& L #	And Metal Angle At Pound or Number
A, AMP AB A/C ACOUS ACT ACU ADDN ADDN'L ADJ AFF AHU ALT ALUM ANCH ANOD ARCH	Ampere or Amperage Anchor Bolt Air Conditioning Acoustical Acoustical Ceiling Tile Air Conditioning Unit Addition Additional Adjustable Above Finish Floor Air Handling Unit Alternate Aluminum Anchor, Anchorage Anodized Architect, Architectural
BD BIT BLDG BLK(G) BM BM BOT BRG BRK BSMT BUR	Board Bituminous Building Blocking Beam Bench Mark Bottom Bearing Brick Basement Built Up Roof
C CAB CD CEF CEM CFM CG CHP CI CJ CKT CLG C CLR CMU CO CONC CONC CONC CONST CONT CONT CONT CONT CONT CONT CONT CCT CT CT CT CT CT CT CT CT CT CT CT C	Course Cabinet Condensate Drain Ceiling Exhaust Fan Cement Cubic Feet Per Minute Corner Guard Cabinet Heat Pump Cast Iron Control Joint Circuit Ceiling Center Line Clear Concrete Masonry Unit Clean Out Column Concrete Connection Construction Construction Contract(or) Condensate Pump Carpet Ceiling Register Ceramic Tile Center Cabinet Unit Heater Cold Water
D DBL DET DF DIA DIM DISP	Diffuser Double Detail Drinking Fountain Diameter Dimension Dispenser
DL DN DO DP DR DWG	Dead Load ^L Down Ditto Distribution Point Door Drawing

E EA EB EF EJ EL ELEC ELEV EMERG ENCL ENGR EP EQ EWC Cooler EXH EXIST EXP EXT	East Each Electric Baseboard Exhaust Fan Expansion Joint Elevation Electrical Elevator Emergency Enclosure Engineer Electrical Panel Equal Electric Water Exhaust Exhaust Existing Expansion Exterior
FA FACP FC(U) FD FDN FE FEC FEC FF FLUOR FOS FOR FPRF(G) FR FT FTG FURN FURR	Fire Alarm Fire Alarm Control Panel Fan Coil Unit Floor Drain Foundation Fire Extinguisher Fire Extinguisher & Cabinet Finished Floor Fluorescent Fuel Oil Supply Fuel Oil Return Fireproofing Frame Foot, Feet Footing Furnish(ed) Furring
GA GALV GB GC GFI GL GND GR GYP	Gauge, Gage Galvanized Gypsum Board General Contractor Ground Fault Interrupter Glass, Glazing Ground Grade Gypsum
HB HDWD HDWE HGT HID HM HORIZ HP WASH HTG HTR HVAC HVU HW HWH HZ	Hose Bibb Hard Wood Hardware Height High Intensity Discharge Hollow Metal Horizontal High Point, Horse POWER & EYE Heating Heater Heat, Vent, & A/C Heating & Vent. Un Hot Water Hot Water Heater Hertz
ID IN INCAND INCL INS INT INV	Inside Diameter Inch Incandescent Include(d), (ing) Insulate(d), (ing) Interior Invert

IN JB, JBOX Junction Box JST JT Joist Joint

ABBREVIATIONS Kip (1,000 lbs) K-FT Kip Feet KVA Kilovolt Amps KW Kilowats LAM Laminated LAV Lavatory LB Pound LCC Lead Coated Copper IF Linear Feet Left Hand LH Live Load

LP

LT(G)

LVL

Lighting Panel

Lighting

Laminated

Veneer Lumber MAS Masonry MAX Maximum MCM Metal Composite Material MDP Main Distribution Panel MECH Mechanical MED Medium MEMB Membrane MET Metal MFR Manufacturer MIN Minimum MISC Miscellaneous MO Masonry Opening MR Moisture Resistant MTD Mounted North NIC Not In Contract NOM Nominal NTS Not To Scale O/A Outdoor Air OC On Center OD Outside Diameter OPG Opening OPP Opposite ΟZ Ounce PA Public Address Pounds Per Cubic PCF Foot PERF Perforated PG Paint Grade Plate PL PLAM Plastic Laminate PLAS Plaster PLBG Plumbing PLYWD Plywood PNL Panel POL Polished PP POWER & EYE WASH Panel PR Pair PRTN Partition PSF Pounds Per Square Foot PSI Pounds Per Square Inch PΤ Paint/ Painted ΡV Plumbing Vent PVMT Pavement QT Quarry Tile QTY Quantity Riser, Register R/ A Return Air RAD Radius RCP Reinforced Concrete Pipe RD Roof Drain **RECPT** Receptacle RE Recycle

RESIL Resilient RET REV Return Revisions, Revised RFG Roofing RH Right Hand RM Room RO Rough Opening RPM Revolutions Per Minute RWL Rain Water Leader RV Roof Vent South S/ A Supply Air S&R Supply & Return SAFB Sound Attenuating Fiber Blanket SAN Sanitary SCHED Schedule SERV Service SF Square Feet SGFT Structural Glazed Facing Tile SHT Sheet SIM SP Similar Static Pressure SPEC Specifications SQ Square SS Stainless Steel ST Storm STD Standard STL Steel STRUCTStructural SW, SW BD Switch, Switch Board SWGR Switchgear SYM Symmetrical Tread, Thermostat TBH Thousand BTU per Hour T&B Top & Bottom T&G Tongue & Groove T/F Top of Frame T/ M Top of Masonry T/ S Top of Steel T/W Top of Wall TEL or TELE Telephone TEMP Temperature THK Thick(ness) THRES Threshold TR Trash TRANS Transformer TYP Typical UG Under Ground UH Unit Heater UON Unless Otherwise Noted UNO Unless Noted Otherwise UV Unit Ventilator Vent, Volt Variable Air Volume AV VCT Vinyl Composition Tile VERT Vertical VENT Ventilator VHP Vertical Heat Pump VIF Verify in Field VIN Vinyl VWC Vinyl Wallcovering Watts, West WB Wet Bulb W/ With W/O Without WC Water Closet WD Wood WP Waterproof WR Water Resistant Wains Wainscot

WT Weight

YD Yard

WWF Welded Wire Fabric

MATERIALS LEGEND METALS EXISTING TO REMAIN, UON ITEM TO BE REMOVED, I____ UON WOOD FRAMING \searrow WOOD FRAMING BLOCKING FINISHED WOOD **GRAPHIC LEGEND** XXX ROOM NUMBER XX DOOR NUMBER INTERIOR ELEVATIONS (XXX) 2- ELEVATION ID SHEET ON WHICH **ELEVATION APPEARS** $\langle \! \times \! \rangle$ WINDOW TYPE XX WORK SCOPE NOTE Δ REVISION MARK Ĵ ACCESSIBILITY SYMBOL - ELEVATION ID SHEET ON WHICH ELEVATION APPEARS **BUILDING SECTION** - SECTION ID SHEET ON WHICH SECTION APPEARS WALL SECTION - SECTION ID SHEET ON WHICH SECTION APPEARS COLUMN LINE GRID (A)-----(1)----- REFERENCE POINT WALL TYPE

RHODE ISLAND STATE BUILDING CODE INFORMATION:	7,440 sqft / 150 = 50 people	RE	QUIRED	PROVIDED
2018 RHODE ISLAND BUILDING CODE	Business: (50 people)			
2018 RHODE ISLAND MECHANICAL CODE	Male Water Closets (25p)			
2018 RHODE ISLAND PLUMBING CODE	1 per 25 for first 50 =1 1 per 50 for remainder exceeding 50 =0	Total=	1	2
RHODE ISLAND STATE FIRE SAFETY CODE (RISFSC) 2018 International Fire Code	Female Water Closets (25p)			
2018 NFPA 1, Fire Code	1 per 50 for remainder exceeding 50 =0	Total=	1	2
2018 NFPA 101, Life Safety Code	Male Lavatories (25p)			
RHODE ISLAND FIRE PREVENTION CODE (RIFPC) 2019 NEPA 1 Uniform Fire Code w/ 2015 RISESC regulations	1 per 40 for the first 80 =1	Totol	4	2
	Eemale Lavatories (25p)	iotai=	I	Z
	1 per 40 for the first $80 = 1$			
	1 per 80 for remainder exceeding 80 =0	Total=	1	2
	Shower - not required		0	0
	Drinking Fountains			
	1 per 100 = 1		1	1
	Service sinks		1	1

REF

REQ

Reference

REINF Reinforce(d), (ing)

Required

REFIN Refinish

RL Roof Leader

THROUGH MEMBER

STATE OF RHODE ISLAND

1330 Main Street

100% CONSTRUCTION DOCUMENT SET

ARCHITECTS: 650 Ten Rod Road North Kingstown, RI 02852

> 141 INDUSTRIAL DRIVE SLATERSVILLE, RI 02876 v: 401.765.7659





GENERAL DEMOLITION NOTES

1. SEE PROJECT MANUAL, MEP & FP DRAWINGS FOR ADDITIONAL INFORMATION AND COORDINATION.

2. CONTRACTOR SHALL COORDINATE ALL ARCHITECTURAL, MECHANICAL, AND PLUMBING DEMOLITION DRAWINGS PRIOR TO COMMENCEMENT OF DEMOLITION.

3. DRAWINGS DO NOT PURPORT TO SHOW ALL OBJECTS EXISTING AT THE SITE. BEFORE WORK IS TO COMMENCE, CONTRACTOR TO FIELD VERIFY ALL (V.I.F.) EXISTING CONDITIONS AND ELEMENTS TO BE PRESERVED AND REPORT TO THE ARCHITECT ANY DISCREPANCIES OR QUESTIONABLE ITEMS FOR DISCREPANCY RESOLUTION.

4. DEMOLITION OF UTILITIES TO BE INVESTIGATED AS TO SOURCE AND LAST SERVICE PRIOR TO DEMOLITION.

5. THE CONTRACTOR SHALL USE ALL MEANS NECESSARY TO PROTECT AND PRESERVE EXISTING CONDITIONS AND OBJECTS DESIGNATED TO REMAIN. IN THE EVENT OF DAMAGE, IMMEDIATELY MAKE ALL REPAIRS AND REPLACEMENTS NECESSARY.

6. PRIOR TO COMMENCING THE WORK, THE CONTRACTOR SHALL REVIEW EXISTING UTILITIES AT THE SITE AND DETERMINE METHODS FOR DISCONNECTING, CAPPING REMOVING OR PROTECTING SAME, IN ACCORDANCE WITH THE REQUIREMENTS OF THE UTILITY COMPANY.

7. THE CONTRACTOR SHALL REMOVE, RE-ROUTE AND/OR CAP OFF ALL UNUSED UTILITIES COMING INTO THE SPACE. ALL EXISTING UTILITIES SHALL BE CAPPED OFF OUTSIDE OF BUILDING - SEE MECHANICAL, ELECTRICAL,

8. NOTIFY THE ARCHITECT AT LEAST (2) TWO FULL DAYS PRIOR TO COMMENCING DEMOLITION WORK.

9. PATCH ALL HOLES IN REMAINING CONSTRUCTION WITH NEW MATERIALS THAT MATCH EXISTING. (INCLUDING PIPE HOLES, CONDUIT HOLES, ETC.)

10.DEMOLISHED PLUMBING FIXTURES ARE TO INCLUDE ALL WATER AND WASTE LINES, ALL FLANGES AND

11.THE CONTRACTOR SHALL TAKE CARE TO PREVENT DAMAGE TO EXISTING ITEMS TO REMAIN. ALL CUTTING IN WALLS/SLAB TO REMAIN SHALL BE DONE WITH MINIMAL DAMAGE TO ADJACENT AREAS/SURFACES.

12.PROVIDE TEMPORARY SHORING AS REQUIRED AT ALL DEMOLITION AREAS THAT REMOVE EXISTING

13.THE CONTRACTOR IS RESPONSIBLE FOR SITE SAFETY INCLUDING TEMPORARY FLOOR AND RAILINGS AT ALL NEWLY CREATED FLOOR OPENINGS.

14. CONTRACTOR TO VISIT SITE TO DETERMINE MAKE-UP OF ITEMS TO BE REMOVED, AND APPROPRIATE METHODS FOR THEIR REMOVAL.

15.COORDINATE ANY SITE EXCAVATION DUE TO NEW WASTE/SEWER/WATER LINES WITH PLUMBING

16. DEMOLITION CONTRACTOR SHALL PROVIDE WALL & FLOOR PROTECTION AS REQUIRED TO NOT DAMAGE

17. RETURN ALL REUSABLE DEMOLISHED ITEMS TO OWNER U.O.N. OR AS PER OWNER'S INSTRUCTIONS.

18. ALL ITEMS TO REMAIN SHALL BE LEFT IN 'AS FOUND'

19. REMOVE ALL DOORS & FRAMES & WALL MTD ACCESSORIES FROM REMOVED PARTITIONS.

LEGEND

ITEM TO REMAIN

DEMOLITION KEY NOTES

REMOVE FLOORING, CEILING AND LIGHT FIXTURES IN THIS AREA

3 REMOVE ALL PLUMBING FIXTURES & WALL/FLOOR MTD ACCESSORIES

PROJECT NORTH

NORTH

GENERAL NOTES

- 1. SEE PROJECT MANUAL, MEP & FP DRAWINGS FOR ADDITIONAL INFORMATION AND COORDINATION.
- 2. ALL CONTRACTORS SHALL CONFIRM CLEARANCES NEEDED TO INSTALL THEIR WORK PRIOR TO PROCEEDING. CONTACT ARCHITECT FOR DISCREPANCY **RESOLUTION.**
- 3. ALL NEW & EXISTING FLOOR PENETRATIONS SHALL BE SMOKE TIGHT.

CONSTRUCTION NOTES

1. ALL INTERIOR STUD PARTITIONS SHALL BE TYPE 1 UNLESS OTHERWISE NOTED

2. ALL INTERIOR PARTITIONS TO EXTEND TO UNDERSIDE OF ROOF DECKING. ALL STRUCTURAL PENETRATIONS THROUGH WALLS SHALL BE ACOUSTICALLY SEALED.

3.PROVIDE BLOCKING FOR ALL WALL MOUNTED MILLWORK.

REFLECTED CEILING NOTES

- 1. ALL LIGHT FIXTURES & CEILING GRIDS SHALL BE CENTERED IN ROOMS UON.
- 2. ALL ACP SHALL BE ACP-1 UON.
- **3. CENTER ALL CEILING MOUNTED OBJECTS** IN CEILING PANEL/PATTERN UON.
- 4. HANGERS SHALL BE SECURELY ATTACHED TO STRUCTURE ABOVE, WIRE HANGERS SHALL NOT BE LESS THAN 12 GA. AND SHALL BE SADDLE TIED TO MAIN RUNNERS.
- 5. ALL EQUIPMENT ITEMS SHALL BE INDEPENDENTLY SUSPENDED AND NOT CONNECTED TO THE CEILING GRID.
- 6. CEILING SUSPENSION SYSTEM SHALL NOT BE USED TO SUPPORT LIGHT FIXTURES, DUCTWORK, PIPING, ETC.





KEY PLAN



COLLABORATIVE ARCHITECTS 650 Ten Rod Road North Kingstown, RI 02852

v: 401.846.9583

Mechanical/Electrical/Plumbing Engineers: Engineering Design Services, Inc. 141 Industrial Drive PO Box 986 Slatersville, Rhode Island 02876 Phone: (401) 765-2984

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REVISIONS:

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	ACCESSORY SCHEDULE
ACC #	DESCRIPTION
T-1 T-2 T-3 T-4 T-5 T-6 T-7 T-8 T-9	GRAB BARS MIRROR PAPER TOWEL DISPENSER SOAP DISPENSER TOILET PAPER HOLDER WASTE RECEPTACLE COAT HOOK BABY CHANGING TABLE HAND DRYER

NOTE:

- SEE A-000 FOR MOUNTING HEIGHTS.

- ANCHOR ALL TOILET ACCESSORIES INTO SOLID WOOD BLOCKING. - SOAP DISPENSERS ARE PROVIDED BY OWNER AND TO BE

INSTALLED BY GC.





	DET/	AILS		
		[]		
E L	FIRE RATING (MIN.)	SIGNAGE	REMARKS	M R
		STORAGE	PAINT DOOR AND FRAME	
		STORAGE	PAINT DOOR AND FRAME	
		JAN CL	PAINT DOOR AND FRAME	
		EMPLOYEE LAVATORY	PAINT DOOR AND FRAME	
		LAVATORY	PAINT DOOR AND FRAME	
		LAVATORY	PAINT DOOR AND FRAME	
		FAMILY LAVATORY	PAINT DOOR AND FRAME	
		BREAK ROOM	PAINT DOOR AND FRAME	<u></u> Э Г

GENERAL FINISH NOTES		LEGE
1. PAINT ALL SOFFITS, FASCIAS, CEILING RETURNS, AND GWB CEILINGS.	P1	GENE (ALL S
2. PAINT ALL EXPOSED METAL TRIM, METAL DECK, METAL STRUCTURE, EXPOSED DUCTWORK AND OTHER EXPOSED ITEMS NOT INCLUDED IN THE SCHEDULE.	P4	COLO DOOF COLO
3. PAINT ALL NEW HOLLOW METAL DOORS AND FRAMES.		EXIST TO RE
4. APPLY RUBBER BASE ON ALL BASE CABINETS.		RUBE
5. ALL BIDDERS TO NOTIFY ARCHITECT OF ANY SURFACE WITHOUT A FINISH PRIOR TO SUBMITTING BID.		
SUBMITTED FINISH BIDS IMPLY ALL EXPOSED SURFACES HAVE FINISH U.O.N.		12 X 2 FLOC
		CARF

		WA	LLS				REMARK
	EAST		SOUTH		WEST		
H MATERIAL	SUBSTRATE	FINISH MATERIAL	SUBSTRATE	FINISH MATERIAL	SUBSTRATE	FINISH MATERIAL	
PAINT	EXIST. GB	PAINT	EXIST. GB	PAINT	EXIST. GB	PAINT	
PAINT	EXIST. GB/ GB	PAINT	EXIST. GB/ GB	PAINT	EXIST. GB/ GB	PAINT	REMOVE EXISTING TILE. P
FRP	EXIST. GB	FRP	EXIST. GB	FRP	GB	FRP	
PAINT	EXIST. GB	PAINT	GB	TILE	EXIST. GB	PAINT	REMOVE EXISTIN
PAINT	GB	PAINT	-	-	EXIST. GB	PAINT	REMOVE EXISTIN
PAINT	EXIST. GB/ GB	PAINT	EXIST. GB/ GB	PAINT	GB	TILE	REMOVE EXISTIN
PAINT	GB	PAINT	GB	PAINT	EXIST. GB	TILE	REMOVE EXISTIN
PAINT	GB	PAINT	-	-	GB	PAINT	REMOVE EXISTIN
PAINT	EXIST.GB / GB	PAINT	EXIST.GB/ GB	PAINT	GB	TILE	REMOVE EXISTIN
PAINT	EXIST. GB	PAINT	EXIST. GB/ GB	PAINT	GB	PAINT	

ERAL PAINT COLOR SURFACES, UON): .OR: TBD

OR & FRAMES DR: TBD

TING FLOOR EMAIN

BER TILE

X 24 PORCELAIN OR TILE

RPET TILE

NORTH
PROJECT NORTH

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KEY PLAN

NORT COLLA ARCHI 650 Ten North Ki v: 401.8 Mechar Enginee 141 Indu PO Box Slatersv Phone:	ing Design Services, Inc. Ustrial Drive 986 idle, Rhode Island 02876 (401) 765-2984
BATHROOM RENOVATIONS	STATE OF RHODE ISLAND DEPARTMENT OF LABOR & TRAINING 1330 MAIN STREET WEST WARWICK, RI 02893
REVISIO	DNS:
SC DE W DATE: NCA JO	CHEDULES, ETAILS AND ALL TYPES 06.09.2023 B NO.: 22330

DRAWING NO.:

A-80²

			ABBRE	VIATION	IS		
GENERAL AB	BREVIATIONS:			CONTROL	S ABBREVIATIONS:		
AAV	AUTOMATIC AIR VENT	L		ACD	AUTOMATIC CONTROL DAMPER	LSPS	LOW STATIC PRESSURE SWITCH
ADD'L AFF	ADDITIONAL ABOVE FINISHED FLOOR	LAI	LEAVING AIR TEMPERATURE		AUTOMATIC CONTROL VALVE	LS	LEVEL SENSOR
AMS	AIR FLOW MEASURING STATION	LF	LINEAR FEET	ALM	ALARM	MD	MOTORIZED DAMPER
ALT	ALTITUDE OR ALTERNATE	LD		ATC	AUTOMATIC TEMPERATURE CONTROL		
AP	AMPERE ACCESS PANEL	LVD	LOUVERED DOOR	AIS	AIR TEMPERATURE SENSOR	NO	NORMALLY OPEN (POWER LOS
APD	AIR PRESSURE DROP	LVG	LEAVING	BD	BACKDRAFT DAMPER		
ARCH		LWT	LEAVING WATER TEMPERATURE	BV	BYPASS VALVE	OAH	
ATM	ATMOSPHERE	MAX	MAXIMUM	CO2	CARBON DIOXIDE SENSOR		OUTSIDE AIR TEMI : SENSOR
AVG	AVERAGE	MBH	THOUSAND BTH	CO	CARBON MONOXIDE SENSOR	RH	RELATIVE HUMIDITY
חחא		MCA MD	MINIMUM CIRCUIT AMPS	CT	CURRENT TRANSFORMER	S	SWITCH
BG	BLAST GATE DAMPER	MECH	MECHANICAL			SP	STATIC PRESSURE SENSOR
BHP	BRAKE HORSEPOWER	MEZZ	MEZZANINE	DDC	DIRECT DIGITAL CONTROL	SD	SMOKE DETECTOR
BLDG	BACKWARDS INCLINED	MER MIN	MANUFACTURER	DPS	DIFFERENTIAL PRESSURE SWITCH	SPD S/S	SPEED CONTROL START/STOP
BMS	BUILDING MANAGEMENT SYSTEM	MUA	MAKE-UP AIR	DPV	DIFF. PRESSURE BYPASS VALVE		
BOD	BOTTOM OF DUCT			DSD	DUCT MOUNTED SMOKE DETECTOR	T	
BSMT	BASEMENT	N/A NC	NOT APPLICABLE NORMALLY CLOSED		DOOBLE WIDTH DOOBLE INLET	13	TEMPERATURE SENSOR
BTU	BRITISH THERMAL UNIT	NC	NOISE CRITERIA	ES	END SWITCH	WTS	WATER TEMPERATURE SENSOR
BTH	BTU PER HOUR	NIC	NOT IN CONTRACT				
CA	COMPRESSED AIR	NO No	NURMALLY OPEN NUMBER	FZ	FLOW METER/TRANSMITTER		
CDW	CONDENSER WATER	NOM	NOMINAL				
CENT		NTS	NOT TO SCALE	H Heda			
CF CFM	CUBIC FEET PER MINITE	\cap		HGB	HOT GAS BYPASS		
CL	CENTERLINE	OD	OUTSIDE DIAMETER	HHL	HIGH HUMIDITY LIMIT SENSOR		
C.L.	COLUMN LINE	ODP	OPEN DRIP PROOF	HOA	HANDS-OFF AUTOMATIC SWITCH		
CND		OED		HZ	HUMIDITY SENSOR HERTZ		
C.O.	CLEAN-OUT	ΟV	OUTLET VELOCITY				
CO	CARBON MONOXIDE	PD	PRESSURE DROP				
CO2		PH	PHASE				
CONN	CONNECTION	PHC PRG	PREHEAT COIL PLUMBING			CMC	
CONTR	CONTRACTOR	POS	PROVIDED BY OTHER SECTION		AC CONDENSING UNIT	GIVIS GUH	GAS FIRED UNIT HEATER
CV	CONSTANT VOLUME	PSI	POUNDS PER SQUARE INCH	AHU	AIR HANDLING UNIT	0011	
NR		PSIA	PSI ABSOLUTE	AS	AIR SEPARATOR	Н	HUMIDIFIER
DB	DRI BOLD TEMPERATURE	PSIG	PSI DIFFERENTIAL PSI GAUGE	В	BOILER	HP	HEAT PUMP HP CONDENSING LINIT
DEG	DEGREE DIRECT	PVC	POLYVINYL CHLORIDE	BB	BASE BOARD	HV	HEATING & VENTILATING UNIT
DDC	DIGITAL CONTROL	PRV	PRESSURE REDUCING VALVE	BC	BRANCH CONTROLLER	HWC	HOT WATER COIL
DIA	DIAMETER	ΟΤΥ	OLIANTITY	BP BT	BOILER PUMP	IV	
DIM	DIMENSION	GII			DOTTER TANK	LV	LOOVER
DN	DOWN	R	RADIUS	CAC	CRITICAL COOLING AC UNIT	KEF	KITCHEN EXHAUST FAN
	DIFFERENTIAL PRESSURE	RA			COOLING COIL	ΜΔΠ	
DX	DIRECT EXPANSION	REG	RETURN	CEF	CEILING EXHAUST FAN	MCC	MOTOR CONTROL CENTER
		REQD	REQUIRED	СН	CHILLER	_	
EA	EACH OR EXHAUST AIR	RH		CP		P	
ECH	ELECTRIC CABINET HEATER	RLA	REFRIGERANT LIQUID LINE		CABINET UNIT HEATER	FIAC	PACKAGED TERMINAL AC UNIT
EFF	EFFICIENCY	RM	ROOM	CWC	CHILLED WATER COIL	R	RETURN GRILLE
ELEC	ELECTRICAL	RPM	REVOLUTIONS PER MINUTE			REF RHP	ROOF EXHAUST FAN
EMER	EMERGENCY	ROL	REFRIGERANT SUCTION LINE	DEF	DISHWASHER EXHAUST FAN	RTU	ROOF TOP UNIT
EMS	ENERGY MANAGEMENT SYSTEM	SA	SUPPLY AIR	DSF	DESTRATIFICATION FAN	_	
ENT		SCH	SCHEDULE			S SA	
ESP EWT	EXTERNAL STATIC PRESSURE ENTERING WATER TEMPERATURE	SD	SMOKE DETECTOR		EXHAUST GRILLE FLECTRIC BASE BOARD	SAC	SOUND ATTENDATOR SPLIT AC UNIT
EXH	EXHAUST	SHC	SENSIBLE HEAT CAPACITY	ECH	ELECTRIC CABINET HEATER	SHP	SPLIT HEAT PUMP
EXIST.	EXISTING	SP	STATIC PRESSURE		ELECTRIC CEILING HEATER	SF	SUPPLY FAN
F	FAHRENHEIT OR FAN	SPECS	SPECIFICATIONS		ΈλΠΑŬST FAN ENERGY RECOVERY VENTILATOR	т	TRANSFER GRILLE
FA	FREE AREA	SG	SQUARE FEET	ET	EXPANSION TANK		
FD	FIRE DAMPER (ACCESS DOOR)	SS	STAINLESS STEEL	EUH	ELECTRIC UNIT HEATER	UH	
FLA FLFX	FULL LOAD AMPS FLEXIBLE	STL	STEEL	F	FURNACE	υv	UNIT VENTILATOR
FPM	FEET PER MINUTE	SUP SWSI	SUPPLI SINGLE WITH SINGLE INLET	FC	FAN COIL UNIT	VAV	VARIABLE AIR VOLUME BOX
FPS	FEET PER SECOND	0.00		FPB	FAN POWERED VAV	VFD	VARIABLE FREQUENCY DRIVE
FRP	FIBERGLASS REINFORCED PLASTIC	T	TEMPERATURE		FINTUBE	WSHP	
го FT	FLOW SWITCH FEET	TEL				VVOI II	WATER SOURCE HEAT PUMP
FTR	FINNED TUBE RADIATION		TOT. ENGLOSED FAN COOLED				
_		TSTAT	THERMOSTAT				
G	GAS	TOD	TOP OF DUCT				
GAL	GALLONG GALVANIZED						
GC	GENERAL CONTRACTOR	тот	TOTAL				
GPH	GALLONS PER HOUR	TSP	TOTAL STATIC PRESSURE				
GHM GWB	GALLONS PER MINUTE GYPSUM WALL ROARD	TYP	TYPICAL				
511D	STI SOM WALL BOAND	V	VENT				
НВ	HOSE BIBB	VВ	VACUUM BREAKER				
HC		VD	VOLUME DAMPER				
HGT	HEIGHT	V VEI	VOLTS (ELECTRICAL)				
HP	HORSEPOWER	VEL	VELUGITY				
HR	HOUR	W	WIDTH OR WATT				
HTG HW/		W/					
nvv HZ	HERTZ	WB					
		WG	WATER GOLUWIN WATER GAUGE				
ID	INSIDE DIAMETER	WMS	WIRE MESH SCREEN				
A L	INCHES	W/O	WITHOUT				
IIN							
K/W	κιι οωάττ	WPD	WATER PRESSURE DROP				

AIR DEVICES	DUCT	WORK	CONTROLS
4-WAY SUPPLY DIFFUSER	STANDARD SIZE REDUCTION	DUCT RISE	THERMOSTAT
3-WAY SUPPLY DIFFUSER	ASYMMETRICAL	DUCT DROP	TS TEMPERATURE SENSOR
2-WAY SUPPLY DIFFUSER	SQUARE-TO-ROUND	STANDARD SQUARE ELBOW	DSD DUCT MOUNTED SMOKE DETECTOR
2-WAY CORNER SUPPLY DIFFUSER	STANDARD BRANCH TAKE-OFF	SQUARE ELBOW WITH TURNING VANES	AIR DAMPERS
1-WAY SUPPLY DIFFUSER	ROUND BRANCH TAKE-OFF	STANDARD RADIUS ELBOW (R=D)	MANUALLY ADJUSTABLE VOLUME DAMPER
RETURN REGISTER	STANDARD TEE	FIRE WRAPPED	FIRE DAMPER
EXHAUST REGISTER	STANDARD TEE WITH TURNING VANES	ACOUSTICALLY LINED	
SIDE WALL SUPPLY		OPEN ENDED DUCT	TAGS
SIDE WALL RETURN OR EXHAUST GRILLE	GRE DAMPER ACCESS DOOR	OPEN ENDED DUCT	CFM
	GREASE DUCT ACCESS DOOR	OPEN ENDED DUCT	X EQUIPMENT TAG
LEGEND NOTE: NOT ALL SYMBOLS ARE NECESSA	ARILY	OPEN ENDED DUCT	

GENERAL CONSTRUCTION NOTES:

- ALL WORK IS TO BE PERFORMED IN STRICT COMPLIANCE WITH LOCAL CODES AND ALL OTHER REGULATIONS GOVERNING WORK OF THIS NATURE.
- 2. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK, MATERIALS, AND LABOR TO SATISFY A COMPLETE WORKING SYSTEM WHETHER SPECIFIED OR IMPLIED.
- THIS CONTRACTOR, PRIOR TO SUBMITTING HIS BID, SHALL VISIT THE PROJECT SITE TO FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS. REQUESTS FOR COMPENSATION FOR EXTRA WORK, WHICH WOULD HAVE BEEN EVIDENT BY COMPLIANCE WITH THE PREVIOUS STATEMENT, WILL NOT BE CONSIDERED. THE CONTRACTOR SHALL CONDUCT A THOROUGH FIELD INVESTIGATION TO VERIFY WORK SHOWN ON THE DRAWINGS. THE DRAWINGS REFLECT THE BEST AVAILABLE INFORMATION FROM EXISTING PLANS AND SITE INVESTIGATIONS. THE MECHANICAL PLANS ARE INTENDED TO BE DIAGRAMMATIC AND ARE BASED ON ONE MANUFACTURER'S EQUIPMENT. THEY ARE NOT INTENDED TO SHOW THE EXACT ROUTING
- OF SYSTEMS OR LOCATION OF COMPONENTS. THE EXACT LOCATIONS, DIMENSIONS AND ALL OTHER DETAILS OF EQUIPMENT ARE THE RESPONSIBILITY OF THIS CONTRACTOR. THIS CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSIONS OF THE EQUIPMENT PROPOSED TO ENSURE THAT THE EQUIPMENT WILL FIT IN THE AVAILABLE SPACE. PROVIDE ALL DUCT AND PIPE TRANSITIONS REQUIRED FOR CONNECTION TO EQUIPMENT.
- THIS CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO PROCEEDING WITH ANY WORK. WHERE DISCREPANCIES OCCUR BETWEEN THESE DOCUMENTS AND EXISTING CONDITIONS, THE DISCREPANCY SHALL BE REPORTED TO THE OWNER AND/OR ENGINEER FOR EXPEDITING AND RESOLVE.
- ALL WORK SHALL BE PERFORMED IN A CLEAN AND WORKMANLIKE MANNER. CARE SHALL BE EXERCISED TO MINIMIZE ANY INCONVENIENCE OR DISTURBANCE TO OTHER AREAS OF THE BUILDING WHICH ARE TO REMAIN IN OPERATION. ISOLATE WORK AREAS BY MEANS OF TEMPORARY PARTITIONS AND/OR TARPS TO KEEP DUST AND DEBRIS WITHIN THE CONSTRUCTION AREA.
- CLEAN THE JOB SITE DAILY AND REMOVE FROM THE PREMISES ANY DIRT AND DEBRIS CAUSED BY THE PERFORMANCE OF THE WORK INCLUDED IN THIS CONTRACT.
- ALL OPENINGS IN WALLS SHALL BE KEPT PROPERLY SEALED AT ALL TIMES, EXCEPT WHEN BEING WORKED ON TO PRECLUDE THE POSSIBILITY OF FLOODING DUE TO STORM OR OTHER CAUSES.

GENERAL RENOVATION NOTES:

- ALL SHUT DOWNS OF EXISTING SYSTEMS SHALL BE SCHEDULED AND APPROVED BY THE OWNER PRIOR TO COMMENCING WITH WORK.
- NO DUCTWORK, PIPING, EQUIPMENT, ETC. SHALL BE REMOVED, DISCONNECTED, OR SHUT DOWN WITHOUT PRIOR REVIEW WITH THE OWNER AND/OR ENGINEER TO CONFIRM THAT AREAS TO REMAIN IN OPERATION WILL NOT BE AFFECTED. IF ANY AREAS NOT WITHIN THE SCOPE OF WORK ARE AFFECTED BY ANY SHUTDOWN, REMOVAL, OR DISCONNECTION, 1 WEEK NOTICE MUST BE GIVEN TO THE OWNER INDICATING WHICH AREAS WILL BE AFFECTED, WHEN THE PROPOSED SHUTDOWN WILL OCCUR, AND FOR HOW LONG A PERIOD.
- USE OF THE OWNER'S ELEVATORS AND BUILDING CORRIDORS FOR HANDLING OF THE OWNER'S AND REMOVED EQUIPMENT AND MATERIALS SHALL BE AT THE DIRECTION OF THE OWNER AND SHALL BE COORDINATED WITH HIS OPERATIONS.
- ALL ITEMS REMOVED SHALL BECOME PROPERTY OF THE OWNER AND SHALL BE DISPOSED OF AS PER OWNER'S INSTRUCTIONS, UNLESS INDICATED OTHERWISE. ALL ITEMS WHICH ARE NOT TO BE STORED ON SITE BY OWNERS SHALL BE REMOVED FROM THE BUILDING IMMEDIATELY.
- DISCONNECT AND REMOVE ALL EXISTING EQUIPMENT, PIPING, DUCTWORK, FLUES, REGISTERS, SUPPORTS, HANGERS, AND ALL OTHER MECHANICAL COMPONENTS MADE OBSOLETE BY THIS PROJECT.
- PRIOR TO RENOVATION, CONTRACTOR TO RECORD ALL SUPPLY & RETURN MAIN AIRFLOWS & SUBMIT A COPY TO THE ENGINEER. ALL READINGS SHALL BE PERFORMED BY A CERTIFIED NEBB

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFEKEEPING OF HIS OWN PROPERTY ON THE JOB SITE. OWNER ASSUMES NO RESPONSIBILITY FOR PROTECTION OF PROPERTIES AGAINST FIRE, THEFT, AND ENVIRONMENTAL CONDITIONS.

10. THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER TRADES PRIOR TO FABRICATION, PURCHASE AND/OR INSTALLATION OF ALL WORK. ALL OFFSETS IN PIPING AND DUCTS TO AVOID OBSTRUCTIONS SHALL BE PROVIDED AT NO COST TO THE OWNER. 11. CONTRACTOR SHALL REFER TO THE COMPLETE SET OF CONTRACT DOCUMENTS INCLUDING SPECIFICATIONS AND OTHER TRADES FOR A FULL UNDERSTANDING OF ALL WORK REQUIRED.

12. WHERE USED THE TERM "PROVIDE" SHALL MEAN "FURNISH AND INSTALL". 13. PROVIDE ALL REQUIRED RIGGING TO ACCOMMODATE THE REMOVAL & INSTALLATION OF ALL EQUIPMENT.

14. PROVIDE ACCESS PANELS FOR ALL CONCEALED DAMPERS, VALVES, AND EQUIPMENT. 15. ALL EQUIPMENT AND MATERIALS SHALL BE AS SPECIFIED OR "APPROVED EQUAL" BY THE

ENGINEER OR ARCHITECT. 16. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF

REGISTERS, DIFFUSERS, AND GRILLES. 17. CONTRACTOR SHALL SPRAY PAINT INSIDE OF DUCT BLACK, BEHIND ALL GRILLES AND REGISTERS.

18. ALL DUCTWORK AND PIPING SHALL BE INSTALLED AS INDICATED ON THE DRAWINGS IN A NEAT AND WORKMANLIKE MANNER AND BE SUPPORTED AS REQUIRED BY CODES. DUCTWORK AND PIPING SHALL BE SET UP AND DOWN AND OFFSET AS REQUIRED TO SUIT FIELD CONDITIONS. DIELECTRIC COUPLINGS SHALL BE USED WHERE DISSIMILAR METALS ARE JOINED.

19. IF A SECTION OF DUCT OR PIPE IS NOT LABELED FOR SIZE, THEN THE LARGER SIZE INDICATED ON THE DRAWINGS SHALL PREVAIL. SIZE OF DUCT RUN-OUTS TO DIFFUSERS SHALL EQUAL DIFFUSER NECK SIZE UNLESS OTHERWISE NOTED.

20. ALL CONCEALED ELECTRICAL CONNECTIONS SHALL BE HARD WIRED. PLUGS SHALL NOT BE USED AS A DISCONNECTING MEANS IN CONCEALED LOCATIONS.

21. ALL THERMOSTATS, CONTROL SWITCHES, ETC. SHALL BE INSTALLED 48" AFF.

CONTRACTOR. COMPARE NEW EQUIPMENT VALUES & ALERT DISCREPANCIES FOR ENGINEER FEEDBACK. AT THE END OF THE PROJECT EXISTING SYSTEMS SHALL BE BALANCED TO PRE-CONSTRUCTION VALUES OR ADJUSTED VALUES BASED ON PRE-CONSTRUCTION TESTING ENGINEERING FEEDBACK.

ALL NEW, RELOCATED, OR EXISTING EQUIPMENT AFFECTED BY THIS SCOPE OF WORK SHALL BE REBALANCED BEFORE BEING PLACED IN SERVICE.

PROVIDE ALL REQUIRED CUTTING AND PATCHING AS REQUIRED TO COMPLETE THE INSTALLATION OF NEW MECHANICAL SYSTEM. PATCH ALL SURFACES TO MATCH AND MAINTAIN ALL FIRE RATINGS. EXISTING MATERIALS THAT ARE REMOVED SHALL NOT BE REUSED IN NEW SYSTEMS, EXCEPT WHERE INDICATED AS SUCH ON THE DRAWINGS. ALL MATERIALS AND EQUIPMENT LISTED AS NEW MUST BE NEW.

10. THE FIRE PROOFING OF THE EXISTING STRUCTURE IS NOT TO BE REMOVED FOR THE INSTALLATION OF HANGERS, SUPPORTS AND DUCTWORK ETC. IF FIRE PROOFING IS DAMAGED, IT SHALL BE REPAIRED AT THE EXPENSE OF THE TRADE.

		MECHANICAL NOTE: 1. THIS IS A PHASED PROJE COORDINATE PHASING V CONTRACTOR & ARCHITE	ECT. VITH ECT.	NORTH COLLA ARCHI ¹⁰ 650 Ten North Kir v: 401.84 CNGINE Iti Indust PO Box 98 Slatersville Phone: (40	I EAST BORATIVE TECTS Rod Road hgstown, RI 02852 do.9583 RINGCOEDENCE Autor Highway Statersville, RI 02876 1) 765-769 Fax (401) 765-2984 AL/Electrical/Plumbing Engineers: hg Design Services, Inc. trial Drive 36 e, Rhode Island 02876 01) 765-2984
BREAK ROM I				BATHROOM RENOVATIONS	STATE OF RHODE ISLAND /N DEPARTMENT OF LABOR & TRAINING 1330 MAIN STREET WEST WARWICK, RI 02893
	NORTH			REVISION No. PRO ME FIR DATE: NCA JOB DRAWING	NS: VILLIAM T. MAYER III VILLIAM T. MAYER

	EXHAUST FAN SCHEDULE (BASED ON GREENHECK)										
							Ν	NOTOR DA	ТА	APROX.	
SYMBOL	MODEL	TYPE	DRIVE	CFM	ESP FAN (IN) RPM	FAN RPM	POWER	RPM	VOLTAGE	WEIGHT (LBS)	NOTES
CEF-1	SP-A110	CEILING	DIRECT	50	.5	950	15W	-	120	17	1,3
CEF-2	SP-A390-VG	CEILING	DIRECT	75	.5	1179	21W	-	120	24	1,3
CEF-3	SP-A390-VG	CEILING	DIRECT	75	.5	1179	21W	-	120	24	1,3
CEF-4	SP-A390-VG	CEILING	DIRECT	75	.5	1179	21W	-	120	24	1,3
CEF-5	SP-700-VG	CEILING	DIRECT	100	.5	1102	41W	-	120	40	1,3
CEF-6	SP-700-VG	CEILING	DIRECT	100	.5	1102	41W	-	120	40	1,2
NOTES:											

AIR DEVICE SCHEDULE (BASED ON PRICE)							
SYMBOL	MODEL	ТҮРЕ	THROW	CFM	SIZE	NOTES	
S-1	AMD	LAY-IN	4-WAY	50-75	12x12	X	
NOTES: 1. CONTRACTOR TO PROVIDE ALL ROUND TO SQUARE TRANSITION. 2. ARCHITECT TO VERIFY COLOR FINISH. ** - S-SUPPLY, R-RETURN, E-EXHAUST, T-TRANSFER ** - SIZE *** - CFM							

HANGER SIZES*							
. SIDE	HANGER	HORIZONTAL SUPPORT ANGLE	MAXIMUM SPACING				
30"	1"x18" GAUGE STRAP	NONE REQUIRED	10'-0"				
36"	1/4" ROD	1-1/2"x1-1/2"x1/8"	8'-0"				
18"	1/4" ROD	2"x2"x1/8"	8'-0"				
60"	5/16" ROD	2"x2"x1/8"	8'-0"				
34"	3/8" ROD	2"x2"x1/8"	8'-0"				

NORTH COLLAN ARCHIT 650 Ten North Kir v: 401.84 CIGINEE Ital Indust PO Box 98 Slatersville Phone: (40	EAST BORATIVE TECTS Rod Road gstown, RI 02852 6.9583 RINGECESIGNSERVICES Ustrial Highway Statersville, RI 02876 1) 765-7659 Fax (401) 765-2984 M/Electrical/Plumbing Engineers: g Design Services, Inc. rial Drive 6 a, Rhode Island 02876 1) 765-2984				
BATHROOM RENOVATIONS	STATE OF RHODE ISLAND /N DEPARTMENT OF LABOR & TRAINING 1330 MAIN STREET WEST WARWICK, RI 02893				
REVISION	IS: ILLIAM T. MAYER III				
No. REGISTERED PROFESSIONAL ENGINEER MECHANICAL					
ME SCH	CHANICAL IEDULES & DETAILS				
DATE: NCA JOB	06.29.2023 NO.: 22330				
	3 NO.: 1-201				

XSECTION 230000 - MECHANICAL

PART 1: GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.
- 1.2 SUMMARY OF WORK
- A. Provide complete functional Heating, Ventilating and Air Conditioning system as shown on Mechanical Construction Documents
- 1.3 REFERENCE STANDARDS
- A. NFPA Standards B. ANSI Standards
- C. ASME Standards
- D. ASTM Standards
- E. AWWA Standards
- F. ASHRAE Standards
- G. SMACNA Standards
- H. OSHA Standards I. NEBB Standards
- J. Local Codes and Ordinances
- K. Owner's Insurance Company Requirements
- L. Where the contract documents indicate more stringent requirements than the above codes and ordinances, the contract documents shall take precedence.
- M. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section
- 1.4 CONTRACT DRAWINGS & SPECIFICATIONS
- A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before proper execution of the work
- B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.
- 1.5 CONFLICT BETWEEN PLANS AND SPECIFICATIONS
- A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.
- 1.6 SHOP DRAWINGS AND PRODUCT DATA
- A. SUBMITTALS: Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication, or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable industry, and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor propose to furnish.
- B. Submit in accordance with Division 1
- C. It is the intent of these specifications that all equipment, materials and workmanship used on this project be in complete conformance with all local, state and national codes, ordinances and standards.
- D. Substitutions shall be equivalent to specified equipment in all aspects of quality and performance and shall conform to the intent stated above. It is the contractor's responsibility to submit only those items that meet these requirements. Should any non-conforming items be installed, they shall be replaced by the contractor at no additional cost to the owner.
- E. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist
- F. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, it shall be provided. Contractor to assume cost and entire responsibility thereof.
- 1.7 INSPECTION AND TESTS
- A. During the progress of the work it shall be subject to the inspection of the Owner and to such other inspectors, as may have jurisdiction B. At completion of the work, Contractor shall submit to the Owner's representative in writing a
- statement stating: (1) that the work is complete; (2) that the entire installation is in accordance with the specification; (3) that preliminary tests have been made; and (4) that the work is ready for final inspection and test
- C. A final inspection of the installation to determine compliance with the drawing and specifications will be made by the Owner's representative. Work will be checked for quality of materials, quality of workmanship, proper installation and finished appearance. This Contractor shall provide the services of the project foreman for inspection purposes. The foreman shall remove and reinstall access panels, ceiling tiles, etc., as required to facilitate any inspections required by the Owner's representative.
- D. The Contractor shall arrange and conduct operating tests on all equipment in the presence of the Owner's representative. The component parts of systems and the various systems shall be demonstrated to operate in accordance with the requirements and intent of this specification. Any non-complying or defective materials or workmanship disclosed as a result of the inspection and the Contractor shall correct tests promptly, and the tests repeated as often as necessary until approved and accepted by the Owner's representative.
- 1.8 ELECTRICAL EQUIPMENT
- A. Electrical components of mechanical equipment and systems, such as motors, factory mounted motor starters, disconnects, and control equipment shall be provided under the related Section of Division 23
- B. Temperature control equipment, including thermostats, zone valves, relays, aquastats, etc. shall be provided under related sections of Division 23. Temperature control wiring not specifically shown on electrical drawings shall be provided under related Section of Division 23.
- C. Upon completion of temperature control system wiring, the responsibility of the control system will fall under Division 23.
- D. All electrical equipment installed in concealed spaces shall be provided with a hard-wired electrical connection. Plug-type disconnects shall not be allowed in concealed spaces. Equipment provided with plug-in cords shall not have their cords modified.
- 1.9 OPENINGS IN EXTERIOR WALLS OR ROOF
- A. Openings in exterior walls or roof shall be kept properly plugged and caulked at all times, except when being worked on to preclude the possibility of flooding due to storm or other causes. After completion of work, openings shall be permanently sealed and caulked in a manner approved by the
- 1.10 GUARANTEE
- A. Except as otherwise specified, all work, materials and equipment shall be guaranteed against defects resulting from the use of inferior materials, equipment, or workmanship for one year from the date of final completion of the contract, or from full acceptance by the Owner, whichever is earlier.
- B. If, within any guarantee period, repairs or changes to guaranteed work are required as a result of the use of defective materials or equipment, inferior workmanship or work that is not in accordance with the terms of the contract, and upon receipt of notice from the Owner, the following shall be done without expense to the Owner.
- C. Place in satisfactory condition in every particular all of such guaranteed work and correct all defects
- D. Repair all damage to the building or site/equipment or contents thereof which is the result of the use of defective materials or equipment or inferior workmanship, or of work not in accordance with the terms of the contract.
- E. Make good any work or materials, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.
- F. In fulfilling the requirements of the contract or of any guarantee embraced in or required thereby, any work guaranteed under another contract is disturbed, restore such disturbed work to original condition and guarantee such restored work to the same extent as it was guaranteed under such other contract.
- G. If upon failure to proceed promptly after notice to comply with the terms of the guarantee, the Owner may have the defects corrected and Contractor and his surety shall be liable for all expenses incurred.
- H. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities, which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of one (1) year minimum from the date of acceptance or final payment.
- 1 11 CLEANING OF SYSTEM
- A. Thoroughly clean piping, ducts, fixtures and equipment of all foreign substances inside and out

before placing in operation. All air handling equipment shall be provided with "constr use during construction. Once construction is substantially complete and prior adjusting and balancing, furnish and install new filters for each piece of equipment.

- B. If any foreign matter should stop any part of a system after being placed in operation, clean and reconnect system.
- 1.12 TEMPORARY OPENINGS
- A. Coordinate construction and provide temporary openings in the building as required for the admission of equipment furnished under this Division.
- 1.13 DEFINITIONS A. "Piping" includes, in addition to pipe, all fittings, valves, hangers, and other accessories relating to
- such piping B. "Concealed" means hidden from sight in trenches, chases, furred spaces, shafts, hung ceilings,
- embedded in construction or in crawl spaces C. "Exposed" means not installed underground or "concealed" as defined above.
- D. "Provide" means furnish and install complete and ready to operate.
- 1 14 EQUIPMENT DEVIATIONS
- A. Where proposals to use an item of equipment other than that specified which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrica or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Architect at the Contractor's expense.
- B. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost
- 1.15 ELECTRICAL ROOM REQUIREMENTS
- A. Do not install any piping, ductwork or equipment in or through electrical rooms, transformer rooms. electrical closets, telephone rooms or elevator machine rooms, unless piping or ductwork o equipment is intended to serve these rooms. Additionally, no ductwork or piping will be installed above electric panels. If the Contractor violates this requirement, he shall remove and/or relocate all items as required at his expense and to the satisfaction of the Architect.
- 1.16 COOPERATION WITH OTHER TRADES

to the Owner.

- A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or
- B. Coordination drawings shall be initiated by this contractor. It this contractor's responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under Section 15500 of the Specifications
- 1. Drawings shall be prepared at not less than 1/4 in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services.
- 2. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections 210000, 220000, and 260000, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted.
- 3. After each Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each drawing has been coordinated between trades, and appropriate revisions made, each trade shall sign each drawing, indicating acceptance of the installation.
- 4. The HVAC Contractor shall then print the coordination original and these prints submitted through the General Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the drawings.

