

# <u>CITY LAKE AQUATIC CENTER RENOVATION:</u> SITE AMENITIES BID # 2024-019 BUILDING & SITE IMPROVEMENTS PACKAGE

# ISSUED FOR PRICING

# NOVEMBER 28, 2023



PROJECT MANAGER:

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M1.0 MECHANICAL FLOOR PLAN M2.0 MECHANICAL SPECIFICATIONS





![](_page_3_Figure_0.jpeg)

![](_page_4_Figure_0.jpeg)

CITY L 2023-20
Release/Revision:
ISSUED FOR BID
Designed:
Drawn:
Checked: AF Project No

ELECTR	RICAL SYMBOLS LEGEND	T ALL SYMBOLS CESSARILY USED				
SYMBOL	DESCRIPTION	ON CENTER				
<u> </u>						
₽ ₽	WALL MOUNTED DUPLEX RECEPTACLE					
atter a	WALL MOUNTED ISOLATED GROUND DUPLEX RECEPTACLE	18" UNO				
I GFCI	WALL MOUNTED G.F.C.I. DUPLEX RECEPTACLE	18" UNO				
	WALL MOUNTED DUPLEX RECEPTACLE WITH (2) USB PORTS	18" UNO				
<b>#</b>	WALL MOUNTED DOUBLE DUPLEX RECEPTACLE	18" UNO				
ର	WALL MOUNTED SPECIAL RECEPTACLE	18" UNO				
$\Theta$	FLUSH MOUNTED DUPLEX RECEPTACLE - SPECIFIED ON PLANS					
Q	ABOVE CEILING JUNCTION BOX - SIZE AS REQUIRED	AS REQUIRED				
Q	WALL MOUNTED JUNCTION BOX - SIZE AS REQUIRED	PER PLANS				
►	WALL MOUNTED TELEPHONE OUTLET-PLASTER RING AND STRING U.N.O.	18" UNO				
⊳	WALL MOUNTED DATA OUTLET-PLASTER RING AND STRING U.N.O.	18" UNO				
۵	FLUSH FLOOR MOUNTED DATA/TELEPHONE COMBINATION OUTLET	FLOOR				
	TV CABLE OUTLET	PER PLANS				
	PANEL BOARD with WORKING CLEARANCES	AS REQUIRED				
	MAIN DISTRIBUTION PANEL OR MAIN SWITCH BOARD	AS REQUIRED				
\$	WALL MOUNTED TOGGLE SWITCH	48" AFF				
\$ <sub>3</sub>	WALL MOUNTED ON/OFF 3-WAY TOGGLE SWITCH	48" AFF				
\$vs	WALL MOUNTED VACANCY SENSOR SWITCH	48" AFF				
\$ <sub>os</sub>	WALL MOUNTED OCCUPANCY SENSOR SWITCH	48" AFF				
\$-		40" AEE				
Ψυ	WALL MOUNTED DIMMER SWITCH (OUW. U.N.U.)	40 AFF				
Ľ	NON-FUSED DISCONNECT SWITCH (FRAME/POLES/NEMA RATING)	AS REQUIRED				
<b>D</b> '	FUSED DISCONNECT SWITCH (FRAME/POLES/FUSES/NEMA RATING)	AS REQUIRED				
F	FIRE ALARM PULL STATION	42" AFF				
Ed	FIRE ALARM ANNUNCIATION DEVICE-WALL MOUNTED	84" AFF				
Ø	CEILING MOUNT HORN/STROBE	CEILING				
FACP	FIRE ALARM CONTROL PANEL					
FAAP	FIRE ALARM ANNUNCIATION PANEL					
D	DOOR/WINDOW CONTACT SWITCH	AS REQUIRED				
	PANIC BUTTON	VARIES				
69	CEILING MOUNTED OCCUPANCY SENSOR	CEILING				
\$	SMOKE DETECTOR	CEILING				
<b>(B)</b>	CEILING MOUNTED DAYLIGHT SENSOR					
D	DUCT MOUNTED SMOKE DETECTOR	SEE MECH.				
Ō	WALL MOUNTED TEMPERATURE SENSOR/THERMOSTAT	SEE MECH.				
		42" AFF				
R		70"				
В В	BELL ANNUNCIATOR	70 AFF				
₹ _	BUZZER ANNUNCIAIUR	70 AT				
●	WALL MOUNTED PUSH BUTTON	48° AFF				
	CCTV SECURITY CAMERA	CEILING				
	LOW VOLTAGE TRANSFORMER - SPECIFIED ON PLANS	VARIES				
	PLYWOOD BACKBOARD					
	ABBREVIATIONS					
ABV CTR	6" ABOVE COUNTERTOP					
GFCI	GROUND FAULT CIRCUIT INTERRUPTING					
GFEP	GROUND FAULT EQUIPMENT PROTECTION					
	ABUVE FINISHED FLOUR					
۳F						
NL	NIGHT LIGHT					
EM	EMERGENCY					
UNO	UNLESS NOTED OTHERWISE					
AHJ	AUTHORITY HAVING JURISDICTION					

![](_page_5_Figure_3.jpeg)

PARK EXAS AKE MESQUITE  $\succ$ CIT

ELECTRICAL DEVICE MOUNTING HEIGHT NOTE:

1. SEE "MOUNTING HEIGHT ELEVATION DETAIL" IN ARCHITECTURAL PLANS FOR ADDITIONAL DETAILS REGARDING DEVICE MOUNTING HEIGHTS. ALL MOUNTING HEIGHTS SHOWN ON ARCHITECTURAL PLANS TAKE PRECEDENCE OVER THOSE INDICATED ON THE ELECTRICAL PLANS.

![](_page_5_Picture_7.jpeg)

# Release/Revision: Date: Designed: Drawn: Checked: AE Project No.: Sheet Title: GENERAL ELECTRICAL SYMBOLS & NOTES Sheet No .: E0.0

![](_page_5_Picture_9.jpeg)

# ELECTRICAL GENERAL NOTES

- ALL WORK IN THIS DIVISION SHALL COMPLY WITH NEC 680 AND ALL LOCAL BUILDING CODES, LAWS, REGULATIONS, ORDINANCES.
- 2. THE CONTRACTOR SHALL KEEP A RECORD OF ANY CHANGES WHICH ARE IN CONFLICT WITH THESE DRAWINGS AND SPECIFICATIONS. AT THE COMPLETION OF HIS WORK HE SHALL SUBMIT "AS BUILT" DOCUMENTS TO THE OWNER.
- THESE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW EVERY COMPONENT, FITTING AND DETAIL FOR A COMPLETE AND FUNCTIONING PROJECT.
- 4. ALL WORK SHALL BE INSTALLED SO THAT JUNCTION BOXES AND COMPONENTS WILL BE ACCESSIBLE FOR SERVICE.
- 5. ALL SYSTEMS, EQUIPMENT, COMPONENTS, WORK, ETC. PROVIDED UNDER THIS DIVISION SHALL BE COVERED BY A ONE YEAR GUARANTEE STARTING AT THE TIME OF FINAL ACCEPTANCE OF THE WORK BY THE OWNER. ANY DEFECTS IN THE WORK, SYSTEMS, EQUIPMENT OR COMPONENTS FOUND DURING THIS YEAR SHALL BE CORRECTED AT NO CHARGE. THE GUARANTEE SHALL INCLUDE PROVIDING ALL NECESSARY CUTTING, PATCHWORK, REPAINTING, ETC. TO MAKE THE WORK COMPLETE AND NEW.
- 6. AS APPLICABLE, ALL CONDUIT SHALL BE CONCEALED IN THE WALLS, UNDERFLOOR OR ABOVE THE CEILING AS MUCH AS POSSIBLE UNLESS OTHERWISE NOTED OR SHOWN. MINIMUM CONDUIT SIZE IS 3/4" UNLESS NOTED OTHERWISE.
- ALL CONDUCTORS SHALL BE COPPER WITH TYPE "THW" OR "THHN" INSULATION. THE MINIMUM WIRE SIZE SHALL BE #12AWG WITH A 75" C TEMPERATURE RATING.
- 8. ALL WORK MUST BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER ACCORDING TO GENERALLY ACCEPTED PRINCIPALS OF FIRST CLASS WORKMANSHIP.
- 9. ALL ROOF PENETRATIONS SHALL BE PERFORMED BY GENERAL CONTRACTOR. MAINTAIN ROOF WATERTIGHT INTEGRITY. COORDINATE WITH OWNER.
- 10. FASTEN ALL RECESSED LIGHTING FIXTURES TO STRUCTURE OR GRID PER N.E.C. 410.10 & 410.36.
- 11. DUPLEX RECEPTACLES SHALL BE PLASTIC, TWO-POLE, THREE WIRE, SELF-GROUNDING, SIDE-WIRED, 125 VOLTS AND 20A RATED, UNLESS NOTED OTHERWISE. COLOR TO BE SPECIFIED BY ARCHITECT UNLESS OTHERWISE NOTED.
- 12. ALL PENETRATIONS THRU FIRE RATED WALLS, FLOORS AND CEILINGS SHALL BE FIRE STOPPED PER N.E.C. 300-21.
- 13. PROVIDE ALL GROUNDING AS REQUIRED BY N.E.C.
- 14. ALL WALL MOUNTED SWITCHES FOR FANS, LIGHTS, ETC. WHICH ARE SHOWN TO BE MOUNTED IN THE SAME GENERAL AREA SHALL SHARE A MULTI-GANG COVER PLATE AS REQUIRED.
- 15. PROVIDE A TYPE-WRITTEN PANEL DIRECTORY CARD FOR ALL PANELS MODIFIED DURING CONSTRUCTION. HAND LETTERED DIRECTORY CARDS WILL NOT BE ACCEPTED. DIRECTORY INFORMATION SHALL INDICATE 'AS-INSTALLED' BRANCH CIRCUIT ASSIGNMENTS AND ALL SPARES AND SPACES.
- 16. PROVIDE #12AWG GROUND FOR ALL MECHANICAL EQUIPMENT UNLESS SHOWN OTHERWISE. ALL EQUIPMENT SHALL BE GROUNDED AT THE PANEL WHICH FEEDS THE EQUIPMENT.
- 17. PROVIDE A SEPARATE GREEN, INSULATED, #12AWG EQUIPMENT GROUNDING CONDUCTOR ROUTED WITH THE BRANCH CIRCUIT HOMERUN CONDUCTORS.
- 18. ARMORED CABLE MAY BE USED IN WALLS AND MILLWORK AND MUST BE 'MC' TYPE (WITH GROUND). VERIFY INSTALLATION WITH AHJ PRIOR TO ROUGH-IN.
- 19. CONTRACTOR SHALL CLEAN SITE AT END OF PROJECT. ALL DUST, DEBRIS, OILS, SPRAYS, FINGERPRINTS, AND LABELS SHALL BE REMOVED FROM ALL EXPOSED FINISHED SURFACES. ELECTRICAL AND TELEPHONE ROOM FLOORS ARE TO BE SWEPT, MOPPED, AND REPAINTED AS REQUIRED.
- 20. ALL LAY IN TYPE LIGHT FIXTURES SHALL BE SUPPORTED INDEPENDENTLY OF THE CEILING SYSTEM.
- 21. 20 AMP BRANCH CIRCUIT HOME RUNS EXCEEDING 75 LINEAR FEET FROM THE PANEL BOARD SHALL UTILIZE #10 CONDUCTORS IN 3/4"CONDUIT, MINIMUM.
- 22. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL NECESSARY DISCONNECTS, SWITCHES, AND RECEPTACLES UNDER THE ELECTRICAL BID AND SHALL INCLUDE ALL NECESSARY CIRCUITS AND FINAL CONNECTIONS TO ALL EQUIPMENT PROVIDED BY SUPPLIERS.
- 23. ELECTRICAL EQUIPMENT SHALL BE INSTALLED SUCH THAT REQUIRED NEC SERVICE CLEARANCES ARE MET.
- 24. THE ELECTRICAL CONTRACTOR SHALL COORDINATE AND VERIFY THE ELECTRICAL SERVICE ARRANGEMENTS WITH THE LOCAL POWER COMPANY AND PROVIDE THE NECESSARY EQUIPMENT FOR A COMPLETE INSTALLATION.
- 25. CIRCUIT BREAKERS AND PANEL BOARDS SHALL BE RATED TO WITHSTAND THE MAXIMUM AVAILABLE FAULT CURRENT AT THE SITE AS DETERMINED BY FAULT CURRENT ANALYSIS STUDY AND COORDINATION WITH THE LOCAL UTILITY COMPANY.
- 26. ALL BUILDING SYSTEM GROUND RODS SHALL BE BONDED TOGETHER TO FORM A SINGLE GROUNDING SYSTEM PER NEC 250.
- 27. MC CABLE OR FLEX CONDUIT IS PERMITTED FOR FINAL CONNECTIONS TO EQUIPMENT AND IS LIMITED TO MAXIMUM LENGTH OF 72". REFER TO NOTE #19 ABOVE.
- 28. SEE ARCHITECTURAL DETAILS AND ELEVATIONS FOR DEVICES TO BE MOUNTED HORIZONTALLY.
- 29. REFERENCE ARCHITECTURAL PLANS FOR COLOR/FINISH OF ALL FIXTURES, DEVICES, ETC.

