADE AND COMPOSED OF A CONTINUOUS METAL LINER DUCT (CPE LINER) PERMANENTLY BONDED TO A COATED SPRING STEEL WIRE HELIX, INSULATED WITH 2" THICK 3/4 LB. DENSITY FIBERGLASS INSULATING BLANKET (R-VALUE NOT LESS THAN 6.0), AND COVERED WITH LOW PERMEABILITY OUTER VAPOR BARRIER OF FIBERGLASS REINFORCED FILM LAMINATE.
    B. THE DUCT SHALL HAVE A MINIMUM RATED AIR VELOCITY OF 4,000 FEET PER MINUTE, A MINIMUM POSITIVE PRESSURE RATING OF 4 INCHES WATER GAUGE, AND A MINIMUM NEGATIVE PRESSURE RATING OF 1 INCH WATER GAUGE.
    C. THE OUTER VAPOR BARRIER SHALL HAVE A PERM RATING NOT GREATER THAN 0.05 PERMS WHEN TESTED IN ACCORDANCE WITH ASTM E96, PROCEDURE A.
    D. FLEXIBLE AIR CONNECTORS SHALL BE LIMITED TO 14 FEET MAXIMUM INSTALLED LENGTH AND SHALL NOT PASS THROUGH ANY WALL, PARTITION, OR ENCLOSURE OF A VERTICAL SHAFT THAT IS REQUIRED TO HAVE A FIRE-RESISTANCE RATING OF 1 HOUR OR MORE.
    E. AIR DUCTS AND EXHAUST DUCT SYSTEMS SHALL NOT BE CONSTRUCTED OF FIBERGLASS DUCT BOARD.
    F. APPROVED MANUFACTURER & MODEL: THERMAFLEX M-KE, FLEXMASTER 1M, OR APPROVED EQUAL.
19. ALL EQUIPMENT AND MATERIALS SHALL BE GUARANTEED FOR THE PERIOD OF ONE YEAR. AN ADDITIONAL FACTORY EXTENDED WARRANTY SHALL BE PROVIDED AS PART OF THIS BID FOR A MINIMUM PERIOD OF FOUR (4) YEARS FOR THE ENTIRE CHILLER UNIT, PARTS, AND LABOR AND AGAINST DEFECTIVE MATERIAL WITH A TOTAL FIVE (5) AFTER THE DATE OF ACCEPTANCE OF THE CHILLER, WHICHEVER IS LATER. ADDITIONAL REQUIRED FACTORY EXTENDED WARRANTY AS OUTLINED IN SECTION 2.9
20. ALL MECHANICAL EQUIPMENT SHALL BE ARI AND U.L. LISTED WHERE APPLICABLE AND RATED FOR THE REQUIRED SERVICE, PRESSURES, TEMPERATURES, AND SHALL BE PROVIDED WITH ALL NECESSARY TRANSFORMERS, SEALS VALVES, CONTROLS, CONNECTIONS, GAUGES, ETC. TO FUNCTION PROPERLY.
21. ALL CONTROL WIRING SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR & SHALL BE 24V. NOTE: THIS PROJECT DOES NOT INVOLVE CONTROLS FOR A BUILDING MANAGEMENT SYSTEM (BMS). ALL CONTROLS ARE ARE STAND-ALONE.
22. THERMOSTATS SHALL BE INSTALLED IN COMPLIANCE WITH FBC ACCESSIBILITY, SECTION 308.3 (SIDE REACH).
23. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF THE FLORIDA BUILDING CODE & NFPA.
24. ALL DUCTWORK SHALL BE LEAK TESTED AS PER LATEST FLORIDA BUILDING CODE. SEAL ALL DUCTS, JOINTS AN SEAMS IN AN APPROVED MANNER AND INSURE AGAINST LEAKAGE.
25. ALL PIPE PENETRATIONS THROUGH RATED WALLS SHALL BE PROTECTED WITH AN ADEQUATE FIRE STOPPING SYSTEM BY PREFERRED AGENCY AS PER FACILITIES STANDARDS TO MAINTAIN THE FIRE RATING OF THE ASSEMBLIES BEING PENETRATED, PER NFPA 101, SEC. 8.5.6. ALL DUCTWORK PENETRATIONS THROUGH RATED WALLS SHALL HAVE A FIRE DAMPER OR FIRE/SMOKE DAMPER, UNLESS INDICATED OTHERWISE TO MAINTAIN THE WALL RATING. ALL DUCTWORK PENETRATING SMOKE TIGHT PARTITIONS SHALL BE PROPERLY SEALED (SMOKE TIGHT).
26. ALL OUTSIDE AIR INTAKES SHALL BE AT 10'-0" MINIMUM DISTANCE FROM ANY EXHAUST DISCHARGE OR PLUMBING VENTS.
27. ALL FIRE DAMPERS, FIRE/SMOKE DAMPERS, SMOKE DAMPERS AND SMOKE DUCT DETECTORS SHALL BE PROVIDED WITH AN ACCESS DOOR ON DUCTWORK (ULTRA LOW LEAKAGE INSULATED & GASKETED) OF ADEQUATE SIZE FOR INSPECTION AND SERVICEABILITY AS PER NFPA 90A, SEC. A-2-3.4.1 AND MECH-FBC SECTION 607.4. FIELD COORDINATE LOCATION / SIDE OF ACCESS DOOR ACCORDINGLY.
28. PROVIDE CEILING/WALL ACCESS PANELS WHERE INDICATED IN THE DRAWINGS AND WHERE REQUIRED TO ACCESS HVAC EQUIPMENT/DEVICES AS PER MECH-FBC SECTION 607.4. PANELS SHALL BE RECESSED TYPE, FIRE RATED IF IN FIRE RATED WALLS OR CEILINGS. LOCATIONS OF PANELS SHALL BE COORDINATED WITH ALL THE OTHER TRADES.
29. ALL MITERED ELBOWS SHALL BE PROVIDED WITH TURNING VANES. TURNING VANES SHALL BE OF SAME MATERIAL AS DUCTWORK, AND BE AIRFOIL TYPE, DOUBLE THICKNESS. REFER TO SPECIFICATIONS.
30. ALL WORK SHALL COORDINATED WITH THE WORK OF OTHER TRADES TO AVOID INTERFERENCE WITH PROGRESS CONSTRUCTION AND IN STRICT COMPLIANCE WITH ALL APPLICABLE CODES AND STANDARDS.
31. COORDINATION DRAWINGS: THE MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. PRIOR TO COMMENCEMENT OF ORDERING MATERIAL, FABRICATION OR INSTALLATION, THE CONTRACTOR SHALL DEVELOP AS REQUIRED DETAILED COORDINATION DRAWINGS SHOWING CLEARANCES WITH BUILDING STRUCTURE, CEILINGS HEIGHT AND OVERALL COORDINATION WITH ALL OTHER TRADES. WHENEVER THERE IS A CONFLICT, THE CONTRACTOR SHALL SHOW THE PROPOSED SOLUTION ON THE COORDINATION DRAWINGS. DUCTWORK, PIPING OFFSETS, RISES/DROPS, RE-ROUTING AND RE-DIMENSIONING SHALL BE SHOWN ON THE COORDINATION DRAWINGS FOR REVIEW AND APPROVAL BY THE ENGINEER.
32. ALL EQUIPMENT, PIPING & DUCTWORK SUPPORT COMPONENTS SHALL BE HOT-DIPPED GALVANIZED.
33. ALL ACTUATORS FOR CONTROL VALVES AND DAMPERS SHALL HAVE THE CAPABILITY FOR FULL FEEDBACK.
34. PROVIDE NEW FILTERS FOR ALL HVAC EQUIPMENT BEFORE START-UP & TESTING. REPLACE FILTERS PRIOR TO FINAL ACCEPTANCE BY OWNER.
35. ALL EXHAUST DUCTS AND OUTSIDE AIR DUCTS SHALL BE GALVANIZED SHEET METAL WITH SEALED SEAMS AND JOINTS. ALL OUTSIDE AIR DUCT SHALL BE EXTERNALLY INSULATED WITH R-6 MINIMUM. ALL METAL EXHAUST, MAKE-UP/OUTSIDE INSTALLED IN LOCATIONS WHERE DEWPOINT CONDITIONS CAN OCCUR INSIDE THE DUCT SHALL BE INSULATED WITH R-8 MINIMUM.
36. ALL MECHANICAL EQUIPMENT INSTALLATION ON THE EXTERIOR OF THE BUILDING SHALL BE CAPABLE TO WITHSTAND HIGH VELOCITY WINDS AS REQUIRED BY FBC.
37. PROVIDE FIRE WATCH DURING ANY ANTICIPATED HOT WORK AND/OR SYSTEM SHUT-DOWNS AS REQUIRED PER NFPA 101 & NFPA 25 CHAPTER 15. PROVIDE ADDITIONAL FIRE EXTINGUISHER(S) AS REQUIRED DURING DEMOLITION/CONSTRUCTION.
38. DUE TO DRAWINGS BEING DIAGRAMMATIC IN NATURE RISERS AND DROPS ARE NOT SHOWN - CONTRACTOR SHALL INCLUDE THESE IN THE BID - WHERE POSSIBLE ALL RISERS AND DROPS SHALL BE CONSTRUCTED USING 45 DEGREE OR LONG RADIUS ELBOWS.
39. PROVIDE AND INSTALL NECESSARY DUCTWORK TRANSITIONS AND PIPING INCREASERS/REDUCERS AS REQUIRED FOR EQUIPMENT CONNECTIONS. CONSULT MANUFACTURER'S DATA FOR ACTUAL DUCTWORK AND PIPING CONNECTIONS SIZES, INCLUDING BUT NOT LIMITED, TO THOSE SHOWN.
40. PROVIDE MANUAL VOLUME DAMPERS AT ALL LOW PRESSURE BRANCH DUCTS TO INDIVIDUAL DIFFUSERS AND GRILLES PROVIDE DAMPERS AS CLOSE AS POSSIBLE TO MAIN IN BRANCH CONNECTION. REFER TO DETAILS.
41. SCHEDULE SHUT DOWNS WITH THE OWNER A MINIMUM OF 72 HOURS IN ADVANCE. ALL SHUT DOWN NOTICES SHALL BE APPROVED BY THE FACILITY DEPARTMENT PRIOR TO COMMENCEMENT.
42. DO NOT BLOCK TUBE PULL OR SERVICE SPACE ON EQUIPMENT WITH PIPING, DUCTWORK, ETC.
43. NO DUCTWORK OR PIPING SHALL BE INSTALLED UNTIL IT IS COORDINATED WITH ALL OTHER TRADES AFFECTED. PROVIDE ALL OFFSETS REQUIRED TO AVOID INTERFERENCE WITH OTHER TRADES, EXISTING CONDITIONS AND WITH THE STRUCTURE, INCLUDING, BUT NOT LIMITED TO, THOSE SHOWN.
44. IF NO SIZE IS SHOWN FOR DUCT SERVING DIFFUSER OR GRILLES, USE SIZE SHOWN ON DIFFUSER AND GRILLE SCHEDULE.
45. ALL CONDUITS, PIPING, DUCTWORK ROUTED PARALLEL TO RATED WALLS (FIRE, FIRE/SMOKE, SMOKE OR CORRIDORS) SHALL BE INSTALLED WITH MINIMUM 6" CLEARANCE TO ALLOW FOR INSPECTION OF WALL PENETRATIONS AS PER FBC. CONTRACTOR SHALL PROVIDE 12" CLEARANCE WHERE POSSIBLE.
46. PROVIDE MINIMUM CLEARANCE OF 36" IN FRONT OF ALL 120/208V PANELS AND MINIMUM 42" IN FRONT OF 277/480V PANELS. PROVIDE ADEQUATE CLEARANCES PER N.E.C.
47. CONTRACTOR SHALL SUBMIT A COMPLETE LIST OF EQUIPMENT AND ITEMS TO BE REMOVED TO THE OWNER. ALL ITEMS THAT THE OWNER WISHES TO RETAIN SHALL BE TURNED OVER TO OWNER AND THE REMAINDER SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A PROPER MANNER BY CONTRACTOR.
48. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL WORK NECESSARY TO PREPARE THE STRUCTURE FOR THE INSTALLATION OF THE MECHANICAL SYSTEMS. AS PART OF DEMOLITION, ALL HOLES, OPENINGS AND ANY DAMAGED MATERIALS OR SURFACES SHALL BE REPAIRED AND FINISHED TO MATCH EXISTING.
49. ALL DEMOLITION WORK SHALL COMPLY WITH NFPA 241 AND THE REQUIREMENTS OF THE OWNER.
50. ALL DIFFUSERS/GRILLES IN SAME SPACE SHALL HAVE THE SAME FULL FACE SIZE USING LARGEST SIZE REQUIRED FROM DIFFUSER AND GRILLE SCHEDULE.
51. PROVIDE MANUFACTURER'S CERTIFIED DATA (NOA) OR CALCULATIONS ON ALL EXTERIOR MOUNTED EQUIPMENT DURING SUBMITTAL PHASE, WHICH INDICATES THAT THE EQUIPMENT CAN WITHSTAND A WIND LOAD REQUIRED BY THE FBC.
52. HVAC CONTRACTOR SHALL PROVIDE ALL SHEET METAL AND PIPING TRANSITIONS TO DIFFUSERS, TERMINAL BOXES, COILS AND OTHER SIMILAR HVAC EQUIPMENT.
53. ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S APPROVED PUBLISHED LITERATURE.
54. PROVIDE INSTRUMENTAL TEST HOLES IN DUCTWORK WHEREVER VOLUME DAMPERS ARE REQUIRED.
55. EXACT LOCATIONS OF THERMOSTATS TO BE COORDINATED WITH ALL OTHER TRADES BEFORE ROUGH-IN OR INSTALLATION.
56. ALL STRAINER/RELIEF VALVE DISCHARGE PIPING SHALL RUN TO 12" ABOVE FINISHED FLOOR OR NEAREST FLOOR DRAIN.
57. COORDINATE ALL STRUCTURAL SUPPORTS AND HOUSEKEEPING CONCRETE PAD REQUIREMENTS WITH STRUCTURAL DRAWINGS FOR ALL EQUIPMENT REQUIRING SAME.
58. COORDINATE ALL MOTOR, STARTER, VFD OR DISCONNECT REQUIREMENTS WITH ELECTRICAL DRAWINGS FOR ALL EQUIPMENT REQUIRING SAME.
59. ALL DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS.
60. PROVIDE ALL PIPE AND DUCT CONNECTIONS TO EQUIPMENT INDICATED ON THIS DRAWINGS AND FOR EQUIPMENT FURNISHED NEW BY THE OWNER. COORDINATE REQUIREMENTS WITH OWNER & CONSTRUCTION MANAGER. REVIEW ALL DRAWINGS FOR THESE REQUIREMENTS AND ASCERTAIN THE EXACT SCOPE IN THE FIELD PRIOR TO SUBMITTING BIDS.
61. THE CONTRACTOR SHALL VISIT THE SITE TO EXAMINE THE EXISTING CONDITIONS AND ALL WORK REQUIRED FOR PHASING, DEACTIVATION, TEMPORARY LINES ETC. QUESTIONS REGARDING PHASING, SCHEDULING OF WORK AND OTHER REQUIREMENTS ASSOCIATED WITH WORK IN THE EXISTING BUILDINGS SHALL BE DIRECTED TO THE OWNER PRIOR TO BIDDING. GENERALLY EACH SYSTEM OR SERVICE SHALL BE DEACTIVATED, DRAINED, MADE SAFE AND DISCONNECTED.
62. DEACTIVATION, RELOCATION AND NEW WORK SHALL BE PLANNED TO MINIMIZE DISRUPTION OF ANY FUNCTIONS, PROVIDE TEMPORARY CAPPING AND CONNECTIONS AS REQUIRED TO MAINTAIN EXISTING SYSTEMS DURING CONSTRUCTION.
63. REINSULATE EXISTING PIPING AND DUCTWORK WITHIN 10'-0" OF POINT OF CONNECTED NEW SYSTEMS.
64. THE HVAC CONTRACTOR, IN CONJUNCTION WITH THE CONSTRUCTION MANAGER SHALL MAKE PROVISIONS TO PROTECT THE EXISTING HVAC EQUIPMENT DURING CONSTRUCTION.
65. DUCTWORK AND PIPING TO BE INSTALLED ON THIS PROJECT SHALL BE TRANSPORTED TO THE SITE IN AN ENCLOSED TRUCK. DUCTWORK AND PIPING TO BE STORED ON SITE SHALL BE KEPT OFF THE FLOOR IN A CLEAN, DRY LOCATION WITH ALL ENDS SEALED WHILE STORED. AS INSTALLATION PROGRESSES ALL DUCTWORK AND PIPING ENDS SHALL BE KEPT SEALED.

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

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Revisions

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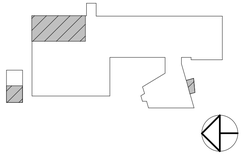
Key Plan



Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL GENERAL NOTES

Drawing No.

M0.02

EXPANSION TANK SCHEDULE

DESIGNATION	SERVES	LOCATION	TYPE	MIN TANK PRESS (PSIG)	TANK VOL. (GALLONS)	DIMENSIONS (DIAMETER x HEIGHT) (IN)	MANUFACTURER / MODEL	NOTES
ET-1	CHILLED WATER	MECH ROOM	VERTICAL	125	23	20 X 29 1/8	TACO / CA90-125	ALL

NOTES:
1. CLOSED BLADDER
2. ASME RATE RATED AT 125 PSIG
3. PROVIDE 6 HOUSEKEEPING PAD.
4. SHALL BE INSULATED 2" ELASMETOMERIC INSULATION AND PROTECTED WITH PVC JACKETING.

AIR SEPARATOR SCHEDULE

DESIGNATION	TYPE	SERVES	LOCATION	MAX FLOW (GPM)	INLET / OUTLET DIA. (IN)	MAX P.D. (FT)	MANUFACTURER / MODEL	NOTES
AS-1	FLANGED IN-LINE	CHILLED WATER	MECH ROOM	416	4 / 4	0.1	TACO / AC04-125	ALL

NOTES:
1. RATED FOR 125 PSIG AT 375F.
2. INTEGRAL AIR VENT, AV813W, 3/4" HI CAPACITY.
3. SHALL BE INSULATED 2" ELASMETOMERIC INSULATION AND PROTECTED WITH PVC JACKETING.

ELECTRIC DUCT HEATER SCHEDULE (EXISTING)

DESIGN BASIS: BTU ELECTRIC HEATERS

UNIT	UNIT NO.	ZONE / AREA SERVING	AIRFLOW	COIL FACE MIN. VEL (FPM)	HEATING CAP. (KW)	CONTROL TYPE	VOLT / PH	DUCT SIZE (IN)
AHU-1	EDH-1	AUDITORIUM	3,500	500	9	STEP CONTROLLER	480 / 3	13.1 X 11.6 (2)

NOTES:
CONTRACTOR SHALL COORDINATE W/ OWNER & ELECTRICAL CONTRACTOR FOR INSTALLATION. HEATER IS EXISTING AND REFERENCED HEREIN FOR COORDINATION PURPOSES ONLY.

1. COORDINATE LOCATION W/ AHU
2. DISCONNECT SWITCH PER EQUIPMENT MANUFACTURER
3. NEW THERMOSTAT AS REQUIRED. NO BMS SET UP

CHEMICAL POT FEEDER SCHEDULE

DESIGNATION	LOCATION	SERVES	TYPE	DIA (IN)	VOLUME (GAL)	PRESSURE RATING (PSI)	MANUFACTURER / MODEL
CPFT-1	CHILLER YARD	CHILLED WATER	VERTICAL STYLE DISH BOTTOM CUT	10	5	300	NEPTUNE / DBFC-5

VALVE SCHEDULE (NO EXCEPTIONS) MANUFACTURER: AMERICAN VALVE COMPANY

MODEL	SIZE	TYPE	END CONNECTION	PRESSURE RATING (PSI)	TEMPERATURE RATING (°F)	USE (OPEN/CLOSE ISOLATION)	NOTES
4001 CF8M	4"	STAINLESS BALL VALVE	FLANGE	150	300	CHILLED WATER (CHILLER)	1,2,3,4,5
4001 CF8M	2"	STAINLESS BALL VALVE	FLANGE	150	300	AHU-1 CHILLED WATER	1,2,3,4,5
3700 CF8M	4"	FUSED SOLID BALL VALVE	FLANGE	200	200	CHILLER TEMPORARY CONNECTIONS	1,2,3,4,5

NOTES:
1. VALVE SHALL BE AMERICAN MADE
2. FULL PORT
3. LOCKABLE
4. CLASS Y1 POSITIVE SHUTOFF
5. STEM EXTENSION REQUIRED

NOTE: 3-WAY VALVE FOR AHU IS EXISTING TO REMAIN AND SPECIFIED UNDER THE AHU SCHEDULE NOTES REFERENCED HEREIN.

VENTILATION AND AIR BALANCE REQUIREMENTS FOR AREAS SERVED BY AHU-1

ROOM INFORMATION					2023 FBC (8TH EDITION)					PROVIDED			
FLOOR	UNIT #	ROOM NAME	CATEGORY	AREA	PERSONS PER 1000 FT²	TOTAL PERSONS	CFM / PERSON	CFM / FT²	REQUIRED O/A (CFM)	O/A (CFM)	SUPPLY (CFM)	RETURN (CFM)	EXHAUST (CFM)
1ST FL	RTU-1	CLASSROOM	FBC - AUDITORIUM	1950	-	73 PPL	5	0.06	482	485	3500	3015	0

AIR HANDLING UNIT SCHEDULE

UNIT NO.		AHU-1
LOCATION		MECHANICAL ROOM
DESIGN MANUFACTURER		DUAL AIR BY COLDFLOW
MODEL NO.		JCCFW180VD
TYPE		VERTICAL / INDOOR
UNIT DIMENSIONS - L x W x H (IN.)		48.5 x 32 x 68.5
OPERATING WEIGHTS (LBS.)		-
ELECTRICAL INFORMATION - V / PH / HZ		460 / 3 / 60
ELECTRICAL INFORMATION - FULL LOAD AMPS		-
FAN	FAN TYPE	BLOWER ECM
	COOLING AIRFLOW (CFM)	3,500
	OUTSIDE AIRFLOW (CFM)	485
	T.S.P (IN WG)	-
	E.S.P (IN WG)	-
	FAN QUANTITY	2
	MOTOR ENCLOSURE	NEMA
	MOTOR EFFICIENCY (%)	80
	MOTOR FRAME SIZE (IN)	10 X 10
	BRAKE HORSEPOWER (BHP)	-
	MOTOR HORSEPOWER (HP)	.75
	MAX FAN RPM	1050
COOLING COIL	TOTAL LOAD CAPACITY (MBH)	40.7
	SENSIBLE LOAD CAPACITY (MBH)	34.5
	WATER TEMPERATURE ENT/LVG (°F)	45 / 55
	WATER FLOW (GPM)	28
	WATER SIDE PRESSURE DROP (FT WG) - MAX	-
	NO. OF COILS	-
	FACE AREA (SQ. FT.) - TOTAL	-
	ROWS OF COIL / FINS PER INCH	-
	ENTERING AIR TEMPERATURE - DB / WB (°F)	80.0 / 67.2
	LEAVING AIR TEMPERATURE - DB / WB (°F)	55.0
	AIR SIDE PRESSURE DROP (IN WG) - MAX	-
FILTERS	FACE VELOCITY (FPM) - MAX	500
	TYPE & THICKNESS	2"
	FILTER QTY & SIZE (IN)	MERV-8
FULL LENGTH BASE RAIL		-

NOTES:
1. CONFIGURATION - VERTICAL UNIT
2. CABINET - STAINLESS STEEL, INSULATED EVAP SECTION, ACCESS PANELS
3. DRAIN PAN - STAINLESS STEEL, INSULATED
4. CONTROLS SAFETY - CONDESNSATE SWITCH, 4 SPEED SWITCH, RELAY FOR OUTSIDE AIR DAMPER (2-POSITION OPEN/CLOSE), TERMINALS FOR FIRE ALARM & DUCT HEATER
5. BLOWERS - CENTRIFUGAL GALVANIZED WHEELS, X13 ECM MOTOR (2 EACH)
6. EVAPORATOR COIL - COOPER TUBES, ALUMINUM FINS
7. TWO 3/4 HP MOTORS, 4 SPEED, X13 ECM DIRECT DRIVE BLOWER MOTORS
8. CONTROLS 24 VOLT 75 VA TRANSFORMER, 2 POLE CONTACTOR
9. 30 MM 2 POSITION SWITCH FOR OUTSIDE AIR DAMPER CONTROL
10. TERMINALS FOR FIRE ALARM & 9KW DUCT HEATER
11. FACTORY INSTALLED 3-WAY WATER SOLENOID VALVES FOR TOTAL OF 28 GPM W/ AFX24-MFT-XA 24V - BELIMO ACTUATOR
12. PROGRAMMABLE THERMOSTAT - 24 VAC
13. TSTAT SOLENOID VALVE FOR

O/A SUPPLY FAN SCHEDULE

UNIT NO.		SF-1
LOCATION		MECHANICAL / ELEC ROOM
BASIS OF DESIGN MANUFACTURER		GREEN HECK (VARI-GREEN)
MODEL NO.		SQ-95-VG
AREA SERVED		CLASSROOM
FAN TYPE / SYSTEM TYPE		CENTRIFUGAL / INLINE (OUTSIDE AIR)
FAN PERFORMANCE	DESIGN AIRFLOW (CFM)	485
	E.S.P. (IN WG)	0.25
	OPERATING POWER (BHP)	0.05
	FAN RPM	1257
	DRIVE TYPE	DIRECT
MOTOR	MOTOR HORSEPOWER (HP)	1 / 6
	ELECTRICAL SERVICE (VOLT/PH)	115 / 1
	MOTOR FLA (AMPS)	2.2
	MOTOR TYPE	ECM
	MOTOR ENCLOSURE	TENV
ACCESSORIES	BACKDRAFT DAMPER	NO
	NOTES / OTHER ACCESSORIES	SEE BELOW
	MIAMI-DADE NOA#	NA
	FLORIDA PRODUCT APPROVAL #	NA
FAN INTERLOCKING		AHU-1 (MECH-ELEC ROOM)

NOTES:-

1. ALL FANS SHALL BE UL/cUL 705 LISTED
2. PROVIDE CONTROL - VARI-GREEN DIAL ON EXTERIOR OF FAN HOUSING, MOUNTED AND WIRED
3. JUNCTION BOX SHALL BE MOUNTED AND WIRED
4. GALVANIZED HOUSING
5. FAN SHALL BE COATED WITH ANTI-CORROSION COATING HI-PRO-POLYESTER INCLUDING ALL COMPONENETS/ACCESSORIES
6. FAN HOUSING INSULATION SHALL BE 1" THICK
7. PROVIDE DISCONNECT SWITCH NEMA 1, TOGGLE, SHIPPED SEPARATE
8. MOTOR VARIGREEN ECM MOTOR WITH SPEED CONTROLLER. CONTRACTOR TO PROVIDE REQUIRED RELAY TO INTERLOCK W/ AHU-1
9. COMPOSITE CENTRIFUGAL WHEEL SHALL NOT BE COATED
10. UNIT WARRANTY SHALL BE 1 YR

AIR COOLED CHILLER SCHEDULE

UNIT DESIGNATION		ACH-1
MODEL NO.		DAIKIN
CAPACITY (TONS)		92.25
EFFICIENCY EER		10.99
IPLV.IP (BTU/W.h)		17.23
ELECTRICAL SERVICE (VOLT/PH/HZ)		460 / 3 / 60
UNIT MCA (AMPS)		212
UNIT MOP (AMPS)		250
REFRIGERANT		R-32
OPERATING WEIGHT W/O CURB (LBS.)		5,826
EVAPORATOR	GPM	220.7
	CHILLED WATER TEMP. ENT/LVG (°F)	54 / 44
	NO. OF PASSES	1
	WPD (FT. WG.) MAX.	10.7
	FOULING FACTOR	0.00010
CONDENSER	AMBIENT TEMPERATURE (°F)	95.0
	NO. OF FANS / FLA (A) EACH	6 / 3.30
	ACCESSORIES	SEE NOTES
COMPRESSOR	TYPE	SCROLL
	NO. OF COMPRESSORS	4
	COMPRESSOR RLA (CKT. 1)	65.0 / 43.0
	COMPRESSOR RLA (CKT. 2)	27.0 / 27.0
PUMPS	PUMP TYPE	DUAL
	MOTOR HORSEPOWER (HP)	7.5
	FINAL IMPELLER DIAMETER (IN)	4.43
	TOTAL FLOW (GPM)	220.7
	MOTOR FLA (A)	11.0
	MOTOR RPM	3600
	TOTAL HEAD PRESSURE	73.1
	PUMP STARTER TYPE	VARIABLE SPEED (SENSORLESS)
VIBRATION ISOLATORS	TYPE	EXTERNAL
	MIN. SET DEFLECTION	BY MFR. RECOMMENDATIONS
	REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL REQUIREMENTS	

* THIS IS A CUSTOM BUILT CHILLER. MANUFACTURER TO PROVIDE WIND LOAD CALCULATIONS OF EQUIPMENT ONCE THE PROJECT IS AWARDED AND HAS RECEIVED A PO FROM THE OWNER.

** AT THE TIME OF PULLING THE MECHANICAL PERMIT, MECHANICAL CONTRACTOR SHALL SUBMIT TO BUILDING DEPARTMENT THE EQUIPMENT WIND LOAD CALCULATIONS AND SITE SPECIFIC SECUREMENT DETAILS IN ACCORDANCE TO FBC-HIGH VELOCITY WINDS 545 BY FL REGISTERED STRUCTURAL ENGINEER.

NOTES:

1. ANTI-CORROSION COMPONENTS COATING - CABINET TO BE COATED WITH MODINE INSITU CLEAR SPRAY COAT, SPRAY-APPLIED. COIL TO BE COATED WITH MODINE INSITU SPRAY COAT ES² SPRAY-APPLIED.
2. EVAPORATOR INSULATION - DOUBLE INSULATION THICKNESS (TOTAL OF 1.5 INCHES) FOR HIGH HUMIDITY AREAS OR LOW FLUID TEMPERATURES.
3. SOUND REDUCTION - ACOUSTICAL BLANKETS ARE FACTORY INSTALLED ON EACH COMPRESSOR. THEY ARE ALSO AVAILABLE FOR RETROFIT FIELD INSTALLATION.
4. SHUT-OFF VALVES - SUCTION VALVES (ONE PER CIRCUIT), LIQUID LINE SHUTOFF VALVES, AND DISCHARGE SHUTOFF VLAVES CAN BE FACTORY MOUNTED.
5. EVAPORATOR INLET STRAINER - FIELD-INSTALLED EVAPORATOR WATER STRAINER KIT CONSISTING OF Y-TYPE STRAINER, BLOWDOWN VALVE, PIPE EXTENSION WITH TWO SCHRADER FITTINGS AND TWO GROOVED COUPLINGS.
6. REPLACEBALE CORE FILTER DRIER - FACTORY INSTALLED FILTER DRIER WITH A REPLACEABLE CORE ALLOWS FOR FAST REPLACEMENT OF FILTER ELEMENT AND EASIER SERVICEABILITY.
7. WATER FLOW SWTICH (FACTORY-SUPPLIED) - A FACTORY INCLUDED THERMAL DISPERSION FLOW SWITCH IS NECESSARY TO AVOID EVAPORATOR FREEZE-UP UNDER LOW OR NO FLOW CONDITIONS. A THERMAL DISPERSION FLOW SWITCH WILL BE FACTORY-INSTALLED ON PACKAGE MODELS. ON REMOTE EVAPORATOR MODELS, THE FLOW SWITCH MAY BE SEPARATELY FIELD INSTALLATION. TERMINALS ARE PROVIDED IN THE UNIT CONTROL CENTER FOR FIELD HOOK-UP OF THE WATER FLOW SWITCH.
8. ALARM BELL (FIELD INSTALLED) - FIELD INSTALLED AND WIRED TO THE CONTROL PANEL TO PROVIDE REMOTE INDICATION OF UNIT ALARM CONDITION.
9. PHASE LOSS / VOLTAGE PROTECTION - PHASE LOSS WITH UNDER / OVER VOLTAGE PROTECTION AND MULTIPLE LED INDICATION OF FAULT TYPE IS AVAILABLE AS A FACTORY-INSTALLED OPTION TO GUARD AGAINST COMPRESSOR MOTOR BURNOUT.
10. PUMP PACKAGES (DUAL PUMPS SINGLE CASTING) - SINGLE SPRING INSIDE-SEAL VERTICAL, IN-LINE, RADIALLY SPLIT-CASE PUMPS, MOUNTED IN A COMMON CASING WITH A COMMON INLET CONNECTION AND OUT CONNECTION AND INCLUDING A FLAPPER VALVE TO PREVENT RECIRCULATION WHEN ONLY ONE PUMP IS OPERATING. THE PUMPS ARE DESIGNED FOR DUTY/STANDBY, NOT PARALLEL OPERATION. ALL INFORMATION AND PERFORMANCE CURVES FOR THE SINGLE PUMP ARRANGEMENT (MODEL 4380) CAN BE USED FOR THE DUAL PUMP ARRANGEMENT (MODEL 4392).
    A. "Y" TYPE INLET STRAINER
    B. COMBINATION TRIPLE-DUTY OUTLET VALVE CONTAINING:
        a. DISCHARGE SHUTOFF VALVE
        b. CHECK VALVE
        c. FLOW THROTTLING VALVE
    C. COMBINATION SUCTION GUIDE WITH FLOW STABILIZING OUTLET VANES AND STAINLESS STEEL STRAINER WITH A DISPOSABLE FINE-MESH START-UP STRAINER
    D. MOUNTED AND WIRED FLOW SWITCH
    E. FACTORY POWER AND CONTROL SWITCH
    F. INTERCONNECTING PIPING AND INSULATION OF ALL COLD SURFACES.
    G. FACTORY EXTENDED WARRANTY: EXTEND 4 YEARS FOR A TOTAL OF 5 YEARS.

ACCESSORIES:

FOR ACCESSORIES DETAIL ON SHEET M4.01

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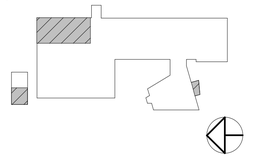

Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56088

Sheet Title

MECHANICAL SCHEDULES

Drawing No.

M0.03

23 00 00 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 01SPECIFICATION SECTIONS, APPLY TO THIS SECTION AND ALL OTHER SECTIONS OF DIVISION 23.

1.2 RESPONSIBILITY
- A. AWARDED CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK INCLUDED IN DIVISION 23. THE DELEGATION OF WORK TO SUB CONTRACTORS SHALL NOT RELIEVE HIM OF THIS RESPONSIBILITY.

1.3 SITE VISIT
- A. PRIOR TO PREPARING THE BID, THE AWARDED CONTRACTOR & CORRESPONDING TRADE CONTRACTORS SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS. MAKE ALL NECESSARY INVESTIGATIONS AS TO LOCATIONS OF UTILITIES AND ALL OTHER MATTERS WHICH CAN AFFECT THE WORK. NO ADDITIONAL COMPENSATION WILL BE MADE TO THE CONTRACTOR AS A RESULT OF HIS FAILURE TO FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED.

1.4 OUTAGES
- A. FOR ALL WORK REQUIRING AN OUTAGE, THE HVAC MECHANICAL SUBCONTRACTOR SHALL SUBMIT AN OUTAGE REQUEST TO THE PROJECT MANAGER.
- B. THE EXISTING HVAC SYSTEM SHALL REMAIN OPERATIONAL UNLESS TURNED OFF BY FACILITIES PERSONNEL DURING THE CONSTRUCTION OF THE PROJECT.
- C. UNLESS OTHERWISE SPECIFIED, OUTAGES OF ANY SERVICES REQUIRED FOR THE PERFORMANCE OF THIS CONTRACT AND AFFECTING AREAS OTHER THAN THE IMMEDIATE WORK AREA SHALL BE SCHEDULED AT LEAST TEN (10) BUSINESS DAYS IN ADVANCE WITH THE PM AND FACILITIES.
- D. ALL HVAC OUTAGES WHICH WILL INTERFERE WITH THE NORMAL USE OF THE BUILDING IN ANY MANNER SHALL BE DONE AT SUCH TIMES AS SHALL BE MUTUALLY AGREED UPON BY THE AWARDED CONTRACTOR, THE PM AND FACILITIES.
- E. THE HVAC CONTRACTOR SHALL INCLUDE IN HIS PRICE THE COST OF ALL PREMIUM TIME REQUIRED FOR OUTAGES AND OTHER WORK WHICH INTERFERES WITH THE NORMAL USE OF THE BUILDING, WHICH WILL BE PERFORMED, IN MOST CASES, DURING OTHER THAN NORMAL WORK TIME AND AT THE CONVENIENCE OF THE FACILITY.
- F. THE OPERATION OF HVAC VALVES OR SWITCHES REQUIRED TO ACHIEVE AN OUTAGE MUST BE COORDINATED WITH FACILITIES PERSONNEL ONLY. UNAUTHORIZED OPERATION OF HVAC VALVES, POWER SWITCHES, ETC. BY CONTRACTORS AND THEIR PERSONNEL COULD RESULT IN EXTREMELY SERIOUS CONSEQUENCES FOR WHICH THE AWARDED CONTRACTOR WILL BE HELD ACCOUNTABLE.