C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

- 1.17 PROJECT RECORD DOCUMENTS A. Each Contractor shall record clearly, neatly, accurately, and promptly as work progresses the
 - following data: 1. Changes made resulting from change orders or instructions issued by the Architect.
 - 2. Changes in routing made to avoid conflict with other trades or structural conditions. 3. Final location of equipment and panels if different than contract documents.
- B. Upon completion of the project submit to the Architect a set of electronic media noting "as built" conditions indicating all variations and deviations of his work from contract documents.
- 1.18 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS
- A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems installed. The cost of providing a manufacturer's representative at the site for instructional purposes shall be included in the Contract Price.
- B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders, indexed, containing the following: 1. Complete shop drawings of all material and equipment of this section.
- Operation descriptions of all systems.
- 3. Names, addresses and telephone numbers of all suppliers of system components. 4. Preventative maintenance instructions for all systems.
- 5. Spare parts list of all system components.

1.19 PROTECTION

- A. Protect all work and material from damage by work and workmen, and accept liability for all damage thus caused.
- B. Be responsible for work and equipment until finally inspected, tested, and accepted. Protect work against theft, injury or damage; and carefully store material and equipment received on site, which is not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.
- C. All openings in stored & installed ductwork shall be covered & sealed when not in use to prevent contamination from dust & debris. 1.20 SCAFFOLDING, RIGGING AND HOISTING
- A. Provide scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of material, equipment and apparatus furnished under this division. Remove same from premises upon completion of work.
- B. Coordinate propose routing with architect prior to rigging and protect all existing building components against damage
- 1.21 MATERIALS AND WORKMANSHIP
- A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class guality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.
- B. Furnish the services of an experienced foreman who shall be constantly in charge of the installation of the work. together with all skilled workmen, fitters, metal workers, welder, helpers, and labor required to unload, transfer, erect, connect, adjust, start, operate, and test each system.
- C. All equipment and materials shall be installed in strict accordance with the manufacturer's recommended installation instructions as well as UL Listing instructions and all Local, State and National codes.
- 1.22 QUIET OPERATION AND VIBRATION
- A. Work shall operate under all conditions of load without any objectionable sound or vibration. In case of moving machinery, sound, or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable shall be corrected in an approved manner at no expense to the Owner. Vibration control shall be means of approved vibration eliminators in a manner as recommended by the manufacturer of the eliminators.
- 1.23 ACCESSIBILITY

1.24 CUTTING AND PATCHING

1.25 GROUNDING

match adjacent surfaces.

- A. Assure and be responsible for the adequacy of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of the work. Cooperate with all other trades whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. Locate all equipment, which must be serviced, operated, adjusted or maintained fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, filters, dampers, starters, coils, fire dampers, smoke dampers and drain points. If required for better accessibility. furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility, and the engineer shall approve any change.
- C. Provide access panels for installation in concrete block walls or gypsum wallboard ceilings and partitions in locations, which require access for service to the items located behind the permanent gypsum wallboard or concrete block finish.

sketch showing locations of all findings and proposed cuts or cores for review.

cutting shall be accomplished in a manner directed by the Structural Engineer.

r	ucti	on filt	ers" for
•	to	final	testing

A. Provide all cutting and patching necessary to install the work specified in this division. Patching shall

B. At floor slabs & wall openings to be cored drilled or cut, contractor shall find and mark on both faces all reinforcing, rebar, conduits, utilities, etc.. by means of x-ray, pach-ometer or prof-ometer. Submit

C. No structural members shall be cut without the approval of the Structural Engineer, and all such

A. All components of mechanical piping systems shall be properly grounded to building ground. Where ground path is interrupted by non-conductive materials, appropriate bonding or grounding to building ground shall be provided.

1.26 WATERPROOFING

A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Architect before work is started. Furnish all necessary sleeves required. 1 27 DEMOLITION

A. Prior to submitting bid, visit site and identify existing conditions and difficulties that will affect work of this section. Demolition work will require careful site examination prior to bidding. No compensation will be granted for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observers.

B. Prior to commencing demolition, contractor shall identify with owner any equipment to be returned to the owner after demolition. All other debris shall be disposed of by this contractor in accordance with all applicable regulations. Any shutdowns required for demolition shall be coordinated with building owner to avoid impact to operations.

C. During demolition, any equipment, ductwork, piping, etc. found to be abandoned shall be demolished. Existing unused connections to existing ducts or piping shall be cut back to the mains and capped accordingly.

D. Under demolition, the following is, in brief, the extent of the work to be performed by the mechanical contractor under this contract. 1. The mechanical contractor shall be responsible for the disconnection and removal of the

- existing mechanical equipment, ductwork, piping, valves, etc., in designated areas. Cut & cap piping and ductwork back to mains. Patch all roof and wall penetrations to match existing. 2. This contractor shall protect work against injury or damage; and carefully store material and
- equipment to be relocated. Open ends of work shall be closed with temporary covers or plugs during storage and construction to prevent entry of obstructing material. 3. All existing HVAC components, including but not limited to ductwork, piping, equipment,
- controls & accessories, shall be removed from the area of renovation. 4. Coordinate all demolition with other trades to ensure all relevant portions of the system including associated electrical and plumbing components are removed.

5. Refer to drawing plans and notes for additional information.

1.28 REBATES

A. The contractor shall make the owner aware of all applicable "upstream" energy rebates available for this project.

B. The contractor shall provide the owner all necessary information and documentation for completion and submission of energy rebate applications.

PART 2: PRODUCTS

- 2.1 IDENTIFICATION. MARKING AND TAGGING
- A. Systems and equipment to be identified and marked and valves tagged include, but are not limited to the Heating, Air Conditioning & Ventilating systems
- B. Submit samples of marking and tagging devices and wording, lettering and numbering scheme for each system.
- C. Equipment Identification
- 1. Manufacturer's nameplates or trademark shall be permanently affixed to all equipment and materials furnished under this division. Manufacturer's nameplates shall include all pertinent data relative to the piece of equipment including model number, serial number, and operating characteristics as applicable.
- 2. Separate Equipment Identification Markers shall identify each item of equipment with a permanently attached marker indicating designation and/or number corresponding to design documents.
- 3. Markers shall be of rigid black Bakelite or phenolic construction with white engraved or incised
- 4. Lettering on equipment markers shall be of adequate size to be legible from floor levels. In all cases marker lettering shall no be less than 1 inch high. 2.2 SUPPORTS & ATTACHMENTS
- A. Provide all necessary supports and bases required for all equipment, piping and for all other equipment furnished under this contract. Submit shop drawings to the Architect for approval before purchase, fabrication or construction of same.
- B. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are not strong enough shall be replaced as directed.
- C. Vibration Isolation: All mechanical equipment, piping and ductwork shall be mounted on vibration isolators/inertia bases to prevent the transmission of vibration and mechanically transmitted sound to the building structure
- 1. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
- 2. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.
- 2.3 ELECTRIC MOTORS/STARTERS/VARIABLE FREQUENCY DRIVES
- A. Electric motors and starters shall conform to requirements of the AIEE, NEMA, UL, and NEC and shall be suitable for load duty, voltage, phase, frequency, service and location required. Provide inverter duty rated motors for use with variable frequency drives. Provide shaft grounding rings for all VFD controlled motors.
- B. All motors shall be rated at 85% power factor at full rated load. Motors less than 85% power factor shall be corrected to 90% power factor at the factory. All motors shall be rated high efficiency.
- C Starters shall be Cerus International or equal 1. Enclosed Non-Combination Starter
- a) Motor Starter shall be enclosed in a Type 1 or Type 4 UL rated enclosure.
- b) Motor Starter shall be rated for NEMA class B motors for AC-3 switching and AC-4 switching
- c) Controls and annunciation shall include Hand- OFF- Auto keypad. LED indication shall include Hand, Off, Auto, Run and Overload. Overload reset shall be available. d) Control inputs shall include: Auto Wet input, Auto Dry input, Permissive Auto input Damper Status Input and Override Input. Automatic control inputs shall be capable of
- accepting a transistorized input without the need for interposing relays. Wet control inputs shall accept AC or DC inputs from 10 to 138VACor DC. e) Damper control shall be built into the starter to provide 24VAC or 120VAC damper
- control and monitoring. f) Override input shall disable the starter from operating in either Hand or Auto mode.
- a) Protective Functions (i) Electronic Overload shall provide phase failure and phase loss protection, stall, and class 1 - 30 selectable overload protection. Phase failure protection shall initiate when phase loss is greater than 70% for 3 seconds or phase unbalance is
- greater than 50% for more than 5 seconds (ii) Cycling fault protection shall be integral to the starter. Cycling fault shall be enabled whenever the starter is cycled more than 1000 times in a one hour period. This feature shall be selectable to be disabled. Cycling fault shall cause overload LED to blink rapidly.

2. Enclosed Combination Starter

- a) Enclosed combination starter shall include all of the above descriptions in addition to either a motor circuit protector with lock-out mechanism, a UL 508 breaker, or a fused disconnect with lock-out mechanism.
- b) The Motor Circuit protector shall be a UL listed 508 manual motor starter with magnetic trip elements only. The breaker and shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides an interrupting rating for the breaker and contactor combination.
- c) Fused disconnect shall be UL 98 suitable for service entrance protection. d) UL 508 breaker shall include thermal and magnetic trip mechanisms.

2.4 USE OF INSTALLATION

Associates or approved equal.

A. The Owners shall have the privilege of using any part of the installation when sufficiently complete, but such use thereof, or partial or final payment shall not be considered as an acceptance of such work in lieu of a written certificate from the Engineer.

2.5 DUCTWORK

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, supports and sealing for operating pressures indicated. B. Duct gauge shall be as required by SMACNA Duct Construction Standards taking into account duct
- size, supports, pressure rating, and any other relevant parameters. All ductwork, regardless of SMACNA Standards, shall be no thinner than 26 gauge. C. Galvanized Steel Ducts: ASTM A525 and ASTM A527 galvanized steel sheet, lock-forming quality,
- having G90 zinc coating of in conformance with ASTM A90. 1. Sealant: As recommended by manufacturer specifically for sealing joints and seams in ductwork
- 2. Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic
- 3. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or
- continuously threaded. D. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously
- threaded E. Flexible Ductwork: Duct shall be Flexmaster Type 4 Insulated Duct as manufactured by Buckley

- 1. Flexible duct (insulated) shall be Underwriters Laboratory Listed (UL 181 Class I Connector) and constructed in accordance with NFPA Standards 90A and 90B. It shall have a smoke/flame spread rating of 50/25.
- 2. Duct fabric shall be of a smooth airtight polymer film mechanically locked to the outside helix. (Use of adhesives to lock to fabric in place is unacceptable.) The helix is constructed of corrosive resistant galvanized steel, formed and mechanically locked to the duct fabric on the
- outside to prevent tearing of the flexible duct. 3. Insulated flex shall have a fire retardant polyethylene outer jacket with a 1/2 lb. density, 1-1/2" thick fiberglass insulation blanket, factory wrapped
- 4. The flexible duct shall be supported as required to prevent sagging. Flexible duct with excessive sagging will not be approved 5. Flexible ductwork shall be rated at 6" positive pressure and 10" negative pressure for sizes up
- to 12". Negative pressure for 14" to 16" shall be 5". Negative pressure for 18" shall be 1". 6. Length of installed flexible duct shall not exceed 6'-0" in developed length.

F. Flexible Connections 1. Flexible connections shall be provided where a fan connects to a duct or casings to prevent transmission of vibration to ductwork.

G. Volume Dampers:

installed in externally insulated duct:

is approximately 23-11/16" x 9-7/8".

Vent Products.

2.6 DUCT INSULATION

B. Definitions:

provided as necessary for systems balancing.

damper shall be provided by Contractor.

supporting rods. Hem over edges parallel to rods.

provided as necessary for system balancing.

ventilation are not considered enclosed spaces.

(i) Supply Air. No Insulation Required

(ii) Return Air: No Insulation Required

(iii)Outside Air: No Insulation Required

(i) Supply Air: R-Value of 6.0 installed

(ii) Return Air: No Insulation Required

(iii)Outside Air: R-Value of 6.0 installed

(i) Supply Air: R-Value of 8.0 installed.

(ii) Return Air: R-Value of 8.0 installed.

(iii)Outside Air: No Insulation Required

(ii) Secure with pressure sensitive tape.

sensitive rubber based adhesive.

Direct Exhaust: No Insulation Required

adjustment, and maintenance of the entire installation

recommendations can be cause for rejection of the material.

3.3 TESTING, ADJUSTING, STARTING UP AND COMMISSIONING

a) Kraft paper with glass fiber yarn and bonded to aluminized film.

(i) Moisture vapor transmission: ASTM E96; 0.02 perms.

a) Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure

A. Instruction to the Owner's Personnel - After completion of all work and all tests and at such times as

B. During the operating period, instruct the Owner's representative in the complete operation,

C. Give at least forty-eight (48) hours advance notice to the Owner to coordinate scheduling of this

D. Furnish to the Architect five (5) complete bound sets of typewritten or blueprinted instruction

manuals for operating and maintaining all systems and equipment included in the contract. All

instruction manuals shall be submitted in draft, for approval, prior to final issue. Manufacturer's

advertising literature or catalogs will not be acceptable for operating and maintenance instructions.

E. The above-mentioned instructions shall include the maintenance schedule for the principal items of

A. Where installation procedures or any part thereof are required to be in accordance with the

recommendations of the manufacturer of the material being installed, printed copies of these

not be allowed to proceed until the recommendations are received. Failure to furnish these

A. Testing: All work must be proved satisfactory. The tests herein specified shall be applied in the

presence of, and to the satisfaction of, the Architect before the work is covered, concealed or made

inaccessible to testing, repair, correction or replacement. Accommodate the testing operation to the

progress of the project as a whole. Correct all defects appearing under test and repeat the tests until

all parts of the work have been successfully tested. Apply the specific tests herein described.

Present all work for acceptance in clean condition, properly adjusted and in good working order; for

instance, all machinery must be quiet, well balanced, and must be in place and reading accurately.

All systems, equipment, controls, and devices in this work shall be tested in operation and must

prove for their purposes in the judgment of the Architect or his authorized representative. All internal

surfaces of all lines and equipment shall be blown or flushed clean. Where pressure tests are

adequate protection of piping and duct systems to prevent vandalism and/or accidental damage,

blockage, etc., that will hinder or prevent proper operation of the finished systems.

specified, the apparatus shall be clean before the tests are applied. Contractor shall provide

1. Provide instruments, pumps, gauges, supplies, equipment, materials, and labor for testing and

2. Perform tests which may be required by authorities or agencies in addition to those herein

3. Furnish certified shop test records for all pressure vessels. After installation, test at full

starting up. Dispose of test water and wastes after test, in a manner approved by all applicable

recommendations shall be furnished to the Architect prior to installation. Installation of the item will

designated by the Architect, provide the necessary skilled personnel to operate the entire installation

C. Supply and Return Air Duct Insulation:

a) Exposed Conditioned

b) Concealed Conditioned

c) Unconditioned

2. Vapor Barrier Jacket:

Vapor Barrier Tape:

D. Exhaust Ductwork Insulation:

until receipt of owners acceptance.

equipment furnished under this contract.

3.2 MANUFACTURER'S RECOMMENDATIONS:

3.1 OPERATING INSTRUCTIONS

instructional period.

specified.

PART 3: EXECUTION

extension for all dampers on externally insulated ductwork.

uninsulated ducts, piping or other sources of heating or cooling,

1. Insulation: ASTM C553; flexible, foil faced, noncombustible blanket.

semiheated space. Crawlspaces, attics, and parking garages with natural or mechanical

a) On each supply, return and general duct take-off.

connecting slide linkage controlled by 3/8" square steel control shaft.

- 2. Flexible connections shall fit tightly around ducts and fans and be securely bolted or clamped in place. Taping shall not be allowed.
- 3. Flexible duct connections shall be 6" long and made of straight, waterproof, flame retardant fabric having a flame spread rating of not over 25 and a smoke development rating of not over

b) At each take-off to register, grille or diffuser (not all are shown on drawing).

The cable between the damper and controller shall be provided by the contractor.

- 1. Provide Young Regulator manual adjustable rectangular opposed blade dampers for duct heights less than 12" with factory-installed locking hand quadrants extended 2" for all dampers
- 2. Dampers are manufactured approximately 5/16" smaller in width and 1/8" smaller in height than size of duct in which they are installed; e.g., nominal damper size is 24" x 10"; actual size
- 3 Damper frame shall be constructed of #6063 extruded aluminum reinforced channel with minimum thickness of .050". Opposed damper blades shall be #6063 extruded aluminum with
- minimum thickness of .050" and shall include reinforcing ribs. Each blade shall be supported in the damper frame by individual Teflon axle bearings, and shall be driven by stainless steel 4. Note: All required volume dampers may not be indicated on drawings but dampers shall be
- 5. Dampers 12" and larger in height shall be opposed multi-blade equal to Greenheck, Nailor or
- 6. Where dampers are inaccessible, use Young Rectangular locking type ceiling regulators and miter gear or worm gear for all horizontal dampers. Bearing coupling for bottom duct control may be used for shaft on vertical blade dampers. The 3/8" rod between ceiling regulator and
- 7. Where dampers are to be located above hard ceilings Young Regulator Bowden Cable Control Dampers shall be utilized. Controllers (actuators) shall be of the concealed ceiling type.
- Controller type, finish & locations to be approved by architect prior to purchase & installation 8. Damper blades shall be two gauges heavier than adjoining ductwork, and shall be riveted to
- 9. Brackets shall be galvanized metal, secured to ductwork with sheetmetal screw with locking quadrant arms (see seal class section for additional requirements). Provide 2" handle
- 10.Note: All required volume dampers may not be indicated on Drawings but dampers shall be
- A. Compliance: Insulation thickness, conductivity and installation shall comply with local Mechanical and Energy Codes. Where local code conflicts with specifications, the more stringent shall apply.
- 1. Conditioned Space: An area, room or space that is enclosed within the building thermal
- envelope and is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors, or ceilings or where they contain
- 2. Unconditioned Space: An enclosed space within a building that is not a conditioned space or a

- operating pressures and temperatures maintained for one hour. Set and test all pressure control, relief and safety devices.
- 4. Repair or replace all defective work and repeat tests until the particular system and component parts thereof receive the approval of the Architect.
- 5. The duration of tests shall be as determined by authorities having jurisdiction, but in no case less than the time prescribed in each section of the specifications.
- 6. Test equipment and systems, which normally operate during seasons of the year during the appropriate season. Perform tests on individual equipment, systems and their controls. Whenever the equipment or system under test is interrelated with and depends upon the operation of other equipment, systems and controls for proper operation, function, and performance; the latter shall be operated simultaneously with the equipment of system being
- B. Adjusting, Balancing and Starting Up
- 1. Flush clean all systems prior to starting up the system. Any damages to the building or system components caused by failure to clean the systems properly shall be corrected to the satisfaction of the Architect or his authorized representative at no additional cost to the Owner. 2. In duct and piping systems, eliminate all noise and vibration and take all measures to secure
- proper circulation 3. Run motor-driven equipment continuously for at least two hours in the presence of the Architect. Correct all defects of noise, vibration, alignment and balance. Replace all motors, which overheat or are noisy.
- 4. Balance systems completely for temperature, volume, and pressure per NEBB performance standards. Balancing subcontractor shall provide proof of certification by NEBB.
- 5. Air and water volumetric flow rates shall be within ten (10) percent of those specified. Air and water quantities and pressures shall be tested, balanced and recorded at all terminal devices. Volumetric flows and pressures shall be recorded on suitable forms and submitted for approval
- 6. Provide any and all labor and equipment necessary to properly balance the installation including but not limited to dampers, valves, flow stations, test ports, sheaves, belts, etc.
- 7. All sequences of the system shall be checked and all temperature controls operated and commissioned as required to insure that all systems operate per Engineers intent.
- C. Commissioning
- 1. This Contractor shall provide the deliverables to the engineer/owner.
- 2. Copies of all records shall be provided to the Engineer by this Contractor including, but not limited to: a) Equipment manuals including the name of at least one service agency;
- b) Testing and Balancing reports;
- c) Functional performance testing of the equipment, controls, economizers, and lighting
- control systems. 3. All commissioning shall be performed as indicated here and elsewhere in the specifications and shall comply with provisions of the applicable Energy Conservation Code.
- 3.4 SEQUENCE OF OPERATIONS
- A. Sequence of Operations: This is a performance-based specification intended to convey the control intent of the various systems. The contractor shall provide detailed shop drawings including P&ID diagrams, equipment lists and finalized sequences for review by the Engineer prior to installation. Any guestions concerning specific details shall be referred to the engineer for clarification. B. System: It is the intent of this specification that complete stand-alone controls be provided for each
- mechanical system to provide the sequences noted.
- C. Equipment and Wiring: This contractor shall provide all control equipment, and wiring (regardless of voltage) to accomplish the sequence of operations as detailed below. This contractor shall carry funds sufficient to hire the Electrical Contractor to provide line-voltage power, including any required wiring, breakers, and/or disconnects, to all control's components needing such power. Such components shall include, but may not be limited to:
- 1. Control Transformers 2. Central Equipment Controllers
- Line-voltage Thermostats or other sensors
- D. Exhaust Fans:
 - 1. Roof Exhausters shall be interlocked with corresponding AHU unless otherwise noted. 2. Bathroom Ceiling Exhaust Fans
 - a) Integral lights (where applicable) shall be energized/de-energized by a separate wall mounted switch.

WIRING DEVICE LEGEND COMBINATION TELEPHONE/DATA OUTL DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING Φ 18" A.F.F STRING FROM OUTLET TO ABOVE DRO LOCATION ABOVE COUNTER BACKSPLA V 42" A.F.F. OF TELEPHONE MOUNTED PER ARCHITECT DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING BE PROVIDED WITH (3) CATEGORY 6 CA 6" ABOV TYPF SPECIFICATIONS. COUNTER DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING DATA OUTLET; PROVIDE 3/4"C. (EMT) W Ш 18" A.F.F TYPE WITH GROUND FAULT PROTECTION. ABOVE DROP CEILING. "C" INDICATES T BACKSPLASH, "W" INDICATES WALL MC 42" A.F.F. OF ARCHITECT'S DIRECTION. EACH OUTLE DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING CATEGORY 6 CABLES PER THE OWNER 6" ABOVE TYPE WITH GROUND FAULT PROTECTION. COUNTER TELEPHONE OUTLET; PROVIDE 3/4"C. (I SPECIAL NEMA CONFIGUATION OUTLET; VERIFY NEMA TYPE WITH OUTLET TO ABOVE DROP CEILING. "C" EQUIPMENT TO BE SERVED. COUNTER BACKSPLASH, "W" INDICATE ∇ MOUNTED PER ARCHITECT'S DIRECTIO PROVIDED WITH (3) CATEGORY 6 CABL SINGLE CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING Φ 18" A.F.F SPECIFICATIONS. TYPE DEDICATED DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT 0 MOTOR: REFER TO PLANS FOR DETAILS 18" A.F.F. GROUNDING TYPE. SWITCHED DUPLEX CONVENIENCE OUTLET: 125 VOLT. 20 AMPERE. U-SLOT SURFACE MOUNTED PANELBOARD; 208Y GROUNDING TYPE. TOP OUTLET SWITCHED, BOTTOM OUTLET 18" A.F.F DRAWINGS FOR ADDITIONAL INFORMAT UN-SWITCHED. REFER TO PLANS FOR SWITCH LOCATION(S). QUADRUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT RECESSED MOUNTED PANELBAORD; 208 ⊕ 18" A.F.F TO DRAWINGS FOR ADDITIONAL INFORM GROUNDING TYPE. 42" A.F.F. OF QUADRUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT SURFACE MOUNTED PANELBOARD: 480Y Ŧ 6" ABOVE GROUNDING TYPE. DRAWINGS FOR ADDITIONAL INFORMAT COUNTER DUPLEX CONVENIENCE OUTLET IN FLOOR BOX; 125 VOLT, 20 AMPERE, RECESSED MOUNTED PANELBAORD; 480 \mathbf{O} FLOOR TO DRAWINGS FOR ADDITIONAL INFORM U-SLOT GROUNDING TYPE. FUSED DISCONNECT SWITCH. 60AF/50AT \mathbf{O} DUPLEX CONVENIENCE OUTLET IN CEILING; 125 VOLT, 20 AMPERE, CEILING IN THAT ORDER, 3P INDICATES NUMBER U-SLOT GROUNDING TYPE. RATING. STARTERS FOR HVAC EQUIPME UN-FUSED DISCONNECT SWITCH. 60AF I QUAD-RUPLEX CONVENIENCE OUTLET IN FLOOR BOX; 125 VOLT, 20 Ð FLOOR INDICATES NUMBER OF POLES & 3R INDI AMPERE, U-SLOT GROUNDING TYPE. FOR HVAC EQUIPMENT BY MECHANICAL GROUNDING CONDUCTOR / MEANS & ME QUAD-RUPLEX CONVENIENCE OUTLET IN CEILING; 125 VOLT, 20 AMPERE, Æ CEILING "NATIONAL ELECTRIC CODE", (NEC). REI U-SLOT GROUNDING TYPE. (\mathbf{J}) JUNCTION BOX; SIZE AS REQUIRED PER CODE. (R)RELAY; REFER TO PLANS FOR RATINGS RECESSED FLOOR-BOX/POKE-THRU WITH POWER FURNITURE FEED (MINIMUM 1" CONDUIT). REFER TO FURNITURE CONNECTION DETAIL ON P FLOOR ELECTRICAL DETAILS SHEET. VERIFY EXACT ELECTRICAL CONNECTION REQUIREMENTS WITH FURNITURE MANUFACTURER. FB/PT С CONTACTOR; REFER TO PLANS FOR RA RECESSED FLOOR-BOX/POKE-THRU WITH COMMUNICATIONS FURNITURE FEED (MINIMUM 2" CONDUIT). REFER TO FURNITURE CONNECTION DETAIL FLOOR ON ELECTRICAL DETAILS SHEET. VERIFY EXACT ELECTRICAL CONNECTION TC FB/PT REQUIREMENTS WITH FURNITURE MANUFACTURER. TIMECLOCK; REFER TO DETAILS ON PLA WALL OR COLUMN RECESSED JUNCTION BOX WITH POWER FURNITURE FEED (MINIMUM 1" CONDUIT). REFER TO PRE WIRED FURNITURE DETAIL ON P 18" A.F.F ELECTRICAL DETAILS SHEET. VERIFY EXACT ELECTRICAL CONNECTION REQUIREMENTS WITH FURNITURE MANUFACTURER. WALL OR COLUMN RECESSED JUNCTION BOX WITH COMMUNICATIONS FURNITURE FEED (MINIMUM 2" CONDUIT). REFER TO PRE WIRED FURNITURE \odot 18" A.F.F. DETAIL ON ELECTRICAL DETAILS SHEET. VERIFY EXACT ELECTRICAL CONNECTION REQUIREMENTS WITH FURNITURE MANUFACTURER. TELEVISION OUTLET. E.C. SHALL PROVIDE RECESSED BACKBOX WITH 3/4" CONDUIT WITH PULL STRING BOX TO ABOVE DROP CEILING WITHIN THE ΤV BUILDING. PROVIDE BUSHED END CAPS TO ALL CONDUITS. SEE "TYPICAL ELECTRICAL NOTES". #16 ON THE SHEET. (J) PLUGMOLD; REFER TO PLANS FOR DETAILS NOTES: DEVICES WITH THE FOLLOWING SUBSCRIPTS SHALL BE PROVIDED & UL LISTED TO BE INSTALLED / WIRED AS NOTED: H - HOSPITAL GRADE IG - ISOLATED GROUND T - TAMPER RESISTANT 1. THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE G.C. FOR WALLS BEING FURRED-OUT WITH SHEETROCK DRYWALL SO OUTLET BOXES & DEVICES CAN BE INSTALLED FLUSH WITHIN THE WALLS. (TYPICAL) 2. ALL RECEPTACLES SHALL BE PROVIDED WITH AN ADHERED, TYPED LABEL INDICATING PANEL NAME AND CIRCUIT NUMBER. HANDWRITTEN LABELS WILL NOT BE ACCEPTED. 3. ALL RECEPTACLES WITH A DEDICATED CIRCUIT SHALL BE LABELED WITH PANEL NAME AND CIRCUIT NUMBER AS INDICATED IN NOTE #3 AS WELL AS LABELED "DEDICATED". 4. ALL COLORS OF RECEPTACLES AND ASSOCIATED FACEPLATES TO BE CONFIRMED WITH OWNER'S REPRESENTATIVE AND LOCAL (AHJ) PRIOR TO ANY SUBMITTALS, PURCHASE AND/OR INSTALLATION OF EQUIPMENT. THIS REQUIREMENT AS INDICATED IN NOTE #11 SHALL BE CORRECTED AS REQUIRED. 5. ALL TYPES AND LOCATIONS OF RECEPTACLES TO BE CONFIRMED WITH OWNER'S REPRESENTATIVE AND LOCAL (AHJ) PRIOR TO ANY SUBMITTALS, PURCHASE AND/OR INSTALLATION OF EQUIPMENT. FAILURE OF THIS REQUIREMENT AS INDICATED IN NOTE #3 SHALL BE CORRECTED AS REQUIRED. 6. ANY CONFLICT WITH RECEPTACLE LOCATIONS, TYPES OF RECEPTACLES OR COLORS OF RECEPTACLES WITH OWNER'S REPRESENTATIVE OR WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR, AND GENERAL CONTRACTOR TO PROVIDE ALL ADDITIONAL WORK AND EXPENSES TO REPAIR AND CORRECT. NO ADDITIONAL REIMBURSEMENTS OR TIME OF COMPLETION FOR WORK WILL BE ALLOWED. 7. ALL RECEPTACLES LOCATED WITHIN HEATHCARE FACILITIES SHALL BE PROVIDED WITH AN ILLUMINATED FACE, OR INDICATOR LIGHT. 8. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH LOCAL (AHJ) FOR ALL INSTALLATIONS AND REQUIREMENTS. ALL DEVICES ARE BASED ON LEGRAND.

ET; PROVIDE 3/4"C. (EMT) WITH PULL P CEILING. "C" INDICATES TO ASH, "W" INDICATES WALL MOUNTED T'S DIRECTION. EACH OUTLET SHALL ABLES PER THE OWNER'S	18" A.F.F.
ITH PULL STRING FROM OUTLET TO TO LOCATION ABOVE COUNTER OUNTED TELEPHONE MOUNTED PER ET SHALL BE PROVIDED WITH (3) 2'S SPECIFICATIONS.	18" A.F.F.
EMT) WITH PULL STRING FROM INDICATES TO LOCATION ABOVE S WALL MOUNTED TELEPHONE IN. EACH OUTLET SHALL BE ES PER THE OWNER'S	18" A.F.F.
ð.	
Y/120V, 3-PHASE, 4-WIRE. REFER TO ION.	MOUNT 6'-6 AFF TO TOF BREAKER.
8Y/120V, 3-PHASE, 4-WIRE. REFER /ATION.	MOUNT 6'-6 AFF TO TOF BREAKER.
Y/277V, 3-PHASE, 4-WIRE. REFER TO ION.	MOUNT 6'-6 AFF TO TOF BREAKER.
0Y/277V, 3-PHASE, 4-WIRE. REFER /ATION.	MOUNT 6'-6 AFF TO TOF BREAKER.
INDICATES FRAME SIZE/FUSE SIZE OF POLES & 3R INDICATES NEMA INT BY MECHANICAL CONTRACTOR.	60AF/50AT/ 3P/3R
NDICATES FRAME SIZE, 3P ICATES NEMA RATING. STARTERS CONTRACTOR.	60AF/3P/3R
ETHOD; IN ACCORDANCE WITH THE FER TO PLANS FOR SIZING.	-
TINGS.	
ANS.	

TELEPHONE & DATA RACEWAY NOTES

1. NO SECTION OF CONDUIT SHALL BE LONGER THAN 100-FEET BETWEEN PULL POINTS 2. NO SECTION OF CONDUIT SHALL CONTAIN MORE THAN TWO 90-DEGREE BENDS, OR EQUIVALENT, BETWEEN PULL POINTS (e.g., OUTLET BOXES, TELECOMMUNICATIONS CLOSETS, OR PULL BOXES). IF THERE IS A REVERSE (U-SHAPED) BEND IN THE SECTION, A PULL BOX SHALL BE INSTALLED. 3. THE INSIDE RADIUS OF A BEND IN CONDUIT SHALL BE AT LEAST 6 TIMES THE INTERNAL DIAMETER.

BENDS IN THE CONDUIT SHALL NOT CONTAIN ANY KINKS OR OTHER DISCONTINUITIES THAT MAY HAVE A DETRIMENTAL EFFECT ON THE CABLE SHEATH DURING CABLE PULLING OPERATIONS. 4. ANY SINGLE CONDUIT RUN EXTENDING FROM A TELECOMMUNICATIONS CLOSET SHALL NOT SERVE

MORE THAN THREE OUTLET BOXES. 5. CONDUITS PROTRUDING / PENETRATING THROUGH THE FLOOR IN THE TELECOMMUNICATIONS CLOSETS SHALL BE TERMINATED 3-INCHES ABOVE THE FLOOR ADJACENT WALLS. PROTRUSIONS / PENETRATIONS SHALL BE LOCATED TO AVOID CREATING A TRIPPING HAZARD WITHIN THE CLOSETS. FIRESTOP ALL PROTRUSIONS / PENETRATIONS.

6. A MINIMUM 3/4-INCH CONDUIT SHALL BE PROVIDED FROM THE TELECOMMUNICATIONS CLOSET TO SERVE EACH WALL-MOUNTED PUBLIC TELEPHONE. IN DISCUSSION WITH THE TELEPHONE PROVIDER, AND WHERE IT IS DESIRABLE TO CONCEAL THE OUTLET BOX DIRECTLY BEHIND THE TELEPHONE, THE CENTER OF THE OUTLET BOX SHALL BE LOCATED 48-INCHES ABOVE THE FINISHED FLOOR. FOR RECESSED APPLICATIONS. THE CONDUIT AND BOX SHALL BE INSTALLED TO SUIT THE SPECIFIC TYPE OF MOUNTING. REFER TO APPLICABLE CODES, ADA GUIDELINES, UNIFORM FEDERAL ACCESSIBILITY STANDARDS, MANUFACTURES SPECIFICATIONS AND ANSI STANDARDS FOR ADDITIONAL REQUIREMENTS.

7. WHERE A TELECOMMUNICATIONS CONDUIT IS TO BE INSTALLED TO A DEVICE EXPOSED TO THE WEATHER, CARE SHALL BE TAKEN TO PREVENT THE INGRESS OF MOISTURE. CARE SHALL ALSO BE TAKEN TO ENSURE THAT MOISTURE WILL NOT COLLECT IN LOW POINTS. FREEZE AND DAMAGE THE CABLE. NONMETALLIC CONDUIT SHALL BE UV RESISTANT AND MARKED ACCORDINGLY.

8. CONDUITS SHALL BE REAMED TO ELIMINATE SHARP EDGES. METALLIC CONDUIT SHALL BE TERMINATED WITH AN INSULATED BUSHING.

9. REFER TO ANSI/TIA/EIA-606 FOR ADMINISTRATION OF THE CONDUIT SYSTEM IDENTIFICATION. 10. ALL CONDUITS SHALL BE PROVIDED WITH PULL STRINGS.

11. OUTLET BOXES SHALL BE NO SMALLER THAN 2-INCHES WIDE, 3-INCHES HIGH AND 2.5-INCHES DEEP. THIS WILL ACCOMODATE ONE OR TWO 3/4-INCH CONDUITS. WHERE A LARGER CONDUIT IS REQUIRED, THE BOX SHALL BE INCREASED ACCORDINGLY. A MAXIMUM 1-1/4-INCH CONDUIT WILL REQUIRE A 4-11/16-INCH x 4-11/16-INCH x 2-1/2-INCH BOX.

12. CONDUIT TYPES SHALL BE ELECTRICAL METALLIC TUBING (EMT) OR RIGID METAL CONDUIT. LOCATIONS SUBJECT TO MOISTURE SHALL BE RIGID PVC. FLEXIBLE CONDUIT SHALL NOT BE USED FOR TELE/DATA RACEWAYS.

13. CONDUIT REQUIREMENTS FOR SUPPORT, END PROTECTION AND CONTINUITY SHALL COMPLY WITH APPROPRIATE ELECTRICAL CODES.

14. CONDUIT AND BOXES FOR TELE/DATA WIRING SHALL BE DEDICATED TO THOSE SYSTEMS. POWER WIRING SHALL BE KEPT OUT OF CONDUIT AND BOXES DEDICATED TO TELE/DATA WIRING. 15. CONDUIT SIZE FOR MAXIMUM NUMBER OF CABLES (SEE TABLE BELOW):

Conduit		Maximum number of cables based upon allowable fill								
Trade			Ca	able Out	side Diar	neter in I	Inches			
0120	0.13	0.18	0.22	0.24	0.29	0.31	0.37	0.53	0.62	0.70
1/2"	1	1	0	0	0	0	0	0	0	0
3/4"	6	5	4	3	2	2	1	0	0	0
1"	8	8	7	6	3	3	2	1	0	0
1-1/4"	16	14	12	10	6	4	3	1	1	1
1-1/2"	20	18	16	15	7	6	4	2	1	1
2"	30	26	22	20	14	12	7	4	3	2
2-1/2"	45	40	36	30	17	14	12	6	3	3
3"	70	60	50	40	20	20	17	7	6	6
3-1/2"	-	-	-	-	-	-	22	12	7	6
4"	-	-	-	-	-	-	30	14	12	7

GROUND

CONDUCTOR AWG.

#12

#10

#10

#10

RECEPTACLE BRANCH CIRCUIT

WIRING SCHEDULE

MAXIMUM CONDUCTOR

LENGTH AT 120V

100'-0"

165'-0"

255'-0"

405'-0"

RECEPTACLE BRANCH CIRCUIT WIRING SCHEDULE NOTES:

1. BASED ON 20A CIRCUIT LOADED TO 9A USING SINGLE PHASE, 2 WIRE

FROM PANEL TO CENTER OF LEAD TO OVERCOME VOLTAGE DROP.

TRANSITION TO #12 WIRE FOR FINAL TERMINATIONS TO DEVICE AS

3. MAKE PROVISIONS FOR JUNCTION BOX ADJACENT TO OUTLET TO

2. THE ABOVE SCHEDULE REPRESENTS MINIMUM CONDUCTOR SIZE BASED

CONDUCTOR

AWG.

#12

#10

#8

#6

CIRCUITS.

REQUIRED.

LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULECONDUCTOR AWG.MAXIMUM CONDUCTOR LENGTH AT 120VGROUND CONDUCTOR LENGTH AT 277V#1275'-0"175'-0"#1275'-0"175'-0"#10120'-0"285'-0"#8190'-0"445'-0"#6300'-0"-LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES:1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.								
CONDUCTOR AWG.MAXIMUM CONDUCTOR LENGTH AT 120VMAXIMUM CONDUCTOR LENGTH AT 277VGROUND CONDUCTOR AWG.#1275'-0"175'-0"#12#10120'-0"285'-0"#10#8190'-0"445'-0"#10#6300'-0"-#10LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES:1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.	LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE							
#12 75'-0" 175'-0" #12 #10 120'-0" 285'-0" #10 #8 190'-0" 445'-0" #10 #6 300'-0" - #10 LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES: 1. BASED ON 2000 CIRCUIT LOADED TO 12A USING SUBLE PHASE, 2 WIRE CIRCUITS.	CONDUCTOR AWG.	MAXIMUM CONDUCTOR LENGTH AT 120V	MAXIMUM CONDUCTOR LENGTH AT 277V	GROUND CONDUCTOR AWG.				
#10 120'-0" 285'-0" #10 #8 190'-0" 445'-0" #10 #6 300'-0" - #10 #6 300'-0" - #10 Image: Solution of the state of th	#12	75'-0"	175'-0"	#12				
#8 190'-0" 445'-0" #10 #6 300'-0" - #10 LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES: - #10 1. BASED ON 20X CIRCUIT LOADED TO 12A USING SUBLE PHASE, 2 WIRE CIRCUITS. - -	#10	120'-0"	285'-0"	#10				
#6 300'-0" - #10 LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES: 1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.	#8	190'-0"	445'-0"	#10				
LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES: 1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.	#6	300'-0"	-	#10				
1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.	LUMINAIRE BR	ANCH CIRCUIT WIR	RING SCHEDULE NO	DTES:				
	1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.							
2. THE ABOVE SCHEDULE REPRESENTS MINIMUM CONDUCTOR SIZE BAS FROM PANEL TO CENTER OF LEAD TO OVERCOME VOLTAGE DROP.								
3. MAKE PROVISIONS FOR JUNCTION BOX ADJACENT TO OUTLET TO TRANSITION TO #12 WIRE FOR FINAL TERMINATIONS TO DEVICE AS REQUIRED.	3. MAKE PROV TRANSITION T REQUIRED.							

ABBREVIATIONS								
AAMPERESADAAMERICANS WITH DISABILITIES ACTAMPSAMPERESAFFABOVE FINISHED FLOORA/CAIR CONDITIONINGAWGAMERICAN WIRE GAGECCONDUITC/BCIRCUIT BREAKERCFCOMPACT FLUORESCENTCLGCEILINGDNDOWN	DWGDRAWINGE.C.ELECTRICAL CONTRACTOREQEQUALETREXISTING TO REMAINEREXISTING TO BE REMOVEERLEXISTING TO BE RE-LOCAF.A.FIRE ALARMFACPFIRE ALARM CONTROL PAFLRFLOORG.C.GENERAL CONTRACTOR	GFCIGROUND FAULT CIRCUIT INTERUPTER.ORGGROUNDGNDGROUNDHVACHEATING, VENTILATING, & & & AIR CONDITIONINGTEDI.T.INFORMATION TECHNOLOGYJBJUNCTION BOXNELKVAKILOVOLT-AMPERESKWKILOWATTLTGLIGHTING MAXMAXMAXIMUM	M.C.MECHANICAL CONTRACTORMECHMECHANICALMINMINIMUMMTDMOUNTEDNACF.A. NOTIFICATION APPLIANCE CIRCUIT EXPANDER PANELNECNATIONAL ELECTRICAL CODENTSNOT TO SCALEPPOLEP.C.PLUMBING CONTRACTORPNLPANEL	RERE-LOCATED DEVICE OR EQUIPMENT SHOWN IN NEW LOCATIONTYPTYPICALULUNDERWRITERS LABATORYUONUNLESS OTHERWISE NOTEDUPSUNINTERRUPTIBLE POWER SUPPLYVVOLTSWWATTSWPWEATHER-PROOF©CENTERLINE				

1. FURNISH LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR THE PROPER AND COMPLETE INSTALLATION OF ALL ELECTRIC WORK SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED. 2. ALL ITEMS NOT SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE ELECTRICAL INSTALLATION, SHALL BE FURNISHED AND INSTALLED AS PART OF THIS PROJECT.

3. ALL ELECTRICAL INSTALLATIONS AND GROUNDING SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE LOCAL, STATE AND NATIONAL CODES.

4. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS. 5. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KIND AND IN FULL ACCORDANCE WITH THE MOST MODERN ELECTRICAL CONSTRUCTION STANDARDS. ALL MATERIAL SHALL BE NEW, UNLESS OTHERWISE NOTED AND FREE OF ANY DEFECTS.

6. THE ELECTRICAL CONTRACTOR SHALL CLEAN AT THE END OF EACH DAY ALL AREAS WORKED IN. EMPTY BOXES, RUBBISH, AND OTHER CONSTRUCTION MATERIALS OF NO USE SHALL BE REMOVED FROM THE BUILDING.

7. ALL WORK SEQUENCES SHALL BE COORDINATED WITH THE G.C. AND SHALL BE COORDINATION WITH OTHER BUILDING TRADES AND G.C. BUILDING SCHEDULES. 8. ALL BRANCH CIRCUITS RATED AT 120 VOLTS, 20 AMPERES EXCEEDING 75 FEET SHALL BE MINIMUM

#10 AWG.

9. THE ELECTRICAL CONTRACTOR (E.C.) SHALL COORDINATE WITH THE LOCAL UTILITY POWER COMPANY AND PROVIDE ALL MATERIAL & LABOR REQUIRED TO COMPLY WITH THE UTILITY POWER COMPANY'S REQUIREMENTS AND STANDARDS, PRIOR TO ORDERING ANY ELECTRICAL EQUIPMENT. SUCH AS, SWITCHGEAR, PANELS, TRANSFORMERS, DISCONNECT SWITCHES, ETC... E.C. SHALL CONFIRM METERING SEQUENCE (HOT OR COLD) AND MAKE THE APPROPRIATE PROVISIONS FOR THE APPROVED METERING SEQUENCE ARRANGEMENT. A.I.C. RATINGS, GROUNDING, BONDING, RACEWAYS, ETC... SHALL BE IN ACCORDANCE WITH THE UTILITY COMPANY'S STANDARDS.

10. THE ELECTRICAL CONTRACTOR (E.C.) SHALL COORDINATE WITH THE LOCAL TELEPHONE COMPANY AND PROVIDE ALL MATERIAL & LABOR REQUIRED TO COMPLY WITH THE TELEPHONE COMPANY'S REQUIREMENTS AND STANDARDS, PRIOR TO ODERING ANY ELECTRICAL EQUIPMENT, SUCH AS, TERMINAL BOARDS, GROUNDING, RACEWAYS, ETC...

11. ALL RECEPTACLE WITH "WP" DESIGNATION SHALL BE PROVIDED WITH A WEATHER-PROOF WHILE IN-USE ENCLOSURE. (TYPICAL)

12. ELECTRICAL CONTRACTOR TO ALLOW TIME FOR DIRECTIONAL ADJUSTMENT OF ALL LIGHT FIXTURES AS DIRECTED BY OWNER. 13. ALL RECEPTACLES SHALL BE LABELED INDICATING THEIR RESPECTIVE PANEL & CIRCUIT NUMBER.

14. AT EXISTING FLOOR SLABS AND WALLS TO BE CORE-DRILLED OR CUT, THE CONTRACTOR SHALL FIND AND MARK ALL EXISTING REINFORCING, PIPING, CONDUIT & FEEDERS, ETC IN BOTH FACES LOCATED BY MEANS OF X-RAY, PACH-OMETER, OR PROFOMETER. SUBMIT DRAWING SHOWING LOCATIONS OF EXISTING REBAR, PIPING AND/OR CONDUIT AND PROPOSED CORES AND/OR CUTS FOR REVIEW.

15. ALL PENETRATIONS FOR POWER RECEPTACLES, JUNCTION BOXES, TELEPHONE/DATA OUTLETS, SWITCHES, BACKBOXES, ETC.. LOCATED IN EXTERIOR WALLS SHALL BE PROVIDED WITH APPROPRIATE CAULKING AND GASKETS TO SEAL OFF AND PREVENT AIR LEAKAGE. FOLLOW CAULKING AND GASKET MANUFACTURERS INSTALLATION GUIDELINES TO ENSURE CORRECT AND EFFECTIVE INSTALLATION. 16. WHERE "TV" POWER RECEPTACLES AND TELEVISION LOW VOLTAGE OUTLETS ARE SHOWN ON THE

PLANS THEY SHALL BE INSTALLED USING A LOW-VOLTAGE RECESSED MEDIA PLATE WITH DUPLEX RECEPTACLE EQUAL TO COMMERCIAL ELECTRIC #5310-WH.PROVIDE POWER RECEPTACLE BACK-BOX AS REQUIRED OR PER THE OWNER'S STANDARDS & DIRECTION (COORDINATE WITH OWNER PRIOR TO ANY WORK. (TYPICAL)

TYPICAL ELECTRICAL NOTES

ADDITIONAL SCOPE OF WORK

REFER TO INFORMATION TECHNOLOGY (IT) AND SECURITY DRAWINGS AND/OR COORDINATE WITH OWNER'S VENDOR FOR ADDITIONAL SCOPE OF WORK INCLUDING CONDUITS AND PATHWAYS, CABLE-TRAY, BACK-BOXES. CABLING AND GROUNDING REQUIREMENTS TO BE PROVIDED BY THIS CONTRACTOR AS PART OF THE ELECTRICAL SCOPE OF WORK.