City Lake Park - Mesoulta, TX         SECTION 1 OF 1         MIN. CONDUIT SUE: 34           Serves         N         POLES         N         POLES         N         SERVES         N         M         N         M         N         SERVES         N         SERVES         N         SERVES         N         SERVES         N         N         SERVES         N         N         SERVES         N         N         N         N         N         N         N         SERVES         N         N         N         N         N         N         SERVES		PANELBOARD SO	CI	HED	ULE			Α					SOUR	CE:	UTILITY TRANSFORMER	
B         SERVES         N         POLES         VA         WRE - CONDUIT         VA         POLES         N         SERVES         N         M <t< th=""><th></th><th>City Lake Park - Mesquite, TX</th><th></th><th></th><th></th><th></th><th></th><th>SEC</th><th>TION 1</th><th>OF <sup>2</sup></th><th></th><th>MIN. CO</th><th>NDUIT SI</th><th>ZE:</th><th>3/4</th><th></th></t<>		City Lake Park - Mesquite, TX						SEC	TION 1	OF <sup>2</sup>		MIN. CO	NDUIT SI	ZE:	3/4	
O         I         JAMPS         6000         366 ± 103 - 1°C.         1         A         2         7000         380         Find A         2           M         WATERSUDE PUMP         360         6000         366 ± 103 - 1°C.         3         B         4         363 ± #86 - 1 1/2°C.         7000         380         EXISTING TO REMAIN         M           M         ACTUVITY FILTER PUMP         360         6000         366 ± 103 - 1°C.         7         A         8         1         100000         370         TRANSFORMER         R           M         ACTUVITY FILTER PUMP         360         6000         366 ± 103 - 1°C.         1         A         14         C         12         100000         370         TRANSFORMER         R           M         SPLASHPAD FEATURE         3300         3300         3300         310 ± 100 - 34°C.         216         16         16         16         16         16         16         16         16         16         16         16         175         A         1         A         22000         330         SPLASHPAD FILTER         M         M         175         A         16         20         2120 ± 100 - 34°C         2000         175	CODE	SERVES		POLES	VA	WRE - CONDU	ЛТ	CK #	¢	CK #	WRE - CONDUIT	VA	POLES	N	SERVES	CODE
WATERSUBE PUMP         3/60         BODD         3/60         Control         1 <th1< th=""> <th1<< th=""><th>N N</th><th></th><th><u>'</u></th><th>/AIVIF 3</th><th>6000</th><th></th><th></th><th># 1</th><th>Δ</th><th>2</th><th></th><th>7000</th><th>/AIVIF 3</th><th><u> </u></th><th></th><th><b>N</b></th></th1<<></th1<>	N N		<u>'</u>	/AIVIF 3	6000			# 1	Δ	2		7000	/AIVIF 3	<u> </u>		<b>N</b>
M         DOUBLE FORM         DOUBLE FORM         D         ADVECTION         A		WATERSLIDE PLIMP		3/60	6000	3#6+ #10G _ 1"C		3	R	1	3#3+ #86 - 1 1/2"0	7000	3/80		EXISTING TO REMAIN	M
M         CO         CO         C         A         B         D         CO	M			0/00	6000	0#0+ #100 - 1 0		5	C	6		7000	0,00			M
M         OTIVITY FILTER PUMP         3/60         6000         3/6+ #10G - 1'C.         9         B         10         3/4+ #8G - 1 funct.         10000         3/70         TRANSFORMER         R           M         SPLASHPAD FEATURE         3/30         3/30         3/10 # 10G - 3/4*C.         115         B         16         3/4*10 # 10G - 3/4*C.         2200         3/30         SPLASHPAD FEATURE         3/30         3/30         3/10 # 10G - 3/4*C.         116         B         16         3/4*10 # 10G - 3/4*C.         2200         3/30         SPLASHPAD FEATURE         M         M           M         4600         3/10 # 10G - 3/4*C.         21         B         2         9/60         2/15         A/10.2         M         M           M         110 A         20         2/2 # 7/2 # 7/20 - 3/4*C.         28/8         2/16         10/20         EXISTING 10 REMAIN         M           M         NEW BREAKER         2/16         6/00         2/12 # 1/20 - 3/4*C.         28         2/12 # 1/20 - 3/4*C.         1500         1/20         EXISTING 10 REMAIN         M           M         NEW BREAKER         2/160         2/10 # 1/00 - 3/4*C.         38         B         2/12 # 1/20 - 3/4*C.         1500         1/20         EXISTING 1	M		+		6000			7	A	8		10000				Б
M         M	M	ACTIVITY FILTER PUMP		3/60	6000	3#6+ #10G - 1"C		9	B	10	3#4+ #8G - 1 1/4"C	10000	3/70		TRANSFORMER	Б
M         SPLASHPAD FEATURE         3300         3300         340 + #10G - 34°C.         13         A         44         2200         3/300         SPLASHPAD FLER         M           M         SPLASHPAD FEATURE         3/30         3300         3300         10 + #10G - 34°C.         2200         3/300         SPLASHPAD FLER         M           M         FINESS FILTER PUMP         3/36         4600         19         A         20         2200         3/300         SPLASHPAD FLER         M           M         FINESS FILTER PUMP         3/36         4600         19         A         20         212 b 2         3/30         2800         AHU-2         M         M           M         4400         2/15         600         2#12 + #120 - 34°C.         2800         2800         CU2         CU2         M         M           M HW BREAKER         2/30         2/30         2/312 + #120 - 34°C.         280         1500         1/20         EXSTING TO REMAIN         M	M				6000			11	- C	12		10000				Ē
SPLASHPAD FEATURE         3/30         3/30         3/30         3/30         SPLASHPAD FEATURE         3/30         SPLASHPAD FLER         M           M         M         Adeou         11         C         18         B         16         3/10         SPLASHPAD FLER         M           M         FINESS FILTER PUMP         3/30         4600         3/30         3/30         SPLASHPAD FLER         M         M           M         M         4600         3/30         3/30         2/12         B         2/20         3/30         SPLASHPAD FLER         M           M         M         M         4600         2/15         6/00         2/12         B         2/12         B         2/12         A/4C         2/80         2/41         NEW BREAKER         M         M         NEW BREAKER         M         C/1-2         EXSTING TO REMAIN         M         M         C/1-2         EXSTING TO REMAIN         M         M         EXSTING TO REMAIN         M         Z/20         2/2/2         3/30         Z/20         EXSTING TO REMAIN         M         Z/20         EXSTING TO REMAIN         M         Z/20         EXSTING TO REMAIN         M         Z/20         Z/2/20         Z/20         EXSTING TO REM	M		╉		3300			13	A	14		2200				м
M         17         C         8         2200         M         M           M         FITNESS FILTER PUMP         3/35         4600         396 # ft0G - 3/4°C.         26         2/15         AHU-2         M         M         NEW BREAKER         M         M         M         19         A         20         2/16 to 3/4°C.         2680         NEW BREAKER         M         M         NEW BREAKER         M         M         M         1/20         2/16 to 3/4°C.         2/26 to 3/4°C.         2/26 to 3/4°C.         1/500         1/20         EXSTING TO REMAIN         M           M NEW BREAKER         2/160         2/10 * #10G - 3/4°C.         2/26 to 3/24°L * #12G - 3/4°C.         1/500         1/20         EXSTING TO REMAIN         M           M NEW BREAKER         2/160         2/10 * #10G - 3/4°C.         3/3         B         3/24°L * #12G - 3/4°C.         1/500         1/20         EXSTING TO REMAIN         M           M EXISTING TO REMAIN         1/20         1/500         2/12 * #12G - 3/4°C.         1/500         1/20         EXSTING TO REMAIN         M           M EXISTING TO REMAIN         1/20         1/500         2/10 * #10G - 3/4°C.         3/2         2/21 * #12G - 3/4°C.         1/500         1/20         EXSTING TO REMAIN	м	SPLASHPAD FEATURE		3/30	3300	3#10+ #10G - 3/4	"С.	15	В	16	3#10+ #10G - 3/4"C.	2200	3/30		SPLASHPAD FILTER	М
M         4600         19         A         20         2#12+#12G-34*C.         960         2/15         AHU2         M           M         FITNESS FILTER PUMP         3/35         4600         2#0+#10G-34*C.         18         221         B         221         B         221         B         221         B         221         B         221         B         221         C         221         B         221         C         1500         11/20         EXSITING TO REMAIN         M         M         221         221         221         221         221         221         221         221         221         221         221         221         221         221         221         221         221         221         212         212         212	M				3300			17	C	18		2200				М
M         FINESS FILTER PUMP         3/35         4600         3/40         2/1         B         22         960         NEW BREAKER         M           M         AHU-1         2/15         600         2/12 + 1/2G - 3/4°C.         2/8         2/80         2/40         NEW BREAKER         M         CU-2         M         M           M         VEW BREAKER         600         2/12 + 1/2G - 3/4°C.         2/8         2/800         1/500         1/20         EXISTING TO REMAIN         M           M         VEW BREAKER         2/160         2/8 100 + #1/0G - 3/4°C.         2/8         0         2/8/2 + #1/2G - 3/4°C.         1/500         1/20         EXISTING TO REMAIN         M           M         VEW BREAKER         2/10 + #1/0G - 3/4°C.         3/8         4         2/8/12 + #1/2G - 3/4°C.         1/500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/500         2/12 + #1/2G - 3/4°C.         1/500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/30         1/30         2/10 + #1/30 - 3/4°C.         3/8         4/8/2 #1/2 + 3/4/2 G - 3/4°C.         500         1/20         EXISTING TO REMAIN         M	M		┥		4600			19	A	20	2#12+ #12G - 3/4"C.	960	2/15		AHU-2	м
M         AHU-1         21         C         24         24%-#10G-34*C.         2880         2/40         CU-2         NEW BREAKER         M           M         NEW BREAKER         2160         2#12# #12G-34*C.         25         A         25         2880         2/40         CU-2         NEW BREAKER         M           M         CU-1         2/15         600         2#12# #12G-34*C.         1500         1/20         EXISTING TO REMAIN         M           M         CU-1         2/160         2#10# #12G-34*C.         28         2/20         1500         1/20         EXISTING TO REMAIN         M           M         EVISTING TO REMAIN         1/20         1500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1500         2#12# #12G-34*C.         30         2#12# #12G-34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1500         2#12# #12G-34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/30         2000         2#12# #12G-34*C.         500         1/20         EXISTING TO REMAIN         M	м	FITNESS FILTER PUMP		3/35	4600	3#8+ #10G - 3/4"	C.	21	В	22		960			NEW BREAKER	М
M HU-1         2/15         600         2#12+ #12G - 34*C.         25         A         26         2880         NEW BREAKER         NEW BREAKER         NEW BREAKER         M           Q CU-1         2/30         2/160         2#10+ #10G - 34*C.         29         C         30         2#12+ #12G - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M NEW BREAKER         2/30         2/160         3/1         A         29         2/2 #12/3 - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M NEW BREAKER         2/160         2#12+ #12G - 34*C.         30         2#12+ #12G - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M EXISTING TO REMAIN         1/20         1/500         2#10+ #100 - 34*C.         30         2#12+ #12G - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M EXISTING TO REMAIN         1/30         1/300         2#10+ #100 - 34*C.         31         B         2#12+ #12G - 34*C.         500         1/20         EXISTING TO REMAIN         M           M EXISTING TO REMAIN         1/30         1/30         2#10+ #100 - 34*C.         31         B         2#12+ #12G - 34*C.         500         1/20         EXI	M				4600			23	С	24	2#8+ #10G - 3/4"C.	2880	2/40		CU-2	м
M         EW         GO         ZZ         B         28         2#12+ #120 - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M         CU-1         2/30         2/160         2#10+ #103 - 34*C.         29         C         0         2/12+ #120 - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M         EV         2/160         2#10 + #103 - 34*C.         33         B         34         2/2+ #120 - 34*C.         1500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1500         2#12+ #120 - 34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/30         1500         2#10+ #100 - 34*C.         38         A         38         2#12+ #120 - 34*C.         500         1/20         EXISTING TO REMAIN         M         M         M         EXISTING TO REMAIN         M         M         M         2#12+ #120 - 34*C.         500         1/20         EXISTING TO REMAIN         M         M         EXISTING TO REMAIN         M         M         M         EXISTING TO REMAIN         M         M         EXISTING TO REMAIN         M         M         E	м	AHU-1	+	2/15	600	2#12+ #12G - 3/4	<b>!</b> "С.	25	A	26		2880			NEW BREAKER	М
M         CU-1         2/30         2/160         2×10 + #10G - 3×4°C.         2×10 - ±         2×10 - ±         1/20         EXISTING TO REMAIN         M           M         NEW BREAKER         2160         2×10 + ±         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         1/20         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1/20         1/20         1/20         1/20         1/20         1/20         1/20 </th <th>M</th> <th>NEW BREAKER</th> <th></th> <th></th> <th>600</th> <th></th> <th></th> <th>27</th> <th>В</th> <th>28</th> <th>2#12+ #12G - 3/4"C.</th> <th>1500</th> <th>1/20</th> <th></th> <th>EXISTING TO REMAIN</th> <th>M</th>	M	NEW BREAKER			600			27	В	28	2#12+ #12G - 3/4"C.	1500	1/20		EXISTING TO REMAIN	M
M         EVE         2160         31         A         32         2#12+#12G-34*C.         1500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         35         G         34         2#12+#12G-34*C.         1500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         35         G         34         2#12+#12G-34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         410         C         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         410         C         4800         2/50         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         150         2#12+#12G-34*C.         410         C         440         2#12+#12G-34*C.         200         1/20         SPARE <th>м</th> <th>CU-1</th> <th>┓</th> <th>2/30</th> <th>2160</th> <th>2#10+ #10G - 3/4</th> <th><b>!</b>"С.</th> <th>29</th> <th>С</th> <th>30</th> <th>2#12+ #12G - 3/4"C.</th> <th>1500</th> <th>1/20</th> <th></th> <th>EXISTING TO REMAIN</th> <th>м</th>	м	CU-1	┓	2/30	2160	2#10+ #10G - 3/4	<b>!</b> "С.	29	С	30	2#12+ #12G - 3/4"C.	1500	1/20		EXISTING TO REMAIN	м
M         EXISTING TO REMAIN         1/20         1500         2#12+#12G-34*C.         35         B         34         2#12+#12G-34*C.         1500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/30         1500         2#12+#12G-34*C.         30         B         40         2#12+#12G-34*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/30         1500         2#12+#12G-34*C.         30         B         40         2#12+#12G-34*C.         4800         2/50         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         200         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         1500         2#12+#12G-34*C.         200         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         11/20         SPARE         1/20         SPARE         1/20         SPARE         SPARE         SPACE         1/20	М	NEW BREAKER		ľ	2160			31	A	32	2#12+ #12G - 3/4"C.	1500	1/20		EXISTING TO REMAIN	м
M         EXISTING TO REMAIN         1/20         1500         2#12+#126 - 3/4*C.         35         C         36         2#12+#12G - 3/4*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/30         1500         2#10+#10G - 3/4*C.         37         A         38         2#12+#12G - 3/4*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/30         2000         2#10+#10G - 3/4*C.         39         B         40         2#6+#10G - 1*C.         4800         2/50         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1500         2#12+#12G - 3/4*C.         41         C         42         2#12+#12G - 3/4*C.         200         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         11/20         SPARE         1/20         SPARE         5         5         1/20         SPARE         5         5         5         5         5         2         1/20         SPARE         5         5         5         6         1/20         SPARE         5         5         5         5         6         1/20	М	EXISTING TO REMAIN		1/20	1500	2#12+ #12G - 3/4	<b>!</b> "С.	33	В	34	2#12+ #12G - 3/4"C.	1500	1/20		EXISTING TO REMAIN	м
M         EXISTING TO REMAIN         1/30         1500         2# 10+ # 10G - 3/#*C.         37         A         38         2# 12+ # 12G - 3/4*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/30         2000         2# 10+ # 10G - 3/4*C.         37         A         38         2# 12+ # 12G - 3/4*C.         500         1/20         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1500         2# 10+ # 10G - 3/4*C.         41         C         42         4800         2/50         EXISTING TO REMAIN         M           SPACE         43         A         44         2# 12+ # 12G - 3/4*C.         200         1/20         SPARE         C         SPARE         C         SPARE         SSPARE         SSPARE	М	EXISTING TO REMAIN		1/20	1500	2#12+ #12G - 3/4	<b>!</b> "С.	35	С	36	2#12+ #12G - 3/4"C.	500	1/20		EXISTING TO REMAIN	М
M         EXISTING TO REMAIN         1/30         2000         2#10+ #10G - 34*C.         39         B         40         2#6+ #10G - 1*C.         4800         2/50         EXISTING TO REMAIN         M           M         EXISTING TO REMAIN         1/20         1500         2#12+ #12G - 34*C.         41         C         42         4800         2/50         EXISTING TO REMAIN         M           SPACE         43         A         44         2#12+ #12G - 3/4*C.         200         1/20         1         FLOW METER READOUT         C           SPACE         45         B         46         1/20         SPARE	М	EXISTING TO REMAIN		1/30	1500	2#10+ #10G - 3/4	<b>!</b> "С.	37	A	38	2#12+ #12G - 3/4"C.	500	1/20		EXISTING TO REMAIN	М
M         EXISTING TO REMAIN         1/20         1500         2#12+ #12G - 3/4*C.         41         C         42         42         4800         M         M         Kan be and the analysis of the analy	М	EXISTING TO REMAIN		1/30	2000	2#10+ #10G - 3/4	<b>!</b> "С.	39	В	40	2#6+ #10G - 1"C.	4800	2/50		EXISTING TO REMAIN	М
SPACE         43         A         44         2#12+ #12G - 34°C.         200         1/20         1         FLOW METER READOUT         C           SPACE         -         -         45         B         46         -         1/20         SPARE         -           SPACE         -         -         47         C         48         -         1/20         SPARE         -           SPACE         -         -         47         C         48         -         1/20         SPARE         -           SPACE         -         -         -         51         B         52         -         1/20         SPARE         -           SPACE         -         -         53         C         54         -         1/20         SPARE         -           SPACE         -         -         -         53         C         54         -         1/20         SPARE         -         -         -         -         1/20         SPARE         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	М	EXISTING TO REMAIN		1/20	1500	2#12+ #12G - 3/4	<b>!</b> "С.	41	С	42		4800				М
SPACE         45         B         46         1/20         SPARE           SPACE         47         C         48         1/20         SPARE           SPACE         49         A         50         1/20         SPARE           SPACE         49         A         50         1/20         SPARE           SPACE         51         B         52         1/20         SPARE           SPACE         53         C         54         1/20         SPARE           SPACE         53         C         54         1/20         SPARE           SPACE         53         C         54         1/20         SPARE           SPACE         1/20         SPARE		SPACE						43	А	44	2#12+ #12G - 3/4"C.	200	1/20	1	FLOW METER READOUT	С
SPACE         47         C         48         1/20         SPARE           SPACE         49         A         50         1/20         SPARE         SPARE           SPACE         51         B         52         1/20         SPARE         SPARE           SPACE         53         C         54         1/20         SPARE         SPARE           SPACE         10         53         C         54         1/20         SPARE         SPARE           CONTINUOUS (2152):         0.2         125.1         NOTORS (430):         10+50% x20.0         20.0         MIC.B.         BUS RATED AMPS:         400         AMPS           MAIN TYPE:         CONDITIONING (440):         0.0         100%         0.0         AIN CONDITIONING (440):         AIN CONDITIONING (440):         AIN CONDITIO		SPACE						45	В	46			1/20		SPARE	
SPACE         49         A         50         1/20         SPARE           SPACE         51         B         52         1/20         SPARE         53           SPACE         53         C         54         1/20         SPARE         53           SPACE         CONN. LOAD         DEMAND LOAD         MOUNTED:         SURFACE         1         GC I BREAKER         2         VIA CONTACTOR/TIME CLOCK           CONTINUOUS (215.2):         0.2         125%         0.3         100%         0.0         AIR CONDITIONING (440):         0.0         AIR CONDITIONING (440):         0.0         AIR CONDITIONING (440		SPACE						47	С	48			1/20		SPARE	
SPACE         51         B         52         1/20         SPARE           SPACE         53         C         54         1/20         SPARE           SPACE         CONN. LOAD         DEMAND         DEMAND LOAD         KVA         AMPS         KVA		SPACE						49	A	50			1/20		SPARE	
SPACE         53         C         54         1/20         SPARE           SUMMARY         CONN. LOAD         DEMAND         DEMAND LOAD         KVA         AMPS         KCPED NOTES (NT):         1. GFCI BREAKER         2. VIA CONTACTOR/TIME CLOCK           SUMMARY         CONTINUOUS (215.2):         0.2         125%         0.3         10+50% x20.0         20.0         PHASE/WIRE:         3/4         2. VIA CONTACTOR/TIME CLOCK           R         RECEPTACLE (TABLE 220.44):         30.0         10+50% x20.0         20.0         100%         125.1         BUS RATED AMPS:         400 AMPS         AMPS           K KITCHEN EQUIP. (TABLE 220.56):         0.0         100%         0.0         MAIN TYPE:         M.C.B.         BUS TYPE:         COPPER         ALL CIRCUITS SHALL BE CLEARLY           A AIR CONDITIONING (440):         0.0         100%         0.0         VA         VA         ABELED AND DENTIFIED ON ELECTRIC         PANEL DIRECTORY. PANEL DIRECTORY. PANEL DIRECTORY.           NON-CONTINUOUS (215.2):         0.0         100%         0.0         VA         VA         PANEL DIRECTORY. PANEL DIRECTORY. PANEL DIRECTORY. PANEL DIRECTORY. PANEL DIRECTORY.           NON-CONTINUOUS (215.2):         0.0         100%         0.0         VA         CONN. PHASE A: 49400         5%         CONN.		SPACE						51	В	52			1/20		SPARE	
Build NameCONN. LOADDEMANDDEMAND LOADMOUNTED:SURFACE1.GFCI BREAKERCONTINUOUS (215.2):0.2125%0.3VOLTS:120/2402.VIA CONTACTOR/TIME CLOCKR RECEPTACLE (TABLE 220.44):30.010+50% x20.020.0HAIN TYPE:3/4NOTES:NOTES:K KITCHEN EQUIP. (TABLE 220.56):0.0100%0.0AIR CONDITIONING (440):0.0AIR CONDITIONING (440):0.0AIR CONDITIONING (440):AUDAUL CIRCUITS SHALL BE CLEARLYH HEAT (ELECTRIC) (220.60):0.00.00.0VACONN. PHASE A:494005%CONN. PHASE B:519600%0TOTAL LOAD155.3374145.4350CONN. PHASE C:539404%4%		SPACE						53	С	54			1/20		SPARE	
SUMMARYCONN. LOADDEMANDDEMAND LOAD0KVAAMPSFACTORKVAAMPSC CONTINUOUS (215.2):0.2125%0.3R RECEPTACLE (TABLE 220.44):30.010+50% x20.020.0M MOTORS (430):125.1100%125.1K KITCHEN EQUIP. (TABLE 220.56):0.0100%0.0A AIR CONDITIONING (440):0.0100%0.0HEAT (ELECTRIC) (220.60):0.00.00%HEAT (ELECTRIC) (220.60):0.00.00%0 TOTAL LOAD155.3374145.4350														VE.		
B COMMART	Ш		-	CONN			DEMAND					SURFACI	F		GECLBREAKER	
C       C (N)       N)       <	S		┢	KVA	AMPS	FACTOR	KVA	OND	AMPS		VOLTS:	120/240		2		
Contraction       Contreaction       Contraction       Contraction	C	CONTINUOUS (215.2)	+	0.2	71111 0	125%	0.3		/ 0		PHASE/WIRE	3/4		<u> </u>		
M         MOTORS (430):         125.1           M         MOTORS (430):         125.1           K         KITCHEN EQUIP. (TABLE 220.56):         0.0           A         AIR CONDITIONING (440):         0.0           A         AIR CONDITIONING (440):         0.0           HEAT (ELECTRIC) (220.60):         0.0           NON-CONTINUOUS (215.2):         0.0           0         100%         0.0           CONN. PHASE A:         49400         5%           CONN. PHASE B:         51960         0%           CONN. PHASE C:         53940         -4%	R	RECEPTACLE (TABLE 220 44):	+	30.0		10+50% x 20.0	20.0				BUS RATED AMPS::	400	AMPS	ΝО	DTES:	
Image: Construction of the constructined of the construction of the construction of the construction of	M	MOTORS (430):	+	125.1		100%	125.1				MAIN TYPE:	M.C.B.				
A         AIR CONDITIONING (440):         0.0         100%         0.0           H         HEAT (ELECTRIC) (220.60):         0.0         0%         0.0         VA         LABELED AND IDENTIFIED ON ELECTRIC           NON-CONTINUOUS (215.2):         0.0         0%         0.0         VA         PANEL DIRECTORY.           0         TOTAL LOAD         155.3         374         145.4         350         CONN. PHASE A:         53940         -4%	K	KITCHEN EQUIP. (TABLE 220.56):	+	0.0		100%	0.0				BUS TYPE:	COPPER				
H         HEAT (ELECTRIC) (220.60):         0.0         0%         0.0         VA         PANEL DIRECTORY.         PANEL DIRECTORY         <	A	AIR CONDITIONING (440):	+	0.0		100%	0.0				FULLY RATED:	22	KAIC			
NON-CONTINUOUS (215.2):         0.0         100%         0.0         CONN. PHASE A:         49400         5%         PANEL DIRECTORY. PANEL DIRECTORY           0         TOTAL LOAD         155.3         374         145.4         350         CONN. PHASE A:         49400         5%         SHALL BE TYPED, NOT HAND WRITTEN.	H	HEAT (ELECTRIC) (220.60):	+	0.0		0%	0.0					VA	-		SELED AND IDENTIFIED ON ELECTRIC	
CONN. PHASE B:         51960         0%         SHALL BE TYPED, NOT HAND WRITTEN.           0         TOTAL LOAD         155.3         374         145.4         350         CONN. PHASE B:         51960         0%		NON-CONTINUOUS (215.2):	+	0.0		100%	0.0				CONN. PHASE A:	49400	5%		NEL DIRECTORY. PANEL DIRECTORY	
0 TOTAL LOAD 155.3 374 145.4 350 CONN. PHASE C: 53940 -4%											CONN. PHASE B:	51960	0%	SH/	ALL BE LYPED, NOT HAND WRITTEN.	
	0	TOTAL LOAD	T	155.3	374		145.4		350		CONN. PHASE C:	53940	-4%			