1.5 SUBMITTALS
- A. GENERAL: FOR GENERAL REQUIREMENTS SEE DIVISION 01 SECTION "SUBMITTAL PROCEDURES".
- B. HVAC SUBMITTALS: PROVIDE SUBMITTALS FOR ALL MATERIAL, EQUIPMENT AND/OR SUPPORTS AS SPECIFIED IN DIVISION 23, AND WHERE INDICATED ON THE DRAWINGS AND DETAILS, FOR APPROVAL OF EQUIPMENT AND MATERIALS PROPOSED TO BE USED ON THIS PROJECT.
- C. SUBMITTAL FILE FORMAT: FILE FORMATS FOR EACH SUBMITTAL SHALL BE ELECTRONICALLY AS FOLLOWS:
  1. PRODUCT DATA FILE: "PDF" FILE FORMAT.
  2. DRAWINGS: "PDF" FORMATS.
  3. COORDINATED DRAWINGS: "PDF" FILE FORMATS.
  4. SCHEDULES: "PDF" FILE FORMAT.
- D. PROVIDE SEPARATE SUBMITTALS BY INDIVIDUAL SPECIFICATIONS SECTIONS. A SINGLE PRODUCT DATA SUBMITTAL SHALL BE SUBMITTED FOR EACH ELEMENT OF CONSTRUCTION AND TYPE OF PRODUCT OR EQUIPMENT.
- E. EACH SUBMITTAL SHALL BE LIMITED TO A MAXIMUM OF (2) REVIEWS BY THE ENGINEER. IF A THIRD OR SUBSEQUENT REVIEWS OF THE SAME RE-REVISED SUBMITTAL ARE REQUIRED, SUCH REVIEWS SHALL BE AT THE EXPENSE OF THE AWARDED CONTRACTOR.
- F. REVIEW TIME: AWARDED CONTRACTOR SHALL ALLOW A MINIMUM OF TWO (2) WEEKS (10 BUSINESS DAYS) FOR EACH SUBMITTAL REVIEW, INCLUDING RE-SUBMITTALS. TIME FOR REVIEW SHALL COMMENCE ON THE NEXT BUSINESS DAY AFTER THE ARCHITECT'S/ENGINEER'S RECEIPT OF SUBMITTAL. AWARDED CONTRACTOR SHALL NOT SUBMIT MORE THAN FOUR (4) DIFFERENT SUBMITTALS AT ONE TIME / WITHIN THE SAME WEEK. IF A PARTICULAR SUBMITTAL REQUIRES AN EXPEDITED REVIEW, SUCH REQUEST SHALL BE MADE TO THE ENGINEER IN ADVANCE; THE ENGINEER WILL MAKE EVERY EFFORT TO ACCOMMODATE SUCH REQUESTS IF POSSIBLE.
- G. PRODUCT DATA: SUBMIT DATA SHEETS THAT CONTAIN ONLY THE SPECIFIC INFORMATION WHICH IS RELATIVE TO THE PARTICULAR EQUIPMENT OR MATERIAL TO BE FURNISHED. WHERE A PRODUCT DATA SHEET DESCRIBES SEVERAL DIFFERENT ITEMS, SUBMITTALS SHALL CLEARLY IDENTIFY THE RELEVANT MATERIAL THAT IS BEING PROPOSED; ALL OTHER IRRELEVANT INFORMATION SHALL BE CROSSED/MARKED OUT.
- H. SHOP DRAWINGS: INCLUDE DETAILS OF FABRICATION AND INSTALLATION FOR SUPPORTS AND ANCHORAGE FOR MECHANICAL MATERIALS AND EQUIPMENT. DO NOT FABRICATE OR SHIP ANY EQUIPMENT UNTIL SUBMITTALS HAVE BEEN REVIEWED AND APPROVED BY THE OWNER/ENGINEER. THIS APPLIES TO ALL SECTIONS HEREIN.
- I. THE AWARDED CONTRACTOR SHALL ASSUME ALL DESIGN RESPONSIBILITY AND FINANCIAL RISKS FOR PROCEEDING WITH WORK PRIOR TO PROPER PROCESSING OF SUBMITTALS AND SHOP DRAWINGS.
- J. SUBSTITUTIONS: ANY SUBSTITUTIONS OF THE DESIGN BASIS SHALL BE LIMITED TO EQUAL PRODUCTS BY APPROVED MANUFACTURERS LISTED IN THE CONSTRUCTION DOCUMENTS AND/OR PREVIOUSLY APPROVED BY THE OWNER.

1.6 VARIANCES
- A. WHERE VARIANCES OCCUR BETWEEN THE DRAWINGS AND SPECIFICATIONS OR WITHIN EITHER DOCUMENT ITSELF, THE ITEM OR ARRANGEMENT OF BETTER QUALITY, GREATER QUANTITY OR HIGHER COST SHALL BE INCLUDED IN THE CONTRACT PRICE. THE ENGINEER SHALL DECIDE ON THE ITEM AND MANNER IN WHICH THE WORK SHALL BE PROVIDED.

1.7 PERFORMANCE REQUIREMENTS
- A. CONTRACT DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DO NOT INDICATE ALL OFFSETS, FITTINGS, TRANSITIONS, ACCESS PANELS AND OTHER SPECIALTIES REQUIRED.
- B. ARRANGE HVAC PIPING, DUCTWORK, EQUIPMENT AND OTHER WORK GENERALLY AS SHOWN ON THE CONTRACT DRAWINGS, PROVIDING PROPER CLEARANCES AND ACCESS.
- C. WHERE DEPARTURES ARE PROPOSED BECAUSE OF FIELD CONDITIONS OR OTHER CAUSES, PREPARE AND SUBMIT DETAILED SHOP DRAWING SUBMITTAL FOR APPROVAL IN ACCORDANCE WITH SUBMITTALS SPECIFIED BELOW.
- D. THE ARCHITECT/ENGINEER MAY MAKE REASONABLE CHANGES IN LOCATION OF EQUIPMENT, PIPING AND DUCTWORK UP TO THE TIME OF ROUGH-IN OR FABRICATION.

1.8 MATERIALS AND EQUIPMENT
- A. THE CONTRACT DRAWINGS AND SYSTEM PERFORMANCES HAVE BEEN DESIGNED ON THE BASIS OF USING THE PARTICULAR MANUFACTURER'S PRODUCTS SPECIFIED OR SCHEDULED ON THE CONTRACT DRAWINGS.
- B. PRODUCTS OF OTHER MANUFACTURER'S LISTED IN THE SPECIFICATION SHALL BE PERMITTED PROVIDED AS FOLLOWS:
  1. PRODUCTS MEET ALL OF THE REQUIREMENTS OF THE SPECIFICATIONS.
  2. MAKE, WITHOUT ADDITIONAL COST TO THE OWNER, ALL ADJUSTMENTS FOR DEVIATIONS, SUCH THAT THE FINAL INSTALLATION IS COMPLETE AND FUNCTIONS AS THE BASIS OF DESIGN PRODUCT IS INTENDED.
- C. PRODUCTS WITH DIMENSIONS OR OTHER CHARACTERISTICS DIFFERENT FROM THE BASIS OF DESIGN PRODUCT THAT RENDER THEIR USE IMPRACTICAL OR CAUSE FUNCTIONAL FIT, ACCESS, OR CONNECTION PROBLEMS, SHALL NOT BE ACCEPTABLE.

1.9 COORDINATION, SEQUENCING AND SCHEDULING
- A. COORDINATE HVAC SYSTEMS, EQUIPMENT, AND MATERIALS INSTALLATION WITH OTHER BUILDING COMPONENTS.
- B. UTILITIES: COORDINATE CONNECTION OF HVAC SYSTEMS WITH EXTERIOR UNDERGROUND SERVICES. COMPLY WITH REQUIREMENTS OF GOVERNING REGULATIONS, FRANCHISED SERVICE COMPANIES, AND CONTROLLING AGENCIES.
- C. CHASES: ARRANGE FOR CHASES, SLOTS, AND OPENINGS IN BUILDING STRUCTURE DURING PROGRESS OF CONSTRUCTION TO ALLOW FOR MECHANICAL INSTALLATIONS.
- D. SLEEVES: COORDINATE THE INSTALLATION OF REQUIRED SUPPORTING DEVICES AND SET SLEEVES IN POURED IN PLACE CONCRETE AND OTHER STRUCTURAL COMPONENTS AS THEY ARE CONSTRUCTED.
- E. SEQUENCING: SEQUENCE, COORDINATE, AND INTEGRATE INSTALLATIONS OF HVAC MATERIALS AND EQUIPMENT FOR EFFICIENT FLOW OF THE WORK. GIVE PARTICULAR ATTENTION TO LARGE EQUIPMENT REQUIRING POSITIONING PRIOR TO CLOSING IN THE BUILDING.
- F. ELECTRICAL SERVICES: COORDINATE CONNECTION OF ELECTRICAL SERVICES.
- G. ACCESS: COORDINATE REQUIREMENTS FOR ACCESS PANELS AND DOORS WHERE HVAC ITEMS REQUIRING ACCESS ARE CONCEALED BEHIND FINISHED SURFACES. ACCESS PANELS AND DOORS ARE SPECIFIED IN ARCHITECTURAL SPECIFICATION SECTION "ACCESS DOORS."
- H. SCHEDULING: SCHEDULE AND COORDINATE THE DELIVERY OF MATERIAL AND EQUIPMENT WITH OTHER TRADES TO AVOID DELIVERY CONFLICTS.

1.10 DEMOLITION
- A. HVAC DEMOLITION: CUT, REMOVE AND LEGALLY DISPOSE OF SELECTED HVAC EQUIPMENT, COMPONENTS, AND MATERIALS AS INDICATED, INCLUDING BUT NOT LIMITED TO REMOVAL OF HVAC PIPING, HVAC EQUIPMENT, DUCTWORK, PLUMBING FIXTURES AND TRIM, AND OTHER HVAC ITEMS MADE OBSOLETE BY THE NEW WORK.

1.11 FIRE SAFE MATERIALS
- A. UNLESS OTHERWISE INDICATED, MATERIALS SHALL CONFORM TO UL, NFPA OR ASTM STANDARDS FOR FIRE SAFETY WITH SMOKE AND FIRE HAZARD RATING NOT EXCEEDING FLAME SPREAD OF TWENTY-FIVE (25) AND SMOKE DEVELOPED OF FIFTY (50).

1.12 UNDERWRITER'S LABORATORY (UL) REQUIREMENTS
- A. ALL EQUIPMENT CONTAINING ELECTRICAL COMPONENTS AND PROVIDED AS PART OF THE MECHANICAL SPECIFICATIONS SHALL BEAR THE UNDERWRITER'S LABORATORY (UL) LABEL, AS A COMPLETE PACKAGED SYSTEM.

1.13 WARRANTY/GUARANTEE
- A. ALL MATERIALS, EQUIPMENT, ETC. PROVIDED BY THE AWARDED MECHANICAL CONTRACTOR AND/OR HIS SUBCONTRACTORS SHALL BE WARRANTED AND GUARANTEED TO BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION AND ACCEPTANCE OF WORK BY OWNER (REFER TO EQUIPMENT SCHEDULE NOTE AND BIDDING DOCUMENTS FOR EXTENDED WARRANTY REQUIRENMENTS). ANY DEFECTS IN WORKMANSHIP, MATERIALS, OR PERFORMANCE WHICH APPEAR WITHIN THE GUARANTEE PERIOD SHALL BE CORRECTED BY THE AWARDED CONTRACTOR WITHOUT COST TO THE OWNER, WITHIN A REASONABLE TIME, TO BE SPECIFIED BY OWNER. IN DEFAULT THEREOF, THE OWNER MAY HAVE SUCH WORK DONE AND CHARGE THE COST OF SAME TO THE AWARDED CONTRACTOR. IN ADDITION TO THE ABOVE STATEMENT THE WARRANTY/GUARANTEE PERIOD SHALL ALSO INCLUDE ALL LABOR COST RELATED TO ALL WARRANTY WORK. PROVIDE TO OWNER ADDITIONAL WARRANTY PACKAGES FOR REVIEW & APPROVAL. AN ADDITIONAL FACTORY EXTENDED WARRANTY SHALL BE PROVIDED AS PART OF THIS BID FOR A MINIMUM PERIOD OF FOUR (4) YEARS FOR THE ENTIRE CHILLER UNIT, PARTS, AND LABOR AND AGAINST DEFECTIVE MATERIAL WITH A TOTAL FIVE (5) AFTER THE DATE OF ACCEPTANCE OF THE CHILLER, WHICHEVER IS LATER. ADDITIONAL REQUIRED FACTORY EXTENDED WARRANTY AS OUTLINED IN SECTION 2.9

PART 2 – PRODUCTS

2.1 LISTED MANUFACTURERS
- A. LISTED MANUFACTURERS: THE MANUFACTURERS INDICATED IN PART 2 REPRESENT THE BASIS FOR DESIGN AND IDENTIFY THE MINIMUM LEVEL OF QUALITY FOR MATERIALS AND EQUIPMENT, SPECIFIED IN THIS DIVISION, THAT ARE ACCEPTABLE. UNLESS "OR EQUAL" IS INCLUDED AS AN OPTION, SUBSTITUTIONS ARE NOT ALLOWED, EXCEPT UNDER THE FOLLOWING CONDITION. DURING BID PHASE, CONTRACTORS MAY SUBMIT MATERIAL AND EQUIPMENT BY NON-LISTED MANUFACTURERS PROVIDED SAID SUBMITTALS MEET THE REQUIREMENTS OF THESE SPECIFICATIONS. ALL SUBMITTED MATERIALS AND EQUIPMENT ARE SUBJECT TO APPROVAL BY THE A/E AND OWNER. REFERENCE: DIVISION 1 SUBSTITUTION SECTION.

2.2 APPROVED EQUAL EQUIPMENT LAYOUTS
- A. APPROVED EQUAL EQUIPMENT LAYOUTS: THE EQUIPMENT LAYOUTS AND THE RELATED MECHANICAL AND ELECTRICAL SERVICE CONNECTIONS, ACCESS SPACE AND SUPPORTS INDICATED ON THE CONSTRUCTION DOCUMENTS REPRESENT EQUIPMENT PROVIDED BY THE SPECIFIED BASIS OF DESIGN MANUFACTURER AND MODEL NUMBER. WHEN THE SUCCESSFUL BIDDER CHOOSES TO PROVIDE "OR APPROVED EQUAL" EQUIPMENT BY ONE (1) OF THE OTHER LISTED MANUFACTURERS IN THE SPECIFICATIONS, THE BIDDER SHALL BE RESPONSIBLE FOR PROVIDING ALL ADJUSTMENTS AND MODIFICATIONS TO THE SERVICES NECESSARY TO MAKE CONNECTIONS TO THE EQUIPMENT, THE BIDDER SHALL BE RESPONSIBLE FOR INSTALLING THE EQUIPMENT SUCH THAT ALL REQUIRED CLEAR ACCESS SPACE IS MAINTAINED, AND THE BIDDER SHALL BE RESPONSIBLE FOR PROVIDING ALL ADJUSTMENTS AND MODIFICATIONS TO THE EQUIPMENT MOUNTING AND SUPPORTS. ALL ADJUSTMENTS AND MODIFICATIONS SHALL BE PROVIDED BY THE BIDDER AND APPROPRIATE SUBCONTRACTORS AT NO ADDITIONAL COST TO THE PROJECT. ANY SUBSTITUTIONS MUST BE APPROVED BY DTPW PROJECT MANAGER PRIOR TO. DTPW WILL BE THE SOLE DETERMINATOR OF OR-EQUAL.

2.3 COORDINATION DRAWINGS
- A. GENERAL: WHEN REQUIRED PARTICIPATE IN THE PREPARATION OF THE COORDINATED DRAWING EFFORT FOR THE PROJECT. SEE SPECIFICATION DIVISION 01 FOR GENERAL REQUIREMENTS.
- B. COORDINATION DRAWINGS: IN ADDITION TO THE REQUIREMENTS OF THE SPECIFICATION DIVISION 01 PREPARE THE HVAC PART FOR THE COORDINATION DRAWING EFFORT. WORK WITH THE OTHER TRADES TO ENSURE THE MATERIAL AND EQUIPMENT INSTALLED AS PART ON THE HVAC SYSTEM WILL NOT BE IN CONFLICT WITH THE INSTALLATION OF MATERIAL AND EQUIPMENT BY THE OTHER TRADE CONTRACTORS. UNLESS OTHERWISE INDICATED THE COORDINATION DRAWINGS, INCLUDING PLANS, SECTIONS, AND ELEVATIONS, SHALL BE PREPARED AT A SCALE OF NOT LESS THAN 1/4 INCH = 1 FOOT- 0 INCHES.
- C. COORDINATION EFFORT: THIS COORDINATION EFFORT SHALL INCLUDE DETAILING MAJOR ELEMENTS, COMPONENTS, AND SYSTEMS OF MECHANICAL EQUIPMENT AND MATERIALS IN RELATIONSHIP WITH OTHER SYSTEMS, INSTALLATIONS, AND BUILDING COMPONENTS. INDICATE LOCATIONS WHERE SPACE IS LIMITED FOR INSTALLATION AND ACCESS AND WHERE SEQUENCING AND COORDINATION OF INSTALLATIONS ARE OF IMPORTANCE TO THE EFFICIENT FLOW OF THE WORK, INCLUDING (BUT NOT NECESSARILY LIMITED TO) THE FOLLOWING
  1. INDICATE THE PROPOSED LOCATIONS OF HVAC SYSTEM PIPING, VALVES, EQUIPMENT, AND MATERIALS. INCLUDE THE FOLLOWING:
     - a. CLEARANCES FOR SERVICING AND MAINTAINING EQUIPMENT, INCLUDING, THE SPACE FOR EQUIPMENT DISASSEMBLY REQUIRED FOR PERIODIC MAINTENANCE.
     - b. EXTERIOR WALL AND FOUNDATION PENETRATIONS.
     - c. SIZES AND LOCATION OF REQUIRED CONCRETE PADS AND BASES.
     - d. SIZE AND LOCATION OF PIPE HANGERS AND OTHER COMPONENTS FOR PIPE SUPPORTS.
     - e. ALL HVAC SYSTEM ROUGH-INS FOR EQUIPMENT.
     - f. ACCESS DOORS.
  2. INDICATE SCHEDULING, SEQUENCING, MOVEMENT, AND POSITIONING OF LARGE EQUIPMENT INTO THE BUILDING DURING CONSTRUCTION.
  3. PREPARE FLOOR PLANS, ELEVATIONS, AND DETAILS TO INDICATE PENETRATIONS IN FLOORS, WALLS, AND CEILINGS AND THEIR RELATIONSHIP TO OTHER PENETRATIONS AND INSTALLATIONS. SHOW ALL WALL MOUNTED ACCESS DOORS FOR MECHANICAL DEVICES.
  4. PREPARE REFLECTED CEILING PLANS TO COORDINATE AND INTEGRATE INSTALLATIONS, AIR OUTLETS AND INLETS, LIGHT FIXTURES, COMMUNICATION SYSTEMS COMPONENTS, CABLE TRAYS, SPRINKLERS, ACCESS DOORS, AND OTHER CEILING MOUNTED ITEMS.

2.4 CONSTRUCTION RECORD DOCUMENTS
- A. THE AWARDED CONTRACTOR SHALL MAINTAIN A SET OF CONSTRUCTION RECORD DOCUMENTS DURING THE CONSTRUCTION PERIOD IN ACCORDANCE WITH SPECIFICATION DIVISION 01 SECTION "PROJECT CLOSEOUT".

2.5 PROJECT OPERATION AND MAINTENANCE MANUAL – ELECTRONIC FILES
- A. PROJECT O & M MANUAL FILE: THE PROJECT OM MANUAL SHALL INCLUDE ONE (1) ELECTRONIC COPY OF EACH APPROVED SUBMITTAL AND ANY MANUFACTURER'S MAINTENANCE MANUALS, AND ALL WARRANTY CERTIFICATES INCLUDED IN THIS DIVISION. ALSO INCLUDE THE ADDRESS, PHONE NUMBER AND CONTACT PERSON FOR EACH SUPPLIER. USING THE FACILITY'S STANDARD O&M MANUAL TEMPLATE REFERENCED IN DIVISION 01 CLOSEOUT PROCEDURES INSERT THE SUBMITTAL FILES INCLUDE BOTH A BOOKMARK AND TREE STRUCTURE FOR ACCESSING EACH SUBMITTAL FILE IN THE MANUAL.

2.6 COMBINATION MOTOR STARTERS, VFD'S, AND CONTROLLERS – HVAC EQUIPMENT
- A. COMBINATION MOTOR STARTERS, VFD'S AND/OR CONTROLLERS SHALL BE PROVIDED FOR ALL MOTORS SERVING HVAC EQUIPMENT.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS – EXECUTION
- A. ALL CONSTRUCTION WORK THAT CREATES EXCESSIVE NOISE WILL NOT BE PERMITTED DURING NORMAL BUSINESS HOURS. SEE DIVISION 01 SPECIFICATION SECTION "CUTTING AND PATCHING" FOR REQUIREMENTS.

3.2 EXISTING HVAC SYSTEMS
- A. BUILDING: IN NO CASE SHALL THE BUILDING'S HVAC SYSTEMS BE PLACED OUT OF SERVICE FOR ANY PERIOD OF TIME UNLESS IT IS IN AN EMERGENCY CONDITION AS DIRECTED BY THE FACILITY.
- B. PROJECT AREA: THE SECTIONS OF THE HVAC SYSTEMS SERVING THE PROJECT AREA CAN BE PLACED OUT OF SERVICE FOR THE CONSTRUCTION PERIOD AS APPROVED BY PM OR FACILITIES. WHEN THE CONSTRUCTION IS COMPLETED, THE SECTION OF THE HVAC SYSTEM SERVING THE PROJECT AREA SHALL BE PLACED BACK IN SERVICE.

3.3 EQUIPMENT ROUGH-INS
- A. VERIFY FINAL LOCATIONS FOR ROUGH INS WITH FIELD MEASUREMENTS AND WITH THE REQUIREMENTS OF THE ACTUAL EQUIPMENT TO BE CONNECTED.
- B. REFER TO EQUIPMENT SPECIFICATIONS INCLUDED IN THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL SPECIFICATIONS FOR EQUIPMENT ROUGH IN REQUIREMENTS.

3.4 MECHANICAL INSTALLATIONS - HVAC
- A. VERIFY ALL DIMENSIONS BY FIELD MEASUREMENTS.
- B. WHERE HVAC SYSTEMS, MATERIALS AND EQUIPMENT ARE INTENDED FOR OVERHEAD INSTALLATION, AND WHERE MOUNTING HEIGHTS ARE NOT DETAILED OR DIMENSIONED, INSTALL SYSTEMS, MATERIALS, AND EQUIPMENT TO PROVIDE THE MAXIMUM HEADROOM POSSIBLE. NOTIFY PM PRIOR TO INSTALLATION OF HVAC COMPONENTS WHEN HEADROOM IS LESS THAN SEVEN (7) FEET- SIX (6) INCHES AND/OR WHERE EXISTING SYSTEM COMPONENTS WILL BE BELOW THE NEW FINISHED CEILING HEIGHT. NOTIFICATION SHALL BE THROUGH THE "RFI" PROCESS.
- C. INSTALL HVAC SYSTEMS, MATERIALS, AND EQUIPMENT TO CONFORM WITH APPROVED SUBMITTAL DATA, INCLUDING COORDINATION DRAWINGS, TO THE GREATEST EXTENT POSSIBLE. CONFORM TO ARRANGEMENTS INDICATED BY THE CONTRACT DOCUMENTS, RECOGNIZING THAT PORTIONS OF THE WORK ARE SHOWN ONLY IN DIAGRAMMATIC FORM. WHERE COORDINATION REQUIREMENTS CONFLICT WITH INDIVIDUAL SYSTEM REQUIREMENTS, IDENTIFY THE CONFLICT AND SUBMIT AND "RFI" FOR EACH CONFLICT TO THE ARCHITECT.
- D. INSTALL HVAC SYSTEMS, MATERIALS, AND EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO OTHER BUILDING SYSTEMS AND COMPONENTS.
- E. INSTALL HVAC EQUIPMENT TO FACILITATE SERVICING, MAINTENANCE, AND REPAIR OR REPLACEMENT OF EQUIPMENT COMPONENTS. AS MUCH AS PRACTICAL, CONNECT EQUIPMENT FOR EASE OF DISCONNECTING, WITH MINIMUM OF INTERFERENCE WITH OTHER INSTALLATIONS. EXTEND GREASE FITTINGS TO AN ACCESSIBLE LOCATION.
- F. INSTALL ACCESS PANEL OR DOORS WHERE UNITS ARE CONCEALED BEHIND FINISHED SURFACES. ACCESS PANELS AND DOORS ARE SPECIFIED IN THE ARCHITECTURAL SPECIFICATIONS.
- G. INSTALL HVAC SYSTEMS, MATERIALS, AND EQUIPMENT GIVING RIGHT-OF-WAY PRIORITY TO SYSTEMS REQUIRED TO BE INSTALLED AT A SPECIFIED SLOPE.

3.5 CUTTING AND PATCHING
- A. GENERAL: PERFORM CUTTING AND PATCHING IN ACCORDANCE WITH SPECIFICATION DIVISION 01 SECTION 'CUTTING AND PATCHING' IN ADDITION TO THE REQUIREMENTS SPECIFIED IN SPECIFICATION DIVISION 01, THE FOLLOWING REQUIREMENTS APPLY:
  1. PATCH MATERIALS: PATCH FINISHED SURFACES AND BUILDING COMPONENTS USING NEW MATERIALS SPECIFIED FOR ORIGINAL INSTALLATION AND USING EXPERIENCED INSTALLERS. INSTALLERS' QUALIFICATIONS REFER TO THE MATERIALS AND METHODS REQUIRED FOR THE SURFACE AND BUILDING COMPONENTS BEING PATCHED.

3.6 CONCRETE STRUCTURES
- A. GENERAL: CONSTRUCT CONCRETE STRUCTURE TO SUPPORT MECHANICAL EQUIPMENT WERE INDICATED AND AS DETAILED ON THE STRUCTURAL DRAWINGS AND AS SPECIFIED. ENGAGE THE SERVICES OF THE STRUCTURAL OR AWARDED CONTRACTOR, AND PAY FOR THEM, TO PROVIDE THE CONCRETE STRUCTURE SUPPORTS. FOLLOW SUPPORTED EQUIPMENT MANUFACTURER'S SETTING TEMPLATES FOR ANCHOR BOLT AND TIE LOCATIONS.

3.7 DEMOLITION
- A. DISCONNECT, DEMOLISH, AND REMOVE WORK SPECIFIED AS PART OF THE HVAC SPECIFICATIONS AND AS INDICATED. REMOVE PIPES AND DUCTS BACK TO THE ACTIVE PIPE AND DUCT TO REMAIN AND CAP.

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

Project No.: 25-020728

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Revisions

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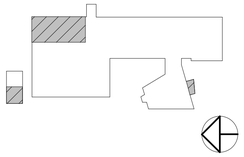

Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56096

Sheet Title

MECHANICAL SPECIFICATIONS

Drawing No.

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3.7 DEMOLITION

B. WHERE PIPE, DUCTWORK, INSULATION, OR EQUIPMENT TO REMAIN IS DAMAGED OR DISTURBED, REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL CAPACITY AND QUALITY.
C. ACCESSIBLE WORK: REMOVE INDICATED EXPOSED PIPE AND DUCTWORK IN ITS ENTIRETY.
D. ABANDONED WORK: CUT AND REMOVE BURIED PIPE ABANDONED IN PLACE, TWO (2) INCHES (50 MM) BEYOND THE FACE OF ADJACENT CONSTRUCTION. CAP AND PATCH SURFACE TO MATCH EXISTING FINISH.
E. REMOVAL: REMOVE INDICATED EQUIPMENT FROM THE PROJECT SITE.
F. TEMPORARY DISCONNECTION: REMOVE, STORE, CLEAN, REINSTALL, RECONNECT, AND MAKE OPERATIONAL EQUIPMENT INDICATED FOR RELOCATION.

3.8 GROUTING (AS REQUIRED ONLY)

A. INSTALL NONMETALLIC NON-SHRINK GROUT FOR HVAC EQUIPMENT BASE BEARING SURFACES, PUMP AND OTHER EQUIPMENT BASE PLATES, AND ANCHORS. MIX GROUT ACCORDING TO MANUFACTURER'S PRINTED INSTRUCTIONS.
B. CLEAN SURFACES THAT WILL COME INTO CONTACT WITH GROUT.
C. PROVIDE FORMS FOR PLACEMENT OF GROUT, AS REQUIRED.
D. AVOID AIR ENTRAPMENT WHEN PLACING GROUT.
E. PLACE GROUT TO COMPLETELY FILL EQUIPMENT BASES.
F. PLACE GROUT ON CONCRETE BASES TO PROVIDE A SMOOTH BEARING SURFACE FOR EQUIPMENT.
G. PLACE GROUT AROUND ANCHORS.
H. CURE PLACED GROUT ACCORDING TO MANUFACTURER'S PRINTED INSTRUCTIONS.

3.9 PENETRATION OF WATERPROOF CONSTRUCTION

A. COORDINATE THE WORK TO MINIMIZE PENETRATION OF WATERPROOF CONSTRUCTION, INCLUDING ROOFS, EXTERIOR WALLS AND INTERIOR WATERPROOF CONSTRUCTION.
B. FURNISH AND INSTALL DRAINS, CURBS, VENT ASSEMBLIES, SLEEVES, FLASHING, ETC. SPECIFICALLY DESIGNED FOR APPLICATION TO THE PARTICULAR CONSTRUCTION. INSTALL SYSTEM IN ACCORDANCE WITH THE ROOFING MANUFACTURER'S INSTRUCTIONS.

3.10 CLEANING AND FINISHES

A. CLEAN SURFACES PRIOR TO APPLICATION OF INSULATION, ADHESIVES, COATING, AND PAINT.
B. PROVIDE FACTORY APPLIED FINISH WHERE SPECIFIED.
C. PROTECT ALL FINISHES AND RESTORE ALL FINISHES TO THEIR ORIGINAL CONDITION IF DAMAGED AS A RESULT OF WORK INSTALLED AS PART OF MECHANICAL SPECIFICATIONS.
D. REMOVE ALL CONSTRUCTION MARKING AND WRITING FROM EXPOSED EQUIPMENT, DUCTWORK, PIPING AND BUILDING SURFACES.

3.11 ELECTRICAL REQUIREMENTS

A. UNLESS OTHERWISE INDICATED, FURNISH, AND INSTALL CONTROL AND INTERLOCK WIRING FOR THE EQUIPMENT FURNISHED UNDER THIS DIVISION. IN GENERAL, POWER WIRING AND MOTOR STARTING EQUIPMENT WILL BE PROVIDED AS SPECIFIED IN ELECTRICAL SPECIFICATIONS.
   1. WHERE THE ELECTRICAL REQUIREMENTS OF THE EQUIPMENT FURNISHED DIFFER FROM THE PROVISIONS MADE IN THE ELECTRICAL SPECIFICATIONS, MAKE THE NECESSARY ALLOWANCES AS PART OF THE MECHANICAL SPECIFICATIONS.
   2. WHERE NO ELECTRICAL PROVISIONS ARE INCLUDED IN THE ELECTRICAL SPECIFICATIONS, INCLUDE ALL NECESSARY ELECTRICAL WORK AS PART OF MECHANICAL SPECIFICATIONS.
B. ALL ELECTRICAL WORK PERFORMED AS PART OF MECHANICAL SPECIFICATIONS SHALL BE PROVIDED IN ACCORDANCE WITH THE ELECTRICAL SPECIFICATIONS.

3.12 PROVISIONS FOR ACCESS

A. FURNISH AND INSTALL ADEQUATE ACCESS TO ALL HVAC AND PLUMBING COMPONENTS. THE FOLLOWING LIST SHALL BE USED AS A GUIDE ONLY:
   1. EQUIPMENT
   2. VALVES
   3. DAMPERS AND OPERATORS
   4. FILTERS
   5. HEATING AND AIR CONDITIONING UNITS
   6. CONTROLS (STAND-ALONE)
   7. ATC PANELS
   8. HEATING AND COOLING COILS
   9. LOW POINT DRAINS
B. ACCESS SHALL BE ADEQUATE AS DETERMINED BY THE ENGINEER.
C. REFER TO CONTRACT DRAWINGS WHERE ACCESS PANELS HAVE BEEN SPECIFICALLY LOCATED OR REQUIRED AS PER THE REQUIRENMENTS LISTED IN THE CONSTRUCTIONS DOCUMENTS.
D. PROVIDE ADDITIONAL ACCESS PANELS FOR ADEQUATE ACCESS AS INDICATED IN PARAGRAPH 'A' ABOVE.
E. WHERE ACCESS IS BY MEANS OF LIFT OUT CEILING TILES OR PANELS MARK EACH ACCESS PANEL USING SMALL COLOR CODED OR NUMBERED TABS. PROVIDE AN INDEX CHART FOR IDENTIFICATION. PLACE MARKERS IN CORNER OF TILE.

3.13 OPERATION OF EQUIPMENT

A. CLEAN ALL SYSTEMS AND EQUIPMENT PRIOR TO INITIAL OPERATION FOR TESTING AND BALANCING.
B. DO NOT OPERATE EQUIPMENT UNLESS ALL PROPER SAFETY DEVICES OR CONTROLS ARE OPERATIONAL.
C. PROVIDE ALL MAINTENANCE AND SERVICE FOR EQUIPMENT WHICH IS OPERATED DURING CONSTRUCTION.
D. WHERE SPECIFIED AND OTHERWISE REQUIRED, PROVIDE THE SERVICES OF A MANUFACTURER'S FACTORY TRAINED SERVICE ORGANIZATION TO START THE EQUIPMENT.

3.14 TEMPORARY SERVICE AND EQUIPMENT USE

A. TEMPORARY SERVICE: UNLESS TEMPORARY SERVICES ARE REQUIRED AS PART OF THE PROJECT, DO NOT USE HVAC SYSTEMS FOR TEMPORARY SERVICES DURING CONSTRUCTION UNLESS AUTHORIZED IN WRITING BY THE ARCHITECT AND/OR THE FACILITY.
B. EQUIPMENT USE: WHERE SUCH AUTHORIZATION IS GRANTED, TEMPORARY USE OF NEW AND OR EXISTING EQUIPMENT SHALL NOT LIMIT OR OTHERWISE AFFECT WARRANTIES OR GUARANTEES COVERING NEW EQUIPMENT. WHERE EQUIPMENT IS USED BY THE AWARDED CONTRACTOR, THE CONTRACTOR SHALL PERFORM ALL REQUIRED PREVENTIVE MAINTENANCE ON THE EQUIPMENT DURING THE CONSTRUCTION PERIOD. UPON COMPLETION OF WORK, CLEAN AND RESTORE ALL NEW AND/OR EXISTING EQUIPMENT TO NEW CONDITION AND REPLACE ALL FILTERS AS NECESSARY.

3.15 DEMONSTRATION AND INSTRUCTIONS

A. DEMONSTRATE OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS TO OWNER'S PERSONNEL A MINIMUM TWO (2) WEEKS PRIOR TO DATE OF FINAL INSPECTION.
B. USE OPERATION AND MAINTENANCE MANUALS AND VIDEO AS BASIS OF INSTRUCTION. REVIEW CONTENTS OF MANUAL AND VIDEO WITH PERSONNEL IN DETAIL TO EXPLAIN ALL ASPECTS OF OPERATION AND MAINTENANCE.