RETURN AIR PLENUM NOTE

ALL CABLES AND WIRING INSTALLED ABOVE RETURN AIR PLENUM CEILINGS SHALL BE UL LISTED AND APPROVED FOR USE IN RETURN AIR PLENUM SPACES PER CODE. VERIFY EXACT LOCATIONS WITH OWNER, G.C. AND M.C. PRIOR TO BID. (TYPICAL)

	WIRING DEVICE LEGEND				
φ	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	18" A.F.F.			
P	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	42" A.F.F. OR 6" ABOVE COUNTER			
Ψ	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE WITH GROUND FAULT PROTECTION.	18" A.F.F.			
Щ.	DUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE WITH GROUND FAULT PROTECTION.	42" A.F.F. OR 6" ABOVE COUNTER			
P	SPECIAL NEMA CONFIGUATION OUTLET; VERIFY NEMA TYPE WITH EQUIPMENT TO BE SERVED.				
#	QUADRUPLEX CONVENIENCE OUTLET; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	18" A.F.F.			
Ø	DUPLEX CONVENIENCE OUTLET IN FLOOR BOX; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	FLOOR			
	DUPLEX CONVENIENCE OUTLET IN CEILING; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	CEILING			
⊕	QUAD-RUPLEX CONVENIENCE OUTLET IN FLOOR BOX; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	FLOOR			
	QUAD-RUPLEX CONVENIENCE OUTLET IN CEILING; 125 VOLT, 20 AMPERE, U-SLOT GROUNDING TYPE.	CEILING			
J	JUNCTION BOX; SIZE AS REQUIRED PER CODE.				
R	RELAY; REFER TO PLANS FOR RATINGS.				
С	CONTACTOR; REFER TO PLANS FOR RATINGS.				
ТС	TIMECLOCK; REFER TO DETAILS ON PLANS.				
6	MOTOR; REFER TO PLANS FOR DETAILS.				
60/50	FUSED DISCONNECT SWITCH. 60/50 INDICATES FRAME SIZE/FUSE SIZE IN THAT ORDER. STARTERS FOR HVAC EQUIPMENT BY MECHANICAL CONTRACTOR.				
	SURFACE MOUNTED PANELBOARD; 208Y/120V, 3-PHASE, 4-WIRE. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.	MOUNT 6'-6" AFF TO TOP BREAKER.			
	RECESSED MOUNTED PANELBAORD; 208Y/120V, 3-PHASE, 4-WIRE. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.	MOUNT 6'-6" AFF TO TOP BREAKER.			
	SURFACE MOUNTED PANELBOARD; 480Y/1277V, 3-PHASE, 4-WIRE. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.	MOUNT 6'-6" AFF TO TOP BREAKER.			
	RECESSED MOUNTED PANELBAORD; 480Y/1277V, 3-PHASE, 4-WIRE. REFER TO DRAWINGS FOR ADDITIONAL INFORMATION.	MOUNT 6'-6" AFF TO TOP BREAKER.			
Ļ	GROUNDING CONDUCTOR / MEANS & METHOD; IN ACCORDANCE WITH THE <u>"NATIONAL ELECTRIC CODE"</u> , (NEC). REFER TO PLANS FOR SIZING.				
P	RECESSED FLOOR-BOX POKE-THRU WITH POWER FURNITURE FEED (MINIMUM 1" CONDUIT). REFER TO DETAIL ON DRAWING E307.	FLOOR			
O J	RECESSED FLOOR-BOX POKE-THRU WITH COMMUNICATIONS FURNITURE FEED (MINIMUM 2" CONDUIT). REFER TO DETAIL ON DRAWING E307.	FLOOR			
NOTES: 1. DE' INS	VICES WITH THE FOLLOWING SUBSCRIPTS SHALL BE PROVIDED & UL LISTED TO BI STALLED / WIRED AS NOTED: H - HOSPITAL GRADE IG - ISOLATED GROUND T - TAMPER RESISTANT	E			
2. TH FUI FLL	E ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE G.C. FOR WALLS BEIN RRED-OUT WITH SHEETROCK DRYWALL SO OUTLET BOXES & DEVICES CAN BE INS JSH WITHIN THE WALLS. (TYPICAL)	IG STALLED			
3. ALI NA	L RECEPTACLES SHALL BE PROVIDED WITH AN ADHERED, TYPED LABEL INDICATIN ME AND CIRCUIT NUMBER. HANDWRITTEN LABELS WILL NOT BE ACCEPTED.	IG PANEL			
4. ALI CIF	L RECEPTACLES WITH A DEDICATED CIRCUIT SHALL BE LABELED WITH PANEL NAM RCUIT NUMBER AS INDICATED IN NOTE #3 AS WELL AS LABELED " <u>DEDICATED".</u>	1E AND			
 ALL COLORS OF RECEPTACLES AND ASSOCIATED FACEPLATES TO BE CONFIRMED WITH OWNER'S REPRESENTATIVE AND LOCAL (AHJ) PRIOR TO ANY SUBMITTALS, PURCHASE AND/OR INSTALLATION OF EQUIPMENT. THIS REQUIREMENT AS INDICATED IN NOTE #11 SHALL BE CORRECTED AS REQUIRED. 					
6. ALI RE INS SH	L TYPES AND LOCATIONS OF RECEPTACLES TO BE CONFIRMED WITH OWNER'S PRESENTATIVE AND LOCAL (AHJ) PRIOR TO ANY SUBMITTALS, PURCHASE AND/OR STALLATION OF EQUIPMENT. FAILURE OF THIS REQUIREMENT AS INDICATED IN NO ALL BE CORRECTED AS REQUIRED.	DTE #3			
7. AN RE ELE AN CO	Y CONFLICT WITH RECEPTACLE LOCATIONS, TYPES OF RECEPTACLES OR COLOR CEPTACLES WITH OWNER'S REPRESENTATIVE OR WILL BE THE RESPONSIBILITY C ECTRICAL CONTRACTOR, AND GENERAL CONTRACTOR TO PROVIDE ALL ADDITION D EXPENSES TO REPAIR AND CORRECT. NO ADDITIONAL REIMBURSEMENTS OR TI MPLETION FOR WORK WILL BE ALLOWED.	S OF DF THE AL WORK ME OF			
8. ALI ILL	L RECEPTACLES LOCATED WITHIN HEATHCARE FACILITIES SHALL BE PROVIDED W UMINATED FACE, OR INDICATOR LIGHT.	'ITH AN			
9. IT S INS	SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH LOCAL (AH STALLATIONS AND REQUIREMENTS.	J) FOR ALL			
<u> </u>					

LIGHTING CONTROL LEGEND						
SYMBOL	DESCRIPTION	MOUNTING				
SM	MANUAL MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERLOADS.	48" A.F.F.				
Sa	SINGLE POLE SWITCH; "a" INDICATES LIGHTING FIXTURES CONTROLLED.	48" A.F.F.				
S3a	THREE-WAY SWITCH; "a" INDICATES LIGHTING FIXTURES CONTROLLED.	48" A.F.F.				
WS	WALL SWITCH VACANCY SENSOR (MANUAL "ON" AND AUTOMATIC "OFF") INSTALL PER MANUFACTURERS INSTRUCTIONS.	48" A.F.F.				
SK	KEYED SWITCH; REFER TO PLANS FOR NUMBER OF POLES AND FIXTURES CONTROLLED	48" A.F.F.				
PC	PHOTOCELL	-				
MS	ULTRASONIC VACANY SENSOR 360-DEGREES CAPABILITY. PROVIDE POWER PACK & WIRE PER MANUFACTURERS INSTRUCTIONS FOR MANUAL "ON" WITH WALL LOW VOLTAGE SWITCH AND AUTOMATIC "OFF" WITH SENSOR. SET DELAY TIMES FOR 15 MINUTES.	CEILING				
PP	POWER PACK FOR "MS" VACANCY SENSORS. WIRE PER MANUFACTURERS INSTRUCTIONS FOR MANUAL "ON" WITH WALL LOW VOLTAGE SWITCH AND AUTOMATIC "OFF" WITH SENSOR.	-				
DH	CEILING MOUNTED DAY-LIGHT HARVESTING SENSOR. VERIFY MOUNTING AND LOCATION FOR OPTIMAL CONTROL.	CEILING				
NOTES: • E.	NOTES: • E.C. SHALL FURNISH AND INSTALL ALL DEVICES AND ACCESSORIES FOR A COMPLETE LIGHTING CONTROL					
INSTALLATION.						
• C(JORDINATE EXACT REQUIREMENTS FOR INSTALLATION WITH LIGHTING CONTROL REPRESENTATIV	E.				

SEISMIC RESTRAINT NOTE

- CONSTRUCTION STANDARDS, THE MOST STRINGENT SHALL APPLY.
- IN THE APPLICABLE BUILDING CODE.
- ACCORDANCE WITH THE APPLICABLE SEISMIC ZONE.
- ISOLATORS AND RIGIDLY MOUNTED EQUIPMENT.

- JOB CONDITIONS.

- 2. THE SEALANT SUPPLIED SHALL BE A TWO STAGED INTUMESCENT AND CAPABLE OF EXPANDING UP TO 8 TIMES ITS ORIGINAL VOLUME.
- 3. THE SEALANT SUPPLIED SHALL CONTAIN NO ASBESTOS, NO FIBERGLASS, AND NO SOLVENTS
- SURROUNDING SURFACES AND SHALL BE IMPERVIOUS TO WATER WHEN DRY.
- WITH ARCHITECT.

. GENERAL: IT IS THE INTENT OF THIS SEISMIC SPECIFICATION TO KEEP ALL ELECTRIAL BUILDING SYSTEM COMPONENTS IN PLACE DURING A SEISMIC EVENT. ALL ELECTRICAL SYSTEMS MUST BE INSTALLED IN STRICT ACCORDANCE WITH SEISMIC CODES, COMPONENT MANUFACTURER'S AND BUILDING CONSTRUCTION STANDARDS. WHENEVER A CONFLICT OCCURS BETWEEN THE MANUFACTURER'S OR

SEISMIC RESTRAINTS SHALL BE DESIGNED IN ACCORDANCE WITH SEISMIC FORCE LEVELS AS DETAILED

1. ALL EQUIPMENT, CONDUIT AND PULL BOXES SHALL BE ADEQUATELY RESTRAINED TO RESIST SEISMIC FORCES. RESTRAINT DEVICES SHALL BE DESIGNED AND SELECTED TO MEET SEISMIC REQUIREMENTS AS DEFINED IN THE LATEST ISSUE OF THE BOCA NATIONAL BUILDING CODE IN

2. ANCHOR BOLT CALCULATORS, SIGNED AND STAMPED BY A REGISTERED PROFESSIONAL ENGINEER, SHALL BE SUBMITTED SHOWING ADEQUACY OF THE BOLT SIZING AND TYPE. STAMPED CALCULATIONS SHALL ALSO BE FURNISHED FOR ANCHORS ON RESTRAINT DEVICES, CABLES,

TYPICAL FIRE STOPPING NOTES

<u>GENERAL:</u> FIRE STOPPING SHALL BE PROVIDED BY THIS CONTRACTOR FOR ALL FLOOR, CEILING AND FIRE RATED WALL PENETRATIONS FOR CONDUIT, SLEEVES AND/OR CABLING AS REQUIRED BY

B. THE CONTRACTOR SHALL PROVIDE A FIRE STOP SYSTEM IN ACCORDANCE WITH THE FOLLOWING:

1. THE SYSTEM SHALL CONSIST OF A WATERBASED SEALANT AND SUITABLE DAMMING MATERIALS (WHERE REQUIRED) AND BE INSTALLED PER MANUFACTURER'S REQUIREMENTS.

NOT CORROSIVE MINERAL SALTS OF ANY KIND. 4. THE SEALANT SHALL FORM A SURFACE CAPABLE OF BEING SANDED AND PAINTED TO MATCH

5. THE FIRE STOP SYSTEM SHALL BE TESTED TO THE TIME/TEMPERATURE REQUIREMENTS OF ASTM E119 AND SHALL BE UL1479 (ASTM E814) AND CLASSIFIED FOR UP TO 3 HOURS.

6. THE FIRE STOP SEALANT SHALL BE SPECSEAL SEALANT AS MANUFACTURED BY SPECIFIED TECHNOLOGIES, INC. OR APPROVED EQUAL.

SPECIAL CARE SHALL BE TAKEN WITH ELECTRICAL SYSTEMS NOT TO COMPROMISE ANY OF THE BUILDING FIRE PARTITIONS, FLOORS, WALLS OR MEMBRANES. PROVIDE ALL FIRESTOPPING REQUIRED TO COMPLY WITH THE BUILDING CODE, THE ELECTRICAL CODE AND THE UL LISTING OF EACH ASSEMBLY. COORDINATE LOCATIONS AND TYPES OF MEMBRANES

A	AMPERES	F.A.	FIRE ALARM
ADA	AMERICANS WITH DISABILITIES ACT	FACP	FIRE ALARM CONTR
		FLR G.C.	FLOOR GENERAL CONTRAC
A/C	AIR CONDITIONING	GFCI	GROUND FAULT CIR
C	CONDUIT	G GND	GROUND
C/B CF		HVAC	HEATING, VENTILAT
CLG	CEILING	JB	JUNCTION BOX
€ DN		KVA KW	KILOVOLT-AMPERE KILOWATT
DWG	DRAWING	LTG	
E.C. FO	ELECTRICAL CONTRACTOR	MAX M.C.	MECHANICAL CONT
ETR	EXISTING TO REMAIN	MECH	MECHANICAL
ER ERL	EXISTING TO BE REMOVED EXISTING TO BE RE-LOCATED	MIN MTD	MINIMUM MOUNTED
		-	

ABBREVIATIONS

F.A.		NAC	F.A. NO CIRCU
FACP FLR	FIRE ALARM CONTROL PANEL	NEC	NATIO
G.C.	GENERAL CONTRACTOR	NTS	NOT T
GFCI	GROUND FAULT CIRCUIT INTERUPTER.	P P.C.	POLE PLUME
G	GROUND	PNL	PANEL
GND HVAC	GROUND HEATING, VENTILATING, & & AIR CONDITIONING	RE	RE-LO EQUIP LOCAT
JB	JUNCTION BOX	TYP	TYPIC
KVA KW	KILOVOLT-AMPERES KILOWATT	UL	UNDEF
LTG	LIGHTING	UON	UNLES
MAX M.C.	MAXIMUM MECHANICAL CONTRACTOR	UPS	UNINT SUPPL
MECH	MECHANICAL	V	VOLTS
MINI		W	WATT
MTD	MOUNTED	WP	WEAT

AUDIO VISUAL ALARM

	_
FIRE ALARM PU	ÍL
OR NURSE CAL	L
EMERGENCY P	U

RECEPTACLE ----

RECEPTACLE BRANCH CIRCUIT WIRING SCHEDULE												
CONDUCTOR AWG.	MAXIMUM CONDUCTOR LENGTH AT 120V	GROUND CONDUCTOR AWG.										
#12	100'-0"	#12										
#10	165'-0"	#10										
#8	255'-0"	#10										
#6	405'-0"	#10										
RECEPTACLE	BRANCH CIRCUIT WIRING SCHE	DULE NOTES:										
1. BASED ON 2 CIRCUITS.	0A CIRCUIT LOADED TO 9A USIN	NG SINGLE PHASE, 2 WIRE										

2. THE ABOVE SCHEDULE REPRESENTS MINIMUM CONDUCTOR SIZE BASED

FROM PANEL TO CENTER OF LEAD TO OVERCOME VOLTAGE DROP. 3. MAKE PROVISIONS FOR JUNCTION BOX ADJACENT TO OUTLET TO TRANSITION TO #12 WIRE FOR FINAL TERMINATIONS TO DEVICE AS REQUIRED

LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE

CONDUCTOR AWG.	MAXIMUM CONDUCTOR LENGTH AT 120V	MAXIMUM CONDUCTOR LENGTH AT 277V	GROUND CONDUCTOR AWG.						
#12	75'-0"	175'-0"	#12						
#10	120'-0"	285'-0"	#10						
#8	190'-0"	445'-0"	#10						
#6	300'-0"	-	#10						
LUMINAIRE BRANCH CIRCUIT WIRING SCHEDULE NOTES:									

1. BASED ON 20A CIRCUIT LOADED TO 12A USING SINGLE PHASE, 2 WIRE CIRCUITS.

2. THE ABOVE SCHEDULE REPRESENTS MINIMUM CONDUCTOR SIZE BASED FROM PANEL TO CENTER OF LEAD TO OVERCOME VOLTAGE DROP. 3. MAKE PROVISIONS FOR JUNCTION BOX ADJACENT TO OUTLET TO TRANSITION TO #12 WIRE FOR FINAL TERMINATIONS TO DEVICE AS REQUIRED.

TYPICAL ELECTRICAL NOTES

- ELECTRIC WORK SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED.
- THE LOCAL, STATE AND NATIONAL CODES.
- 4. OBTAIN AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS. ANY DEFECTS.
- AND G.C. BUILDING SCHEDULES.
- WITH THE UTILITY COMPANY'S STANDARDS.
- ELECTRICAL EQUIPMENT, SUCH AS, TERMINAL BOARDS, GROUNDING, RACEWAYS, ETC ...

- 13. ALL RECEPTACLES SHALL BE LABELED INDICATING THEIR RESPECTIVE PANEL & CIRCUIT NUMBER.
- EFFECTIVE INSTALLATION.

NOTES:

1. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN CONTRACT. INFORMATION AND COMPONENTS SHOWN ON RISER DIAGRAMS BUT NOT ON PLANS, AND VICE VERSA, SHALL APPLY OR SHALL BE PROVIDED AS THOUGH EXPRESSLY REQUIRED ON BOTH. IT IS NOT INTENDED THAT EVERY JUNCTION BOX, OFFSET, FITTING OR COMPONENT BE SPECIFIED OR SHOWN ON DRAWINGS; HOWEVER, CONTRACT DOCUMENTS REQUIRE PROVISION OF ALL COMPONENTS AND MATERIALS NECESSARY FOR COMPLETE AND OPERATIONAL ELECTRICAL INSTALLATION, WHETHER OR NOT INDICATED OR SPECIFIED.

2. BRANCH CIRCUIT WIRING MAY NOT BE GRAPHICALLY SHOWN ON DRAWINGS AND MAY BE SHOWN BY CIRCUIT NUMBERS BESIDE FIXTURES, DEVICES AND EQUIPMENT. PROVIDE COMPLETE WIRING SYSTEM WHETHER OR NOT SHOWN GRAPHICALLY. WIRING IS SHOWN BY CONDUIT RUNS ON DRAWINGS WHERE SPECIFIC ROUTING IS REQUIRED OR FOR OTHER SPECIAL REASONS. ONLY ROOMS WITH MULTIPLE SWITCHING HAVE "SWITCH CONTROL LETTERS" ASSIGNED. PROVIDE THHN CONDUCTORS IN AREAS WITH HIGH AMBIENT TEMPERATURES SUCH AS BOILER ROOMS, INCINERATOR ROOMS, MECHANICAL EQUIPMENT ROOMS ETC., FOR SIZES LARGER THAN NO. 10 AWG.

TYPICAL CIRCUITING DETAIL NOT TO SCALE

NOTES:

ATTACHED.

INCHES.

1. FURNISH LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR THE PROPER AND COMPLETE INSTALLATION OF ALL

2. ALL ITEMS NOT SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS, BUT WHICH ARE NECESSARY TO MAKE A COMPLETE ELECTRICAL INSTALLATION, SHALL BE FURNISHED AND INSTALLED AS PART OF THIS PROJECT.

3. ALL ELECTRICAL INSTALLATIONS AND GROUNDING SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF

5. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KIND AND IN FULL ACCORDANCE WITH THE MOST MODERN ELECTRICAL CONSTRUCTION STANDARDS. ALL MATERIAL SHALL BE NEW, UNLESS OTHERWISE NOTED AND FREE OF

6. THE ELECTRICAL CONTRACTOR SHALL CLEAN AT THE END OF EACH DAY ALL AREAS WORKED IN. EMPTY BOXES, RUBBISH, AND OTHER CONSTRUCTION MATERIALS OF NO USE SHALL BE REMOVED FROM THE BUILDING.

7. ALL WORK SEQUENCES SHALL BE COORDINATED WITH THE G.C. AND SHALL BE COORDINATION WITH OTHER BUILDING TRADES

8. ALL BRANCH CIRCUITS RATED AT 120 VOLTS, 20 AMPERES EXCEEDING 75 FEET SHALL BE MINIMUM #10 AWG.

9. THE ELECTRICAL CONTRACTOR (E.C.) SHALL COORDINATE WITH THE LOCAL UTILITY POWER COMPANY AND PROVIDE ALL MATERIAL & LABOR REQUIRED TO COMPLY WITH THE UTILITY POWER COMPANY'S REQUIREMENTS AND STANDARDS, PRIOR TO ORDERING ANY ELECTRICAL EQUIPMENT, SUCH AS, SWITCHGEAR, PANELS, TRANSFORMERS, DISCONNECT SWITCHES, ETC... E.C. SHALL CONFIRM METERING SEQUENCE (HOT OR COLD) AND MAKE THE APPROPRIATE PROVISIONS FOR THE APPROVED METERING SEQUENCE ARRANGEMENT. A.I.C. RATINGS, GROUNDING, BONDING, RACEWAYS, ETC... SHALL BE IN ACCORDANCE

10. THE ELECTRICAL CONTRACTOR (E.C.) SHALL COORDINATE WITH THE LOCAL TELEPHONE COMPANY AND PROVIDE ALL MATERIAL & LABOR REQUIRED TO COMPLY WITH THE TELEPHONE COMPANY'S REQUIREMENTS AND STANDARDS, PRIOR TO ODERING ANY

11. ALL RECEPTACLE WITH "WP" DESIGNATION SHALL BE PROVIDED WITH A WEATHER-PROOF WHILE IN-USE ENCLOSURE. (TYPICAL)

12. ELECTRICAL CONTRACTOR TO ALLOW TIME FOR DIRECTIONAL ADJUSTMENT OF ALL LIGHT FIXTURES AS DIRECTED BY OWNER.

14. ALL PENETRATIONS FOR POWER RECEPTACLES, JUNCTION BOXES, TELEPHONE/DATA OUTLETS, SWITCHES, BACKBOXES, ETC... LOCATED IN EXTERIOR WALLS SHALL BE PROVIDED WITH APPROPRIATE CAULKING AND GASKETS TO SEAL OFF AND PREVENT AIR LEAKAGE. FOLLOW CAULKING AND GASKET MANUFACTURERS INSTALLATION GUIDELINES TO ENSURE CORRECT AND

1. PROVIDE GROUND BAR (1/4" X 4" X 12") WITH WALL MOUNTING BRACKETS, INSULATORS AND A 25' EXOTHERMICALLY WELDED PIGTAIL (#6 AWG) IN EACH LAN ROOM & COMMUNICATIONS ROOM.

2. MOUNT GROUND BAR AT THE BOTTOM RIGHT CORNER ON THE PLYWOOD BACKBOARD.

3. GROUND BARS SHALL HAVE CAPACITY FOR NINE (9) GROUNDING LUGS TO BE

4. CONNECT EXOTHERMICALLY WELDED PIGTAIL TO BUILDING STEEL.

5. GROUND BARS SHALL BE ELECTROLYTIC COPPER AND SHALL BE MOUNTED ON INSULATORS RATED AT 2700 VOLTS.

6. COPPER SURFACES SHALL BE SMOOTH AND WITHOUT MARKS DEEPER THAN 0.010

7. MANUFACTURERS SHALL BE ERICO, HARGER OR APPROVED EQUAL.

TYPICAL GROUND BAR DETAIL

NOT TO SCALE

FIRE ALARM SYMBOL LEGEND									
SYMBOL	DESCRIPTION	MOUNTING							
(FIRE ALARM SYSTEM PHOTOELECTRIC SMOKE DETECTOR.	CEILING							
Ð	FIRE ALARM SYSTEM COMBINATION RATE OF RISE AND 135-DEGREES FAHRENHEIT FIXED TEMPERATURE HEAT DETECTOR. "AC" DESIGNATION INDICATES TO INSTALL HEAT DETECTOR "ABOVE CEILING".	CEILING							
H ₁₉₇	FIRE ALARM SYSTEM 197-DEGREES FAHRENHEIT FIXED TEMPERATURE HEAT DETECTOR.	CEILING							
B	FIRE ALARM SYSTEM DUCT SMOKE DETECTOR; INSTALLED BY HVAC CONTRACTOR & FURNISHED AND WIRED BY ELECTRICAL CONTRACTOR.	CEILING							
FS	FIRE SPRINKLER SYSTEM FLOW SWITCH; FURNISHED & INSTALLED BY F.P. CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR INTO THE FIRE ALARM SYSTEM VIA AN INDIVIDUAL ADDRESSABLE MONITOR MODULE.	VALVE							
(13)	FIRE SPRINKLER SYSTEM TAMPER SWITCH; FURNISHED & INSTALLED BY F.P. CONTRACTOR AND WIRED BY ELECTRICAL CONTRACTOR INTO THE FIRE ALARM SYSTEM VIA AN INDIVIDUAL ADDRESSABLE MONITOR MODULE.	VALVE							
R	FIRE ALARM SHUT DOWN RELAY.								
F	FIRE ALARM SYSTEM MANUAL DOUBLE ACTION PULL STATION.	48" AFF TO TOP OF HANDLE.							
F 75cd	FIRE ALARM SYSTEM STROBE. ALL STROBES SHALL BE SYNCHRONIZED AND COMPLY WITH ADA.	80" AFF							
75cd F LF WP	FIRE ALARM SYSTEM AUDIBLE/STROBE. ALL AUDIBLE/STROBES SHALL BE SYNCHRONIZED AND COMPLY WITH ADA. "WP" INDICATES TO PROVIDE WEATHER-PROOF DEVICE. "LF" INDICATES HORN SHALL BE 520Hz LOW-FREQUENCY TYPE DEVICE. "75cd" INDICATES CANDELA RATING OF STROBE.	80" AFF							
F LF	FIRE ALARM SYSTEM CEILING TYPE AUDIBLE/STROBE. ALL AUDIBLE/STROBES SHALL BE SYNCHRONIZED AND COMPLY WITH ADA. "WP" INDICATES TO PROVIDE WEATHER-PROOF DEVICE. "LF" INDICATES HORN SHALL BE 520Hz LOW-FREQUENCY TYPE DEVICE.	CEILING							
F LF	FIRE ALARM SYSTEM AUDIBLE ONLY. ALL AUDIBLE DEVICES SHALL BE SYNCHRONIZED AND COMPLY WITH ADA. "LF" INDICATES HORN SHALL BE 520Hz LOW-FREQUENCY TYPE DEVICE.	80" AFF							
CM	FIRE ALARM SYSTEM CONTROL MODULE.								
	FIRE ALARM SYSTEM MONITOR MODULE.								
RTS	FIRE ALARM SYSTEM DEVICE REMOTE TEST STATION WITH LED INDICATING LIGHT.								
RIL	FIRE ALARM SYSTEM DEVICE WITH LED INDICATING LIGHT TO DISPLAY ALARM CONDITION OF REMOTE DETECTOR. CENTER ABOVE DOOR.								
	FIRE ALARM DIALER. COORDINATE EXACT TIE IN WITH MANUFACTURER. LOCATE PER LOCAL AHJ.								
К	WEATHER-PROOF KNOX-BOX. LOCATE PER LOCAL AHJ.								
BDA	BI-DIRECTIONAL APPLICATION. LOCATE PER LOCAL AHJ.								
Ö B ^{WP}	FIRE ALARM SYSTEM BEACON. "WP" INDICATES TO PROVIDE WEATHER-PROOF DEVICE.								
F/SD	FIRE / SMOKE DAMPER PROVIDED BY THE MECHANICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AN INDIVIDUAL FIRE ALARM SYSTEM CONTROL RELAY MODULE AND TIE-IN DAMPER INTO THE FIRE ALARM SYSTEM. PROVIDE 120VAC POWER SUPPLY CIRCUIT AS REQUIRED.								
FACP	ADDRESSABLE FIRE ALARM CONTROL UNIT (PANEL).								
NAC	FIRE ALARM SYSTEM NOTIFICATION APPLIANCE CIRCUIT EXTENDER PANEL (BOOSTER).								

FIRE AL

BE DAMAGED BY BUILDING USE.

15. PROVIDE A WEATHER-PROOF KNOX-BOX 3200 SERIES ON THE EXTERIOR OF THE BUILDING. COORDINATE EXACT LOCATION WITH LOCAL FIRE DEPARTMENT.

16. ALL SMOKE DETECTORS SHALL BE MOUNTED ON THE CEILING AND UL LISTED FOR CEILING MOUNTING AND LOCATED NOT LESS THAN 12-INCHES FROM ANY WALL. DETECTORS SHALL NOT BE IN A DIRECT AIR FLOW NOR CLOSER THAN 3-FEET FROM ANY AIR SUPPLY DIFFUSER. (TYPICAL)

INSTALLATIONS.

18. FAULT ISOLATION MODULES SHALL BE INSTALLED FOR EVERY 25 DEVICES AND IN NO CASE SHALL THE LENGTH OF AN AREA BE

DISABLED BY A WIRE-TO-WIRE SHORT CIRCUIT FAULT EXCEED 200' IN ANY ONE DIRECTION. WHERE A SINGLE CIRCUIT SERVES MORE THAN ONE FLOOR; FAULT ISOLATION MODULES SHALL BE INSTALLED TO PREVENT A WIRE-TO-WIRE SHORT CIRCUIT FAULT ON ONE FLOOR TO DISABLE THE CIRCUIT ON ANOTHER FLOOR. 19. WIRING FOR THE FIRE ALARM SYSTEM SHALL BE CLASS "A".

20. REFER TO THE SPECIFICATIONS FOR THE "SEQUENCE OF OPERATION" AND ADDITIONAL INFORMATION.

21. E.C. SHALL PRODUCE A MANUFACTURER'S COMPLETE FIRE ALARM SYSTEM ONE-LINE DIAGRAM AND ADDRESS PLAN DURING THE SHOP DRAWING SUBMITTAL PROCESS.

22. E.C. SHALL PROVIDE ALARM INDICATORS AND HVAC EQUIPMENT OVERRIDE SWITCHES MOUNTED IN UTILITY ROOMS WITH FIRE ALARM PANEL. ALL SWITCHES AND HEATING UNITS SHALL BE CLEARLY LABELED BY NUMBERS AS PER PLANS.

23. E.C. SHALL OBTAIN FROM THE LOCAL FIRE DEPARTMENT, A LIST OF FIRE ALARM ZONE CODES AND DESCRIPTIONS AND PROGRAM INTO FIRE ALARM SYSTEM AS REQUIRED.

REMOTE HEADS FED FROM EBU. (TYPICAL)

—— E ——

E.C. SHALL LIMIT # OF REMOTE — HEADS FOR MAXIMUM VOLTAGE DROP INDICATED IN TABLE. (TYPICAL)

NOTES:

1. E.C. SHALL PROVIDE CIRCUIT BREAKER "LOCK-ON" DEVICE FOR ALL CIRCUITS TO EMERGENCY BATTERY UNITS (EBU). (TYPICAL)

2. DETAIL IS TYPICAL TO ALL DRAWINGS, UON.

3. RELAY PANEL WITH (3) 20A, N.O. 120V COIL RELAYS MOUNTED IN 8"x8"x4" NEMA-1 STEEL ENCLOSURE WITH HINGED COVER. RELAYS HELD CLOSED BY MONITORED LIGHTING CIRCUITS. FIELD VERIFY EXACT NUMBER OF RELAYS REQUIRED PRIOR TO WORK. MONITORED LIGHTING CIRCUITS SHALL BE CONNECTED AHEAD OF ANY SWITCHES.

	EMERGENCY LIGHTING SYMBOL LEG	GEND
SYMBOL	DESCRIPTION	MOUNTING
	DUAL EMERGENCY LIGHTING FIXTURE (REMOTE HEAD) WIRED TO EMERGENCY	
⊕⊕ #1 WP	BATTERY UNIT (EBU) WITH REMOTE CAPABILITY. COOPER LIGHTING #APEL. LAMPS SHALL BE 8-WATTS / 12-VOLTS FOR EACH LAMP. #1 INDICATES WIRE TO EBU WITH SAME DESIGNATION.	WALL
	EMERGENCY BATTERY UNIT (NO ATTACHED HEADS) WITH REMOTE CAPABILITIES.	
#1	120-VOLT LIGHTING CIRCUIT. "#1" INDICATES EBU DESIGNATION.	WALL
	DUAL EMERGENCY LIGHTING FIXTURE (REMOTE HEAD) WIRED TO EMERGENCY	
⊕⊕ #1 CLG	BATTERY UNIT (EBU) WITH REMOTE CAPABILITY. COOPER LIGHTING #APEL. LAMPS SHALL BE 5.5-WATTS / 12-VOLTS FOR EACH LAMP. #1 INDICATES WIRE TO EBU WITH SAME DESIGNATION. "CLG" INDICATES CEILING MOUNTED.	WALL, UON
⊗↑	SINGLE FACE LED LIGHTED EXIT SIGN WITH EMERGENCY BATTERY BACK-UP. SHADED QUADRANT DENOTES LIGHTED FACE(S). EQUAL TO MULE LIGHTING #EUS79-R (HOUSING COLOR TO BE DETERMINED BY ARCHITECT). PROVIDE DIRECTIONAL ARROWS WHERE INDICATED ON PLANS. CONNECT UN-SWITCHED TO A 120 OR 277/OLT LOCAL LIGHTING CIRCUIT.	CEILING
	DUAL FACE LED LIGHTED EXIT SIGN WITH EMERGENCY BATTERY BACK-UP. SHADED QUADRANT DENOTES LIGHTED FACE(S). EQUAL TO MULE LIGHTING	
↑⊕ ↑	#EUS79-R (HOUSING COLOR TO BE DETERMINED BY ARCHITECT). PROVIDE DIRECTIONAL ARROWS WHERE INDICATED ON PLANS. CONNECT UN-SWITCHED TO A 120 OR 277VOLT LOCAL LIGHTING CIRCUIT.	CEILING
	SYMBOL #1 WP EBU #1 CLG M tett	EMERGENCY LIGHTING SYMBOL LEC SYMBOL DESCRIPTION ## DUAL EMERGENCY LIGHTING FIXTURE (REMOTE HEAD) WIRED TO EMERGENCY BATTERY UNIT (EBU) WITH REMOTE CAPABILITY. COOPER LIGHTING #APEL LATTERY UNIT (EBU) WITH REMOTE CAPABILITY. COOPER LIGHTING #APEL DUAL EMERGENCY LIGHTING FIXTURE (REMOTE HEAD) WIRED TO EMERGENCY BATTERY UNIT (EBU) WITH REMOTE CAPABILITY. COOPER LIGHTING #APEL LAMPS SHALL BE 8-WATTS / 12-VOLTS FOR EACH LAMP. #1 INDICATES WIRE TO EBU WITH SAME DESIGNATION. ## MERGENCY LIGHTING FIXTURE (REMOTE HEAD) WITH REMOTE CAPABILITIES. EQUAL TO LITHONIA #ELT275-W.Ro-AM-VM. CONNECT UN-SWITCHED TO LOCAL 120-VOLT LIGHTING CIRCUIT. "#1" INDICATES EBU DESIGNATION. ## DUAL EMERGENCY LIGHTING FIXTURE (REMOTE HEAD) WIRED TO EMERGENCY BATTERY UNIT (EBU) WITH REMOTE CAPABILITY. COOPER LIGHTING #APEL LAMPS SHALL BE 5.5-WATTS / 12-VOLTS FOR EACH LAMP. #1 INDICATES WIRE TO EBU WITH SAME DESIGNATION. "CLG" INDICATES CEILING MOUNTED. #01 SINGLE FACE LED LIGHTED EXIT SIGN WITH EMERGENCY BATTERY BACK-UP. SHADED QUADRANT DENOTES LIGHTED FACE(S). EQUAL TO MULE LIGHTING #EUS379.R (HOUSING COLOR TO BE DETERMINED BY ARCHITECT). PROVIDE DIRECTIONAL ARROWS WHERE INDICATED ON PLANS. CONNECT UN-SWITCHED TO A 120 OR 277VOLT LOCAL LIGHTING CIRCUIT. #041 DUAL FACE LED LIGHTED EXIT SIGN WITH EMERGENCY BATTERY BACK-UP. SHADED QUADRANT DENOTES LIGHTED FACE(S). EQUAL TO MULE LIGHTING #EUS379.R (HOUSING COLOR TO BE DETERMINED BY ARCHITECT). PROVIDE DIRECTIONAL ARROWS WHERE INDICATED ON PLANS. CONNECT UN-SWITCHED TO A 120 OR 277VOLT LOCAL LIGHTING CIRCUIT.

17. UL LISTED INSULATED THROAT, SET SCREW CONNECTORS SHALL BE USED WITH MC CABLE INSTALLATIONS, (CLAMP CONNECTORS ARE NOT ALLOWED). A CABLE CUTTING TOOL WITH CONTROLLED DEPTH OF CUT SHALL BE USED IN ALL MC CABLE

TYPICAL EMERGENCY LIGHTING CONNECTION DETAIL

NOT TO SCALE

		,							
DEMOLITION ABBREVIATIONS									
SUBSCRIPT	DESCRIPTION								
ER	INDICATES EXISTING ELECTRICAL DEVICE TO BE COMPLETELY REMOVED AS WELL AS ASSOCIATED WIRING. IT SHALL BE THIS CONTRACTOR'S RESPONSIBILITY TO PROPERLY DISPOSE OF EQUIPMENT.								
ERN	INDICATES EXISTING ELECTRICAL DEVICE TO REMAIN IN PLACE. E.C. SHALL ENSURE DEVICE IS PROTECTED AND FULLY OPERATIONAL UPON COMPLETION OF PROJECT. ANY DEVICE SCHEDULED TO REMAIN, NOT IN PROPERLY WORKING ORDER SHALL BE REPLACED IN KIND.								
ERL	INDICATES EXISTING ELECTRICAL DEVICE TO BE REMOVED & RELOCATED, EXISTING WIRNG / CIRCUITRY TO BE EXTENDED. ANY NEW WIRING & INSTALLATIONS REQUIRED TO RELOCATE EQUIPMENT SHALL MATCH EXISTING ELECTRICAL CHARACTERISTICS.								
RE	INDICATES EXISTING ELECTRICAL DEVICE IN NEW LOCATION. ANY DEVICE SCHEDULED TO BE RELOCATED, NOT IN PROPERLY WORKING ORDER SHALL BE REPLACED IN KIND.								

E.C. SHALL TIE PROPOSED GFCI / DUPLEX RECEPTACLES INTO EXISTING ELECTRICAL CIRCUIT FEEDING EXISTING (DEMO'D) RECEPTACLE(S). E.C. SHALL FIELD VERIFY EXACT CIRCUITRY, ROUTING, CIRCUIT, AND PANELBOARD PRIOR TO ANY WORK.

ELECTRICAL - 1st FLOOR DEMO PLAN

1 ALL EXISTING LIGHTING FIXTURES AND CONTROLS IN THIS AREA TO REMAIN	NORTH COLLA ARCHI 650 Ter North Ki v: 401.8 CNGINE I41 In Tel (4 Mechanic Engineer 141 Indus PO Box S Slatersvil Phone: (4)	A Construction of the second design of the second d
CH: 9-11"	BATHROOM RENOVATIONS	STATE OF RHODE ISLAND /N DEPARTMENT OF LABOR & TRAINING 1330 MAIN STREET WEST WARWICK, RI 02893
	REVISIO RA No PF	YMOND W. DUSSEAULT III WHODE N N N N N N N N N N N N N
NORTH PROJECT NORTH	EL FIF DATE: NCA JOE DRAWIN	ECTRICAL ST FLOOR PLANS 06.29.2023 B NO.: 22330 G NO.: E-111

ALL EXISTING LIFE SAFETY EQUIPMENT IN THIS AREA TO REMAIN

1 ELECTI E-112 1/4" = 1'-0"

ELECTRICAL - 1st FLOOR LIGHTING PLAN

ELECTRICAL - 1st FLOOR LIFE SAFETY PLAN

CH: 9'-11"			NORTH COLLA ARCHI 650 Ten North Ki v: 401.8 CNGINE 141 In Tel (4 Mechanic Engineeri 141 Indus PO Box 9 Slatersvill Phone: (4	A Contraction of the second se
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			OM RENOVATIONS	RHODE ISLAND /N OF LABOR & TRAININ MAIN STREET ARWICK, RI 02893
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	NORTH Image: North Image: PROJECT NORTH		EL FIR DATE: NCA JOE DRAWIN	ECTRICAL ST FLOOR PLANS 06.29.2023 3 NO.: 22330 G NO.: E-112

(EQUIPMENT) SIZING CIRCUIT									
AMP / POLE PANEL / SERVICE	POLES	TYPE (XHHW) COPPER CONDUCTORS							
15A, 20A	1 (or) 2	2#12 + 1#12 GND. IN 3/4" CONDUIT							
15A, 20A	3	3#12 + 1#12 GND. IN 3/4" CONDUIT							
25A, 30A	1 (or) 2	2#10 + 1#10 GND. IN 3/4" CONDUIT							
25A, 30A	3	3#10 + 1#10 GND. IN 3/4" CONDUIT							
35A, 40A	1 (or) 2	2#8 + 1#10 GND. IN 3/4" CONDUIT							
35A, 40A	3	3#8 + 1#10 GND. IN 3/4" CONDUIT							
45A, 50A, 55A	1 (or) 2	2#6 + 1#10 GND. IN 3/4" CONDUIT							
45A, 50A, 55A	3	3#6 + 1#10 GND. IN 3/4" CONDUIT							
60A	2	2#4 + 1#10 GND. IN 1" CONDUIT							
60A	3	3#4 + 1#10 GND. IN 1" CONDUIT							
70A	3	3#4 + 1#8 GND. IN 1" CONDUIT							
80A	3	3#3 + 1#8 GND. IN 1-1/4" CONDUIT							
90A	3	3#2 + 1#8 GND. IN 1-1/4" CONDUIT							
100A, 110A	3	3#1 + 1#6 GND. IN 1-1/4" CONDUIT							
125A, 150A	3	3#1/0 + 1#6 GND. IN 1-1/2" CONDUIT							
175A	3	3#2/0 + 1#6 GND. IN 2" CONDUIT							
200A	3	3#3/0 + 1#4 GND. IN 2" CONDUIT							

MECHANICAL EQUIPMENT ELECTRICAL CONNECTION SCHEDULE																
XXX			EQU	IPMEN	Г CHARA	CTERIST	FICS		CIRCUIT BREAKER (HACR TYPE) FEEDER & CONDUIT DISCONNECT SWITCH SIZE FUSE POLES NEMA MANUAL MOTOR CO		DISCONNECT SWITCH					
ITEM No.	DESCRPITION	LOCATION	VOLTS	PH	FREQ.	KW/(HP	FLA	CIRCUIT		MANUAL MOTOR CONTROLLER	REMARKS					
CEF-1	CEILING EXHAUST FAN	(SEE PLANS)	120	1	60	0.129	1.1			2#12 + 1#12 GND. IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES.	SEE BELOW
CEF-2	CEILING EXHAUST FAN	(SEE PLANS)	120	1	60	0.083	0.7	AREA'S LTG. CIRCUIT	20A/1P	2#12 + 1#12 GND. IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES.	SEE BELOW
CEF-3	CEILING EXHAUST FAN	(SEE PLANS)	120	1	60	0.129	1.1			2#12 + 1#12 GND. IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES.	CIRCUIT TO BE RUN THROU THERMOSTAT, VERIFY EXACT V
CEF-4	CEILING EXHAUST FAN	(SEE PLANS)	120	1	60	0.129	1.1			2#12 + 1#12 GND. IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES.	SEE BELOW
CEF-5	CEILING EXHAUST FAN	(SEE PLANS)	120	1	60	0.129	1.1	AREA'S LTG. CIRCUIT	20A/1P	2#12 + 1#12 GND. IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES.	SEE BELOW
CEF-6	CEILING EXHAUST FAN	(SEE PLANS)	120	1	60	0.129	1.1			2#12 + 1#12 GND. IN 3/4" CONDUIT	-	-	-	-	PROVIDE MOTOR RATED TOGGLE SWITCH WITH THERMAL OVERRIDES.	CIRCUIT TO BE RUN THROU THERMOSTAT, VERIFY EXACT V
EWH-1	ELECTRIC WATER HEATER	(SEE PLANS)	208	1	60	4.5	21.6	LP1/TBD,TBD	25A/2P	3#10 + 1#10 GND. IN 3/4" CONDUIT	30	25	3	1	PROVIDE DISCONNECT SWITCH WITH FUSING AS INDICATED.	SEE BELOW
NOTES: 1. COORDINATE WITH HVAC CONTRACTOR & DRAWINGS FOR EXACT LOCATIONS OF ALL MECHANICAL EQUIPMENT PRIOR TO INSTALLING ELECTRICAL COMPONENTS. 2. COORDINATE WITH PLUMBING CONTRACTOR & DRAWINGS FOR EXACT LOCATIONS OF ALL PLUMBING EQUIPMENT PRIOR TO INSTALLING ELECTRICAL COMPONENTS. 3. ALL DISCONNECTING MEANS SHALL BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. 4. ALL STARTERS, VFD'S ETC. SHALL BE SUPPLIED AND INSTALLED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL WIRE ALL HVAC EQUIPMENT.																
5. ALL I	5. ALL HVAC CONTROL WIRING SHALL BE PROVIDED BY OTHERS.															

LIGHTING FIXTURE SCHEDULE										
туре	MANUFACTURER		MOUNTING	L	AMPING			T	DESCRIPTION / REMA	
		TYPE WATTAGE QUANTITY								
A	OVATION BY RENOVA LIGHTING	RVN 24 N-L030-UNV-DM-C30-AF	RECESSED	LED	32/42/52	1	120		2X4 RECESSED LED PA	
NOTES: 1. PROVIDE ACCESSORIES AND MOUNTING HARDWARE AS REQUIRED FOR ALL FIXTURES. 2. ALL FIXTURE/ACCESSORY COLORS NOT INDICATED ON DRAWING'S SHALL BE SELECTED BY ARCHITECT. 3. PROVIDE LAMPING FOR ALL FIXTURES UNLESS LAMPING IS INCLUDED WITH FIXTURE AS INDICATED IN SCHEDULE. 4. PROVIDE TYPICAL UNIT MOCK UP FOR LIGHT FIXTURE HANGING HEIGHTS AND EXPOSED ELECTRICAL CONDUIT LAYOUT TO BE REVIEWED BY ARCHITECT. 5. FIXTURE TO BE WIRED TO PHOTO CELL AND TIME CLOCK PROVIDED BY G.C. 6. ALL LIGHT FIXTURES WITH INCANDESCENT LAMPING SHALL BE PROVIDED W/ CFL/LED LAMP IN LIEU OF INCANDESCENT LAMP. 7. THE ELECTRICAL CONTRACTOR SHALL VERIFY COLOR & FINISH WITH ARCHITECT PRIOR TO SUBMITTAL OF SHOP DRAWINGS.										

(PANEL / SWITCHBOARD / SERVICE) FEEDER SIZING

AMPERES	POLES	TYPE (XHHW) COPPER CONDUCTORS
30A	3	4#10 + 1#8 GND. IN 3/4" CONDUIT
60A	2	3#4 + 1#8 GND. IN 1" CONDUIT
60A	3	4#4 + 1#8 GND. IN 1-1/4" CONDUIT
100A	2	3#1 + 1#6 GND. IN 1-1/4" CONDUIT
100A	3	4#1 + 1#6 GND. IN 1-1/2" CONDUIT
125A, 150A	2	3#1/0 + 1#6 GND. IN 1-1/2" CONDUIT
125A, 150A	3	4#1/0 + 1#6 GND. IN 2" CONDUIT
200A	2	3#3/0 + 1#4 GND. IN 2" CONDUIT
200A	3	4#3/0 + 1#4 GND. IN 2" CONDUIT
225A	3	4#4/0 + 1#2 GND. IN 2-1/2" CONDUIT
300A	3	4#350kcmil + 1#2 GND. IN 3" CONDUIT
400A	3	4#600kcmil + 1#1/0 GND. IN 3-1/2" CONDUIT
600A	3	2 SETS OF: (4#350kcmil + 1#2 GND.) IN TWO (2) 3" CONDUITS
800A	3	2 SETS OF: (4#600kcmil + 1#1/0 GND.) IN TWO (2) 3-1/2" CONDUITS
1000A	3	3 SETS OF: (4#400kcmil + 1#1/0 GND.) IN THREE (3) 3" CONDUITS

8. CC = CUSTOM COLOR TO BE SELECTED BY ARCHITECT (THE ELECTRICAL CONTRACTOR SHALL VERIFY CUSTOM COLOR & FINISH WITH ARCHITECT PRIOR TO SUBMITTAL OF SHOP DRAWINGS.

IARKS
PANEL
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SECTION 160000 ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A.DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO WORK OF THIS SECTION.
- B. THIS CONTRACTOR SHALL ALSO INCLUDE ALLOWANCES FOR STARTUP AND FOR MAKING THE SYSTEMS FULLY OPERATIONAL, AND FOR SCOPE AND DESIGN CONTINGENCIES. FUTURE CHANGES IN PRICE FOR ITEMS NOT SHOWN ON THESE DRAWINGS WILL NOT BE ALLOWED IF THE SYSTEM ITSELF IS SHOWN ON THESE DRAWINGS.
- CGIVE NOTICES, FILE PLANS, OBTAIN PERMITS AND LICENSES, PAY FEES AND BACK CHARGES, AND OBTAIN NECESSARY APPROVALS FROM AUTHORITIES THAT HAVE JURISDICTION AS REQUIRED TO PERFORM WORK IN ACCORDANCE WITH ALL LEGAL REQUIREMENTS AND WITH SPECIFICATIONS, DRAWINGS, ADDENDA AND CHANGE ORDERS, ALL OF WHICH ARE PART OF CONTRACT DOCUMENTS.
- THE DRAWINGS SHOW THE LAYOUT OF THE ELECTRICAL SYSTEMS AND INDICATE THE APPROXIMATE LOCATIONS OF OUTLETS, APPARATUS, AND EQUIPMENT. THE RUNS OF FEEDERS AND BRANCHES AS SHOWN ON THE DRAWINGS ARE SCHEMATIC ONLY. THE EXACT ROUTING OF BRANCH CIRCUITS AND FEEDERS SHALL BE DETERMINED BY THE STRUCTURAL CONDITIONS AND POSSIBLE OBSTRUCTIONS. THIS SHALL NOT BE CONSTRUED TO MEAN THAT THE DESIGN OF THE SYSTEMS MAY BE CHANGED, BUT REFERS ONLY TO EXACT RUNS BETWEEN GIVEN POINTS. THE ENGINEER RESERVES THE RIGHT TO REVISE THE DRAWINGS FROM TIME TO TIME TO INDICATE CHANGES IN THE WORK
- THE CONTRACTOR SHALL CONSULT AND REVIEW ALL CONTRACT AND REFERENCE DRAWINGS WHICH MAY AFFECT THE LOCATION OF ANY OUTLETS, APPARATUS AND EQUIPMENT TO AVOID ANY POSSIBLE INTERFERENCE AND PERMIT FULL LOCATION OF OUTLETS, APPARATUS AND EQUIPMENT UP TO THE TIME OF ROUGH-IN IS RESERVED BY THE ENGINEER AND SUCH CHANGE SHALL BE MADE WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
- . IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO SEE THAT ALL ELECTRICAL EQUIPMENT SUCH AS JUNCTION AND PULL BOXES. PANELBOARDS SWITCHES, CONTROLS AND SUCH OTHER APPARATUS AS MAY REQUIRE MAINTENANCE AND OPERATION FROM TIME TO TIME IS MADE ACCESSIBLE. ALTHOUGH THE EQUIPMENT MAY BE SHOWN ON THE DRAWINGS IN CERTAIN LOCATIONS, THE CONSTRUCTION MAY DISCLOSE THE FACT THAT SUCH LOCATIONS DO MAKE ITS POSITION ACCESSIBLE. IN SUCH CASES THIS CONTRACTOR SHALL CALL THE ATTENTION OF THE ENGINEER TO THE CONDITION BEFORE ADVANCING THE CONSTRUCTION TO A STATE WHERE A CHANGE WILL REFLECT ADDITIONAL EXPENSE TO THE OWNER.