	PANELBOARD S	SC	HED	ULE			Α					SOUR	CE:	UTILITY TRANSFORMER	
	City Lake Park - Mesquite, TX						SEC	TION 1	OF <sup>2</sup>	I	MIN. CO	NDUIT SI	ZE:	3/4	
ODE	SERVES	N	POLES	VA	WRE - CONDU	JIT	CK	¢	CK	WRE - CONDUIT	VA	POLES	N	SERVES	ODE
			/AMPS	0000			#	•	#		7000	/AMPS			0
M			2/00	6000	0110 11400 4110		1	A	2		7000	2/00			M
M	WATERSLIDE PUMP		3/60	6000	3#6+ #10G - 1°C	<i>.</i>	3	В	4	3#3+#8G - 1 1/2°C.	7000	3/80			M
м				6000			5	0	6		7000				M
м			2/22	6000	0110 11400 410		1	A	8		10000	0.170		TRANSFORMER	R
M	ACTIVITY FILTER PUMP		3/60	6000	3#6+ #10G - 1"C	<i>.</i>	9	В	10	3#4+#8G-11/4"C.	10000	3/70		IRANSFORMER	R
M				6000			11	C A	12		10000				R
M			2/20	3300	01140 11400 01	410	13	A	14		2200	2/20			М
м	SPLASHPAD FEATURE		3/30	3300	3#10+ #10G - 3/4	4°C.	15	B	16	3#10+ #10G - 3/4°C.	2200	3/30		SPLASHPAD FILIER	M
М				3300			1/	C	18	0// 40 // 400 0/ 410	2200	0/45			М
м			2/25	4600	0.110 11.400 01.41		19	A	20	2#12+#12G-3/4°C.	960	2/15			M
M	FIINESS FILIER PUMP		3/35	4600	3#8+ #10G - 3/4	"C.	21	В	22	0//0 // 400 0/ 4//0	960	0/40			M
M			0/45	4600	0 40 400 04	410	23	C	24	2#8+ #10G - 3/4"C.	2880	2/40			M
м			2/15	600	2#12+ #12G - 3/4	4"C.	25	A	26	0// 40 // 400 0/ 410	2880	1/00			М
M			0/0.0	600	0 1 1 0 1 1 0 0 0 1		27	В	28	2#12+ #12G - 3/4"C.	1500	1/20			М
М			2/30	2160	2#10+ #10G - 3/4	4"C.	29	C	30	2#12+ #12G - 3/4"C.	1500	1/20			M
M			4 / 2 . 2	2160			31	A	32	2#12+ #12G - 3/4"C.	1500	1/20			M
M			1/20	1500	2#12+ #12G - 3/4	4"C.	33	В	34	2#12+ #12G - 3/4"C.	1500	1/20			M
M			1/20	1500	2#12+ #12G - 3/4	4"C.	35	C	36	2#12+ #12G - 3/4"C.	500	1/20			M
М			1/30	1500	2#10+ #10G - 3/4	4"C.	37	A	38	2#12+ #12G - 3/4"C.	500	1/20			М
М			1/30	2000	2#10+ #10G - 3/4	4"C.	39	В	40	2#6+ #10G - 1"C.	4800	2/50		EXISTING TO REMAIN	М
м			1/20	1500	2#12+ #12G - 3/4	4"C.	41	C	42	a	4800	4 /0.0			M
	SPACE						43	A	44	2#12+ #12G - 3/4"C.	200	1/20	1		C
	SPACE						45	В	46			1/20		SPARE	
	SPACE						4/	С	48			1/20		SPARE	
	SPACE						49	A	50			1/20		SPARE	
	SPACE						51	В	52			1/20		SPARE	
	SPACE						53	C	54			1/20		SPARE	
									I				KE I⊿		
0	SUMMARY		CONN.				UAD			MOUNTED.	50 RFACE		1.		
<u>~</u>			KVA 0.0	AIMP5	FACTOR	NVA 0.2		AIVIP5			120/240		Z.	VIA CONTACTOR/TIME CLOCK	
	CONTINUOUS (215.2).		0.2		120%	0.3				PHASE/WIRE.	3/4			μ μ ε ·	
R	RECEPTACLE (TABLE 220.44).		30.0		10+50% X 20.0	20.0				BUS KATED AMPS	400	AIMP5		IES.	
			125.1		100%	120.1							-		
ĸ	KITCHEN EQUIP. (TABLE 220.56):		0.0		100%	0.0					COPPER	KAIO	ALL	CIRCUITS SHALL BE CLEARLY	
A			0.0		100%	0.0				FULLY KAIED	22	NAIG	LAE	BELED AND IDENTIFIED ON ELECTRIC	
Н			0.0		0%	0.0					VA	E0/	PAN	NEL DIRECTORY. PANEL DIRECTORY	
	INUN-CUN IINUUUS (215.2):		0.0		100%	0.0				CONN. PHASE A	49400	5%	SH/	ALL BE TYPED, NOT HAND WRITTEN.	
0			455.0	074		A AE 4		050			51960	U%			
U	TO TAL LUAD		155.3	3/4		145.4		350		GUNN. PHASE C	53940	-4%			