3.16 LUBRICATION

A. ALL BEARINGS, MOTORS AND ALL EQUIPMENT REQUIRING LUBRICATION SHALL BE PROVIDED WITH ACCESSIBLE FITTINGS.
B. BEFORE TURNING OVER THE EQUIPMENT TO THE OWNER, THE INSTALLER SHALL PROVIDE THE FOLLOWING:
   1. FULLY LUBRICATE EACH ITEM OF EQUIPMENT.
   2. PROVIDE ONE (1) YEAR'S SUPPLY OF LUBRICANT FOR EACH TYPE OF LUBRICANT.
   3. PROVIDE COMPLETE WRITTEN LUBRICATING INSTRUCTIONS, TOGETHER WITH DIAGRAM LOCATING THE POINTS REQUIRING LUBRICATION.
C. MOTORS AND EQUIPMENT SHALL BE PROVIDED WITH GREASE LUBRICATED ROLLER OR BALL BEARINGS WITH ALEMITE OR EQUAL EXTENDED GREASE FITTINGS AND DRAIN PLUGS.

3.17 WALL AND FLOOR PENETRATIONS

A. ALL PENETRATIONS OF PARTITIONS, WALLS AND FLOORS BY DUCTS, PIPING OR CONDUIT UNDER SPECIFICATION DIVISION 23 SHALL BE SEALED AND CAULKED. PROVIDE UL LISTED FIRE STOPPING SYSTEMS AT PENETRATIONS THROUGH FIRE WALLS AS SPECIFIED IN THE ARCHITECTURAL SPECIFICATIONS.

3.18 CONSTRUCTION RECORD DRAWINGS

A. AS THE WORK PROGRESSES, THE AWARDED CONTRACTOR SHALL RECORD ON ONE (1) SET OF PRINTS, THE INSTALLED LOCATIONS, SIZES, AND DEPTHS OF PIPES, SERVICES, EQUIPMENT, ETC. WHICH MAY DIFFER FROM THE APPROVED CONTRACT DRAWINGS.
B. UPON COMPLETION OF THE HVAC INSTALLATIONS, THE INSTALLER SHALL DELIVER TO THE ENGINEER ONE (1) COMPLETE SET OF MARKED-UP BLUEPRINTS OF THE HVAC CONTRACT DRAWINGS. THE CONSTRUCTION MANAGER SHALL COMPILE THE MARK UP PRINTS INTO A COMPOSITE SET AND TRANSMIT THE SET THE ENGINEER WHO SHALL INCORPORATE THE MARK UPS INTO THE RECORD DRAWING ELECTRONIC FILE.
   1. THE MARK-UPS SHALL BE LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES AND DEPARTURES OF THE INSTALLATION AS COMPARED WITH THE ORIGINAL DESIGN.
C. AT A MINIMUM INCLUDE THE FOLLOWING INSTALLED CONDITIONS:
   1. LOCATION OF ALL SHUT OFF VALVES, DRAIN VALVES, AND BALANCING VALVES WITH ASSIGNED VALVE TAG NUMBERS.
   2. SHOW THE LOCATION OF CONCEALED MATERIAL AND/OR EQUIPMENT REQUIRING SERVICE SUCH AS STRAINERS, TRAPS, LOCALIZED A/C UNITS, CONTROL VALVES AND/OR EXPANSION COMPENSATORS.
   3. ACTUAL ENTERING/LEAVING INVERT ELEVATIONS FOR CHILLED WATER SERVICES FOR THE BUILDING.

3.19 CLOSEOUT PROCEDURES

A. OPERATING AND MAINTENANCE INSTRUCTIONS: SUBMIT COMPLETE PACKAGE AT LEAST ONE (1) MONTH PRIOR TO SUBSTANTIAL COMPLETION. ARRANGE FOR EACH INSTALLER OF EQUIPMENT THAT REQUIRES REGULAR MAINTENANCE TO MEET WITH THE OWNER'S PERSONNEL TO PROVIDE INSTRUCTION IN PROPER OPERATION AND MAINTENANCE. IF INSTALLERS ARE NOT EXPERIENCED IN PROCEDURES, PROVIDE INSTRUCTION BY THE MANUFACTURER'S REPRESENTATIVES.

3.20 CLEAN UP

A. EXCESSIVE DEBRIS AND DIRT, SUCH AS OCCURS FROM CUTTING THROUGH MASONRY OR PLASTER WALLS SHALL BE CLEANED UP FROM THE EQUIPMENT AND REMOVED IMMEDIATELY AFTER THE WORK OF CUTTING THROUGH THE WALLS.
B. DEBRIS SHALL BE REMOVED FROM PROPERTY.
C. CEILING PANELS SHALL BE REPLACED AS SOON AS WORK IS FINISHED IN THE AREA AND SHALL BE KEPT FREE OF DIRTY FINGERPRINTS. WHERE WORK IS BEING DONE IN CORRIDORS USED BY EMPLOYEES CEILING PANELS SHALL BE REPLACED AT THE CLOSE OF THE DAY'S WORK EVEN IF WORK IS AT THE PARTICULAR LOCATION IS INCOMPLETE.
D. ALL AREAS SHALL BE LEFT BROOM-CLEAN AT THE END OF THE WORK PERIOD.
E. REMOVE ALL MECHANICAL CLIPPING, WIRING, NUTS, BOLTS, ETC. LEFT ON TOP OF CEILINGS AND CEILING TILES.

3.21 PROJECT PUNCH OUT

A. ENGINEER WILL PERFORM PUNCH OUT REVIEWS AND WILL PROVIDE THE AWARDED CONTRACTOR WITH A LIST OF PUNCH LIST ITEMS TO BE COMPLETED BEFORE CONTRACT CLOSE OUT. EACH AND EVERY PUNCH LIST ITEM SHALL BE INITIALED AND DATED BY THE AWARDED CONTRACTOR WHEN THE WORK IS COMPLETE. THE ENGINEER WILL NOT PERFORM ANY PUNCH LIST VERIFICATION UNTIL ALL ITEMS HAVE BEEN COMPLETED, INITIALED, DATED AND THE LIST RETURNED TO THE ENGINEER. IF ANY ITEMS HAVE BEEN INITIALED AS BEING COMPLETED BY THE AWARDED CONTRACTOR AND THE ENGINEER DETERMINES THAT THE WORK IS NOT COMPLETE, THE ENGINEER SHALL BE REIMBURSED BY THE AWARDED CONTRACTOR AT HIS REGULAR HOURLY RATE FOR ANY AND ALL ITEMS REQUIRING REVISITING OF THE SITE BY THE ENGINEER. REIMBURSEMENT SHALL BE MADE BY DEDUCTING THE ENGINEER FEE FROM THE AWARDED CONTRACTOR'S FINAL PAYMENT.

END OF SECTION

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

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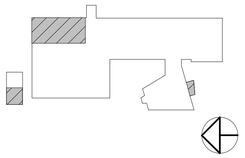

Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56088

Sheet Title

MECHANICAL SPECIFICATIONS

Drawing No.

M0.05

23 05 93 - TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 SCOPE OF WORK
- A. AWARDED CONTRACTOR SHALL OBTAIN AND PAY FOR SERVICES OF AN INDEPENDENT AIR BALANCE AND TESTING AGENCY THAT SPECIALIZES SOLELY IN BALANCING AND TESTING OF HEATING, VENTILATING, AND AIR CONDITIONING SYSTEMS.
- B. THE MECHANICAL CONTRACTOR IS REQUIRED TO COOPERATE WITH AND TO ASSIST THE TEST AND BALANCE AGENCY AS DESCRIBED HEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DELIVERING SYSTEMS THAT PRODUCE THE SPECIFIED PERFORMANCE, AND THEREFORE, HE SHALL ACCEPT INSTRUCTIONS FROM THE TEST AND BALANCE AGENCY AS REQUIRED TO ACCOMPLISH THIS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PERFORMANCE OF ALL SYSTEMS FOR ONE YEAR AFTER FINAL ACCEPTANCE.

1.2 SUBMITTALS
- A. CERTIFIED TESTING, ADJUSTING, AND BALANCING REPORTS: SUBMIT 2 COPIES OF REPORTS PREPARED, AS SPECIFIED IN THIS SECTION, ON APPROVED FORMS CERTIFIED BY THE TESTING, ADJUSTING, AND BALANCING AGENT.

1.3 COORDINATION
- A. COORDINATE THE EFFORTS OF FACTORY-AUTHORIZED SERVICE REPRESENTATIVES FOR SYSTEMS AND EQUIPMENT, HVAC CONTROLS INSTALLERS, AND OTHER MECHANICS TO OPERATE HVAC SYSTEMS AND EQUIPMENT TO SUPPORT AND ASSIST TESTING, ADJUSTING, AND BALANCING ACTIVITIES.
- B. ALL TESTING & VERIFICATION SHALL BE COORDINATED WITH OWNER AND SHALL BE PERFORMED DURING UNOCCUPIED HOURS.

PART 2 - EXECUTION

2.1 CONTRACTOR'S RESPONSIBILITY
- A. FURNISH TO TEST AND BALANCE AGENCY ONE COMPLETE SET OF APPROVED EQUIPMENT SUBMITTAL DATA AND APPROVED, UP-TO-DATE MECHANICAL DRAWINGS OR SHOP DRAWINGS.
- B. PROVIDE SCAFFOLDING AS REQUIRED FOR TEST AND BALANCE AGENCY.
- C. PREPARE AIR SIDE FOR BALANCING AS FOLLOWS:
  1. MECHANICALLY CHECK DUAL DUCT TERMINALS, FANS, BLOWERS, AND AIR HANDLING EQUIPMENT AND MAKE AVAILABLE TO OPERATE UNDER DESIGN CONDITIONS.
  2. SET SPLITTERS, VOLUME DAMPERS, FIRE DAMPERS AND VANES IN THEIR NEUTRAL POSITIONS.
  3. GRILLES, DIFFUSERS, ETC., INSTALLED, WITH VANES, BLADES IN THEIR NEUTRAL POSITIONS.
  4. MECHANICALLY CHECK CONTROLS, WHETHER THEY ARE ELECTRONIC, ELECTRIC, OR A COMBINATION THEREOF, AND MAKE AVAILABLE TO OPERATE UNDER DESIGN CONDITIONS.
  5. DAMPERS AND LOCKING DEVICES MARKED IN A INCONSPICUOUS PERMANENT MANNER TO TRULY REPRESENT POSITION OF THEIR RESPECTIVE DAMPERS.
- D. PREPARE WATER SIDE FOR BALANCING AS FOLLOWS:
  1. MECHANICALLY CHECK CHILLER, PUMPS, AND AIR HANDLING EQUIPMENT AND MAKE AVAILABLE TO OPERATE UNDER DESIGN CONDITIONS.
  2. SET VALVE POSITIONS, VFD'S, AND CONTROLS.
  3. MECHANICALLY CHECK CONTROLS, WHETHER THEY ARE ELECTRONIC, ELECTRIC, OR A COMBINATION THEREOF, AND MAKE AVAILABLE TO OPERATE UNDER DESIGN CONDITIONS.
  4. CHECK VALVES AND LOCKING DEVICES MARKED IN AN INCONSPICUOUS PERMANENT MANNER TO TRULY REPRESENT POSITION OF THEIR RESPECTIVE VALVE POSITIONS.
  5. CHECK STRAINERS AND VERIFY THAT ALL LINES ARE NOT OBSTRUCTED OR WITH DEBRIS.
  6. CONTRACTOR TO CHANGE VALVES, SETTERS, CONTROLS, DP SWITCHES, AS REQUIRED FOR CORRECT BALANCE AS NEEDED.

2.2 EXAMINATION
- A. EXAMINE CONTRACT DOCUMENTS TO BECOME FAMILIAR WITH PROJECT REQUIREMENTS AND TO DISCOVER CONDITIONS IN SYSTEMS' DESIGNS THAT MAY PRECLUDE PROPER TESTING, ADJUSTING, AND BALANCING OF SYSTEMS AND EQUIPMENT.
- B. EXAMINE APPROVED SUBMITTAL DATA OF HVAC SYSTEMS AND EQUIPMENT.
- C. REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TESTING, ADJUSTING, AND BALANCING PROCEDURES.

2.3 TESTING AND BALANCING PROCEDURES
- A. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN NEBB NATIONAL STANDARDS AND THIS SECTION.
- B. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN SMACNA'S "HVAC SYSTEMS-TESTING, ADJUSTING, AND BALANCING" AND THIS SECTION.

2.3 TESTING AND BALANCING PROCEDURES (CONT.)
- C. CUT INSULATION, DUCTS, AND PIPES FOR INSTALLATION OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY TO ALLOW ADEQUATE PERFORMANCE OF PROCEDURES. AFTER TESTING AND BALANCING, CLOSE PROBE HOLES AND PATCH INSULATION WITH NEW MATERIALS IDENTICAL TO THOSE REMOVED. RESTORE VAPOR BARRIER AND FINISH ACCORDING TO THE INSULATION SPECIFICATIONS FOR THIS PROJECT.
- D. MARK EQUIPMENT SETTINGS WITH PAINT OR OTHER SUITABLE, PERMANENT IDENTIFICATION MATERIAL, INCLUDING DAMPER-CONTROL POSITIONS, FAN-SPEED-CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, TO SHOW FINAL SETTINGS.

2.4 TOLERANCES
- A. SET HVAC SYSTEM AIRFLOW RATES WITHIN THE FOLLOWING TOLERANCES:
  1. AIR OUTLETS AND INLETS: +5 TO MINUS 5 PERCENT.

2.5 FINAL REPORT
1. SUBMIT TEST & BALANCE REPORT FOR EOR TO REVIEW & APPROVE.

END OF SECTION

23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SUBMITTALS
- A. PRODUCT DATA: IDENTIFY THERMAL CONDUCTIVITY, DENSITY, THICKNESS, AND JACKETS (BOTH FACTORY AND FIELD APPLIED, IF ANY), FOR EACH TYPE OF PRODUCT INDICATED.
- B. INSTALLER CERTIFICATES: SIGNED BY THE AWARDED CONTRACTOR CERTIFYING THAT INSTALLERS COMPLY WITH REQUIREMENTS.

1.2 QUALITY ASSURANCE
- A. INSTALLER QUALIFICATIONS: SKILLED MECHANICS WHO HAVE SUCCESSFULLY COMPLETED AN APPRENTICESHIP PROGRAM OR ANOTHER CRAFT TRAINING PROGRAM CERTIFIED BY THE U.S. DEPARTMENT OF LABOR, BUREAU OF APPRENTICESHIP AND TRAINING.
- B. FIRE-TEST-RESPONSE CHARACTERISTICS: AS DETERMINED BY TESTING MATERIALS IDENTICAL TO THOSE SPECIFIED IN THIS SECTION ACCORDING TO ASTM E 84, BY A TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION. FACTORY LABEL INSULATION AND JACKET MATERIALS AND ADHESIVE, MASTIC, TAPES, SEALER AND CEMENT MATERIAL CONTAINERS WITH APPROPRIATE MARKINGS OF APPLICABLE TESTING AND INSPECTING AGENCY.
  1. INSULATION INSTALLED INDOORS AND OUTDOORS: FLAME-SPREAD RATING OF 25 OR LESS, AND SMOKE-DEVELOPED RATING OF 50 OR LESS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
- A. MINERAL-FIBER BLANKET INSULATION
  1. JOHNS MANVILLE CORPORATION
  2. OWENS-CORNING FIBERGLASS CORPORATION
  3. CERTAINTEED MANSON
  4. KNAUF INSULATION
- B. RIGID FIBERGLASS BOARD INSULATION
  1. JOHNS MANVILLE CORPORATION
  2. OWENS-CORNING CORPORATION
  3. CERTAINTEED MANSON
  4. KNAUF INSULATION
- C. FIRE-RATED BLANKET INSULATION
  1. THERMAL CERAMICS: FIREMASTER DUCT WRAP
  2. 3M: FIRE BARRIER WRAP
- D. CELLULAR GLASS INSULATION:
  1. PITTSBURGH-CORNING CORPORATION
- E. FLEXIBLE ELASTOMERIC THERMAL INSULATION:
  1. ARMACELL LLC
  2. K-FLEX USA
  3. RUBATEX CORPORATION
- F. SUBJECT TO COMPLIANCE WITH REQUIREMENTS OF THESE SPECIFICATIONS.

2.2 INSULATION MATERIALS
- A. MINERAL-FIBER BLANKET THERMAL INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 553, TYPE II WITH FACTORY-APPLIED FSK JACKET MANUFACTURED FROM KRAFT PAPER, REINFORCING SCRIM, ALUMINUM FOIL, AND VINYL FILM. DENSITY SHALL BE MIN. 3/4 PCF WITH AN INSTALLED MINIMUM R-VALUE OF 6.0.
  1. APPLICATION SCHEDULE:
     a. CONCEALED SUPPLY & OUTSIDE AIR DUCTWORK: 2-1/5" THICK
     b. CONCEALED RETURN AIR DUCTWORK: 2-1/5" THICK
- B. RIGID FIBERGLASS BOARD INSULATION: GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. COMPLY WITH ASTM C 612, TYPE 1B, WITH FACTORY-APPLIED REINFORCED ALUMINUM FOIL VAPOR BARRIER. DENSITY SHALL BE MIN. 3 PCF WITH AN INSTALLED MINIMUM R-VALUE OF 6.0.
  1. APPLICATION SCHEDULE:
     a. EXPOSED (INTERIOR) SUPPLY, RETURN & OUTSIDE AIR DUCTWORK/PLENUMS: 2" THICK
     b. LOUVER BLANK-OFF PANELS: 3" THICK
     c. EXTERIOR (OUTDOOR) ALL DUCTWORK SYSTEMS (S/A, R/A, E/A, O/A): 3" THICK
  2. VAPOR RETARDER REQUIRED: YES
- C. CELLULAR GLASS INSULATION: INORGANIC, FOAMED OR CELLULATED GLASS, ANNEALED, RIGID, HERMETICALLY SEALED CELLS, INCOMBUSTIBLE. COMPLY WITH ASTM C 552, TYPE II, CLASS 2. PRE-FORMED CELLULAR GLASS INSULATION EQUAL TO PITTSBURGH CORNING "FOAMGLAS". INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
  1. INDOOR INSTALLATIONS:
     a. CONCEALED: COVER WITH FIRE RESISTANT WHITE STAY-DRY JACKETING.
     b. EXPOSED: COVER WITH ALUMINUM JACKETING.
     c. INSULATION THICKNESS SHALL BE AS FOLLOWS:
        - CHILLED WATER PIPES UP TO 2": 1-½" THICK
        - CHILLED WATER PIPES 2-½" & LARGER: 2" THICK
  2. OUTDOOR INSTALLATIONS:
     a. FINISHED WITH 0.050" ALUMINUM JACKET (PABCO - CHILDERS METALS) SECURED WITH 1/2" ALUMINUM BANDS AND SEALS, ALUMINUM SCREWS, OR POP RIVETS 9" ON CENTER. ELBOWS, VALVES, AND FITTINGS SHALL BE FINISHED WITH PRE-FORMED ALUMINUM FITTING COVERS. SEAM SHALL BE PLACED AT THE BOTTOM. CAULK ALL JOINTS TO PREVENT WATER INTRUSION. SEAL ALL JOINTS AND SEAMS WITH VAPOR-RETARDER MASTIC TO AVOID PASSAGE OF AIR TO THE PIPE SURFACE. REFER TO PITTSBUGH CORNING INSULATION PROCEDURES FOR PROPER EXECUTION.
     b. INSULATION THICKNESS SHALL BE AS FOLLOWS:
        - CHILLED WATER PIPES (ALL SIZES): 2" THICK
  3. VAPOR RETARDER REQUIRED: YES
- D. FLEXIBLE ELASTOMERIC THERMAL INSULATION: CLOSED-CELL, SPONGE- OR EXPANDED-RUBBER MATERIAL WITH BUILT-IN VAPOR BARRIER RATED SELF-EXTINGUISHING. COMPLY WITH ASTM C 534, TYPE I FOR TUBULAR MATERIALS AND TYPE II FOR SHEET MATERIALS.
  1. APPLICATION SCHEDULE:
     a. ALL CONDENSATE PIPING: 1-½" THICK
  2. VAPOR RETARDER REQUIRED: YES
- E. PREFABRICATED THERMAL INSULATING FITTING COVERS: COMPLY WITH ASTM C 450 FOR DIMENSIONS USED IN PREFORMING INSULATION TO COVER VALVES, ELBOWS, TEES, AND FLANGES.

2.3 FIELD-APPLIED JACKETS
- A. STANDARD PVC FITTING COVERS: FACTORY-FABRICATED FITTING COVERS MANUFACTURED FROM 20-MIL THICK, HIGH-IMPACT, ULTRAVIOLET-RESISTANT PVC.
- B. ALUMINUM JACKET: FACTORY CUT AND ROLLED TO INDICATED SIZES. COMPLY WITH ASTM B 209, 3003 ALLOY, H-14 TEMPER. ALL PIPING INSTALLED ABOVEGROUND ON BUILDING EXTERIOR SHALL BE COVERED WITH ALUMINUM JACKETING.
- C. PVC JACKET FOR INDOOR APPLICATIONS: ALL EXPOSED PIPING INSTALLED ON INTERIOR OF BUILDING SHALL BE COVERED WITH 4-MIL THICK, WHITE PVC JACKETING.

2.4 ACCESSORIES AND ATTACHMENTS
- A. ADHESIVE ATTACHED ANCHOR PINS AND SPEED WASHERS: GALVANIZED STEEL PLATE, PIN, AND WASHER MANUFACTURED FOR ATTACHMENT TO DUCT AND PLENUM WITH ADHESIVE. PIN LENGTH SUFFICIENT FOR INSULATION THICKNESS INDICATED.
  1. ADHESIVE: RECOMMENDED BY THE ANCHOR PIN MANUFACTURER AS APPROPRIATE FOR SURFACE TEMPERATURES OF DUCTS, PLENUMS, AND BREECHINGS; AND TO ACHIEVE A HOLDING CAPACITY OF 100 LB (45 KG) FOR DIRECT PULL PERPENDICULAR TO THE ADHERED SURFACE.
- B. BANDS: 3/4 INCH WIDE, IN ONE OF THE FOLLOWING MATERIALS COMPATIBLE WITH JACKET:
  1. STAINLESS STEEL: ASTM A 666, TYPE 304; 0.020 INCH THICK
  2. GALVANIZED STEEL: 0.005 INCH THICK
  3. ALUMINUM: 0.007 INCH THICK
  4. BRASS: 0.010 INCH THICK
  5. NICKEL-COPPER ALLOY: 0.005 INCH THICK
- C. WIRE: 0.080-INCH, NICKEL-COPPER ALLOY; 0.062-INCH, SOFT-ANNEALED, STAINLESS STEEL; OR 0.062-INCH, SOFT-ANNEALED, GALVANIZED STEEL.

2.5 VAPOR RETARDERS
A. MASTICS:
  1. MATERIALS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER THAT ARE COMPATIBLE WITH INSULATION MATERIALS, JACKETS, AND SUBSTRATES.
  2. VAPOR-BARRIER MASTIC: WATER BASED; SUITABLE FOR INDOOR AND OUTDOOR USE ON BELOW AMBIENT SERVICES.
  3. USE MASTIC THAT HAVE A VOC CONTENT OF 50 g/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR, SUBPART D.
  4. APPROVED PRODUCTS:
     a. CHILDERS PRODCUTS - CP-35
     b. FOSTERS PRODUCTS - 30-90

PART 3 - EXECUTION

3.1 PREPARATION
- A. SURFACE PREPARATION: CLEAN AND DRY SURFACES TO RECEIVE INSULATION. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.
- B. MIX INSULATING CEMENTS WITH CLEAN POTABLE WATER; IF INSULATING CEMENTS ARE TO BE IN CONTACT WITH STAINLESS-STEEL SURFACES, USE DEMINERALIZED WATER.

3.2 GENERAL INSTALLATION REQUIREMENTS
- A. INSTALL INSULATION MATERIALS, ACCESSORIES, AND FINISHES ACCORDING TO THE MANUFACTURER'S WRITTEN INSTRUCTIONS; WITH SMOOTH, STRAIGHT, AND EVEN SURFACES; AND FREE OF VOIDS THROUGHOUT THE LENGTH OF EQUIPMENT, DUCTS AND FITTINGS, AND PIPING, INCLUDING FITTINGS, VALVES, AND SPECIALTIES.
- B. INSTALL INSULATION MATERIALS, FORMS, VAPOR BARRIERS OR RETARDERS, JACKETS, AND THICKNESS REQUIRED FOR EACH ITEM OF EQUIPMENT, DUCT SYSTEMS, AND PIPE SYSTEM AS SPECIFIED.
- C. USE ACCESSORIES COMPATIBLE WITH INSULATION MATERIALS AND SUITABLE FOR THE SERVICE. USE ACCESSORIES THAT DO NOT CORRODE, SOFTEN, OR OTHERWISE ATTACK INSULATION OR JACKET IN EITHER WET OR DRY STATE.
- D. APPLY INSULATION WITH LONGITUDINAL SEAMS AT TOP AND BOTTOM OF HORIZONTAL RUNS.
- E. APPLY MULTIPLE LAYERS OF INSULATION WITH LONGITUDINAL AND END SEAMS STAGGERED.
- F. DO NOT WELD BRACKETS, CLIPS, OR OTHER ATTACHMENT DEVICES TO PIPING, FITTINGS, AND SPECIALTIES.
- G. KEEP INSULATION MATERIALS DRY DURING APPLICATION AND FINISHING.
- H. APPLY INSULATION WITH TIGHT LONGITUDINAL SEAMS AND END JOINTS. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY THE INSULATION MATERIAL MANUFACTURER.
- I. APPLY INSULATION WITH THE LEAST NUMBER OF JOINTS PRACTICAL.
- J. WHERE VAPOR BARRIER IS INDICATED, SEAL JOINTS, SEAMS, AND PENETRATIONS IN INSULATION AT HANGERS, SUPPORTS, ANCHORS, AND OTHER PROJECTIONS WITH VAPOR-RETARDER MASTIC.
  1. INSTALL INSULATION CONTINUOUSLY THROUGH HANGERS AND AROUND ANCHOR ATTACHMENTS.

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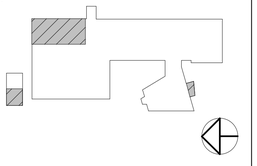

Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL SPECIFICATIONS

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2. EXTEND INSULATION ON ANCHOR LEGS FROM POINT OF ATTACHMENT TO SUPPORTED ITEM TO POINT OF ATTACHMENT TO STRUCTURE. TAPER AND SEAL ENDS AT ATTACHMENTS TO STRUCTURE WITH VAPOR-BARRIER MASTIC.
3. TAPER INSULATION ENDS AND SEAL TAPERED ENDS WITH A COMPOUND RECOMMENDED BY THE INSULATION MATERIAL MANUFACTURER TO MAINTAIN VAPOR RETARDER.
4. INSTALL INSERT MATERIALS AND INSTALL INSULATION TO TIGHTLY JOIN THE INSERT. SEAL INSULATION TO INSULATION INSERTS WITH ADHESIVE OR SEALING COMPOUND RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
5. COVER INSERTS WITH JACKET MATERIAL MATCHING ADJACENT PIPE INSULATION. INSTALL SHIELDS OVER JACKET, ARRANGED TO PROTECT JACKET FROM TEAR OR PUNCTURE BY HANGER, SUPPORT, AND SHIELD.

K. APPLY ADHESIVES, MASTICS AND SEALANTS AT THE MANUFACTURER'S RECOMMENDED COVERAGE RATE AND WET & DRY FILM THICKNESSES.

L. APPLY INSULATION WITH INTEGRAL JACKETS AS FOLLOWS:
1. PULL JACKET TIGHT AND SMOOTH.
2. CIRCUMFERENTIAL JOINTS: COVER WITH 3-INCH WIDE STRIPS, OF SAME MATERIAL AS INSULATION JACKET. SECURE STRIPS WITH ADHESIVE AND OUTWARD CLINCHING STAPLES ALONG BOTH EDGES OF STRIP, SPACED 4- INCHES O.C.
3. LONGITUDINAL SEAMS: OVERLAP JACKET SEAMS AT LEAST 1-1/2 INCHES. APPLY INSULATION WITH LONGITUDINAL SEAMS AT BOTTOM OF PIPE. CLEAN AND DRY SURFACE TO RECEIVE SELF-SEALING LAP. STAPLE LAPS WITH OUTWARD CLINCHING STAPLES ALONG EDGE AT 4-INCHES O.C.
   a. EXCEPTION: DO NOT STAPLE LONGITUDINAL LAPS ON INSULATION HAVING A VAPOR RETARDER.
4. COVER JOINTS AND SEAMS WITH TAPE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER TO MAINTAIN VAPOR SEAL.
5. VAPOR-RETARDER MASTICS: WHERE VAPOR RETARDERS ARE INDICATED, APPLY MASTIC ON SEAMS AND JOINTS AND AT ENDS ADJACENT TO DUCT AND PIPE FLANGES, UNIONS, VALVES, AND FITTINGS.
6. AT PENETRATIONS IN JACKETS FOR THERMOMETERS AND PRESSURE GAGES, FILL AND SEAL VOIDS WITH VAPOR-RETARDER MASTIC.

M. CUT INSULATION IN A MANNER TO AVOID COMPRESSING INSULATION MORE THAN 75 PERCENT OF ITS NOMINAL THICKNESS.

N. FINISH INSTALLATION WITH SYSTEMS AT OPERATING CONDITIONS. REPAIR JOINT SEPARATIONS AND CRACKING DUE TO THERMAL MOVEMENT.

O. REPAIR DAMAGED INSULATION FACINGS BY APPLYING SAME FACING MATERIAL OVER DAMAGED AREAS. EXTEND PATCHES AT LEAST 4-INCHES BEYOND DAMAGED AREAS. ADHERE, STAPLE, AND SEAL PATCHES SIMILAR TO BUTT JOINTS.

P. FOR ABOVE AMBIENT SERVICES, DO NOT INSTALL INSULATION TO THE FOLLOWING:
1. VIBRATION-CONTROL DEVICES.
2. TESTING AGENCY LABELS AND STAMPS.
3. NAMEPLATES AND DATA PLATES.
4. MANHOLES.
5. HANDHOLES.
6. CLEANOUTS.

3.3 INSULATION APPLICATION AT PENETRATIONS

A. ABOVEGROUND EXTERIOR WALL PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH WALL PENETRATIONS.

B. INTERIOR WALL AND PARTITION PENETRATIONS (NOT FIRE-RATED): APPLY INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.

C. FIRE-RATED WALL AND PARTITION PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH PENETRATIONS. TERMINATE INSULATION AT FIRE/SMOKE DAMPER SLEEVES FOR FIRE-RATED WALL AND PARTITION PENETRATIONS. EXTERNALLY INSULATE DAMPER SLEEVES TO MATCH ADJACENT INSULATION AND OVERLAP INSULATION AT LEAST 2-INCHES.

3.4 GENERAL PIPE INSULATION APPLICATION

A. APPLY INSULATION OVER FITTINGS, VALVES, STRAINERS, FLANGES, UNIONS AND OTHER SPECIALTIES, WITH CONTINUOUS THERMAL AND VAPOR-RETARDER INTEGRITY, UNLESS OTHERWISE INDICATED. REFER TO SPECIAL INSTRUCTIONS FOR APPLYING INSULATION OVER FITTINGS, VALVES, AND SPECIALTIES.

B. INSULATE PIPE ELBOWS, FITTINGS, VALVES, STRAINERS, ETC.. USING PREFORMED FITTING INSULATION, MITERED FITTINGS OR SECTIONAL PIPE INSULATION MADE FROM SAME MATERIAL, THICKNESS & DENSITY AS ADJACENT PIPE INSULATION.

C. INSULATE FLANGES AND UNIONS USING A SECTION OF OVERSIZED PREFORMED PIPE INSULATION.

D. COVER SEGMENTED INSULATED SURFACES WITH A LAYER OF FINISHING CEMENT AND COAT WITH A MASTIC.

E. INSTALL FITTED PVC COVER OVER ELBOWS, TEES, STRAINERS, VALVES, FLANGES, AND UNIONS, EXCEPT FOR SYSTEMS THAT ARE TO RECEIVE A FIELD-APPLIED JACKET OR FLEXIBLE ELASTOMERIC INSULATED SYSTEMS. TERMINATE ENDS WITH PVC END CAPS. TAPE PVC COVERS TO ADJOINING INSULATION FACING USING PVC TAPE (THUS REQUIRENMENT APPLIES TO ALL OF THE EXPOSED AHUS CHILLED WATER PIPING

F. INSULATE INSTRUMENT CONNECTIONS FOR THERMOMETERS, PRESSURE GAGES, PRESSURE TEMPERATURE TAPS, TEST CONNECTIONS, FLOW METERS, SENSORS, SWITCHES, AND TRANSMITTERS ON INSULATED PIPES, VESSELS, AND EQUIPMENT.

G. INSTALL REMOVABLE INSULATION COVERS AT LOCATIONS WHERE ACCESS TO FITTING, VALVE, ETC.. IS REQUIRED.

3.5 CELLULAR-GLASS INSULATION APPLICATION

A. STRAIGHT PIPES AND TUBES:
1. SECURE EACH LAYER OF INSULATION TO PIPE WITH WIRE OR BANDS, AND TIGHTEN BANDS WITHOUT DEFORMING INSULATION MATERIALS.
2. WHERE VAPOR BARRIERS ARE INDICATED, SEAL LONGITUDINAL SEAMS, END JOINTS, AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT.
3. FOR FACTORY-APPLIED JACKETS ON ABOVE AMBIENT SERVICES: SECURE LAPS WITH OUTWARD CLINCHED STAPLES AT 6-INCHES O.C.
4. FOR FACTORY-APPLIED JACKETS ON BELOW AMBIENT SERVICES: DO NOT STAPLE LONGITUDINAL TABS BUT SECURE TABS WITH ADDITIONAL ADHESIVE AS RECOMMENDED BY INSULATION MATERIAL MANUFACTURER AND SEAL WITH VAPOR-BARRIER MASTIC AND FLASHING SEALANT.

3.6 CELLULAR-GLASS INSULATION APPLICATION (CONT.)

A. PIPE FLANGES:
1. INSTALL PREFORMED PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.
2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.
3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH CUT SECTIONS OF CELLULAR-GLASS BLOCK INSULATION OF SAME THICKNESS AS PIPE INSULATION.
4. INSTALL JACKET MATERIAL WITH MANUFACTURER'S RECOMMENDED ADHESIVE, OVERLAP SEAMS AT LEAST 1-INCH, AND SEAL JOINTS WITH FLASHING SEALANT.

B. PIPE FITTINGS AND ELBOWS:
1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION WHEN AVAILABLE. SECURE ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
2. WHEN PREFORMED SECTIONS ARE NOT AVAILABLE, INSTALL MITERED SECTIONS OF STRAIGHT PIPE INSULATION, THICKNESS EQUAL TO ADJOINING PIPE INSULATION. SECURE INSULATION MATERIALS WITH WIRE OR BANDS.

C. VALVES AND PIPE SPECIALTIES:
1. INSTALL PREFORMED SECTIONS OF SAME MATERIAL AS STRAIGHT SEGMENTS OF PIPE INSULATION TO VALVE BODY.
2. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
3. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR PIPE FLANGES ABOVE.

3.7 MINERAL-FIBER INSULATION APPLICATION

A. STRAIGHT PIPES AND TUBES: INSTALL INSULATION SIMILARLY AS INDICATED FOR "STRAIGHT PIPES AND TUBES" UNDER SECTION "CELLULAR-GLASS INSULATION APPLICATION" ABOVE.

B. PIPE FLANGES: INSTALL INSULATION SIMILARLY AS INDICATED FOR "PIPE FLANGES" UNDER SECTION "CELLULAR-GLASS INSULATION APPLICATION" ABOVE.

C. PIPE FITTINGS AND ELBOWS: INSTALL INSULATION SIMILARLY AS INDICATED FOR "PIPE FITTINGS AND ELBOWS" UNDER SECTION "CELLULAR-GLASS INSULATION APPLICATION" ABOVE.