2 SUMMARY

- A.THIS SECTION SPECIFIES THE BASIC REQUIREMENTS FOR ELECTRICAL INSTALLATIONS AND INCLUDES REQUIREMENTS COMMON TO MORE THAN ONE SECTION OF DIVISION 26. IT EXPANDS AND SUPPLEMENTS THE REQUIREMENTS SPECIFIED IN SECTIONS OF **DIVISION 1.**
- 3. THESE DOCUMENTS HAVE BEEN PREPARED WITH THE INTENTION THAT THEY CALL FOR FINISHED, TESTED WORK, IN FULL OPERATING CONDITION AND COMPLETE WITH NECESSARY ACCESSORIES.
- THE CONTRACT DRAWINGS ARE GENERALLY DIAGRAMMATIC AND CONVEY THE SCOPE OF WORK AND GENERAL ARRANGEMENT OF APPARATUS AND EQUIPMENT. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED AT THE PROJECT AND SHALL HAVE THE APPROVAL OF THE ARCHITECT/ENGINEER BEFORE BEING INSTALLED. THE CONTRACTOR SHALL FOLLOW THE DRAWINGS IN LAYING OUT WORK AND SHALL CHECK DRAWINGS OF THE OTHER TRADES TO VERIFY SPACES IN WHICH WORK WILL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS. IF DIRECTED BY THE GENERAL CONTRACTOR. ENGINEER AND/OR ARCHITECT. THE CONTRACTOR SHALL. WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE
- THESE CONTRACT DOCUMENTS ARE COMPLEMENTARY. WHAT IS CALLED FOR BY ONE SHALL BE AS BINDING AS IF CALLED FOR BY ALL. MATERIALS OR WORK DESCRIBED IN WORDS, WHICH HAVE WELL-KNOWN TECHNICAL, OR TRADE MEANING SHALL BE HELD TO REFER TO SUCH RECOGNIZED STANDARDS. INCIDENTAL DEVICES AND ACCESSORIES NEEDED FOR COMPLETE, OPERATIONAL SYSTEMS SHALL BE PROVIDED EVEN THOUGH THEY MAY NOT BE INDICATED OR IDENTIFIED IN THE DOCUMENTS.
- IF APPARATUS HAVE BEEN OMITTED, NOTIFY THE ARCHITECTS/ENGINEERS OF SUCH BELIEF. IT IS UNDERSTOOD THAT BIDDER HAS INCLUDED ALL REQUIRED ITEMS AND WORK IN HIS BID, AND WILL NOT IF BID IS SUCCESSFUL, CLAIM EXTRA COMPENSATION FOR FURNISHING A COMPLETE AND SATISFACTORY SYSTEM. IF A PARTICULAR ITEM IS CALLED FOR OR SPECIFIED MORE THAN ONCE IN THESE CONTRACT DOCUMENTS, TH HIGHER GRADE SHALL BE CONSIDERED SPECIFIED.
- SHOULD IT APPEAR THAT THE CHARACTER OF THE WORK IS NOT SUFFICIENTLY EXPLAINED IN THESE SPECIFICATIONS OR ON THE DRAWINGS, APPLY TO THE A/E FOR FURTHER INFORMATION. CONFORM TO THE A/E'S DECISION AND DIRECTIONS AS SHALL BECOME PART OF THESE CONTRACT DOCUMENTS. THE A/E RESERVES THE RIGHT TO BE SOLE INTERPRETER OF THE DRAWINGS AND SPECIFICATIONS, AND ALL DECISIONS SHALL BE CONCLUSIVE, FINAL AND BINDING ON THE PARTIES.
- G.MATERIALS CALLED FOR IN THESE DOCUMENTS SHALL BE NEW, UNUSED EQUIPMENT AND OF THE LATEST RECOGNIZED STANDARDS.
- H. THE WORK TO BE DONE UNDER DIVISION 16 IS SHOWN ON THE ELECTRICAL DRAWINGS. .3 OUTLINE SCOPE OF WORK
- A.THE WORK UNDER THIS CONTRACT, WITHOUT LIMITING THE GENERALITY THEREOF, INCLUDES ALL MATERIALS, LABOR, EQUIPMENT, SERVICES, AND TRANSPORTATION, UNLESS OTHERWISE SPECIFIED, NECESSARY TO COMPLETE ALL SYSTEMS OF ELECTRICAL WIRING AND EQUIPMENT REQUIRED BY THE DRAWINGS AND/OR AS SPECIFIED HEREIN. IT IS THE INTENT OF THIS SECTION AND ACCOMPANYING ELECTRICAL DRAWINGS THAT THESE SYSTEMS BE FURNISHED COMPLETE IN EVERY RESPECT. THE ELECTRICAL CONTRACTOR SHALL FURNISH ALL WIRING, EQUIPMENT AND LABOR NEEDED FOR A COMPLETE OPERATING INSTALLATION.
- B. THE ELECTRICAL CONTRACTOR SHALL FULLY INDEMNIFY THE OWNER AGAINST ANY DAMAGES, REMOVALS AND ALTERATION WORK. THIS IS IN ADDITION TO THE REQUIREMENTS OF THE GENERAL CONDITIONS OF THE SPECIFICATIONS.
- THE ELECTRICAL CONTRACTOR SHALL REVIEW ARCHITECTURAL, INTERIOR DESIGN AND ALL OTHER TRADES PLANS, ELEVATIONS AND DETAILS PRIOR TO ANY WORK AND IDENTIFY ANY CONFLICTS BETWEEN FURNISHINGS, FURNITURE, ART-WORK, MOLDING, CASEWORK, TELEVISIONS, SIGNAGE, AWNINGS, CANOPIES, DIFFUSERS, FIXTURES, ETC. AND ELECTRICAL, FIRE ALARM, AUDIO/VISUAL AND COMMUNICATIONS DEVICES SHOWN ON THE ELECTRICAL PLANS AND DETAILS. THE ELECTRICAL CONTRACTOR SHALL PREPARE 8.5" X 11" SKETCHES SHOWING THE CONFLICTS AND SUBMIT TO THE ARCHITECT FOR RESOLUTION PRIOR TO ANY WORK. FAILURE OF THE ELECTRICAL CONTRACTOR TO COORDINATE, IDENTIFY AND OBTAIN A FIELD-DIRECTIVE ON ANY CONFLICT HEREIN NOTED, THAT RESULTS IN INSTALLED ELECTRICAL WORK TO BE RELOCATED TO THE OWNER/ARCHITECTS LIKING SHALL BE THE SOLE-RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL ASSUME AND COVER ALL COSTS ASSOCIATED WITH CONFLICTS NOT COORDINATED. IDENTIFIED AND SUBMITTED TO THE ARCHITECT, INCLUSIVE OF MATERIAL, LABOR, OVERTIME PAY, ETC... AND SHALL NOT AFFECT THE PROJECT SCHEDULE.
- .4 ROUGH-IN
- 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 IN DIVISIONS 2 THROUGH 25 FOR ROUGH-IN REQUIREMENTS.
- .5 SURVEYS AND MEASUREMENTS
- A.BASE MEASUREMENTS, BOTH HORIZONTAL AND VERTICAL, ON ESTABLISHED BENCH MARKS, WORK SHALL AGREE WITH THESE ESTABLISHED LINES AND LEVELS. VERIFY MEASUREMENTS AT SITE AND CHECK THE CORRECTIONS OF SAME AS RELATED TO THE WORK.
- 3. SHOULD THE CONTRACTOR DISCOVER ANY DISCREPANCY BETWEEN ACTUAL MEASUREMENTS AND THOSE INDICATED, WHICH PREVENTS FOLLOWING GOOD PRACTICE OR THE INTENT OF THE DRAWINGS AND SPECIFICATIONS, HE SHALL NOTIFY THE A/E. .6 EXAMINATION OF SITE
- A.PRIOR TO SUBMITTING BID, VISIT THE SITE WHERE THE WORK IS TO BE PERFORMED AND THE MATERIALS ARE TO BE DELIVERED. FAILURE IN THIS RESPECT SHALL NOT EXCUSE THE CONTRACTOR FROM HIS OBLIGATION TO SUPPLY AND INSTALL THE WORK IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS AND UNDER ALL CONDITIONS, AS H.PERFORM CUTTING, FITTING, AND PATCHING OF ELECTRICAL EQUIPMENT AND MATERIAL THEY EXIST.
- 3.BY SUBMITTING A BID, THIS CONTRACTOR WARRANTS THAT ALL SPECIFICATION SECTIONS AND DRAWINGS SHOWING EQUIPMENT FOR PLUMBING, HEATING, VENTILATION, AIR CONDITIONING, ELECTRICAL, AND ARCHITECTURAL, HAVE BEEN EXAMINED AND IS FAMILIAR WITH THE CONDITIONS AND EXTENT OF WORK AFFECTING THIS CONTRACT.
- .7 EQUIPMENT AND MATERIALS A.ALL EQUIPMENT AND MATERIALS FOR PERMANENT INSTALLATION SHALL BE THE

PRODUCTS OF RECOGNIZED MANUFACTURER'S AND SHALL BE NEW, UNLESS NOT RE-USE, WITHOUT DAMAGED, FUNCTIONAL OR AESTHETIC COMPONENTS. **B.NEW EQUIPMENT AND MATERIALS SHALL:**

- 1. BE UNDERWRITERS LABORATORIES, INC. (UL) LABELED AND/OR LISTED SPECIFICALLY CALLED FOR, OR WHERE NORMALLY SUBJECT TO SUCH UL LA AND/OR LISTING SERVICES
- 2. BE WITHOUT BLEMISH OR DEFECT.
- 3. BE IN ACCORDANCE WITH THE LATEST APPLICABLE NEMA STANDARDS.
- 4. BE PRODUCTS, WHICH WILL MEET WITH THE ACCEPTANCE OF THE INSPECTING THE ELECTRICAL WORK. WHERE SUCH ACCEPTANCE IS CONTI UPON HAVING THE PRODUCTS EXAMINED, TESTED AND CERTIFIED BY UL OR RECOGNIZED TESTING LABORATORY, THE PRODUCT SHALL BE SO EXA TESTED AND CERTIFIED.

C.FOR ALL EQUIPMENT, WHICH IS TO BE INSTALLED BUT NOT PURCHASED AS PART ELECTRICAL WORK, THE ELECTRICAL WORK SHALL INCLUDE: 1. THE COORDINATION OF THEIR DELIVERY.

- 2. THEIR UNLOADING FROM DELIVERY TRUCKS DRIVEN IN TO ANY POINT C PROPERTY LINE AT GRADE LEVEL.
- 3. THEIR SAFE HANDLING AND FIELD STORAGE UP TO THE TIME OF PERM PLACEMENT IN THE PROJECT.
- 4. THE CORRECTION OF ANY DAMAGE, DEFACEMENT OR CORROSION TO WHICH MAY HAVE BEEN SUBJECTED.
- 5. THEIR FIELD MAKE-UP AND INTERNAL WIRING AS MAY BE NECESSARY FOR PROPER OPERATION.
- 6. THEIR MOUNTING IN PLACE, INCLUDING THE PURCHASE AND INSTALLATION DUNNAGE, SUPPORTING MEMBERS AND FASTENINGS NECESSARY TO ADAP TO ARCHITECTURAL AND STRUCTURAL CONDITIONS.
- D.EQUIPMENT. WHICH IS TO BE INSTALLED BUT NOT PURCHASED AS PART (ELECTRICAL WORK. SHALL BE CAREFULLY EXAMINED UPON DELIVERY TO THE PR CLAIMS THAT ANY OF THESE ITEMS HAVE BEEN RECEIVED IN SUCH CONDITION THEIR INSTALLATION WILL REQUIRE PROCEDURES BEYOND THE REASONABLE SCI THE ELECTRIC WORK WILL BE CONSIDERED ONLY IF PRESENTED IN WRITING WITH WEEK OF THE DATE OF DELIVERY TO THE PROJECT OF THE ITEMS IN QUESTIOI ELECTRIC WORK INCLUDES ALL PROCEDURES, REGARDLESS OF HOW EXT NECESSARY TO PUT INTO SATISFACTORY OPERATION, ALL ITEMS FOR WHICH NO HAVE BEEN SUBMITTED AS OUTLINED ABOVE.
- 1.8 ELECTRICAL INSTALLATIONS
- A.ALL MATERIALS AND LABOR CALLED FOR, SPECIFIED IN DIVISION 16 C SPECIFICATIONS, AND OR SHOWN ON THE ELECTRICAL DRAWINGS FURNISHED THIS CONTRACT SHALL BE PROVIDED UNDER DIVISION 16 UNLESS CALLE OTHERWISE IN THE DIVISION 16 DOCUMENTS. THE WORD "PROVIDE" AS USED DIVISION 16 DOCUMENTS. SHALL MEAN TO FURNISH, INSTALL, CONNECT UP, CO WITH ALL ACCESSORIES READY FOR OPERATION AND WARRANTED.
- B.COORDINATE ELECTRICAL EQUIPMENT AND MATERIALS INSTALLATION WITH BUILDING COMPONENTS. FULLY COORDINATE WORK WITH THAT OF OTHER FURNISH INFORMATION IN WRITING THAT IS NEEDED FOR THE COORDINAT CLEARANCES, ETC., WITH THE WORK OF OTHERS, AND SUCH INFORMATION SH GIVEN IN A TIMELY FASHION SO AS NOT TO IMPEDE THE PROGRESS OF TWO OF TRADES. CONFER AND RESOLVE THE CONFLICT IMMEDIATELY. IF SO DIRECTED A/E, PREPARE COMPOSITE DRAWINGS TO RESOLVE ANY SPACE OR CLE/ CONFLICT
- C. VERIFY ALL DIMENSIONS BY FIELD MEASUREMENTS.
- D.ARRANGE FOR CHASES, SLOTS, AND OPENINGS IN OTHER BUILDING COMPONE ALLOW FOR ELECTRICAL INSTALLATIONS. E. COORDINATE THE INSTALLATION OF REQUIRED SUPPORTING DEVICES AND SLEE
- BE SET IN POURED IN PLACE CONCRETE AND OTHER STRUCTURAL COMPONEN THEY ARE CONSTRUCTED.
- F. SEQUENCE, COORDINATE, AND INTEGRATE INSTALLATIONS OF ELECTRICAL MAT AND EQUIPMENT FOR EFFICIENT FLOW OF THE WORK. GIVE PARTICULAR ATTEN LARGE EQUIPMENT REQUIRING POSITIONING PRIOR TO CLOSING-IN THE BUILDING. G.COORDINATE THE CUTTING AND PATCHING OF BUILDING COMPONENT
- ACCOMMODATE THE INSTALLATION OF ELECTRICAL EQUIPMENT AND MATERIALS. H. WHERE MOUNTING HEIGHTS ARE NOT DETAILED OR DIMENSIONED, THE EXACT LC SHALL BE DETERMINED BY THE A/E, INSTALL ELECTRICAL SERVICES AND OVE
- EQUIPMENT TO PROVIDE THE CODE AND/OR UTILITY REQUIREMENTS. . INSTALL ELECTRICAL EQUIPMENT TO FACILITATE MAINTENANCE AND REP. REPLACEMENT OF EQUIPMENT COMPONENTS. AS MUCH AS PRACTICAL, CC EQUIPMENT FOR EASE OF DISCONNECTING, WITH MINIMUM OF INTERFERENCE OTHER INSTALLATIONS.
- J. COORDINATE THE INSTALLATION OF ELECTRICAL MATERIALS AND EQUIPMENT CEILINGS WITH SUSPENSION SYSTEMS, MECHANICAL EQUIPMENT AND SYSTEM STRUCTURAL COMPONENTS.
- K. COORDINATE CONNECTION OF ELECTRICAL SYSTEMS WITH EXTERIOR UNDERG AND OVERHEAD UTILITIES AND SERVICES. COMPLY WITH REQUIREMEN GOVERNING REGULATIONS, FRANCHISED SERVICE COMPANIES, AND CONTR AGENCIES. PROVIDE REQUIRED CONNECTION FOR EACH SERVICE.
- L. ATTENTION IS DIRECTED TO AREAS AND ITEMS INDICATED ON THE DRAWINGS NOTATIONS "HOLD", "N.I.C.", "BY OTHERS" AND WORDS OF SIMILAR INTENT. THE INDICATED IN THESE AREAS IS SHOWN FOR INFORMATION AND CONTINUITY ONLY OR ITEMS FURNISHED AND INSTALLED IN THESE AREAS SOLELY FOR THE CONVE OF THIS CONTRACTOR OR OTHERS, WITHOUT PRIOR WRITTEN APPROVAL OWNER, SHALL BE REMOVED AT THE OPTION OF THE OWNER AND AT THE CONTRA EXPENSE.
- M.PROVIDE ALL REQUIRED STAGING AND SCAFFOLDING FOR ALL THE WORK THIS SECTION.
- 1.9 ALTERATION WORK
- A.MAINTAIN CONTINUITY OF SERVICE IN AREAS WHERE OCCUPANCY IS TO BE MAIN DURING ALTERATIONS. IF IT BECOMES NECESSARY TO DISCONNECT OR INTE SERVICE, OBTAIN WRITTEN CONSENT OF THE OWNER, AND ONLY DISCONNECT S AT THE CONVENIENCE OF, AND WITH THE CONSENT OF THE OWNER. A COPY WRITTEN REQUEST FOR A SHUTDOWN SHALL BE FORWARDED TO THE A/E. 1.10 CUTTING AND PATCHING
- A.CUTTING AND PATCHING OF ELECTRICAL EQUIPMENT, COMPONENTS, AND MA SPECIFIED UNDER DIVISION 16 (CONDUIT, SLEEVES, EQUIPMENT, ETC.) SHA
- PERFORMED BY ELECTRICAL CONTRACTOR. B.REFER TO THE CONDITIONS OF THE CONTRACT (GENERAL AND SUPPLEMENTAR DIVISION 1 SECTION: "CUTTING AND PATCHING" FOR DEFINITIONS, REQUIREMENT
- PROCEDURES. C.CUTTING AND PATCHING OF EXISTING STRUCTURES (THRU WALLS, FLOORS, CEILINGS, ETC.) TO ACCOMMODATE EQUIPMENT, COMPONENTS, AND MATERIALS OF ALL
- CONTRACTORS, INCLUDING MECHANICAL AND ELECTRICAL CONTRACTORS, SHALL BE PERFORMED BY GENERAL CONTRACTOR AND/OR HIS DESIGNATED SUBCONTRACTOR. D.CUTTING AND PATCHING OF NEW STRUCTURES (THRU WALLS, FLOORS, CEILINGS, ETC.) TO ACCOMMODATE INSTALLATION OF ILL-TIMED WORK OR REMOVAL AND REPLACEMENT OF DEFECTIVE WORK OR WORK NOT CONFORMING TO REQUIREMENTS OF CONTRACT
- DOCUMENTS, SHALL BE PERFORMED BY GENERAL CONTRACTOR AND/OR HIS DESIGNATED SUBCONTRACTOR AND COSTS SHALL BE BACK CHARGED TO APPROPRIATE TRADE CONTRACTOR. E.DO NOT ENDANGER OR DAMAGE INSTALLED WORK THROUGH PROCEDURES AND
- PROCESSES OF CUTTING AND PATCHING. F. ARRANGE FOR REPAIRS REQUIRED TO RESTORE OTHER WORK, BECAUSE OF DAMAGE CAUSED AS A RESULT OF ELECTRICAL INSTALLATIONS.
- G.ARRANGE TO HAVE DUCTS, RACEWAYS, CONDUIT, PANELBOARDS, BOXES, AND SUCH OTHER PERTINENT PARTS, SET IN PLACE AHEAD OF CONSTRUCTION WORK SO THAT THEY WILL BE BUILT-IN WITH STRUCTURES AND ELIMINATE NEED FOR CUTTING AND PATCHING. FAILURE TO CONFORM TO THIS PARAGRAPH WILL REQUIRE THAT THIS CONTRACTOR PERFORM ANY CUTTING AND PATCHING REQUIRED FOR HIS WORK AT HIS EXPENSE. CUTTING SHALL BE NEATLY FINISHED TO MATCH ADJOINING WORK IN A MANNER ACCEPTABLE TO THE A/E. CUTTING AND PATCHING SHALL NOT AFFECT THE FIRE RATING OF WALLS OR STRUCTURAL PARTS. CUTTING AND PATCHING REQUIRED TO CORRECT WORK, DUE TO ERROR OR NEGLIGENCE OF THE CONTRACTOR, OR TO DEFECTS IN HIS MATERIAL OR WORKMANSHIP, SHALL BE CORRECTED AT NO ADDITIONAL COST TO THE OWNER. PATCHING SHALL MEET OR EXCEED QUALITY OF ADJACENT SURFACES. CUTTING MUST BE ACCOMPLISHED AS NOT TO WEAKEN ADJACENT STRUCTURAL MEMBERS AND MUST BE APPROVED BY THE STRUCTURAL ENGINEER BEFORE PROCEEDING.
- **REQUIRED TO:**
- UNCOVER WORK TO PROVIDE FOR INSTALLATION OF ILL-TIMED WORK.
- 2. REMOVE AND REPLACE DEFECTIVE WORK. 3. REMOVE AND REPLACE WORK NOT CONFORMING TO REQUIREMENTS OF THE CONTRACT DOCUMENTS.
- 4. REMOVE SAMPLES OF INSTALLED WORK AS SPECIFIED FOR TESTING.
- 5. INSTALL EQUIPMENT AND MATERIALS IN EXISTING STRUCTURES.
- 6. UPON WRITTEN INSTRUCTIONS FROM THE A/E, UNCOVER AND RESTORE WORK TO

ED FOR	PROVIDE FOR A/E OBSERVATION OF CONCEALED WORK.	
	I. CUT, REMOVE AND LEGALLY DISPOSE OF SELECTED ELECTRICAL EQUIPMENT,	
	COMPONENTS AND MATERIALS AS INDICATED, INCLUDING, BUT NOT LIMITED TO, REMOVAL OF ELECTRICAL ITEMS INDICATED TO BE REMOVED AND ITEMS MADE	С
BELING	OBSOLETE BY THE WORK.	0.
	J. PROTECT THE STRUCTURE, FURNISHING, FINISHES, AND ADJACENT MATERIALS NOT	
	WORK OF OTHERS IN A MANNER BEST SUITED TO THE PARTICULAR CASE. CORRECT ANY	1.1
AGENCY	DAMAGE DONE TO ANY WORK AT NO ADDITIONAL COST.	Α.
INGENT	PREVENT THE SPREAD OF DUST AND DIRT TO ADJACENT AREAS.	
AMINED,	L. LOCATE, IDENTIFY, AND PROTECT ELECTRICAL SERVICES PASSING THROUGH AREAS	
~	THAT ARE TO UNDER-GO REMODELING OR DEMOLITION. ELECTRICAL SERVICES SERVING OTHER AREAS REQUIRED TO BE MAINTAINED, AND TRANSIT SERVICES MUST BE	
OF THE	INTERRUPTED, PROVIDE TEMPORARY SERVICES FOR THE AFFECTED AREAS AND NOTIFY	
	1 11 SUBMITTALS	
ON THE	A.WITHIN FIFTEEN (15) BUSINESS DAYS AFTER THE DATE OF NOTICE TO PROCEED AND	
//ANENT	BEFORE PURCHASING ANY MATERIALS OR EQUIPMENT, SUBMIT FOR APPROVAL A COMPLETE LIST, IN SIX (6) COPIES, OF ALL MATERIALS TO BE INCORPORATED IN THE	В.
H THEY	WORK. B. SHOP DRAWINGS/MANI JEACTURER'S CUTS ARE REQUIRED FOR:	
	1. WIRE & CABLE.	
K THEIR	2. LIGHTING FIXTURES.	С.
OF ALL	3. DISCONNECT SWITCHES.	D.
T THEM	4. WIRING DEVICES AND PLATES. 5. FIRE ALARM SYSTEM	
OF THE	6. FIRE STOPPING MATERIALS.	F.
ROJECT. N THAT	7. SEISMIC RESTRAINT COMPONENTS.	
	C.AFTER THE LIST HAS BEEN PROCESSED, SUBMIT COMPLETE SHOP DRAWINGS OF ALL EQUIPMENT, THESE SHOP DRAWINGS SUBMITTALS SHALL BE SUBMITTED WITHIN THIRTY	
N. THE	DAYS AFTER THE PROCESSING DATE OF THE ORIGINAL SUBMITTAL.	1.1
ENSIVE, CLAIMS	D.ALL SUBMITTALS SHALL BE COMPLETE AND SUBMITTED ELECTRONICALLY TO ALL	Α.
	EXCEPT WITH PRIOR APPROVAL. NO CONSIDERATION WILL BE GIVEN TO FAXED	В.
	SUBMITTALS. E EXPLANATION OF SHOP DRAWING STAMP	
UNDER	1. APPROVED: INDICATES THAT WE HAVE NOT FOUND ANY REASON WHY THIS ITEM	
D FOR	SHOULD NOT BE ACCEPTABLE WITHIN THE INTENT OF THE DOCUMENTS.	
MPLETE	2. APPROVED WITH COMMENTS: INDICATES THAT WE HAVE FOUND QUESTIONABLE COMPONENTS WHICH, IF CORRECTED OR OTHERWISE EXPLAINED, MAKE THE PRODUCT ACCEPTABLE.	
OTHER	3. RESUBMIT FOR FINAL REVIEW: INDICATES THAT THIS ITEM SHOULD BE RESUBMITTED	
ION OF	4. DOES NOT CONFORM: INDICATES THAT THE ITEM WILL NOT MEET THE INTENT OF THE	
ALL BE	CONTRACT.	C.
BY THE ARANCE	F. NO SHOP DRAWING STAMP OR NOTE SHALL CONSTITUTE AN ORDER TO FABRICATE OR SHIP. SUCH NOTIFICATION CAN ONLY BE PERFORMED BY THE PROJECT MANAGER FOR CONSTRUCTION, THE CONTRACTOR SCHEDULING HIS OWN WORK, OR THE OWNER.	
NTS TO	G.SUBMITTAL OF SHOP DRAWINGS, PRODUCT DATA, WILL BE REVIEWED ONLY WHEN SUBMITTED BY THE CONTRACTOR. DATA SUBMITTED FROM SUB-CONTRACTORS AND MATERIAL SUPPLIERS DIRECTLY TO THE A/E WILL NOT BE PROCESSED.	D.
VES TO	H.IF SHOP DRAWING IS NOT IN COMPLIANCE AFTER TWO SUBMISSIONS, A THIRD	F
NTS, AS	I. CHECK SHOP DRAWINGS AND OTHER SUBMITTALS TO ASSURE COMPLIANCE WITH	
TERIALS	CONTRACT DOCUMENTS BEFORE SUBMITTAL TO A/E.	F.
FION TO	CONSIDERED WITHOUT WRITTEN APPLICATION. SHOP DRAWING REVIEW DOES NOT	1.1
тѕ то	APPLY TO QUANTITIES, DIMENSIONS, NOR RELIEVE THIS CONTRACTOR OF HIS RESPONSIBILITY FOR ELIRNISHING MATERIALS OR PERFORMING HIS WORK IN FULL	A.
	COMPLIANCE WITH THESE CONTRACT DRAWINGS AND SPECIFICATIONS. REVIEW OF	D
ERHEAD	THESE SHOP DRAWINGS SHALL NOT BE CONSIDERED A GUARANTEE OF THE MEASUREMENTS OF THIS BUILDING OR THE CONDITIONS ENCOUNTERED.	D.
	K.GENERAL REQUIREMENTS FOR THE SUBSTITUTION OF EQUIPMENT AND SUBMITTAL OF	
ONNECT	SHOP DRAWINGS AS FOLLOWS. IF APPARATUS, SYSTEMS OR MATERIALS ARE SUBSTITUTED FOR THOSE SPECIFIED, AND SUCH SUBSTITUTION NECESSITATES	
E WITH	CHANGES IN, OR ADDITIONAL CONNECTIONS, WIRING, SUPPORTS, OR CONSTRUCTION, IT	1.1
ABOVE	THIS CONTRACTOR SHALL ASSUME ALL COST AND ENTIRE RESPONSIBILITY THEREOF.	Α.
IS, AND	THE APPROVAL OF SUBSTITUTED EQUIPMENT DOES NOT RELIEVE THE CONTRACTOR OF HIS/HER RESPONSIBILITY OF SHOP DRAWING ERRORS RELATED TO DETAILS. SIZES.	В.
ROUND	QUANTITIES, WIRING DIAGRAM ARRANGEMENTS AND DIMENSIONS WHICH DEVIATE FROM	C
	RESPONSIBILITY TO SUBMIT ONLY THOSE ITEMS THAT MEET THE SPECIFIED APPARATUS,	0.
OLLING	SYSTEMS AND MATERIAL. SHOULD ANY NON-CONFORMANCE CODE ITEMS BE INSTALLED,	D.
BY THE	OWNER. THE CONSTRUCTION MEANS AND METHODS USED IN THE PROJECT SHALL BE	
WORK	REVIEWED AND APPROVED THROUGH THE LOCAL BUILDING DEPARTMENT OR A DEPUTY INSPECTOR TO INSURE COMPLIANCE WITH THE CURRENT CODES. PROJECT	Ε.
NIENCE	SPECIFICATIONS AND GENERAL BUILDING PRACTICES.	F.
CTOR'S	L. COORDINATION DRAWINGS SHALL BE SUBMITTED AND SHALL SHOW ALL HVAC, FLECTRICAL PLUMBING AND FIRE PROTECTION SYSTEMS SUPERIMPOSED IN ORDER TO	
	IDENTIFY CONFLICTS AND ENSURE INTER-COORDINATION OF ALL TRADES.	G
	SPECIFICATIONS. IT IS THIS CONTRACTORS RESPONSIBILITY FOR PREPARATION OF	Э.
	PROJECT COORDINATION DRAWINGS SHOWING THE INSTALLATION OF ALL ELECTRICAL	ц
ITAINED FREI IPT	TRANSFORMERS, TRANSFER SWITCHES, DISCONNECT SWITCHES, ENCLOSED CIRCUIT	п. 11
ERVICE	BREAKERS, CONDUITS, OUTLETS, SWITCHES AND ACCESSORIES TO BE PROVIDED UNDER THIS SECTION OF THE SPECIFICATIONS. THESE DRAWINGS SHALL BE PREPARED AT NOT	A.
OF THE	LESS THAN 3/8 IN. = 1 FT. SCALE, AND SHALL SHOW BUILDING ROOM LAYOUTS,	
	STRUCTURAL ELEMENTS, DUCTWORK AND LIGHTING LAYOUTS OF FUNCTION. A REPRODUCIBLE COPY OF EACH DRAWING PREPARED SHALL THEN BE SUBMITTED TO THE	В.
FERIALS	MECHANICAL, PLUMBING AND SPRINKLER CONTRACTORS, WHO SHALL BE RESPONSIBLE	
ALL BE	DRAWINGS SUBMITTED. AFTER THIS CONTRACTOR HAS FULFILLED HIS OBLIGATION, HE	1 1
RY) AND	SHALL NOTIFY ALL OTHER CONTRACTORS. AFTER EACH DRAWING HAS BEEN COORDINATED BETWEEN TRADES, FACH TRADE SHALL SIGN FACH DRAWING INDICATING	A.
is, and	ACCEPTANCE OF THE INSTALLATION. THIS CONTRACTOR SHALL THEN PRINT THE	
	COORDINATION ORIGINAL AND THESE PRINTS SUBMITTED THROUGH THE GENERAL	р

IGINAL AND THESE PRINTS SUDMITTED THROUGH THE GENERAL CONTRACTOR TO THE ARCHITECT FOR REVIEW AND COMMENT, SIMILAR TO SHOP DRAWINGS. COMMENTS MADE ON THESE DRAWINGS SHALL RESULT IN A CORRECTION AND RE-SUBMITTAL OF THE DRAWINGS, A SUBCONTRACTOR WHO FAILS TO PROMPTLY REVIEW AND INCORPORATE HIS WORK ON THE DRAWINGS SHALL ASSUME FULL RESPONSIBILITY OF ANY INSTALLATION CONFLICTS AFFECTING HIS WORK AND OF ANY SCHEDULE RAMIFICATIONS. REVIEW OF COORDINATION DRAWINGS SHALL NOT DIMINISH RESPONSIBILITY UNDER THIS CONTRACT FOR FINAL COORDINATION OF INSTALLATION AND MAINTENANCE CLEARANCES OF ALL SYSTEMS AND EQUIPMENT WITH ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND ELECTRICAL CONTRACTORS.

1.12 PRODUCT OPTIONS AND SUBSTITUTIONS

- A.REFER TO THE CONDITIONS OF THE CONTRACT (GENERAL AND SUPPLEMENTARY) AND DIVISION 1 FOR DEFINITIONS, REQUIREMENTS, AND PROCEDURES.
- B.IF MATERIALS OF EQUIPMENT ARE SUBSTITUTED FOR SPECIFIED ITEMS THAT ALTER THE SYSTEMS SHOWN OR ITS PHYSICAL CHARACTERISTICS, OR WHICH HAVE DIFFERENT OPERATING CHARACTERISTICS, CLEARLY NOTE THE ALTERATIONS OR DIFFERENCES AND CALL IT TO THE ATTENTION OF THE A/E. UNDER NO CIRCUMSTANCES SHALL SUBSTITUTIONS BE MADE UNLESS IDENTICAL MATERIAL OR EQUIPMENT HAS BEEN SUCCESSFULLY OPERATED FOR AT LEAST THREE CONSECUTIVE YEARS.
- C.ALL SUBSTITUTION MADE BY THE CONTRACTOR SHALL REQUIRE THE CONTRACTOR TO FULLY COORDINATE THE SUBSTITUTION WITH OTHER TRADES. THE CONTRACTOR MUST MAKE ANY MODIFICATIONS REQUIRED BY THE SUBSTITUTION AT NO ADDITIONAL COST TO THE OWNER. IN ADDITION THE CONTRACTOR MUST NOTIFY THE A/E OF ANY CHANGES REQUIRED AND OBTAIN APPROVAL FOR THE CHANGES. THE REVIEW OF THE SHOP DRAWINGS BY THE A/E SHALL NOT RELIEVE THE CONTRACTOR FROM HIS RESPONSIBILITY AS SET FORTH IN THIS SPECIFICATION.

1.13 NAMEPLATE DATA

A.PROVIDE PERMANENT OPERATIONAL DATA NAMEPLATE ON EACH ITEM OF POWER OPERATED EQUIPMENT, CONDUITS WITH PULL STRING, INDICATING MANUFACTURER, PRODUCT NAME, MODEL NUMBER, SERIAL NUMBER, CAPACITY, OPERATING AND POWER CHARACTERISTICS, LABELS OF TESTED COMPLIANCES, AND SIMILAR ESSENTIAL DATA. LOCATE NAMEPLATES IN A READILY ACCESSIBLE LOCATION.

1.14 DELIVERY STORAGE AND HANDLING

- A.DELIVER PRODUCTS TO PROJECT PROPERLY IDENTIFIED WITH NAMES. MODEL NUMBERS. TYPES, GRADES, COMPLIANCE LABELS, AND SIMILAR INFORMATION NEEDED FOR DISTINCT IDENTIFICATIONS; ADEQUATELY PACKAGED AND PROTECTED TO PREVENT DAMAGE DURING SHIPMENT, STORAGE, AND HANDLING.
- B.STORE EQUIPMENT AND MATERIALS AT THE SITE, UNLESS OFF-SITE STORAGE IS

AUTHORIZED IN WRITING. PROTECT STORED EQUIPMENT AND MATERIALS FROM DAMAGE. ALL DEVICES SHALL BE STORED IN A LOCKED ROOM. ASSUME RESPONSIBILITY FOR THE DEVICES UNTIL THE DATE OF FINAL INSPECTION.

COORDINATE DELIVERIES OF ELECTRICAL MATERIALS AND EQUIPMENT TO MINIMIZE CONSTRUCTION SITE CONGESTION. LIMIT EACH SHIPMENT OF MATERIALS AND EQUIPMENT TO THE ITEMS AND QUANTITIES NEEDED FOR THE SMOOTH AND EFFICIENT FLOW OF INSTALLATIONS.

.15 RECORD DOCUMENTS

- AS WORK PROGRESSES AND FOR THE DURATION OF CONTRACT, MAINTAIN A COMPLETE AND SEPARATE SET OF PRINTS OF CONTRACT DRAWINGS AT JOB SITE AT ALL TIMES. RECORD WORK COMPLETED AND ALL CHANGES FROM ORIGINAL CONTRACT DRAWINGS CLEARLY AND ACCURATELY INCLUDING WORK INSTALLED AS A MODIFICATION OR ADDITION TO THE ORIGINAL DESIGN. WORK SHALL BE UPDATED ON A WEEKLY BASIS AND SHALL BE MADE AVAILABLE FOR REVIEW BY ARCHITECT. FAILURE TO PERFORM THIS WORK SHALL BE REASON FOR WITHHOLDING REQUISITION PAYMENTS. IN ADDITION, TAKE PHOTOGRAPHS OF ALL CONCEALED EQUIPMENT IN GYPSUM BOARD CEILINGS, SHAFTS, AND OTHER CONCEALED, INACCESSIBLE WORK. AT COMPLETION OF WORK, MAKE COPIES OF PHOTOGRAPHS WITH WRITTEN EXPLANATION ON BACK. THESE SHALL BECOME PART OF RECORD DOCUMENTS.
- AT COMPLETION OF WORK PREPARE A COMPLETE SET OF RECORD AS-BUILT DRAWINGS UNTIL APPROVED AND ACCEPTED BY THE OWNER'S REPRESENTATIVE. IN AUTOCAD, COMPUTER AIDED DRAFTING (CAD) SOFTWARE, SHOWING ALL SYSTEMS AS THE CONTRACTOR SHALL VISIT THE SITE TO ACQUAINT HIMSELF WITH EXISTING ACTUALLY INSTALLED, INCLUDING ALL FIRE ALARM AND ELECTRICAL CIRCUITRY. THE CONDITIONS. NO EXTRA COMPENSATION WILL BE PAID FOR FAILURE TO COMPLY WITH RECORD AS-BUILT DRAWINGS COMPUTER FILES SHALL BE MADE AVAILABLE TO THE THIS PARAGRAPH ARCHITECT, ENGINEER AND OWNER PRIOR TO FINAL PAYMENT.
- M.THE ELECTRICAL CONTRACTOR SHALL PROVIDE SUPERVISION, LABOR, MATERIALS, THE ARCHITECT WILL NOT CERTIFY THE ACCURACY OF THE RECORD DRAWINGS. THIS IS TOOLS, TEST EQUIPMENT, AND ALL OTHER EQUIPMENT OR SERVICES AND EXPENSES THE SOLE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. REQUIRED TO TEST, ADJUST, SET, CALIBRATE, AND OPERATIONALLY CHECK WORK AND THIS TRADE SHALL SUBMIT THE RECORD SET FOR APPROVAL BY THE FIRE AND BUILDING COMPONENTS OF THE ELECTRICAL SYSTEMS AND CIRCUITRY THROUGHOUT THIS DEPARTMENTS IN A FORM ACCEPTABLE TO THE DEPARTMENTS, WHEN REQUIRED BY THE SECTION
- JURISDICTION
- DRAWINGS SHALL SHOW RECORD CONDITION OF DETAILS, SECTIONS, RISER DIAGRAMS, CONTROL CHANGES AND CORRECTIONS TO SCHEDULES. SCHEDULES SHALL SHOW ACTUAL MANUFACTURER AND MAKE AND MODEL NUMBERS OF FINAL EQUIPMENT INSTALLATION.
- .16 WARRANTIES
- REFER TO THE CONDITIONS OF THE CONTRACT (GENERAL AND SUPPLEMENTARY) AND DIVISION 1 FOR DEFINITIONS, REQUIREMENTS, AND PROCEDURES.
- ALL WORK AND EQUIPMENT FURNISHED UNDER THIS SECTION SHALL BE GUARANTEED A.IT IS THE INTENT OF THIS SEISMIC SPECIFICATION TO KEEP ALL ELECTRICAL BUILDING FREE FROM DEFECTS IN WORKMANSHIP OR MATERIALS FOR A PERIOD OF ONE (1) YEAR, SYSTEM COMPONENTS IN PLACE DURING A SEISMIC EVENT. UNLESS SPECIFICALLY NOTED OTHERWISE FOR A PARTICULAR SYSTEM, FROM THE DATE B.ALL ELECTRICAL SYSTEMS MUST BE INSTALLED IN STRICT ACCORDANCE WITH SEISMIC OF FINAL ACCEPTANCE OF THE SYSTEMS AS SET FORTH IN THIS CONTRACT. THE CODES, COMPONENT MANUFACTURER'S AND BUILDING CONSTRUCTION STANDARDS. SUBCONTRACTOR SHALL REPLACE ANY DEFECTIVE WORK DEVELOPING DURING THIS WHENEVER A CONFLICT OCCURS BETWEEN THE MANUFACTURER'S OR CONSTRUCTION PERIOD, UNLESS SUCH DEFECTS ARE CLEARLY THE RESULT OF MISUSE OF EQUIPMENT STANDARDS. THE MOST STRINGENT SHALL APPLY. BY PERSONS NOT UNDER THE CONTROL OF THE SUBCONTRACTOR, WITHOUT COST TO THE OWNER. WHERE SUCH DEFECTIVE WORK RESULTS IN DAMAGE TO WORK OF OTHER C.THIS CONTRACTOR SHALL ENGAGE A PROFESSIONAL STRUCTURAL ENGINEER SECTIONS. ALL SUCH WORK SHALL BE RESTORED TO ITS ORIGINAL CONDITION BY REGISTERED IN THE JURISDICTION OF THIS PROJECT TO REVIEW THE ENTIRE MECHANICS SKILLED IN THE AFFECTED TRADE, AT THE EXPENSE OF THE INSTALLATION TO DETERMINE ALL SEISMIC RESTRAINT REQUIREMENTS AND METHODS. SUBCONTRACTOR. THE SUBCONTRACTOR SHALL SUBMIT A SEPARATE WRITTEN CONTRACTOR SHALL SUBMIT A REPORT OUTLINING THE STRUCTURAL ENGINEER'S GUARANTEE STIPULATING THE AFORESAID CONDITIONS. REVIEW AS WELL AS SEISMIC RESTRAINT SHOP DRAWINGS AND SUPPORTING CALCULATIONS PREPARED BY THE PROFESSIONAL STRUCTURAL ENGINEER FOR REVIEW PRIOR TO OR AT THE TIME OF SUBSTANTIAL COMPLETION FOR THE WORK AND DURING ADMINISTRATIVE CLOSE-OUT OF THE PROJECT, SUBMIT ONE (1) COPY OF ALL SPECIFIED BY THE ARCHITECT.
- WARRANTIES AND GUARANTEES TO THE ARCHITECT FOR REVIEW, APPROVAL AND SUBSEQUENT TRANSMITTAL TO THE OWNER.
- WARRANTIES AND GUARANTEES, INCLUDING THOSE SPECIFIED IN EXCESS OF THE GENERAL ONE (1) YEAR GUARANTEE, SHALL BE COMPLETE FOR ALL SPECIFIC MATERIALS, REQUIRED BY THE CONTRACT DOCUMENT
- A.UNDER THIS SECTION OF THE SPECIFICATIONS, THIS CONTRACTOR SHALL PROVIDE SYSTEMS, SUB-SYSTEMS, EQUIPMENT, APPLIANCES AND PRODUCTS SPECIFIED AND TEMPORARY ELECTRIC SERVICE, SIZED SUITABLE FOR CONSTRUCTION FOR EACH TRADE. THIS CONTRACTOR SHALL PROVIDE ALL MATERIAL AND LABOR FOR TEMPORARY WARRANTIES AND GUARANTEES SHALL CLEARLY DEFINE WHAT IS TO BE GUARANTEED; ELECTRICAL SERVICE PER THE LOCAL POWER COMPANY'S REQUIREMENTS AND THE EXTENT, TERMS, CONDITIONS, TIME AND EFFECTIVE DATES. STANDARDS WITH ALL NECESSARY PANELBOARDS, DISCONNECT SWITCHES, COPIES OF THE SAME WARRANTIES AND GUARANTEES SHALL BE INCLUDED IN THE TRANSFORMERS, CONDUIT, WIRING, ETC. AS REQUIRED. THIS CONTRACTOR SHALL PAY "OPERATING AND MAINTENANCE MANUAL" AS SPECIFIED HEREIN. ALL ASSOCIATED COSTS, UP FRONT.
- B.WHERE TEMPORARY ELECTRICAL SERVICE CANNOT BE OBTAINED FROM THE LOCAL .17 CLEANING POWER COMPANY, THIS CONTRACTOR SHALL PROVIDE A TEMPORARY, ON-SITE, REFER TO THE CONDITIONS OF THE CONTRACT (GENERAL AND SUPPLEMENTARY) AND ELECTRIC GENERATOR WITH ALL NECESSARY PANELBOARDS, DISCONNECT SWITCHES, DIVISION 1 FOR DEFINITIONS, REQUIREMENTS, AND PROCEDURES. TRANSFORMERS, CONDUIT, WIRING, ETC. AS REQUIRED. THE FUEL USED FOR THE UPON COMPLETION OF WORK, THE CONTRACTOR SHALL CLEAN, POLISH AND LEAVE GENERATOR SHALL BE PROVIDED AND PAID FOR BY THIS CONTRACTOR.
- BRIGHT, FIXTURES AND LAMPS, AND SHALL REMOVE DUST, DIRT, DEBRIS AND LOOSE C.THIS CONTRACTOR SHALL PROVIDE A DISTRIBUTION SYSTEM WITH CIRCUITS FOR PLASTER FROM PANELBOARDS, CONTROLS, AND SWITCHBOARDS. UNUSED OPENINGS IN RECEPTACLES AND LIGHTING AS REQUIRED FOR CONSTRUCTION. THIS CONTRACTOR PULL BOXES, JUNCTION BOXES, EQUIPMENT AND RACEWAYS SHALL BE CAPPED OR SHALL MAINTAIN THE TEMPORARY ELECTRICAL SYSTEM DURING CONSTRUCTION AND CLOSED BY AN APPROVED MEANS. REPLACE ALL INOPERATIVE LAMPS. REMOVE THE SYSTEM WHEN CONSTRUCTION IS COMPLETE.
- 18 DEFINITION OF TERMS D. UNDER THIS SECTION OF THE SPECIFICATIONS, THIS CONTRACTOR SHALL PROVIDE AND "THIS CONTRACTOR" OR "E.C." SPECIFICALLY MEANS, THE ELECTRICAL CONTRACTOR MAINTAIN TEMPORARY LIGHTING BASED ON USING NOT LESS THAN ONE 100-WATT LAMP FOR EACH 100 SQUARE FEET OF BUILDING FLOOR AREA AND ONE DUPLEX GFCI WORKING UNDER THIS SECTION OF THE SPECIFICATIONS. RECEPTACLE FOR EACH 200 SQUARE FEET OF BUILDING FLOOR AREA. WHERE HIGHER CONCEALED" MEANS HIDDEN, IN CHASES, FURRED SPACES, WALLS, ABOVE CEILINGS OR LIGHTING INTENSITIES ARE REQUIRED BY FEDERAL OR STATE LAWS OR OTHERWISE ENCLOSED IN CONSTRUCTION. SPECIFIED, THE ABOVE SPECIFIED WATTAGE SHALL BE INCREASED TO PROVIDE THE "EXPOSED" MEANS VISIBLE IN SIGHT OR NOT INSTALLED "CONCEALED" AS DEFINED INCREASE INTENSITIES.
- ABOVE "APPROVED EQUAL" MEANS ANY EQUIPMENT OR MATERIAL WHICH IS APPROVED BY THE
- ENGINEER AND EQUAL IN QUALITY, DURABILITY, APPEARANCE, STRENGTH, DESIGN AND PERFORMANCE TO THE EQUIPMENT OR MATERIAL ORIGINALLY SPECIFIED. "CONDUIT" SHALL MEAN ALL CONDUIT INCLUDING FITTINGS, JOINTS, HANGERS AND
- SUPPORTS "FURNISH" SHALL MEAN TO PURCHASE AND DELIVER TO THE PROJECT SITE COMPLETE
- WITH EVERY NECESSARY APPURTENANCE AND SUPPORT, ALL AS PART OF THE ELECTRICAL WORK
- "INSTALL" SHALL MEAN TO PERFORM EVERY OPERATION NECESSARY TO ESTABLISH SECURE MOUNTING AND CORRECT OPERATION AT THE PROPER LOCATION IN THE PROJECT, ALL AS PART OF THE ELECTRICAL WORK. ."PROVIDE" SHALL MEAN TO FURNISH AND INSTALL.
- 19 QUALITY ASSURANCE B. EACH COPY OF THE APPROVED OPERATING AND MAINTENANCE MANUAL SHALL CONTAIN COPIES OF APPROVED SHOP DRAWINGS, EQUIPMENT LITERATURE, CUTS, BULLETINS, OBTAIN SERVICES OF MANUFACTURER'S REPRESENTATIVES OF ELECTRICAL EQUIPMENT, DETAILS, EQUIPMENT AND ENGINEERING DATA SHEETS AND TYPEWRITTEN DURING ERECTION AND CONSTRUCTION OF THEIR RESPECTIVE EQUIPMENT TO INSURE INSTRUCTIONS RELATIVE TO THE CARE AND MAINTENANCE FOR THE OPERATION OF THE PROPER INSTALLATION OF SAME. EQUIPMENT, ALL PROPERLY INDEXED. A LETTER IS REQUIRED FROM EACH SYSTEM MANUFACTURER'S REPRESENTATIVE
- CERTIFYING TO THE A/E THAT REQUIREMENTS HAVE BEEN CHECKED AND ARE PROPERLY INSTALLED AND OPERATING.
- .20 PERFORMANCE TESTS ELECTRICAL TEST AND ADJUST THE ELECTRICAL SYSTEMS AND EQUIPMENT DURING THE PROGRESS OF THE WORK.
- B.UPON COMPLETION OF WORK AND AFTER PRELIMINARY TESTS TO ASSURE THAT ALL SYSTEMS ARE COMPLETE AND IN PROPER WORKING ORDER, ARRANGE WITH THE A/E TO CONDUCT PERFORMANCE TESTS OF THE ELECTRICAL SYSTEMS. THESE TESTS MAY BE WITNESSED BY THE A/E PRIOR TO ACCEPTANCE OF SYSTEMS AND SHALL BE ARRANGED FOR THE PURPOSE OF DEMONSTRATING COMPLIANCE WITH CONTRACT DOCUMENTS. DURING THIS PERIOD, VISUALLY INSPECT ALL ELECTRICAL EQUIPMENT. LIGHTING FIXTURES SHALL BE TESTED WITH SPECIFIED LAMPS IN PLACE FOR NOT LESS THAN SIX (6) HOURS. CHECK VOLTAGES TO ASSURE THAT ALL TRANSFORMER TAPS ARE PROPERLY SET.
- C.GENERAL OPERATING TESTS SHALL BE PERFORMED UNDER AS NEAR DESIGN CONDITIONS AS POSSIBLE, FOR A PERIOD OF NOT LESS THAN ONE (1) HOUR FOR EACH SYSTEM, AND SHALL DEMONSTRATE THAT ALL EQUIPMENT IS FUNCTIONING IN ACCORDANCE WITH SPECIFICATIONS. FURNISH ALL INSTRUMENTS, LADDERS, TEST EQUIPMENT AND PERSONNEL REQUIRED FOR TESTS. ANY EQUIPMENT OR SYSTEMS FOUND BY TEST TO BE DEFICIENT OR UNSATISFACTORY SHALL BE REPLACED AND TESTS REPEATED AS OFTEN AS NECESSARY TO ASSURE COMPLIANCE WITH CONTRACT DOCUMENTS.
- D. TEST ALL FEEDERS, SUB-FEEDERS AND ALL BRANCH WIRING FOR AMPERAGE, VOLTAGE, PHASE BALANCE, PHASE SEQUENCE OF A,B,C AND INSULATION RESISTANCE, THEN SUBMIT THE RESULTS OF THIS TEST TO THE A/E NEATLY TYPED IN TRIPLICATE FOR REVIEW. THIS TEST MAY BE CONDUCTED AT ANY TIME UP TO, THROUGH AND INCLUDING, THE GUARANTEE PERIOD IF REQUESTED BY THE A/E, AT NO ADDITIONAL COST TO THE OWNER
- E.PHASE BALANCE THE COMPLETE ELECTRICAL SYSTEM, PHASE BALANCE ALL PANELS AS NEAR AS LOADS WILL PERMIT UNDER NORMAL WORKING CONDITIONS.
- F. TEST ALL GROUND CONDUCTORS FOR CURRENT FLOW, AS NEAR DESIGN OPERATING CONDITIONS AS POSSIBLE. IF ANY MEASURED CURRENT EXCEEDS ONE (1) AMPERE, DETERMINE AND CORRECT THE CAUSE. ALSO, IF MEASURED RESISTANCE IS GREATER THAN 5 OHMS INDOOR OR 10 OHMS OUTDOOR, DETERMINE AND CORRECT THE CAUSE.
- G DURING THE PROGRESS OR COMPLETION OF THE WORK IT SHALL BE SUBJECT TO THE INSPECTION OF THE OWNER AND TO SUCH OTHER INSPECTORS, AS MAY HAVE JURISDICTION, INCLUDING THOSE OF THE ELECTRIC COMPANY, FIRE DEPARTMENT AND THE TELEPHONE COMPANY.
- H. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECT VOLTAGES, TAP SETTINGS, TRIP SETTINGS AND CORRECT PHASING ON ALL EQUIPMENT. SECONDARY VOLTAGES SHALL BE MEASURED AT THE LINE SIDE OF THE MAIN BREAKERS WITH THE BREAKERS IN AN OPEN POSITION, AT PANELBOARDS, AND AT SUCH OTHER LOCATION ON THE DISTRIBUTION SYSTEMS AND BRANCH CIRCUITS AS DIRECTED BY THE ENGINEER.
- AND BLASTING RELATED TO THIS CONTRACTOR. B. THE ELECTRICAL CONTRACTOR SHALL PAY FOR ALL PERMITS, INSPECTIONS, LABOR, I. AT COMPLETION OF THE WORK, CONTRACTOR SHALL SUBMIT TO THE OWNER'S

REPRESENTATIVE IN WRITING A STATEMENT STATING: (1) THAT THE WORK IS COMPLETE (2) THAT THE ENTIRE INSTALLATION IS IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS; (3) THAT PRELIMINARY TESTS HAVE BEEN MADE; AND (4) THAT THE WORK IS READY FOR FINAL INSPECTION AND TEST.