![](_page_6_Figure_32.jpeg)

![](_page_6_Figure_33.jpeg)

![](_page_6_Figure_34.jpeg)

Scale: NONE

![](_page_6_Figure_36.jpeg)

- NEW 10HP PUMP FOR FITNESS FILTER TO REPLACE EXISTING. NEW EVENFLOW #EF-C-31-12-2 WALL MOUNTED 42"AFF VARIABLE
- FREQUENCY DRIVE FOR FITNESS FILTER PUMP.
- 3. NEW 15HP PUMP FOR WATERSLIDE TO REPLACE EXISTING.
- NEW EVENFLOW #EF-C-46-12-2 WALL MOUNTED 42"AFF VARIABLE FREQUENCY DRIVE FOR WATERSLIDE PUMP.
- 5. NEW 15HP PUMP FOR ACTIVITY FILTER TO REPLACE EXISTING.
- 6. NEW EVENFLOW #EV-C-46-12-2 WALL MOUNTED 42"AFF VARIABLE FREQUENCY DRIVE FOR ACTIVITY FILTER PUMP.
- 7. NEW 5HP PUMP FOR SPLASHPAD FILTER TO REPLACE EXISTING.
- 8. NEW EVENFLOW #EF-C-18-12-2 WALL MOUNTED 42"AFF VARIABLE FREQUENCY DRIVE FOR SPLASHPAD FILTER PUMP.
- 9. NEW 7.5HP PUMP FOR SPLASHPAD FEATURE TO REPLACE EXISTING.
- 10. NEW EVENFLOW #EF-C-26-12-2 WALL MOUNTED 42"AFF VARIABLE FREQUENCY DRIVE FOR SPLASHPAD FILTER PUMP.
- 11. A-19/21/23 NEW 3P-35A BRANCH CIRCUIT. ALL FINAL CONNECTIONS TO BE MADE BY CONTRACTOR PER MANUFACTURERS REQUIREMENTS. VERIFY EXISTING CONDITIONS IN FIELD. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICT OR DISCREPANCY FOR RESOLUTION.
- 12. A-1/3/5 NEW 3P-60A BRANCH CIRCUIT. ALL FINAL CONNECTIONS TO BE MADE BY CONTRACTOR PER MANUFACTURERS REQUIREMENTS. VERIFY EXISTING CONDITIONS IN FIELD. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICT OR DISCREPANCY FOR RESOLUTION.
- 13. A-7/9/11 NEW 3P-60A BRANCH CIRCUIT. ALL FINAL CONNECTIONS TO BE MADE BY CONTRACTOR PER MANUFACTURERS REQUIREMENTS. VERIFY EXISTING CONDITIONS IN FIELD. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICT OR DISCREPANCY FOR RESOLUTION.
- 14. A-22/24/26 3P-25A BRANCH CIRCUIT. ALL FINAL CONNECTIONS TO BE MADE BY CONTRACTOR PER MANUFACTURERS REQUIREMENTS. VERIFY EXISTING CONDITIONS IN FIELD. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICT OR DISCREPANCY FOR RESOLUTION.
- 15. A-13/15/17 3P-30A BRANCH CIRCUIT. ALL FINAL CONNECTIONS TO BE MADE BY CONTRACTOR PER MANUFACTURERS REQUIREMENTS. VERIFY EXISTING CONDITIONS IN FIELD. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICT OR DISCREPANCY FOR RESOLUTION.
- 16. EXISTING BRANCH CIRCUIT SERVING EQUIPMENT BEING REPLACED SHALL BE REUSED. VERIFY EXISTING CONDITIONS IN FIELD. NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICT OR DISCREPANCY FOR RESOLUTION.

![](_page_6_Figure_53.jpeg)

- IN SAME LOCATION. PROVIDE WITH NEW CLASS 'J' 800AMP FUSES. REMOVED EXISTING SWITCH TO BE RETURNED TO OWNER OR PLACED IN OWNER APPROVED STORAGE.
- B. EXISTING 200AMP OFFICE PANEL 'B' CIRCUIT BREAKER AND ENCLOSURE TO REMAIN.
- C. EXISTING SERVICE ENTRANCE WIREWAY TO REMAIN.
- D. EXISTING 225A PANEL BOARD TO BE REMOVED AND RETURNED TO OWNER OR PLACED IN OWNER APPROVED STORAGE.
- E. EXISTING TRANSFORMER TO REMAIN. RE-FEED FROM NEW PANEL 'A'. SEE PANEL 'A' SCHEDULE.
- F. EXISTING FEEDER TO 'B' ABOVE TO REMAIN.
- G. EXISTING TIME CLOCK TO REMAIN AND BE RE-FED FROM NEW PANEL 'A'. SEE PANEL 'A' SCHEDULE.
- H. EXISTING LOAD CENTER TO REMAIN AND BE RE-FED FROM NEW PANEL 'A'. SEE PANEL 'A' SCHEDULE.
- NEW SQUARE 'D'/SCHNEIDER SURFACE MOUNTED 400AMP MAIN CIRCUIT BREAKER 120/240V., 30, 4W PANEL BOARD. SEE PANEL SCHEDULE 'A'

![](_page_6_Picture_63.jpeg)

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Release/Revision:

Designed: Drawn: Checked: AE Project No.: Sheet Title:

Sheet No.