D. VALVES AND PIPE SPECIALTIES: INSTALL INSULATION SIMILARLY AS INDICATED FOR "VALVES AND PIPE SPECIALTIES" UNDER SECTION "CELLULAR-GLASS INSULATION APPLICATION" ABOVE.

E. BLANKET INSULATION ON DUCTS AND PLENUMS: SECURE BLANKET INSULATION WITH ADHESIVE AND ANCHOR PINS AND SPEED WASHERS.
1. APPLY ADHESIVES ACCORDING TO MANUFACTURER'S RECOMMENDED COVERAGE RATES PER SQUARE FOOT, FOR 100 PERCENT COVERAGE OF DUCT AND PLENUM SURFACES.
2. APPLY ADHESIVE TO ENTIRE CIRCUMFERENCE OF DUCTS AND TO ALL SURFACES OF FITTINGS AND TRANSITIONS.
3. INSTALL ANCHOR PINS AND SPEED WASHERS ON SIDES AND BOTTOM OF HORIZONTAL DUCTS AND SIDES OF VERTICAL DUCTS AS FOLLOWS:
   a. ON DUCT SIDES WITH DIMENSIONS 18 INCHES AND SMALLER, ALONG LONGITUDINAL CENTERLINE OF DUCT. SPACE 3 INCHES MAXIMUM FROM INSULATION END JOINTS, AND 16 INCHES O.C.
   b. ON DUCT SIDES WITH DIMENSIONS LARGER THAN 18 INCHES, SPACE PINS 16 INCHES O.C. EACH WAY, AND 3 INCHES MAXIMUM FROM INSULATION JOINTS. APPLY ADDITIONAL PINS AND CLIPS TO HOLD INSULATION TIGHTLY AGAINST SURFACE AT CROSS BRACING.
   c. ANCHOR PINS MAY BE OMITTED FROM TOP SURFACE OF HORIZONTAL, RECTANGULAR DUCTS AND PLENUMS.
   d. DO NOT OVERCOMPRESS INSULATION DURING INSTALLATION.
   e. IMPALE INSULATION OVER ANCHORS AND ATTACH SPEED WASHERS. *(APPLIES TO BLANKET INSULATION ONLY.)*
   f. CUT EXCESS PORTION OF PINS EXTENDING BEYOND SPEED WASHERS OR BEND PARALLEL WITH INSULATION SURFACE. COVER EXPOSED PINS AND WASHERS WITH TAPE MATCHING INSULATION FACING.
4. FOR DUCTS AND PLENUMS WITH SURFACE TEMPERATURES BELOW AMBIENT, INSTALL A CONTINUOUS UNBROKEN VAPOR BARRIER. CREATE A FACING LAP FOR LONGITUDINAL SEAMS AND END JOINTS WITH INSULATION BY REMOVING 2 INCHES FROM ONE EDGE AND ONE END OF INSULATION SEGMENT. SECURE LAPS TO ADJACENT INSULATION SEGMENT WITH 1/2-INCH STAPLES, 1 INCH O.C., AND COVER WITH PRESSURE-SENSITIVE TAPE HAVING SAME FACING AS INSULATION.
5. OVERLAP UNFACED BLANKETS A MINIMUM OF 2 INCHES ON LONGITUDINAL SEAMS AND END JOINTS. SECURE WITH STEEL BAND AT END JOINTS AND SPACED A MAXIMUM OF 18 INCHES O.C. *(APPLIES TO BLANKET INSULATION ONLY.)*
6. INSTALL INSULATION ON RECTANGULAR DUCT ELBOWS AND TRANSITIONS WITH A FULL INSULATION SEGMENT FOR EACH SURFACE. APPLY INSULATION ON ROUND AND FLAT-OVAL DUCT ELBOWS WITH INDIVIDUALLY MITERED GORES CUT TO FIT THE ELBOW *(APPLIES TO BLANKET INSULATION ONLY.)*.
7. INSULATE DUCT STIFFENERS, HANGERS, AND FLANGES THAT PROTRUDE BEYOND THE INSULATION SURFACE WITH 6-INCH- WIDE STRIPS OF THE SAME MATERIAL USED TO INSULATE DUCT. SECURE ON ALTERNATING SIDES OF STIFFENER, HANGER, AND FLANGE WITH PINS SPACED 6 INCHES O.C.
8. APPLY VAPOR-RETARDER MASTIC TO OPEN JOINTS, BREAKS, AND PUNCTURES FOR INSULATION INDICATED TO RECEIVE VAPOR RETARDER.

F. BOARD INSULATION ON EXPOSED DUCTS AND PLENUMS WITHIN MECHANICAL ROOMS (AHU-1): INSTALL INSULATION SIMILARLY AS INDICATED FOR "BLANKET INSULATION ON DUCTS AND PLENUMS" UNDER SECTION "MINERAL-FIBER INSULATION APPLICATION", EXCEPT AS FOLLOWS:
1. INSTALL INSULATION ON RECTANGULAR DUCT ELBOWS AND TRANSITIONS WITH A FULL INSULATION SEGMENT FOR EACH SURFACE. GROOVE AND SCORE INSULATION TO FIT AS CLOSELY AS POSSIBLE TO OUTSIDE AND INSIDE RADIUS OF ELBOWS. INSTALL INSULATION ON ROUND AND FLAT-OVAL DUCT ELBOWS WITH INDIVIDUALLY MITERED GORES CUT TO FIT ELBOWS.

3.8 FLEXIBLE ELASTOMERIC INSULATION APPLICATION

A. SEAL LONGITUDINAL SEAMS AND END JOINTS WITH MANUFACTURER'S RECOMMENDED ADHESIVE.

B. PIPE FLANGES:
1. INSTALL PIPE INSULATION TO OUTER DIAMETER OF PIPE FLANGE.
2. MAKE WIDTH OF INSULATION SECTION SAME AS OVERALL WIDTH OF FLANGE AND BOLTS, PLUS TWICE THE THICKNESS OF PIPE INSULATION.
3. FILL VOIDS BETWEEN INNER CIRCUMFERENCE OF FLANGE INSULATION AND OUTER CIRCUMFERENCE OF ADJACENT STRAIGHT PIPE SEGMENTS WITH CUT SECTIONS OF SHEET INSULATION OF SAME THICKNESS AS PIPE INSULATION.
4. SECURE INSULATION TO FLANGES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE.

C. PIPE FITTINGS AND ELBOWS:
1. INSTALL MITERED SECTIONS OF PIPE INSULATION.
2. SECURE INSULATION TO FLANGES AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE.

D. VALVES AND PIPE SPECIALTIES:
1. INSTALL PREFORMED VALVE COVERS MANUFACTURED OF SAME MATERIAL AS PIPE INSULATION WHEN AVAILABLE.
2. WHEN PREFORMED VALVE COVERS ARE NOT AVAILABLE, INSTALL CUT SECTIONS OF PIPE AND SHEET INSULATION TO VALVE BODY. ARRANGE INSULATION TO PERMIT ACCESS TO PACKING AND TO ALLOW VALVE OPERATION WITHOUT DISTURBING INSULATION.
3. INSTALL INSULATION TO FLANGES AS SPECIFIED FOR PIPE FLANGES ABOVE.
4. SECURE INSULATION TO VALVES AND SPECIALTIES, AND SEAL SEAMS WITH MANUFACTURER'S RECOMMENDED ADHESIVE.

END OF SECTION

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CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

Project No.: 25-020728

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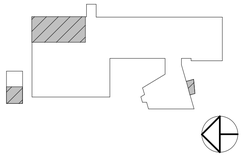

Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL SPECIFICATIONS

Drawing No.

M0.07

23 21 13 - HYDRONIC PIPING SPECIFICATIONS

23 21 13 HYDRONIC PIPING

A. AQUATHERM PP-R AND PP-RP (RCT) (POLYPROPYLENE RANDOM AND POLYPROPYLENE RAISED PRESSURE (RANDOM CRYSTALLINITY TEMPERATURE) ASTM F 2389, CSA B137.11, NSF 14, 51, 61 COMPLIANT.

B. PIPE SHALL BE MANUFACTURED FROM A PP-R RESIN (FUSIOLEN) MEETING THE SHORT-TERM PROPERTIES AND LONG-TERM STRENGTH REQUIREMENTS OF ASTM F 2389. THE PIPE SHALL CONTAIN NO REWORK OR RECYCLED MATERIALS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. ALL PIPE SHALL BE MADE IN AN EXTRUSION PROCESS. HYDRONIC SYSTEM PIPING (BLUE PIPE) SHALL CONTAIN A FIBER LAYER (FASER) TO RESTRICT THERMAL EXPANSION. ALL PIPE SHALL COMPLY WITH THE RATED PRESSURE REQUIREMENTS OF ASTM F 2389. ALL PIPE SHALL BE CERTIFIED BY NSF INTERNATIONAL AS COMPLYING WITH NSF 14, NSF 61, AND ASTM F 2389 OR CSA B137.11.

C. PIPE SHALL BE AQUATHERM BLUE PIPE MF-RP(RCT), NA. SDR 11 BASED ON THE REQUIRED MINIMUM PRESSURE RATING AND USE TEMPERATURE, IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND ASTM F2389. R-VALUE: 3.45 FOR A 4" NOMINAL OD.

D. FITTINGS SHALL BE MANUFACTURED FROM A PP-R RESIN (FUSIOLEN) MEETING THE SHORT-TERM PROPERTIES AND LONG-TERM STRENGTH REQUIREMENTS OF ASTM F 2389. THE FITTINGS SHALL CONTAIN NO REWORK OR RECYCLED MATERIALS EXCEPT THAT GENERATED IN THE MANUFACTURER'S OWN PLANT FROM RESIN OF THE SAME SPECIFICATION FROM THE SAME RAW MATERIAL. ALL FITTINGS SHALL BE CERTIFIED BY NSF INTERNATIONAL AS COMPLYING WITH NSF 14, NSF 61, AND ASTM F 2389 OR CSA B137.11.

E. FITTINGS SHALL BE AQUATHERM® BLUE-MP-RO (RCT)® AVAILABLE FROM AQUATHERM, NA. FITTINGS SPECIFICATIONS AND ORDERING INFORMATION ARE AVAILABLE AT WWW.AQUATHERM.COM. FITTINGS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

F. SMOKE AND FIRE RATINGS.
   1. WHERE INDICATED ON THE DRAWINGS THAT A PLENUM-RATED PIPING SYSTEM IS NEEDED, THE PIPE SHALL BE WRAPPED AND/OR INSULATED WITH STANDARD FIBERGLASS OR MINERAL WOOL PIPE INSULATION, MINIMUM 1-IN. THICK, FIELD INSTALLED, WITH BARE FITTINGS NO CLOSER THAN EVERY 6 FT. OF PIPE. THE PIPE WRAP OR INSULATION AS A SYSTEM SHALL MEET THE REQUIREMENTS OF CAN/ULC-S102.2-03 OR ASTM E84. THE SYSTEM SHALL HAVE A FLAME SPREAD CLASSIFICATION OF LESS THAN 25 AND SMOKE DEVELOPMENT RATING OF LESS THAN 50.

G. UV PROTECTION.
   1. WHEN PIPE WILL BE EXPOSED TO DIRECT UV LIGHT (NO INSULATION), IT SHALL BE FIELD COATED WITH UV-RESISTANT COATING APPROVED BY MANUFACTURER.
      a. REFER TO AQUATHERM BULLETING 20131 1A-AQTTB FOR METHODS OF UV PROTECTION.

H. MANUFACTURER SHALL WARRANT PIPE AND FITTINGS FOR 10 YEARS TO BE FREE OF DEFECTS IN MATERIALS OR MANUFACTURING.
   1. WARRANTY SHALL COVER LABOR AND MATERIAL COSTS OF REPAIRING AND/OR REPLACING DEFECTIVE MATERIALS AND REPAIRING ANY INCIDENTAL DAMAGE CAUSED BY FAILURE OF THE PIPING SYSTEM DUE TO DEFECTS IN MATERIALS OR MANUFACTURING.
   2. WARRANTY SHALL BE IN EFFECT ONLY UPON SUBMISSION BY THE CONTRACTOR TO THE MANUFACTURER OF VALID PRESSURE/LEAK TEST. DOCUMENTATION INDICATING THAT THE SYSTEM WAS TESTED AND PASSED THE MANUFACTURER'S PRESSURE/LEAK TEST.
   3. WARRANTY SHALL COVER THE FITTINGS AND PREFABRICATED PIECES MADE BY THE MANUFACTURER.

I. INSTALL HANGERS AND SUPPORTS AT INTERVALS SPECIFIED IN THE APPLICABLE PLUMBING CODE AND/OR AS RECOMMENDED BY PIPE MANUFACTURER.
   1. SUPPORT VERTICAL PIPING AND TUBING AT BASE AND AT EACH FLOOR. FOR PIPING 2" (63MM) OR SMALLER, INSTALL MID-STORY GUIDES.
   2. FOR HOT WATER PIPING, PROVIDE CLAMPS AND SUPPORTS THAT ARE FELT OR RUBBER/VINYL COATED OR LINED.
   3. FOR COLD WATER PIPING SUPPORTS AND CLAMPS MAY BE BARE METAL. ENSURE THAT THE CLAMP OR SUPPORT DOES NOT HAVE SHARP EDGES THAT MAY SCRAPE OR GOUGE THE PIPING.
   4. USE CARE WHEN INSTALLING RISER CLAMPS TO NOT OVER TIGHTEN THE CLAMPS TO CAUSE INDENTATION OF THE PIPE.

J. INSTALL FITTINGS AND JOINTS USING SOCKET-FUSION, ELECROFUSION, OR BUTT-FUSION AS APPLICABLE FOR THE FITTING TYPE. ALL FUSION-WELD JOINTS SHALL BE MADE IN ACCORDANCE WITH THE PIPE AND FITTING MANUFACTURER'S SPECIFICATIONS AND PRODUCT STANDARDS.
   1. FUSION-WELD TOOLING, WELDING MACHINES, AND ELECTROFUSION DEVICES SHALL BE AS SPECIFIED BY THE PIPE AND FITTINGS MANUFACTURER.
   2. PRIOR TO JOINING, THE PIPE AND FITTINGS SHALL BE PREPARED IN ACCORDANCE WITH F 2389 AND THE MANUFACTURER'S SPECIFICATIONS.
   3. JOINT PREPARATION, SETTING AND ALIGNMENT, FUSION PROCESS, COOLING TIMES AND WORKING PRESSURE SHALL BE IN ACCORDANCE WITH THE PIPE AND FITTING MANUFACTURER'S SPECIFICATIONS.
   4. ALL INSTALLERS IF AQUATHERM PIPE AND FITTINGS SHALL BE CERTIFIED AND TRAINED BY MANUFACTURER'S REPRESENTATIVES.

K. QUALITY ASSURANCE:
   1. INSTALLERS OF AQUATHERM PIPING SHALL BE CERTIFIED BY MANUFACTURER OF PIPES AND FITTINGS AS HAVING BEEN TRAINED AND QUALIFIED TO JOIN POLYPROPYLENE PIPING USING FUSION WELDING OF THE SAME TYPE AS SPECIFIED IN DRAWINGS (SOCKET, BUTT, ELECTROFUSION, FUSION OUTLET).
      a. CONTACT YOUR LOCAL AQUATHERM REPRESENTATIVE FOR TRAINING.

L. THERMAL AND VAPOR BARRIER
   1. CONTRACTOR SHALL PROVIDE A THERMAL (RADIANT, CONDUCTIVE, AND CONVECTIVE) AND VAPOR BARRIER INSULATION. THE INSULATION PRODUCTS SHALL BE PROVIDED AS INDICATED ON THE INSULATION SPECIFICATION SECTION IN THE DRAWINGS (M0.06).

M. PRESSURE/LEAK TESTING
   1. WHILE STILL ACCESSIBLE ALL PIPING SHALL BE PRESSURE/LEAK TESTED TO THE MANUFACTURER'S STANDARDS.
   2. TESTS SHALL BE CARRIED OUT USING WATER, COMPRESSED AIR OR A MIXTURE OF THE TWO. THE TEST PRESSURE SHALL BE AS INDICATED IN THE PRESSURE LEAK TESTING PROCEDURES REQUIRED BY THE MANUFACTURER.
   3. IN THE EVENT THAT WATER IS NOT AVAILABLE FOR TESTING IT SHALL BE PERMISSIBLE TO USE COMPRESSED AIR AS A TESTING MEDIUM. CONTACT THE ENGINEERING DEPARTMENT OF THE MANUFACTURER FOR GUIDANCE. FOLLOW ALL PRECAUTIONARY PROCEDURES RECOMMENDED BY THE PIPING MANUFACTURER
   4. ANY LEAKS DETECTED SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE BY REMOVING THE LEAKING PART AND REPLACING WITH NEW PARTS WELDED PER THE PIPE MANUFACTURER'S GUIDELINES. SEE WWW.AQUATHERM.COM FOR ADDITIONAL DETAILS AND FORMS.

N. INSPECTING AND CLEANING
   1. THE PIPES SHALL BE FLUSHED WITH COLD WATER AFTER FINISHING THE INSTALLATION. FLUSH THE SYSTEM UNTIL THE WATER RUNS CLEAR OF DEBRIS AND DIRT.
   2. INSPECT AND TEST PIPING SYSTEMS FOLLOWING PROCEDURES OF AUTHORITIES HAVING JURISDICTION AND AS SPECIFIED BY THE PIPING SYSTEM MANUFACTURER.
   3. CLEAN AND DISINFECT WATER DISTRIBUTION PIPING FOLLOWING PROCEDURES OF THE MANUFACTURER AND/OR THE AUTHORITY HAVING JURISDICTION.

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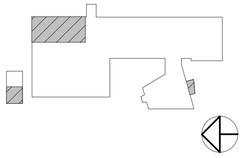


Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL SPECIFICATIONS

Drawing No.

M0.08

23 31 13 - SHEET METAL WORK AND ACCESSORIES

PART 1 - GENERAL

1.1 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.
B. SHOP DRAWINGS: SHOW DETAILS OF THE FOLLOWING:
1. FABRICATION, ASSEMBLY, AND INSTALLATION, INCLUDING PLANS, ELEVATIONS, SECTIONS, COMPONENTS, AND ATTACHMENTS TO OTHER WORK.
2. DUCT LAYOUT INDICATING PRESSURE CLASSIFICATIONS AND SIZES ON PLANS.
3. FITTINGS.
4. REINFORCEMENT AND SPACING.
5. SEAM AND JOINT CONSTRUCTION.
6. PENETRATIONS THROUGH FIRE-RATED AND OTHER PARTITIONS.
7. TERMINAL UNIT, AND COIL.
8. HANGERS AND SUPPORTS, INCLUDING METHODS FOR BUILDING ATTACHMENT, VIBRATION ISOLATION, AND DUCT ATTACHMENT.
9. MANUAL VOLUME DAMPERS, CONTROL DAMPERS, FIRE DAMPERS, SMOKE DAMPERS, COMBINATION FIRE/SMOKE DAMPERS AND CORRIDOR DAMPER INSTALLATIONS.
10. CEILING RADIATION DAMPER INSTALLATION.

1.2 QUALITY ASSURANCE
A. AWARDED CONTRACTOR MUST COMPLY WITH ENCLOSED SPECIFICATION IN ITS ENTIRETY. IF ON INSPECTION, THE ENGINEER OF RECORD FINDS CHANGES HAVE BEEN MADE WITHOUT PRIOR WRITTEN APPROVAL, THE AWARDED CONTRACTOR WILL MAKE THE APPLICABLE CHANGES TO COMPLY WITH THIS SPECIFICATION AT THE AWARDED CONTRACTOR'S EXPENSE.
B. COMPLY WITH NFPA 90A, "INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS," UNLESS OTHERWISE INDICATED.
C. COMPLY WITH NFPA 90B, "INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS," UNLESS OTHERWISE INDICATED.
D. CONSTRUCTION DUCTWORK TO MEET ALL FUNCTIONAL CRITERIA DEFINED IN SECTION 11 OF THE 2005 SMACNA "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" THIRD EDITION, EXCEPT AS NOTED: ALL DUCTWORK MUST COMPLY WITH ANY APPLICABLE LOCAL, STATE, AND FEDERAL CODE REQUIREMENTS.

1.3 DELIVERY, STORAGE, AND HANDLING
A. DELIVER SEALANT AND FIRESTOPPING MATERIALS TO SITE IN ORIGINAL UNOPENED CONTAINERS OR BUNDLES WITH LABELS INDICATING MANUFACTURER, PRODUCT NAME AND DESIGNATION, COLOR, EXPIRATION PERIOD FOR USE, POT LIFE, CURING TIME, AND MIXING INSTRUCTIONS FOR MULTICOMPONENT MATERIALS.
B. STORE AND HANDLE SEALANT AND FIRESTOPPING MATERIALS ACCORDING TO MANUFACTURER'S WRITTEN RECOMMENDATIONS.

1.4 GUARANTEE
A. AWARDED CONTRACTOR SHALL GUARANTEE ALL WORK FOR ONE YEAR FROM THE DATE OF ACCEPTANCE AGAINST ALL DEFECTS IN MATERIAL, EQUIPMENT, AND WORKMANSHIP. THIS GUARANTEE SHALL INCLUDE REPAIR OF DAMAGE TO ANY PART OF THE PREMISES RESULTING FROM LEAKS OR OTHER DEFECTS IN MATERIAL, EQUIPMENT, OR WORKMANSHIP.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS
A. GALVANIZED, SHEET STEEL: LOCK-FORMING QUALITY; ASTM A 653/A 653M, G90 COATING DESIGNATION; MILL-PHOSPHATIZED FINISH FOR SURFACES OF DUCTS EXPOSED TO VIEW.
B. REINFORCEMENT SHAPES AND PLATES: GALVANIZED STEEL REINFORCEMENT WHERE INSTALLED ON GALVANIZED, SHEET METAL DUCTS.
C. TIE RODS: GALVANIZED STEEL, 1/4-INCH MINIMUM DIAMETER FOR 36-INCH LENGTH OR LESS; 3/8-INCH MINIMUM DIAMETER FOR LENGTHS LONGER THAN 36 INCHES.

2.2 DUCT CONSTRUCTION REQUIREMENTS
A. SMACNA CONSTRUCTION PRESSURE CLASSIFICATION: SUPPLY UPSTREAM OF AIR TERMINAL BOXES, RETURN, OUTSIDE AIR & EXHAUST: NOT LESS THAN ±4" W.G.
B. SMACNA CONSTRUCTION PRESSURE CLASSIFICATION: SUPPLY DOWNSTREAM OF AIR TERMINAL BOXES, AND TRANSFERS: NOT LESS THAN ±2" W.G.
C. SEAL CLASS: CLASS A - ALL DUCTWORK

2.3 SEALANT MATERIALS
A. JOINT AND SEAM SEALANTS, GENERAL: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR SEALANT APPLICATION.
1. JOINT AND SEAM SEALANT: FLEXIBLE, WATER-BASED, ADHESIVE SEALANT DESIGNED FOR USE IN ALL PRESSURE DUCT SYSTEMS. AFTER CURING, IT SHALL BE RESISTANT TO ULTRAVIOLET LIGHT AND SHALL PREVENT ENTRY OF WATER, AIR AND MOISTURE IN THE DUCT SYSTEM. SEALER SHALL BE UL181B-M AND UL 723 LISTED AND MEET NFPA REQUIREMENTS FOR CLASS 1 DUCT WORK. VOC SHALL BE MAXIMUM 75g/L (LESS WATER).
* APPROVED MFR: DUCTMATE INDUSTRIES PROSEAL, SOLVSEAL OR APPROVED EQUAL.
2. FLANGED JOINT MASTICS: ONE-PART, ACID-CURING, SILICONE, ELASTOMERIC JOINT SEALANTS, COMPLYING WITH ASTM C 920, TYPE S, GRADE NS, CLASS 25, USE O.
* APPROVED MFR: DUCTMATE 440 BUTYLE GASKET TAPE OR APPROVED EQUAL.

2.4 RECTANGULAR TRANSVERSE JOINT CONNECTORS:
SLIDE-ON TRANSVERSE JOINT CONNECTORS:
A. DUCT CONSTRUCTED USING PREFABRICATED SYSTEMS WILL REFER TO THE MANUFACTURER'S GUIDELINES FOR SHEET GAUGE, INTERMEDIATE REINFORCEMENT SIZE AND SPACING, AND PROPER JOINT REINFORCEMENT(S).
B. MANUFACTURERS OF PREFABRICATED SYSTEMS MUST HAVE DUCT CONSTRUCTION AND REINFORCEMENT GUIDELINES ALONG WITH SUPPORTING INDEPENDENT LEAKAGE AND DEFLECTION PERFORMANCE TESTING. MANUFACTURER'S PREFABRICATED SYSTEMS PRINTED ASSEMBLY AND INSTALLATION PROCEDURES MUST BE ADHERED TO DURING ALL PHASES.
C. ALL COMPONENTS OF PREFABRICATED SYSTEM MUST BE CLEARLY EMBOSSED WITH MANUFACTURER'S MARKINGS AND SYSTEMS MANUFACTURER CLEARLY IDENTIFIED ON ALL DUCT LABELS. NO SUBSTITUTION OF SYSTEM COMPONENTS IS PERMITTED.
APPROVED MANUFACTURER: DUCTMATE INDUSTRIES OR WARD DUCT CONNECTORS INCORPORATED "W.D.C.I."

2.5 LONGITUDINAL SEAMS:
A. ALL "RECTANGULAR" DUCT LONGITUDINAL SEAMS SHALL BE PITTSBURGH LOCK SEAM.
B. ALL LONGITUDINAL SEAMS SHALL BE SEALED WITH AN APPROVED SEALANT OR PRE-SEALED WITH AN ENCAPSULATED MASTIC.

2.6 ROUND DUCT AND FITTINGS:
A. A CONSTRUCT DUCTS IN ACCORDANCE WITH SECTION 3 OF THE 2005 SMACNA MANUAL, "HVAC DUCT CONSTRUCTION STANDARDS, METAL & FLEXIBLE" THIRD EDITION.
B. FOR DUCT CONSTRUCTION PRESSURE 2" W.G. OR BELOW (SUPPLY DUCTWORK DOWNSTREAM OF AIR TERMINAL BOXES WHERE APPLICABLE)
1) ROUND DUCTWORK
A) ROUND LOW VELOCITY DUCTWORK SHALL BE CONSTRUCTED FROM A MINIMUM OF 26 GAUGE, SELF-LOCKING, PRE-SEALED SNAPLOCK PIPE, WHICH INCORPORATES A FACTORY APPLIED GASKET IN THE LONGITUDINAL SEAM AND ON THE FEMALE END OF THE TRANSVERSE JOINT. SNAPLOCK PIPE SHALL BE "GREENSEAM +" AS MANUFACTURED BY GREENSEAM OR APPROVED EQUAL.
2) FITTINGS
A) ALL HIGH EFFICIENCY TAKE-OFFS, CONICALS, AND COLLARS MUST HAVE A FACTORY APPLIED GASKET ALONG ALL RIVETS, CO-LATCHES, AND FLANGE. ALL FITTINGS SHALL BE CONSTRUCTED FROM A MINIMUM OF 26 GAUGE STEEL. ALL DAMPERED FITTINGS MUST HAVE LOW-LEAKAGE HARDWARE WITH CLOSED-END BEARINGS.
* APPROVED MANUFACTURER: DUCTMATE INDUSTRIES "GREENSEAM FITTINGS" OR APPROVED EQUAL.

2.7 HANGERS AND SUPPORTS
A. BUILDING ATTACHMENTS: CONCRETE INSERTS, POWDER-ACTUATED FASTENERS, OR STRUCTURAL-STEEL FASTENERS APPROPRIATE FOR BUILDING MATERIALS.
1. USE POWDER-ACTUATED CONCRETE FASTENERS FOR STANDARD-WEIGHT AGGREGATE CONCRETES OR FOR SLABS MORE THAN 4 INCHES THICK.
2. EXCEPTION: DO NOT USE POWDER-ACTUATED CONCRETE FASTENERS FOR LIGHTWEIGHT-AGGREGATE CONCRETES OR FOR SLABS LESS THAN 4 INCHES THICK.
B. HANGER MATERIALS: GALVANIZED, SHEET STEEL OR ROUND, THREADED STEEL ROD SHALL BE STAINLESS STEEL TYPE 316.
1. HANGERS INSTALLED IN CORROSIVE ATMOSPHERES: ELECTROGALVANIZED, ALL-THREAD ROD OR GALVANIZED RODS WITH THREADS PAINTED AFTER INSTALLATION.
2. STRAPS AND ROD SIZES: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS--METAL AND FLEXIBLE" FOR SHEET STEEL WIDTH AND THICKNESS AND FOR STEEL ROD DIAMETERS.
3. STEEL CABLE: MUST BE DESIGNED TO HAVE A SAFETY FACTOR OF 5 TO 1 AND COMPLY WITH ASTM A 603 OR ASTM 1023 FOR GALVANIZED STEEL DUCTS AND COMPLY WITH ASTM A492 FOR STAINLESS STEEL DUCTS.
4. DUCT ATTACHMENTS: SHEET METAL SCREWS, BLIND RIVETS, OR SELF-TAPPING METAL SCREWS; COMPATIBLE WITH DUCT MATERIALS.
5. TRAPEZE AND RISER SUPPORTS: STEEL SHAPES COMPLYING WITH ASTM A 36/A 36M.
6. SUPPORTS FOR GALVANIZED-STEEL DUCTS: GALVANIZED STEEL SHAPES AND PLATES.

2.8 ACCESS DOORS IN DUCTWORK
A. PROVIDE ACCESS DOORS OF ADEQUATE SIZE TO ALLOW EASY ACCESS TO THE EQUIPMENT THAT WILL REQUIRE MAINTENANCE. PROVIDE INSULATED OR ACOUSTICALLY LINED DOORS TO PREVENT CONDENSATION WHERE APPLICABLE.
B. MANUFACTURER TO PROVIDE AN INSTALLED NEOPRENE GASKET AROUND PERIMETER OF ACCESS DOOR FOR AIRTIGHT SEAL.
C. SYSTEMS 2" W.G. OR LESS SHALL UTILIZE A HINGED, CAM, OR HINGED & CAM SQUARE-FRAMED ACCESS DOOR.
D. SYSTEMS 3" W.G. AND ABOVE SHALL UTILIZE A SANDWICH-TYPE ACCESS DOOR. CONSTRUCT DOORS IN ACCORDANCE WITH FIGURE 7-3 OF THE 2005 SMACNA MANUAL, "HVAC DUCT CONSTRUCTION STANDARDS, METAL& FLEXIBLE" THIRD EDITION.
APPROVED MANUFACTURER: DUCTMATE INDUSTRIES "SANDWICH" STYLE DOOR OR APPROVED EQUAL.

2.9 SANDWICH-TYPE ACCESS DOORS
A. GALVANIZED STEEL ACCESS DOORS IN DUCTWORK AND PLENUMS SHALL BE OF THE REMOVABLE, SANDWICH-TYPE CONSTRUCTION, CONSISTING OF THREE LAYERS OF PRECISION STAMPED 0.030" GALVANIZED STEEL. THE INSIDE DOOR SHALL COMBINE TWO LAYERS OF METAL SPOT WELDED TOGETHER AT THE RIM AND ENCAPSULATING HIGH DENSITY FIBERGLASS INSULATION - UL CLASSIFIED FHC 25/50. DOORS SHALL HAVE A MINIMUM R-VALUE OF 4.0 TOTAL. DOORS SHALL BE EASILY REMOVED BY HAND AND WITHOUT THE NEED FOR TOOLS.
B. ALL DOORS SHALL SEAL AGAINST THE DUCT WALL WITH A CLOSED CELL NEOPRENE GASKET - UL 94 HF 1 LISTED - WITH A SERVICE TEMPERATURE RANGE OF [ASTM D-746] -70°F TO 220°F. THE GASKET SHALL BE PERMANENTLY BONDED TO THE INSIDE OF THE DOOR TO ELIMINATE LEAKAGE. DOORS SHALL BE ABLE TO WITHSTAND A MINIMUM OF 10" WG PRESSURE WITH NO NOTICEABLE LEAKAGE.
C. INSTALLATION OF ACCESS DOORS SHALL BE AS SPECIFIED BY THE MANUFACTURER, DUCTMATE INDUSTRIES, INC.

2.10 TURNING VANES
A. FABRICATE TO COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS--METAL AND FLEXIBLE."
B. TURNING VANES SHALL BE PROVIDED IN ALL MITERED ELBOWS, AND SHALL BE OF SAME MATERIAL AS THE DUCTWORK. TURNING VANES SHALL BE OF AIRFOIL TYPE, DOUBLE THICKNESS.

2.11 MANUAL-VOLUME DAMPERS
A. GENERAL: FACTORY FABRICATED WITH REQUIRED HARDWARE AND ACCESSORIES. STIFFEN DAMPER BLADES FOR STABILITY. INCLUDE LOCKING DEVICE TO HOLD SINGLE-BLADE DAMPERS IN A FIXED POSITION WITHOUT VIBRATION.
B. STANDARD VOLUME DAMPERS: MULTIPLE- OR SINGLE-BLADE, OPPOSED-BLADE DESIGN AS INDICATED, STANDARD LEAKAGE RATING, WITH LINKAGE OUTSIDE AIRSTREAM, AND SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS.
1. STEEL FRAMES: HAT-SHAPED, GALVANIZED, SHEET STEEL CHANNELS, MINIMUM OF 0.064 INCH THICK, WITH MITERED AND WELDED CORNERS; FRAMES WITH FLANGES WHERE INDICATED FOR ATTACHING TO WALLS; AND FLANGELESS FRAMES WHERE INDICATED FOR INSTALLING IN DUCTS.
2. ROLL-FORMED STEEL BLADES: 0.064-INCH- THICK, GALVANIZED, SHEET STEEL.
3. BLADE AXLES: NONFERROUS.
4. TIE BARS AND BRACKETS: GALVANIZED STEEL.
C. JACKSHAFT: 1-INCH- DIAMETER, GALVANIZED STEEL PIPE ROTATING WITHIN A PIPE-BEARING ASSEMBLY MOUNTED ON SUPPORTS AT EACH MULLION AND AT EACH END OF MULTIPLE-DAMPER ASSEMBLIES.
1. LENGTH AND NUMBER OF MOUNTINGS: APPROPRIATE TO CONNECT LINKAGE OF EACH DAMPER OF A MULTIPLE-DAMPER ASSEMBLY.
D. DAMPER HARDWARE: ZINC-PLATED, DIE-CAST CORE WITH DIAL AND HANDLE MADE OF 3/32-INCH- THICK ZINC-PLATED STEEL, AND A 3/4-INCH HEXAGON LOCKING NUT. INCLUDE CENTER HOLE TO SUIT DAMPER OPERATING-ROD SIZE. INCLUDE ELEVATED PLATFORM FOR INSULATED DUCT MOUNTING.

2.13 FLEXIBLE CONNECTORS
A. GENERAL: FLAME-RETARDED OR NONCOMBUSTIBLE FABRICS, COATINGS, AND ADHESIVES COMPLYING WITH UL 181, CLASS 1.
B. STANDARD METAL-EDGED CONNECTORS: FACTORY FABRICATED WITH A STRIP OF FABRIC 3-1/2 INCHES WIDE ATTACHED TO TWO STRIPS OF 2-3/4-INCH WIDE, 0.028-INCH THICK, GALVANIZED, SHEET STEEL OR 0.032-INCH ALUMINUM SHEETS. SELECT METAL COMPATIBLE WITH CONNECTED DUCTS.
C. CONVENTIONAL, INDOOR SYSTEM FLEXIBLE CONNECTOR FABRIC: GLASS FABRIC DOUBLE COATED WITH POLYCHLOROPRENE.
1. MINIMUM WEIGHT: 26 OZ./SQ. YD..
2. TENSILE STRENGTH: 480 LBF/INCH IN THE WARP, AND 360 LBF/INCH IN THE FILLING.

2.14 FLEXIBLE DUCTS (APPROVED MANUFACTURERS: THERMAFLEX M-KE AND FLEXMASTER 1M)
A. FLEXIBLE DUCTS SHALL BE LISTED BY UNDERWRITERS LABORATORIES, INC., UNDER UL STANDARD 181 AS A CLASS 1 FLEXIBLE AIR DUCT AND COMPLYING WITH NFPA STANDARDS 90A AND 90B.
B. DUCTS SHALL BE FACTORY MADE AND COMPOSED OF A CONTINUOUS METAL LINER DUCT (CPE LINER) PERMANENTLY BONDED TO A COATED SPRING STEEL WIRE HELIX, INSULATED WITH 2" THICK 3/4 LB. DENSITY FIBERGLASS INSULATING BLANKET (R-VALUE NOT LESS THAN 6.0), AND COVERED WITH LOW PERMEABILITY OUTER VAPOR BARRIER OF FIBERGLASS REINFORCED FILM LAMINATE.