- J. A FINAL INSPECTION OF THE INSTALLATION TO DETERMINE COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS WILL BE MADE BY THE OWNER'S REPRESENTATIVE. WORK WILL BE CHECKED FOR QUALITY OF MATERIALS, QUALITY OF WORKMANSHIP, PROPER INSTALLATION AND FINISHED APPEARANCE. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE SERVICES OF THE PROJECT ELECTRICAL FOREMAN FOR INSPECTION PURPOSES. THE FOREMAN SHALL REMOVE AND REINSTALL WIRING DEVICES, JUNCTION BOX COVERS, PANELBOARD TRIMS, SWITCHBOARD COVERS, TERMINAL BOX COVERS, CEILING TILES, LIGHTING FIXTURES, ETC. AS REQUIRED TO FACILITATE ANY INSPECTIONS REQUIRED BY THE OWNER'S REPRESENTATIVE.
- K.THE CONTRACTOR SHALL ARRANGE AND CONDUCT OPERATING TESTS ON ALL EQUIPMENT IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE. THE COMPONENTS PARTS OF SYSTEMS AND THE VARIOUS SYSTEMS SHALL BE DEMONSTRATED TO OPERATE IN ACCORDANCE WITH THE REQUIREMENTS AND INTENT OF THIS SPECIFICATION. ANY NON-COMPLYING OR DEFECTIVE MATERIALS OR WORKMANSHIP DISCLOSED AS A RESULT OF THE INSPECTION AND TESTS SHALL BE CORRECTED PROMPTLY BY THE CONTRACTOR, AND THE TESTS REPEATED AS OFTEN AS NECESSARY
- N.THE ELECTRICAL CONTRACTOR SHALL PAY FOR ALL TESTS INCLUDING EXPENCES INCIDENT TO RETESTS OCCASIONED BY DEFECTS AND FAILURES OF EQUIPMENT TO MEET SPECIFICATIONS AT NO ADDITIONAL COST TO THE OWNER.
- O.ANY DEFECTS OR DEFICIENCIES DISCOVERED IN ANY OF THE ELECTRICAL WORK SHALL BE CORRECTED AT NO COST TO THE OWNER. P. ALL TESTING SHALL BE COMPATIBLE WITH THE MANUFACTURER'S INSTALLATION
- INSTRUCTIONS.
- 1.21 SEISMIC RESTRAINT

D.SEISMIC RESTRAINTS SHALL BE DESIGNED IN ACCORDANCE WITH SEISMIC FORCE LEVELS AS DETAILED IN THE APPLICABLE BUILDING CODE.

1.22 TEMPORARY LIGHT AND POWER

- E. THIS CONTACTOR SHALL PROVIDE TEMPORARY POWER AND TELEPHONE SERVICES FROM THE LOCAL TELEPHONE COMPANY FOR SITE TRAILERS, FAX MACHINES, COMPUTERS, ETC., PER THE GENERAL CONTRACTOR'S DIRECTION.
- F. THE SERVICE SHALL INCORPORATE GROUND FAULT PROTECTION AND COMPLY WITH NEC ARTICLE 527 AND OSHA REQUIREMENTS.
- 1.23 PERMITS
- A.OBTAIN ALL REQUIRED ELECTRICAL PERMITS AND PAY ALL FEES FOR SAME.
- B. PROVIDE TO ENGINEER, IN DUPLICATE, A CERTIFICATE OF FINAL INSPECTION FROM THE AUTHORITY HAVING JURISDICTION FOR THE ELECTRICAL AND SYSTEMS.
- 1.24 OPERATING, INSTRUCTION, AND MAINTAINANCE MANUALS A.REFER TO SECTION 01700 - CONTRACT CLOSEOUT FOR SUBMITTAL PROCEDURES PERTAINING TO OPERATING AND MAINTENANCE MANUALS.
- 1.25 BIDDERS REPRESENTATION
- A.BY THE ACT OF SUBMITTING A BID FOR THE PROPOSED CONTRACT, THE BIDDER REPRESENTS THAT:
- 1. THE BIDDER AND ALL SUBCONTRACTORS THE BIDDER INTENDS TO USE HAVE CAREFULLY AND THOROUGHLY REVIEWED THE DRAWINGS, SPECIFICATIONS AND OTHER CONSTRUCTION CONTRACT DOCUMENTS AND HAVE FOUND THEM COMPLETE AND FREE FROM AMBIGUITIES AND SUFFICIENT FOR THE PURPOSE INTENDED; FURTHER THAT,
- 2. THE BIDDER AND WORKMEN, EMPLOYEES AND SUBCONTRACTORS THE BIDDER INTENDS TO USE ARE SKILLED AND EXPERIENCED IN THE TYPE OF CONSTRUCTION REPRESENTED BY THE CONSTRUCTION CONTRACT DOCUMENTS BID UPON; FURTHER THAT
- 3. NEITHER THE BIDDER NOR ANY OF THE BIDDER'S EMPLOYEES, AGENTS, INTENDED SUPPLIERS OR SUBCONTRACTORS HAVE RELIED UPON ANY VERBAL REPRESENTATIONS, ALLEGEDLY AUTHORIZED OR UNAUTHORIZED FROM THE OWNER, OR THE OWNER'S EMPLOYEES OR AGENTS INCLUDING ARCHITECTS, ENGINEERS OR CONSULTANTS, IN ASSEMBLING THE BID FIGURE; AND FURTHER
- 4. THE BID FIGURE IS BASED SOLELY UPON THE CONSTRUCTION CONTRACT DOCUMENTS AND PROPERLY ISSUED WRITTEN ADDENDA AND NOT UPON ANY OTHER WRITTEN REPRESENTATION.
- 1.26 UTILITY COMPANY & AGENCY COORDINATION
- A. THIS SECTION INCLUDES, BUT IS NOT LIMITED TO COORDINATION WITH THE FOLLOWING UTILITIES, AGENCIES AND AUTHORITIES HAVING JURISDICTION:
- 1. LOCAL FIRE MARSHAL: THIS CONTRACTOR SHALL VERIFY WITH THE LOCAL FIRE ALARM OFFICIAL, THE TYPE OF MASTER-BOX OR MUNICIPAL CONNECTION REQUIRED FOR THIS PROJECT. THIS CONTRACTOR SHALL PROVIDE ALL MATERIAL & LABOR TO COMPLY WITH THE LOCAL MUNICIPALITY. NOTIFY ENGINEER OF DISCREPANCIES BETWEEN THE PLANS AND THE MUNICIPALITY'S STANDARDS. NO EXTRA COMPENSATION WILL BE GIVEN FOR CORRECTIONS REQUIRED FOR FAILURE TO COORDINATE WITH THE MUNICIPALITY, BUT CORRECTIONS SHALL BE MADE.
- 2. ELECTRICAL INSPECTOR: REVIEW PLANS AND SPECIFICATIONS WITH THE LOCAL ELECTRICAL AND/OR WIRING INSPECTOR(S). OBTAIN AND PAY FOR ALL PERMITS.
- 3. BUILDING INSPECTOR: REVIEW PLANS AND SPECIFICATIONS WITH THE LOCAL BUILDING INSPECTOR, IF NOT DONE SO BY THE GENERAL CONTRACTOR. 4. OSHA REPRESENTATIVE: REVIEW PLANS AND SPECIFICATIONS WITH THE LOCAL
- OSHA REPRESENTATIVE. IF NOT DONE SO BY THE GENERAL CONTRACTOR. 5. DIG SAFE: THIS CONTRACTOR SHALL NOTIFY AND COORDINATE WITH DIG SAFE PRIOR TO ANY EXCAVATION: DIGGING: TRENCHING: GRADING: TUNNELING: AUGERING; BORING; DRILLING; PILE DRIVING; PLOWING-IN OR PULLING-IN PIPE, CABLE, WIRE, CONDUIT, OR OTHER SUB-STRUCTURE; BACKFILLING; DEMOLITION;

MATERIAL AND FEES ASSOCIATED WITH THE VARIOUS UTILITY COMPANIES COORDINATION REQUIREMENTS MENTIONED IN THIS SECTION AND FOR THIS CONTRACTOR'S WORK UNDER THIS PROJECT

- C.THE ELECTRICAL CONTRACTOR SHALL CARRY A MINIMUM OF \$15,000 OF UTILITY EXPENSES. IN THE CASE THE EXPENSES ARE LESS THAN THE CARRIED EXPENSE, THE DIFFERENCE WILL BE CREDITED TO THE OWNER. IN THE CASE THE UTILITY CHARGES ARE MORE THAN THE CARRIED EXPENSE, THE REMAINING PAYMENT SHALL BE COORDINATED BETWEEN THE ELECTRICAL CONTRACTOR, GENERAL CONTRACTOR AND OWNER.
- D.HVAC, PLUMBING, FIRE PROTECTION, AND ELECTRICAL DRAWINGS ARE DIAGRAMMATIC. THEY INDICATE GENERAL ARRANGEMENTS OF MECHANICAL AND ELECTRICAL SYSTEMS AND OTHER WORK. THEY DO NOT SHOW ALL OFFSETS REQUIRED FOR COORDINATION NOR DO THEY SHOW THE EXACT ROLITINGS AND LOCATIONS NEEDED TO COORDINATE WITH STRUCTURAL AND OTHER TRADES AND TO MEET ARCHITECTURAL REQUIREMENTS.
- E.IN ALL SPACES, PRIOR TO INSTALLATION OF VISIBLE MATERIAL AND EQUIPMENT INCLUDING ACCESS PANELS, REVIEW ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS AND WHERE NOT DEFINITELY INDICATED, REQUEST INFORMATION FROM ARCHITECT. WHERE THE ELECTRICAL WORK SHALL INTERFERE WITH THE WORK OF OTHER TRADES, ASSIST IN WORKING OUT THE SPACE CONDITIONS TO MAKE SATISFACTORY ADJUSTMENTS BEFORE INSTALLATION. WITHOUT EXTRA COST TO THE OWNERS, MAKE REASONABLE MODIFICATIONS TO THE WORK AS REQUIRED BY NORMAL STRUCTURAL INTERFERENCES. PAY THE GENERAL CONTRACTOR FOR ADDITIONAL OPENINGS, OR RELOCATING AND/OR ENLARGING EXISTING OPENINGS THROUGH CONCRETE FLOORS, WALLS, BEAMS AND ROOF REQUIRED FOR ANY WORK WHICH WAS NOT PROPERLY COORDINATED. MAINTAIN MAXIMUM HEADROOM AT ALL LOCATIONS. ALL PIPING, DUCT, CONDUIT, AND ASSOCIATED COMPONENTS TO BE AS TIGHT TO UNDERSIDE OF STRUCTURE AS POSSIBLE
- F. IF ANY ELECTRICAL WORK HAS BEEN INSTALLED BEFORE COORDINATION WITH OTHER TRADES SO AS TO CAUSE INTERFERENCE WITH THE WORK OF SUCH TRADES, ALL NECESSARY ADJUSTMENTS AND CORRECTIONS SHALL BE MADE BY THE TRADES INVOLVED WITHOUT EXTRA COST TO THE OWNERS.
- G.WHERE CONFLICTS OR POTENTIAL CONFLICTS EXIST AND ENGINEERING GUIDANCE IS DESIRED, SUBMIT SKETCH OF PROPOSED RESOLUTION TO ARCHITECT AND ENGINEER FOR REVIEW AND APPROVAL

PART 2 - PRODUCTS

2.1 CONDUIT

- A.MINIMUM SIZE: ¾-INCH, UNLESS OTHERWISE SPECIFIED.
- **B. UNDERGROUND INSTALLATIONS**
- 1. MORE THAN FIVE FEET FROM FOUNDATION WALL: USE THICK WALL NONMETALLIC CONDUIT CONCRETE ENCASED. 2. WITHIN FIVE FEET FROM FOUNDATION WALL: USE RIGID STEEL CONDUIT CONCRETE
- ENCASED.
- 3. IN OR UNDER SLAB ON GRADE: USE PLASTIC COATED CONDUIT. 4. MINIMUM SIZE: 1-INCH.

C.OUTDOOR LOCATIONS, ABOVE GRADE: USE RIGID STEEL CONDUIT.

- D.IN SLAB ABOVE GRADE
- 1. USE RIGID STEEL CONDUIT.
- 2. MAXIMUM SIZE CONDUIT IN SLAB: 3/4 INCH (19 MM); 1/2 INCH (13 MM) FOR CONDUITS CROSSING EACH OTHER. E. WET AND DAMP LOCATIONS: USE RIGID ALUMINUM CONDUIT.
- F. DRY LOCATIONS:
- 1. CONCEALED AND IN CABLE-TRAY: USE METAL CLAD (MC) CABLE (SEE DIVISION 1)
- 2. EXPOSED: (UNFINISHED OR UTILITY SPACES) USE ELECTRICAL METALLIC TUBING. G.METAL CONDUIT: RIGID STEEL CONDUIT SHALL COMPLY WITH ANSI C80.1 AND BE HEAVY WALL ZINC COATED STEEL. RIGID ALUMINUM CONDUIT SHALL COMPLY WITH ANSI C80.5. INTERMEDIATE METAL CONDUIT (IMC) SHALL BE RIGID STEEL. FITTINGS AND CONDUIT BODIES SHALL COMPLY WITH ANSI/NEMA FB 1 AND MATERIAL TO MATCH CONDUIT ACCEPTABLE MANUFACTURERS ARE WESTERN TUBE AND CONDUIT COMPANY, ALLIED TUBE AND CONDUIT COMPANY AND TRIANGLE WIRE AND CABLE, INC
- H.FLEXIBLE METAL CONDUIT SHALL BE INTERLOCKED ALUMINUM CONTRUCTION. FITTINGS SHALL COMPLY WITH ANSI/NEMA FB 1. ACCEPTABLE MANUFACTURERS ARE AFC CABLE SYSTEMS, ELECTRI-FLEX COMPANY AND EASTERN FLEXIBLE CONDUIT TECHNOLOGIES. ALL FLEXIBLE CONDUITS SHALL INCLUDE A GROUNDING CONDUCTOR
- . ELECTRICAL METALLIC TUBING (EMT) SHALL COMPLY WITH ANSI C80.3; GALVANIZED ZINC COATED STEEL TUBING. FITTINGS AND CONDUIT BODIES SHALL COMPLY WITH ANSI/NEMA FB 1; STEEL, COMPRESSION OR SET SCREW TYPE. ACCEPTABLE MANUFACTURERS ARE WESTERN TUBE AND CONDUIT COMPANY, ALLIED TUBE AND CONDUIT COMPANY AND TRIANGLE WIRE AND CABLE, INC.
- J. NONMETAL CONDUIT SHALL COMPLY WITH NEMA TC 2; SCHEDULE 40 PVC, OR AS INDICATED ON PLANS. FITTINGS AND CONDUIT BODIES SHALL COMPLY WITH NEMA TC 3. ACCEPTABLE MANUFACTURERS ARE CARLON OR APPROVED EQUAL.
- K.FLEXIBLE NONMETALLIC CONDUIT (SEALTITE) SHALL BE UL AND CSA LISTED FOR PURPOSE SPECIFIED AND SHOWN. ACCEPTABLE MANUFACTURERS ARE CARLON OR APPROVED EQUAL
- .. INSTALL CONDUIT IN ACCORDANCE WITH NECA "STANDARD OF INSTALLATION." INSTALL NONMETALLIC CONDUIT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- M.ARRANGE SUPPORTS TO PREVENT MISALIGNMENT DURING WIRING INSTALLATION. SUPPORT CONDUIT USING COATED STEEL OR MALLEABLE IRON STRAPS, LAY-IN ADJUSTABLE HANGERS. CLEVIS HANGERS. AND SPLIT HANGERS. GROUP RELATED CONDUITS; SUPPORT USING CONDUIT RACK. CONSTRUCT RACK USING STEEL CHANNEL; PROVIDE SPACE ON EACH FOR 25 PERCENT ADDITIONAL CONDUITS. FASTEN CONDUIT SUPPORTS TO BUILDING STRUCTURE AND SURFACES UNDER PROVISIONS OF DIVISION 1. DO NOT SUPPORT CONDUIT WITH WIRE OR PERFORATED PIPE STRAPS. REMOVE WIRE USED FOR TEMPORARY SUPPORTS. DO NOT ATTACH CONDUIT TO CEILING SUPPORT WIRES.
- N.ARRANGE CONDUIT TO MAINTAIN HEADROOM AND PRESENT NEAT APPEARANCE. ROUTE EXPOSED CONDUIT PARALLEL AND PERPENDICULAR TO WALLS. ROUTE CONDUIT INSTALLED ABOVE ACCESSIBLE CEILINGS PARALLEL AND PERPENDICULAR TO WALLS. ROUTE CONDUIT IN AND UNDER SLAB FROM POINT-TO-POINT. DO NOT CROSS CONDUITS IN SLAB.
- O.MAINTAIN ADEQUATE CLEARANCE BETWEEN CONDUIT AND PIPING. MAINTAIN 12-INCH (300 MM) CLEARANCE BETWEEN CONDUIT AND SURFACES WITH TEMPERATURES EXCEEDING 104 DEGREES F (40 DEGREES C).
- P.CUT CONDUIT SQUARE USING SAW OR PIPE CUTTER; DE-BURR CUT ENDS. BRING CONDUIT TO SHOULDER OF FITTINGS; FASTEN SECURELY. JOIN NONMETALLIC CONDUIT USING CEMENT AS RECOMMENDED BY MANUFACTURER. WIPE NONMETALLIC CONDUIT DRY AND CLEAN BEFORE JOINING. APPLY FULL EVEN COAT OF CEMENT TO ENTIRE AREA INSERTED IN FITTING. ALLOW JOINT TO CURE FOR 20 MINUTES, MINIMUM. USE CONDUIT HUBS OR SEALING LOCKNUTS TO FASTEN CONDUIT TO SHEET METAL BOXES IN DAMP AND WET LOCATIONS AND TO CAST BOXES.
- Q.INSTALL NO MORE THAN EQUIVALENT OF THREE 90-DEGREE BENDS BETWEEN BOXES. USE CONDUIT BODIES TO MAKE SHARP CHANGES IN DIRECTION, AS AROUND BEAMS. USE HYDRAULIC ONE-SHOT BENDER TO FABRICATE OR FACTORY ELBOWS FOR BENDS IN METAL CONDUIT LARGER THAN 2 INCH (50 MM) SIZE.
- R. AVOID MOISTURE TRAPS; PROVIDE JUNCTION BOX WITH DRAIN FITTING AT LOW POINTS IN CONDUIT SYSTEM. PROVIDE SUITABLE FITTINGS TO ACCOMMODATE EXPANSION AND DEFLECTION WHERE CONDUIT CROSSES SEISMIC, CONTROL AND EXPANSION JOINTS. ALL EXPANSION AND DEFLECTION FITTINGS SHALL HAVE A GROUND STRAP. PROVIDE SUITABLE PULL STRING IN EACH EMPTY CONDUIT EXCEPT SLEEVES AND NIPPLES. USE SUITABLE CAPS TO PROTECT INSTALLED CONDUIT AGAINST ENTRANCE OF DIRT AND MOISTURE.
- S. GROUND AND BOND CONDUIT UNDER PROVISIONS OF NEC 250.
- 2.2 BUILDING WIRE & CABLE
- A.BUILDING WIRE AND CABLE SHALL BE COPPER WITH 600V INSULATION RATED AT 75°C MINIMUM, TYPE XHHW INSULATION FOR FEEDERS AND BRANCH CIRCUITS LARGER THAN #3 AWG; TYPE THHN/THWN INSULATION FOR FEEDERS AND BRANCH CIRCUITS #4 AWG AND SMALLER.
- B. CONDUCTORS SHALL BE OF SOFT DRAWN 98% MINIMUM CONDUCTIVITY PROPERLY REFINED COPPER, SOLID CONSTRUCTION WHERE NO. 10 AWG AND SMALLER, STRANDED CONSTRUCTION WHERE NO. 8 AWG AND LARGER.
- C.EXTERIOR OF WIRES SHALL BEAR REPETITIVE MARKINGS ALONG THEIR ENTIRE LENGTH INDICATING CONDUCTOR SIZE, INSULATION TYPE AND VOLTAGE RATING.
- D.EXTERIOR OF WIRES SHALL BE COLOR CODED, SO AS TO INDICATE A CLEAR DIFFERENTIATION BETWEEN EACH PHASE AND BETWEEN EACH PHASE AND NEUTRAL. IN ALL CASES, GROUNDED NEUTRAL WIRES AND CABLES SHALL BE IDENTIFIED BY THE COLORS "WHITE" OR "GRAY". IN SIZES AND INSULATION TYPES WHERE FACTORY APPLIED COLORS ARE NOT AVAILABLE, WIRES AND CABLES SHALL BE COLOR CODED BY THE APPLICATION OF COLORED PLASTIC TAPES IN OVERLAPPING TURNS AT ALL TERMINAL POINTS, AND IN ALL BOXES IN WHICH SPLICES ARE MADE. COLORED TAPE SHALL BE APPLIED FOR A DISTANCE OF 6 INCHES ALONG THE WIRES AND CABLES, OR ALONG THEIR ENTIRE EXTENSIONS BEYOND RACEWAY ENDS. WHICHEVER IS LESS.
- E. FINAL CONNECTIONS TO MOTORS SHALL BE MADE WITH 18" OF NEOPRENE SHEATHED FLEXIBLE CONDUIT.
- F. MINIMUM BRANCH CIRCUIT CONDUCTOR SIZE SHALL BE NO. 12 AWG INSTALLED IN CONDUIT. MOTOR CONTROL CIRCUIT WIRING SHALL BE MINIMUM NO. 14 AWG INSTALLED IN CONDUIT.

- G.FIRE ALARM AND SECURITY SYSTEM WIRING SHALL BE NO. 16 TWISTED NON-SHIELDED PAIRS FOR ALARM AND TROUBLE CIRCUITS AND A MINIMUM OF #14 AWG FOR DEVICE POWER, CONTROL AND ALARM ANNUNCIATION CIRCUITS. FIRE ALARM SYSTEM RISER CIRCUITS SHALL BE 2-HOUR RATED, CI TYPE (CIRCUIT INTEGRITY) CABLE PER NFPA 72
- HAVE SCREW FASTENED COVERS, IF A HINGED COVER WOULD NOT BE CAPABLE OF ENCLOSURE. PROVIDE PRODUCTS SUITABLE FOR USE AS SERVICE ENTRANCE BEING OPENED A FULL 90 DEGREES DUE TO INSTALLATION LOCATION. AND NEC 760 IDENTIFIED EQUIPMENT GROUNDING CONDUCTOR, SUITABLE FOR USE IN DAMP EQUIPMENT WHERE SO APPLIED. FABRICATE ENCLOSURE FROM STEEL. LOCATIONS. SIZE: SUITABLE FOR CONNECTED LOAD OF EQUIPMENT, LENGTH OF CORD, C.INSTALL BOXES IN ACCORDANCE WITH NECA "STANDARD OF INSTALLATION." INSTALL IN B.INSTALL ENCLOSED CIRCUIT BREAKERS WHERE INDICATED, IN ACCORDANCE WITH AND RATING OF BRANCH CIRCUIT OVERCURRENT PROTECTION. LOCATIONS AS SHOWN ON DRAWINGS, AND AS REQUIRED FOR SPLICES, TAPS, WIRE ELSEWHERE IN THIS SECTION OF THE SPECIFICATIONS SHALL BE AS SPECIFIED HEREIN, MANUFACTURER'S INSTRUCTIONS. INSTALL ENCLOSED CIRCUIT BREAKERS PLUMB. PULLING, EQUIPMENT CONNECTIONS AND COMPLIANCE WITH REGULATORY AS SHOWN ON THE CONTRACT DRAWINGS, OR AS RECOMMENDED BY THE B.MOTOR CONTROL EQUIPMENT: EACH MOTOR SHALL HAVE A STARTER FURNISHED UNDER PROVIDE SUPPORTS IN ACCORDANCE WITH THESE SPECIFICATIONS. HEIGHT: 5 FT (1.6 M) MANUFACTURER OF THE SPECIFIC EQUIPMENT FOR WHICH THEY ARE USED, ALL REQUIREMENTS. THIS SECTION WHERE IT IS NOT BEING SUPPLIED BY OTHER SECTIONS. WIRE AND TO OPERATING HANDLE. PROVIDE ENGRAVED PLASTIC NAMEPLATES. INSTALLED IN CONDUIT. INSTALLED UNDER THIS SECTION, UNLESS OTHERWISE NOTED HEREIN OR ON THE D.SET WALL MOUNTED BOXES AT ELEVATIONS TO ACCOMMODATE MOUNTING HEIGHTS C.INSPECT EACH CIRCUIT BREAKER VISUALLY. PERFORM SEVERAL MECHANICAL ON-OFF DRAWINGS. INDICATED OR SPECIFIED IN SECTION FOR OUTLET DEVICE. ELECTRICAL BOXES ARE OPERATIONS ON EACH CIRCUIT BREAKER. VERIFY CIRCUIT CONTINUITY ON EACH POLE IN SHOWN ON DRAWINGS IN APPROXIMATE LOCATIONS UNLESS DIMENSIONED. ADJUST WHERE SHOWN AND WHERE RUN CONCEALED AND NOT SUBJECT TO PHYSICAL DAMAGE. 1. CONNECT THE MOTOR STARTING DEVICES FOR ALL MOTORS, EXCEPT WHERE CLOSED POSITION. DETERMINE THAT CIRCUIT BREAKER WILL TRIP ON OVERCURRENT BOX LOCATION UP TO 10-FEET (3M) IF REQUIRED TO ACCOMMODATE INTENDED PURPOSE ALL BRANCH CIRCUITS SHALL BE RUN IN CONDUIT FROM THE PANELBOARD TO THE FIRST OTHERWISE SPECIFICALLY PROVIDED FOR UNDER OTHER SECTIONS, FURNISH ALL CONDITION, WITH TRIPPING TIME TO NEMA AB 1 REQUIREMENTS. INCLUDE DESCRIPTION ORIENT BOXES TO ACCOMMODATE WIRING DEVICES. MAINTAIN HEADROOM AND NECESSARY CONNECTIONS BETWEEN CONTROLLERS AND MOTORS, IN CONDUIT AND OUTLET. ALL TYPE MC CABLE USED SHALL CONTAIN A FULL SIZE INSULATED GROUND OF TESTING AND RESULTS IN TEST REPORT. CONDUCTOR. ALL CONDUCTORS SHALL BE COPPER. ALL TYPE MC CABLE INSULATION PRESENT NEAT MECHANICAL APPEARANCE LEAVE MOTORS READY TO START. CHANGE CONNECTIONS, IF NECESSARY, TO USED SHALL HAVE VOLTAGE RATING OF 600 VOLTS, SHALL HAVE A TEMPERATURE SECURE PROPER ROTATION OF MOTORS. E.INSTALL PULL BOXES AND JUNCTION BOXES ABOVE ACCESSIBLE CEILINGS AND IN RATING OF 75° C, AND SHALL BE THERMOPLASTIC MATERIAL. ARMOR MATERIAL SHALL BE UNFINISHED AREAS ONLY. INACCESSIBLE CEILING AREAS: INSTALL OUTLET AND A.ALL FUSES SHALL BE RATED FOR PROPER VOLTAGE IN WHICH THEY ARE APPLIED. 2. PERFORM ALL THE NECESSARY WIRING IN CONNECTION WITH THE MOTOR STARTING STEEL AND ARMOR DESIGN SHALL BE INTERLOCKED METAL TAPE. FIRE ALARM RATED JUNCTION BOXES NO MORE THAN 6 INCHES (150 MM) FROM CEILING ACCESS PANEL OR AND REMOTE CONTROL EQUIPMENT, WHERE SO DESIGNATED, FURNISHED UNDER INTERRUPTING RATINGS SHALL BE GREATER THAN THE SHORT CIRCUIT CURRENT MC CABLE MAY BE USED FOR FIRE ALARM WORK WHERE CONCEALED AND APPROVED BY FROM REMOVABLE RECESSED LUMINAIRE. INSTALL BOXES TO PRESERVE FIRE OTHER SECTIONS. WHERE CONTROL OR STARTING EQUIPMENT IS SENT TO THE JOB AVAILABLE AT THE TERMINALS OF THE SWITCH. THE AUTHORITY HAVING JURISDICTION RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS, USING MATERIALS AND AS INDIVIDUAL UNITS, THEY SHALL BE INSTALLED, WIRED UP COMPLETE AND LEFT **B. FUSE TYPES:** METHODS SPECIFIED IN DIVISION 7 READY FOR OPERATION UNDER WORK OF THIS SECTION. 1. FUSES FOR BRANCH CIRCUITS SHALL BE TIME DELAY CLASS J. ELECTRONIC DISCHARGE LIGHTING AND OTHER SENSITIVE ELECTRONIC EQUIPMENT F. COORDINATE MOUNTING HEIGHTS AND LOCATIONS OF OUTLETS MOUNTED ABOVE 3. WIRING TO MOTOR SHALL BE IN RIGID CONDUIT WITH WATERTIGHT FLEXIBLE 2. FUSES FOR EQUIPMENT OTHER THAN MOTOR LOADS SHALL BE GENERAL FAST SHALL CONSIST OF 90°C THHN COPPER CONDUCTORS WITH INSULATED GROUND AND COUNTERS, BENCHES, AND BACKSPLASHES. LOCATE OUTLET BOXES TO ALLOW CONDUIT FROM WALL TO MOTOR ONLY. OVERSIZED NEUTRAL CONDUCTOR (OR ONE FULL SIZE NEUTRAL CONDUCTOR FOR EACH ACTING RK-5 OR CLASS J. LUMINAIRES POSITIONED AS SHOWN ON REFLECTED CEILING PLAN. ALIGN ADJACENT INCLUDED IN THE GENERAL REQUIREMENTS FOR MOTOR CONTROL EQUIPMENT WIRING PHASE CONDUCTOR). CABLE SHALL BE U.L. LISTED/LABELED, AND SHALL MEET THE WALL MOUNTED OUTLET BOXES FOR SWITCHES, THERMOSTATS, AND SIMILAR DEVICES. 3. CONTROL POWER TRANSFORMERS FOR MOTOR CONTROLLER CIRCUITS SHALL BE AND CONNECTIONS, THE FOLLOWING SPECIFIED ITEMS SHALL BE PERFORMED: REQUIREMENTS OF NEC ART. 334 AND 675. AS RECOMMENDED BY MOTOR STARTER AND MOTOR CONTROL CENTER G.USE FLUSH MOUNTING OUTLET BOX IN FINISHED AREAS. LOCATE FLUSH MOUNTING BOX 1. INSTALLATION AND CONNECTION OF MOTOR CONTROLS WHICH WILL BE FURNISHED MANUFACTURER. IN MASONRY WALL TO REQUIRE CUTTING OF MASONRY UNIT CORNER ONLY. UNDER THE HEATING, VENTILATING AND AIR CONDITIONING SECTION AND THE FEEDERS IN AREAS OF PATIENT CARE IN HOSPITALS, NURSING HOMES AND MEDICAL COORDINATE MASONRY CUTTING TO ACHIEVE NEAT OPENING. DO NOT INSTALL FLUSH 4. FUSES FOR MOTORS SHALL BE SIZED AT 250% OF THE MOTOR FLA. PLUMBING SECTION CENTERS, MEDICAL OFFICE BUILDINGS AND NURSES' OFFICE AREAS OF SCHOOLS. THIS MOUNTING BOX BACK-TO-BACK IN WALLS; PROVIDE MINIMUM 6-INCHES (150 MM) 5. FUSES FOR NON-MOTOR LOADS SHALL BE SIZED AT 125% OF THE RATED FLA OF STARTERS BY THIS CONTRACTOR: WHERE STARTERS ARE NOT PROVIDED UNDER OTHER CABLE SHALL CONSIST OF 90°C THHN COPPER CONDUCTORS WITH COMBINED SEPARATION. PROVIDE MINIMUM 24 INCHES (600 MM) SEPARATION IN ACOUSTIC RATED EQUIPMENT SERVED. ARMOR/BOND WIRE (EQUIPMENT) PLUS A GREEN INSULATED GROUND (REDUNDANT). USE SECTIONS, THIS CONTRACTOR SHALL FURNISH STARTERS FOR MOTORS 1/2 HP AND WALLS. SECURE FLUSH MOUNTING BOX TO INTERIOR WALL AND PARTITION STUDS. 6. FUSES FOR ELEVATOR LIFTS SHALL BE DUAL ELEMENT TYPE AND SIZED IN LARGER AND WHERE REQUIRED BY THE CONTROL SEQUENCE FOR SMALLER MOTORS INSULATED BUSHINGS. CABLE SHALL BE U.L. LISTED/LABELED, AND SHALL MEET THE ACCURATELY POSITION TO ALLOW FOR SURFACE FINISH THICKNESS. USE STAMPED AND SHALL BE MAGNETIC ACROSS THE LINE STARTERS WITH ADJUSTABLE OVERLOAD ACCORDANCE WITH THE ELEVATOR MANUFACTURER'S RECOMMENDATIONS. REQUIREMENTS OF NEC ART. 333, 517 AND 645. STEEL BRIDGES TO FASTEN FLUSH MOUNTING OUTLET BOX BETWEEN STUDS. INSTALL PROTECTION IN EACH PHASE LINE, ALL IN NEMA 1 ENCLOSURES. STARTERS SHALL BE C.SPARE FUSES FLUSH MOUNTING BOX WITHOUT DAMAGING WALL INSULATION OR REDUCING ITS SOLID STATE OR ACCEPTABLE SUBSTITUTE. COMBINATION STARTERS SHALL BE WITH EFFECTIVENESS. FEEDERS IN ALL BUILDINGS IN THE FOLLOWING AREAS; DATA PROCESSING SYSTEMS, 1. PROVIDE SPARE FUSES IN THE AMOUNT OF 20% (NOT LESS THAN THREE (3) NOR FUSED OR NON-FUSIBLE DISCONNECT AS REQUIRED. PLACES OF ASSEMBLY, UNDER RAISED FLOORS, ABOVE SUSPENDED CEILINGS AND IN H. USE ADJUSTABLE STEEL CHANNEL FASTENERS FOR HUNG CEILING OUTLET BOX. DO NOT MORE THAN NINE (9) OF ALL SIZES AND TYPES). 1. MAGNETIC STARTERS SHALL HAVE 120 VOLT HOLDING CIRCUITS, INTEGRAL OTHER ENVIRONMENTAL AIR-HANDLING SPACES. THIS CABLE SHALL CONSIST OF 90°C FASTEN BOXES TO CEILING SUPPORT WIRES. SUPPORT BOXES INDEPENDENTLY OF 2. SPARE FUSES SHALL INCLUDE GENERAL PURPOSE FUSES, MOTOR FUSES, AND TRANSFORMERS, AUXILIARY CONTACTS AS REQUIRED BY THE CONTROL SEQUENCE THHN COPPER CONDUCTORS WITH COMBINED ARMOR/BOND WIRE (EQUIPMENT) PLUS A CONDUIT. USE GANG BOX WHERE MORE THAN ONE DEVICE IS MOUNTED TOGETHER. DO CONTROL FUSES USED IN MOTOR CONTROL CENTERS, STARTERS ETC. AND INTEGRAL SELECTOR SWITCHES WITH PUSH-TO-TEST PILOT LIGHTS. ONE SIDE GREEN INSULATED GROUND (REDUNDANT). USE INSULATED BUSHINGS. CABLE SHALL BE NOT USE SECTIONAL BOX. USE GANG BOX WITH PLASTER RING FOR SINGLE DEVICE 3. A COMPLETE LIST AND QUANTITY OF SPARE FUSES SHALL BE SUBMITTED WITH OF EACH PILOT LIGHT SHALL BE CONNECTED ON THE LOAD SIDE OF THE MOTOR U.L. LISTED/LABELED, AND SHALL MEET THE REQUIREMENTS OF NEC ART. 333, 517 AND OUTLETS. USE CAST OUTLET BOX IN EXTERIOR LOCATIONS EXPOSED TO THE WEATHER RECORD DRAWINGS FOR REVIEW. STARTER AND WET LOCATIONS. USE CAST FLOOR BOXES FOR INSTALLATIONS IN SLAB ON GRADE; 2.INTEGRAL TRANSFORMERS SHALL HAVE OVERLOAD PROTECTION ON THE FORMED STEEL BOXES ARE ACCEPTABLE FOR OTHER INSTALLATIONS. SET FLOOR BOXES 2.12 INTERIOR LUMINAIRES SECONDARY SECTION AND, ALSO, THE SECONDARY NEUTRAL SHALL BE GROUNDED. LEVEL A.LIGHTING FIXTURES SHALL BE IN ACCORDANCE WITH IDENTIFICATIONS AS FOLLOWS: I. LARGE PULL BOXES: USE HINGED ENCLOSURE IN INTERIOR DRY LOCATIONS, 3. STARTERS SHALL BE AS MANUFACTURED BY SQUARE D COMPANY OR GENERAL B. ALL LAMPING SHALL BE OF THE HIGHEST QUALITY AVAILABLE. SURFACE-MOUNTED CAST METAL BOX IN OTHER LOCATIONS. ELECTRIC. XHHW INSULATION IN RACEWAY, OR METAL CLAD CABLE WHERE CONCEALED AND CODE C.FINISHES SHALL BE AS SELECTED BY THE ARCHITECT OR AS INDICATED ON THE PLANS ACCEPTABLE J. ADJUST FLOOR BOX FLUSH WITH FINISH FLOORING MATERIAL. ADJUST FLUSH-MOUNTING E. TEMPERATURE CONTROL WIRING SHALL BE BY OTHERS AS INDICATED UNDER THE D.ANY ADDITIONAL APPURTENANCES REQUIRED FOR INSTALLATION AND OPERATION, OUTLETS TO MAKE FRONT FLUSH WITH FINISHED WALL MATERIAL. INSTALL KNOCKOUT HEATING, VENTILATING AND AIR CONDITIONING SECTION. WHERE SAME ARE NOT COVERED BY THE IDENTIFICATION USED ON THE DRAWINGS, CLOSURES IN UNUSED BOX OPENINGS. XHHW INSULATION. IN RACEWAY F. PROVIDE A SUITABLE PLYWOOD BACKBOARD ON A WALL AND/OR ANGLE IRON OR SHALL BE INCLUDED. LIGHTING FIXTURES AND EQUIPMENT SHALL BE FURNISHED UNISTRUT FRAMEWORK WITH PLYWOOD FOR ALL STARTERS. STARTERS WILL BE 2.4 WIRING DEVICES COMPLETE, WIRED AND ASSEMBLED, INCLUDING CANOPIES, LAMPS AND OTHER INSTALLED AND WIRED UNDER THIS SECTION. INSULATION, IN RACEWAY OR METAL CLAD CABLE WHERE CODE ACCEPTABLE. INCIDENTAL ITEMS. INSTALL SPECIFIED LAMPS IN EACH LUMINAIRE. A.PROVIDE WIRING DEVICE TYPE PLATES FOR ALL WALL-MOUNTED DEVICES. ALL WALL G.ALL STARTERS SHALL BE LOCATED NEXT TO THE PANEL FEEDING SAME, IF PANEL IS IN A PLATES SHALL BE EITHER BRUSHED ALUMINUM OR SMOOTH HIGH IMPACT NYLON FOR E.RECESSED FIXTURES SHALL BE COORDINATED WITH CEILING CONSTRUCTION BY THE CLOSET OR UTILITY SPACE, UNLESS NOTED OTHERWISE ON THE DRAWINGS. IF PANEL IS XHHW INSULATION, IN RACEWAY. ALL PUBLIC AREAS AS DIRECTED BY THE ARCHITECT. PROVIDE GALVANIZED STEEL FOR ELECTRICAL CONTRACTOR PRIOR TO BID. REFER TO THE ARCHITECT'S PLANS, DETAILS LOCATED IN A FINISHED SPACE (I.E. CORRIDOR, GYMNASIUM, ETC.) STARTERS SHALL BE ALL UTILITY, ELECTRIC AND MECHANICAL ROOMS. COLORS OF WALL PLATES AS AND ELEVATIONS FOR CEILING TYPES BY AREA. PROVIDE PLASTER TRIM KITS AS LOCATED IN NEARBY UTILITY CLOSET OR SPACE ACCEPTABLE TO THE ENGINEER. DIRECTED BY THE ARCHITECT. REQUIRED BY CEILING CONSTRUCTION. INSULATION, IN RACEWAY. H.NAMEPLATES: EACH STARTER SHALL HAVE A 1.0" X 2.5" HOT STAMPED NAMEPLATE B. WIRING DEVICES STANDARD FOR THE PROJECT (I.E., WITH NO SPECIFIC TYPE INDICATED) F. EXACT LOCATION OF ALL FIXTURES SHALL BE CONFIRMED WITH ARCHITECT PRIOR TO IDENTIFYING THE UNIT AND PANEL IT IS FED FROM. THE LETTERING SHALL BE WHITE 1/2" SHALL CONFORM TO THE FOLLOWING: ROUGH-IN. INSTALL SURFACE MOUNTED LUMINAIRES AND EXIT SIGNS PLUMB AND INSULATION, IN RACEWAY. HIGH IN A BLACK BACKGROUND ADJUST TO ALIGN WITH BUILDING LINES AND WITH EACH OTHER. SECURE TO PREVENT 1. VISIBLE PART COLORS OF WIRING DEVICES SHALL BE AS DIRECTED BY THE I. CONNECTIONS TO SYSTEMS: MAKE ELECTRICAL CONNECTIONS IN ACCORDANCE WITH MOVEMENT ARCHITECT FOR ALL PUBLIC AREAS. PROVIDE IVORY COLORED DEVICES FOR ALL 1. GALVANIZED RIGID STEEL CONDUIT SHALL BE USED FOR TELEPHONE SYSTEM EQUIPMENT MANUFACTURER'S INSTRUCTIONS. MAKE CONDUIT CONNECTIONS TO UTILITY, ELECTRICAL AND MECHANICAL ROOMS. G.RECESSED FIXTURES THROUGHOUT SHALL HAVE THEIR COMPONENTS, WIRING AND SLEEVES FOR MAIN CABLE RUNS BETWEEN FLOORS, CLOSETS, ETC. AND FOR EQUIPMENT USING FLEXIBLE CONDUIT. USE LIQUID-TIGHT FLEXIBLE CONDUIT WITH EXTERNAL CONNECTIONS COORDINATED FOR USE IN CEILINGS UTILIZED AS AIR 2. EXCLUDE COMPACT TYPE DEVICES. SWEEPS, BENDS, ETC. IN DUCTBANKS AND AS SPECIFICALLY NOTED ON THE PLANS. WATERTIGHT CONNECTORS IN DAMP OR WET LOCATIONS. MAKE WIRING CONNECTIONS HANDLING PLENUMS. INSTALL RECESSED LUMINAIRES TO PERMIT REMOVAL FROM EMT SHALL BE USED GENERALLY FOR EXPOSED CIRCUITING IN UNFINISHED SPACES. C.WIRING DEVICE SWITCHES SHALL BE TOGGLE TYPE, A.C. QUIET DESIGN, SPECIFICATION USING WIRE AND CABLE WITH INSULATION SUITABLE FOR TEMPERATURES BELOW. INSTALL RECESSED LUMINAIRES USING ACCESSORIES AND FIRESTOPPING METAL CLAD CABLE (TYPE MC) MAY BE USED FOR BRANCH CIRCUITING AND FIRE GRADE, 20 AMPS ON 120 VOLT CIRCUITS. SWITCHES SHALL BE MOUNTED 48-INCHES TO ENCOUNTERED IN HEAT PRODUCING EQUIPMENT. PROVIDE RECEPTACLE OUTLET WHERE MATERIALS TO MEET REGULATORY REQUIREMENTS FOR FIRE RATING. INSTALL CLIPS TO ALARM RATED MC CABLE FOR FIRE ALARM CIRCUITING WHERE RUN CONCEALED AND CENTER LINE ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE. EQUIVALENT CONNECTION WITH ATTACHMENT PLUG IS INDICATED. PROVIDE CORD AND CAP WHERE SECURE RECESSED GRID-SUPPORTED LUMINAIRES IN PLACE WHERE CODE ACCEPTABLE. 277VOLT, 20 AMP SWITCHES SHALL BE USED WHERE REQUIRED. FIELD-SUPPLIED ATTACHMENT PLUG IS INDICATED. PROVIDE SUITABLE STRAIN-RELIEF H.FIXTURES FOR USE OUTDOORS OR IN AREAS DESIGNATED AS DAMP LOCATIONS. SHALL 2. TO PREVENT TRANSMITTAL OF VIBRATION TO CONDUIT, CONNECTIONS TO ANY D.STANDARD DUPLEX CONVENIENCE RECEPTACLES SHALL BE 125VOLT, 20 AMPS, THREE CLAMPS AND FITTINGS FOR CORD CONNECTIONS AT OUTLET BOXES AND EQUIPMENT BE SUITABLY GASKETED AND UL LISTED FOR SUCH APPLICATIONS. VIBRATION PRODUCING EQUIPMENT (I.E. TRANSFORMERS, MOTORS, ETC.) SHALL BE CONNECTION BOXES. INSTALL DISCONNECT SWITCHES, CONTROLLERS, CONTROL WIRE (TWO CIRCUIT WIRES PLUS GROUND), "U-SLOT" GROUND NEMA CONFIGURATION I. MAKE WIRING CONNECTIONS TO BRANCH CIRCUIT USING BUILDING WIRE WITH TERMINATED BY 18 INCHES OF FLEXIBLE METAL CONDUIT. WHERE FLEXIBLE 5-20R, SPECIFICATION GRADE. RECEPTACLES SHALL BE MOUNTED 18" TO CENTER LINE STATIONS, AND CONTROL DEVICES AS INDICATED. MODIFY EQUIPMENT CONTROL WIRING INSULATION SUITABLE FOR TEMPERATURE CONDITIONS WITHIN LUMINAIRE CONNECTIONS ARE EXPOSED TO GREASE AND OIL, LIQUID-TIGHT FLEXIBLE METAL ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE. WHERE INDICATED ON PLANS WITH TERMINAL BLOCK JUMPERS AS INDICATED. PROVIDE INTERCONNECTING CONDUIT CONDUIT SHALL BE USED. PROVIDE RECEPTACLES WITH GROUND FAULT CURRENT INTERRUPTERS, UL CLASS A; AND WIRING BETWEEN DEVICES AND EQUIPMENT WHERE INDICATED I. EMERGENCY BATTERIES FOR EXTERIOR FIXTURES SHALL BE REMOTE MOUNTED WITHIN 20A, 125V THE BUILDING. VERIFY MAXIMUM DISTANCES FOR REMOTE MOUNTING THE EMERGENCY 3. IN GENERAL, NO SPLICES OR JOINTS SHALL BE PERMITTED IN EITHER FEEDERS OR 2.7 SUPPORTING DEVICES E.NON-STANDARD CONVENIENCE RECEPTACLES AND SPECIAL PURPOSE POWER SUPPLY BATTERIES WITH THE MANUFACTURER PRIOR TO INSTALLATION. LOCATE REMOTE BRANCHES EXCEPT AT OUTLETS OR ACCESSIBLE JUNCTION BOXES. SPLICES IN WIRE A.MATERIALS AND FINISHES: PROVIDE ADEQUATE CORROSION RESISTANCE. PROVIDE EMERGENCY BATTERIES ABOVE ACCESSIBLE CEILINGS OR UTILITY ROOMS AS REQUIRED. #8 AWG AND SMALLER SHALL BE PIGTAIL TYPE, MADE MECHANICALLY TIGHT. ALL RECEPTACLES SHALL BE AS LISTED ON PLANS. MATERIALS, SIZES, AND TYPES OF ANCHORS, FASTENERS AND SUPPORTS TO CARRY THE CONDUIT SYSTEMS SHALL BE COMPLETE. PROVIDE TEST SWITCHES FOR ALL EMERGENCY BATTERIES AS REQUIRED. F. PROVIDE GROUND FAULT CIRCUIT INTERRUPTER (GFCI), WEATHER-RESISTANT TYPE LOADS OF EQUIPMENT AND CONDUIT. CONSIDER WEIGHT OF WIRE IN CONDUIT WHEN K. UNLESS NOTED OTHERWISE, ALL FIXTURES SHALL BE 3500K AND HAVE A MINIMUM CRI OF 4. RACEWAY, BOXES, ETC., RUN ON WALLS IN WET AREAS WHICH ARE SUBJECT TO RECEPTACLES IN ALL WET AND DAMP LOCATIONS AS DEFINED BY THE NATIONAL SELECTING PRODUCTS. STEEL CHANNEL SHALL BE GALVANIZED. BEING WASHED DOWN, SHALL BE MOUNTED ON THE WALLS WITH 1/4" STAND-OFFS. ELECTRICAL CODE. ALL OUTDOOR RECEPTACLES AND WHERE INDICATED ON THE PLANS **B. ANCHORS AND FASTENERS:** ALL BOXES SHALL BE CAST TYPE. SHALL BE INSTALLED IN A WEATHERPROOF WHILE-IN-USE ENCLOSURES. L. THE CONTRACTOR SHALL OBTAIN ALL INFORMATION RELATIVE TO THE EXACT TYPE OF 1. CONCRETE STRUCTURAL ELEMENTS: USE PRECAST INSERT SYSTEM, EXPANSION HUNG CEILINGS AND SUSPENSION SYSTEMS TO BE INSTALLED BEFORE ORDERING ANY G.WEATHERPROOF RECEPTACLE ENCLOSURES SHALL BE NEMA 3R RATED FOR RAIN-TIGHT ANCHORS. RECESSED FIXTURES. THIS CONTRACTOR SHALL FURNISH THE PROPER TYPE FIXTURES CABLE IN ACCORDANCE WITH THE NECA "STANDARD OF INSTALLATION." USE SOLID WHILE-IN-USE, GASKETED, IMPACT RESISTANT THERMOPLASTIC WITH HINGED GASKETED 2. STEEL STRUCTURAL ELEMENTS: USE BEAM CLAMPS, OR WELDED FASTENERS. APPLICABLE TO THE CEILING FRAMING SYSTEM. IF. OTHER THAN THE TYPE OF FIXTURES CONDUCTOR FOR FEEDERS AND BRANCH CIRCUITS 10 AWG AND SMALLER. USE DEVICE COVER. SPECIFIED ARE REQUIRED FOR INSTALLATION DUE TO THE TYPE OF CEILING STRANDED CONDUCTORS FOR CONTROL CIRCUITS. USE CONDUCTOR NOT SMALLER 3. CONCRETE SURFACES: USE SELF-DRILLING ANCHORS OR EXPANSION ANCHORS. H.PROVIDE EXTENSION RINGS TO BRING OUTLET BOXES FLUSH WITH FINISHED SURFACE. CONSTRUCTION, THIS CONTRACTOR SHALL FURNISH AND INSTALL THE PROPER TYPE THAN 12 AWG FOR POWER AND LIGHTING CIRCUITS. USE CONDUCTOR NOT SMALLER CLEAN DEBRIS FROM OUTLET BOXES. INSTALL DEVICES PLUMB AND LEVEL. INSTALL 4. HOLLOW MASONRY, PLASTER, AND GYPSUM BOARD PARTITIONS: USE TOGGLE BOLTS FIXTURES AND MOUNTING APPURTENANCES REQUIRED AT NO EXTRA CHARGE. THAN 16 AWG FOR CONTROL CIRCUITS. USE 10 AWG CONDUCTORS FOR 20 AMPERE, 120 RECEPTACLES WITH GROUNDING POLE ON TOP. CONNECT WIRING DEVICE GROUNDING OR HOLLOW WALL FASTENERS. VOLT BRANCH CIRCUITS LONGER THAN 75 FEET (25 M), USE 10 AWG CONDUCTORS FOR 20 M.THE CONTRACTOR SHALL COORDINATE THE EXACT LOCATIONS OF ALL LIGHTING TERMINAL TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR. USE JUMBO SIZE 5. SOLID MASONRY WALLS: USE EXPANSION ANCHORS OR PRESET INSERTS. AMPERE, 277 VOLT BRANCH CIRCUITS LONGER THAN 200 FEET (160 M). PULL ALL FIXTURES WITH THE CEILING PATTERN DURING THE CONSTRUCTION PERIOD AND PLATES FOR OUTLETS INSTALLED IN MASONRY WALLS. INSTALL GALVANIZED STEEL CONDUCTORS INTO RACEWAY AT SAME TIME. USE SUITABLE WIRE PULLING LUBRICANT 6. SHEET METAL: USE SHEET METAL SCREWS. BEFORE INSTALLATION OF THE FIXTURES. INTERFERENCES BETWEEN LIGHTING PLATES ON OUTLET BOXES AND JUNCTION BOXES IN UNFINISHED AREAS, ABOVE FOR BUILDING WIRE 4 AWG AND LARGER. PROTECT EXPOSED CABLE FROM DAMAGE. FIXTURES, AND OTHER EQUIPMENT, SHALL BE BROUGHT TO THE ATTENTION OF THE ACCESSIBLE CEILINGS. AND ON SURFACE MOUNTED OUTLETS. 7. WOOD ELEMENTS: USE WOOD SCREWS. GENERAL CONTRACTOR. C.INSTALLATION: INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTALL WALL SWITCH 48 INCHES ABOVE FINISHED FLOOR TO TOP OF HANDLE. ON CABLE TIES TO SUPPORT CABLES FROM STRUCTURE OR CEILING SUSPENSION SYSTEM, N.INCLUDE THE AIMING AND/OR ADJUSTMENTS OF ALL LIGHTING FIXTURES REQUIRING POSITION, SHALL BE UP. INSTALL CONVENIENCE RECEPTACLES 18-INCHES ABOVE INSTRUCTIONS. PROVIDE ANCHORS, FASTENERS, AND SUPPORTS IN ACCORDANCE WITH CABLES THAT ARE NOT PART OF THE CEILING SYSTEM CANNOT BE SUPPORTED FROM SAME IN ACCORDANCE WITH INSTRUCTIONS ISSUED BY THE ARCHITECT IN THE FIELD. FINISHED FLOOR. INSTALL CONVENIENCE RECEPTACLE 6-INCHES ABOVE BACKSPLASH OF NECA "STANDARD OF INSTALLATION". DO NOT FASTEN SUPPORTS TO PIPES, DUCTS, CEILING SUPPORTS. DO NOT REST CABLE ON CEILING PANELS. USE SUITABLE CABLE AIM AND ADJUST LUMINARIES AS INDICATED OR AS DIRECTED BY THE OWNER. COUNTER. INSTALL DIMMER SWITCHES 48 INCHES ABOVE FINISHED FLOOR TO TOP. MECHANICAL EQUIPMENT, AND CONDUIT. DO NOT USE SPRING STEEL CLIPS AND CLAMPS. FITTINGS AND CONNECTORS. NEATLY TRAIN AND LACE WIRING INSIDE BOXES, ARCHITECT OR ENGINEER. POSITION EXIT SIGN DIRECTIONAL ARROWS AS INDICATED. DO NOT USE POWDER-ACTUATED ANCHORS. DO NO DRILL OR CUT STRUCTURAL J. VERIFY THAT EACH RECEPTACLE DEVICE IS ENERGIZED. TEST EACH RECEPTACLE EQUIPMENT, AND PANELBOARDS. OPERATE EACH LUMINAIRE AFTER INSTALLATION AND CONNECTION. ENSURE PROPER MEMBERS. FABRICATE SUPPORTS FROM STRUCTURAL STEEL OR STEEL CHANNEL. DEVICE FOR PROPER POLARITY. TEST EACH GFCI RECEPTACLE DEVICE FOR PROPER CONNECTION AND OPERATION. RIGIDLY WELD MEMBERS OR USE HEXAGON HEAD BOLTS TO PRESENT NEAT OPERATION. SPLICES, TAPS, AND TERMINATIONS TO CARRY FULL AMPACITIES OF CONDUCTORS WITH APPEARANCE WITH ADEQUATE STRENGTH AND RIGIDITY. USE SPRING LOCK WASHERS O.LIGHTING FIXTURES SHALL BE SUPPORTED FROM BUILDING STRUCTURE ONLY. NOT 2.5 GROUNDING & BONDING NO PERCEPTIBLE TEMPERATURE RISE. USE SUITABLE REDUCING CONNECTORS OR UNDER ALL NUTS. INSTALL SURFACE-MOUNTED CABINETS AND PANELBOARDS WITH FROM HUNG OR SUSPENDED CEILING, BY MEANS OF CHAINS OR THREADED RODS. THE MECHANICAL CONNECTOR ADAPTERS FOR CONNECTING ALUMINUM CONDUCTORS TO MINIMUM OF FOUR ANCHORS. IN WET AND DAMP LOCATIONS USE STEEL CHANNEL A.GROUND ALL SYSTEMS AND EQUIPMENT IN ACCORDANCE WITH BEST INDUSTRY USE OF TIE WIRE WILL NOT BE ALLOWED. ALL FIXTURES SHALL INCLUDE SEISMIC CLIPS COPPER CONDUCTORS. USE SPLIT BOLT CONNECTORS FOR COPPER CONDUCTOR SUPPORTS TO STAND CABINETS AND PANELBOARDS ONE INCH OFF WALL. USE SHEET PRACTICE, THE REQUIREMENTS OF NFPA 70 AND THE FOLLOWING: AND SHALL BE SUPPORTED TO COMPLY WITH SEISMIC REGULATIONS. INSTALL SPLICES AND TAPS, 6 AWG AND LARGER. TAPE UN-INSULATED CONDUCTORS AND METAL CHANNEL TO BRIDGE STUDS ABOVE AND BELOW CABINETS AND PANELBOARDS SUSPENDED LUMINAIRES USING PENDANTS SUPPORTED FROM SWIVEL HANGERS OR 1. PROVIDE GROUNDING BONDS BETWEEN ALL METALLIC CONDUITS OF THE LIGHT AND CONNECTOR WITH ELECTRICAL TAPE TO 150 PERCENT OF INSULATION RATING OF RECESSED IN HOLLOW PARTITIONS. OTHER SUITABLE LEVELING MEANS. ALL ROWS OF FIXTURES SHALL BE LEVEL, ALIGNED POWER SYSTEM WHICH ENTER AND LEAVE CABLE CHAMBERS OR OTHER CONDUCTOR. USE SOLDERLESS PRESSURE CONNECTORS WITH INSULATING COVERS WITH BUILDING LINES AND RUN PARALLEL TO EACH OTHER. PROVIDE PENDANT LENGTH NON-METALLIC CABLE PULLING AND SPLICING BOXES. ACCOMPLISH THIS BY 2.8 ELECTRICAL IDENTIFICATION FOR COPPER CONDUCTOR SPLICES AND TAPS, 8 AWG AND SMALLER. USE INSULATED REQUIRED TO SUSPEND LUMINAIRES AT INDICATED HEIGHT. SUPPORT LUMINAIRES TO EQUIPPING THE CONDUITS WITH BUSHINGS OF THE GROUNDING TYPE INDIVIDUALLY A.NAMEPLATES: ENGRAVED THREE-LAYER LAMINATED PLASTIC, BLACK LETTERS ON WHITE SPRING WIRE CONNECTORS WITH PLASTIC CAPS FOR COPPER CONDUCTOR SPLICES BUILDING STRUCTURE, INDEPENDENT OF CEILING FRAMING. CROSS CONNECTED. BACKGROUND. LOCATIONS: EACH ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT AND TAPS, 10 AWG AND SMALLER. IDENTIFY AND COLOR CODE WIRE AND CABLE. 2.13 FIRE ALARM SYSTEM 2. BOND METALLIC CONDUITS CONTAINING GROUNDING ELECTRODE CONDUCTORS ENCLOSURE, COMMUNICATION CABINETS. LETTER SIZE: USE 1/8 INCH LETTERS FOR IDENTIFY EACH CONDUCTOR WITH ITS CIRCUIT NUMBER OR OTHER DESIGNATION AND MAIN BONDING CONDUCTORS TO THE GROUND BUS SERVICE ENCLOSURE IDENTIFYING INDIVIDUAL EQUIPMENT AND LOADS. USE 1/4 INCH LETTERS FOR INDICATED A.GENERAL AND/OR GROUNDING ELECTRODE AT BOTH ENDS OF EACH RUN UTILIZING IDENTIFYING GROUPED EQUIPMENT AND LOADS. 1. THE CONTRACTOR SHALL SUBMIT COMPLETE DOCUMENTATION FOR THE FIRE GROUNDING BUSHINGS AND JUMPERS. B.LABELS: EMBOSSED ADHESIVE TAPE, WITH 3/16 INCH WHITE LETTERS ON BLACK ALARM/LIFE SAFETY SYSTEM DATA SHEETS FOR ALL ITEMS TO ENSURE COMPLIANCE 3. PROVIDE GROUNDING BONDS FOR ALL METALLIC CONDUITS OF THE LIGHT AND BACKGROUND. USE FOR IDENTIFICATION OF INDIVIDUAL POWER RECEPTACLE WITH THESE SPECIFICATIONS. COPIES OF THIS INFORMATION SHALL BE SUBMITTED POWER SYSTEM WHICH TERMINATE IN PITS BELOW EQUIPMENT FOR WHICH A 1. EACH OUTLET IN WIRING OR RACEWAY SYSTEMS SHALL BE PROVIDED WITH AN FACEPLATES INDICATING PANEL & CIRCUIT NUMBER THE OUTLET IS FED FROM AND AS REQUIRED TO THE ARCHITECT AWARD OF THIS WORK AND SHALL BE SUBJECT TO OUTLET BOX TO SUIT CONDITIONS ENCOUNTERED. BOXES INSTALLED IN NORMALLY GROUND BUS IS SPECIFIED. ACCOMPLISH THIS BY EQUIPPING THE CONDUITS WITH CONTROL DEVICE STATIONS. IN ADDITION TO NAMEPLATES AS DESCRIBED ABOVE, USE THE APPROVAL OF THE ARCHITECT. WET LOCATIONS SHALL BE OF CAST-METAL TYPE HAVING HUBS. CONCEALED BOXES BUSHINGS OF THE GROUNDING TYPE CONNECTED INDIVIDUALLY TO THE GROUND LABELS ON ALL PANELBOARDS, DISCONNECT SWITCHES AND ENCLOSED CIRCUIT 2. THE CONTRACTOR SHALL SUBMIT, AS PART OF THE COMPLETE BID DOCUMENTATION SHALL BE CADMIUM PLATED OR ZINC COATED SHEET METAL TYPE. OLD WORK BREAKERS TO IDENTIFY WHERE THE EQUIPMENT IS FED FROM, VOLTAGE & PHASE. PACKAGE, CERTIFICATION THAT THE ENGINEERED SYSTEM DISTRIBUTOR IS A FULLY BOXES WITH MADISON CLAMPS ARE NOT ALLOWED IN NEW CONSTRUCTION. 4. PROVIDE SUPPLEMENTARY GROUND BONDING WHERE METALLIC CONDUITS C.WIRE MARKERS: TAPE, OR TUBING TYPE WIRE MARKERS. LOCATIONS: EACH AUTHORIZED FACTORY TRAINED AND CERTIFIED DISTRIBUTOR OF THE SYSTEM TERMINATE AT METAL CLAD EQUIPMENT (OR AT THE METAL PULL BOX OF 2. EACH BOX SHALL HAVE SUFFICIENT VOLUME TO ACCOMMODATE NUMBER OF CONDUCTOR AT PANELBOARD GUTTERS, PULL BOXES, OUTLET AND JUNCTION BOXES, DETAILED WITHIN THIS SPECIFICATION. CONDUCTORS IN ACCORDANCE WITH REQUIREMENTS OF NFPA 70. BOXES SHALL EQUIPMENT) FOR WHICH A GROUND BUS IS SPECIFIED. ACCOMPLISH THIS BE AND EACH LOAD CONNECTION. POWER AND LIGHTING CIRCUITS SHALL BE MARKED WITH 3. ALL EQUIPMENT AND MATERIAL SHALL BE NEW AND UNUSED, AND LISTED BY NOT BE LESS THAN 1-1/2" DEEP UNLESS SHALLOWER BOXES ARE REQUIRED BY EQUIPPING THE CONDUITS WITH BUSHINGS OF THE GROUNDING TYPE CONNECTED PANEL AND BRANCH CIRCUIT OR FEEDER NUMBER AS INDICATED ON DRAWINGS. UNDERWRITER'S LABORATORIES FOR THE SPECIFIC INTENDED PURPOSE. ALL INDIVIDUALLY BY MEANS OF JUMPERS TO THE GROUND BUS. EXCLUDE THE CONTROL CIRCUITS SHALL BE MARKED WITH CONTROL WIRE NUMBER INDICATED ON STRUCTURAL CONDITIONS AND ARE SPECIFICALLY APPROVED BY ARCHITECT. CONTROL PANEL COMPONENTS, FIELD PERIPHERALS AND INTERACTIVE COMPUTER CEILING AND BRACKET OUTLET BOXES SHALL NOT BE LESS THAN 4" OCTAGONAL JUMPERS WHERE DIRECTED. THIS EXCLUSION WILL BE REQUIRED WHERE AN SCHEMATIC AND INTERCONNECTION DIAGRAMS ON DRAWINGS PERIPHERALS SHALL BE DESIGNED FOR CONTINUOUS DUTY OPERATION WITHOUT ISOLATED GROUND FOR ELECTRONIC EQUIPMENT IS TO BE MAINTAINED. EXCEPT THAT SMALLER BOXES MAY BE USED WHERE REQUIRED BY PARTICULAR D. CONDUIT MARKERS: CORROSION AND ABRASION RESISTANT. LOCATION: FURNISH DEGRADATION OF FUNCTION OR PERFORMANCE. FIXTURE TO BE INSTALLED. FLUSH OR RECESSED FIXTURES SHALL BE PROVIDED 5. EACH GROUNDING TYPE BUSHING SHALL HAVE THE MAXIMUM GROUND WIRE MARKERS FOR EACH CONDUIT LONGER THAN 6 FEET (2 M). SPACING: 20 FOOT ON 4. ALL EQUIPMENT COVERED BY THIS SPECIFICATION OR NOTED ON INSTALLATION WITH SEPARATE JUNCTION BOXES WHEN REQUIRED BY FIXTURE TERMINAL ACCOMMODATION AVAILABLE IN STANDARD MANUFACTURE FOR THE PARTICULAR CENTER. INDICATE VOLTAGE AND PHASE. DRAWINGS SHALL BE THE BEST EQUIPMENT SUITED FOR THE APPLICATION AND TEMPERATURE REQUIREMENTS. SWITCH AND RECEPTACLE BOXES SHALL BE 4" CONDUIT SIZE. CONNECTION TO BUSHING SHALL BE WITH WIRE OF THIS MAXIMUM E.ALL PANELBOARDS SHALL BE PROVIDED WITH A TYPED (HAND WRITTEN IS NOT SHALL BE PROVIDED BY A SINGLE MANUFACTURER. SQUARE OR OF COMPARABLE VOLUME. LUMINAIRE AND EQUIPMENT SUPPORTING SIZE ALLOWED) CIRCUIT DIRECTORY INDICATING THE LOAD FED BY EACH CIRCUIT BREAKER BOXES SHALL BE RATED FOR WEIGHT OF EQUIPMENT SUPPORTED; INCLUDE 1/2 INCH 5. PROVIDE ALL EQUIPMENT AND ACCESSORIES AND COMPATIBLE DEVICES FOR A 6. BONDING CONDUCTORS ON THE LOAD SIZE OF THE SERVICE DEVICE AND AND IT'S LOCATION IN THE BUILDING. (13 MM) MALE FIXTURE STUDS WHERE REQUIRED. COMPLETE AND FULLY FUNCTIONING FIRE ALARM SYSTEM. THE FIRE ALARM SYSTEM EQUIPMENT GROUNDING CONDUCTORS SHALL BE SIZED IN RELATION TO THE FUSES 2.9 ENCLOSED SWITCHES SHALL BE COORDINATED WITH AND INSPECTED BY THE LOCAL FIRE DEPARTMENT, 3. ACCEPTABLE MANUFACTURERS: OR TRIP SIZE OF THE OVERCURRENT DEVICE SUPPLYING THE CIRCUIT AND ANY INCONSISTENCY MENTIONED DURING ANY INSPECTION SHALL BE A.FUSIBLE SWITCH ASSEMBLIES SHALL BE PROVIDED IN ACCORDANCE WITH THE a. APPLETON 7. THE CENTRAL EQUIPMENT FOR THE FIRE PROTECTIVE ALARM SYSTEM AND CORRECTED BY CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
- I. METAL CLAD SHEATHED CABLE NFPA 70, TYPE MC MAY BE USED FOR BRANCH CIRCUITRY J. METAL-CLAD CABLE (TYPE MC) FOR CIRCUITS SUPPLYING COMPUTER EQUIPMENT, ESSEX, GENERAL CABLE, AFC, SOUTHWIRE OR EQUAL.
- U.ROUTE WIRE AND CABLE AS REQUIRED TO MEET THE PROJECT CONDITIONS. INSTALL A.OUTLET BOXES:
- H.OTHER WIRES AND CABLES REQUIRED FOR THE VARIOUS SYSTEMS DESCRIBED K.USE ARMORED CABLE (AFC TYPE HCF-90 OR EQUAL) FOR BRANCH CIRCUITS AND L. USE ARMORED CABLE (AFC TYPE HCF-90 OR EQUAL) FOR BRANCH CIRCUITS AND M.WIRING MATERIALS EXCEPT MI CABLE SHALL BE MANUFACTURED BY TRIANGLE, N. CONCEALED DRY INTERIOR LOCATIONS: USE ONLY BUILDING WIRE TYPE THHN/THWN OR O.EXPOSED DRY INTERIOR LOCATIONS: USE ONLY BUILDING WIRE, TYPE THHN/THWN OR P. ABOVE ACCESSIBLE CEILINGS: USE ONLY BUILDING WIRE, TYPE THHN/THWN OR XHHW Q.WET OR DAMP INTERIOR LOCATIONS: USE ONLY BUILDING WIRE, TYPE THHN/THWN OR R.EXTERIOR LOCATIONS: USE ONLY BUILDING WIRE, TYPE THHN/THWN OR XHHW S.UNDERGROUND INSTALLATIONS: USE ONLY BUILDING WIRE, TYPE THHN/THWN OR XHHW T. WIRING METHODS, IN GENERAL, ARE AS FOLLOWS: V.SUPPORT CABLES ABOVE ACCESSIBLE CEILING, USING SPRING METAL CLIPS OR METAL W. CLEAN CONDUCTOR SURFACES BEFORE INSTALLING LUGS AND CONNECTORS. MAKE 2.3 BOXES