ELECTRICAL FLOOR PLAN PUMP ROOM

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Date

### SECTION 16001: ELECTRICAL GENERAL PROVISIONS <u>ART 1– GENERAL</u>

- 01 WORK INCLUDED A. PROVIDE ALL MATERIALS, LABOR AND EQUIPMENT REQUIRED TO FURNISH AND INSTALL A COMPLETE
- ELECTRICAL SYSTEM AS INDICATED ON DRAWINGS AND AS SPECIFIED HEREIN. B. THE ELECTRICAL WORK INCLUDES PROVIDING THE NEW MATERIAL, FIXTURES, DEVICES, FINAL CONNECTIONS AND ACCESSORIES NECESSARY FOR A COMPLETE AND FUNCTIONING SYSTEM. THE WORK ALSO INCLUDES MAKING ALL FINAL CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS. ALL WORK SHALL BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE IN FORCE AND LOCAL CODES OR ORDINANCES AND SUBJECT TO INSPECTION AND APPROVAL FROM AUTHORITY HAVING JURISDICTION.
- C. THE INTENT OF THE DRAWINGS IS TO INDICATE THE GENERAL EXTENT OF WORK REQUIRED FOR THE PROJECT. THE DRAWINGS FOR THE ELECTRICAL WORK ARE DIAGRAMMATIC, SHOWING THE LOCATION, TYPE DEVICES AND EQUIPMENT REQUIRED. THE DRAWINGS SHALL NOT BE SCALED FOR EXACT MEASUREMENTS. PROVIDE ALL FIXTURES, LAMPS, DEVICES, ACCESSORIES, OFFSETS. FINAL CONNECTIONS AND MATERIAL NECESSARY TO FACILITATE THE SYSTEM'S FUNCTIONING AS INDICATED BY THE DESIGN AND PER SPECIFIED AND OWNER SUPPLIED EQUIPMENT
- MANUFACTURERS RECOMMENDATIONS AND REQUIREMENTS. . IT IS THE INTENT THAT THE FOREGOING WORK SHALL BE COMPLETE IN EVERY RESPECT AND THAT ANY MATERIAL OR WORK NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS. BUT NECESSARY TO FULLY COMPLETE THE WORK SHALL BE FURNISHED.
- <u>REGULATORY REQUIREMENTS</u> A. EQUIPMENT FURNISHED SHALL BE UL LISTED WHERE SUCH LABEL IS AVAILABLE. INSTALLATION SHALL CONFORM TO UL STANDARDS WHERE APPLICABLE.
- B. ELECTRICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS, LATEST EDITION OF NEC AND NEPA CODES. IN FEFECT AT PROJECT LOCATION. STATE AND LOCAL ELECTRICAL AND BUILDING CODES AND SPECIAL CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS WITHIN COMPLETE INSTALLATION.
- C. OBTAIN PERMITS AND CERTIFICATES OF APPROVAL FROM ALL AUTHORITIES HAVING JURISDICTION OVER THE INSTALLATION AND PAY ALL FEES REQUIRED.
- 5 SUBMITTALS A. SUBMIT LIST OF MATERIALS AND EQUIPMENT PRIOR TO MANUFACTURE. ORDER OR INSTALLATION AND WITHIN TWENTY DAYS AFTER AWARD OF CONTRACT FOR APPROVAL. INCLUDE EACH ITEM OF MATERIAL AND EQUIPMENT WHETHER OR NOT SHOP DRAWINGS ARE ALSO REQUIRED. LIST SHALL INCLUDE MANUFACTURER'S NAME, CATALOG NUMBER AND OTHER COMPLETE IDENTIFICATION AS WELL AS DIMENSIONS AND DETAILED DATA. SUBMITTALS SHALL INCLUDE BUT NOT LIMITED TO THE
- FOLLOWING: LIGHTING FIXTURES SWITCHGEAR, PANEL BOARDS & BREAKERS WIRING DEVICES AND DEVICE PLATES
- ENCLOSED SWITCHES
- CONTACTORS & TIMECLOCKS B. CERTIFIED SHOP DRAWINGS AND SUBMITTALS SHALL BEAR STAMP OF APPROVAL OF CONTRACTOR AS EVIDENCE THAT DRAWINGS HAVE BEEN CHECKED. DRAWINGS SUBMITTED WITHOUT THIS STAMP OF APPROVAL WILL NOT BE CONSIDERED AND WILL BE RETURNED FOR PROPER RESUBMISSION.
- . IF SUBMITTALS SHOW VARIANCES OR SUBSTITUTIONS FROM REQUIREMENTS OF CONTRACT, CONTRACTOR SHALL MAKE SPECIFIC MENTION OF SUCH VARIATION IN HIS LETTER OF TRANSMITTAL IN ORDER THAT, IF ACCEPTABLE, SUITABLE ACTION MAY BE TAKEN FOR PROPER ADJUSTMENT. OTHERWISE CONTRACTOR SHALL NOT BE RELIEVED OF RESPONSIBILITY FOR EXECUTING WORK IN ACCORDANCE WITH CONTRACT EVEN THOUGH SUCH SUBMITTALS HAVE BEEN APPROVED.
- ECTION 16050: BASIC MATERIALS AND METHODS
- <u>PART 1 GENERAL</u> 1.01 COORDINATION A. OBTAIN AND REVIEW SHOP DRAWINGS, PRODUCT DATA, AND MANUFACTURER'S INSTRUCTIONS FOR EQUIPMENT FURNISHED UNDER OTHER SECTIONS TO DETERMINE CONNECTION
- LOCATIONS AND REQUIREMENTS. B. SEQUENCE ROUGH-IN OF ELECTRICAL CONNECTIONS TO COORDINATE WITH INSTALLATION AND START-UP OF EQUIPMENT FURNISHED UNDER OTHER SECTIONS.
- PART 2 PRODUCTS
- 01 SUBSTITUTIONS A. WHERE SPECIFICATIONS LIST ONE OR MORE MANUFACTURERS AND DO NOT INCLUDE "OR APPROVED EQUAL". FURNISH MATERIALS MADE BY ONE OF MANUFACTURERS LISTED. WHERE "OR APPROVED EQUAL" IS INCLUDED. CONTRACTOR MAY SUBSTITUTE EQUAL PRODUCTS BY ANOTHER MANUFACTURER SUBJECT TO APPROVAL BY ENGINEER AND OWNER. <u>ART 3 - EXECUTION</u>
- )1 INSTALLATIO A. MAKE ALL ELECTRICAL CONNECTIONS TO ALL EQUIPMENT IN ACCORDANCE WITH RESPECTIVE EQUIPMENT MANUFACTURER'S
- PUBLISHED INSTRUCTIONS. B. PROTECT WORK AND MATERIALS FROM DAMAGE BY WEATHER, ENTRANCE OF WATER AND DIRT. CAP CONDUIT DURING INSTALLATION. AVOID DAMAGE TO MATERIALS AND EQUIPMENT IN
- SATISFACTORILY REPAIR OR REMOVE AND REPLACE DAMAGED WORK WITH NEW MATERIALS. DELIVER EQUIPMENT AND MATERIALS TO JOB SITE IN ORIGINAL, UNOPENED, LABELED CONTAINERS. STORE FERROUS MATERIALS TO PREVENT RUSTING. STORE FINISHED MATERIALS AND EQUIPMENT TO PREVENT STAINING AND DISCOLORING.
- . TRENCHES SHALL BE EXCAVATED 6" BELOW ELEVATION OF BOTTOM OF CONDUIT.
- COORDINATE ALL CONDUIT ROUTING PRIOR TO CONSTRUCTION WITH ALL OTHER TRADES. FAILURE TO ROUTE CONDUIT THROUGH BUILDING WITHOUT INTERFERING WITH OTHER EQUIPMENT AND CONSTRUCTION SHALL NOT CONSTITUTE A REASON FOR AN EXTRA CHARGE. EQUIPMENT, CONDUIT AND FIXTURES SHALL FIT INTO AVAILABLE SPACES IN BUILDING AND SHALL NOT BE INTRODUCED INTO BUILDING AT SUCH TIMES AND MANNER AS TO CAUSE DAMAGE TO STRUCTURE.
- EQUIPMENT REQUIRING SERVICE SHALL BE READILY ACCESSIBLE. <u>TESTING AND EQUIPMENT SERVICING</u> A. MAKE TEST TO ENSURE THAT ENTIRE SYSTEM IS IN PROPER OPERATING CONDITION. AND THAT ADJUSTMENTS TO BREAKERS.
- FUSES, CONTROL EQUIPMENT AND APPARATUS HAVE BEEN MADE. CORRECT DEFECTS DISCOVERED DURING TESTS. <u>3 REMOVAL OF DEBRIS</u> A. REMOVE SURPLUS MATERIALS AND DEBRIS CAUSED BY, OR
- INCIDENTAL TO, ELECTRICAL WORK. REMOVE SUCH DEBRIS AT FREQUENT INTERVALS. KEEP JOB CLEAN DURING CONSTRUCTION. 4 IDENTIFICATION OF EQUIPMENT
- A. IDENTIFY ELECTRICAL DISTRIBUTION EQUIPMENT, DISCONNECTS, AND CONTACTORS WITH BLACK LAMINATED PLASTIC NAME-PLATES, ATTACHED WITH TWO SCREWS, ENGRAVED WITH 1/4 " HIGH, WHITE LETTERS. GUARANTEE-WARRANTY
- A. GUARANTEE WORK TO BE FREE FROM DEFECTS OF MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF BUILDING. REPAIR AND REPLACE DEFECTIVE WORK AND OTHER WORK DAMAGED THEREBY WHICH BECOMES DEFECTIVE DURING TERM OF GUARANTEE-WARRANTY. FURNISH OWNER WITH THREE WRITTEN COPIES OF GUARANTEE/WARRANTY.
  - END OF SECTION

## GENERAL ELECTRICAL SPECIFICATIONS

### SECTION 1611: RACEWAY AND CONDUIT SYSTEMS

- <u> PART 1 PRODUCTS</u> 1.01 ACCEPTABLE MANUFACTURERS A. RIGID IMC, AND EMT CONDUIT SHALL BE HOT-DIPPED,
- GALVANIZED, OR ELECTROGALVANIZED STEEL BY ALLIED, REPUBLIC, TRIANGLE, WHEATLAND, OR APPROVED EQUAL.
- B. PVC CONDUIT SHALL BE CARLON, SCHEDULE 40, 90 DEGREES 'C' RATED, UNLESS OTHERWISE NOTED.
- C. ASSOCIATED COUPLINGS, CONNECTORS AND FITTINGS SHALL BE STEEL AS MANUFACTURED BY RACO OR
- APPROVED EQUIVALENT. CATALOG NUMBERS USED BELOW ARE THOSE OF RACO. D. ERICKSON COUPLINGS, SERIES 1502, SHALL BE USED
- WHERE NEITHER LENGTH OF CONDUIT CAN BE ROTATED. E. INSULATED BUSHINGS SHALL BE SERIES 1402.
- F. CONDUIT, CONNECTORS, COUPLINGS AND FITTINGS SHALL BE UL LISTED AND LABELED. 1.02 ELECTRICAL METALLIC TUBING (EMT)
- A. USE ELECTRIC METALLIC TUBING (EMT) WHERE DRAWINGS CALL FOR CONDUIT TO BE: 1. CONCEALED IN WALLS.
- 2. INSTALLED ABOVE SUSPENDED CEILINGS. 3. INSTALLED EXPOSED, ABOVE 6 FEET.
- 1.03 INTERMEDIATE METAL CONDUIT (IMC)
- A. USE INTERMEDIATE METAL CONDUIT (IMC) WHERE DRAWINGS CALL FOR CONDUIT TO BE: . INSTALLED FOR PANEL BOARD FEEDERS.
- 2. INSTALLED IN CONCRETE SLABS AT GROUND FLOOR. 3. INSTALLED EXPOSED BELOW 6 FEET
- 4. INSTALLED IN WET LOCATIONS (INTERIOR AND EXTERIOR). .04 POLYVINYL CHLORIDE (PVC) A. USE PVC FOR
- 1. UNDERGROUND ELECTRICAL SERVICE ENTRANCE CONDUITS 2. TELEPHONE AND POWER SERVICE ENTRANCE CONDUITS. 3. EXTERIOR BRANCH CIRCUITS INSTALLED UNDERGROUND.
- 1.05 RIGID STEEL CONDUIT (RSC) 1. INSTALL UNDERGROUND FOR POWER SERVICE ENTRANCE ELBOWS PENETRATING FLOOR SLAB.
- 2. EXPOSED TO PHYSICAL DAMAGE.
- 1.06 FLEXIBLE METAL CONDUIT A. PROVIDE FLEXIBLE METAL CONDUIT FOR TERMINATION AT EQUIPMENT SUBJECT TO MOTION AND VIBRATION.
- B. LENGTH SHALL NOT EXCEED 6 FEET. C. MAXIMUM LENGTH CONCEALED IN WALLS SHALL BE 3
- D. WHERE EXPOSED TO CONTINUOUS OR INTERMITTENT MOISTURE, CONDUIT SHALL BE U.L. TYPE EF LIQUID
- PART 2 EXECUTION 2.01 INSTALLATION
- A. MINIMUM SIZE OF CONDUITS SHALL BE 3/4 INCH UNLESS OTHERWISE NOTED B. RUN CONCEALED CONDUITS IN DIRECT LINE WITH LONG
- SWEEP BENDS OR OFFSETS. RUN EXPOSED CONDUITS PARALLEL TO AND AT RIGHT ANGLES TO BUILDING LINES. GROUP MULTIPLE CONDUIT RUNS IN BANKS. C. CAP ENDS OF CONDUITS TO PREVENT ENTRANCE OF
- WATER AND OTHER FOREIGN MATERIAL DURING CONSTRUCTION. D. PROVIDE NO.12 AWG COPPER PULL WIRES OR NYLON
- CORD IN ALL EMPTY CONDUITS. STEEL WIRE NOT ACCEPTABLE AS PULL WIRE E. WHERE IMC CONDUIT ENTERS A CABINET, JUNCTION BOX.
- OR PULL BOX CONDUCTORS SHALL BE PROTECTED BY AN INSULATED BUSHING. LOCKNUTS SHALL BE INSTALLED ON CONDUIT OUTSIDE AND INSIDE ENCLOSURE.
- F. IN AREAS WHERE ENCLOSED AND GASKET FIXTURES AND WEATHERPROOF DEVICES ARE SPECIFIED. WHERE RIGID CONDUIT ENTERS A SHEET METAL ENCLOSURE, JUNCTION BOX AND OUTLET BOX, AND NOT TERMINATED IN A THREADED HUB, A STEEL, OR MALLEABLE IRON NYLON INSULATED HUB, COMPLETE WITH RECESSED SEALING "O" RING OR SEALING LOCKNUT SHALL BE USED.
- G. PROVIDE SEAL-OFF FITTING IN ALL CONDUITS ENTERING A COLD TEMPERATURE AREA SUCH AS FREEZERS AND DRY **REFRIGERATORS.**
- H. IN CONCRETE SLABS, BLOCK UP CONDUIT FROM FORMS AND SECURELY FASTEN IN PLACE. ALL CONDUITS IN SLABS SHALL HAVE A MINIMUM OF 4" INCHES CONCRETE COVERAGE ABOVE
- FAILURE TO ROUTE CONDUIT THROUGH BUILDING WITHOUT INTERFERING WITH OTHER EQUIPMENT, AND CONSTRUCTION SHALL NOT CONSTITUTE A REASON FOR AN EXTRA CHARGE. EQUIPMENT. CONDUIT. AND FIXTURES SHALL FIT INTO AVAILABLE SPACES IN BUILDING AND SHALL NOT BE INTRODUCED INTO BUILDING AT SUCH TIMES AND MANNER AS TO CAUSE DAMAGE TO STRUCTURE OR EQUIPMENT. EQUIPMENT REQUIRING SERVICING SHALL BE READILY ACCESSIBLE.
- I. CONDUIT SHALL BE SIZED TO COMPLY WITH "NEC" FOR NUMBER AND SIZE OF CONDUCTORS INSTALLED. EMT CONNECTORS AND COUPLINGS SHALL BE COMPRESSION TYPE. CLAMP CONDUIT TO BOXES WITH BUSHINGS INSIDE AND LOCKNUT OUTSIDE.
- K. TERMINATE EACH CONDUIT STUB-UP OR TERMINATION WITH NYLON INSULATED BUSHINGS. CONTRACTOR SHALL CONTACT THE OWNER AND VENDOR AND SCHEDULE THE WORK.
- 2.02 EMT (ELECTRICAL METALLIC TUBING) A. DO NOT USE ELECTRIC METALLIC TUBING IN CINDER CONCRETE OR CINDER FILL OR WHERE CONDUIT SYSTEM IS IN CONTACT WITH DISSIMILAR METALS OR IN WET LOCATIONS.
- <u>2.03 PVC</u> A. USE THREADED FITTINGS FOR ALL CONNECTORS AND ADAPTERS.
- B. PROVIDE 1/4-INCH NYLON PULL ROPE IN ALL PRIMARY POWER AND INCOMING TELEPHONE SERVICE ENTRANCE CONDUITS
- C. NO PVC SHALL EMERGE FROM THE GROUND OR THE CONCRETE SLAB OR ENCASEMENT. PVC SHALL CONVERT TO GALVANIZED RIGID METAL PRIOR TO ITS EMERGENCE. 2.04 FLEXIBLE METAL CONDUIT
- A. WHERE FITTINGS FOR LIQUID TIGHT FLEXIBLE CONDUIT ARE BROUGHT INTO AN ENCLOSURE WITH A KNOCK-OUT. A GASKET ASSEMBLY, CONSISTING OF ONE PIECE "O" RING. WITH BUNA-N SEALING MATERIAL, SERIES 3400, SHALL BE INSTALLED ON OUTSIDE OF BOX. FITTINGS SHALL BE MADE OF EITHER STEEL OR MALLEABLE IRON ONLY AND SHALL HAVE INSULATED THROATS OR INSULATED BUSHINGS.
- B. IN DRY LOCATIONS, WHERE FINAL CONNECTIONS TO MOTORS AND OTHER EQUIPMENT MAY BE MADE WITH FLEXIBLE METAL CONDUIT. FITTINGS SHALL BE OF STEEL OR MALLEABLE IRON ONLY WITH INSULATED THROATS OR INSULATED BUSHINGS, AND SHALL BE OF WEDGE AND SCREW TYPE HAVING AN ANGULAR WEDGE FITTING BETWEEN CONVOLUTIONS OF CONDUIT.