2.15 MOTORIZED CONTROL DAMPERS
A. ULTRA LOW LEAKAGE AIR-FOIL, TAMCO SERIES 2100SW (OPPOSED BLADE).
B. FRAMES SHALL BE 4" DEEP X 1" AND NO LESS THAN .080" IN THICKNESS, EXTRUDED ALUMINUM (6063T5) WITH MOUNTING FLANGES ON BOTH SIDES OF FRAME. ALUMINUM FRAME SHALL BE CLEAR ANODIZED TO A MINIMUM THICKNESS OF 0.7 MIL (18 MICRONS) DEEP. FRAME TO BE ASSEMBLED USING TYPE 316 STAINLESS STEEL SCREWS.
C. BLADES SHALL BE EXTRUDED ALUMINUM (6063T5) AIR-FOIL PROFILES AND SHALL BE CLEAR ANODIZED TO A MINIMUM THICKNESS OF 0.7MIL (18 MICRONS) DEEP. ALUMINUM END CAPS ARE TO BE PRESS FITTED TO BLADE ENDS AND SHALL BE CLEAR ANODIZED.
D. BLADE AND FRAME SEALS SHALL BE OF EXTRUDED SILICONE AND SHALL BE SECURED IN AN INTEGRAL SLOT WITHIN THE ALUMINUM EXTRUSIONS. BLADE AND FRAME SEALS ARE TO BE MECHANICALLY FASTENED TO ELIMINATE SHRINKAGE AND MOVEMENT OVER THE LIFE OF THE DAMPER. ADHESIVE OR CLIP-ON TYPE BLADE SEALS SHALL NOT BE APPROVED.
E. MAINTENANCE-FREE BEARINGS ARE TO BE COMPOSED OF A CELCON INNER BEARING FIXED TO A 7/16" (11.11MM) ALUMINUM HEXAGON BLADE PIVOT PIN, ROTATING WITHIN A POLYCARBONATE OUTER BEARING INSERTED INTO THE FRAME. THERE SHALL BE NO METAL-TO-METAL OR METAL-TO-PLASTIC CONTACT. ALUMINUM BLADE PIVOT PIN SHALL BE CLEAR ANODIZED.
F. ADJUSTABLE HEXAGONAL DRIVE ROD, U-BOLT FASTENER AND RETAINING NUTS SHALL BE HEXAGONAL, 316 STAINLESS STEEL TO PROVIDE POSITIVE CONNECTION TO BLADES AND LINKAGE.
G. LINKAGE HARDWARE TO BE INSTALLED IN THE FRAME SIDE. ALL ALUMINUM LINKAGE HARDWARE PARTS SHALL BE CLEAR ANODIZED. ALL NON-ALUMINUM LINKAGE HARDWARE PARTS SHALL BE TYPE 316 STAINLESS STEEL. TO BE COMPLETE WITH CUP-POINT TRUNNION SCREWS FOR SLIP-PROOF GRIP.

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

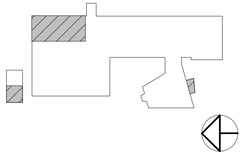
Project No.: 25-020728

Issue	Date
PERMIT SET	03/03/2026

Revisions

No.	Description	Date

Key Plan



Seal

Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL SPECIFICATIONS

Drawing No.

M0.09

23 31 13 - SHEET METAL WORK AND ACCESSORIES (CONT.)

2.15 MOTORIZED CONTROL DAMPERS (CONT.)

H. DAMPERS SHALL BE MADE TO SIZE REQUIRED WITHOUT BLANKING OFF FREE AREA.
I. DAMPERS SHALL BE AVAILABLE WITH EITHER OPPOSED BLADE ACTION OR PARALLEL BLADE ACTION.
J. DAMPERS SHALL BE AVAILABLE IN TWO MOUNTING TYPES: I.E., "INSTALLED IN DUCT" OR "FLANGED TO DUCT".
K. INSTALLATION OF DAMPERS MUST BE IN ACCORDANCE WITH TAMCO'S CURRENT INSTALLATION GUIDELINES, PROVIDED WITH EACH DAMPER SHIPMENT. (NOTE THAT ALL TECHNICAL INFORMATION AVAILABLE ON TAMCO'S WEB SITE AT WWW.TAMCODAMPERS.COM SUPERSEDES AND TAKES PRECEDENCE OVER ALL INFORMATION CONTAINED WITHIN THE PRINTED CATALOG.)
L. INTERMEDIATE OR TUBULAR STEEL STRUCTURAL SUPPORT IS REQUIRED TO RESIST APPLIED PRESSURE LOADS FOR DAMPERS THAT CONSIST OF TWO OR MORE SECTIONS IN BOTH HEIGHT AND WIDTH. (SEE TAMCO ALUMINUM DAMPER INSTALLATION GUIDELINES.)
M. ACTUATOR:
   1. DDC: 24 V, 60 HZ, MODULATING.
   2. FAILSAFE POSITION: CLOSE.
N. ACCEPTABLE PRODUCT SHALL BE TAMCO SERIES 1500 SW ENHANCED AIR-FOIL CONTROL DAMPER WITH SALT WATER RESISTANCE OPTION, AS MANUFACTURED BY T.A. MORRISON & CO., INC. (TEL: 1-800-561-3449, USA & CANADA)
O. APPROVED ALTERNATE FOR NON-OUTSIDE AIR DUCT SYSTEMS: GREENHECK MODEL VCD-43 WITH SILICONE BLADE SEALS AND 316SS OPTIONS.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION, GENERAL
A. INSTALL ROUND DUCTS IN LENGTHS NOT LESS THAN 12 FEET, UNLESS INTERRUPTED BY FITTINGS.
B. INSTALL DUCTS WITH FEWEST POSSIBLE JOINTS.
C. INSTALL FABRICATED FITTINGS FOR CHANGES IN DIRECTIONS, CHANGES IN SIZE AND SHAPE, AND CONNECTIONS.
D. INSTALL DUCTS, UNLESS OTHERWISE INDICATED, VERTICALLY AND HORIZONTALLY, PARALLEL AND PERPENDICULAR TO BUILDING LINES; AVOID DIAGONAL RUNS.
E. COORDINATE LAYOUT WITH SUSPENDED CEILING.
F. ELECTRICAL EQUIPMENT SPACES: ROUTE DUCTWORK TO AVOID PASSING THROUGH TRANSFORMER VAULTS AND ELECTRICAL EQUIPMENT SPACES AND ENCLOSURES.
G. FIRE-RATED PARTITION PENETRATIONS: WHERE DUCTS PASS THROUGH INTERIOR PARTITIONS AND EXTERIOR WALLS, INSTALL APPROPRIATELY RATED FIRE FIRESTOPPING AND SLEEVE, INCLUDING DAMPER PER DETAILS ON CONTRACT DRAWINGS.

3.2 SEAM AND JOINT SEALING
A. GENERAL: SEAL DUCT SEAMS AND JOINTS ACCORDING TO THE DUCT PRESSURE CLASS INDICATED HEREIN AND AS DESCRIBED IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS--METAL AND FLEXIBLE".

3.3 HANGING AND SUPPORTING
A. INSTALL RIGID ROUND AND RECTANGULAR METAL DUCT WITH SUPPORT SYSTEMS INDICATED IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS--METAL AND FLEXIBLE."
B. SUPPORT HORIZONTAL DUCTS WITHIN 24 INCHES OF EACH ELBOW AND WITHIN 48 INCHES OF EACH BRANCH INTERSECTION.
C. SUPPORT VERTICAL DUCTS AT A MAXIMUM INTERVAL OF 16 FEET AND AT EACH FLOOR.
D. INSTALL UPPER ATTACHMENTS TO STRUCTURES WITH AN ALLOWABLE LOAD NOT EXCEEDING ONE-FOURTH OF FAILURE (PROOF-TEST) LOAD.
E. INSTALL CONCRETE INSERTS BEFORE PLACING CONCRETE.
F. INSTALL POWDER-ACTUATED CONCRETE FASTENERS AFTER CONCRETE IS PLACED AND COMPLETELY CURED.

3.4 DUCT LEAKAGE
****** ALL DUCTWORK SHALL BE LEAK TESTED AS PER THE LATEST FLORIDA ENERGY CODE.******
A. SEAL CLASS:
   1. ALL TRANSVERSE JOINTS, LONGITUDINAL SEAMS AND PENETRATIONS SHALL BE SEALED TO CONFORM TO SMACNA CLASS A SEALING REQUIREMENTS AS DEFINED ON PAGE 1.11 OF THE 2005 SMACNA MANUAL, THIRD EDITION.
B. LEAKAGE CRITERIA:
   1. PER FLORIDA BUILDING CODE - ENERGY.

3.5 DUCT CLEANING & LEAKAGE TESTING (NEW DUCTWORK ONLY)
A. CLEANING:
   1. INTERIOR SURFACES SHALL BE FREE OF DUST AND DEBRIS PRIOR TO INITIAL START UP. PROTECT EQUIPMENT WHICH MAY BE HARMED BY EXCESSIVE DIRT WITH FILTERS, OR BYPASS DURING CLEANING.
   2. WHEN INTERNALLY CLEANING DUCT WORK PRIOR TO INSTALLATION OR SHIPMENT TO THE JOBSITE, ALL DUCT ENDS AND OPENINGS MUST BE COVERED PRIOR TO TRANSPORTING WITH A DUAL POLYETHYLENE PROTECTIVE FILM. FILM MUST BE SECURELY AFFIXED TO PROTECT AGAINST DIRT AND DEBRIS AND MUST BE TRANSLUCENT TO FACILITATE INSPECTION OF INTERIOR SURFACES WITHOUT REMOVING FILM.
   3. CLEAN EXTERNAL SURFACES OF FOREIGN SUBSTANCES THAT MIGHT CAUSE CORROSION, DETERIORATION OF THE METAL PRIOR TO INSULATING DUCTWORK.

23 37 13 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 DEFINITIONS
A. DIFFUSER: SQUARE, OR RECTANGULAR AIR DISTRIBUTION OUTLET, GENERALLY LOCATED IN THE CEILING AND COMPRISED OF DEFLECTING MEMBERS DISCHARGING SUPPLY AIR IN VARIOUS DIRECTIONS AND PLANES AND ARRANGED TO PROMOTE MIXING OF PRIMARY AIR WITH SECONDARY ROOM AIR.
B. GRILLE: A LOUVERED OR PERFORATED COVERING FOR AN OPENING IN AN AIR PASSAGE, WHICH CAN BE LOCATED IN A SIDEWALL, CEILING, OR FLOOR.

1.2 SUBMITTALS
A. PRODUCT DATA: PROVIDE DATA FOR MODEL REQUIRED FOR THIS PROJECT. INCLUDE THE FOLLOWING:
   1. DATA SHEET: FOR EACH TYPE OF AIR OUTLET AND INLET, AND ACCESSORY FURNISHED; INDICATE CONSTRUCTION, FINISH, AND MOUNTING DETAILS.
   2. SCHEDULE OF DIFFUSERS, REGISTERS, AND GRILLES INDICATING DRAWING DESIGNATION, ROOM LOCATION, QUANTITY, MODEL NUMBER, SIZE, AND ACCESSORIES FURNISHED.
B. PROJECT RECORD DOCUMENTS: RECORD ACTUAL LOCATIONS OF AIR OUTLETS AND INLETS.
C. SUBMIT AIR TERMINAL PERFORMANCE DATA INCLUDING STATIC PRESSURE, THROW, VELOCITY, AIRFLOW AND ACOUSTICAL (NOISE RATINGS) PERFORMANCE. DATA MUST INDICATE COMPLIANCE WITH APPLICABLE CODES AND STANDARDS.
D. MANUFACTURER SHALL REVIEW REQUIREMENTS OF OUTLETS AS TO SIZE, FINISH AND TYPE OF MOUNTING BEFORE SUBMITTING SHOP DRAWINGS AND SCHEDULE OF OUTLETS.
E. MANUFACTURER SHALL CHECK LOCATION OF OUTLETS AND MAKE NECESSARY ADJUSTMENTS IN POSITION TO CONFORM WITH ARCHITECTURAL FEATURES, SYMMETRY AND LIGHTING ARRANGEMENT BEFORE SUBMITTING SHOP DRAWINGS.

1.3 QUALITY ASSURANCE
A. MANUFACTURER SHALL CERTIFY CATALOGED PERFORMANCE AND ENSURE CORRECT APPLICATION OF AIR OUTLET TYPES.
B. MANUFACTURER SHALL BE RESPONSIBLE FOR EXAMINING APPLICATION OF EACH OUTLET AND SHALL GUARANTEE THAT EACH WILL PROVIDE COMFORTABLE SPACE CONDITIONS WITHOUT DRAFTS AT NOTED CAPACITY.
C. PRODUCT OPTIONS: DRAWINGS AND SCHEDULES INDICATE SPECIFIC REQUIREMENTS OF DIFFUSERS, REGISTERS, AND GRILLES AND ARE BASED ON THE SPECIFIC REQUIREMENTS OF THE SYSTEMS INDICATED. OTHER MANUFACTURERS' PRODUCTS WITH EQUAL PERFORMANCE CHARACTERISTICS MAY BE CONSIDERED.
D. NFPA COMPLIANCE: INSTALL DIFFUSERS, REGISTERS, AND GRILLES ACCORDING TO NFPA 90A, "STANDARD FOR THE INSTALLATION OF AIR-CONDITIONING AND VENTILATING SYSTEMS".

PART 2 - PRODUCTS

2.1 GENERAL
A. ACCEPTABLE MANUFACTURERS CONTINGENT ON COMPLIANCE WITH SPECIFICATIONS.
   1. PRICE (BASIS OF DESIGN)
   2. TITUS
B. ALL AIR DISTRIBUTION DEVICES SHALL BE OF ALUMINUM CONSTRUCTION UNLESS OTHERWISE SPECIFIED HEREIN OR SCHEDULED ON THE DRAWINGS.
C. ALL DIFFUSERS, GRILLES AND REGISTERS MUST BE COMPATIBLE WITH THE DESIGNED CEILING / WALL TYPE.

2.2 DIFFUSERS, REGISTERS AND GRILLES SCHEDULE
A. REFER TO DRAWINGS FOR TYPE & SIZES, PERFORMANCE, AND NOISE CRITERIA.

2.3 SOURCE QUALITY CONTROL
A. TESTING: TEST PERFORMANCE ACCORDING TO ASHRAE 70, "METHOD OF TESTING FOR RATING THE PERFORMANCE OF AIR OUTLETS AND INLETS".

PART 3 - INSTALLATION

3.1 EXAMINATION
A. EXAMINE AREAS WHERE DIFFUSERS, REGISTERS, AND GRILLES ARE TO BE INSTALLED FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF EQUIPMENT. DO NOT PROCEED WITH INSTALLATION UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION
A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. INSTALL DIFFUSERS AND GRILLES LEVEL AND PLUMB, ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS, COORDINATION DRAWINGS, ORIGINAL DESIGN, AND REFERENCED STANDARDS.
C. CEILING-MOUNTED OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. AIR OUTLET AND INLET LOCATIONS HAVE BEEN INDICATED TO ACHIEVE DESIGN REQUIREMENTS FOR AIR VOLUME, NOISE CRITERIA, AIRFLOW PATTERN, THROW, AND PRESSURE DROP. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICABLE. FOR UNITS INSTALLED IN LAY-IN CEILING PANELS, LOCATE UNITS IN THE CENTER OF THE PANEL. WHERE ARCHITECTURAL FEATURES OR OTHER ITEMS CONFLICT WITH INSTALLATION, NOTIFY ENGINEER FOR A DETERMINATION OF FINAL LOCATION.
D. INSTALL DIFFUSERS AND GRILLES WITH AIRTIGHT CONNECTION TO DUCTS AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS.
E. CHECK LOCATION OF OUTLETS AND INLETS AND MAKE NECESSARY ADJUSTMENTS IN POSITION TO CONFORM WITH THE SYMMETRY AND LIGHTING ARRANGEMENT.
F. INSTALL DIFFUSERS TO DUCTWORK WITH AIR TIGHT CONNECTIONS.
G. PAINT DUCTWORK VISIBLE BEHIND AIR OUTLETS AND INLETS MATTE BLACK.

3.4 CLEANING
A. AFTER INSTALLATION OF DIFFUSERS, REGISTERS, AND GRILLES, INSPECT EXPOSED FINISH. CLEAN EXPOSED SURFACES TO REMOVE BURRS, DIRT AND SMUDGES. REPLACE DIFFUSERS, REGISTERS, AND GRILLES THAT HAVE DAMAGED FINISHES.

END OF SECTION

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
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FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

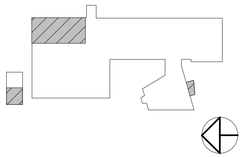
Project No.: 25-020728

Issue	Date
PERMIT SET	03/03/2026

Revisions

No.	Description	Date

Key Plan



Seal

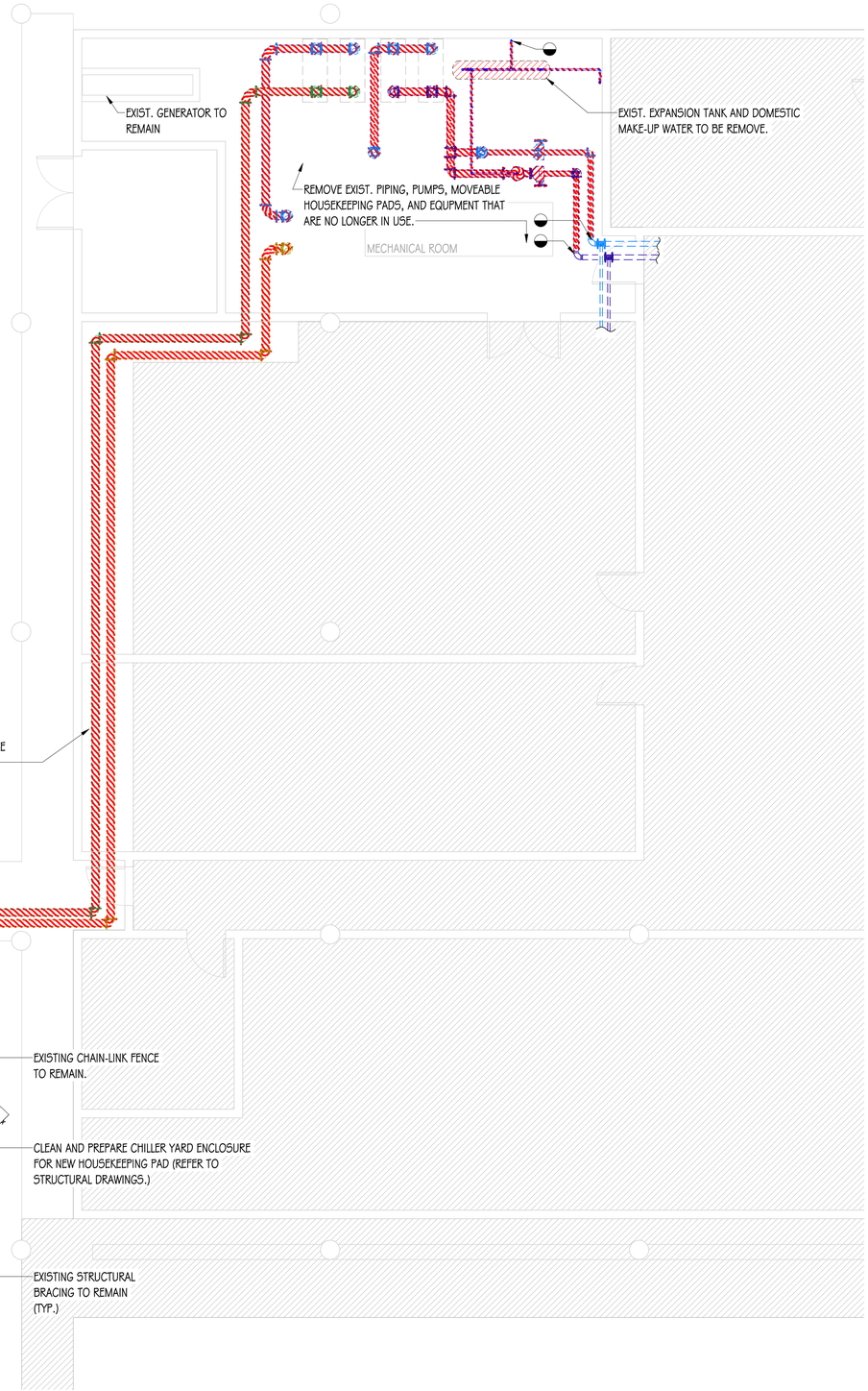
Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

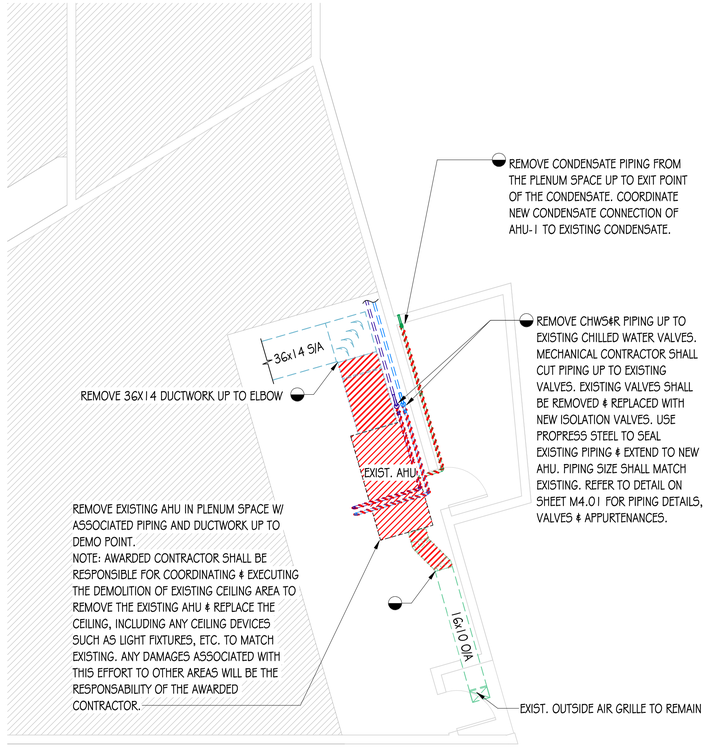
MECHANICAL SPECIFICATIONS

Drawing No.

M0.10



1 MECHANICAL PIPING CHILLER YARD & MECH ROOM DEMOLITION
3/16" = 1'-0"



2 MECHANICAL DUCTWORK AUDITORIUM & MECH/ELEC ROOM DEMOLITION
3/16" = 1'-0"

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

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Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL GROUND FLOOR PLAN - DEMOLITION

Drawing No.

M1.01

DAIKIN

Daikin Applied South Florida
15712 SW 41st Street - Suite 6
Davie, FL 33331
Phone: (954) 862-8500
Fax: (954) 486-9735

August 25, 2025

ESI Consulting Engineers, Inc.
1315 NW 98th Court, Unit 15
Doral, Florida 33172

RE: Miami Central Bus Transit – Air Cooled Chilled Wind Load Calcs

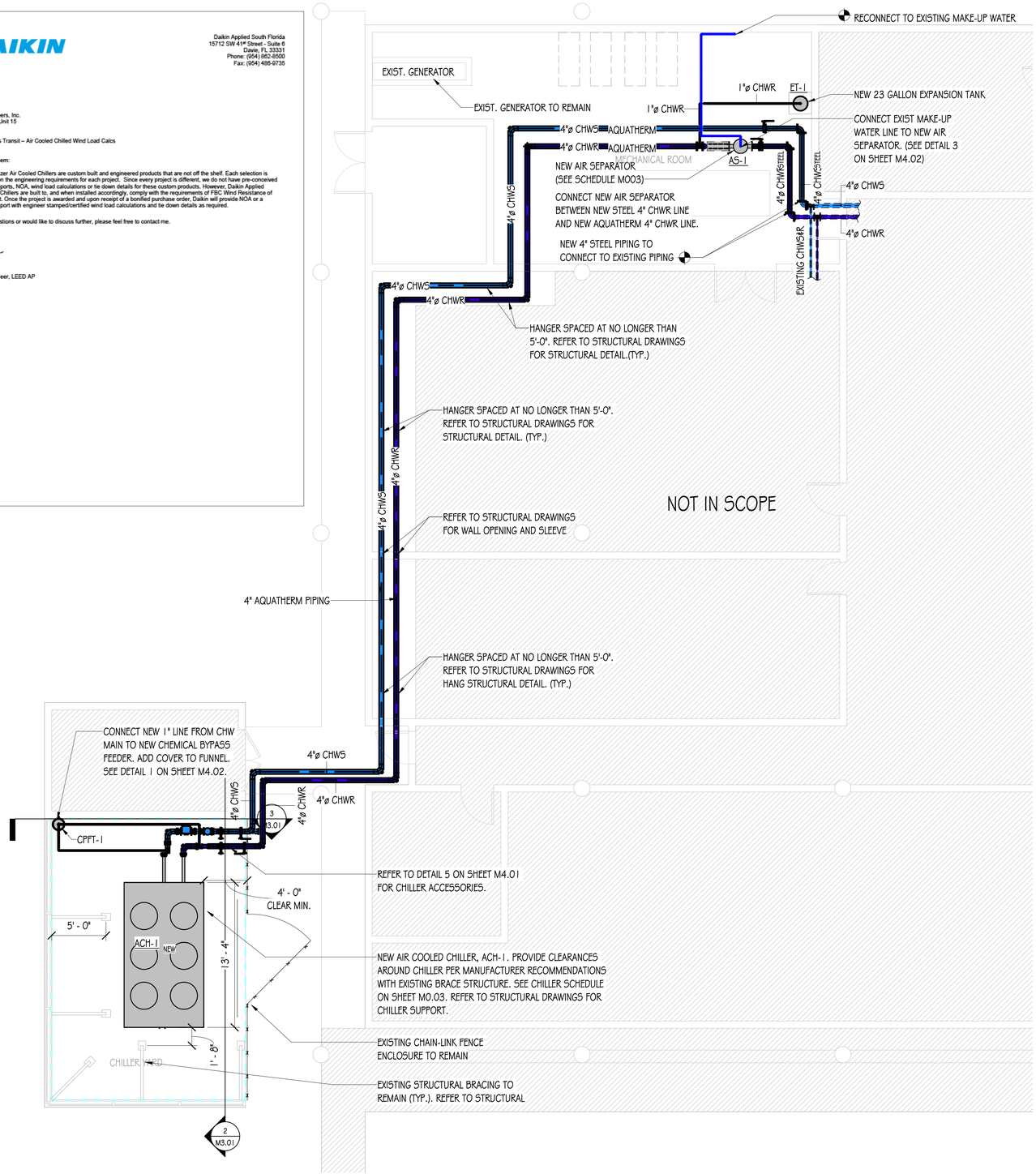
To Whom It May Concern:

Daikin Applied Trailblazer Air Cooled Chillers are custom built and engineered products that are not off the shelf. Each selection is custom and is based on the engineering requirements for each project. Since every project is different, we do not have pre-conceived technical evaluation reports, NOA, wind load calculations or tie down details for these custom products. However, Daikin Applied Trailblazer Air Cooled Chillers are built to, and when installed accordingly, comply with the requirements of FBC Wind Resistance of Mechanical Equipment. Once the project is awarded and upon receipt of a bonified purchase order, Daikin will provide NOA or a technical evaluation report with engineer stamped/certified wind load calculations and tie down details as required.

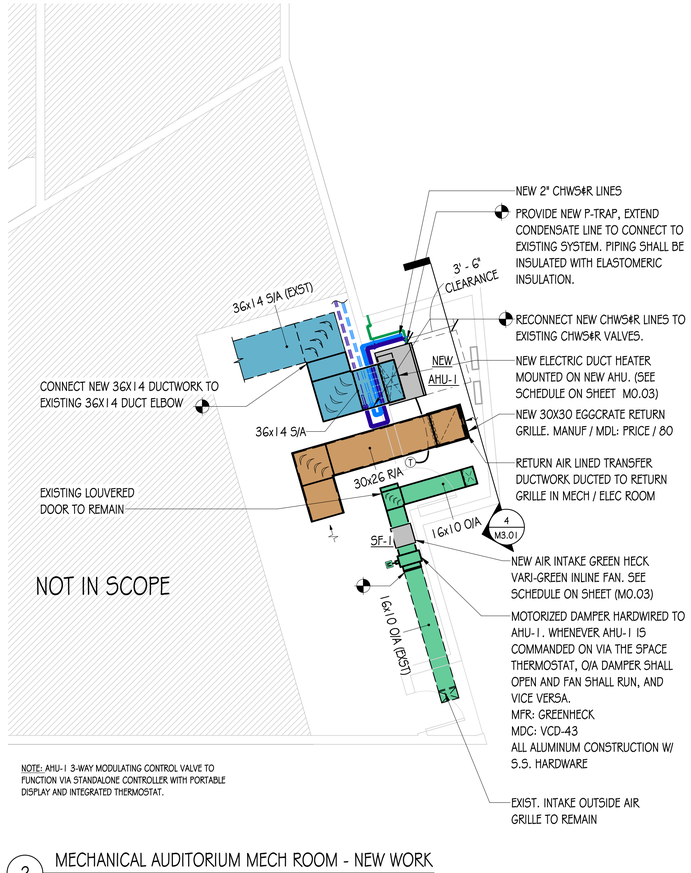
If anyone has any questions or would like to discuss further, please feel free to contact me.

Regards,

David Diaz
Executive Sales Engineer, LEED AP
786-512-0264



1 MECHANICAL CHILLER YARD & MECH ROOM - NEW WORK
3/16" = 1'-0"



NOTE: AHU-1 3-WAY MODULATING CONTROL VALVE TO FUNCTION VIA STANDALONE CONTROLLER WITH PORTABLE DISPLAY AND INTEGRATED THERMOSTAT.

2 MECHANICAL AUDITORIUM MECH ROOM - NEW WORK
3/16" = 1'-0"

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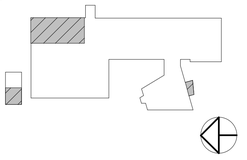

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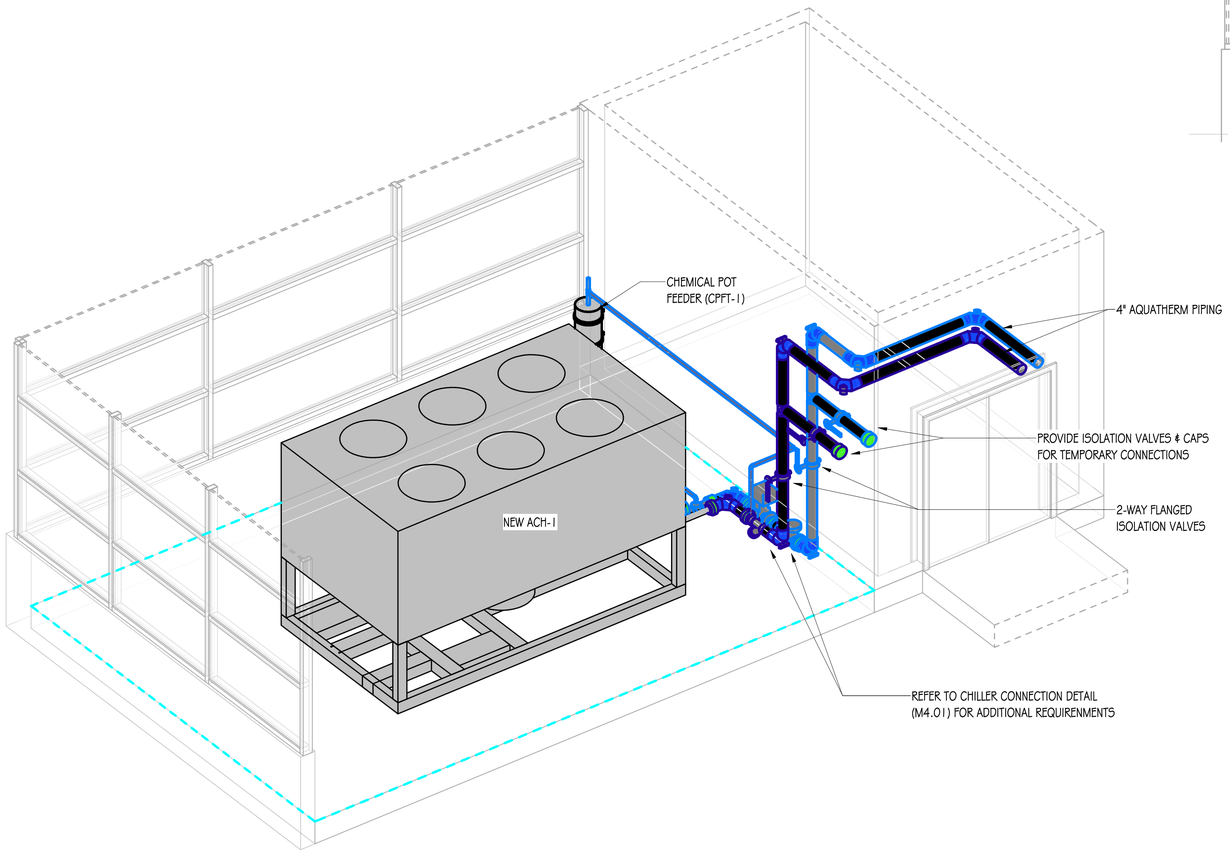
Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

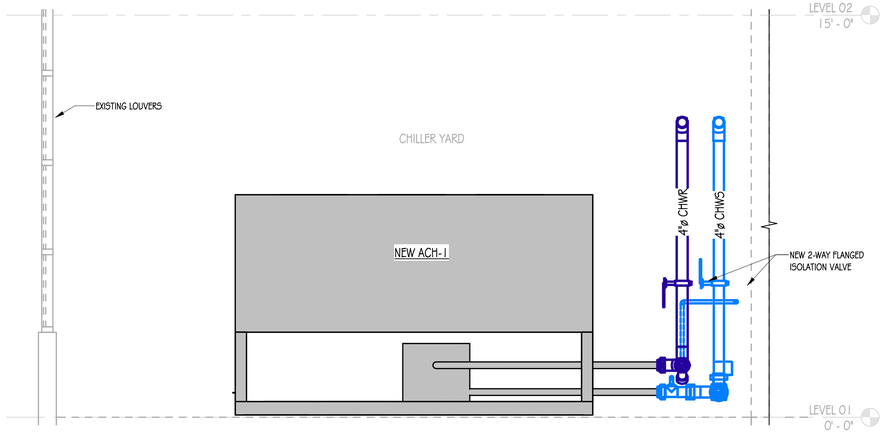
MECHANICAL GROUND FLOOR PLAN - NEW WORK

Drawing No.