- b. CROUSE HINDS
- c. STEEL CITY
- d. RACO
- B. PULL AND JUNCTION BOXES: WHERE NECESSARY TO TERMINATE, TAP OFF, OR REDIRECT MULTIPLE RACEWAY RUNS OR TO FACILITATE CONDUCTOR INSTALLATION, FURNISH AND INSTALL APPROPRIATELY DESIGNED BOXES. BOXES SHALL BE FABRICATED FROM CODE GAUGE STEEL ASSEMBLED WITH CORROSION RESISTANT MACHINE SCREWS. BOX SIZE SHALL BE AS REQUIRED BY CODE. WHERE INTERMEDIATE CABLE SUPPORTS ARE NECESSARY BECAUSE OF BOX DIMENSIONS, PROVIDE INSULATED REMOVABLE CORE BRACKETS TO SUPPORT CONDUCTORS. JUNCTION BOXES ARE TO BE EQUIPPED WITH BARRIERS TO SEPARATE CIRCUITS. WHERE SPLICES ARE TO BE MADE, BOXES SHALL BE LARGE ENOUGH TO PROVIDE AMPLE WORK SPACE. ALL CONDUCTORS IN BOXES ARE TO BE CLEARLY TAGGED TO INDICATE CHARACTERISTICS. BOXES SHALL BE SUPPORTED
- TELEPHONE SYSTEM SHALL HAVE ITS GROUNDING TERMINAL CONNECTED TO THE GROUNDING ELECTRODE BY MEANS OF A NO. 6 GREEN CODED INSULATED CONDUCTOR, RUN IN 3/4" CONDUIT. UTILIZE A GROUND CLAMP OF A TYPE SPECIFICALLY MANUFACTURED FOR THE PURPOSE. 8. PERFORM INSPECTIONS AND TESTS LISTED IN NETA ATS, SECTION 7.13. DOCUMENT

GALVANIZED TYPE. BOXES LARGER THAN 4-INCHES SQUARE SHALL HAVE HINGED

COVERS. BOXES LARGER THAN 12-INCHES IN ONE DIMENSION WILL BE ALLOWED TO

- TEST RESULTS IN RECORD DOCUMENTS. 9. GROUNDING MEANS SHALL NEVER EXCEED 10 OHMS WHEN LOCATED OUTDOORS, OR
- 5 OHMS WHEN LOCATED INDOORS 10. AN ACCEPTABLE MEANS OF GROUNDING IS TO PROVIDE AN UNDERGROUND 2" THICK. CONCRETE-ENCASED ELECTRODE OF EITHER 1/2" DIAMETER. ELECTRICALLY CONDUCTIVE REINFORCING BAR OF #4/0 BARE COPPER CONDUCTOR (MINIMUM OF 20-FEET IN LENGTH) PER NEC 250.52(A)(3). 2.6 EQUIPMENT WIRING SYSTEM

INDEPENDENTLY OF RACEWAYS. JUNCTION BOXES IN MOIST OR WET AREAS SHALL BE A.CORDS & CAPS: MANUFACTURERS: HUBBEL, PASS & SEYMOUR OR ARROW HART. ATTACHMENT PLUG CONSTRUCTION: CONFORM TO NEMA WD 1. CONFIGURATION: NEMA WD 6; MATCH RECEPTACLE CONFIGURATION AT OUTLET PROVIDED FOR EQUIPMENT. CORD CONSTRUCTION: ANSI/NFPA 70, TYPE SO MULTICONDUCTOR FLEXIBLE CORD WITH

- FOLLOWING. DESCRIPTION: NEMA KS 1, TYPE GD WITH EXTERNALLY OPERABLE HANDLE INTERLOCKED TO PREVENT OPENING FRONT COVER WITH SWITCH IN ON POSITION, ENCLOSED LOAD INTERRUPTER KNIFE SWITCH. HANDLE LOCKABLE IN OFF POSITION. FUSE CLIPS: DESIGNED TO ACCOMMODATE NEMA FU1, CLASS R FUSES. PROVIDE NEMA 3R WHERE LOCATED OUTDOORS, KITCHENS OR OTHER INTERIOR WET AREAS.
- 3. NON-FUSIBLE SWITCH ASSEMBLIES SHALL BE PROVIDED IN ACCORDANCE WITH FOLLOWING. DESCRIPTION: NEMA KS 1, TYPE GD WITH EXTERNALLY OPERABLE HANDLE INTERLOCKED TO PREVENT OPENING FRONT COVER WITH SWITCH IN ON POSITION ENCLOSED LOAD INTERRUPTER KNIFE SWITCH. HANDLE LOCKABLE IN OFF POSITION. PROVIDE NEMA 3R WHERE LOCATED OUTDOORS, KITCHENS OR OTHER INTERIOR WET AREAS.
- C.INSTALL IN ACCORDANCE WITH NECA "STANDARD OF INSTALLATION". INSTALL FUSES IN FUSIBLE DISCONNECT SWITCHES, APPLY ADHESIVE TAG ON INSIDE DOOR OF EACH FUSED SWITCH INDICATING NEMA FUSE CLASS AND SIZE INSTALLED.

2.10 ENCLOSED CIRCUIT BREAKERS

A.ENCLOSED MOLDED CASE CIRCUIT BREAKER: COMPLY WITH NEMA AB 1. INCLUDE PROVISIONS FOR PADLOCKING. PROVIDE INSULATED GROUNDING LUG IN EACH

- 6. THE CONTROL PANEL SHALL CONTAIN A MICROPROCESSOR WITH 10/100 ETHERNET MEDIA ACCESS CONTROLLER (MAC). THE SYSTEM SHALL BE DESIGNED SPECIFICALLY FOR FIRE DETECTION, AND NOTIFICATION APPLICATIONS.
- 7. THE INSTALLING CONTRACTOR SHALL COORDINATE MASTER-BOX, RADIO-BOX, AND/OR DIALER REQUIREMENTS WITH LOCAL FIRE DEPARTMENT. B. FIRE ALARM LIFE SAFETY SYSTEM SEQUENCE OF OPERATION
- 1. THE OPERATION OF A MANUAL STATION OR ACTIVATION OF ANY AUTOMATIC ALARM INITIATING DEVICE (SYSTEM SMOKE, HEAT, WATERFLOW) SHALL AUTOMATICALLY: a. INITIATE THE TRANSMISSION OF THE ALARM TO THE MUNICIPAL FIRE STATION OR APPROVED CENTRAL STATION VIA THE LOCAL ENERGY OR RADIO MASTER-BOX.
- b. SOUND A CODE 3 TEMPORAL EVACUATION SIGNAL OVER ALL AUDIO CIRCUITS, EXCEPT IN DESIGNATED AREAS OF ASSEMBLY. IN DESIGNATED AREAS OF

ASSEMBLY (SOUND A PRE-RECORDED VOICE MESSAGE) AND/OR CONDUCT MANUAL VOICE EVACUATION FROM THE SYSTEM MICROPHONE(S) LOCATED AT THE FACP OR REMOTE LOCATION(S) IN ACCORDANCE WITH THE LOCAL REQUIREMENTS

- c. FLASH ALL VISUAL SIGNALS THROUGHOUT THE BUILDING IN A SYNCHRONIZED MANNER.
- d. FLASH AN ALARM LED AND SOUND AN AUDIBLE SIGNAL AT THE FACP. UPON ACKNOWLEDGEMENT, THE ALARM LED SHALL LIGHT STEADILY AND THE AUDIBLE SHALL SILENCE. SUBSEQUENT ALARMS SHALL RE-INITIATE THIS SEQUENCE.
- e. UPON ALARM INITIATION BY AN ELEVATOR LOBBY SMOKE DETECTOR OR OTHER DESIGNATED RECALL DEVICE, RECALL ALL ELEVATORS THAT SERVE THE FLOOR OF INITIALIZATION TO THE MAIN EGRESS LEVEL. IF THE ALARM INITIATES ON THE MAIN EGRESS LEVEL, RETURN THE ELEVATOR TO THE ALTERNATE FLOOR AS DIRECTED BY THE LOCAL AUTHORITY HAVING JURISDICTION.
- f. VISUALLY INDICATE THE ALARM INITIATING DEVICE TYPE AND LOCATION VIA THE LCD DISPLAY LOCATED AT THE FACP (AND AT ANY REMOTE ANNUNCIATORS) AND (ILLUMINATE THE APPROPRIATE ALARM ZONE LED AT THE REMOTE ANNUNCIATOR)
- g. AUTOMATICALLY SHUT DOWN OR CONTROL HVAC EQUIPMENT TO INITIATE SMOKE CONTROL FUNCTIONS AS REQUIRED. MANUAL OVERRIDE CONTROLS AND PROGRAMMABLE RELAY INTERFACE SHALL SERVE AS AN INTERFACE TO THE BUILDING AUTOMATION SYSTEM.
- h. OPERATE PRIORITIZED OUTPUTS TO RELEASE ALL MAGNETICALLY HELD SMOKE DOORS AND MAGNETICALLY LOCKED DOORS THROUGHOUT THE BUILDING. i. ACTIVATE THE EXTERIOR WEATHERPROOF BEACON.

WIRING

- 1. PROVIDE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS ALL WIRING, CONDUIT AND OUTLET BOXES REQUIRED FOR THE INSTALLATION OF COMPLETE SYSTEM AS DESCRIBED HEREIN AND AS SHOWN ON THE DRAWINGS. WIRING SHALL BE CLASS A.
- 2. INSTALLATION AND FIRE ALARM SYSTEM WIRING SHALL BE INSTALLED IN METAL RACEWAY. AN EQUIPMENT BONDING CONDUCTOR SHALL BE PROVIDED IN ALL FLEXIBLE METALLIC RACEWAYS.
- 3. COLOR CODE FOR FIRE ALARM SYSTEMS SHALL BE PER THE STATE FIRE ALARM CODE
- 4. DC SUPPLY TO THE MAIN FIRE ALARM PANEL SHALL BE WHITE AND BLACK. FIRE ALARM PRIMARY POWER SOURCE SHALL BE ON DEDICATED BRANCH CIRCUIT. CIRCUIT BREAKER LOCKS SHALL BE USED. IF A SEPARATE FEED IS REQUIRED FOR THE BATTERY CHARGER IT SHALL BE BLACK AND WHITE UNLESS THE MAIN FIRE ALARM PANEL REQUIRED ONLY AC FEED. IN THIS CASE THE CONDUCTORS TO THE BATTERY CHARGER SHALL BE RED AND WHITE AND SHALL BE ON A CIRCUIT BREAKER OF FITS OWN.
- 5. CONDUCTORS SHALL BE MINIMUM #14-GAUGE SOLID COPPER TYPE THHN/THWN. CONDUCTOR'S SIZE SHALL BE INCREASED AS REQUIRED TO MAINTAIN VOLTAGE DROP TO A MAXIMUM OF 3%. ALL AC AND DC PORTIONS OF THE SYSTEM SHALL BE INSTALLED IN SEPARATE RACEWAY. ADDRESSABLE LOOP WIRING MAY BE #16 PROVIDING MANUFACTURER'S RECOMMENDED DISTANCE IS OBSERVED. SYSTEMS REQUIRING SHIELDED WIRING FOR ADDRESSABLE LOOPS SHALL NOT BE ACCEPTABLE
- 6. RED PAINTED TERMINAL CABINETS WITH HINGED LOCAL COVERS SHALL BE PROVIDED AT ALL JUNCTION POINTS. ALL CONDUCTOR SPLICES SHALL BE MADE ON SCREW TYPE TERMINAL BLOCKS, WIRE NUTS SHALL NOT BE USED. ALL TERMINALS WITHIN TERMINAL CABINET SHALL BE PROPERLY LABELED. PROVIDE TERMINAL CABINET AT EACH BUILDING CABLE ENTRANCE AND AT OTHER LOCATIONS AS REQUIRED
- 7. ALL FIRE ALARM INITIATING ZONE AND SIGNAL WIRING SHALL BE WIRED CLASS A. 8. FINAL CONNECTIONS BETWEEN THE EQUIPMENT AND THE WIRING SYSTEM SHALL BE
- MADE UNDER THE DIRECT SUPERVISION OF A REPRESENTATIVE OF THE MANUFACTURER. 9. UPON COMPLETION OF THE INSTALLATION OF FIRE ALARM EQUIPMENT, THE
- ELECTRICAL CONTRACTOR SHALL PROVIDE TO THE ENGINEER A SIGNED STATEMENT SUBSTANTIALLY IN THE FORM AS FOLLOWS:
- a. THE UNDERSIGNED HAVING BEEN ENGAGED AS THE ELECTRICAL CONTRACTOR ON THIS PROJECT CONFIRMS THE FIRE ALARM EQUIPMENT WAS INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS AND IN ACCORDANCE WITH WIRING DIAGRAMS, INSTRUCTIONS, AND DIRECTIONS PROVIDED TO US BY THE MANUFACTURER.
- .GUARANTEE AND FINAL TEST
- 1. ALL TESTING (PRE-TESTING, FINAL TESTING, QUARTERLY TESTING AND PROGRAM CHANGE TESTING) TO BE COORDINATED WITH THE OWNER AND SCHEDULED IN ADVANCE SO THAT OWNERS AND PERSONNEL CAN BE PRESENT DURING TESTING. CONTRACTOR TO CERTIFY THAT ALL TESTS COMPLY WITH THE "STATE FIRE CODE", LATEST EDITION.
- 2. BEFORE THIS INSTALLATION SHALL BE CONSIDERED COMPLETE AND ACCEPTABLE TO THE AWARDING AUTHORITIES, A COMPLETE TEST ON THE SYSTEM SHALL BE PERFORMED AS FOLLOWS:
- a. A PRE-TEST WILL BE HELD BY THE ELECTRICAL CONTRACTOR WITH THE MANUFACTURER'S AUTHORIZED REPRESENTATIVE PRESENT. AFTER CERTIFICATION OF A COMPLETE PRE-TEST. THE INSTALLING CONTRACTOR SHALL INFORM THE AUTHORITY HAVING JURISDICTION OF THE OUTCOME OF THE TEST AND WILL RE-INSPECT IN THE PRESENCE OF THE AUTHORITY HAVING PART 3 - EXECUTION JURISDICTION AND THE MANUFACTURER'S AUTHORIZED REPRESENTATIVE.
- b. FINAL TEST: THE ELECTRICAL CONTRACTOR IN THE PRESENCE OF AUTHORIZED REPRESENTATIVE OF THE MANUFACTURER AND THE FIRE DEPARTMENT SHALL OPERATE EVERY MANUAL STATION, SMOKE DETECTOR, AND THERMODETECTOR. EACH STATION/DETECTOR CIRCUIT AND HORN CIRCUIT SHALL BE OPENED IN AT LEAST TWO LOCATIONS TO CHECK FOR THE PRESENCE OF CORRECT SUPERVISORY CIRCUITRY. WHEN THIS TESTING AHS BEEN COMPLETED TO THE SATISFACTION OF BOTH THE ELECTRICAL CONTRACTOR'S JOB FOREMAN AND THE REPRESENTATIVE OF THE MANUFACTURER, A LETTER FROM THE CONTRACTOR COSIGNED BY THE MANUFACTURER ATTESTING T THE SATISFACTORY COMPLETION OF SAID TESTING, SHALL BE FORWARDED TO THE OWNER.
- 3. THE ELECTRICAL CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT AND WIRING TO BE FREE FROM INHERENT MECHANICAL AND ELECTRICAL DEFECTS FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.
- 4. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A FORMAL WRITTEN EQUIPMENT GUARANTEE UPON COMPLETION OF THE INSTALLATION AND TESTING OF THE SYSTEM. THE GUARANTEE PERIOD SHALL BEGIN ON THE DAY OF ACCEPTANCE OF THE SYSTEM BY THE OWNER AND SHALL PROVIDE FOR A PERIOD OF ONE YEAR. THIS GUARANTEE SHALL BE INDICATED IN THE MANUFACTURER'S SUBMISSION PRIOR TO APPROVAL. THIS GUARANTEE SHALL BE AS NORMAL POLICY BY THE EQUIPMENT MANUFACTURER
- 5. THE MANUFACTURER SHALL MAINTAIN A FULL-TIME SERVICE AND PARTS FACILITY,
- WITH SEVEN DAYS PER WEEK, 24 HOUR PER DAY SERVICE AVAILABLE. 6. ALL SERVICE TECHNICIANS SHALL BE LICENSED BY THE STATE FIRE CODE COVERING SERVICE AND MAINTENANCE OF SYSTEMS
- 7. INCLUDE AS PART OF THE CONTRACT, THE FOUR QUARTERLY TESTS FOLLOWING THE FINAL ACCEPTANCE TEST. PROVIDE QUARTERLY TESTING IN CONFORMANCE WITH THE STATE FIRE CODE LATEST ADDITION.

2.14 DATA

- THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL THE DATA OUTLETS AND WIRING PER THE OWNER'S SPECIFICATIONS AND DIRECTION PER DATA OUTLET AND WIRING AS SHOWN ON THE PLANS. EACH DATA CONNECTION SHALL INCLUDE THE FOLLOWING:
- 1. DATA OUTLET INSTALLED FLUSH IN THE WALL UNLESS OTHERWISE REQUIRED BY THE SITE CONDITIONS AND APPROVED BY THE OWNER. THE OUTLET SHALL INCLUDE FACEPLATE, ID LABEL, INSERTS, JACKS AND ALL OTHER REQUIRED ACCESSORIES FOR A COMPLETE INSTALLATION.
- 2. WIRING CONSISTING OF CATEGORY 6, 24AWG, COPPER CABLING INSTALLED FROM OUTLET TO PATCH PANEL. ALL WIRING SHALL BE INSTALLED CONCEALED IN FINISHED & PUBLIC SPACES UNLESS OTHERWISE REQUIRED BY THE SITE CONDITIONS AND APPROVED BY THE OWNER. SHALL BE USED FROM THE OUTLET TO AN ACCESSIBLE CEILING. IN UNFINISHED OR UTILITY SPACES, THE DATA CABLING SHALL BE INSTALLED IN EMT CONDUIT WHERE NOT CONCEALED. ACCESSIBLE ABOVE CEILING INSTALLATIONS SHALL USE J-HOOKS UNLESS CABLE TRAY IS USED. USE PLENUM RATED CABLE WHERE INSTALLED IN PLENUM RETURN SPACES PER THE MECHANICAL CONTRACTORS DIRECTION PRIOR TO BID.
- 3. PATCH PANEL AND OUTLET TERMINATIONS. PROVIDE IDENTIFICATION LABELS AT EACH END OF THE CABLE PER THE OWNERS REQUIREMENTS. COORDINATE WITH OWNER FOR NOMENCLATURE.
- 4. TEST EACH CABLE FOR SIGNAL STRENGTH PER EIA/TIA STANDARDS AND RECORD ALL RESULTS TO BE SUBMITTED TO THE OWNER. ALL DEFECTIVE CABLE AND/OR TERMINATION SHALL BE REPLACED AT NO COST TO THE OWNER.
- PROVIDE PATCH PANEL(S) TO ACCOMMODATE EACH OUTLET PLUS 10% SPARE. PROVIDE RACK(S) TO ACCOMMODATE EACH PATCH PANEL.

PROVIDE A COPPER GROUND BAR (1/4" THICK X 4" HIGH X 36" LONG) WITH WALL

MOUNTING BRACKETS, INSULATORS AND A #6AWG COPPER EXOTHERMICALLY WELDED PIGTAIL IN EACH TELEPHONE / DATA CLOSET, SERVER ROOM AND/OR IDF CLOSET. CONNECT PIG TAIL TO BUILDING STEEL OR ELECTRICAL SERVICE GROUNDING SYSTEM. D.SERVERS, SWITCHES, ROUTERS AND ACTIVE ELECTRONIC EQUIPMENT BY OWNER. 2.15 TELEPHONE

- A.PROVIDE INCOMING TELEPHONE SERVICE RACEWAYS AND CABLE AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING TELEPHONE COMPANY. PROVIDE 8' X 8' X 3/4" PLYWOOD BOARD (AND ONE DOUBLE DUPLEX OUTLET) ON WALL FOR TELEPHONE EQUIPMENT. PROVIDE 3/4-INCH THICK PLYWOOD BOARD, FIRE-RETARDANT-TREATED AND STAMPED FRT, SECURELY ANCHORED TO THE WALL.
- B. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL THE TELEPHONE OUTLETS AND WIRING PER THE OWNER'S SPECIFICATIONS AND DIRECTION AS SHOWN ON THE PLANS. EACH TELEPHONE CONNECTION SHALL INCLUDE THE FOLLOWING:
- 1. TELEPHONE OUTLET INSTALLED FLUSH IN THE WALL UNLESS OTHERWISE REQUIRED BY THE SITE CONDITIONS AND APPROVED BY THE OWNER. THE OUTLET SHALL INCLUDE FACEPLATE, ID LABEL, INSERTS, JACKS AND ALL OTHER REQUIRED ACCESSORIES FOR A COMPLETE INSTALLATION.
- 2. WIRING CONSISTING OF CATEGORY 6, 24AWG, COPPER CABLING INSTALLED FROM OUTLET TO PATCH PANEL. ALL WIRING SHALL BE INSTALLED CONCEALED IN FINISHED & PUBLIC SPACES UNLESS OTHERWISE REQUIRED BY THE SITE CONDITIONS AND APPROVED BY THE OWNER. SHALL BE USED FROM THE OUTLET TO AN ACCESSIBLE CEILING. IN UNFINISHED OR UTILITY SPACES, THE DATA CABLING SHALL BE INSTALLED IN EMT CONDUIT WHERE NOT CONCEALED. ACCESSIBLE ABOVE CEILING INSTALLATIONS SHALL USE J-HOOKS UNLESS CABLE TRAY IS USED. USE PLENUM RATED CABLE WHERE INSTALLED IN PLENUM RETURN SPACES PER THE MECHANICAL CONTRACTORS DIRECTION PRIOR TO BID.
- 3. TELEPHONE TERMINAL BOARD OR PBX (PRIVATE BRANCH EXCHANGE) EQUIPMENT AND OUTLET TERMINATIONS. PROVIDE IDENTIFICATION LABELS AT EACH END OF THE CABLE PER THE OWNERS REQUIREMENTS. COORDINATE WITH OWNER FOR NOMENCLATURE.
- 4. TEST EACH CABLE FOR SIGNAL STRENGTH PER EIA/TIA STANDARDS AND RECORD ALL RESULTS TO BE SUBMITTED TO THE OWNER. ALL DEFECTIVE CABLE AND/OR TERMINATION SHALL BE REPLACED AT NO COST TO THE OWNER.
- C.PROVIDE A COPPER GROUND BAR (1/4" THICK X 4" HIGH X 36" LONG) WITH WALL MOUNTING BRACKETS, INSULATORS AND A #6AWG COPPER EXOTHERMICALLY WELDED PIGTAIL IN EACH TELEPHONE ROOM AND TELEPHONE TERMINAL BOARD. CONNECT PIG TAIL TO BUILDING STEEL OR ELECTRICAL SERVICE GROUNDING SYSTEM PER THE TELEPHONE COMPANY'S REQUIREMENTS.
- D.PBX (PRIVATE BRANCH EXCHANGE) EQUIPMENT BY OWNER.