END OF SECTION

### SECTION 16123: CONDUCTORE <u>ART 1 – PRODUCTS</u>

- CONDUCTORS A. PROVIDE 98% CONDUCTIVITY COPPER CONDUCTORS WITH 600-VOLT INSULATION. FOR CONDUCTORS NO. 12 AWG AND NO. 10 AWG, PROVIDE SOLID TYPE. FOR ALL CONDUCTORS NO. 8 AWG AND LARGER, PROVIDE STRANDED TYPE. ALL CONDUCTORS SHALL HAVE THHN/THWN INSULATION UNLESS NOTED OTHERWISE.
- B. CONDUCTORS SHALL BE MANUFACTURED BY TRIANGLE. AMERICAN, ROME, SOUTHWIRE OR APPROVED EQUAL.
- C. NO MORE THAN (3) CIRCUIT CONDUCTORS SHALL BE UTILIZED WITH A SINGLE NEUTRAL
- D. ISOLATED GROUND CIRCUITS SHALL HAVE SEPARATE. DEDICATED GROUND AND NEUTRAL CONDUCTORS.
- D. THE SIZE OF NEUTRAL CONDUCTOR SHALL NOT BE SMALLER THAN THE LARGEST PHASE CONDUCTOR WITHIN THE CONDUIT
- E. AC, MC AND BX CABLES ARE NOT PERMITTED. <u> PART 2 – EXECUTION</u>
- .01 INSTALLATION
- A. INSTALL PULL BOXES IN CIRCUITS OR FEEDERS OVER 100' LINEAR FEET IN LENGTH.
- B. MAKE ALL SPLICES OR CONNECTIONS ONLY AT OUTLET, PULL OR JUNCTION BOXES. C. ALL CONDUCTORS AND CONNECTIONS SHALL TEST FREE OF
- GROUNDS, SHORTS, AND OPENS PRIOR TO ENERGIZING D. PROVIDE NO. 10 WIRE IN LIEU OF NO. 12 WIRE FOR ANY
- BRANCH CIRCUIT IN EXCESS OF 75' LINEAR FEET LENGTH TO PREVENT EXCESSIVE VOLTAGE DROP. E. USE WING NUTS AS MANUFACTURED BY IDEAL, SCOTCHLOK
- TYPE Y. R. G. OR B. OR APPROVED EQUAL CONNECTORS FOR FIXTURE CONNECTIONS AT OUTLET BOXES. . MAKE FEEDER TAPS AND JOINTS WITH OZ TYPE T. PT. PM
- PTS. OR APPROVED EQUIVALENT CLAMP CONNECTORS AS MANUFACTURED BY KUPLER, OR WITH APPROVED COMPRESSION SLEEVES. WRAP CONNECTORS WITH NO. 10 ELECTRO-SEAL OR APPROVED EQUIVALENT PLASTIC FILLER AND VINYL TAPE.
- G. LEAVE A MINIMUM OF 10" SLACK WIRE IN EVERY OUTLET BOX
- H. PROVIDE COLOR CODED WIRE, WITH A DIFFERENT COLOR FOR EACH PHASE AND NEUTRAL AND GROUND PER NEC. N.E.C. APPROVED COLORED TAPE IS ACCEPTABLE FOR FEEDERS USING LARGER THAN #6 CONDUCTORS.
- ALL CONDUCTORS SHALL BE CONCEALED IN CONDUIT AND BE CONTINUOUS FROM ORIGIN AT PANEL TO EQUIPMENT TERMINATION WITHOUT SPLICES WHERE POSSIBLE. WHERE SPLICES AND TAPS ARE NECESSARY OR ARE REQUIRED. THEY SHALL BE MADE IN SPLICE BOXES WITH SUITABLE
- CONNECTORS J. LOW VOLTAGE COMMUNICATION AND CONTROLS WIRING NOT IN CONDUITS SHALL BE PLENUM RATED AND SUPPORTED PER MANUFACTURERS PUBLISHED RECOMMENDATIONS. ALL SUCH CONDUCTORS MUST BE APPROVED BY OWNER AND AUTHORITY HAVING JURISDICTION PRIOR TO INSTALLATION.
- END OF SECTION SECTION 16130: OUTLET AND JUNCTION BOXES
- <u>RT 1 PRODUCTS</u> PROJECT CONDITIONS
- A. VERIFY FIELD MEASUREMENTS ARE AS SHOWN ON DRAWINGS B. VERIFY LOCATIONS OF FLOOR BOXES AND OUTLETS IN WORK AREAS PRIOR TO ROUGH-IN WITH ARCHITECTS DIMENSIONED PLANS.
- rt 2 products
- 2.01 OUTLET BOXES A. SHEET METAL OUTLET BOXES: GALVANIZED STEEL.
- B. CAST BOXES: TYPE FS. CAST FERALLOY. PROVIDE GASKET COVER BY BOX MANUFACTURER.
- C. MANUFACTURERS: NATIONAL, APPLETON, GENERAL ELECTRIC, RACO OR STEEL CITY
- D. PROVIDE BOXES FOR FIXTURES WITH FIXTURE STUDS IN CENTER
- E. OUTLET BOXES FOR LIGHTING, SWITCHES AND RECEPTACLES IN INTERIOR AREAS WITH EXPOSED CONDULT SHALL BE PRESSED STEEL AND IN EXTERIOR AREAS WITH EXPOSED CONDUIT SHALL BE CAST METAL WITH THREADED HUBS. "FS" TYPE. USE GALVANIZED STEEL FOR CONCEALED BOXES. BOXES SHALL BE 1-1/2" DEEP MINIMUM.
- 2.02 PULL AND JUNCTION BOXES A. SHEET METAL BOXES: GALVANIZED STEEL.
- B. SURFACE-MOUNTED CAST METAL BOX: TYPE 4; FLAT-FLANGED. SURFACE-MOUNTED JUNCTION BOX. 1. MATERIAL: GALVANIZED CAST IRON. 2. COVER: FURNISH WITH GROUND FLANGE. NEOPRENE
- GASKET, AND STAINLESS STEEL COVER SCREWS. . IN-GROUND CAST METAL BOX: INSIDE FLANGED, RECESSED COVER BOX FOR FLUSH MOUNTING.
- 1. MATERIAL: GALVANIZED CAST IRON. 2. COVER: NONSKID COVER WITH NEOPRENE GASKET AND STAINLESS STEEL COVER SCREWS.
- 3. COVER LEGEND: ELECTRIC. D. MANUFACTURERS: NATIONAL, APPLETON, GENERAL ELECTRIC, RACO. OZ-GEDNEY OR STEEL CITY.
- ART 3 EXECUTION 3.01 INSTALLATION A. INSTALL ELECTRICAL BOXES AS SHOWN ON DRAWINGS, AND
- AS REQUIRED FOR SPLICES, TAPS, WIRE PULLING, EQUIPMENT CONNECTIONS AND COMPLIANCE WITH REGULATORY REQUIREMENTS ABOVE ACCESSIBLE CEILINGS.
- B. INACCESSIBLE CEILING AREAS: INSTALL OUTLET AND JUNCTION BOXES NO MORE THAN 6 INCHES FROM CEILING ACCESS PANEL OR FROM REMOVABLE RECESSED LIGHT
- FIXTURF C. USE FLUSH MOUNTING OUTLET BOXES IN FINISHED AREAS. D. USE STAMPED STEEL BRIDGES TO FASTEN FLUSH MOUNTING
- OUTLET BOX BETWEEN STUDS . DO NOT FASTEN BOXES TO CEILING SUPPORT WIRES.
- F. SUPPORT BOXES INDEPENDENTLY OF CONDUIT, EXCEPT CAST PART 1 PRODUCTS BOX THAT IS CONNECTED TO TWO RIGID METAL CONDUITS BOTH SUPPORTED WITHIN 12 INCHES OF BOX. G. USE GANG BOX WHERE MORE THAN ONE DEVICE IS
- MOUNTED TOGETHER. DO NOT USE SECTIONAL BOX. H. USE GANG BOX WITH PLASTER RING FOR SINGLE DEVICE
- OUTI FTS. I. USE CAST OUTLET BOX IN EXTERIOR LOCATIONS AND WET LOCATIONS.
- 3.02 OUTLET BOXES A. SELECT BOXES ACCORDING TO INTENDED USE AND TYPE OF OUTLET. CEILING OUTLET BOXES SHALL BE 4" OCTAGONAL AND 1-1/2" DEEP. USE 2-1/8" DEEP OCTAGONAL BOXES OR 4" SQUARE BOXES WHERE REQUIRED. ALL CEILING OUTLET BOXES SHALL HAVE A FIXTURE STUD OF 'NO BOLT SELF-LOCKING' TYPE INSTALLED IF REQUIRED TO HANG THE FIXTURE SPECIFIED AT THE OUTLET.
- .03 JUNCTION BOXES A. JUNCTION BOXES SHALL BE SIZED ACCORDING TO NUMBER OF CONDUCTORS IN BOX OR TYPE OF SERVICE TO BE PROVIDED. MINIMUM JUNCTION BOX SIZE 4-11/16" SQUARE AND 2-1/8" DEEP. PROVIDE SCREW COVERS FOR JUNCTION BOXES.
- B. USE CODE GAUGE STEEL WITH SCREW COVERS FOR PULL BOXES WITH PRIME COAT AND PROVIDE WITH SCREW COVER. SIZE PULL BOXES ACCORDING TO THE NEC.
- C. PROVIDE PULL BOX EVERY 100' OF CONDUIT RUN OR WHERE EXCESSIVE NUMBER OF BENDS NECESSITATES A BOX FOR EAS OF WIRE INSTALLATION.