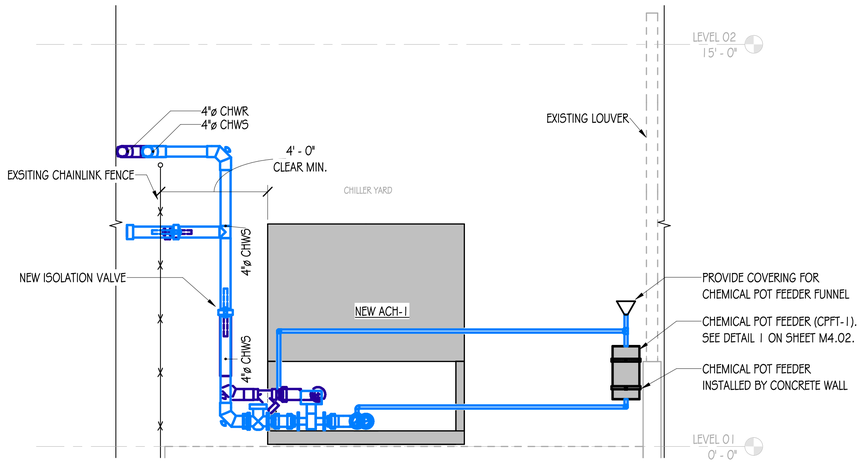
M2.01



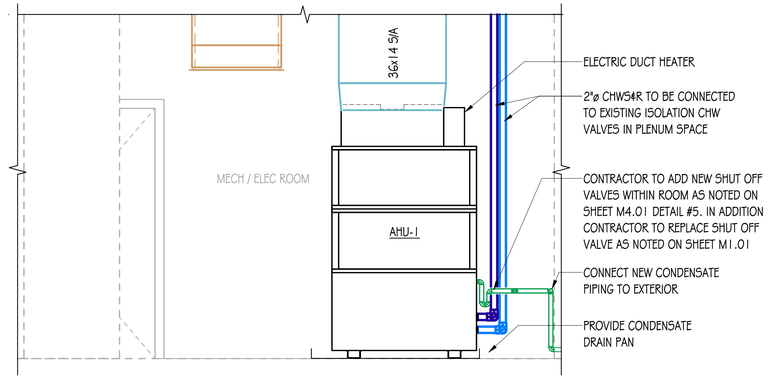
1 3D ISOMETRIC VIEW CHILLER YARD - NEW WORK



2 SECTION A CHILLER YARD - NEW WORK
3/8" = 1'-0"



3 SECTION B CHILLER YARD - NEW WORK
3/8" = 1'-0"



4 AHU-1 MECH / ELEC ROOM SECTION A - NEW WORK
1/2" = 1'-0"

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CHILLER + AHU REPLACEMENT

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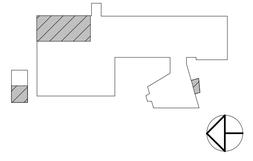

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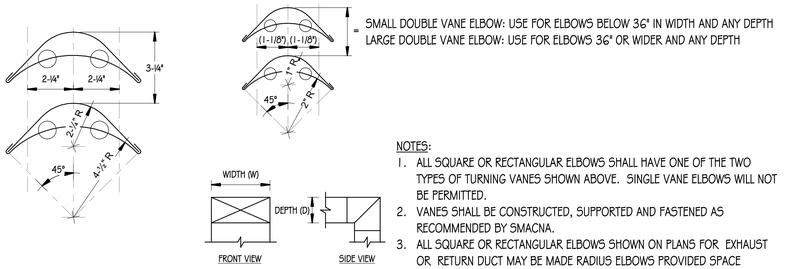
Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL ELEVATION & ISOMETRICS

Drawing No.

M3.01

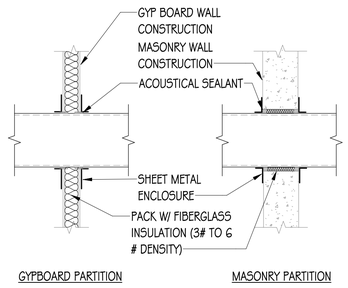


TYPICAL ELBOW

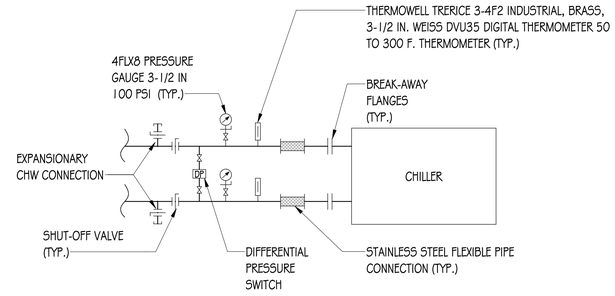
= SMALL DOUBLE VANE ELBOW: USE FOR ELBOWS BELOW 36" IN WIDTH AND ANY DEPTH
LARGE DOUBLE VANE ELBOW: USE FOR ELBOWS 36" OR WIDER AND ANY DEPTH

NOTES:
1. ALL SQUARE OR RECTANGULAR ELBOWS SHALL HAVE ONE OF THE TWO TYPES OF TURNING VANES SHOWN ABOVE. SINGLE VANE ELBOWS WILL NOT BE PERMITTED.
2. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.
3. ALL SQUARE OR RECTANGULAR ELBOWS SHOWN ON PLANS FOR EXHAUST OR RETURN DUCT MAY BE MADE RADIUS ELBOWS PROVIDED SPACE PERMITS RADIUS INSTALLATION.
4. ALL SQUARE OR RECTANGULAR ELBOWS SHOWN ON PLANS FOR SUPPLY DUCT MAY BE MADE RADIUS ELBOWS PROVIDED SPACE PERMITS RADIUS INSTAL- LATION AND/OR THERE ISN'T AN OUTLET OR TAKE-OFF WITHIN 5D ON THE DOWNSTREAM SIDE OF THE ELBOW.

1 ELBOW VANE CONSTRUCTION DETAIL
N.T.S.

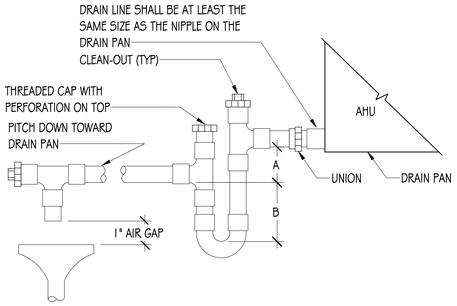


2 DUCT PENETRATION CONSTRUCTION DETAIL
N.T.S.



NOTES:
1. THIS IS A SCHEMATIC DETAIL. CONFIGURE PIPING BASED ON SITE CONDITIONS AND WITHOUT OBSTRUCTIONS OF CLEARANCES.
2. ALL COMPONENTS SHALL BE INSULATED PER SPECIFICATIONS.
3. CHILLER SHALL BE MOUNTED ON NEOPRENE PADS (OUTDOOR RATED), OR AS INDICATED BY CHILLER MANUFACTURER.
4. CHILLER SHALL BE SECURED IN COMPLIANCE WITH FBC HIGH VELOCITY WINDS.
5. PROVIDE MANUAL AIR VENTS AT HIGHEST POINT FOR PURGING AIR WHILE FILLING LINES.
6. INSTALL FLUSH PORTS WITH ISOLATION VALVES.

3 CHILLER CONNECTION DETAIL
N.T.S.

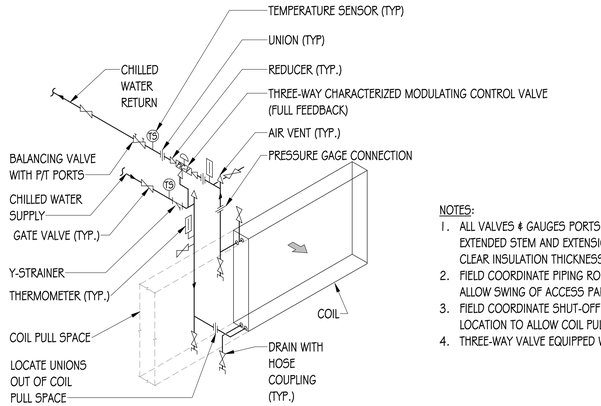


UNIT TYPE	A	B
DRAW THRU	2" PLUS X	X
BLOW THRU	1" MIN	2X
WHERE "X" = STATIC PRESSURE IN PAN		

NOTES:
1. FIRE RATED PACKING SHALL BE U.L. SYSTEM C-AJ-1015.
2. SLOPE PIPE @ 1/4" PER FOOT.
3. SUSPENDED UNIT SHALL BE PROVIDED WITH OVERFLOW SWITCH ON CONDENSATE LINE FOR UNIT SHUT-DOWN.
4. SECURE NEW CONDENSATE DRAIN PIPING TO FLOOR WITH COPPER BRACKETS OR CLAMPS (USE NON-FERROUS FASTENERS).
5. INSULATE ALL PIPING WITH 1" ARMAFLEX INSULATION, OR AS PER SPECIFICATIONS.
6. PROVIDE SHIELDING OVER CONDENSATE PIPING WHERE SUBJECT TO DAMAGE.
7. PROVIDE INDIRECT CONNECTION AT DISCHARGE.

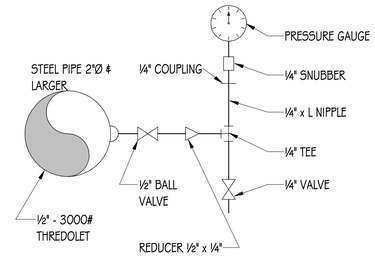
*** COORDINATE P-TRAP SIZE WITH UNIT MANUFACTURER'S RECOMMENDATIONS.

4 TYPICAL AHU CONDENSATE P-TRAP DRAIN CONNECTION DETAIL
N.T.S.

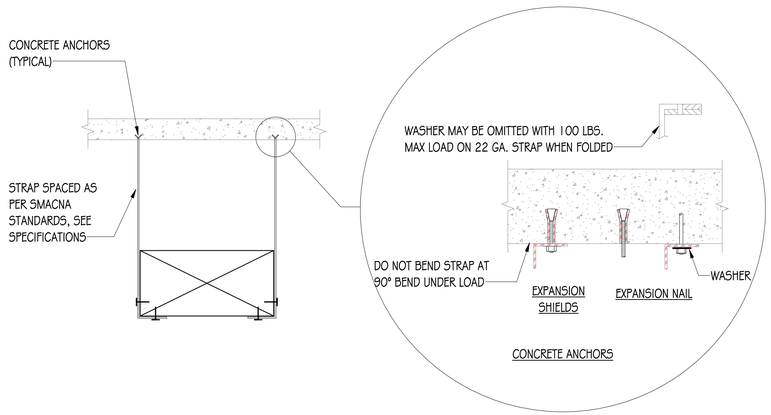


NOTES:
1. ALL VALVES & GAUGES PORTS SHALL HAVE EXTENDED STEM AND EXTENSIONS TO CLEAR INSULATION THICKNESS.
2. FIELD COORDINATE PIPING ROUTING TO ALLOW SWING OF ACCESS PANELS/DOORS.
3. FIELD COORDINATE SHUT-OFF VALE LOCATION TO ALLOW COIL PULL-OUT.
4. THREE-WAY VALVE EQUIPPED WITH AHU.

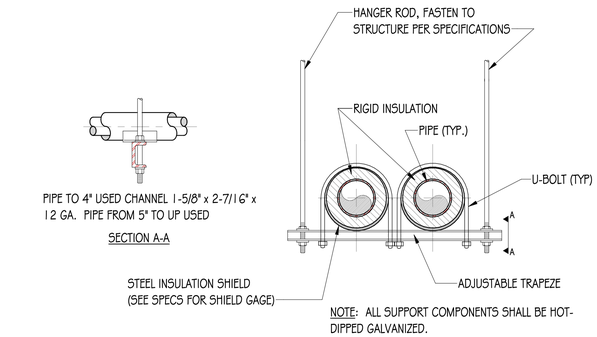
5 TYPICAL CHILLED WATER COIL CONNECTION
N.T.S.



6 CHILLED WATER PRESSURE GAUGE ASSEMBLY
N.T.S.

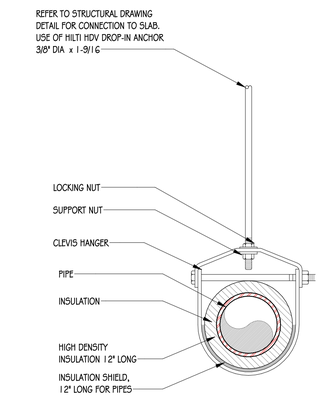


7 DUCT SUPPORT DETAIL
N.T.S.



NOTE: ALL SUPPORT COMPONENTS SHALL BE HOT-DIPPED GALVANIZED.

8 TRAPEZE TYPE PIPE HANGER
N.T.S.



9 PIPE HANGER
N.T.S.

CENTRAL BUS ADMINISTRATION BUILDING

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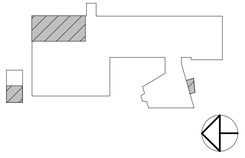

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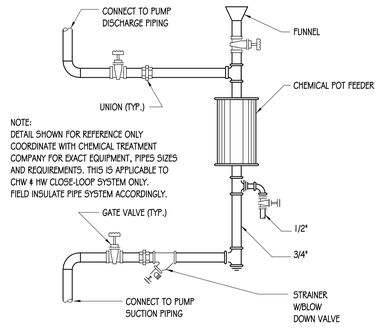
Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL DETAILS

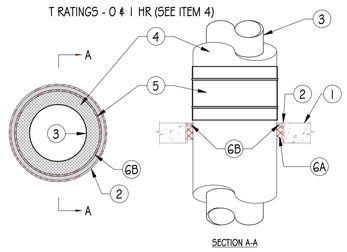
Drawing No.

M4.01



1 CHEMICAL FEEDER DETAILS

N.T.S.

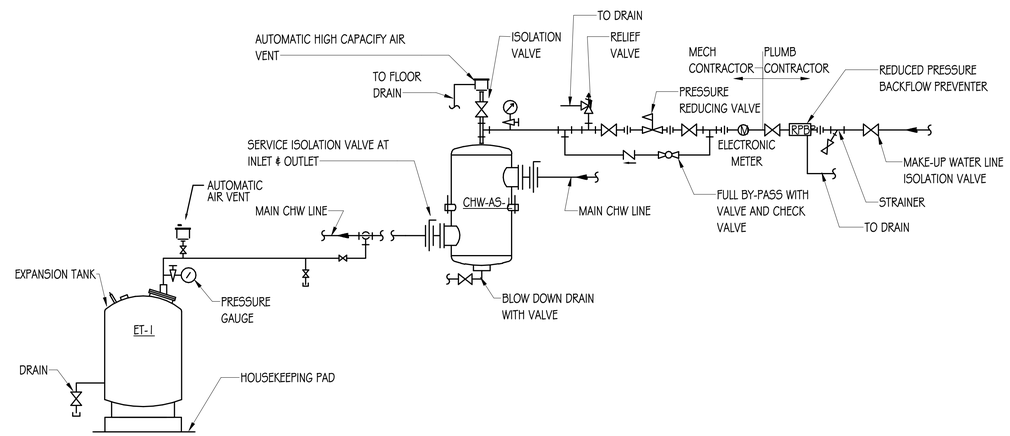


1. FLOOR OR WALL ASSEMBLY: MIN 4-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAM OF OPENING IS 22 IN.
2. METALLIC SLEEVE: NOM 22 IN. DIAM (OR SMALLER) SCHEDULE 40 STEEL PIPE CAST OR GROUTED INTO FLOOR OR WALL ASSEMBLY, FLUSH WITH FLOOR OR WALL SURFACES.
3. THROUGH PENETRANTS: ONE METALLIC PIPE OR TUBING TO BE POSITIONED WITHIN THE FIRESTOP SYSTEM. PIPE OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES OR TUBING MAY BE USED:
   A. STEEL PIPE: NOM 12 IN. DIAM (OR SMALLER) SCHEDULE 40 (OR HEAVIER) STEEL PIPE.
   B. COPPER TUBING: NOM 6 IN. DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
   C. COPPER PIPE: NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
4. PIPE COVERING MATERIALS*: CELLULAR GLASS INSULATION - NOM 1 IN. OR 3 IN. THICK CELLULAR GLASS PIPE INSULATION SIZED TO THE OUTSIDE DIAM OF THE STEEL PIPE OR TUBE AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. T RATING IS 0 HR WHEN NOM 1-1/2 IN. THICK PIPE INSULATION IS USED. T RATING IS 1 HR WHEN NOM 3 IN. THICK PIPE INSULATION IS USED. THE ANNULAR SPACE SHALL BE MIN 3/4 IN. TO MAX 3 IN. NOTE: AQUATHERM INTERIOR PIPING SHALL USE NOM. 1 IN. THICK CELLULAR GLASS INSULATION. AQUATHERM EXTERIOR EXPOSED PIPING SHALL USE 1-1/2 IN THICK CELLULAR GLASS INSULATION.
5. PITTSBURGH CORNING CORP. - FOAMGLASS
   METAL JACKET: MIN 12 IN. LONG JACKET FORMED OF MIN 0.010 IN. THICK STEEL OR ALUMINUM SHEET CUT TO WRAP TIGHTLY AROUND THE PIPE INSULATION WITH A MIN 2 IN. LAP. JACKET SECURED WITH MIN 1/2 IN. WIDE STAINLESS STEEL HOSE CLAMPS OR BANDS LOCATED WITHIN 2 IN. OF EACH END OF THE JACKET AND SPACED A MAX OF 10 IN. OC. JACKET TO BE INSTALLED WITH ABUTTING SURFACE OF SEALANT (ITEM 6B) ON TOP OF FLOOR OR BOTH SURFACES OF WALL.
6. FIRESTOP SYSTEM: THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
   A. PACKING MATERIAL - MIN 3 IN. THICKNESS OF MIN 4.0 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR OR FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
   B. FILL, VOID OR CAVITY MATERIAL* - SEALANT - MIN 3/4 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH THE TOP SURFACE OF THE FLOOR OR WITH BOTH SURFACES OF THE WALL.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI, INC. - FS-ONE SEALANT * BEARING THE UL CLASSIFICATION MARKING

2 TYPICAL PIPE PENETRATION DETAIL

N.T.S.



3 AIR SEPARATOR / ELIMINATION & EXPANSION TANK PIPING

N.T.S.

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CHILLER + AHU REPLACEMENT

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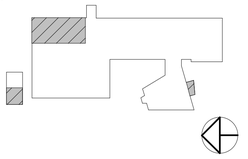

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Professional of Record: IGOR F. GONZALEZ, P.E.
Discipline: MECHANICAL
Registration No.: 56098

Sheet Title

MECHANICAL DETAILS

Drawing No.

M4.02

GENERAL ELECTRICAL NOTES

1. PROJECT RECORD DOCUMENTS:
   A. RECORD DRAWINGS: MAINTAIN A CLEAN, UNDAMAGED SET OF BLUE OR BLACK LINE WHITE-PRINTS OF CONTRACT DRAWINGS AND SHOP DRAWINGS. MARK THE SET TO SHOW THE ACTUAL INSTALLATION WHERE THE INSTALLATION VARIES FROM THE WORK AS ORIGINALLY SHOWN. MARK WHICH DRAWING IS MOST CAPABLE OF SHOWING CONDITIONS FULLY AND ACCURATELY. GIVE PARTICULAR ATTENTION TO CONCEALED ELEMENTS THAT WOULD BE DIFFICULT TO MEASURE AND RECORD AT A LATER DATE.
      1. MARK RECORD SETS WITH RED ERASABLE COLORED PENCIL.
      2. MARK IMPORTANT ADDITIONAL INFORMATION THAT WAS EITHER SHOWN SCHEMATICALLY OR OMITTED FROM ORIGINAL DRAWINGS.

2. ALL WORK SHALL BE PERFORMED BY A LICENSED ELECTRICAL CONTRACTOR IN A FIRST CLASS MANNER AND SHALL BE COMPLETED AND FULLY OPERATIVE TO THE ACCEPTANCE OF THE OWNER, GENERAL CONTRACTOR AND ENGINEER.

3. CONTRACTOR SHALL GUARANTEE ALL ELECTRICAL WORK, INCLUDING PARTS AND LABOR, FOR A PERIOD OF ONE (1) YEAR AFTER FINAL WRITTEN ACCEPTANCE BY OWNER AND ENGINEER.

4. THIS CONTRACTOR SHALL PAY FOR ALL FEES, INSPECTIONS, TESTS, FINES, ETC., AS REQUIRED.

5. PRIOR TO COMMENCEMENT OF WORK, VERIFY MEASUREMENTS AT SITE. SUBMIT DISCREPANCIES AND DIFFERENCES TO ARCHITECT-ENGINEER FOR CONSIDERATION AND DECISION BEFORE PROCEEDING.

6. VERIFY ALL DIMENSIONS PRIOR TO ANY FABRICATION OR INSTALLATION.

7. OBTAIN FULL INFORMATION REGARDING PECULIARITIES AND LIMITATIONS OF SPACE AVAILABLE FOR INSTALLATION OF THE EQUIPMENT AND MATERIALS UNDER CONTRACT, AND PROVIDE READY ACCESSIBILITY TO ELECTRICAL EQUIPMENT, INCLUDING ANY PART OF SYSTEM REQUIRED TO BE REACHED FOR MAINTENANCE AND OPERATIONS.

8. CUT ALL OPENINGS REQUIRED TO ACCOMMODATE THE WORK UNDER THIS CONTRACT, AND REPAIR ALL SURFACES, ETC., DAMAGED BY SUCH CUTTINGS. ALL WORK DONE UNDER THIS HEADING MUST CONFORM IN EVERY RESPECT TO FINISH AND QUALITY OF MATERIALS AND WORKMANSHIP SPECIFIED UNDER APPROPRIATE SECTIONS. CONCRETE FLOOR OPENINGS SHALL BE CORE DRILLED. FIRE SEAL PENETRATIONS IN WALLS, FLOORS AND CEILING AS REQUIRED.

9. PROVIDE CODE APPROVED FIRE STOPPING AT ALL CONDUIT, PENETRATIONS THROUGH BUILDING CONSTRUCTION TO MAINTAIN FIRE, SMOKE AND SOUND RATINGS. SEAL TELECOMMUNICATION SLEEVES AFTER CABLES HAVE BEEN INSTALLED.

10. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH OTHERS AS WELL AS PROVIDING TEMPORARY POWER.

11. ALL MATERIAL SHALL BE NEW AND OF AMERICAN MANUFACTURE AND BEAR THE UNDERWRITER'S LABORATORY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE DELIVERY SCHEDULE OF MATERIAL.

12. VERIFY EQUIPMENT SIZES, VOLTAGE AND CURRENT CHARACTERISTICS, ETC., BEFORE THE ORDERING OF ANY EQUIPMENT AND BEFORE ROUGHING-IN FOR EQUIPMENT TO BE SUPPLIED BY OTHERS. NOTIFY ENGINEER OF ANY CONFLICTS. ADVISE ALL TRADES AND OTHERS FURNISHING EQUIPMENT THAT NOMINAL CHARACTERISTICS ARE 277/480 VOLTS, AND 120/208 VOLTS, THREE PHASE, FOUR WIRE "WYE".

13. CORRECTION OF ANY DEFECTS, REPAIR OF DAMAGE DURING CONSTRUCTION AS WELL AS ANY MINOR CHANGES IN OUTLET LOCATIONS SHALL BE MADE WITHOUT ADDITIONAL COST.

14. GUTTERS, WIREWAYS, PULL BOXES, ETC., SHALL BE GALVANIZED STEEL SIZED PER NATIONAL ELECTRICAL CODE. ARTICLE 314. USE OF GUTTERS, WIREWAYS, PULL BOXES IN COMPLIANCE WITH NEC.

15. ALL WIRING SHALL BE IN RACEWAY, EXCEPT AS INDICATED IN PLANS.
   A. INDOORS: USE THE FOLLOWING WIRING METHODS:
      1. EXPOSED: RIGID STEEL OR IMC BELOW 8 FEET FROM FLOOR, EMT. ABOVE 8 FEET FROM FLOOR.
      2. CONCEALED: EMT.
      3. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR - DRIVEN EQUIPMENT): FMC; EXCEPT IN WET OR DAMP LOCATIONS, USE LIQUID TIGHT FMC..
      4. DAMP OR WET LOCATIONS: RIGID STEEL CONDUIT.
   B. SEALING FITTINGS SHALL BE INSTALLED AT THE FOLLOWING POINTS, AND ELSEWHERE AS SHOWN.
      1. WHERE REQUIRED BY THE NEC.
   C. MINIMUM SIZE OF CONDUITS SHALL BE 1/2".

16. CIRCUIT NUMBERS ARE FOR IDENTIFICATION PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CORRECTLY PHASING THE CIRCUITS IN THE PANEL AND SHALL BALANCE THE LOAD ON THE PHASES UNDER NORMAL OPERATING CONDITIONS. PROVIDE TYPEWRITTEN PANEL BOARD DIRECTORIES. UPDATE ALL DIRECTORIES IN EXISTING PANEL BOARDS AFFECTED BY THIS PROJECT ELECTRONICALLY TRACING ALL CIRCUITS.

17. GROUNDING
   A. THE ENTIRE SYSTEM OF RACEWAYS AND EQUIPMENT SHALL BE GROUNDED IN ACCORDANCE WITH ARTICLE #250 OF THE NATIONAL ELECTRICAL CODE AND LOCAL REGULATIONS AND AUTHORITIES.

18. PROVIDE NYLON PULL STRINGS IN ALL EMPTY CONDUITS FOR FUTURE USE.

19. CONDUCTORS SHALL BE AS FOLLOWS:
   A. COMPOSED OF 98 IACS ANNEALED COPPER, 600 VOLTS MINIMUM RATED 75 DEGREES CENTIGRADE, MAXIMUM TEMPERATURE - THW, THWN/THHN.
   B. SOLID THW IN SIZE 10 AWG AND UNDER AND STRANDED THW IN SIZE 8 AWG AND LARGER.
   C. PLAINLY MARKED AND COLOR CODED THROUGHOUT INSTALLATION.
   D. ALL NEW BRANCH CIRCUIT INSTALLATIONS SHALL COMPLY WITH NEC 210.4(B). A DEDICATED NEUTRAL WIRE FOR EACH PHASE CONDUCTOR SHALL BE PROVIDED.
   E. MINIMUM SIZE WIRE FOR BRANCH CIRCUIT AND POWER WIRING SHALL BE #12 AWG, FOR REMOTE CONTROL SIGNAL CIRCUIT AND INTERLOCK WIRING CAN BE #14 AWG. FOR 20A BRANCH CIRCUIT RUNS EXCEEDING 100'-0" IN LENGTH FROM PANELBOARD TO THE FIRST OUTLET, THE ENTIRE BRANCH CIRCUIT RUN SHALL BE #10 AWG OR LARGER. FOR RUNS OVER 175'-0" TO THE FIRST OUTLET, USE #8 AWG OR LARGER FOR THE ENTIRE BRANCH CIRCUIT RUN.

20. FURNISH AND INSTALL HEAVY DUTY DISCONNECT SWITCHES AS SHOWN AND REQUIRED FOR EQUIPMENT FURNISHED BY OTHERS. FUSES SHALL BE DUAL ELEMENT, TIME DELAY TYPE.

21. COLOR CODING OF CONDUCTORS: *
   A. WIRING FOR 277/480 VOLT SHALL BE CODED:
      - PHASE "A" - BROWN
      - PHASE "B" - PURPLE
      - PHASE "C" - YELLOW
      - NEUTRAL - WHITE
      - GROUND - GREEN

   B. WIRING FOR 120/208 VOLT SHALL BE CODED:
      - PHASE "A" - BLACK
      - PHASE "B" - RED
      - PHASE "C" - BLUE
      - NEUTRAL - WHITE
      - GROUND - GREEN

   C. COLORS ON CONDUCTOR 6 AWG AND SMALLER SHALL BE INTEGRAL PART OF INSULATION, ON CONDUCTOR 4 AWG AND LARGER CONDUCTORS, EITHER COLOR CODING TAPE OR PAINTED WITH TWO COATS OF CORRECT COLOR PAINT AT ALL TERMINALS AND CONNECTION POINTS.

22. OUTLET BOXES SHALL BE GALVANIZED STEEL OR RUST RESISTANT MALLEABLE IRON ALLOY. OUTLET BOXES FOR WIRING DEVICES SHALL BE ONE PIECE STANDARD GANG BOX. IDENTIFY BOXES AS REQUIRED PER N.E.C. FOR EMERGENCY AND LIFE SAFETY CIRCUITS.

23. PULL AND JUNCTION BOXES SHALL BE OF STEEL CONSTRUCTION, SPOT OF SEAM WELDED AT JOINTS AND HOT DIPPED GALVANIZED AFTER FABRICATION. IDENTIFY PULL AND JUNCTION BOXES WITH CIRCUIT NUMBER ON IT WITH A PERMANENT MARKER.

24. COORDINATION WITH OTHER TRADES:
   A. PROVIDE COMPLETE AND PROPERLY FUNCTIONING ELECTRICAL SYSTEMS FOR THIS PROJECT. VISIT THE PROJECT SITE, EXAMINE THE CONDITION OF THE PREMISES, THESE PLANS AND ALL CONTRACT DOCUMENTS AND SPECIFICATIONS RELATING TO THE AREA OF WORK. REPORT ANY DISCREPANCIES OR OMISSIONS IN THIS PLAN SET TO THE ENGINEER FOR RESOLUTION AND CLARIFICATION PRIOR TO SUBMISSION OF BIDS. BY SUBMITTING A BID ON THIS PROJECT, THE CONTRACTOR ACCEPTS THESE DOCUMENTS AS AN ADEQUATE DEFINITION OF THE SCOPE OF WORK. ADDITIONAL COSTS TO ACHIEVE THE INTENDED SCOPE OF WORK AS A RESULT OF ANY OF THESE CONDITIONS WILL NOT BE ACCEPTED.
   B. SPECIAL ATTENTION SHALL BE GIVEN BUT NOT BE LIMITED TO NEW AND EXISTING FIELD CONDITIONS.
   C. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATION WITH OTHER TRADES.

25. FINAL TESTING, ADJUSTMENTS AND ACCEPTANCE OF ELECTRICAL EQUIPMENT AND SYSTEMS:
   A. INITIATE TESTING SCHEDULE AND CLEAR WITH ENGINEER AND/OR OWNER. DO NOT SCHEDULE OR TEST WITHOUT THIS CLEARANCE FURNISH ARCHITECT/ENGINEER AND/OR OWNER WITH NAME OF PERSON WHO WILL BE IN CHARGE OF TESTING, ENERGIZING AND STARTING UP. CONFER WITH ENGINEER AND/OR OWNER ON PROCEDURES TO BE FOLLOWED IN OBTAINING CLEARANCES FOR ELECTRICAL EQUIPMENT. ADHERE TO PROCEDURES AS FINALLY AGREED UPON.
   B. COMPILE COMPLETE TEST AND INSPECTION RECORDS AND INCORPORATE INTO A REPORT FOR EACH PIECE OF EQUIPMENT TESTED. RECORD ALL READINGS TAKEN. SUBMIT (4) COPIES TO ENGINEER AND/OR OWNER FOR REVIEW.
   C. NOTIFY ENGINEER BY LETTER AT LEAST ONE WEEK PRIOR TO TEST, ESTABLISHING THE TIME TEST IS TO BE PERFORMED. PERFORM TESTS IN PRESENCE OF ARCHITECT/ENGINEER AND/OR OWNER.
   D. FURNISH NECESSARY METERS, INSTRUMENTS, TEMPORARY WIRING AND LABOR TO PERFORM TESTS AND ADJUSTMENTS OF EQUIPMENT AND WIRING, INCLUDING ELECTRICAL EQUIPMENT FURNISHED BY OTHERS, TO DETERMINE PROPER POLARITY, PHASING, FREEDOM FROM GROUNDS AND SHORTS, RESISTANCE TO GROUND AND OPERATION OF EQUIPMENT. MEASURING INSTRUMENTS SHALL BE PROPERLY CALIBRATED AND CERTIFIED PRIOR TO USE.
   E. DEMONSTRATE MATERIALS AND MANNER OF INSTALLATION TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF STATE AND LOCAL PUBLIC AUTHORITIES, THE UTILITY COMPANIES AND NFPA.
   F. ENERGIZE EQUIPMENT FOLLOWING ESTABLISHED PROCEDURES AFTER CERTIFICATION BY THE CONTRACTOR THAT THE INSTALLATION IS SATISFACTORY.
   G. WIRING:
      1. CHECK SYSTEM AND EQUIPMENT GROUNDS FOR RESISTANCE USING THE MEGGER GROUND TESTER IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
      2. INVESTIGATE CIRCUITS SHOWING INSULATION RESISTANCE LESS THAN MINIMUM VALUES GIVEN IN N.E.C. CORRECT WEAK POINTS.
      3. CORRECT OR REPLACE NOMINAL CURRENT-CARRYING CIRCUITS WHICH ARE DEFECTIVE OR GROUNDED. CORRECT OTHER TROUBLES ENCOUNTERED IN THESE TESTS.
   H. BREAKERS: SET BREAKERS SO EQUIPMENT WILL BE IN PROPER OPERATING CONDITION BEFORE BEING PLACED IN SERVICE. PERFORM FINAL OPERATIONAL TESTS TO DETERMINE THAT WIRING CONNECTIONS ARE CORRECT.
   I. MOTORS:
      1. MAKE THESE TESTS ON MOTORS BEFORE START-UP: CHECK MOTOR NAMEPLATES FOR HP, SPEED, PHASE AND VOLTAGE.
      2. MAKE THESE TESTS ON MOTORS DURING START-UP:
         a. CHECK SHAFT ROTATION BEFORE FINAL CONNECTIONS ARE MADE.
         b. TAKE A CURRENT READING AT FULL LOAD USING A CLAMP-ON AMMETER. IF AMMETER READING IS OVER THE RATED FULL LOAD CURRENT, DETERMINE REASON FOR THE DISCREPANCY AND TAKE CORRECTIVE ACTION.
      3. AFTER ALL CONNECTIONS ARE MADE, TEST MOTORS AND EQUIPMENT FOR PROPER OPERATION. INVESTIGATE CAUSE OF ANY MOTOR OPERATING ABOVE FULL LOAD RATING AND REMOVE CAUSE, OR REPORT TO ARCHITECT/ENGINEER AND/OR OWNER. CHECK ROTATION OF MOTORS.
   J. WIRING DEVICES:
      1. TEST WIRING DEVICES FOR PROPER POLARITY AND GROUND CONTINUITY. OPERATE EACH DEVICE AT LEAST SIX TIMES.
      2. TEST GFCI OPERATION WITH BOTH LOCAL AND REMOTE FAULT SIMULATIONS AS PER MANUFACTURER'S WRITTEN INSTRUCTIONS.
   K. ACCEPTANCE: OBSERVATION OF THE OPERATION OF THE ELECTRICAL INSTALLATION AND EQUIPMENT BY THE ENGINEER AND/OR OWNER DOES NOT CONSTITUTE ACCEPTANCE OF THE WORK. ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, DEMONSTRATED THAT IT MEETS THE REQUIREMENTS OF THE CONTRACT DOCUMENT, AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES.
   L. PERFORM VOLTAGE AND IMPEDANCE TEST (EQUIPOTENTIAL TEST)IN ACCORDANCE WITH NFPA-99 IN THE PRESENCE OF THE ENGINEER AS REQUESTED DURING THE FINAL INSPECTIONS. THESE TESTS SHALL BE PERFORMED IN ADDITION TO THOSE REFERENCED IN THE GROUNDING SECTION OF THE SPECIFICATION.
   M. THE CONTRACTOR SHALL CORRECT OR REPLACE ANY NOMINAL CURRENT CARRYING CIRCUIT WHICH IS DEFECTIVE OR GROUNDED AND SHALL ALSO CORRECT ALL OTHER TROUBLES BY THESE TESTS. ALL DEFECTS WHETHER THROUGH FAULTY WORKMANSHIP OR MATERIAL FURNISHED SHALL BE CORRECTED UNDER THIS PROJECT AT THE CONTRACTORS EXPENSE.

26. REFER TO MECHANICAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL WORK UNDER THIS CONTRACT NOT SHOWN IN THIS SET OF CONTRACT DOCUMENTS PROVIDING ACCORDINGLY.