2.16 CABLE TELEVISION

- A.PROVIDE INCOMING CABLE TELEVISION SERVICE RACEWAYS AND CABLE AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING CABLE TELEVISION COMPANY. PROVIDE 8' X 8' X 3/4" PLYWOOD BOARD (AND ONE DOUBLE DUPLEX OUTLET) ON WALL FOR CABLE EQUIPMENT. PROVIDE 3/4-INCH THICK PLYWOOD BOARD, FIRE-RETARDANT-TREATED AND STAMPED FRT, SECURELY ANCHORED TO THE WALL. PROVIDE FLUSH MOUNTED CATV OUTLETS WITH 3/4-INCH EMT CONDUIT CONCEALED FROM OUTLET BOX TO CABLE TERMINAL BOARD. LEAVE A PULL STRING IN ALL EMPTY CONDUITS
- B.PROVIDE A COPPER GROUND BAR (1/4" THICK X 4" HIGH X 36" LONG) WITH WALL MOUNTING BRACKETS, INSULATORS AND A #6AWG COPPER EXOTHERMICALLY WELDED PIGTAIL IN EACH CATV TERMINAL ROOM AND MAIN CATV TERMINAL BOARD. CONNECT PIG TAIL TO BUILDING STEEL OR ELECTRICAL SERVICE GROUNDING SYSTEM PER THE CATV UTILITY COMPANY'S REQUIREMENTS
- C.THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL THE CATV OUTLETS AND WIRING PER THE OWNER'S SPECIFICATIONS AND DIRECTION AS SHOWN ON THE PLANS. THE ALLOWANCE FOR EACH CATV CONNECTION SHALL INCLUDE THE FOLLOWING:
- 1. CATV OUTLET INSTALLED FLUSH IN THE WALL UNLESS OTHERWISE REQUIRED BY THE SITE CONDITIONS AND APPROVED BY THE OWNER. THE OUTLET SHALL INCLUDE FACEPLATE, ID LABEL, INSERTS, JACKS AND ALL OTHER REQUIRED ACCESSORIES FOR A COMPLETE INSTALLATION.
- 2. WIRING CONSISTING OF COAXIAL COPPER CABLING PER THE CATV UTILITY COMPANY'S REQUIREMENTS INSTALLED FROM OUTLET TO TERMINAL BOARD. ALL WIRING SHALL BE INSTALLED CONCEALED IN FINISHED & PUBLIC SPACES UNLESS OTHERWISE REQUIRED BY THE SITE CONDITIONS AND APPROVED BY THE OWNER. BE USED FROM THE OUTLET TO AN ACCESSIBLE CEILING. IN UNFINISHED OR UTILITY SPACES, THE DATA CABLING SHALL BE INSTALLED IN EMT CONDUIT WHERE NOT CONCEALED. ACCESSIBLE ABOVE CEILING INSTALLATIONS SHALL USE J-HOOKS UNLESS CABLE TRAY IS USED. USE PLENUM RATED CABLE WHERE INSTALLED IN PLENUM RETURN SPACES PER THE MECHANICAL CONTRACTORS DIRECTION PRIOR TO BID. THE LENGTH OF CABLE TO BE USED FOR THE ALLOWANCE SHALL BE BASED ON 100'-0".
- 3. CATV TERMINAL BOARD AND OUTLET TERMINATIONS. PROVIDE IDENTIFICATION LABELS AT EACH END OF THE CABLE PER THE OWNERS REQUIREMENTS. COORDINATE WITH OWNER FOR NOMENCLATURE.
- 4. TEST EACH CABLE FOR SIGNAL STRENGTH PER CATV UTILITY COMPANY'S REQUIREMENTS AND RECORD ALL RESULTS TO BE SUBMITTED TO THE OWNER. ALL DEFECTIVE CABLE AND/OR TERMINATION SHALL BE REPLACED AT NO COST TO THE OWNER

3.1 BASIC REQUIREMENTS

- A. ADHERE TO BEST INDUSTRY PRACTICE AND THE FOLLOWING:
- 1. ALL WORK SHALL BE CONCEALED.
- 2. ROUTE CIRCUITRY RUNS EMBEDDED IN CONCRETE TO COORDINATE WITH STRUCTURAL REQUIREMENTS. 3. EQUIP EACH RACEWAY INTENDED FOR THE FUTURE INSTALLATION OF WIRE OR
- CABLE WITH A NYLON PULLING CORD 3/16" IN DIAMETER AND CLEARLY IDENTIFY BOTH ENDS OF THE RACEWAY. 4. PROVIDE ALL OUTLET BOXES, JUNCTION BOXES, AND PULL BOXES FOR PROPER
- WIRE PULLING AND DEVICE INSTALLATION. INCLUDE THOSE OMITTED FROM THE DRAWINGS DUE TO SYMBOLIC METHODS OF NOTATION. 5. UTILIZE LUGS OF THE LIMITED TYPE TO MAKE CONNECTIONS AT BOTH ENDS OF
- CABLES INSTALLED ON THE LINE SIDE OF MAIN SERVICE OVERCURRENT AND SWITCHING DEVICES. PROVIDE CABLE LIMITERS FOR EACH END OF EACH SERVICE ENTRANCE CABLE.
- 6. BEYOND THE TERMINATION OF RACEWAYS, FIREPROOF THE FOLLOWING:
- a. ALL WIRES AND CABLES WITHIN PAD-MOUNTED TRANSFORMER ENCLOSURE. b. ALL SERVICE FEEDER CABLES AHEAD OF MAIN SERVICE OVERCURRENT PROTECTION DEVICES, AND ELSEWHERE WHERE NOT IN RACEWAYS.
- 7. FIREPROOFING OF WIRES AND CABLES SHALL BE BY MEANS OF A HALF-LAPPED LAYER OF ARCPROOF OR BY MEANS OF SLEEVING OF A TYPE SPECIFICALLY MANUFACTURED FOR THE PURPOSE. ENDS OF TAPE OR SLEEVING SHALL BE SEVERED WITH TWINE. FIREPROOFING SHALL BE EXTENDED UP INTO RACEWAYS. AFTER CONDUCTORS HAVE BEEN FINALLY SHAPED INTO THEIR PERMANENT CONFIGURATION. FIREPROOFING TAPE OR SLEEVING SHALL BE COATED WITH SILICATE OF SODA (WATER GLASS). FIREPROOFING SHALL BE APPLIED IN AN OVERALL MANNER TO RACEWAY GROUPINGS OF CONDUCTORS.
- 8. PROVIDE ALL SLEEVES THROUGH FIREPROOF AND WATERPROOF SLABS, WALLS, ETC., REQUIRED FOR ELECTRIC WORK.
- 9. PROVIDE WATERPROOF SEALING FOR THE SLEEVES THROUGH WATERPROOF SLABS, WALLS. ETC. 10. PROVIDE FIREPROOF SEALING FOR THE SLEEVES THROUGH FIREPROOF WALLS,
- SLABS, ETC. 11. PROVIDE FIREPROOF SEALING FOR THE OPENINGS IN FIREPROOF WALLS, SLABS, ETC., RESULTING FROM REMOVAL OF EXISTING ELECTRICAL SLEEVES,
- CONDUITS, POKE-THRU'S ETC. 12. NO SPLICING OF WIRES WILL BE PERMITTED IN THE FIRE ALARM SYSTEM. 13. BUNDLE WIRING PASSING THROUGH PULL BOXES AND PANELBOARDS IN A NEAT AND ORDERLY MANNER WITH PLASTIC CABLE TIES. CABLE TIES SHALL BE BY
- TY-RAPS AS MANUFACTURED BY THOMAS & BETTS, HOLUB INDUSTRIES INC., QUICK WRAP, BUNDY UNIRAP, OR EQUAL. 14. TURN BRANCH CIRCUITS AND AUXILIARY SYSTEM WIRING OUT OF WIRING
- GUTTERS AT 90 DEGREES TO CIRCUIT BREAKERS AND TERMINAL LUGS. 3.2 TESTING REQUIREMENTS & INSTRUCTIONS

A.WHERE ANY REPAIRS, MODIFICATIONS, ADJUSTMENTS, TESTS OR CHECKS ARE TO BE MADE, THE CONTRACTOR SHALL CONTACT THE ENGINEER TO DETERMINE IF THE WORK SHOULD BE PERFORMED BY OR WITH THE MANUFACTURER'S REPRESENTATIVE. B. TESTS ARE TO:

- 1. PROVIDE INITIAL EQUIPMENT/SYSTEM ACCEPTANCE.
- TROUBLE-SHOOTING 3. PROVIDE ASSURANCE THAT EACH SYSTEM COMPONENT IS INSTALLED
- SATISFACTORILY AND CAN BE EXPECTED TO PERFORM, AND CONTINUE TO PERFORM

THE FACILITY. C.AT ANY STAGE OF CONSTRUCTION AND WHEN OBSERVED, ANY ELECTRICAL EQUIPMENT OR SYSTEM DETERMINED TO BE DAMAGED, OR FAULTY, IS TO BE REPORTED TO THE ENGINEER. CORRECTIVE ACTION BY THE CONTRACTOR REQUIRES PRIOR ENGINEER APPROVAL, RETESTING, AND INSPECTION D.WHEN THE ELECTRICAL TESTS AND INSPECTIONS SPECIFIED OR REQUIRED WITHIN DIVISION 16 ARE COMPLETED AND RESULTS REPORTED, REVIEWED, AND APPROVED BY THE ENGINEER, THE CONTRACTOR MAY CONSIDER THAT PORTION OF THE ELECTRICAL EQUIPMENT SYSTEM OR INSTALLATION ELECTRICALLY COMPLETE. THE CONTRACTOR WILL THEN AFFIX APPROPRIATE, APPROVED, AND DATED COMPLETION OR CALIBRATION LABELS TO THE TESTED EQUIPMENT AND NOTIFY THE ENGINEER OF ELECTRICAL COMPLETION. IF THE ENGINEER FINDS COMPLETED WORK UNACCEPTABLE, HE WILL NOTIFY THE CONTRACTOR IN WRITING OF THE UNFINISHED OR DEFICIENT WORK, WITH THE REASON FOR HIS REJECTION, TO BE CORRECTED BY THE CONTRACTOR. THE CONTRACTOR WILL NOTIFY THE ENGINEER IN WRITING WHEN EXCEPTIONS HAVE BEEN CORRECTED. THE CONTRACTOR WILL PREPARE A "NOTIFICATION OR SUBSTANTIAL ELECTRICAL COMPLETION" FOR APPROVAL BY THE ENGINEER FOLLOWING ENGINEER'S ACCEPTANCE OF ELECTRICAL COMPLETION. IF LATER IN-SERVICE OPERATION OR FURTHER TESTING IDENTIFIED PROBLEMS ATTRIBUTABLE TO THE CONTRACTOR, THESE WILL BE CORRECTED BY THE CONTRACTOR, AT NO ADDITIONAL COST TO THE AUTHORITY . GROUNDING SYSTEMS 1. TEST MAIN BUILDING LOOPS AND MAJOR EQUIPMENT GROUNDS TO REMOTE EARTH, DIRECTLY REFERENCED TO AN EXTREMELY LOW RESISTANCE (APPROXIMATELY ' OHM) REFERENCE GROUND BENCHMARK. PERFORM A VISUAL INSPECTION OF THE SYSTEMS, RACEWAY AND EQUIPMENT GROUNDS TO DETERMINE THE ADEQUACY AND INTEGRITY OF THE GROUNDING. GROUND TESTING RESULTS SHALL BE RECORDED, WITNESSES, AND SUBMITTED TO THE ENGINEER. 2. PERFORM GROUND TESTS USING A LOW RESISTANCE, NULL-BALANCE TYPE GROUND G.SUPPORT LESS THAN 2" TRADE SIZE, VERTICALLY RUN, CONDUITS AT INTERVALS NO TESTING OHMMETER, WITH TEST LEAD RESISTANCE COMPENSATED FOR. USE THE TYPE OF TEST INSTRUMENT WHICH COMPENSATES FOR POTENTIAL AND CURRENT ROD RESISTANCES. 3. TEST EACH GROUND ROD AND MEASURE GROUND RESISTANCE. IF RESISTANCE IS NOT 10 OHMS OR LESS, DRIVE ADDITIONAL RODS TO OBTAIN A RESISTANCE OF 10 OHMS OR LESS. SUBMIT TABULATION OF RESULTS TO ENGINEER. INCLUDE IDENTIFICATION OF ELECTRODE, DATE OF READING AND GROUND RESISTANCE VALVE IN THE TEST REPORTS 4. TEST EACH BUILDING AND MAJOR EQUIPMENT GROUNDING SYSTEM FOR CONTINUITY OF CONNECTIONS AND FOR RESISTANCE. GROUND RESISTANCE OF CONDUITS, EQUIPMENT CASES, AND SUPPORTING FRAMES, SHALL NOT EXCEED 5 OHMS TO GROUND. SUBMIT ALL READINGS TO THE ENGINEER. 5. WHERE GROUND TEST RESULTS IDENTIFY THE NEED FOR ADDITIONAL GROUNDING CONDUCTORS OR RODS THAT ARE NOT INDICATED OR SPECIFIED. DESIGN CHANGES WILL BE INITIATED TO OBTAIN THE ACCEPTABLE VALUES. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSTALLATION OF THE GROUNDING INDICATED AND SPECIFIED. 6. OPERATING INSTRUCTIONS: FURNISH OPERATING INSTRUCTIONS TO OWNER'S DESIGNATED REPRESENTATIVE WITH RESPECT TO OPERATIONS, FUNCTIONS AND MAINTENANCE PROCEDURES FOR EQUIPMENT AND SYSTEMS INSTALLED. COST OF SUCH INSTRUCTION UP TO A FULL FIVE (5) DAYS OF ELECTRICAL SUBCONTRACTOR'S TIME SHALL BE INCLUDED IN CONTRACT. COST OF PROVIDING A MANUFACTURER'S REPRESENTATIVE AT SITE FOR INSTRUCTIONAL PURPOSES SHALL ALSO BE INCLUDED. BRANCH CIRCUITRY A.FOR ALL LIGHTING AND APPLIANCE BRANCH CIRCUITRY, RACEWAY SIZES SHALL CONFORM TO INDUSTRY STANDARD MAXIMUM PERMISSIBLE OCCUPANCY REQUIREMENTS EXCEPT WHERE THESE ARE EXCEEDED BY OTHER REQUIREMENTS SPECIFIED ELSEWHERE B. CIRCUITS SHALL BE BALANCED ON PHASES AT THEIR SUPPLY AS EVENLY AS POSSIBLE. C.FEEDER CONNECTIONS SHALL BE IN THE PHASE ROTATION WHICH ESTABLISHES PROPER OPERATION FOR ALL EQUIPMENT SUPPLIED. D.REDUCED SIZE CONDUCTORS INDICATED FOR ANY FEEDERS SHALL BE TAKEN AS THEIR GROUNDING CONDUCTORS. E.FEEDERS CONSISTING OF MULTIPLE CABLES AND RACEWAYS SHALL BE ARRANGED SUCH THAT EACH RACEWAY OF THE FEEDER CONTAINS ONE (1) CABLE FOR EACH LEG AND ONE A.MAINTAIN ALL SPLICES AND JOINTS IN REMOVABLE COVER BOXES OR CABINETS WHERE (1) NEUTRAL CABLE, IF ANY. F. FOR CIRCUITRY INDICATED AS BEING PROTECTED AT 20 AMPS OR LESS, ABIDE BY THE FOLLOWING 1. ALL 20 AMP, 120/208 VOLT, 3-PHASE, 4-WIRE COMBINED BRANCH CIRCUIT HOMERUNS SHALL BE PROVIDED WITH A #8 AWG NEUTRAL CONDUCTOR. 2. MINIMUM CONDUCTOR SIZE SHALL BE NO. 12 AWG COOPER. 3 CONDUCTORS OPERATING AT 120 VOLTS EXTENDING IN EXCESS OF 100 FT, OR AT 277 VOLTS EXTENDING IN EXCESS OF 200 FT., OR THE LAST OUTLET OR FIXTURE TAP SHALL BE NO. 10 AWG COOPER THROUGHOUT. 4. LIGHTING FIXTURES AND RECEPTACLES SHALL NOT BE CONNECTED TO THE SAME CIRCUIT. G.TYPE MC CABLE INSTALLATION: 1. WHERE CABLE IS PERMITTED UNDER THE PRODUCTS SECTION, THE INSTALLATION OF SAME SHALL BE DONE IN ACCORDANCE WITH CODE AND THE FOLLOWING: a. CABLE SHALL BE SUPPORTED IN ACCORDANCE WITH CODE. TIE WIRE IS NOT AN ACCEPTABLE MEANS OF SUPPORT. CABLE SUPPORTS SUCH AS CADDY WMX-6, MX-3, AND CLAMPS SUCH AS CADDY 449 SHALL BE USED. WHERE CABLES ARE SUPPORTED BY THE STRUCTURE AND ONLY NEED SECURING IN PLACE, THEN TY-RAPS WILL BE ACCEPTABLE. TY-RAPS ARE NOT ACCEPTABLE AS A MEANS OF SUPPORT. ALL FITTINGS. HANGERS. AND CLAMPS FOR SUPPORT AND TERMINATION OF CABLES SHALL BE OF TYPE SPECIFICALLY DESIGNED FOR USE WITH CABLE, I.E., ROMEX CONNECTORS NOT ACCEPTABLE. b. ARMOR OF CABLE SHALL BE REMOVED WITH ROTARY CUTTER DEVICE EQUAL TO ROTO-SPLIT BY SEATEK CO.; NOT WITH A HACKSAW. c. USE SPLIT "INSULINER" SLEEVES AT TERMINATIONS. CLIPS. 3.4 REQUIREMENTS GOVERNING ELECTRICAL WORK IN DAMP OR WET LOCATIONS A.OUTLETS AND OUTLET SIZE BOXES SHALL BE OF GALVANIZED CAST FERROUS METAL B. THE FINISH OF THREADED STEEL CONDUIT SHALL BE GALVANIZED ONLY. C. WIRES FOR PULLING INTO RACEWAYS FOR LIGHTING AND APPLIANCE BRANCH CIRCUITRY SHALL BE LIMITED TO "THWN". D. WIRES FOR PULLING INTO RACEWAYS FOR FEEDERS SHALL BE LIMITED TO "THWN". E. PLATES FOR TOGGLE SWITCHES AND RECEPTACLES SHALL HAVE GASKETED SNAP SHUT COVERS SUITABLE FOR WET LOCATIONS WHILE IN USE. F. FINAL CONNECTIONS OF FLEXIBLE CONDUIT SHALL BE NEOPRENE SHEATHED. G.APPLY ONE (1) LAYER OF HALF LOOPED PLASTIC ELECTRIC INSULATING TAPE OVER WIRE NUTS USED FOR JOINING THE CONDUCTORS OF WIRES. H.ENCLOSURES, JUNCTION BOXES, PULL BOXES, CABINETS, CABINET TRIMS, WIRING TROUGHS AND THE LIKE, SHALL BE FABRICATED OF GALVANIZED SHEET METAL, SHALL CONFORM TO THE FOLLOWING: 1. THEY SHALL BE CONSTRUCTED WITH CONTINUOUSLY WELDED JOINTS AND SEAMS. PURPOSE 2. THEIR EDGES AND WELD SPOTS SHALL BE FACTORY TREATED WITH COLD GALVANIZING COMPOUND. 3. THEIR CONNECTION TO CIRCUITRY SHALL BE BY MEANS OF WATERTIGHT HUB CONNECTORS WITH SEALING RINGS. I. ENCLOSURES FOR INDIVIDUALLY MOUNTED SWITCHING AND OVERCURRENT DEVICES SHALL BE NEMA CLASS IV WEATHERPROOF CONSTRUCTION. J. THE COVERS, DOORS AND PLATES AND TRIMS USED IN CONJUNCTION WITH ALL ENCLOSURES, PULL BOXES, OUTLET BOXES, JUNCTION BOXES, CABINETS AND THE LIKE A.FLUSH WALL-MOUNTED OUTLET BOXES SHALL NOT BE SET BACK TO BACK BUT SHALL BE SHALL BE EQUIPPED WITH GASKETS K. PANELS SHALL BE EQUIPPED WITH DOORS WITHOUT EXCEPTION. L. THE FOLLOWING SHALL BE INTERPRETED AS DAMP OR WET LOCATIONS WITHIN BUILDING CONFINES: 1. SPACES WHERE ANY DESIGNATIONS INDICATING WEATHERPROOF (WP) OR VAPOR PROOF APPEAR ON THE DRAWINGS. 2. BELOW WATERPROOFING IN SLABS APPLIED DIRECTLY ON GRADE.

ITS SPECIFIED FUNCTION WITH REASONABLE RELIABILITY THROUGHOUT THE LIFE OF

- 3. SPACES DEFINED AS WET OR DAMP LOCATIONS BY ARTICLE 100 OF THE NATIONAL ELECTRIC CODE 4. PARKING GARAGE
- 2. PROVIDE RECORDED DATA FOR FUTURE ROUTINE MAINTENANCE AND 3.5 LIMITING NOISE PRODUCED BY ELECTRICAL INSTALLATION

A.PERFORM THE FOLLOWING WORK, IN ACCORDANCE WITH FIELD INSTRUCTIONS ISSUED BY THE ARCHITECT TO ASSURE THAT MINIMAL NOISE IS PRODUCED BY ELECTRICAL

- INSTALLATIONS DUE TO EQUIPMENT FURNISHED AS PART OF THE ELECTRICAL WORK. B. CHECK AND TIGHTEN THE FASTENINGS OF SHEET METAL PLATES, COVERS, DOORS AND
- TRIMS USED IN THE ENCLOSURES OF ELECTRICAL EQUIPMENT C.REMOVE AND REPLACE ANY INDIVIDUAL DEVICE CONTAINING ONE OR MORE MAGNETIC FLUX PATH METALLIC CORES (E.G., DISCHARGE LAMP BALLAST, TRANSFORMER, REACTOR, DIMMER, AND SOLENOID) WHICH IS FOUND TO HAVE A NOISE OUTPUT EXCEEDING THAT OF OTHER IDENTICAL DEVICES INSTALLED AT THE PROJECT.
- 3.6 SUPPORTS AND FASTENINGS
- A.SUPPORT WORK IN ACCORDANCE WITH BEST INDUSTRY STANDARDS, AND LOCAL FI FCTRIC CODE
- B.INCLUDE SUPPORTING FRAMES OR RACKS FOR EQUIPMENT, INTENDED FOR VERTICAL SURFACE MOUNTING, WHICH IS REQUIRED IN A FREE STANDING POSITION.
- C.SUPPORTING FRAMES OR RACKS SHALL BE OF STANDARD ANGLE, STANDARD CHANNEL L. CLOSE UP ALL UNUSED CIRCUITRY OPENINGS IN OUTLET BOXES. UNUSED OPENINGS IN OR SPECIALTY SUPPORT SYSTEM STEEL MEMBERS. THEY SHALL BE RIGIDLY BOLTED OR CAST BOXES SHALL BE CLOSED WITH APPROVED CAST METAL THREADED PLUGS. WELDED TOGETHER AND ADEQUATELY BRACES TO FORM A SUBSTANTIAL STRUCTURE. UNUSED OPENINGS IN SHEET METAL BOXES SHALL BE CLOSED WITH SHEET METAL RACKS SHALL BE OF AMPLE SIZE TO ASSURE A WORKMANLIKE ARRANGEMENT OF ALL KNOCK-OUT PLUGS. EQUIPMENT MOUNTED ON THEM.
- M.OUTLET BOXES FOR SWITCHES SHALL BE LOCATED AT THE STRIKE SIDE OF DOORS. D.NO WORK INTENDED FOR EXPOSED INSTALLATION SHALL BE MOUNTED DIRECTLY ON INDICATE DOOR SWINGS ARE SUBJECT TO FIELD CHANGE. OUTLET BOXES SHALL BE ANY BUILDING SURFACE. IN SUCH LOCATIONS, FLAT BAR MEMBERS OR SPACES SHALL LOCATED ON THE BASIS OF FINAL DOOR SWING ARRANGEMENTS. BE USED TO CREATE A MINIMUM OF 1/4" AIR SPACE BETWEEN THE BUILDING SURFACES AND THE WORK. PROVIDE ¾" THICK EXTERIOR GRADE PLYWOOD PAINTED WITH TWO (2) N.BOXES AND PLASTER COVERS FOR DUPLEX RECEPTACLES SHALL BE ARRANGED FOR COATS OF FIRE-RETARDANT GRAY PAINT FOR MOUNTING OF PANELBOARDS. VERTICAL MOUNTING OF THE RECEPTACLE.
- E.NOTHING (INCLUDING OUTLET, PULL AND JUNCTION BOXES AND FITTINGS) SHALL DEPEND ON ELECTRIC CONDUITS, RACEWAYS OR CABLES FOR SUPPORT
- F. NOTHING SHALL REST ON, OR DEPEND FOR SUPPORT ON, SUSPENDED CEILING MEDIA. GREATER THAN 8'. SUPPORT SUCH CONDUITS, 2-1/2" TRADE SIZE OR LARGER, AT INTERVALS NO GREATER THAN THEY STORY HEIGHT, OR 15', WHICHEVER IS SMALLER.
- Q.BARRIERS IN JUNCTION AND PULL BOXES WHICH ARE LARGER THAN OUTLET SIZE SHALL BE OF THE POLYESTER RESIN FIBERGLASS OF ADEQUATE THICKNESS FOR MECHANICAL H. WHERE THEY ARE NOT EMBEDDED IN CONCRETE, SUPPORT LESS THAN 1" TRADE SIZE, STRENGTH, BUT IN NO CASE LESS THAN 1/4" THICK. EACH BARRIER SHALL BE MOUNTED. HORIZONTALLY RUN, CONDUITS AT INTERVALS NO GREATER THAN 7'. SUPPORT SUCH WITHOUT FASTENINGS, BETWEEN ANGLE IRON GUIDES SO THAT THEY MAY BE READILY CONDUITS, 1" TRADE SIZE OR LARGER, AT INTERVALS NO GREATER THAN 10'. REMOVED.
- . SUPPORT ALL LIGHTING FIXTURES DIRECTLY FROM STRUCTURAL SLAB, DECK OR FRAMING MEMBER.
- J. WHERE FIXTURES AND CEILINGS ARE SUCH AS TO REQUIRE FIXTURE SUPPORT FROM CEILING OPENINGS FRAMES, INCLUDE IN THE ELECTRIC WORK THE MEMBERS NECESSARY TO TIE BACK THE CEILING OPENING FRAMES TO CEILING SUSPENSION MEMBERS OR SLABS SO AS TO PROVIDE ACTUAL SUPPORT FOR THE FIXTURES NOTED
- K.AS A MINIMUM PROCEDURE, IN SUSPENDED CEILINGS SUPPORT SMALLS RUNS OF CIRCUITRY (E.G., CONDUIT NOT IN EXCESS OF 1" TRADE SIZE) FROM CEILING SUSPENSION MEMBERS AS DEFINED ABOVE. SUPPORT LARGER RUNS OF CIRCUITRY DIRECTLY FROM STRUCTURAL SLABS, DECKS OR FRAMING MEMBERS.
- L. FASTEN ELECTRIC WORK TO BUILDING STRUCTURE IN ACCORDANCE WITH THE BEST INDUSTRY PRACTICE.
- M.FLOOR MOUNTED EQUIPMENT SHALL NOT BE HELD IN PLACE SOLELY BY ITS OWN DEAD WEIGHT. INCLUDE FLOOR ANCHOR FASTENINGS IN ALL CASES.
- N.FOR ITEMS WHICH ARE SHOWN AS BEING CEILING MOUNTED AT LOCATIONS WHERE FASTENINGS TO THE BUILDING CONSTRUCTION ELEMENT ABOVE IS NOT POSSIBLE. PROVIDE SUITABLY AUXILIARY CHANNEL OR ANGLE IRON BRIDGING TYING TO BUILDING STRUCTURAL ELEMENTS
- O.AS A MINIMUM PROCEDURE, WHERE WEIGHT APPLIED TO THE ATTACHMENT POINTS IS 100 LBS. OR LESS, FASTEN TO CONCRETE AND SOLID MASONRY WITH BOLTS AND EXPANSION SHIELDS.
- P. AS A MINIMUM PROCEDURE, WHERE WEIGHT APPLIED TO BUILDING ATTACHMENT POINTS EXCEED 100 LBS., BUT IS 300 LBS. OR LESS, CONFORM TO THE FOLLOWING: 1. AT FIELD POURED CONCRETE SLABS, UTILIZE INSERTS WITH 20' MINIMUM LENGTH SLIP-THROUGH STEEL RODS, SET TRANSVERSE TO REINFORCING STEEL.
- 3.7 SPLICING AND TERMINATING WIRES AND CABLES
- THEY MAY BE EASILY INSPECTED.
- B. LOCATE EACH COMPLETED CONDUCTOR SPLICE OR JOINT IN THE OUTLET BOX, JUNCTION BOX, OR PULL BOX CONTAINING IT, SO THAT IT IS ACCESSIBLE FROM THE REMOVAL COVER SIDE OF THE BOX
- C.JOIN SOLID CONDUCTORS NO. 8 AWG AND SMALLER BY SECURELY TWISTING THEM TOGETHER AND SOLDERING, OR BY USING INSULATED COILED STEEL SPRING "WIRE NUT" F. CIRCUITRY SHALL NOT BE RUN IN ELEVATOR SHAFTS, HOISTWAYS, AND THE LIKE. YPE CONNECTORS. EXCLUDE "WIRE NUTS" EMPLOYING NON-EXPANDABLE SPRINGS TERMINATE CONDUCTORS NO. 8 AWG AND SMALLER BY MEANS OF A NEAT AND FAST HOLDING APPLICATION OF THE CONDUCTORS DIRECTLY TO THE BINDING SCREWS OR TERMINALS OF THE EQUIPMENT OR DEVICES TO BE CONNECTED.
- D. JOIN, TAP AND TERMINATE STANDARD CONDUCTORS NO. 6 AWG AND LARGER BY MEANS 3.11 INSTALLING CIRCUITRY OF SOLDER SLEEVES, TAPS, AND LUGS WITH APPLIED SOLDER OR BY MEANS OF BOLTED SADDLE TYPE OR PRESSURE INDENT TYPE CONNECTORS, TAPS AND LUGS. EXCLUDE CONNECTORS AND LUGS OF THE TYPES WHICH APPLY SET SCREWS DIRECTLY TO A.THE OUTSIDE SURFACE OF CIRCUITRY, WHICH IS TO BE EMBEDDED IN CINDER CONCRETE, SHALL BE COATED WITH ASPHALTUM PAINT. CONDUCTORS. WHERE EQUIPMENT OR DEVICES ARE EQUIPPED WITH SET SCREW TYPE TERMINALS WHICH ARE IMPOSSIBLE TO CHANGE, REPLACE THE FACTORY SUPPLIED SET B.IN RUNS OF CONDUIT OR RACEWAY INCLUDING FLEXIBLE LIMIT THE NUMBER OF BENDS BETWEEN CABLE ACCESS POINTS TO A TOTAL WHICH DOES NOT EXCEED THE MAXIMUM SCREWS WITH A TYPE HAVING A BALL BEARING TIP. APPLY PRESSURE INDENT TYPE CONNECTORS, TAPS AND LUGS UTILIZING TOOLS MANUFACTURED SPECIFICALLY FOR SPECIFIED FOR THE PARTICULAR SYSTEM. WHERE NO SUCH MAXIMUM IS SPECIFIED, THE PURPOSE AND HAVING FEATURES PREVENTING THEIR RELEASE UNTIL THE FULL LIMIT THE NUMBER TO FOUR (4) RIGHT ANGLE BENDS OR THE EQUIVALENT THEREOF. PRESSURE HAS BEEN EXERTED ON THE LUG OR CONNECTOR.
- E. EXCEPT WHERE WIRE NUTS ARE USED, BUILD UP INSULATION OVER CONDUCTOR JOINTS TO A VALUE, EQUAL BOTH IN THICKNESS AND DIELECTRIC STRENGTH, TO THAT OF THE FACTORY APPLIED CONDUCTOR INSULATION. INSULATION OF CONDUCTOR TAPS AND JOINTS SHALL BE BY MEANS OF HALF-LAPPED LAYERS OF RUBBER TAPE. WITH AN OUTER LAYER OF FRICTION TAPE; BY MEANS OF HALF-LAPPED LAYERS OF APPROVED PLASTIC ELECTRIC INSULATING TAPE; OR BY A MEANS OF SPLIT INSULATING CASINGS MANUFACTURED SPECIFICALLY TO INSULATE THE PARTICULAR CONNECTOR AND CONDUCTOR, AND FASTENED WITH STAINLESS STEEL OR NON-METALLIC SNAPS OR
- 3.8 PULLING WIRES INTO CONDUITS AND RACEWAYS
- A.DELAY PULLING WIRES OR CABLES IN UNTIL THE PROJECT HAS PROGRESSED TO A POINT WHEN GENERAL CONSTRUCTION PROCEDURES ARE NOT LIABLE TO INJURE WIRES AND CABLES, AND WHEN MOISTURE IS EXCLUDED FROM RACEWAYS.
- B.UTILIZE NYLON SNAKES OR METALLIC FISH TAPES WITH BALL TYPE HEADS TO SET UP FOR PULLING. IN RACEWAYS 2" TRADE SIZE AND LARGER, UTILIZE A PULLING ASSEMBLY AHEAD OF WIRES CONSISTING OF A SUITABLE BRUSH FOLLOWED BY A 3-1/2" DIAMETER
- BALL MANDREL. C.LEAVE SUFFICIENT SLACK ON ALL RUNS OF WIRE AND CABLE TO PERMIT THE SECURE CONNECTION OF DEVICES AND EQUIPMENT.
- D.INCLUDE CIRCULAR WEDGE-TYPE CABLE SUPPORTS FOR WIRES AND CABLES AT THE TOP OF ANY VERTICAL RACEWAY LONGER THAN 20 FEET. ALSO INCLUDE ADDITIONAL SUPPORTS SPACED AT INTERVALS WHICH ARE NO GREATER THAN 10'. SUPPORTS SHALL BE LOCATED IN ACCESSIBLE PULL BOXES. SUPPORTS SHALL BE OF A NON-DETERIORATING INSULATING MATERIAL MANUFACTURED SPECIFICALLY FOR THE
- E.PULLING LUBRICANTS SHALL BE USED. THEY SHALL BE PRODUCTS MANUFACTURED SPECIFICALLY FOR THE PURPOSE.
- 3.9 REQUIREMENTS FOR THE INSTALLATION OF JUNCTION BOXES, OUTLET BOXES AND PULL BOXES
- OFFSET AT LEAST 12" HORIZONTALLY REGARDLESS OF ANY INDICATION ON THE DRAWINGS
- B.LOCATE ALL BOXES SO THAT THEIR REMOVABLE COVERS ARE ACCESSIBLE WITHOUT NECESSITATING THE REMOVAL OF PARTS OF PERMANENT BUILDING STRUCTURE, INCLUDING PIPING, DUCTWORK, AND OTHER PERMANENT MECHANICAL ELEMENTS.
- C.IN CONJUNCTION WITH CONCEALED CIRCUITRY, ABIDE BY ONE OF THE FOLLOWING INSTRUCTIONS (AS MAY BE APPLICABLE TO THE CONDITIONS) IN ORDER TO ASSURE THE AFOREMENTIONED ACCESSIBILITY. (NOT REQUIRED FOR CIRCUITRY CONCEALED BY REMOVABLE SUSPENDED CEILING TILES.)
- D.FOR A SMALL (OUTLET SIZE) BOX ON CIRCUITRY CONCEALED IN A PARTITION OR WALL. LOCATE BOX OR FITTING SO THAT ITS REMOVABLE COVER SIDE, (OR THE FACE OF ANY APPLIED RAISED COVER) PENETRATES THROUGH TO WITHIN 1/8" OF THE EXPOSED SURFACE OF THE BUILDING MATERIALS CONCEALING THE CIRCUITRY AND APPLY A BLANK OR DEVICE PLATE TO SUIT THE FUNCTIONAL REQUIREMENTS.
- E.FOR A LARGE BOX ON CIRCUITRY CONCEALED IN A PARTITION, SUSPENDED CEILING, OR WALL, LOCATE BOX TOTALLY HIDDEN BUT WITH ITS REMOVABLE COVER DIRECTLY BEHIND AN ARCHITECTURAL ACCESS DOOR OR PANEL (INCLUDED FOR THE PURPOSE, SEPARATE FROM THE ELECTRIC WORK) IN THE BUILDING CONSTRUCTION WHICH

CONCEALS THE CIRCUITRY.

- F. INCLUDE ALL REQUIRED JUNCTION AND PULL BOXES REGARDLESS OF INDICATIONS ON THE DRAWINGS (WHICH, DUE TO SYMBOLIC METHODS OF NOTATION, MAY OMIT TO SHOW SOME OF THEM).
- G.UNLESS NOTED BELOW OR OTHERWISE SPECIFICALLY INDICATED, INCLUDE A SEPARATE OUTLET BOX FOR EACH INDIVIDUAL WIRING DEVICE, LIGHTING FIXTURE AND SIGNAL OR COMMUNICATION SYSTEM OUTLET COMPONENT. OUTLET BOXES SUPPLIED ATTACHED TO LIGHTING FIXTURES SHALL NOT BE USED AS REPLACEMENTS FOR THE BOXES SPECIFIED HEREIN.
- H.UTILIZE AN OUTLET BOX NO SMALLER THAN 5" SQUARE BY 2-1/2" DEEP.
- ALLOW NO FIXTURE TO BE SUPPLIED FROM AN OUTLET BOX IN ANOTHER ROOM.
- J. MULTIPLE LOCAL SWITCHES INDICATED AT A SINGLE LOCATION SHALL BE GANG-MOUNTED IN A SINGLE OUTLET BOX.
- K.INSTALL JUNCTION BOXES, PULL BOXES AND OUTLET BOXES IN CONJUNCTION WITH CONCEALED CIRCUITRY.
- O.EQUIP OUTLET BOXES USED FOR DEVICES WHICH ARE CONNECTED TO WIRES OF SYSTEMS SUPPLIED BY MORE THAN ONE SET OF VOLTAGE CHARACTERISTICS WITH BARRIERS TO SEPARATE THE DIFFERENT SYSTEMS.
- P. BARRIERS IN JUNCTION AND PULL BOXES OF OUTLET SIZE SHALL BE OF THE SAME METAL AS THE BOX.

3.10 LOCATING AND ROUTING OF CIRCUITRY

A.IN GENERAL, ALL CIRCUITRY SHALL BE RUN CONCEALED EXCEPT THAT IT SHALL BE RUN EXPOSED WHERE THE FOLLOWING CONDITIONS OCCUR:

- 1. HORIZONTALLY AT THE CEILING OF PERMANENTLY UNFINISHED SPACES WHICH ARE NOT ASSIGNED TO MECHANICAL OR ELECTRICAL EQUIPMENT.
- 2. HORIZONTALLY AND VERTICALLY IN MECHANICAL EQUIPMENT SPACES
- 3. HORIZONTALLY AND VERTICALLY IN ELECTRIC EQUIPMENT ROOMS.
- B. CONCEALED CIRCUITRY SHALL BE SO LOCATED THAT BUILDING CONSTRUCTION MATERIALS CAN BE APPLIED OVER ITS THICKEST ELEMENTS WITHOUT BEING SUBJECT TO SPALLING OR CRACKING
- C.ALL CIRCUITRY AND RACEWAYS SHALL NOT BE RUN WITHIN SLABS. IF FIELD CONDITIONS REQUIRES RACEWAYS TO BE EMBEDDED IN FIELD-POURED STRUCTURAL BUILDING CONSTRUCTION CONCRETE FILL OR SLAB SHALL CONFORM TO THE FOLLOWING:
- 1. WHERE TURNED UP OR DOWN INTO A WALL OR PARTITION THEY SHALL, BEFORE ENTERING SAME, BE ROUTED PARALLEL FOR A LONG ENOUGH DISTANCE TO ASSURE THAT NO RELOCATION OF THE WALL OR PARTITION WILL BE NECESSARY TO
- CONCEAL THE REQUIRED BEND. 2. THEY SHALL BE ROUTED IN SUCH A MANNER AS TO COORDINATE WITH THE STRUCTURAL REQUIREMENTS OF THE BUILDING.
- 3. THEY SHALL BE ROUTED IN ACCORDANCE WITH FIELD INSTRUCTIONS ISSUED BY THE ARCHITECT WHERE SUCH INSTRUCTIONS DIFFER FROM SPECIFICATIONS SET FORTH
- HFRFIN D.CIRCUITRY RUN EXPOSED SHALL BE ROUTED PARALLEL TO BUILDING WALLS AND COLUMN LINES
- E. CIRCUITRY SHALL BE ROUTED SO AS TO PREVENT ELECTRIC CONDUCTORS FROM BEING SUBJECT TO HIGH AMBIENT TEMPERATURE. MINIMUM CLEARANCES FROM HEATED LINES OR SURFACES SHALL BE MAINTAINED AS FOLLOWS:
- 1. CROSSING WHERE UNINSULATED: 3".
- 2. CROSSING WHERE INSULATED: 1"
- 3. RUNNING PARALLEL WHERE UNINSULATED: 36"
- 4. RUNNING PARALLEL WHERE INSULATED: 6".
- WHERE OUTLETS FOR TRAIL CABLES, PIT LIGHTS, RUN BE LEVEL LIGHTS, AND THE LIKE ARE INVOLVED, ONLY THE "FINAL CONNECTION" OUTLET BOXES THEMSELVES SHALL BE LOCATED WITHIN OR OPEN INTO, THE CONFINES OF THE SHAFT.

- C.IN EACH CONDUIT OR RACEWAY ASSIGNED FOR THE FUTURE PULLING IN OF WIRES. INCLUDE A NYLON DRAG CORD. IN RACEWAYS 2" TRADE SIZE AND LARGER, THE CORD SHALL BE PULLED IN UTILIZING A SUITABLE BRUSH, FOLLOWED BY AN 85% DIAMETER BALL MANDREL AHEAD OF THE CORD IN THE PULLING ASSEMBLY. IN THE EVENT THAT OBSTRUCTIONS ARE ENCOUNTERED, WHICH WILL NOT PERMIT THE DRAG CORD TO BE INSTALLED, THE BLOCKED SECTION OF RACEWAY SHALL BE REPLACED AND ANY CUTTING AND PATCHING OF THE STRUCTURE INVOLVED IN SUCH REPLACEMENT SHALL BE INCLUDED AS PART OF THE ELECTRIC WORK.
- D.CIRCUITRY SHALL BE ARRANGED SUCH THAT CONDUCTORS OF ONE FEEDER OR CIRCUITRY CARRYING "GOING" CURRENT ARE NOT SEPARATED FROM CONDUCTORS OF THE SAME FEEDER OR CIRCUITRY CARRYING "RETURN" CURRENT BY ANY FERROUS OR OTHER METAL. WHERE NOT WITHIN RACEWAYS, ALL "GOING" AND "RETURN" CURRENT CONDUCTORS OF ONE FEEDER OR CIRCUIT SHALL BE LACED TOGETHER SO AS TO MINIMIZE INDUCTION HEATING OF ADJACENT METAL COMPONENTS.
- E. SLEEVES USED WHERE CIRCUITRY IS TO PENETRATE WATERPROOF SLABS. DECKS AND WALLS, SHALL BE OF A TYPE SELECTED TO SUIT THE WATER CONDITION ENCOUNTERED IN THE FIELD.

END OF SECTION

						PLUMB	ING	SYMBOL LEGEND					
			GENERAL			PIPING							
	AP TP	ACCESS PANEL	—ຼຸຼ	OED	NATURAL GAS TEST COCK WITH PLUG		ETR	EXISTING WORK TO REMAIN (ABOVE GROUND) (PERTAINS TO ALL SYSTEMS)	IW	IW IR	INDIRECT WASTE		
TP	CE	CAP OR PLUG EXISTING	×	•	PIPE ANCHOR		DEMO	EXISTING WORK TO BE REMOVED ABOVE GROUND (PERTAINS TO ALL SYSTEMS)	——— KW ———	KW	KITCHEN WASTE		
	СО	CLEANOUT	Ⅰ —•		PVC SCHEDULE 40 SOLID WALL EXPANSION JOINT RISE (DOES NOT PENETRATE LEVEL ABOVE)		ETR	EXISTING WORK TO REMAIN BELOW GROUND OR FLOOR (PERTAINS TO ALL SYSTEMS)	——— G ——— ——— GTV ———	G GTV	NATURAL GAS NATURAL GAS/PROPANE TRAIN.		
<u> </u>	FCO DCO	FLOOR CLEANOUT (FLUSH FLOOR) CLEANOUT (DANDY)	₹	SA	SHOCK ABSORBER		DEMO	EXISTING WORK TO BE REMOVED BELOW GROUND OR FLOOR (PERTAINS TO ALL SYSTEMS)	МА	МА	APPLIANCE, OR REGULATOR VENT		
ד	WCO	CLEANOUT (WALL)			SLEEVE			NEW WORK TO BELOW GROUND OR FLOOR (PERTAINS TO ALL SYSTEMS)	ox	OX	MEDICAL OXYGEN PIPING		
	CTE AD-A	CONNECT TO EXISTING DRAIN (AREA DRAIN & TYPE)	ť		SOVENT AERATOR	—— BDTV —— —— CA ——	BDTV CA	BLOWDOWN TANK VENT	VAC NPCW	VAC NPCW	MEDICAL VACUUM PIPING		
	FD-A	DRAIN (FLOOR DRAIN & TYPE)	\.		SOVENT DE-AERATOR	CBW	CBW	CARBONATED BEVERAGE WASTE	NPHW	NPHW	NON-POTABLE HOT WATER W/ TEMP. MAINTENANCE CABLE		
	FS-A RD-A	DRAIN (FLOOR SINK & TYPE) DRAIN (ROOF DRAIN & TYPE)	• -+		UP (PENETRATES LEVEL ABOVE) WALL HYDRANT	DYE	CW DYE	COLD WATER DYE (FROM HAIR COLORING SINK)		NPHWC	NON-POTABLE HOT WATER CIRCULATION		
	TD-A	DRAIN (TRENCH DRAIN & TYPE)	— Е —	E	WATER HEATER VENT EXHAUST	ESPPD	ESPPD	ELEVATOR SUMP PUMP PRESSURE DISCHARGE	LP PD	LP PD	PROPANE GAS PUMPED DISCHARGE		
	DC	DRESSER COUPLING	 ≑	ı wts	WATER HEATER COMBUSTION AIR INTAKE WATER TIGHT SLEEVE	GRL GSV	GRL GSV	GARAGE RAIN LEADER GARAGE SEPARATOR VENT	BEER	BEER	PVC CONDUIT (BEER)		
	DN	DOWN (PENETRATES LEVEL BELOW) DROP (DOES NOT PENETRATE LEVEL BEL	──∞ _OW)	W & T	WASTE & TRAP	GW	GW	GARAGE WASTE	SODA	SODA RL	PVC CONDUIT (SODA) RAIN LEADER		
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	HTI	HEAT TRACE AND INSULATE (FREEZE PRO	OTECTION)				GSID HW	GREASE INTERCEPTOR SUCTION DISCHARGE	SRL	SRL	SECONDARY RAIN LEADER		
	TMC	HOT WATER TEMPERATURE MAINTENANC	CE CABLE				HWC	HOT WATER RECIRCULATION		S or W SSVS	SOIL OR WASTE SUBSLAB VENTILATION SYSTEM		
		INDICATES DIRECTION OF SLOPE DOWN				140 140C	140HW 140HW	HOT WATER (140°F) HOT WATER RECIRCUALTION (140°F)		TP	(PROVIDED UNDER BASE BUILDING) TRAP PRIMER WATER		
1 ^ <del>~~~~~~~~</del>	KWHTI	KEY DESIGNATION KITCHEN WASTE HEAT TRACE AND INSUL	ATE			180	180HW	HOT WATER (180°F)		V	VENT		
						—— 180C ——	180HW	HOT WATER RECIRCUALTION (180°F)	—— PPV ——	PPV	WATER HEATER POSITIVE PRESSURE VEI		

# **ABBREVIATIONS**

		G	GAS
ADD'L	ADDITIONAL	GAL	GALLONS
AFF	ABOVE FINISHED FLOOR	GALV	GALVANIZED
		GC	
ALI	ALITUDE OR ALTERNATE	GC	GENERAL CONTRACTOR
AMP	AMPERE	GPH	GALLONS PER HOUR
AP	ACCESS PANEL	GPM	GALLONS PER MINUTE
ARCH	ARCHITECT	GRL	GARAGE RAIN LEADER
AVG	AVERAGE	GSID	GREASE INTERCEPTOR SUCTION DISCHARGE
-			
		GSV	GARAGE SEPARATOR VENT
BDTV	BLOWDOWN TANK VENT	GTV	NATURAL GAS/PROPANE TRAIN APPLIANCE. OR REGULATOR VEN
		C)M/	CARACEWASTE
BHP	BRAKE HORSEPOWER	GW	GARAGE WASTE
BLDG	BUILDING	GWH-A	WATER HEATER (GAS & TYPE)
DMC		GW/B	
DIVIO	BUILDING MANAGEMENT STSTEM	GVVD	GTT SOM WALL BOARD
BSMT	BASEMENT		
DV/		Цр	
DV	DALANGING VALVE	пр	
BW	BACKWATER VALVE	HB-A	HOSE BIBB WITH HOSE THREADS
		HGT	HEIGHT
		1101	
C&C	CUT & CAP	HP	HORSEPOWER
		HR	HOUR
CDVV	CARDUNATED DEVERAGE WASTE		
CE	CAP OR PLUG EXISTING	HIG	HEATING
CL	CAST IRON PIPE & FITTINGS	HTI	HEAT TRACE AND INSULATE (EREEZE PROTECTION)
CO	CLEANOUT		HUI WAIER
CP	CIRCULATOR PLIMP	HWC	HOT WATER RECIRCULATION
CIE	CONNECT TO EXISTING		TUT WATER REGIRGULATION RISER
CU	COPPER PIPE & FITTINGS	HWR	HOT WATER RISER
		Н7	
CV	CHECK VALVE	I IZ	HERIZ
CVT	CONCENTRIC VENT TERMINATION		
CW	COLD WATER	U U	INSIDE DIAMETER
CWR	COLD WATER RISER	IN	INCHES
onne			
		IINV	INVERTELEVATION
DC	DRESSER COUPLING	IR	IRRIGATION WATER
		1\//	
DCO	CLEANOUT (DANDY)	1 V V	INDIRECT WASTE
DEMO	DEMOLITION		
		19	IANITOD SINK
DF	DRINKING FOUNTAIN	10	JANTON SINK
DIA	DIAMETER		
	DIMENSION		
	DIMENSION	NE .	KITCHEN EQUIPMENT
DN	DOWN	KEC	KITCHEN EQUIPMENT CONTRACTOR
	DIVAIN VALVETTE W/ HOSE THINEADS		KITCHEN WASTE
		KW & V	KITCHEN WASTE & VENT
		K/WHTI	KITCHEN WASTE HEAT TRACE AND INSULATE
EA	EAGH		KITCHEN WASTE HEAT TRACE AND INSULATE
EFF	EFFICIENCY		
FLEC	FLECTRICAL	1	I ENGTH
		L	LENGTH
ELEV	ELEVATION	LAV	LAVATORY
EMER	EMERGENCY	IB	POLIND
	ENERGY MANAGEMENT SYSTEM	LF	
ENT	ENTER	LP	PROPANE GAS
ECODO			
ESSPD	ELEVATOR SUMP PUMP PRESSURE DISCHARGE	LKA	LUUKED KUTUK AMPS
ETR	EXISTING TO REMAIN	LWT	LEAVING WATER TEMPERATURE
	ELECTRIC WATER COULER		
EWH-A	WATER HEATER (ELECTRIC & TYPE)	MAX	MAXIMUM
FWT			
EXIST.	EXISTING	MCA	MINIMUM CIRCUIT AMPS
		MECH	ΜΕΛΗΔΝΙΛΔΙ
-			
F	FAHRENHEII	MEZZ	MEZZANINE
FAI	FRESH AIR INTAKE	MFR	MANUFACTURER
Г <u>С</u> О			
FCO	FLOUR CLEANOUT	MIN	IVIINIMUM
FD-A	DRAIN (FLOOR DRAIN & TYPE)	MSB	MOP SERVICE BASIN
			· · · · · · · · · · · · · · · · · · ·
FGE	FINISHED GRADE ELEVATION	N/A	NOT APPLICABLE
FLΔ		NC	
		NC .	
FLEX	FLEXIBLE	NIC	NOISE CRITERIA
FPM	FEET PER MINUTE	NO	
		NU .	
FPS	FEET PER SECOND	No.	NUMBER
FS	FLOW SWITCH	NOM	ΝΟΜΙΝΔΙ
FS-A	DRAIN (FLOOR & SINK TYPE)	NPCW	NON-POTABLE COLD WATER
FT	FEET	NPHW/	NON-POTABLE HOT WATER
ETD			
LIK		NPHWC	NON-POTABLE HOT WATER RECIRCULATION
		NTS	NOT TO SCALE
		OED	OPEN-END DRAIN WITH CAP

PD PBG POS PPV PRV PSI PSIA PSID PSIG PVC	PUMPED DISCHARGE PLUMBING PROVIDED BY OTHER SECTION WATER HEATER POSITIVE PRESSURE VENT PRESSURE REDUCING VALVE POUNDS PER SQUARE INCH PSI ABSOLUTE PSI DIFFERENTIAL PSI GAUGE POLYVINYL CHLORIDE	
QTY	QUANTITY	
RD-A RPBFP REQD RL RLA RLS RM RPM	DRAIN (ROOF DRAIN & TYPE) BACKFLOW PREVENTER REQUIRED RAIN LEADER RUNNING LOAD AMPS RAIN LEADER STACK ROOM REVOLUTIONS PER MINUTE	
S=0.01 S=0.02 S=0.04 S & V S or W SA SH SK SPECS SF SQ SRL SS SSVS STL SV	SLOPE = 1/8" PER FOOT - 1% SLOPE = 1/4" PER FOOT - 2% SLOPE = 1/2" PER FOOT - 4% SOIL & VENT SOIL OR WASTE SHOCK ABSORBER SHOWER SINK SPECIFICATIONS SQUARE FEET SQUARE SECONDARY RAIN LEADER SOIL STACK SUBSLAB VENTILATION SYSTEM STEEL SOLENOID VALVE	
T TD-A TEMP TMC TSTAT TOP TOT TP TYP	TEMPERATURE DRAIN (TRENCH DRAIN & TYPE) TEMPERATURE HOT WATER TEMPERATURE MAINTENANCE CABLE THERMOSTAT TOP OF PIPE TOTAL AUTOMATIC TRAP PRIMER TYPICAL	
URN	URINAL	
V VB VEL VIV VS VTR	VENT VACUUM BREAKER VOLTS (ELECTRICAL) VELOCITY VALVE IN VERTICAL VENT STACK VENT THROUGH ROOF	

WIDTH OR WATT

WASTE & TRAP

WASTE & VENT

WATER COLUMN

CLEANOUT (WALL)

WATER PRESSURE DROP

WATER TIGHT SLEEVE

WATER TEMPERATURE DIFF.

WATER GAUGE

WASTE STACK

WITHOUT

WASTE PIPE

WITH

W

W/

WC

WCO

WG

W/O

WP

WPD

WS

WTD

WTS

W & T

W & V

1. CONTRACTOR SHALL REFER TO THE PLUMBING SPECIFICATIONS. 2. GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO ALL PLUMBING DRAWINGS.