END OF SECTION

RECTION 181/11	WIDING	DEVICES	
	WILLING.		
PART 1 – PRODU	ICTS		

- WALL SWITCHES A. COLOR OF WIRING DEVICES AND COVER PLATES SHALL
- BE SELECTED BY ARCHITECT. B. RATINGS: 20 AMPS, 120/277 VOLTS A.C. OR AS
- IDENTIFIED ON DRAWINGS. C. DEVICES: (LEVITON CATALOG NUMBERS ARE LISTED UNLESS NOTED OTHERWISE):
- 1. SINGLE POLE TOGGLE SWITCHES: A. 20 AMP IVORY DEVICE - #1221-21
- B. 20 AMP PILOT LIGHTS ILLÜMINATED WITH LOAD ON -#1221-PL 2. DOÜBLE POLE TOGGLE SWITCHES: 20 AMP IVORY DEVICE- #1222-21
- CROUSE HINDS #EDS2129 OR APPROVED EQUAL EXPLOSION PROÖF SWITCH PER PLANS IN CLASS 1
- DIVISION 1 AREAS.

### RECEPTACI ES

<u>3 SPECIAL DEVICES:</u>

WALL PLATES

USE COVER'

BOXES.

2.01 INSTALLATION

A. MOUNTING:

<u>RT 2 - EXECUTION</u>

I FGFND.

ROUGH-IN.

IN MASONRY WALLS.

PLANS.

TESTING:

<u>ROUNDING SYSTEM:</u>

1.01 ROD ELECTRODES

WIRE

2.01 INSTALLATION

AND POWER OUTLETS.

AND EXPOSED WORK COVERS.

- A. COLOR OF WIRING DEVICES AND COVER PLATES SHALL BE SELECTED BY ARCHITECT.
- B. DEVICES: (LEVITION CATALOG NUMBERS ARE LISTED UNLESS OTHERWISE NOTED):
- 1. SPECIFICATION GRADE DEVICES

IG5361IG-ORANGE

A. MANUAL MOTOR STARTER SWITCH:

OR EXTERIOR LOCATIONS.

- A. 20 AMP, 125 VOLTS A.C., RECEPTACLES 1. SINGLE DEVICE: #5361-I(IVORY)
- 2. DUPLEX DEVICE: 5362A-I OR GY(GREY) 3. ISOLATED GROUND DUPLEX DEVICE:

SQ. D CLASS 2510, TYPE F, FOR USE ON MOTORS UP

TO 3/4 HORSEPOWER, PROVIDE NEMA 1 ENCLOSURE IN

DRY LOCATIONS; PROVIDE NEMA 3R ENCLOSURE IN WET

STARTER FOR CLASS 1 DIV. 1 AREAS PER PLANS.

A. PROVIDE SPECIFICATION/COMMERCIAL GRADE STAINLESS

B. PROVIDE BLANK PLATES ON ALL OUTLET BOXES FOR

. IMPACT RESISTANT CAST METAL LEVITON SERIES FOR

WEATHERPROOF DUPLEX GFCI RECEPTACLES LOCATED

OUTSIDE OR IN WET LOCATIONS. PROVIDE WITH 'WHILE IN

WHERE DEVICES ARE INSTALLED IN EXPOSED BOXES OR

E. INSTALL GALVANIZED STEEL PLATES ON OUTLET BOXES

AND JUNCTION BOXES IN UNFINISHED AREAS, ABOVE

ACCESSIBLE CEILINGS, AND ON SURFACE-MOUNTED

1. MOUNT SWITCHES AND RECEPTACLES AT HEIGHT

ABOVE FINISHED FLOOR AS INDICATED ON PLANS. AND

2. MOUNT SWITCHES ON STRIKE SIDE OF DOOR MAXIMUM

8" FROM DOOR FRAME. OUTLET BOX FOR SWITCH

COORDINATE WITH ARCHITECTURAL PLANS PRIOR TO

4. FOR GFCI TYPE RECEPTACLES, DO NOT USE THE FEED

THRU FEATURE UNLESS OTHERWISE INDICATED ON

5. USE JUMBO SIZED PLATES FOR OUTLETS INSTALLED

6. EACH RECEPTACLE SHALL BE PROVIDED WITH A #12

7. THE GROUNDING CONDUCTOR TO EACH RECEPTACLE

1. TEST EACH SWITCH AND VERIFY PROPER OPERATION

2. TEST EACH RECEPTACLE FOR PROPER POLARITY ON

RECEPTACLE TESTER AND VERIFY CIRCUIT IS OPENED

BY GFCI DEVICE AT AMPERE RANGES ESTABLISHED BY

3. TEST EACH GFCI RECEPTACLE WITH GFCI

END OF SECTION

PERMANENTLY AND EFFECTIVELY GROUND ALL METALLIC CONDUITS,

THROUGHOUT THE SYSTEM. GROUND CLAMPS SHALL BE APPROVED

CLAMP SHALL BE OF A TYPE WHICH GROUNDS BOTH CONDUCTOR

PLASTIC(PVC) CONDUIT SHALL INCLUDE A GROUND WIRE SIZED IN

SUPPORTS, CABINETS, PANEL BOARDS AND SYSTEM GROUNDING

NEUTRAL, MAINTAIN CONTINUITY OF EQUIPMENT GROUND

TYPE, SPECIFICALLY DESIGNED FOR GROUNDING. WHERE

ND CONDUIT. ALL CIRCUITS IN FLEXIBLE CONDUIT OR

ACCORDANCÉ WITH NEC ART250. CONDUIT SHALL NOT BE

GROUNDING CONDUCTOR IS ENCLOSED IN CONDUIT, GROUND

THE DEVICE WILL NOT INTERFERE WITH THE

CONTINUITY OF THE GROUND.

WITH ENERGIZED CIRCUIT.

SECTION 16170: GROUNDING AND BONDING

ENERGIZED CIRCUIT.

MANUFACTURER.

ALLOWED AS A GROUNDING MEANS.

B. DIAMETER: 3/4 INCH.

1.02 MECHANICAL CONNECTORS

A. MATERIAL: BRONZE.

<u>T 2 – EXECUTION</u>

C. LENGTH: 10 FEET MINIMUM.

A. MATERIAL: STRANDED COPPER.

AND OTHER METAL OBJECTS.

B. FOUNDATION ELECTRODES: 3/0 AWG.

C. GROUNDING ELECTRODE CONDUCTOR: SIZE TO MEET

A. PROVIDE BONDING TO MEET REGULATORY REQUIREMENTS.

CIRCUITS SUPPLYING ALL ISOLATED GROUND OUTLETS. DO

NOT SHARE THIS CONDUCTOR WITH ANY OTHER BRANCH

CIRCUIT. INSULATION SHALL BE GREEN WITH YELLOW

STRIPE, SIZED PER NEC 250. DEDICATED GROUNDING

CONDUCTOR SHALL RUN IN ADDITION TO EQUIPMENT

GROUNDING CONDUCTOR AND THE BRANCH CIRCUIT

CONDUCTORS IN SAME CONDUIT. TERMINATE ON THE

END OF SECTION

IGROUND BUS WITHIN THE PANEL BOARD SERVING LOAD.

B. BOND TOGETHER EACH METALLIC RACEWAY, PIPE, DUCT

. PROVIDE DEDICATED GROUNDING CONDUCTOR FOR

A. MATERIAL: COPPER-CLAD STEEL.

GREEN GROUNDING JUMPER BETWEEN THE GROUND

SHALL BE INSTALLED SUCH THAT THE REMOVAL OF

ERMINAL OF THE RECEPTACLE AND THE OUTLET BOX.

SHALL BE LOCATED CLEAR OF DOOR FRAME.

3. INSTALL SWITCHES WITH OFF POSITION DOWN.

CONDUIT FITTINGS, PROVIDE PROPERLY DESIGNED PLATES

PLATE STYLE SHALL MATCH DEVICE PLATES.

STEEL LEVITON SERIES FOR SWITCHES, COMMUNICATION

FUTURE OUTLETS OR OUTLETS WITHOUT DEVICES. BLANK

CROUSE HINDS #EFD OR APPROVED EQUAL MANUAL MOTOR

IG5362IG-ORANGE 4. ISOLATED GROUND SINGLE DEVICE:

### 2.02 GROUNDING A. GROUND ELECTRICAL SYSTEM IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ART.250 AND LOCAL AUTHORITIES HAVING JURISDICTION.

B. INSTALL A GREEN EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY, SIZED PER N.E.C. ART.250. TERMINATE ON EQUIPMENT GROUND BUS WITHIN PANEL BOARD SERVING I OAD.

C. INSTALL #6 AWG COPPER GROUNDING CONDUCTOR FROM GROUND BAR IN MAIN TELEPHONE BOX OR BOARD TO EQUIPMENT GROUND BUS IN MAIN DISTRIBUTION PANEL OR AT SERVICE ENTRANCE EQUIPMENT PER NEC . ALL SEPARATE GROUNDING ELECTRODES SHALL BE BONDED TOGETHER PER NEC ART.250 AND BONDED BETWEEN THEIR ASSOCIATED WIRING SYSTEMS. THIS INCLUDES THE POWER SYSTEM, TELEPHONE SYSTEM, ETC.

03 FIELD QUALITY CONTROL A. INSPECT GROUNDING AND BONDING SYSTEM CONDUCTORS AND

CONNECTIONS FOR TIGHTNESS AND PROPER INSTALLATION. END OF SECTION

SECTION 16190: SUPPORTING DEVICES AND HANGERS PART 1 – PRODUCTS 1.01 ACCEPTABLE MANUFACTURERS

A. SUPPORTING DEVICES AND HANGERS SHALL BE MANUFACTURED BY RAYCO FASTENERS.

### PART 2 - EXECUTION 2.01 INSTALLATION:

A. SECURE CONDUITS WITHIN 3' OF EACH OUTLET BOX, JUNCTION BOX, CABINET, FITTING, ETC., AND AT INTERVALS NOT TO EXCEED TEN FEET (10') AND IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE. IN SEISMIC ZONES, SUPPORT CONDUITS 1" AND UNDER AT 6' INTERVALS. B. INSTALL CLAMPS SECURED TO STRUCTURE FOR FEEDER AND

OTHER CONDUITS ROUTED AGAINST THE STRUCTURE. USE DROP RODS AND HANGERS OR RACKS TO SUPPORT CONDUITS RUN APART FROM THE STRUCTURE.

. PROVIDE AND INSTALL SUITABLE ANGLE IRON, CHANNEL IRON OR STEEL METAL FRAMING WITH ACCESSORIES TO SUPPORT OR BRACE ELECTRICAL EQUIPMENT INCLUDING SAFETY SWITCHES, FIXTURES, PANEL BOARDS, ETC. . USE OF CHAINS, PERFORATED IRON, BALING WIRE OR TH

WIRES FOR SUPPORTING CONDUIT RUNS IS NOT PERMITTED. . PROVIDE A SYSTEM OF SUPPORTING DEVICES AND HANGERS TO INSURE SECURE SUPPORT OF LOW VOLTAGE WIRING. FOR SUPPORT OF LOW VOLTAGE WIRING NOT REQUIRED TO BE IN CONDUIT. BUNDLE CABLES TOGETHER IN A NEAT. ORDERLY MANNER USING APPROVED NYLON TIE WRAPS. BUNDLED CABLES SHALL BE SUPPORTED WITH "J" HOOKS ON

TELEPHONE TYPE BRIDLE RINGS, A MINIMUM OF 6 FEET ON CENTERS. CLEARLY IDENTIFY ALL DIFFERING TYPES OF CABLES BEING RUN AND TAG WITH TAPE TAGS REGARDING TELEPHONE, PAR, MUSIC/COMMUNICATION, SECURITY, ETC. FOR VARIOUS SYSTEM UTILIZING SAID CABLE. IDENTIFICATION TAPE SHALL BE PROVIDED AT MINIMUM INTERVALS OF 25 FEET ON CENTER AND WITHIN EACH BUILDING SPACE. END OF SECTION

SECTION 16441: ENCLOSED SWITCHES PART 1 - PRODUCTS

### 1.01 MANUFACTURERS A. SQUARE D. B. SIEMENS.

C. CUTLER—HAMMER

1.02 ENCLOSED SWITCHES A. NON-FUSIBLE SWITCH ASSEMBLIES: NEMA KS 1, TYPE GENERAL DUTY FOR 250 VOLT AND 600 VOLT LOAD INTERRUPTER ENCLOSED KNIFE SWITCH WITH EXTERNALLY OPERABLE HANDLE INTERLOCKED TO PREVENT OPENING FRONT

COVER WITH SWITCH IN 'ON' POSITION. B. ENCLOSURES: NEMA KS 1. 1. INTERIOR DRY LOCATIONS: TYPE 1.