27. EXISTING CONDITIONS:
   A. ALL WORK HEREIN DESCRIBED AND SHOWN ON DRAWINGS AND REQUIRED TO MAKE PROJECT COMPLETE IN EVERY RESPECT, PLUS ANY AND ALL PATCHING NECESSARY SHALL BE DONE TO THE COMPLETE SATISFACTION OF THE ENGINEER AND/OR OWNER AND SHALL BE ACCOMPLISHED IN STRICT ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS. ALL MATERIALS SHALL MATCH EXISTING WHERE APPLICABLE AND ALL CONSTRUCTION AND ALTERATION LEFT IN NEW CONDITION.
   B. ALL ITEMS TO BE REMOVED SHALL BE REMOVED WITH UTMOST CARE AND WITHOUT DAMAGE AND THOSE ITEMS NOT DESIGNATED TO BE REUSED SHALL BE DELIVERED TO THE OWNER OR DISPOSED OF AS PER HIS WRITTEN INSTRUCTIONS.
   C. ALL ALTERATIONS, DEMOLITION AND REMOVAL, CUTTING AND PATCHING AND OTHER WORK NECESSARY FOR CONSTRUCTION OF THIS CONTRACT SHALL BE PERFORMED WITHOUT ADDITIONAL COST TO THE OWNER. THIS SHALL INCLUDE REMOVAL, REROUTING, ETC. OF ALL ELECTRICAL ITEMS REQUIRED TO COMPLETE INSTALLATION INTENDED.
   D. PATCH OR REPLACE ALL DAMAGED FLOOR, WALL, CEILING, ETC. SURFACES ALTERED TO ACCOMMODATE THE NEW CONSTRUCTION. PATCHED SURFACES SHALL MATCH EXISTING ADJACENT SURFACES.
   E. ALL CUTTING, PATCHING, DEMOLITION, REPAIRING, REPLACING ETC. NECESSARY UNDER THIS CONTRACT SHALL BE COORDINATED BY THE GENERAL CONTRACTOR. WHERE APPLICABLE COORDINATE WORK WITH UTILITY COMPANIES, LOCAL AND STATE AUTHORITIES HAVING JURISDICTION, OWNER'S REPRESENTATIVES AND ALL APPLICABLE CODES.
   F. WHERE ALTERATIONS TAKE PLACE IN OCCUPIED AREAS, CONTRACTOR SHALL CLEAN UP DAILY, AND NOISE SHALL BE KEPT TO A MINIMUM.
   G. NONE OF THE SERVICES TO EXISTING BUILDINGS SHALL BE DISRUPTED IN ANY WAY EXCEPT WITH THE WRITTEN PERMISSION OF THE OWNER.
   H. ALL EQUIPMENT PRESENTLY "HOT" AND REQUIRED TO BE MAINTAINED SHALL BE RETURNED TO THIS CONDITION AFTER PER- FORMING THE CHANGES TO EXISTING BUILDING. REROUTE CONDUITS AND EXTEND OR REPLACE CIRCUITS AS REQUIRED. PERFORM WORK AT CONVENIENCE OF THE OWNER.
   I. WHERE DEVICES ARE SHOWN TO BE REMOVED ON PLANS, REMOVE ALL ASSOCIATED WIRING AND CONDUIT BACK TO THE SOURCE OR MAINTAIN CONTINUITY OF THE CIRCUIT IF OTHER LOADS ARE SERVED FROM THE SAME CIRCUIT. CONSOLIDATE PARTIALLY LOADED CONVENIENCE RECEPTACLE CIRCUITS TO MAXIMIZE SPACE MADE AVAILABLE AT THE PANELBOARD. TRACE CONSOLIDATED CIRCUITS TO VERIFY THAT THE TOTAL LOAD DOES NOT EXCEED 1920 VOLT AMPERES.
   J. EXECUTE ALL WORK IN SUCH A MANNER TO AVOID INTERFERENCE WITH THE USE OF PASSAGE TO AND FROM ADJOINING BUILDING.
   K. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE TO EXISTING BUILDING AND TO CONTENTS THEREOF INCLUDING MACHINERY, FURNITURE, EQUIPMENT, ETC. AND DAMAGE TO BUILDINGS OR CONTENTS THEREOF DUE TO CONTRACTOR OPERATIONS, SHALL BE REPAIRED OR REPLACED AT DIRECTION OF ARCHITECT/ENGINEER, AND/OR OWNER, THE CONTRACTOR, AT NO EXTRA COST TO THE OWNER.
   L. CONNECTION TO EXISTING STRUCTURES OR SYSTEMS SHALL BE MADE IN SUCH A MANNER THAT AS LITTLE TIME AS ABSOLUTELY POSSIBLE WILL BE TAKEN, AND CONTRACTOR WILL BE REQUIRED TO COORDINATE FULLY WITH OWNER IN CONNECTION WITH CONVENIENCE AND SAFETY OF ALL PERSONS INVOLVED, INCLUDING EMPLOYEES.

28. LABELING
   A. ALL WIRING DEVICES (RECEPTACLES AND LIGHT SWITCHES) COVERPLATES SHALL BE ENGRAVED INDICATING THE PANELBOARD OF ORIGIN AND CIRCUIT NUMBER.
   B. FOR ALL EXISTING DUPLEX RECEPTACLES THAT ARE TO BE REPLACED OR TO REMAIN IN THIS SCOPE OF WORK CONTRACTOR SHALL PROVIDE NEW ENGRAVED COVERPLATES.

CODE COMPLIANCE

ELECTRICAL WORK SHALL COMPLY WITH THE STANDARDS OF THE FOLLOWING ORGANIZATIONS, AS APPLICABLE. THE LATEST EDITION OF THE FLORIDA BUILDING CODE SHALL APPLY EXCEPT WHERE THE PUBLIC AUTHORITY REQUIRES USE OF AN EARLIER EDITION:

2023 FLORIDA BUILDING CODE, BUILDING (8TH EDITION)
2023 FLORIDA FIRE PREVENTION CODE (8TH EDITION)
- 2021 NFPA 1 - FIRE CODE
- 2021 NFPA 101 - LIFE SAFETY CODE

2020 NFPA 70 - NATIONAL ELECTRIC CODE (NEC)
2019 NFPA 72 - NATIONAL FIRE ALARM CODE

SCOPE OF WORK

THE SCOPE OF WORK CONSISTS OF THE INSTALLATION OF A NEW AIR COOLED CHILLER AND THE REPLACEMENT OF AN EXISTING AIR HANDLING UNIT (AHU-1).
THE ELECTRICAL WORK INCLUDES THE FOLLOWING:

- PROVIDING POWER CONNECTION FOR THE NEW CHILLER FROM EXISTING PANEL MDP2.
- THE NEW AHU UNIT REPLACING THE EXISTING ONE SHALL BE FED FROM THE EXISTING AHU POWER FEEDER.
- NEW O/A SF-1 SHALL BE POWERED FROM EXISTING PANEL "ILC."
- ALL TERMINATIONS, EQUIPMENT COORDINATION, AND RECONNECTIONS SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CODES AND COORDINATED WITH MECHANICAL AND CONTROL TRADES

ABBREVIATIONS

SYMBOL	DESCRIPTION
A	AMPERE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	SHORT CIRCUIT CURRENT RATING (SYMMETRIC OR AMPERE INTERRUPTING RATING)
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
BMS/EMS	BUILDING/ENERGY MANAGEMENT SYSTEM
BRKR	BREAKER
3/C	CONDUCTOR, NUMBER OF (3)
EC	EMPTY CONDUIT
EDH	ELECTRIC DUCT HEATER
ELEC	ELECTRICAL(AL)
EPRF	EXPLOSION PROOF
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EXH	EXHAUST
EF, EXH FN	EXHAUST FAN
EXIST	EXISTING
FA	FIRE ALARM
FCP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FLR	FLOOR
FLUOR	FLUORESCENT
FPB	FAN POWER BOX
FU	FUSE
FXTR	FIXTURE
G, GND	GROUND
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
HID	HIGH INTENSITY DISCHARGE (ILLUMINATION)
HOA	HAND-OFF-AUTO
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MH	MAN HOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
m.	METER
mm.	MILLIMETER
MT	MOUNT
MTD	MOUNTED
MTG	MOUNTING
NL	NIGHT LIGHT
OLS	OVERLOADS
PB	PUSH BUTTON
SHT	SHEET
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMBOL
TEL	TELEPHONE
THRU	THROUGH
TYP	TYPICAL
UIO	UNLESS INDICATED OTHERWISE
UON	UNLESS OTHERWISE NOTED
V	VOLTS
VAV	VARIABLE AIR VOLUME BOX
W	WATT OR WIRE
W/	WITH
WHTR	WATER- HEATER
WP	WEATHER PROOF
XFMR	TRANSFORMER

NOTE:
NOT ALL SYMBOLS AND ABBREVATIONS LISTED APPLY TO THIS PROJECT.
REFER TO CONSTRUCTION DOCUEMNTS FOR SCOPE OF WORK.

ELECTRICAL DRAWING INDEX

CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

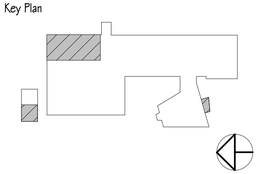
Project No.: 25-020728

Issue	Date
PERMIT SET	03/03/2026

Revisions

No.	Description	Date

Key Plan



Seal

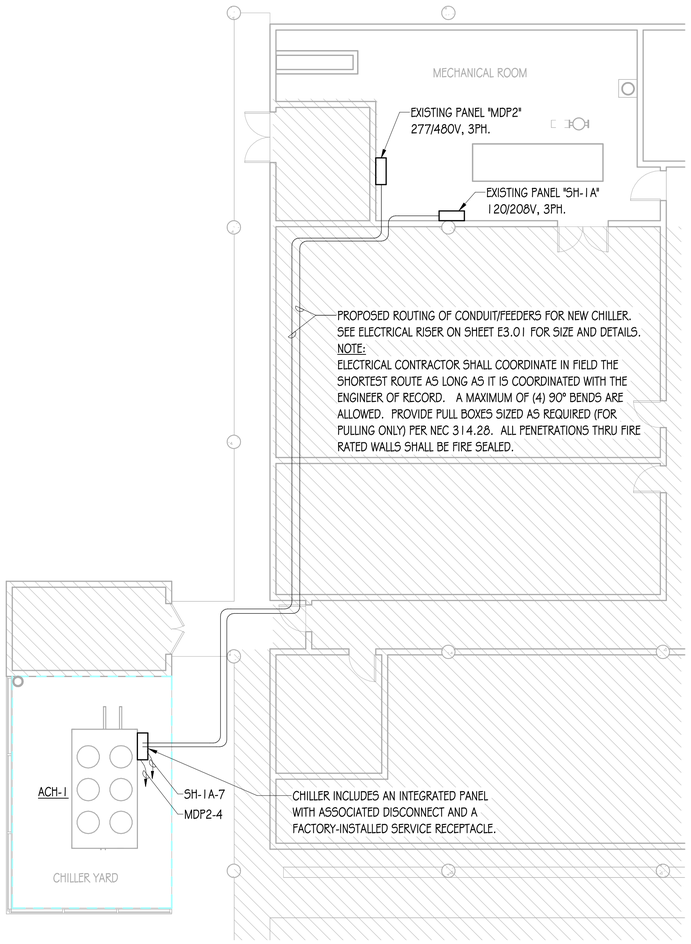
Professional of Record: MARIO D. PAZOS, P.E.
Discipline: ELECTRICAL
Registration No.: 52078

Sheet Title

ELECTRICAL GENERAL NOTES, ABBREVIATIONS

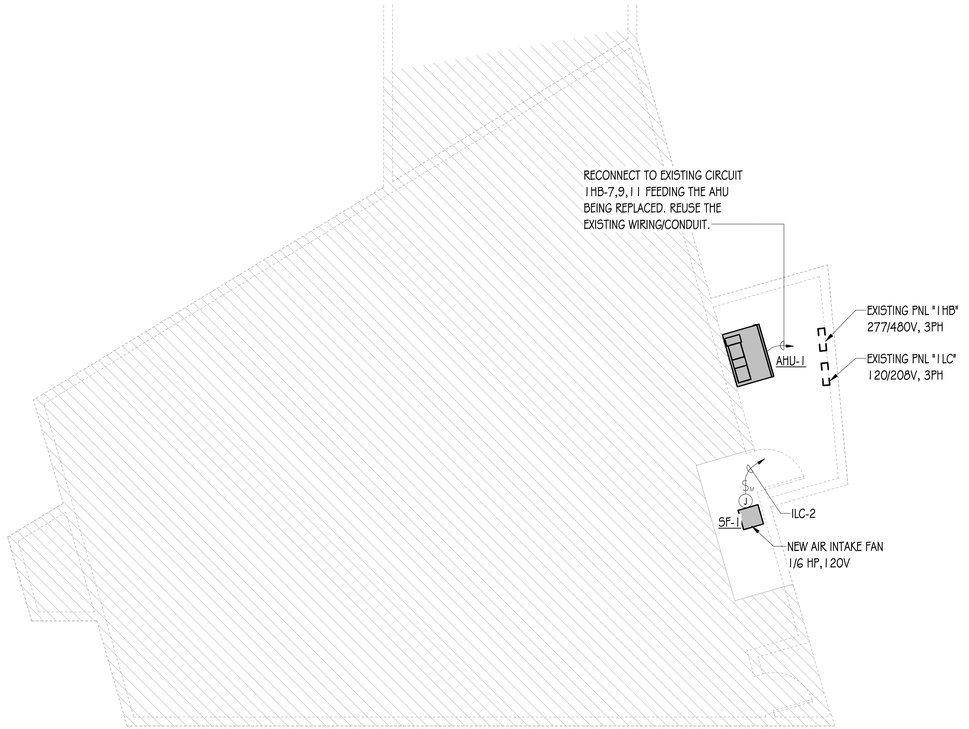
Drawing No.

E0.01



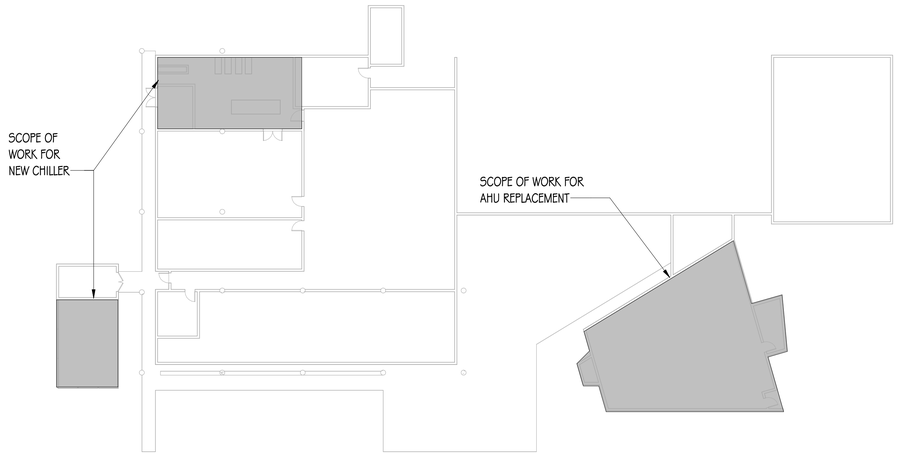
1 PARTIAL LEVEL 01 - CHILLER POWER PLAN

1/8" = 1'-0"



2 PARTIAL LEVEL 01 - AHU POWER PLAN

3/16" = 1'-0"



3 OVERALL - LEVEL 01

3/64" = 1'-0"

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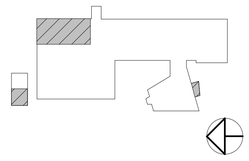


Seal

Professional of Record: MARIO D. PAZOS, P.E.
Discipline: ELECTRICAL
Registration No.: 52078

Sheet Title

ELECTRICAL POWER PLAN

Drawing No.

E2.01

SQUARE D

MOUNTING: SURFACE
SHORT CIRCUIT RATING: 10K
LOCATION: MECHANICAL / GENERATOR ROOM

EXISTING PANEL "SH-1A"

VOLTS: 120/208V, 3Ø, 4W
MAIN BUS AMPS: 100A.
MAIN BREAKER AMPS: 100 A

	CKT. No.	LOAD SERVED	POLE	TRIP	WIRE AWG	CONDUIT IN (TRADE SIZE)	LOAD		LOAD	CONDUIT IN (TRADE SIZE)	WIRE AWG	TRIP	POLE	LOAD SERVED	CKT. No.
	1	EXISTING A/C TEMP RECEPT	2	50	(E)	(E)	5000		3500	(E)	(E)	40	2	EXISTING A/C TEMP RECEPT	2
	3														4
	5	EXISTING ATM	1	20	(E)	(E)	500							SPACE	6
(1)	7	NEW CHILLER CONTROL PANEL	1	20	#12	3/4"	540							SPACE	8
	9	SPACE												SPACE	10
	11	SPACE												SPACE	12
	13	SPACE												SPACE	14
	15	SPACE												SPACE	16
	17	SPACE												SPACE	18
	19	SPACE												SPACE	20
	21	SPACE												SPACE	22
	23	SPACE												SPACE	24

TOTAL CONNECTED LOAD: 9720 VA (27A)

(1) PROVIDE NEW C.B AS SHOWN.
(E) DENOTES EXISTING.

GENERAL ELECTRIC

MOUNTING: SURFACE
SHORT CIRCUIT RATING: 10K
LOCATION: AUDITORIUM MECHANICAL / ELECTRICAL ROOM

EXISTING PANEL "1LC"

VOLTS: 120/208V, , 3Ø, 4W
MAIN BUS AMPS: 60A.
MAIN BREAKER AMPS: 100 A

	CKT. No.	LOAD SERVED	POLE	TRIP	WIRE AWG	CONDUIT IN (TRADE SIZE)	LOAD		LOAD	CONDUIT IN (TRADE SIZE)	WIRE AWG	TRIP	POLE	LOAD SERVED	CKT. No.
	1	EXISTING GENERAL RECEPTACLE	1	20	(E)	(E)	720		100	1/2"	#12	20	1	NEW SF-1	2 (1)
	3	EXISTING FRONT STAGE LIGHTS	1	20	(E)	(E)	300		4000	(E)	(E)	40	2	EXISTING A/C	4
	5	EXISTING FRONT STAGE LIGHTS	1	20	(E)	(E)	400								6
	7	EXISTING AUDIO-VIDEO EQUIPMENT	1	20	(E)	(E)	250		720	(E)	(E)	20	1	EXISTING SOUTH RECEPTACLE	8
	9	EXISTING A/C CONTROL BOX	1	20	(E)	(E)	50		360	(E)	(E)	20	1	EXISTING NORTH RECEPTACLE	10
	11	EXISTING STEP LIGHTS-NORTH	1	20	(E)	(E)	500		380	(E)	(E)	20	1	EXISTING EF-1	12
	13	EXISTING STEP LIGHT SOUTH	1	20	(E)	(E)	300		200	(E)	(E)	20	1	EXISTING LIGHTS	14
	15	EXISTING LIGHT ELECTRICAL ROOM	1	20	(E)	(E)	180		540	(E)	(E)	20	1	EXISTING RECEPTACLE	16

TOTAL CONNECTED LOAD: 8900 VA (25A)

(1) PROVIDE NEW C.B AS SHOWN.
(E) DENOTES EXISTING.

GENERAL ELECTRIC

MOUNTING: SURFACE
SHORT CIRCUIT RATING: 35K
LOCATION: EXISTING MECHANICAL / GENERATOR ROOM

EXISTING MDP2

VOLTS: 277/480V
MAIN BUS AMPS: 800 A
MAIN BREAKER AMPS: 600A

	CKT. No.	EQUIPMENT PROTECTED	LOAD HP	LOAD KVA	VOLTS	Ø	POLE	C.B	WIRE (AWG) No.	WIRE (AWG) SIZE	WIRE (AWG) GRD	CONDUIT (TRADE SIZE)	REMARKS
	1	EXISTING LOAD		66	480	3	3	125					
	2	EXISTING LOAD		117	480	3	3	225					
	3	SPARE			480	3	3	125					
(1)	4	NEW CHILLER		141	480	3	3	250	SEE ELECTRICAL RISER				
	5	SPARE			480	3	3	20					
	6	SPARE			480	3	3	20					
	7	SPARE			480	3	3	20					
	8	SPARE			480	3	3	20					
	9	SPARE			480	3	3	20					
	10	SPARE			480	3	3	20					

TOTAL CONNECTED 324 KVA / 390 AMPS

(1) EXISTING C.B SPARE TO BE USED ON THIS PROJECT.

GENERAL ELECTRIC

MOUNTING: SURFACE
SHORT CIRCUIT RATING: EXISTING
LOCATION: AUDITORIUM MECHANICAL / ELECTRICAL ROOM

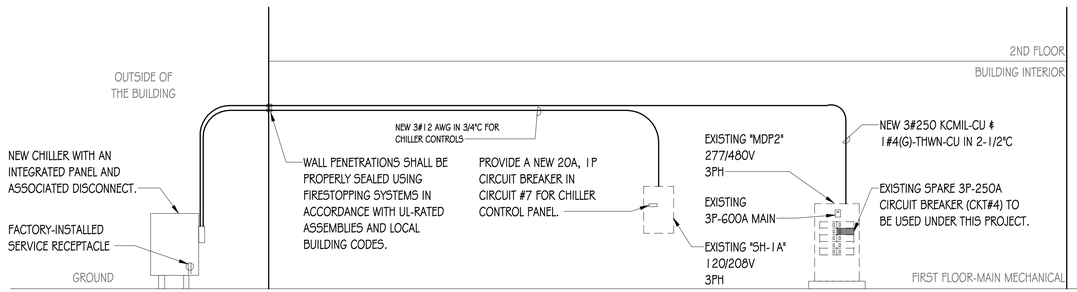
EXISTING PANEL "1HB"

VOLTS: 277/480V, , 3Ø, 4W
MAIN BUS AMPS: 100A.
MAIN BREAKER AMPS: M.L.O

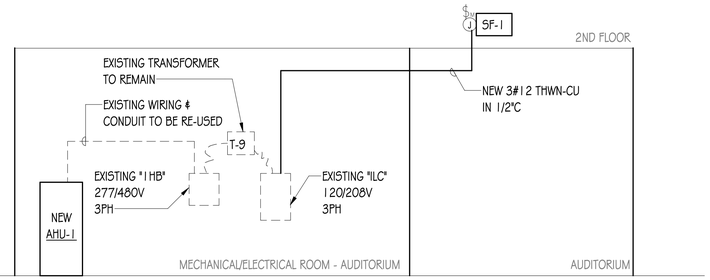
	CKT. No.	LOAD SERVED	POLE	TRIP	WIRE AWG	CONDUIT IN (TRADE SIZE)	LOAD		LOAD	CONDUIT IN (TRADE SIZE)	WIRE AWG	TRIP	POLE	LOAD SERVED	CKT. No.
	1	EXISTING BUILDING GENERAL LIGHTING	3	30	(E)	(E)	3000		1000	(E)	(E)	20	1	EXISTING GENERAL LIGHTING	2
	3								1200	(E)	(E)	20	1	EXISTING LIGHTING	4
	5								800	(E)	(E)	20	1	EXISTING LIGHTING	6
(1)	7														8
	9	NEW AHU/HEATER	3	20	#12	1/2"	9003		9000	(E)	(E)	20	3	EXISTING 9KVA TRANSFORMER	10
	11														12

TOTAL CONNECTED LOAD: 24003 VA (30A)

(1) EXISTING 3P-15A BREAKER TO BE REPLACED WITH NEW AS SHOWN. NEW BREAKER SHALL MATCH EXISTING PANEL MANUFACTURER, TYPE, AND AIC RATING
(E) DENOTES EXISTING.



1 PARTIAL ELECTRICAL RISER
1/8" = 1'-0"



CENTRAL BUS ADMINISTRATION BUILDING

CHILLER + AHU REPLACEMENT

3300 NW 32ND AVE, MIAMI, FL 33142-5729

CONSULTING ENGINEERS

1315 NW 98th Court, Unit 15
Doral, Florida 33172
Tel: (305) 418-9177
www.esiconsult.com
FIRM CERTIFICATE OF AUTHORIZATION No.: 26243

STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th ST. #108
Miami Lakes, Florida 33016

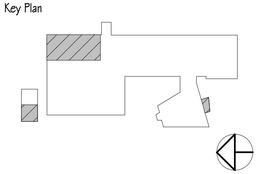
Project No.: 25-020728

Issue	Date
PERMIT SET	03/03/2026

Revisions

No.	Description	Date

Key Plan



Seal

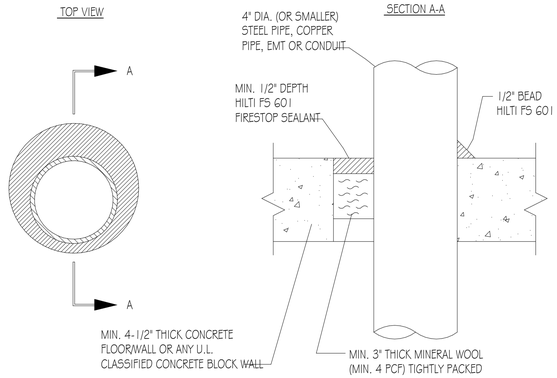
Professional of Record: MARIO D. PAZOS, P.E.
Discipline: ELECTRICAL
Registration No.: 52078

Sheet Title

ELECTRICAL RISER AND SCHEDULE

Drawing No.

E3.01



NOTES:
1. MAXIMUM DIAMETER OF OPENING = 6".
2. ANNULAR SPACE = MIN. 0" (POINT CONTACT), MAX. 2".
3. WALLS REQUIRE 1/2" OF SEALANT FLUSH WITH BOTH SIDES.

F RATING = 2-HR.
T RATING = 0-HR.

INSTALLATION INSTRUCTIONS FOR UL No. CAJ1149

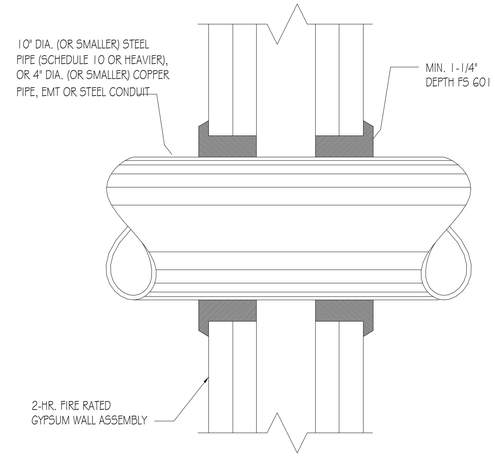
STEP 1 - PREPARATION: ALL SURFACES MUST BE CLEAN, SOUND, DRY AND FROST FREE PRIOR TO APPLICATION OF MATERIALS.

STEP 2 - BACKING MATERIAL: PACK MINERAL WOOL TIGHTLY AROUND THE PENETRATING ITEM TO THE DEPTH SHOWN IN THE DRAWINGS, AND RECESS IT BELOW THE TOP SURFACE OF THE FLOOR (OR BOTH SURFACES OF A WALL) TO ALLOW PROPER SPACE FOR THE FIRESTOP MATERIAL.

STEP 3 - FIRESTOP SEALANT: APPLY THE FIRESTOP SEALANT OVER THE BACKING MATERIAL TO THE DEPTH SHOWN. IF THE PIPE IS OFFSET TO ONE SIDE, APPLY A 1/2" BEAD OF FIRESTOP SEALANT AROUND ITS CIRCUMFERENCE WHERE IT CONTACTS THE WALL OR FLOOR. WALL PENETRATIONS REQUIRED FIRESTOP SEALANT ON BOTH SIDES. LEAVE COMPLETED SEAL UNDISTURBED FOR 48 HOURS. OR FLOOR.

D1 METAL PIPE THROUGH CONCRETE FLOOR/WALL OF BLOCK WALL

SCALE: N.T.S.



NOTE: 1. MAX. DIA. OF OPENING IS 12-1/2"
2. ANNULAR SPACE REQUIRED MIN. 1/2" TO MAX. 7/8"

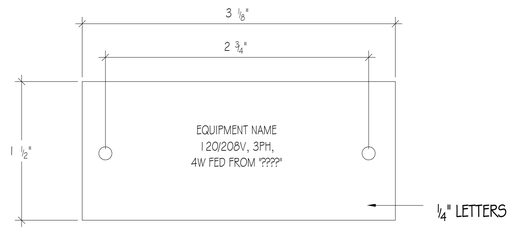
F RATING = 2-HR
T RATING = 0-HR

PROTOTYPE: HILTI

U.L. SYSTEM No. WL1054
METAL PIPE THROUGH 2-HR. GYPSUM WALL

D2 METAL PIPE THROUGH GYPSUM WALL

SCALE: N.T.S.



NOTES:

1. NAMEPLATE TO BE 1/16" WHITE PLASTIC WITH BLACK CENTER LAMINATION. FACE TO BE WHITE, ENGRAVED LETTERS TO BE BLACK.
2. SECURE NAMEPLATE TO SURFACE WITH 2 FLAT HEAD BRASS SCREWS.

D3 TYPICAL PANEL, DISCONNECT, ENCLOSED BREAKER NAMEPLATE

SCALE: N.T.S.

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Miami Lakes, Florida 33016

Project No.: 25-020728

Issue	Date
PERMIT SET	03/03/2026

Revisions

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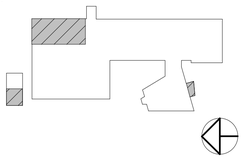
Key Plan



Seal

Professional of Record: MARIO D. PAZOS, P.E.
Discipline: ELECTRICAL
Registration No.: 52078

Sheet Title

ELECTRICAL DETAILS

Drawing No.

E4.02

1: CODES

1. FLORIDA BUILDING CODE 8TH EDITION (2023) WITH HIGH VELOCITY HURRICANE ZONE PROVISIONS.
2. AMERICAN INSTITUTE OF STEEL CONSTRUCTION "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS", AISC 360-16.
3. AMERICAN CONCRETE INSTITUTE "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE" ACI 318-19.
4. THE MASONRY SOCIETY "BUILDING CODE FOR MASONRY STRUCTURES" TMS 402-2016.
5. MINIMUM DESIGN LOADS AND ASSOCIATED CRITERIA FOR BUILDINGS AND OTHER STRUCTURES "ASCE 7-22'

2: MATERIALS

UNLESS OTHERWISE SHOWN OR NOTED ON DRAWINGS:

1. CAST-IN-PLACE CONCRETE*:
   - 1.1. CONCRETE CURB: 4 KSI NORMAL WT.
   - 1.2 *WATER/CEMENT RATIO = 0.4
2. REINFORCEMENT:
   - 2.1. DEFORMED BARS: ASTM A615, GRADE 60
   - 2.2. WELDED WIRE FABRIC: ASTM A185.
3. WELDING ELECTRODES: E70XX LOW HYDROGEN.
4. BOLTING MATERIALS: ASTM A325 OR A490, U.O.N.

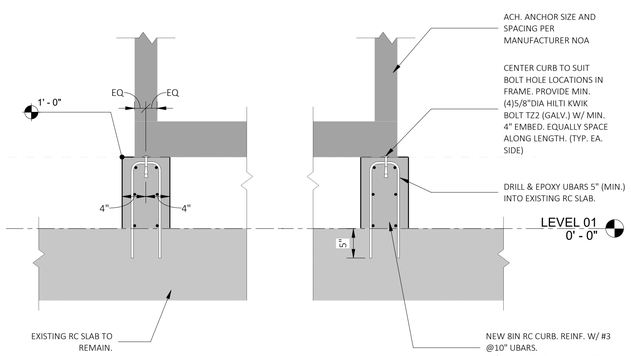
3: GENERAL

1. NOTIFY THE ARCHITECT AND ENGINEER OF RECORD OF ANY DISCREPANCIES OR INCONSISTENCIES BETWEEN ARCHITECTURAL, MEP AND THE STRUCTURAL DRAWINGS.
2. ENGINEERING REQUIREMENTS FOR CONTRACTOR U.O.N. ON PLANS SHALL BE AS FOLLOWS:
   - 2.1 ALL DRAWINGS ENGINEERED BY THE CONTRACTOR SHALL MAINTAIN THE DESIGN INTENT OF THE ARCHITECTURAL DRAWINGS.
   - 2.2 DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER OF RECORD AND ARCHITECT FOR REVIEW TO ENSURE COMPATIBILITY WITH THE BASE STRUCTURE AND LOADING REQUIREMENTS SET FORTH IN THE MAIN STRUCTURAL DRAWINGS.
   - 2.3 THE CONTRACTOR'S ENGINEER SHALL BE A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF FLORIDA.
   - 2.4 ALL EXTERIOR STUD WALLS, EXTERIOR SOFFIT FRAMING, CURTAIN WALLS, CLADDING, VENEER AND GLAZING SHALL BE ENGINEERED BY THE CONTRACTOR. ALL MECHANICAL EQUIPMENT/DUCT WORK/PIPING ETC SUPPORTING FRAMING AT ROOF LEVEL TO BE DESIGN BY THE GC. REFER TO MEP DRAWINGS FOR LOCATIONS AND SUPPORT REQUIREMENTS.
   - 2.5 ALL INTERIOR CEILING SYSTEMS, HANGING CHANDELIERS, SIGNAGE, ETC., SHALL BE ENGINEERED BY THE CONTRACTOR.
   - 2.6 ALL METAL OR PRECAST STAIRS AND LANDINGS SHALL MAINTAIN THE DESIGN INTENT ON THE ARCHITECTURAL DRAWINGS AND STRUCTURAL DRAWINGS AND SHALL BE ENGINEERED BY THE CONTRACTOR.
3. DO NOT SCALE DRAWINGS.
4. SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR WATERPROOFING AND FIREPROOFING INFORMATION.
5. SPECIFIC PLAN NOTES, SECTIONS OR DETAILS SHALL TAKE PRECEDENCE OVER THE GENERAL NOTES AND TYPICAL DETAILS.
6. VISITS BY THE STRUCTURAL ENGINEER TO THE JOB SITE SHALL NOT INCLUDE INSPECTIONS OF SHORING, BRACING OR MEANS AND METHODS OF PROTECTING THE STRUCTURE (NEW OR EXISTING) DURING CONSTRUCTION.
7. THE STRUCTURAL DRAWINGS DEPICT THE FINISHED STRUCTURE. SHORING, BRACING AND PROTECTION OF EXISTING AND ADJACENT STRUCTURES DURING CONSTRUCTION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND ARE NOT INDICATED IN THE STRUCTURAL DRAWINGS.
8. ALL EXISTING DIMENSIONS AND LOCATIONS OF EXISTING STRUCTURES SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY FIELD MEASUREMENTS, ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.
9. DEFICIENT WORK SHALL BE REPLACED OR REPAIRED, AS DETERMINED BY THE ENGINEER, AT NO COST TO OWNER, INCLUDING ENGINEERING COSTS INCURRED.
10. SHOP DRAWINGS SHALL BE SUBMITTED ELECTRONICALLY IN PDF FORMAT TO THE STRUCTURAL ENGINEER FOR REVIEW AND ACCEPTANCE PRIOR TO THE START OF WORK. ALLOW FOR A MINIMUM OF FIVE DAYS FOR THE ENGINEER'S REVIEW. ONCE ELECTRONIC REVIEW IS COMPLETE, TWO HARD COPIES OF THE REVIEWED SHOP DRAWINGS SHALL BE SEND TO GMG FOR STAMPING AND ISSUE TO THE BUILDING DEPARTMENT
11. SPECIAL INSPECTION SHALL BE REQUIRED FOR THE FOLLOWING STRUCTURAL WORK:
    - 11.1 SOIL COMPACTION, STEEL BOLTED AND WELDED CONNECTIONS, REINFORCED MASONRY

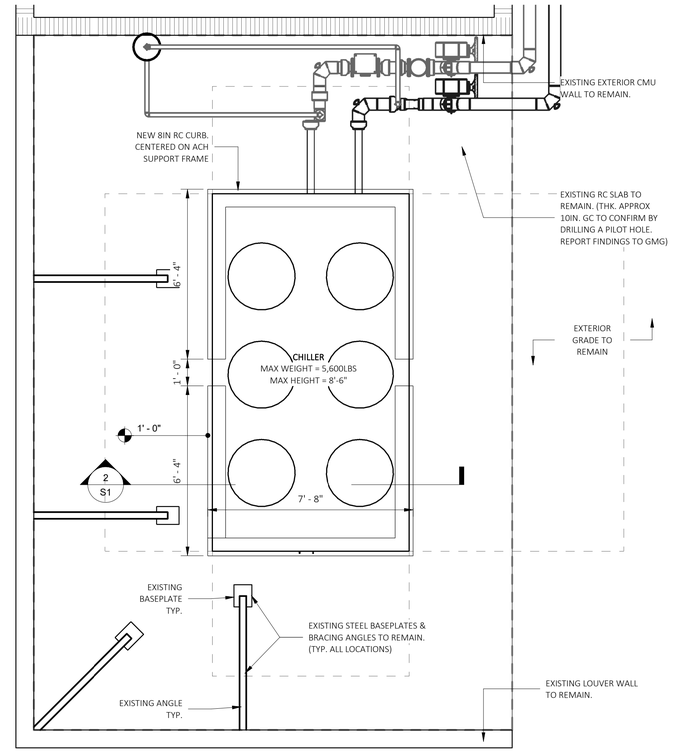
7. LOADING INFORMATION

1. WIND LOADING
   - 1.1 CRITERIA

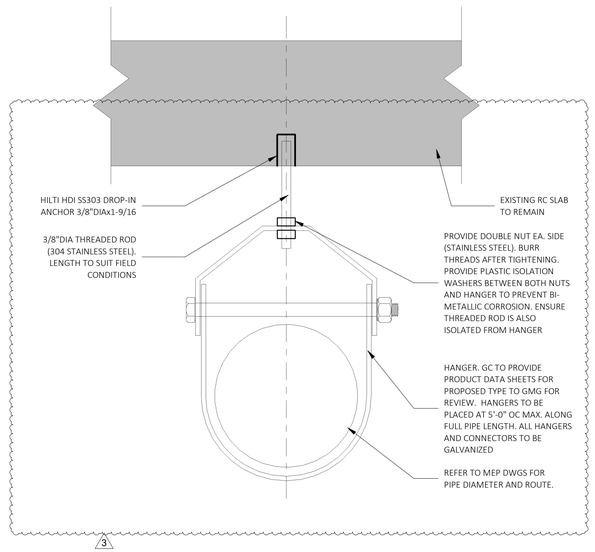
WIND LOAD CRITERIA		
1.	DESIGN CODE	ASCE 7-22
2.	DESIGN WIND SPEED	175 MPH
	FBC 2023 8TH EDITION	
3.	IMPORTANCE FACTOR	1.0
4.	BUILDING CATEOGRY	II
5.	EXPOSURE TYPE	C
6.	GUST EFFECT (RIGID STRUCTURE)	0.85
7.	TOPOGRAPHICAL FACTOR, Kzt	1.0
8.	DIRECTIONALITY FACTOR, Kd	0.85
9.	h, MEAN ROOF HEIGHT	15'-0"
10.	a =	7'-0"



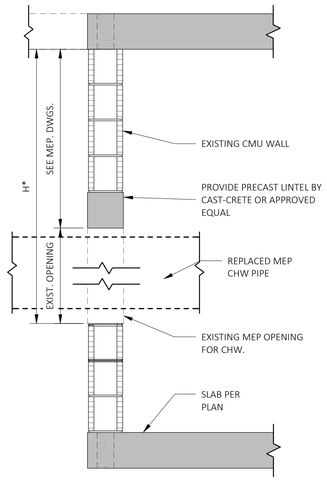
2 NEW CURB SECTION
1" = 1'-0"



1 CHILLER LAB CURB FRAMING PLAN
3/8" = 1'-0"



4 HANGER DETAIL
3" = 1'-0"



3 EXTERIOR EXISTING OPENING - CMU LINTEL RETROFIT
3/4" = 1'-0"

CENTRAL BUS ADMINISTRATION BUILDING

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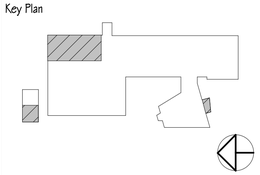
STRUCTURAL ENGINEERING CONSULTANT:
GARCIA MULLIN GROUP
7900 NW 155th Street #108
Miami Lakes, Florida 33016

Issue	Date
PERMIT SET	09/16/2025

Revisions

No.	Description	Date
2	BLDG DPT COMMENTS	02.13.2026
3	OWNER CHANGES	03.03.2026

Key Plan



Seal

Sheet Title

NOTES, PLANS AND SECTION

Drawing No.