GENERAL CONSTRUCTION NOTES:

- 3. DRAWINGS ARE DIAGRAMMATIC: DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
- 4. ALL PLUMBING WORK SHALL BE IN ACCORDANCE WITH THE LOCAL STATE PLUMBING CODE, THE LOCAL STATE BUILDING CODE AND THE DRAWINGS. NO WORK SHALL BE INSTALLED IN VIOLATION OF ANY GOVERNING CODES. ANY WORK SHOWN ON THE DRAWINGS WHICH IS IN ^{19.} P VIOLATION OF SUCH CODES SHALL BE BROUGHT TO THE ATTENTION OF THE CONSTRUCTION MANAGER AND THE OWNER'S REPRESENTATIVE AND SHALL BE RESOLVED PRIOR TO THE INSTALLATION OF THE WORK INVOLVED.
- 5. MANUFACTURERS' MODEL NUMBERS ARE SPECIFIED SOLELY TO ESTABLISH STANDARDS OF QUALITY FOR PERFORMANCE AND MATERIALS.
- 6. ALL PRODUCT INSTALLATIONS SHALL ADHERE TO MANUFACTURERS' RECOMMENDATIONS.
- 7. RUN PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE, AND CLEAR OF CEILING INSERTS. 8. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO
- PREVENT STRESS ON PIPING. 9. PROVIDE VENTS AT HIGH POINTS IN PRESSURE PIPING SYSTEMS AND DRAIN VALVES AT LOW 23. 1
- POINTS. 10. THIS CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER CONTRACTORS IN 24. P
- ESTABLISHING PIPE RUNS AND SPACE CONDITIONS. 11. FOR SIZES AND REQUIREMENTS OF ALL HVAC EQUIPMENT SHOWN IN THESE DRAWINGS, 25. REFER TO HVAC DRAWINGS AND SPECIFICATIONS.
- 12. PRIOR TO THE START OF CORING ANY STRUCTURAL MEMBER PLUMBING SUBCONTRACTOR SHALL COORDINATE LOCATION OF PENETRATION WITH STRUCTURAL ENGINEER AND 26. PF GENERAL CONTRACTOR. PLUMBING SUBCONTRACTOR SHALL PREPARE AND SUBMIT TO STRUCTURAL ENGINEER AND ARCHITECT A SET OF PENETRATION DRAWINGS DURING 27. Al COORDINATION DRAWING REVIEW PERIOD. PLUMBING SUBCONTRACTOR MAY DEVIATE FROM LOCATIONS OF PENETRATIONS AS SHOWN ON PLUMBING DRAWINGS BUT MUST COORDINATE ALTERNATIVE LOCATIONS WITH STRUCTURAL ENGINEER.
- 28. I 13. PRIOR TO START OF INSTALLATION OF BELOW SLAB PIPING, PLUMBING SUBCONTRACTOR SHALL COORDINATE LOCATIONS OF PIPING WITH STRUCTURAL FOOTINGS, GRADE BEAMS, 29. P ETC. WITH STRUCTURAL ENGINEER.
- 14. PRIOR TO INSTALLATION OF UNDER SLAB PIPING AT GROUND FLOOR, PLUMBING SUBCONTRACTOR SHALL COORDINATE ALL EXTERIOR INVERT ELEVATIONS WITH CIVIL ENGINEER.
- 15. PRIOR TO INSTALLATION OF ANY SURFACE MOUNTED OR RECESSED PLUMBING COMPONENTS (I.E. WALL HYDRANTS, PIPING PENETRATIONS, ETC.) ON EXTERIOR OF BUILDING, PLUMBING SUBCONTRACTOR SHALL COORDINATE THEIR EXACT LOCATION WITH ARCHITECT AND GENERAL CONTRACTOR.
- 16. PRIOR TO INSTALLATION OF ANY FLOOR DRAINS THIS ENTIRE PROJECT, PLUMBING

### GENERAL RENOVATION NOTES:

- 1. THE PLUMBING CONTRACTOR SHALL REVIEW ALL OF THE ARCHITECTS AND OTHER TRADES DRAWINGS TO VERIFY ALL AREAS OF RENOVATION AND TO GET A COMPLETE UNDERSTANDING OF THE DEMOLITION WORK REQUIRED BY THIS PROJECT.
- 2. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK OF THIS SECTION. RENOVATION WORK WILL REQUIRE CAREFUL SITE EXAMINATION PRIOR TO BIDDING. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY CONSTRUED BY AN EXPERIENCED OBSERVER.
- 3. COORDINATE ALL WORK WITH THE BUILDING OWNER 10 DAYS PRIOR TO DISRUPTION TO ANY PLUMBING 11. MA SERVICES.
- 4. DISCONNECT AND REMOVE ALL PLUMBING FIXTURES, WATER & WASTE & VENT PIPING, VALVES AND 12. PF FITTINGS, HANGERS, SUPPORTS, AND ALL OTHER PLUMBING COMPONENTS MADE OBSOLETE BY THIS PROJECT. ALL MATERIALS SHALL BECOME THE PROPERTY OF THE OWNER.
- REFER TO ALL CONSTRUCTION DOCUMENTS TO GAIN A COMPLETE UNDERSTANDING OF THE DEMOLITION WORK REQUIRED. 6. ALL HVAC UNITS SCHEDULED TO BE REMOVED OR RE-LOCATED SHALL BE DONE SO BY THE HVAC
- CONTRACTOR. THE PLUMBING CONTRACTOR SHALL DISCONNECT GAS PIPING AND MAKE-SAFE FOR REMOVAL.
- TEMPORARY WALL OPENINGS AND/OR MODIFICATIONS REQUIRED FOR REMOVAL/INSTALLATION OF EQUIPMENT SHALL BE PROVIDED AS NEEDED AND COORDINATED WITH THE GENERAL CONTRACTOR. . CUT, REMOVE AND LEGALLY DISPOSE OF SELECTED PLUMBING EQUIPMENT, COMPONENTS AND
- MATERIALS AS INDICATED, INCLUDING, BUT NOT LIMITED TO, REMOVAL OF PLUMBING ITEMS INDICATED TO BE REMOVED AND ITEMS MADE OBSOLETE BY THE WORK. THE OWNER RESERVES THE OPTION OF SALVAGE RIGHTS TO DEMOLISHED MATERIAL AND REMOVED EQUIPMENT. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER'S REPRESENTATIVE TO OBTAIN A LIST OF MATERIALS AND REMOVED
- 13. 1

				VALVES
			RPBFP	BACKFLOW PREVENTER
			BV	
		- <b></b> Q-D+ <b>-</b> N		
		<u>_</u>		
		- <b>-</b> -	HB-A	HOSE BIBB TYPE WITH HOSE THREADS
				HOT WATER CIRCULATION FLOW SPLITTER
		Ţ	PRV	PRESSURE REDUCING VALVE
		<b>ē</b>		SHUTOFF VALVE
		δ		SHUTOFF VALVE (EXISTING)
			SV	SOLENOID VALVE
ЛС		<b>—</b> >>+	VIV	VALVE IN VERTICAL
	_			MISCELLANEOUS
		-	CONNEC	T TO EXISTING
		×	RISER DE	ESIGNATION <b>{</b> NUMBER DENOTES WATER LETTER DENOTES SANITARY
		4 5 16 FU	CAPPED DESIGNA	CONNECTION TOP DENOTES SIZE (IN.) BOTTOM DENOTES SERVICE TYPE SIDE DENOTES FUTURE FIXTURE UNITS
			EXISTING	PLUMBING FIXTURE TO BE REMOVED (SAMPLE)
		<u>(1-1</u> )		
		LEGEND NOT ALL SYMBOL NOT REC COMPLE	<u>NOTE:</u> SYMBOLS AF ON THE DRA QUIRED. REFE TE UNDERST	RE NECESSARILY USED. ABSENCE OF A WINGS DOES NOT NECESSARILY MEAN IT IS ER TO DETAILS & SPECIFICATIONS FOR A TANDING OF WORK REQUIRED.
/ENT	-			J
<ol> <li>17.</li> <li>18.</li> <li>19.</li> <li>20.</li> <li>21.</li> <li>22.</li> <li>23.</li> <li>24.</li> <li>25.</li> <li>26.</li> <li>27.</li> <li>28.</li> <li>29.</li> <li>30.</li> </ol>	SUBCONTRACT PLUMBING SUB SUBCONTRACT PENETRATIONS THE PLUMBING PIPING AT THE O PLUMBING SUB LOCATED WITH LOCATION OF T NOT ALL BRANG PIPING IS SHO PLUMBING SUB CONSTRUCTION EACH INDIVIDU ALL NECESSAR PENETRATING A ALL WASTE/SAN THE PLUMBING SUB GAS DISTRIBUT PRIOR TO THE STACK LOCATIO AND PARTITION PRIOR TO THE REQUIREMENTS ALL PLUMBING WITH GENERAL PLUMBING SUB GAS FIRED EQU PLUMBING SUB GAS FIRED EQU PLUMBING SUB GAS FIRED EQU	OR & ARCHITEC CONTRACTOR OR. REFER TO OR. REFER TO OR. REFER TO OR. REFER TO OR. REFER TO OR. REFER TO CONTRACTOR IN BUILDING OF THI CONTRACTOR IN BUILDING. TRAP PRIMER V/ CH PIPING AND WN FOR CLAF CONTRACTOR N. AL CONTRACTOR NITARY AND ST SUBCONTRACTOR ION PIPE SIZES START OF WO DNS WITH ARCH I CONFLICTS. START OF WO S FOR AND THE SYSTEMS TO I CONTRACTOR I CONTRACTOR CONTRACTOR I CONTRACTOR I CONTRACTOR	CT. SHALL COOR D ARCHITECT TOR SHALL IN E TOP FLOOR SHALL INSTA THE PLUMBIN ALVE AND WA O OR OFFSETS RITY PURPOS TO OWN THE OR SHALL BE NG OF SLEEV RITY OWN THE OR SHALL BE NG OF SLEEV RITIONS, FLC ORM STACKS TOR SHALL BE SHALL REFEIS RK THE PLUM E LOCATIONS BE INSTALLE (CONSTRUCT SHALL OWN AND AT ALL OWN AND AT ALL OWN R SHALL OWN C SHALL OWN	ADIATE ALL ROOF PENETRATIONS WITH ROOFING FURAL DRAWINGS FOR FLASHING AT ALL ROOF ISULATE ALL SANITARY, WASTE AND CONDENSATE  LL TRAP PRIMER VALVES FOR ALL FLOOR DRAINS IG SUBCONTRACTOR SHALL COORDINATE EXACT TER PIPING IN FIELD. S FOR SOIL, WASTE, VENT AND DOMESTIC WATER PROVISION OF THIS PIPING DURING BIDDING AND E RESPONSIBLE FOR PROVIDING AND INSTALLING VES, PIPING, ELECTRICAL PIPING, DUCTWORK, ETC. 900RS, AND CEILINGS FOR HIS/HER OWN WORK. S HALL HAVE A CLEAN OUT AT THEIR BASE. EAT TRACE AND INSULATE ALL PIPING SUBJECTED R TO PLUMBING FLOOR PLANS FOR ALL NATURAL MBING SUBCONTRACTOR SHALL COORDINATE ALL CONSTRUCTION MANAGER TO AVOID STRUCTURAL MBING SUBCONTRACTOR SHALL COORDINATE THE OF ALL EQUIPMENT PERTAINING TO THE PROJECT. D IN PARTITIONS WHERE POSSIBLE. COORDINATE TON MANAGER PRIOR TO START OF WORK. DRIP LEGS AND SHUT OFF VALVES AT THE BASE CONNECTIONS TO EQUIPMENT. ALL FINAL CONNECTIONS OF GAS PIPING TO ALL MBTAIN ALL BUILDING STANDARDS & LEASE START OF BIDDING & SHALL NOTIFY ARCHITECT OF
	EQUIPMENT TO B NOT BEING SALVA	E TURNED OVE	R TO THE OW	NER. ALL OTHER MATERIAL AND REMOVED EQUIPMENT E DISPOSED OF BY THE CONTRACTOR.
9. I	PROTECT THE ST	RUCTURE, FUR	NISHINGS, FIN PROTECT THI	ISHES, AND ADJACENT MATERIALS NOT INDICATED OR E PLUMBING WORK AND THE WORK OF OTHERS IN A
	MANNER BEST SU ADDITIONAL COST	ITED TO THE PA	ARTICULAR CAS	SE. CORRECT ANY DAMAGE DONE TO ANY WORK AT NO
10.	PROVIDE AND MA SPREAD OF DUST	AINTAIN TEMPOR AND DIRT TO AD	RARY PARTITIC	DNS OR DUST BARRIERS ADEQUATE TO PREVENT THE
11.			IG PLUMBING	INSTALLATIONS WHICH REMAIN ACTIVE. MODIFY
12.	PROVIDE TEMPOR	RARY WATER &	WASTE CONN	ECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE
a.	DURING CONSTRU EXISTING WATER READY FOR SER PERMISSION FRO COMPLETED Y DU	JCTION. R & WASTE SER\ VICE. DISABLE S OM OWNER AND SABLING SYSTE	/ICES: MAINTAI SYSTEM ONLY ARCHITECT/EI M. MINIMIZE O	IN EXISTING SYSTEMS IN SERVICE COMPLETE AND TO MAKE SWITCHOVERS AND CONNECTIONS. OBTAIN NGINEER AT LEAST TEN DAYS BEFORE PARTIALLY OR UTAGE DURATION. MAKE TEMPORARY CONNECTIONS
13.	TO MAINTAIN SE THESE DRAWING INTENDED TO LIM OR COVERED CO CONTRACTOR TO WILL BE ASSUMED THE INFORMATION	S HAVE BEEN ( IT THE SCOPE O ONDITIONS, NO PROVIDE ADDI D THAT THE CON N SUPPLIED HER	ADJACENT TC COMPILED FRO F THE WORK. DT INDICATED TIONAL WORK NTRACTOR HAS REIN.	WORK AREA AS REQUIRED. MORK AREA AS REQUIRED. MTHE BEST AVAILABLE INFORMATION AND ARE NOT THE PLUMBING CONTRACTOR MAY ENCOUNTER HIDDEN IN THESE DOCUMENTS, REQUIRING THE PLUMBING FOR THE COMPLETION OF HIS OR HER CONTRACT. IT S INSPECTED THE SITE PRIOR TO BIDDING AND VERIFIED

14. PROTECT ALL EXISTING WALLS, FLOORS, CEILINGS, PLUMBING FIXTURES, ETC. WHICH ARE TO REMAIN & TO PREVENT DAMAGE DURING ALL CONSTRUCTION PHASES.

![](_page_18_Picture_31.jpeg)

![](_page_19_Figure_0.jpeg)

<image/> <text><text><text><text><text><text></text></text></text></text></text></text>
BATHROOM RENOVATIONS STATE OF RHODE ISLAND /N DEPARTMENT OF LABOR & TRAINING 1330 MAIN STREET WEST WARWICK, RI 02893
REVISIONS: GLEN G. MARKEY KING OF TOTAL No. REGISTERED PROFESSIONAL ENGINEER MECHANICAL
PLUMBING FIRST FLOOR PLANSDATE:06.29.2023NCA JOB NO.:22330DRAWING NO.: <b>P_101</b>

NORTH
PROJECT NORTH

![](_page_20_Figure_0.jpeg)

PLUMBING FIXTURE SCHEDULE													
FIXTURE INI	ORMATION			FITTING INFORMATION			CONNE	CTIONS		TDAD		MAXIMUM WATER	
MANUFACTURER	MODEL	COLOR	TYPE	MAKE/MODEL	SUPPLY	WASTE	VENT	HW	CW	TRAP	CARRIER	CONSUMPTION	REMARKS AND SPECIFICATIONS
AMERICAN STANDARD	LUCERNE 0355.012	WHITE	FAUCET-MOUNT	AMERICAN STANDARD INNSBROOK SELECTRONIC 605B.205	4" CENTERS, 2 HANDLE, POP-UP STRAINER	1-1/2"	1-1/2"	1/2"	1/2"	1-1/4"x1-1/2" CAST BRASS P-TRAP w/C.O. PLUG	ZURN OR EQUAL	0.5 GPM	G.C. SHALL COORDINATE FINAL SELECTIONS WITH OWNER PRIOR TO BIDDING/CONSTRUCTION. SENSOR OPERATED. PROVIDE WITH 0.5 GPM AERATOR.
AMERICAN STANDARD	CADET PRO "RIGHT-HEIGHT" #215AA104.020	WHITE	FLOOR-MOUNTED	AMERICAN STANDARD CHROME TRIP LEVER	SUPPLY WITH STOP & LOOSE KEY	3"	2"	-	1/2"	INTEGRAL	-	1.28 GPF	G.C. SHALL COORDINATE FINAL SELECTIONS WITH OWNER PRIOR TO BIDDING/CONSTRUCTION.
ELKAY	LUSTERTONE LRAD-2219-65-4-Q	STAINLESS STEEL	SURFACE MOUNTED	CHICAGO FAUCET 200-A317CPR-CF	8" CENTERS W/ SWING SPOUT	1-1/2"	1-1/2"	1/2"	1/2"	1-1/4"x1-1/2" CAST BRASS P-TRAP w/C.O. PLUG	-	2.0 GPM	G.C. SHALL COORDINATE FINAL SELECTIONS WITH OWNER PRIOR TO BIDDING/CONSTRUCTION. PROVIDE WITH 2.0 GPM AERATOR.
MUSTEE	63M	MOLDED FIBERGLASS	FAUCET	MUSTEE 63.600A	-	3"	2"	1/2"	1/2"	-	-	1.5 GPM	WALL MOUNTED FAUCET WITH VACUUM BREAKER, WALL-MOUNTED BRACE AND PAIL HOOK, 65.700 BRACKET, 65.600 MOP HANGER
ELKAY	LZSG8WSLK	STAINLESS STEEL	-	-	-	1-1/2"	1-1/2"	-	1/2"	-	-	-	ADA COMPLIANT, 120V. PROVIDE WITH BOTTLER FILLER.

1. APPLY SILICONE SEALANT WHERE FIXTURES MEET FLOORS AND WALLS.

CLEANOUT, FLOOR DRAIN, AND FLOOR SINK SCHEDULE						
SYMBOL	TYPE	MANUFACTURER	MODEL	OUTLET	MATERIAL	REMARKS
FCO	FLOOR CLEANOUT	J.R. SMITH	4026C	CAULK	NICKEL BRONZE TOP BRONZE PLUG	FINISHED AREAS (PROVIDE CARPET MARKER IN CARPETED ARAS).
FD	FLOOR DRAIN	J.R. SMITH	2005-P050	CAULK	NICKEL BRONZE TOP BRONZE PLUG	INSTALL TRAP PRIMER VALVES FOR ALL FLOOR DRAINS OR INSTALL "SURE-SEAL" OR "PRO-SET" TRAP SEAL NEOPRENE DUCKBILL FLAPPER TO PREVENT EVAPORATION.
NOTES.		·	•			

ALL FLOOR DRAINS THAT DO NOT RECEIVE INDIRECT WASTE DISCHARGE SHALL BE TRAP SEAL PROTECTED WITH TRAP PRIMER VALVES, BELOW SLAB PIPING AND DISTRIBUTION UNITS OR INSTALL "SURE-SEAL" OR "PRO-SET" NEOPRENE DUCKBILL FLAPPER DEVICE TO PREVENT TRAP SEAL EVAPORATION.

WATER HEATER SCHEDULE (BASED ON STATE WATER HEATERS)											
SYMBOL	LOCATION	MODEL	RECOVERY TEMP. RISE	FUEL	NO. OF ELEMENTS	SIMULTANEOUS	кw	ELECTRICAL DATA		WEIGHT	NOTES
								AMPS	VOLTAGE	(LBS.)	NOTES
WH-1	JANITORS CLOSET	DEL-20	100	NA	2	NO	4.5	21.6	208/1/60	73	1,2
NOTES: 1. PROVIDE WITH DISCONNECT. COORDINATE WITH E.C. 2. PROVIDE WITH AMTROL # ST-5 EXPANSION TANK (ET-1) RATED FOR 150 PSIG.											

![](_page_20_Figure_6.jpeg)

**ELECTRIC WATER HEATER DETAIL** NTS

NORTH COLLA ARCHIT 650 Ten North Kir v: 401.84 CNGINE I41 Indust PO Box 98 Slatersville Phone: (40	EAST BORATIVE TECTS Rod Road Igstown, RI 02852 Id.9583 RINGCOESIGN SERVICES (1) 765-7659 Fax (401) 765-2984 A/Electrical/Plumbing Engineers: Ig Design Services, Inc. rial Drive 36 a, Rhode Island 02876 (1) 765-2984				
BATHROOM RENOVATIONS	STATE OF RHODE ISLAND /N DEPARTMENT OF LABOR & TRAINING 1330 MAIN STREET WEST WARWICK, RI 02893				
REVISION	<b>NS</b> :				
No.	GLEN G. MARKEY				
PI SCH [	LUMBING IEDULES & DETAILS				
DATE: NCA JOB	06.29.2023 NO.: 22330				
DRAWING C 2023 NORTHEAST CC	S NO.: P-201 DLLABORATIVE ARCHITECTS				

### SECTION 22000 - PLUMBING

### PART I -- GENERAL

- .1 DESCRIPTION OF WORK
- A. The work under this section shall consist of furnishing all labor, materials, equipment, supervision, transportation, construction, facilities, devices and incidentals necessary to provide complete plumbing systems as hereinafter described and as indicated on the drawings, including, but not
- limited to the following:
- 1. Sanitary, waste and vent piping system
- Domestic water piping system
   Natural gas system (Refer to mechanical plans for scope of work)
- 4. Plumbing fixtures and trim
- ${\small 5. \ Sleeves, escutcheons, hangers and supports}$
- 6. Fire safing of pipe penetrations
   7. Floor drains
- 8. Hose bibs
- 9. Insulation
- 10.Valves
- 11.Water Hammer arrestors12.Backflow preventers and file DEP submission
- 13.Fittings, unions and couplings
- 14.Cleaning, flushing, testing and disinfection
- 15.All supplementary steel for piping and equipment support
- 16.Guarantees
- 17.Drilling for installation of inserts18.Vibration isolation and flexible connections
- 19.Installation of toilet accessories
- 20. Coordination drawings
- 21. Access panels
- 22. Selective demolition
- 1.2 CODES, ORDINANCES AND PERMITS
- A. All material and work provided shall be in accordance with the following codes and standards:1. State Plumbing and Fuel Gas Code
- 2. State Department of Public Safety
- 3. Standards of the Underwriters' Laboratories (UL)
- 4. RI State and local Building Codes
- Occupational Safety and Health Act
   Local Codes and Board of Health requirements
- Requirements of the RI Department of Environmental Protection
- 8. Requirements of the Town of West Warwick, RI
- B. Where the contract documents indicate more stringent requirements than the above codes and
- ordinances, the contract documents shall take precedence.C. File all documents, pay all fees and secure all permits, inspections and approvals necessary for the work of this section.
- 1.3 CONTRACT DRAWINGS & SPECIFICATIONS
- A. The Contract Drawings are generally diagrammatic and convey the Scope of Work and General Arrangement of apparatus and equipment. The locations of all items shown on the drawings or called for in the specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect and Engineer before being installed. The Subcontractor shall follow drawings in laying out work and shall check drawings of the other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. If directed by the General Contractor, Engineer and/or Architect, the Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or before proper execution of the work.
- B. Specifications: The specifications are intended only to complement the drawings; however, work detailed and/or noted only on the drawings or work described only in the specifications shall all be considered as part of the scope of work.
- .4 SHOP DRAWINGS
- A. Within thirty (30) days after the date of notice to proceed, and before purchasing any materials or equipment, submit for approval a complete list, in six (6) copies, of all materials to be incorporated in the work.
- B. After the list has been processed, submit six (6) complete sets of shop drawings of all equipment. These shop-drawing submittals shall be submitted within thirty (30) days after the processing date of the original submittal.
- C. All submittals shall be complete and shall be in three-ring loose-leaf binders. No consideration will be given to partial submittals, except with prior approval.D. The approval of the equipment does not relieve the Subcontractor of responsibility of shop drawing
- errors related to details, sizes, quantities, wiring diagram arrangements and dimensions which deviate from the Specifications, and/or job conditions as they exist.
- E. Refer to General Requirements for the substitutions of equipment and submittal of shop drawings. If apparatus or materials are substituted for those specified, and such substitution necessitates changes in, or additional connections, piping, supports, or construction, same shall be provided. Plumbing Subcontractor to assume cost and entire responsibility thereof.
- 1.5 RECORD DRAWINGS
- A. The General Contractor will provide two sets of black or blue line and white drawings to the Plumbing Contractor to maintain and submit record drawings. One set of which shall be maintained at the site, and which shall, at all times, be accurate, clear and complete. Showing the actual location of all equipment and piping. The record drawings shall be available to the Architect/Engineer and/or General Contractor field representative at all times.
- B. Any addenda, sketches, and supplementary drawings issued during the course of construction shall
- be transferred to the "as-built" drawings in AutoCAD format. C. At the completion of the contract, submit an accurate, checked set of "as-built" drawings along with a
- disc with plans in AutoCAD format. D. All valves installed shall be indicated on these drawings, and shall be numbered with numbers
- corresponding to those on the valve charts.
- 6 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS
- A. Operating Instructions: Provide operating instructions to the Owner's designated representative with respect to the operation functions and maintenance procedures for all equipment and systems
- B. Maintenance Manuals: At the completion of the project, turn over to the General Contractor four (4) complete manuals in 3-ring binders, indexed, containing the following:
- Complete shop drawings of all material and equipment in Part 2 of this section.
   Operation descriptions of all systems.
- 3. Names, addresses and telephone numbers of all suppliers of system components.
- 4. Preventative maintenance instructions for all systems.
- 5. Spare parts list of all system components.
- 6. Copies of all valve charts
- .7 GUARANTEE
- A. This Contractor shall obtain in the General Contractor's and Owner's name, the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents. The guarantee shall be for a period of one (1) year minimum from the date of acceptance or final payment.
- STORAGE OF MATERIALS
   A. Store materials prior to their installation where designated by the General Contractor. This Contractor shall be responsible for all materials stored and protect all installed equipment from injury or defacement.
- .9 SITE VISITATION
- A. Prior to bid, This Contractor shall be required to visit the site and to have examined the existing conditions, which may affect the work under this contract. Failure to do so shall be this Subcontractor's responsibility and no claims for extra compensation or extension of time shall be allowed because of it.
- 1.10 COOPERATION WITH OTHER TRADES
- A. Give full cooperation to other trades and furnish in writing to the Architect any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay
- B. Coordination drawings shall be initiated under Section 15500 of the Specifications. It is their responsibility for preparation of project coordination drawings showing the installation of all equipment, piping, ducts and accessories to be provided under Section 15500 of the Specifications. These drawings shall be prepared at not less than ¼ in. = 1 ft. scale, and shall show building room layouts, structural elements, ductwork and lighting layouts of function. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services. A reproducible copy of each drawing prepared shall then be submitted to each Contractor working under Sections 15300, 15400 and 16000, who shall be responsible to coordinate his equipment and systems and shall show these on the drawings submitted. After this Contractor has fulfilled his obligation, he shall return the drawings to the HVAC Contractor. After each drawing has been coordinated between trades, each trade shall sign each drawing, indicating acceptance of the installation. The HVAC Contractor to the architect for review and comment, similar to shop drawings. Comments made on these drawings shall result in a correction and re-submittal of the

- drawings.C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.
- 1.11 DEMOLITION
- A. Prior to submitting bid, visit site and identify existing conditions and difficulties that will affect work of this section. Demolition work will require careful site examination prior to bidding. No compensation will be granted for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observers.
- B. Prior to commencing demolition, contractor shall identify with owner any equipment to be returned to the owner after demolition. All other debris shall be disposed of by this contractor in accordance with all applicable regulations. Any shutdowns required for demolition shall be coordinated with building owner to avoid impact to operations.
- C. During demolition, any equipment found to be abandoned shall be demolished. Existing unused connections to existing piping shall be capped accordingly.
- D. Under demolition, the following is, in brief, the extent of the work to be performed by the Plumbing Contractor under this contract.
- The plumbing contractor shall be responsible for the disconnection and removal of the existing equipment, fixtures, piping, valves, etc. in designated areas. Cut & cap piping back to mains.
- Patch all roof and wall penetrations to match existing.2. This contractor shall protect work against injury or damage; and carefully store material and equipment to be relocated. Open ends of work shall be closed with temporary covers or plugs
- during storage and construction to prevent entry of obstructing material.
   Refer to plumbing relocation drawings for new locations of equipment called out "To be
- Re-installed". 1.12 INSPECTION AND TESTS
- A. If inspection of materials installed shows defects, such defective work, materials, and/or equipment shall be replaced at no cost to the General Contractor or Owner, and the inspection and tests repeated
- B. Make all reasonable tests as required, and prove the integrity of all work and leave the entire installation in correct adjustment and ready to operate.
- 1.13 CONFLICT BETWEEN PLANS AND SPECIFICATIONS
- A. In case of conflict between the contract drawings and specifications, the Engineer shall determine which takes precedence.
- PART 2 PRODUCTS
- 2.1 ACCESS PANELS
- A. Furnish access panels for access to all concealed parts of the plumbing system that require accessibility such as valves, shock absorbers and cleanouts. Access panels to be installed by others under the appropriate section of the specifications.
- B. All access panels shall be located in a workmanlike manner, positioned so that the component can be easily reached and the size shall be sufficient for this purpose (minimum size 12-in. square). Location of access panels will be submitted for approval prior to installation.
- C. Access panels shall be prime painted with cam lock, as manufactured by Inland Steel Products Co.
   Milcor, Miami Carey or Walsh-Hannon-Gladwin, Inc., Wayloctor or an approved equal. Provide fire rated access panels where required by applicable code. They should be as follows:
- D. Access panel shop drawings shall be submitted to the Architect for approval.
- 2.2 PIPING/FITTINGS/JOINTS
- A. Pipe and fittings shall be of US manufacture, and shall conform to the latest ASA, ASTM and/or FS Standards.B. Domestic Water Piping: Pipe Type L copper tubing, conforming to Federal Specification WW-T-799
- hard temper, or ASTM B88 drawn copper. Fittings -Wrought copper and bronze solder joints. Joints Soldered joints shall be lead free solder.C. Waste and Vent: PVC Schedule 40 solid wall pipe and PVC drainage fittings joined by solvent
- Waste and Vent: PVC Schedule 40 solid wall pipe and PVC drainage fittings joined by solvent welding.
   Network Oce Division 2 4/2 in and known Schedule 40, block steel size (ACTM 4422) with Schedule 40.
- D. Natural Gas Piping 2-1/2 in. and Larger: Schedule 40, black steel pipe (ASTM A120) with Schedule 40, black steel fittings. Pipe joints shall be welded or flanged.
   E. Natural Gas Piping and Gas Train Vents 2 in. and Smaller: Schedule 40, black steel pipe (ASTM
- E. Natural Gas Piping and Gas Train Vents 2 in. and Smaller: Schedule 40, black steel pipe (ASTM B16.3) with 125-psi malleable iron, screwed fittings.
- 2.3 HANGERS A. All piping shall be supported fro

vapor barrier and self-sealing lap

water vapor permeability of .02 perms

this work and employing particularly skilled therein.

Provide shut off valves for each battery of fixtures.

Mount the hose bib with the outlet 16-in, above finish floor

A. Traps installed on threaded pipe shall be recessed drainage pattern.

with vapor barrier.

approving authority.

non-shock cold water.

working pressure.

2.8 PLUMBING FIXTURES

2.6 HOSE BIBS AND WALL HYDRANTS

2.5 VALVES

- A. All piping shall be supported from the building structure by means of approved standard weight UL/FM hangers and supports. Piping shall be supported to maintain required grading and pitching of lines to prevent vibration and to secure piping in place and shall be so arranged as to provide for expansion and contraction. Piping shall not be hung from the hangers of other trades.
- B. The spacing of hangers for horizontal piping shall be in accordance with State Plumbing Code. In no case shall horizontal piping be supported at intervals greater than 10 ft. Vertical lines shall be adequately supported at their bases by a suitable hanger placed in the horizontal line near the riser and at every story height vertically.
- C. Hangers shall be manufactured by Grinnell, Carpenter and Patterson, Fee and Mason, or equal. All hangers and support figure numbers referred to are Carpenter and Patterson.
- D. On insulated piping, each hanger shall be oversized so that the hanger will allow the insulation to pass through undisturbed and uncut. Install a 14 gauge metal pipe shield between pipe insulation and at all pipe hangers or saddles. Hangers shall be around insulation so insulation will be between pipe and hanger or saddle.
- E. Seismic Restraints: It is the intent of this seismic specification to keep all mechanical building system components in place during a seismic event.
- 2.4 INSULATION
- A. Pipe and equipment installed under this Contract shall be covered as follows:B. All cold water piping: 1/2 in. glass fiber, 3-1/2 pound density, snap-on fiberglass insulation with vapor

fiberglass insulation with vapor barrier jacket and self-sealing lap.

joints and throat. No tacks or staples will be allowed on this project.

barrier jacket and self-sealing lap.C. All Hot Water Piping: 1 in. glass fiber, 3-1/2 pound density, snap-on fiberglass insulation with jacketed

D. All existing horizontal storm water drain piping: 1/2 in. glass fiber, 3-1/2 pound density, snap-on

E. All valves and fittings shall have fiberglass insulation and covered with Manville's Zeston or Proto,

F. All Condensate Piping: Horizontal runs of condensate drainage piping, including the horizontal to

G. All piping on factory assembled equipment shall be insulated same as for field installed piping.

H. All pipe insulation shall be covered with a fire retardant vapor jacket in accordance with NFPA.

jacket finish. End joints on cold water piping shall be sealed with vapor barrier mastic

PVC fitting covers with a 25/50 flame and smoke rating. The covers shall be Manville's Zeston or an

approved equal. The covers shall be secured in place with a 1-inch wide white vinyl tape on all seams

vertical elbow of fitting and drain body and connection shall be insulated with 1/2" fiberglass insulation

Jacket shall be constructed of outer layers of white kraft paper and one mil aluminum foil with a glass

fiber reinforcing between, laminated together with fire retardant adhesive. This jacket shall have a

I. Joints: The end joints of insulation shall be tightly butted and covered with factory furnished end joint

J. All sealer, solvents, tapes, adhesives and mastics used in conjunction with the installation of all

flame-spread rating shall not exceed 25. Smoke development rating shall not exceed 50.

K. No covering will be applied until the piping has passed all tests as required by the Engineer and

L. All covering shall be Gustin Bacon, Johns-Manville, Owens Corning Fiberglass Co., or equal by

A. Furnish and install valves, required by code, where indicated on the drawings or specifications, so

B. Ball valves 2 in. and smaller shall be two piece, all bronze with full port chrome plated ball, teflon

C. Stop and waste ball valves 3/4 in. and smaller shall be two piece, all bronze, with full port chrome

D. Gas cocks 2-1/2 in. and larger shall be all iron, lubricated plug, flanged ends, and 125-psi working

pressure. Gas cocks 2 in. and smaller shall be bronze, lubricated plug, screwed ends and 125-psi

A. Hose bibs shall be Chicago No. 293, 1/2-in. brass "Y" pattern with lock shield, composition disk, loose

tee handler and 3/4 in. hose end. Provide watts #8-A chrome plated backflow preventer on outlet.

A. Plumbing fixtures shall be of the best quality as fabricated by a manufacturer of established

reputation. Refer to architectural plans (Interior Design) for plumbing fixture specifications.

located that they may be operated, repaired or replaced with minimum effort and repacked under

pressure. Provide access panels where valves are concealed behind non-removable ceilings or walls.

seats, solder or threaded ends, extended stems and 600 psi cold working pressure. Ball valves 2-1/2

plated ball, drain cap, teflon seats, solder or threaded ends, extended stems and 400-psi cold working

in. and larger shall be carbon steel with full port ball, teflon seats, flanged and designed for 600 lbs.

sealing tapes. The jacket overlap shall be sealed with an approved sealer which shall not mar the

insulation specified under this section of the specifications, shall pass the maximum possible fire safe

ecognized manufacturer, and shall be installed by reputable Sub-subcontractors regularly engaged in

qualities available and be of a type approved under NFPA or NFBU 91A and 90B Standards. The

- B. All fixtures shall have the manufacturer's guarantee label or trademark indicating first quality.
  C. Provide in all areas where floor drains are located a 1/2" chrome plated hose bib with vacuum breaker and loose key.
- D. All materials specified to be chromium plated shall be thoroughly cleaned and polished before plating and plate shall be heavily, thoroughly and evenly plated, guaranteed not to strip or peel.E. Where escutcheons are not furnished with plumbing fixtures, this Contractor shall supply them.
- Fixtures shall meet the requirements for the conservation of hot and cold water as noted in the State Plumbing Code.F. Each fixture shall be separately trapped, using the type and size of trap required by the Plumbing Code or as specifically denoted otherwise. Unless otherwise specified, faucets and all exposed
- G. Dimensions locating plumbing fixtures shall be as shown on the architectural drawings.

### 2.9 SHOCK ABSORBERS

- A. Furnish and install where required to prevent water hammer (all cold water drops to waterclosets and urinals), Zurn Z-1700 Shoktrol arrestors stainless steel, gas filled, bellows type shock absorber. Installation of absorbers shall be as per manufacturer's recommendations. Access panels are required at shock absorbers.
- 2.10 DRAIN VALVES
- A. It shall be possible to drain the water from all the cold and hot and hot water piping. This subcontractor shall furnish and install 1/2-in. bronze gate valves with 3/4-in. hose outlets to drain each section and branch.

### 2.11 FIRE SAFING

- A. Where piping passes through fire rated walls, floors and ceilings, provide a fire safing system so as to maintain the integrity of the rated assemblies to the satisfaction of the Architect and the Building Inspector. The fire safing system shall be as manufactured by 3M, Dow, Bio-Fire Shield, or Nelson. Provide manufacturer's details or custom details when there are not manufacturer's details for each condition with a UL listing referenced. Where piping is insulated, pipe insulation shall run continuously through the rated opening. Details shall show the required depth and annular space width requirements and limitations and any packing requirements.
- B. Refer to architectural drawings for rated walls and partitions. Where there are no architectural drawings or they do not indicate rated walls and partitions, the following guidelines shall be used. All floors, corridor walls, party walls, mechanical room walls, duct and pipe chase walls, stairwells, trash room and chute walls shall be considered minimum two hour fire rated walls.
- C. Products for fire safing of PVC piping shall be Proset System "C" or approved equal.

### 2.12 SYSTEMS IDENTIFICATION

- A. All systems identification materials shall meet ANSI standard A13.1 1975, and be as manufactured by Seton Name Plate Corporation or approved equal.
  B. Valve tags shall be circular 19 gauge brass, 1-1/2 in. diameter, with black filled text Seton No. 250-BL
- with No 530 brass hooks, No. 16 brass jack chain, or No.6 nickel-plated bead chain. Letter abbreviations shall be 4 in. high above 1/2-in. high numbers.
- C. Pipe markers shall be setmark type "SNA" pre-molded acrylic plastic, snap on markers, either 8 in. or 12 in. long with overlap, for up to 6 in. diameter ER and type "STP" strap for 6 in. and larger. The background, field and legend colors and letter sizes shall be per ANSI standards.

### 2.13 ESCUTCHEONS

Install escutcheons around exposed pipe passing through finished floor, wall or ceiling. Escutcheons shall be one piece heavy cast brass, chromium plated, with set screw adjustable and shall be of sufficient outside diameter to cover sleeve opening and shall fit snugly around pipe.

### 2.14 FLOOR DRAINS

- All floor drains shall be the product of one manufacturer such as Jay R. Smith, Josam, Zurn, or approved equal. A. FD-A: Cast iron body and flashing collar with protector cap and 5-inch nickel bronze adjustable square strainer, similar to Jay R. Smith 2010C.
- B. Provide round funnel similar to Jay R. Smith Figure No. 3580 where applicable.
- C. Provide trap primer connection similar to Jay R. Smith P050 where applicable.
- D. FD-B: Cast iron body and flashing collar with adjustable top bar grate and sediment bucket, similar to Jay R. Smith 2360C-S
- E. Provide round funnel similar to Jay R. Smith Figure No. 3580 where applicable.
- F. Provide trap primer connection similar to Jay R. Smith P050 where applicable.
- G. FS-A: Cast iron flanged body with flashing clamp, acid-resistant coated interior, nickel bronze rim and secured grate, with aluminum sediment bucket, similar to Jay R. Smith 3151C-C.
- H. FS-B: Same as FS-A except with Jay R. Smith 12 nickel bronze rim and half grate.
- I. FS-C: Same as FS-A except with Jay R. Smith 13 nickel bronze rim and 3/4 grate.
- J. FS-D: Cast iron flanged body with flashing clamp, acid-resistant coated interior, nickel bronze rim and half secured grate, aluminum sediment bucket and trap primer connection similar to Jay R. Smith 3151C-12-LXH-P050.

### 2.15 PLUMBING FIXTURES

See Plumbing Fixture Schedule

### PART 3 - EXECUTION

### 3.1 WORKMANSHIP

- A. Prior to the work of this section, this Contractor must ascertain that preceding work has been accomplished in a manner to permit compliance with the level of quality required by this Section.
- B. The entire work provided in this specification shall be constructed and finished in every respect in a workmanlike and substantial manner. It is not intended that the drawings shall show every pipe, fitting, and appliance. Furnish all parts as may be necessary to complete the system in accordance with the best trade practices and to be the satisfaction of the Architect, Engineer and General Contractor.
- C. This Contractor shall keep other contractors fully informed as the shape, size and position of all openings required for his apparatus and shall give full information to the General Contractor or other contractors sufficiently in advance of the work so that all openings may be built in advance. Furnish and install all sleeves, supports, etc., specified or required.
  D. In the case of failure on the part of this Subcontractor to give proper and timely information as noted
- above, he shall do his own cutting and patching, or have same done by the General Contractor at this subcontractor's expense, but in any case, without extra expense to the Owner and General Contractor.
- E. This Contractor shall obtain detailed information from the manufacturer of apparatus as to the proper method of installing and connecting same. He shall also obtain all information from the General Contractor and the other contractors which may be necessary to facilitate his work and the completion of the whole project.

### 3.2 CORE DRILLING

- A. All holes through concrete or masonry for the passage of plumbing piping not provided by sleeves or openings at the time of casting, shall be cut by the Plumbing Contractor using an approved core boring machine with diamond edge bit and vacuum sludge removal device. The size of holes shall provide for fire stopping around a pipe. The location of all core drilled holes shall be coordinated with the structural reinforcing and be reviewed by the Architect prior to commencing work.
- B. Prior to coring, the Plumbing Contractor shall submit a minimum 1/8 in. scale plan, dimensioning the location of proposed cored opening locations and indicating the core diameter. Prior to developing the coring plan, the Plumbing Contractor shall examine the site carefully in an attempt to determine whether there are structural, mechanical or electrical obstacles in the proposed coring locations. Once the plans are reviewed by the Architect and Owner's representative, the Plumbing Contractor may proceed with caution.

### 3.3 TESTING PIPING SYSTEMS

- A. Test all work in the presence of the Architect/Engineer and/or Owner, Owner's representative and Plumbing Inspector as called for in local codes.
- B. After soil, waste and vent piping is in place and before being furred in, plug lower ends and fill. The system shall be left tight under these conditions and water level shall be maintained intact for a period of at least four hours.
- C. Test domestic water piping and service by applying a hydrostatic pressure of 125 psi using a pump for this purpose. Make sure that all lines are properly plugged or capped, and that air has been vented before applying pressure, which shall remain constant without pumping for one hour at least.
- D. Gas system piping shall be tested at a pressure of 5 psig and pressure shall be held for two hours minimum.
- E. This Contractor shall furnish all equipment, labor and materials, required for these tests.
   F. Any leaks in joints or evidence of defective pipe or fittings disclosed by tests shall be immediately corrected by replacing defective parts with new joints or corrected materials. No makeshift repairs effected by caulking threaded pipe with lead wool, application of wicking or patented compounds being permitted. Perform smoke tests as required by local code or by the Architect/Engineer.

### 3.4 PROTECTION AND CLEANING

- A. Each subcontractor shall be responsible for his work and equipment until finally inspected, tested and accepted. Carefully store materials and equipment, which are not immediately installed after delivery on site. Close open ends or work with temporary covers or plug during construction to prevent entry of obstructing materials.
- B. Each subcontractor shall protect work and materials of other trades from damage that might be caused by his work or workman and make good damage thus caused.
- C. The premises shall be kept reasonably clean at all times, and rubbish shall be removed as directed by the General Contractor.
- D. Upon completion of this work, the Contractor shall clean all fixtures and equipment and replace damaged parts. Upon failure of this Contractor to fulfill his obligation, this work will be taken care of at his expense.

- A. Plumbing equipment shall not be installed in congested and possible problem areas without first coordinating the installation of same with the other trades and the General Contractor.
- B. Particular attention shall be directed to the coordination of system with all equipment of other trades installed in and above the ceiling areas. Conflicts in heights and clearance above hung ceilings shall
- be brought to the attention of the General Contractor for a decision before equipment is installed. C. Furnish to the General Contractor and other trades all information relative to the position of the
- plumbing installation that will affect them so that they may plan their work and installation accordingly. 3.6 SUPPLEMENTARY STEEL, CHANNEL AND SUPPORTS
- A. Furnish and install all supplementary steel, channels and supports required for the proper installation, mounting and support of all equipment.
- B. Supplementary steel and channels shall be firmly connected to building construction in a manner approved by the Architect/Engineer.
- C. The type and size of the supporting channels and supplementary steel shall be determined by the Plumbing Subcontractor and shall be sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All supplementary steel and channels shall be installed in a neat and workmanlike manner parallel to the walls, floor and ceiling construction. all turns to be made with 90 degree fittings, as required to suit the construction and installation conditions.

### 3.7 SLEEVES AND INSERTS

- A. Sleeves shall be furnished, set and properly secured in place and at all points where piping passes through masonry or concrete. All sleeves shall be of sufficient diameter to provide 1/4-in. clearance around the pipe.
- B. Sleeves through concrete slabs, and interior concrete and masonry walls or partitions shall be steel pipe. Fire stop annular openings between sleeves and pipes at floor slab passages and make watertight. Galvanized sleeves and copper piping shall not be placed in concrete.
- C. Install UL listed and FM approved inserts or other anchoring devices in concrete and masonry construction as required to support piping. Inserts shall be of the adjustable type as manufactured by Carpenter and Patterson, Grinnell, or Fee and Mason.

### 3.8 SYSTEM IDENTIFICATION

- A. All valves on pipes of every description shall have circular brass valve tags of at least 1-1/2 in. in diameter, attached with brass hooks to each valve stem. Stamp number of the valve and the service, such as "HW", "CW", "GAS", etc., for hot water, cold water, gas, etc., respectively. The numbers of each service shall be consecutive and shall correspond with the numbers indicated for valves and controls on the record drawings and on three printed valve lists. These printed lists shall state number and locations of each valve and control and the section, fixture or equipment which it controls.
- B. The printed valve lists shall be prepared in a form to meet the approval of the Architect and Engineer and one copy shall be framed under glass and mounted in approved locations.
- C. All plumbing lines and equipment shall be identified by pipe markings, which shall be provided by this Contractor. Markers shall be applied every 20 ft. Markings shall indicate pipe content and direction of flow. The markers shall be as manufactured by Seton Name Plate Corp. or equal.

### 3.9 INSERTS AND OPENINGS

- A. Inserts: Install inserts or other anchoring devices in concrete and masonry construction as required to support piping. Inserts shall be of the adjustable type as manufactured by Carpenter and Patterson, Grinnell of Fee and Mason.
- B. Escutcheons: All exposed pipe, uncovered, passing through walls, floors or ceilings shall be fitted with one piece chrome plated brass escutcheons with set screw holding in position. Floor escutcheons to be deep enough to fit over sleeves, fastened to pipe and extending down to floor.

### 3.10 PLANS AND SPECIFICATIONS

- A. The drawing showing layout of the plumbing systems indicate the approximate location of outlets, apparatus and equipment are schematic. The final determination as to the routing shall be governed by structural conditions and other obstructions.
- B. The right to make any reasonable change in the location of outlets, apparatus and equipment up to the time of the roughing-in is reserved by the Architect and Engineer without involving any expense to
- the Owner or the General Contractor.
   C. The specifications supplement the drawings and provide specifics pertaining to the methods of material to be used in the execution of the work.

### 3.11 SANITARY WASTE, STORM WATER AND VENT SYSTEMS

- A. Furnish and install piping to take wastes from all soil and waste stacks, fixtures, drains and equipment
- as indicated and/or described in these plans and specifications.B. Unless specifically noted otherwise on the plans, all horizontal piping 4 in. and larger shall be pitched at the rate of 1/8 in. per foot in the direction of the flow. Horizontal sanitary piping 3 in. and smaller
- shall be pitched at the rate of 1/4 in. per foot in the direction of the flow.C. When connecting new piping to existing, the existing waste lines shall be tested and thoroughly
- cleaned to insure proper operation of all new and existing systems.
- D. Vent System: Furnish and install piping to vent all stacks, fixtures, traps and appliances as indicated on the drawings and/or required to meet the Plumbing Code. All vent piping shall be concealed where possible with the horizontal pipe pitching back toward fixtures to allow connection to drain. Whether indicated on plan, riser diagram or not, offset vents below the roof to avoid air intakes, equipment, penthouse mansard etc., bring vents through the roof a minimum of 25 ft. away from air intakes, windows, and operable sash and 10 ft. away from other obstructions.

3.12 HOT AND COLD WATER SYSTEMS

A. Furnish and install complete cold, hot and hot water return systems to service all fixtures and equipment indicated on the drawings or specified as requiring cold or hot water. Cold water piping shall start at the connection to the water main indicated on plan and extend to all fixtures and equipment, including piping, fittings and valves requiring connections. Hot water piping shall extend from the hot water heater to all fixtures and equipment, including piping, fittings and equipment, including piping shall extend from the hot water heater to all fixtures and equipment, including piping, fittings and valves. In general, piping shall pitch upward in the direction of flow with each branch and riser separately valved and with 1/2 in. hose end drains on the outlet side of the valve and at all low points in the systems. Install valves for each battery of fixtures and other valves as necessary to isolate all parts of these systems. All valves shall be accessible.

B. Hot water piping shall be circulated as shown on plans to ensure uniform temperatures throughout the system. All branches larger than 50 ft. shall be provided with hot water return lines.

### 3.13 GAS SYSTEM

- A. Furnish and install pipe, fittings, valves and connections to all gas-fired equipment and all accessories and incidentals as indicated or specified to maintain a complete gas system. Install solenoid valves supplied by others as required. Installations shall be made in accordance with the State Gas Code requirements. All horizontal gas piping shall be pitched not less than 1/4 in. in 15 ft. to prevent traps. Pitch piping to risers. Install an 8 in. long sediment leg at the base of all risers.
- B. All changes in direction shall be made with plugged tees for cleaning out piping. All horizontal branch outlet pipes shall be taken from the top or side of horizontal mains and not from the bottom. Coordinate the installation of the gas system with the utility company and General Contractor.
- C. Provide gas train vents to the atmosphere for all gas-fired equipment as required by Code.

3.14 CHLORINATION

- A. All water lines and water service shall be thoroughly flushed and chlorinated before being put into service. The domestic cold and hot water systems shall be chlorinated and flushed in accordance with the requirements of the State Plumbing Code and Local Inspector.
- B. Submit a certificate of compliance when chlorination has been completed stating when performed, by whom and who witnessed the procedure.

END OF SECTION

3.5 WORK COORDINATION AND JOB COORDINATION

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