S1

STRUCTURAL CALCULATIONS

MIAMI DADE COUNTY

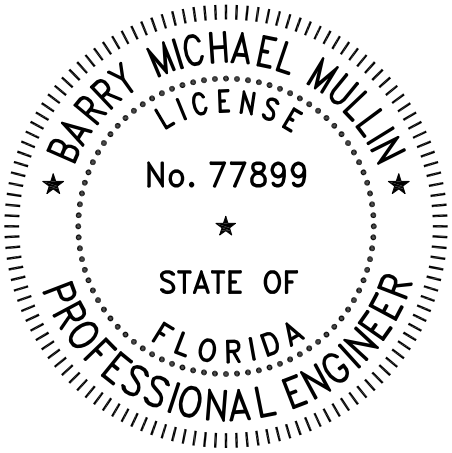
CENTRAL BUS ADMINISTRATION BUILDING – CHILLER ANCHORAGE

CLIENT

ESI CONSULTING ENGINEERS

PREPARED BY: Garcia Mullin Group, LLC
PROJECT NAME: BUS ADMIN CHILLER
PROJECT #: 25607

TABLE OF CONTENTS



This item has been digitally signed and sealed by Barry Mullin, PE on the date shown above using a Digital Signature. Printed copies of this document are not considered signed and sealed and SHA authentication code must be verified on electronic copies.

Barry Mullin

Digitally signed by Barry Mullin
DN: CN=Barry Mullin, dnQualifier=A01410D000001 8ECF059EE0000B6347, O=GARCIA MULLIN GROUP, C=US
Reason: I am approving this document
Date: 2025.09.03 18:14:49-04'00'

BARRY MULLIN

FLORIDA P.E. #77899

STRUCTURAL CALCULATIONS

FOR

BUS ADMIN CHILLER

GMG STRUCTURAL
7900 NW 155TH ST
MIAMI LAKES, FL 33016
786.646.2344

Code Search

Code: Florida Building Code 2023

Occupancy:

Occupancy Group = I Institutional

Risk Category & Importance Factors:

Risk Category =	IV	0
Wind Factor =	1.00	
Snow Factor	1.00	
Seismic Importance factor =	1.50	

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	0.00 / 12	0.0 deg
Building length	110.0 ft	
Least width	110.0 ft	
Mean Roof Ht (h)	45.0 ft	
Parapet ht above grd	0.0 ft	
Minimum parapet ht	0.0 ft	
hb for Elevated bldg	0.0 ft	

Live Loads:

Roof
0 to 200 sf: 20 psf
200 to 600 sf: 24 - 0.02Area, but not less than 12 psf
over 600 sf: 12 psf

Roofs used for roof gardens 100 psf

Floor:

Typical Floor	50 psf
Partitions	15 psf
Corridors above first floor	80 psf
Lobbies & first floor corridors	100 psf
Stairs and exit ways	100 psf

GMG STRUCTURAL
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JOB TITLE BUS ADMIN CHILLER

JOB NO. 25067 **SHEET NO.**
CALCULATED BY **DATE**
CHECKED BY **DATE**

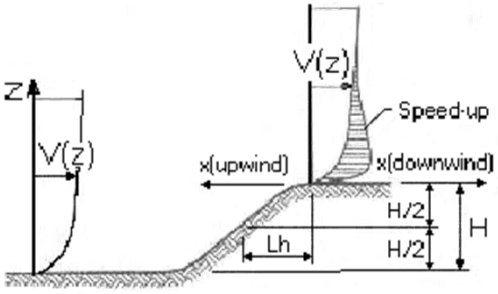
Wind Loads : ASCE 7 - 22

Ultimate Wind Speed	185 mph
Nominal Wind Speed	143.3 mph
Risk Category	IV
Exposure Category	C
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Bldg Directionality (Kd)	0.85
Kh MWFRS<=60	1.065
Kh all other	1.065
Type of roof	Monoslope

Topographic Factor (Kzt)

Topography		Flat
Hill Height	(H)	0.0 ft
Half Hill Length (Lh)		0.0 ft
Actual H/Lh	=	0.00
Use H/Lh	=	0.00
Modified Lh	=	0.0 ft
From top of crest: x =		0.0 ft
Bldg up/down wind?		downwind

H< 15ft;exp C
∴ Kzt=1.0

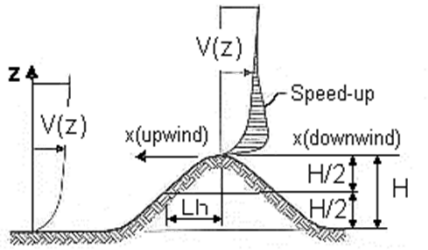


ESCARPMENT

H/Lh= 0.00 K_1 = 0.000
x/Lh = 0.00 K_2 = 0.000
z/Lh = 0.00 K_3 = 1.000

At Mean Roof Ht:

$Kzt = (1+K_1K_2K_3)^2$ = 1.00



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

h =	45.0 ft
B =	110.0 ft
/z (0.6h) =	27.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).
If building h/B>4 then may be flexible and should be investigated.
h/B = 0.41 Rigid structure (low rise bldg)

G = 0.85 Using rigid structure default

Rigid Structure

$\bar{e}$ =	0.20
ℓ =	500 ft
z_{min} =	15 ft
c =	0.20
g_Q, g_v =	3.4
L_z =	480.3 ft
Q =	0.87
I_z =	0.21
G =	**0.86** use G = 0.85

Flexible or Dynamically Sensitive Structure

Natural Frequency (η_1) =	0.7 Hz			
Damping ratio (β) =	0.01			
/b =	0.660			
/α =	0.156			
Vz =	173.6			
N_1 =	1.94			
R_n =	0.091			
R_h =	0.616	η =	0.835	h = 45.0 ft
R_B =	0.372	η =	2.041	
R_L =	0.136	η =	6.833	
g_R =	4.104			
R =	1.111			
Gf =	1.228			

GMG STRUCTURAL
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MIAMI LAKES, FL 33016
786.646.2344

JOB TITLE BUS ADMIN CHILLER

JOB NO. 25067 **SHEET NO.**
CALCULATED BY **DATE**
CHECKED BY **DATE**

Ground Elevation Factor (Ke)

Grd level above sea level = 0 ft
Constant = 0.00256
0.00256Ke = 0.00256

Ke = 1.0000

Enclosure Classification

Test for Enclosed Building: Ao < 0.01Ag or 4 sf, whichever is smaller

Test for Open Building: All walls are at least 80% open.
Ao ≥ 0.8Ag

Test for Partially Enclosed Building: Predominately open on one side only

	Input			Test	
Ao	500.0	sf	Ao ≥ 1.1Aoi	NO	
Ag	600.0	sf	Ao > 4' or 0.01Ag	YES	
Aoi	1000.0	sf	Aoi / Agi ≤ 0.20	YES	Building is NOT
Agi	10000.0	sf			Partially Enclosed

Conditions to qualify as Partially Enclosed Building. Must satisfy all of the following:
Ao ≥ 1.1Aoi
Ao > smaller of 4' or 0.01 Ag
Aoi / Agi ≤ 0.20
Where:
Ao = the total area of openings in a wall that receives positive external pressure.
Ag = the gross area of that wall in which Ao is identified.
Aoi = the sum of the areas of openings in the building envelope (walls and roof) not including Ao.
Agi = the sum of the gross surface areas of the building envelope (walls and roof) not including Ag.

Test for Partially Open Building: A building that does not qualify as open, enclosed or partially enclosed.
(This type building will have same wind pressures as an enclosed building.

Reduction Factor for large volume partially enclosed buildings (Ri) :

If the partially enclosed building contains a single room that is unpartitioned , the internal pressure coefficient may be multiplied by the reduction factor Ri.

Total area of all wall & roof openings (Aog): - SF
Unpartitioned internal volume (Vi) : - CF
Ri = 1.00

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JOB TITLE BUS ADMIN CHILLER
JOB NO. 25067 **SHEET NO.**
CALCULATED BY **DATE**
CHECKED BY **DATE**

Ultimate Wind Pressures

Wind Loads - Components & Cladding : h ≤ 60'

Base pressure (qh) =	93.3 psf	Kh =	1.065	
(Kd qh) =	**79.3 psf**	h =	45.0 ft	0.2h = 9.0 ft
Minimum parapet ht =	0.0 ft	0.6h =	27.0 ft	
Roof Angle (θ) =	0.0 deg	GCpi =	+/-0.18	
Type of roof =	Monoslope	qi = qh =	79.3 psf	

Roof

	GCp +/- Gcpi				Surface Pressure (psf)				User input	
Area	10 sf	100 sf	500 sf	1000 sf	10 sf	100 sf	500 sf	1000 sf	80 sf	200 sf
Negative Zone 1	-1.88	-1.47	-1.18	-1.18	-149.1	-116.4	-93.6	-93.6	-119.6	-106.6
Negative Zone 1'	-1.08	-1.08	-0.73	-0.58	-85.7	-85.7	-57.9	-46.0	-85.7	-73.7
Negative Zone 2	-2.48	-1.95	-1.58	-1.58	-196.7	-154.7	-125.3	-125.3	-158.8	-142.0
Negative Zone 3	-3.38	-2.32	-1.58	-1.58	-268.1	-184.1	-125.3	-125.3	-192.2	-158.8
Positive All Zones	0.48	0.38	0.38	0.38	38.1	30.1	30.1	30.1	30.9	30.1
Overhang Zone 1&1'	-1.70	-1.60	-1.00	-1.00	-134.8	-126.9	-79.3	-79.3	-127.7	-106.4
Overhang Zone 2	-2.30	-1.59	-1.10	-1.10	-182.4	-126.4	-87.3	-87.3	-131.8	-109.5
Overhang Zone 3	-3.20	-1.96	-1.10	-1.10	-253.8	-155.8	-87.3	-87.3	-165.3	-126.3

Overhang pressures in the table above assume an internal pressure coefficient (Gcpi) of 0.0
Overhang soffit pressure equals adj wall pressure (which includes internal pressure of 14.3 psf)

Parapet

Kd qp = 0.0 psf

	Surface Pressure (psf)						User input
Solid Parapet Pressure	10 sf	20 sf	50 sf	100 sf	200 sf	500 sf	80 sf
CASE A: Zone 2 :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zone 3 :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CASE B: Interior zone :	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Corner zone :	0.0	0.0	0.0	0.0	0.0	0.0	0.0

wall a = 11.0 ft

Walls

	GCp +/- GCpi				Surface Pressure at h				User input	
Area	10 sf	100 sf	200 sf	500 sf	10 sf	100 sf	200 sf	500 sf	28 sf	80 sf
Negative Zone 4	-1.17	-1.01	-0.96	-0.90	-92.8	-80.2	-76.4	-71.4	-87.3	-81.4
Negative Zone 5	-1.44	-1.12	-1.03	-0.90	-114.2	-89.0	-81.4	-71.4	-103.1	-91.4
Positive Zone 4 & 5	1.08	0.92	0.87	0.81	85.7	73.1	69.3	64.2	80.1	74.3

Note: GCp reduced by 10% due to roof angle <= 10 deg.

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786.646.2344

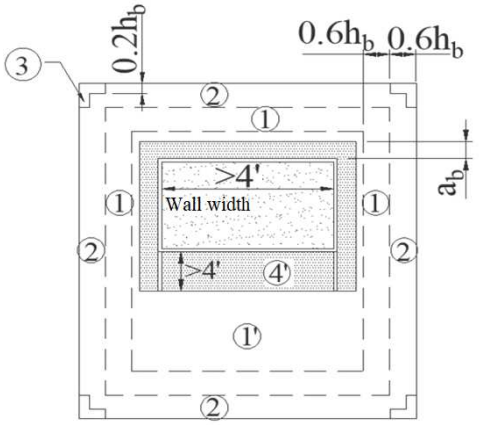
JOB TITLE BUS ADMIN CHILLER
JOB NO. 25067 SHEET NO.
CALCULATED BY DATE
CHECKED BY DATE

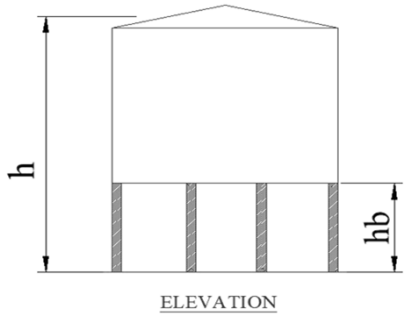
Bottom Horizontal Surface of Eleveated Buildings

Base pressure (qh) =	1.07	h =	45.0 ft	0.2hb =	0.00
(Kd qh) =	**79.3 psf**	hb =	0.0 ft	0.6hb =	0.00
Wall width =	5.0 ft			ab =	0.00

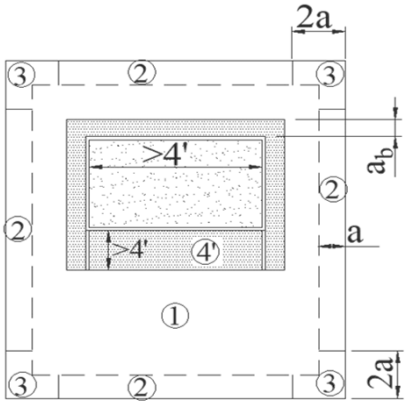
	GCp				Surface Pressure (psf)				User input	
Area	10 sf	100 sf	500 sf	1000 sf	10 sf	100 sf	500 sf	1000 sf	80 sf	200 sf
Negative Zone 1	-1.70	-1.29	-1.00	-1.00	-149.1	-116.4	-93.6	-93.6	-119.6	-106.6
Negative Zone 1'	-0.90	-0.90	-0.55	-0.40	-85.7	-85.7	-57.9	-46.0	-85.7	-73.7
Negative Zone 2	-2.30	-1.77	-1.40	-1.40	-196.7	-154.7	-125.3	-125.3	-158.8	-142.0
Negative Zone 3	-3.20	-2.14	-1.40	-1.40	-268.1	-184.1	-125.3	-125.3	-192.2	-158.8
Positive Zones 1-3	0.30	0.20	0.20	0.20	38.1	30.1	30.1	30.1	30.9	30.1
Negative Zone 4'	-0.99	-0.83	-0.72	-0.72	-92.8	-80.2	-71.4	-71.4	-81.4	-76.4
Positive Zone 4'	0.90	0.74	0.63	0.63	85.7	73.1	64.2	64.2	74.3	69.3

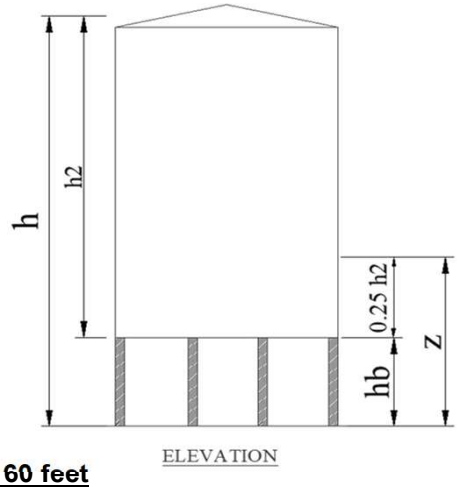
Negative pressures are downward





Building Bottom Plan: h ≤ 60' and alternate design 60'<h<90'





Building Bottom Plan: h> 60 feet

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JOB TITLE BUS ADMIN CHILLER

JOB NO. 25067 **SHEET NO.**
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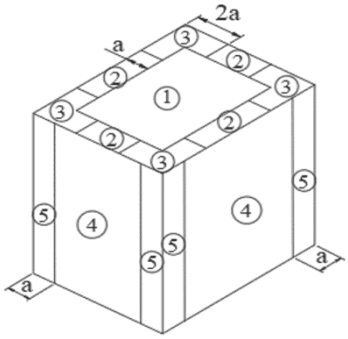
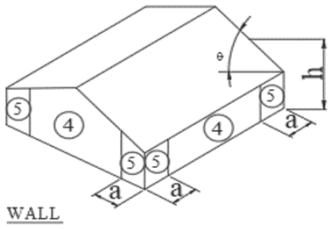
CHECKED BY **DATE**

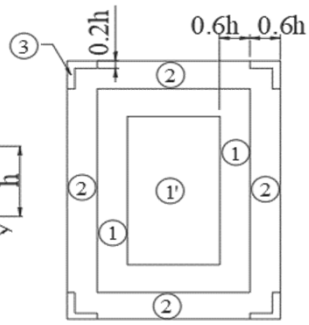
Location of C&C Wind Pressure Zones - ASCE 7-22



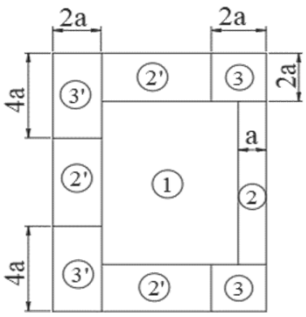
Roofs w/ θ ≤ 10°
and all walls
h > 60'



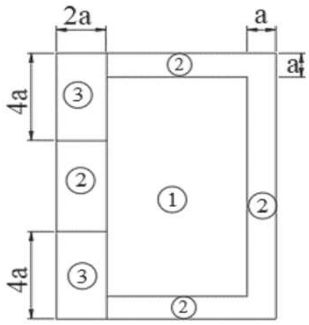
Walls h ≤ 60'
& alt design h<90'



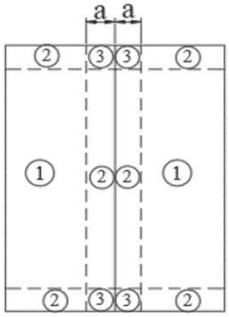
Multispan Gable & Sawtooth ≤ 10°
& Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'



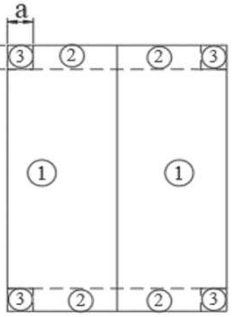
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



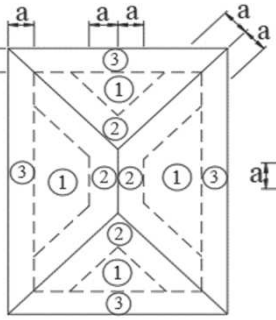
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'



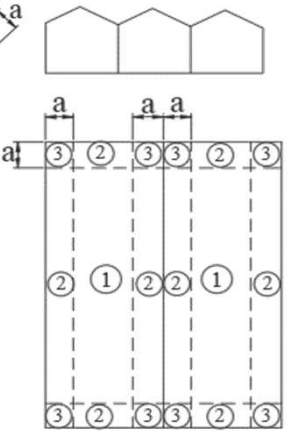
Gable 7° < θ ≤ 27°



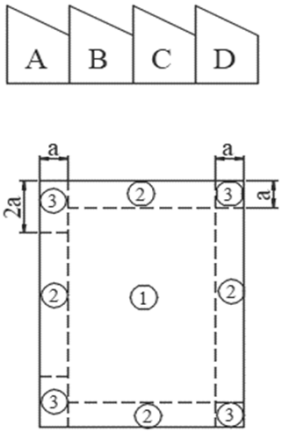
Gable 27° < θ ≤ 45°



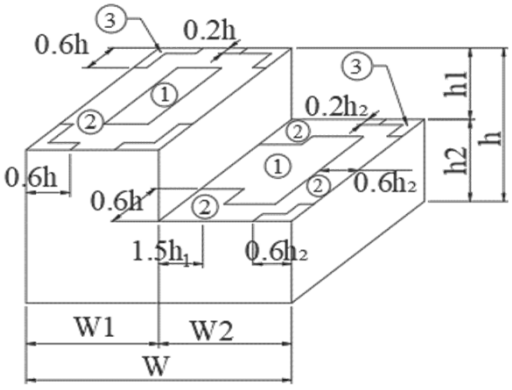
Hip 7° < θ ≤ 45°

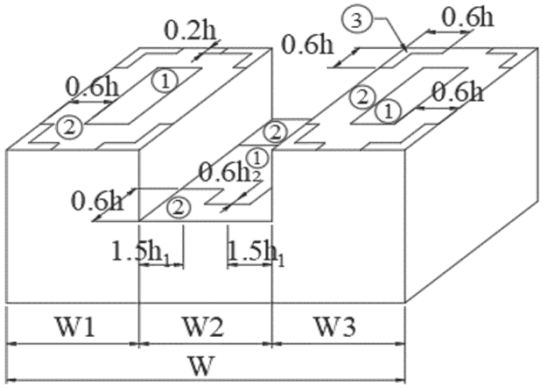


Multispan gable 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'



Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'





Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

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JOB TITLE BUS ADMIN CHILLER

JOB NO. 25067 **SHEET NO.**
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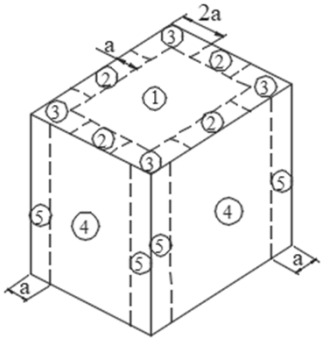
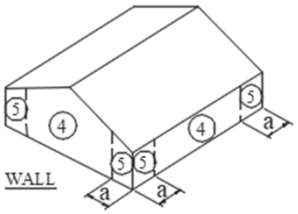
CHECKED BY **DATE**

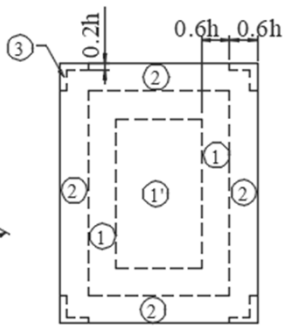
Location of C&C Wind Pressure Zones - ASCE 7-16

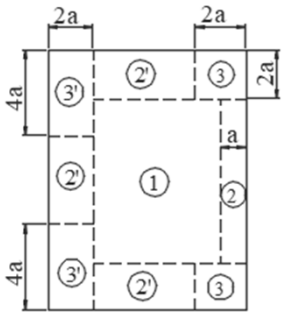


Roofs w/ θ ≤ 10°
and all walls
h > 60'



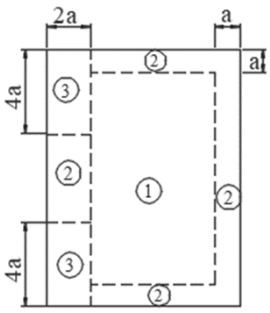
Walls h ≤ 60'
& alt design h<90'



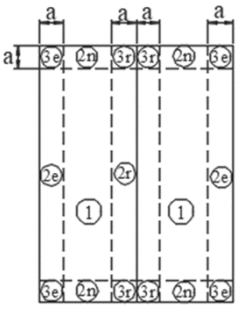


Multispan Gable & Sawtooth ≤ 10°
and Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'

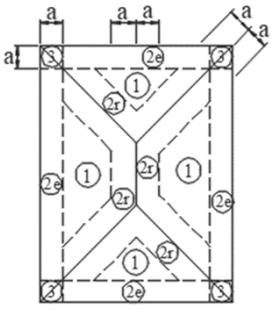
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



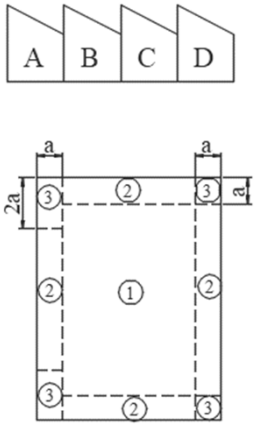
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'



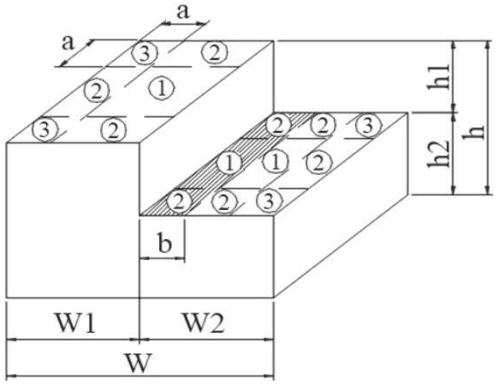
Multispan Gable > 10°
& Gable 7° < θ ≤ 45°



Hip 7° < θ ≤ 27°

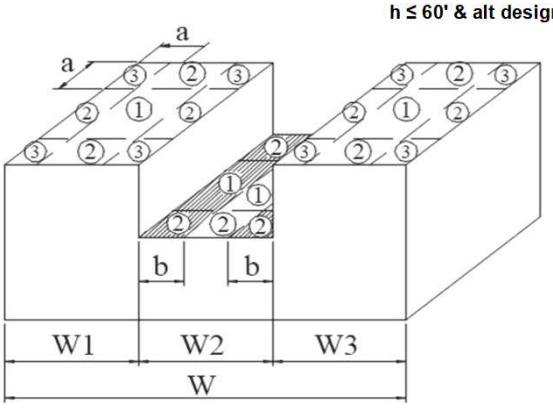


Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'



Note: The hatched area indicates where roof positive pressures are equal to the adjacent wall positive pressure.

Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

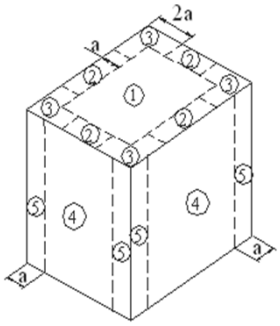


Note: The stepped roof zones above are as shown in ASCE 7-16 . Prior editions didn't show zones, but the notes sent you to the low slope gable figure. The note in ASCE 7-16 still sends you to the low slope gable figure, but for some reason the zones shown are per editions prior to ASCE 7-16. Therefore, the above zones may be a code mistake and the correct zone locations may be per the low slope gable roof shown at the top of this page.

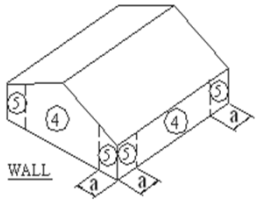
GMG STRUCTURAL
7900 NW 155TH ST
MIAMI LAKES, FL 33016
786.646.2344

JOB TITLE	BUS ADMIN CHILLER		
JOB NO.	25067	**SHEET NO.**	
CALCULATED BY		**DATE**	
CHECKED BY		**DATE**	

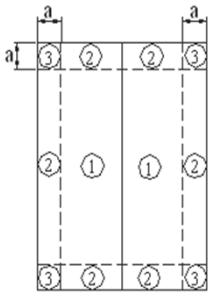
Location of C&C Wind Pressure Zones - ASCE 7-10 & earlier

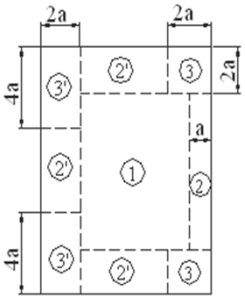


Roofs w/ θ ≤ 10°
and all walls
h > 60'



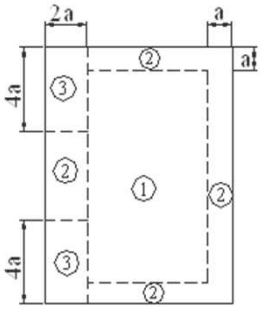
Walls h ≤ 60'
& alt design h<90'



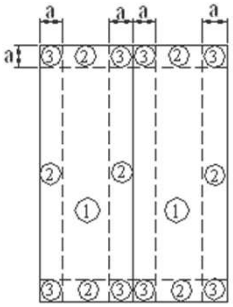


Gable & Sawtooth ≤ 10 degrees
& Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'

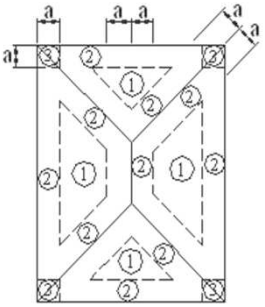
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



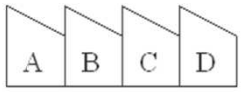
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'

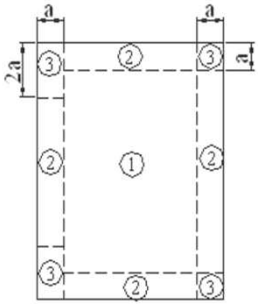


Multispan Gable > 10°
& Gable 7° < θ ≤ 45°

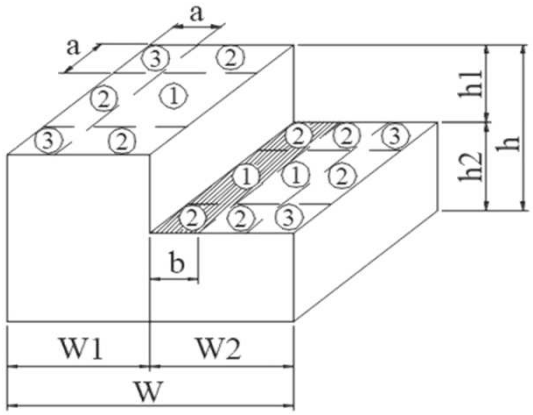


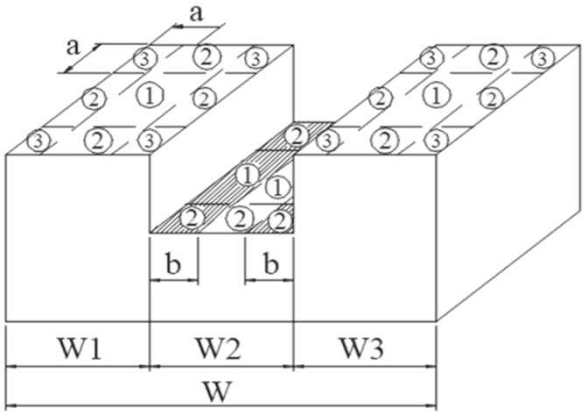
Hip 7° < θ ≤ 27°





Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'





Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

Note: The hatched area indicates where roof positive pressures are equal to the adjacent wall positive pressure.

GMG
STRUCTURAL ENGINEERS
8181 NW 154TH STREET, SUITE 247
MIAMI LAKES, FL, 33016
T: 786.646.2344
JORGE GARCIA - FLORIDA P.E. No. 74028
BARRY MULLIN - FLORIDA P.E. No. 77899

JOB #: 25067	PAGE:
INITIALS: BMM	DATE: 9.3.25

PROJECT: BUS ADMIN

TITLE: ANCHOR SIZE & SPACING

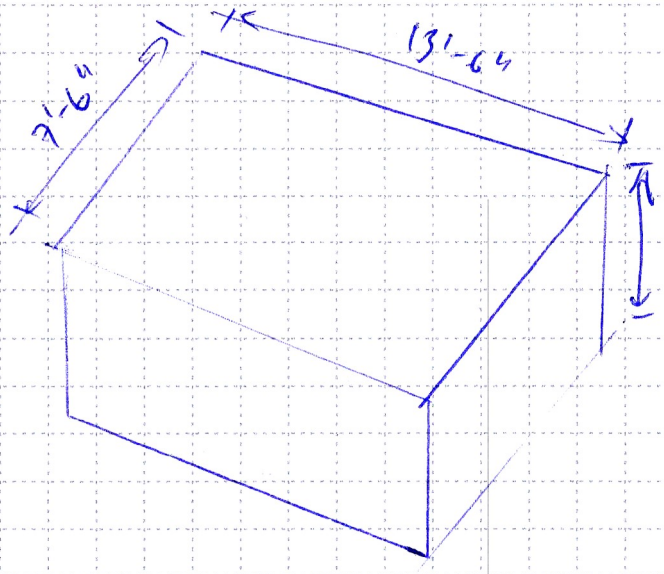
LOADING

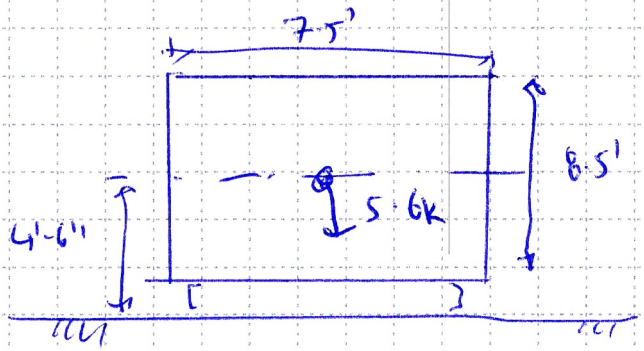
☐ SELF WEIGHT OF CHILLER = 5,600 LBS

☐ WIND

SPEED = 185
RISK CAT. = IV
EXP = C

SEE STRUWARE OUTPUT
WIND = 100 PSF (ULTIMATE)





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JOB #: 25067	PAGE:
INITIALS: BMM	DATE: 9.3.25

PROJECT: BUS. ADMIN.

TITLE: ANCHOR SIZE & SPACING

$M_{OT} = 100 \times 8.5' \times 13.5' \times 4.5'$
$= 51,637$ FT LBS

$M_{RESIST} = 5600 \times 3.75'$
$= 21,000$ FT LBS

O.T. FACTOR OF SAFETY = 1.5

$M_{OT\ FACT} = 1.5 \times 51,637$
$= 77,455$

ADDED ANCHORAGE REQUIRED $= 77,455 - 0.9(21,000)$
$= 58,555$ FT LBS

FORCE REQD $= 58555 / 7.5'$
$= 7807$ LBS
$= 7.8$ K

SAY 4 ANCHORS PER SIDE

$= 2.0$ K / ANCHOR

PROVIDE (4) 5/8" DIA HILTI KWIK BOLT TZ2 W/ 4" EMBED.

TENSION CAPACITY / BOLT = 4,570 LB