2. EXTERIOR LOCATIONS: TYPE 3R. END OF SECTION

SECTION 16470: PANEL BOARDS <u> RT 1 – PRODUCT</u>

1.01 MANUFACTURERS A. SQUARE D. B. SIEMENS.

C. CUTI FR-HAMMFR

D. FOR EXISTING BUILDINGS MATCH EXISTING MANUFACTURER. 1.02 PANEL BOARD FEATURES A. PANEL BOARDS SHALL BE FULLY RATED & SHALL HAVE A MINIMUM SYMMETRICAL INTERRUPTING RATING TO MEET OR EXCEED THE AVAILABLE SYMMETRICAL INTERRUPTING FAULT

CURRENT INDICATED ON PANEL BOARD SCHEDULE. BUS BARS SHALL BE COPPER. C. PROVIDE FACTORY-INSTALLED COPPER GROUND BUS IN EACH PANEL BOARD WITH LUGS OR CONNECTORS ON BAR.

D. PROVIDE ELECTRICALLY ISOLATED, FACTORY INSTALLED COPPER, NEUTRAL BUS IN EACH 3 PHASE, 4 WIRE PANEL

E. IN ADDITION TO THE GROUND BUS REQUIRED BY PARAGRAPH 1.02D, PROVIDE FACTORY INSTALLED, ELECTRICALLY ISOLATED, COPPER GROUND BUS IN EACH PANEL BOARD SERVING ISOLATED GROUND RECEPTACLES.

F. MAIN LUGS AND MAIN CIRCUIT BREAKER LUGS SHALL BE U.L. LISTED FOR USE WITH BOTH ALUMINUM AND COPPER WIRES. G. PROVIDE PANEL BOARD DOORS WITH CHROME-PLATED LOCKS AND CATCHES. ALL LOCKS SHALL BE KEYED ALIKE. PROVIDE TWO KEYS FOR EACH LOCK. PANEL BOARD FRONTS SHALL

HAVE ADJUSTABLE, INDICATING TRIM CLAMPS. H. PROVIDE THERMAL-MAGNETIC CIRCUIT BREAKERS WHICH ARE RATED FOR 40 DEGREES C AMBIENT TEMPERATURE. BREAKERS SHALL BE QUICK-MAKE, QUICK-BREAK TYPE TRIP WITH TRIP INDICATION SHOWN BY HANDLE POSITION OTHER THAN ON OR OFF. MULTI-POLE BREAKERS SHALL HAVE A

FACTORY APPROVED COMMON TRIP HANDLE. BENT WIRE THRU BREAKER HANDLES IS NOT ALLOWED. TANDEM TYPE CIRCUIT BREAKERS SHALL NOT BE PERMITTED. PROVIDE TYPED DIRECTORY CARD WITH CLEAR HOLDER FOR

EACH PANEL BOARD. HAND WRITTEN CARDS ARE NOT ALLOWED

PART 2 - EXECUTION 2.01 INSTALLATION

A. NEW PANEL BOARDS SHALL BE MOUNTED AT HEIGHT ABOVE FINISHED FLOOR SUCH THAT THE HEIGHT OF THE TOP-MOST BREAKER IN THE PANEL IS NOT MORE THAN 6FT-6 INCHES ABOVE FINISHED FLOOR IN ITS HIGHEST POSITION. 3. WHERE MULTIPLE NEW PANEL BOARDS ARE INSTALLED IN WALLS IN COMMON AREAS OF BUILDINGS. THE PANEL BOARDS

SHALL BE INSTALLED WITH THE TOP OF ALL PANEL BOARDS AT THE SAME HEIGHT. . PROVIDE BLANK FILLER PLATES OVER ALL UNUSED SPACES IN PANEL BOARDS.

D. TYPED DIRECTORY CARDS SHALL INDICATE DEVICES BEING SERVED AND THE SPACE NAME WHERE THE DEVICE IS I OCATED PROVIDE MINIMUM OF (1)ONE 3/4" EMPTY CONDUIT WITH

PULL WIRE, I.D. TAG AND GROMMET ENDS FOR EVERY 3 POLES OF SPARE BREAKER OR SPACE IN THE PANEL BOARD. STUB CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE. LABEL CONDUIT AS SPARE AT PANEL BOARD AND TERMINATION POINT.

END OF SECTION

CONTRACTOR VERIFICATION RESPONSIBILITIES CONTRACTOR SHALL REPORT ANY DISCREPANCIES. OMISSIONS OR INCONSISTENCIES ON THE DRAWINGS TO THE ARCHITECT FOR VERIFICATION BEFORE STARTING CONSTRUCTION. OWNER AND ARCHITECT ARE NOT RESPONSIBLE FOR ANY COSTS ARISING FROM SUCH ERRORS IN CONSTRUCTION WHERE SUCH DISCREPANCIES. OMISSIONS OR INCONSISTENCIES HAVE NOT BEEN PROPERLY REPORTED IN A TIMELY MANNER.

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# **GENERAL NOTES**

1. THE MECHANICAL CONTRACTOR SHALL VERIFY THAT ALL EQUIPMENT, AS SHOWN ON THESE DRAWINGS, WILL NOT CONFLICT WITH ANY DRAINS, SCUTTLES, JOINT, VENTS, PIPING OR EQUIPMENT.

2. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ADMINISTERING ALL WARRANTIES ON EQUIPMENT HE INSTALLS. THIS INCLUDES, BUT IS NOT LIMITED TO, REFRIGERANT LINES, ETC.

4. ALL OUTSIDE AIR INTAKES SHALL BE A MINIMUM OF 10'-0" FROM ANY EXHAUST FANS OR PLUMBING VENTS.

5. ALL DUCT DIMENSIONS SHOWN ON THE DRAWINGS ARE CLEAR INSIDE DIMENSIONS. NO ALLOWANCE HAS BEEN MADE FOR LINER OR WRAP.

6. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR AND OTHER TRADES, ALL REQUIRED OPENINGS AND EXCAVATIONS. ALL REQUIRED OPENINGS IN FOUNDATIONS, FLOORS, WALLS AND ROOFS SHALL BE CONSTRUCTED INTO THE STRUCTURE WITH THE USE OF SLEEVES, CURB, ETC. CUTTING AND PATCHING SHALL BE HELD TO A MINIMUM.

7. ALL ITEMS PROJECTING THRU ROOFS SHALL BE FLASHED THRU CURBS OR PIPE SEALS A MINIMUM OF 12" ABOVE THE ROOF. THE PIPE CURBS AND SEALS SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ROOFING CONTRACTOR. INSURE THAT AMPLE BOOT OPENINGS ARE PROVIDED TO ACCOMMODATE ANY ELECTRICAL CONDUIT PENETRATIONS REQUIRED. UTILIZE LL'S REQUIRED ROOFER.

8. ALL SUPPLY, RETURN AND EXHAUST AIR DEVICES SHALL BE PAINTED AS REQUIRED BY THE OWNER.

![](_page_8_Figure_8.jpeg)

![](_page_8_Picture_9.jpeg)

DESIGNATION	AHU-1	AHU-2
SERVES	PUMP ROOM	PUMP ROOM
TOTAL C.F.M.	1200	1600
O.A. C.F.M.	120	160
FAN		
E.S.P. (IN.W.G.)	0.5	0.5
H.P.		
COOLING		
ENTERING AIR (DB/WB °F)	80/67	80/67
TOTAL CAP. (MBH)	33.1	45.8
SENSIBLE CAP. (MBH)	25.5	35.5
ELECTRICAL		
VOLTS	230	230
PHASE	1	1
MCA	5	8
MOCP	15	15
FILTERS		
FILTER TYPE	MERV 8	MERV 8
FILTER THICKNESS (inches)	2"	2"
MANUFACTURER	TRANE	TRANE
MODEL NO.	TEM4B0C37M31	TEM4A0C48S41
WEIGHT (lbs)	144	138
REMARKS		

3. PROVIDE AUXILIARY DRAIN PAN UNDER COIL FOR HORIZONTAL MOUNTED

UNITS. 4. COIL TO HAVE TXV REFRIGERANT CONTROL.

DX CONDENSING UNIT SCHEDULE				
DESIGNATION	CU-1	CU-2		
INDOOR SECTION DESIGNATION	AHU-1	AHU-2		
TOTAL COOLING CAP. (MBH)	36	48		
AMBIENT TEMP (°F)	100	100		
COMPRESSOR				
NO. OF COMPRESSORS	1	1		
R.L.A. (EACH)	14.1	18.5		
CONDENSER FAN	·			
NO. OF FANS	1	1		
H.P. (EACH)	0.125	0.20		
F.L.A. (EACH)	0.77	1.05		
ELECTRICAL				
VOLTAGE/PHASE	230/1	230/1		
MCA	18	24		
MOCP	30	40		
	·			
MANUFACTURER	TRANE	TRANE		
MODEL NO.	4TTR4036	4TT44048		
SEER/EER	14.3 / 11.7	14.3 / 11.7		
NOMINAL TON.	3	4		
WEIGHT (lbs)	156	189		
REMARKS				
NOTES: 1. OR APPROVED EQUAL BY LENNOX CA		•		

2. REFRIGERANT LINES ARE TO BE SIZED AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

# AIR DEVICE SCHEDULE

DESIGNATION	А	В
MODULE SIZE	SEE PLAN	SEE PLAN
NECK SIZE	SEE PLAN	SEE PLAN
FLOW RATE (CFM)	SEE PLAN	SEE PLAN
NECK VELOCITY (FPM)	700 MAX.	600 MAX
N.C. LEVEL	30 MAX.	25 MAX
MANUFACTURER	TITUS	TITUS
MODEL NO.	300FL	350FL
DESCRIPTION	DUCT MOUNTED SUPPLY	DUCT MOUNTED RETURN
REMARKS	1,2	1,2

NOTES:

1. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. 2. OR APPROVED ALTERNATE. ALTERNATE EQUIPMENT SUBMITTAL SHALL INCLUDE A CROSS REFERENCE GUIDE FOR APPROVAL.

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### STANDARD PROVISIONS

### PART 1 - GENERAL 1.01 GENERAL:

- A. Related Work Specified Elsewhere: 1. The general provisions of the Contract, including General and Supplementar Conditions, instructions to Bidders and General Requirements, apply to the work
- specified in this Division. This section applies to all aspects of Divisio 15 and is intended to be complementary to the General Conditions, Supplementary General Conditions, and General
- Requirements. 3. Furnish all labor, materials, services equipment and appliances required for the complete furnishing and installation of the Mechanical systems, including Plumbing Heating, Ventilating and Air Conditioning and
- 4. The use of the words "provide", "furnish", or "install" means that the item or facility is to be both furnished and installed unless expressly stated otherwise.
- 5. The term "Contractor" used in this Division of the Specifications shall mean the "Mechanica Sub-Contractor", or "HVAC Subcontractor" 6. Refer to the energy code report submitted to the city for building permit on this project. listed are requirements for compliance for mechanical and plumbing systems. These
- shall be followed for equipment selection, installation, and commissioning. B. Scope: 1. Refer to Architectural Supplements for the scope of the Projec
- 2. The contract documents and complete scope of work are illustrated on the combined Architectural: Structural: Plumbing: Heating Ventilating and Air Conditioning; and Electrical drawings. Review and examine the complete set of contract documents Refer discrepancies, errors, omissions and
- ambiguities in the contract documents to the Architect. Otherwise, provide materials and labor to resolve same in a manner approve by the Architect at no additional costs to the
- The intent of the drawings and specifications is to provide complete systems. Items included in one and not the other are of like effect as if included in both. Provide miscellaneous items and accessories required for complete systems.
- 5. Items indicated by one discipline and not included in another discipline in the drawings and specifications shall be provided as if included, at no additional costs to the Owner.
- Description of System: 1. Facilities and systems of mechanical work in general include, but are not limited to, the
- a. Basic Materials and Methods Heating, Air Conditioning and Ventilating
- . System Controls. 2. Provide labor, materials, equipment and accessories for complete systems whether or
- not specifically included in the Contract Documents. 3. Drawings are diagrammatic and contain graphic representations, schedules and notations showing mechanical work. Follow drawings as closely as actual construction will permit. Make deviations from drawings for conformance to actual construction at no additional costs to the Owner. Refer items requiring clarifications and interpretations to the Owner's representative for resolution provide work as resolved at no additional costs to the Owner. Deviations for reasons other than described above, if deemed
- necessary, shall be submitted to the Owner's representative for approval. Do not make deviations without written approval. D. Definitions: 1. The Contractor is responsible for the Work of Sub-Contractors.
- Furnish Supply Materials. Install - Install Materials. 4. Provide - Furnish and Install Materials.
- D. NFPA 96 Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooling Equipment. 1.04 QUALITY ASSURANCE:
- Meet the requirements of UL, Health Codes, NFPA and applicable codes. B. All supply and exhaust air requirements and
- limitations shall be thoroughly coordinated with hood manufacturer in writing to insure compatibility and maintain UL listing on hood C. Contractor shall obtain kitchen ventilation equipment approval from local fire authority prior
- to equipment submitta 1.05 SUBMITTALS: A. Submit shop drawings and product data under provisions of Section 15010.
- B. Submit manufacturer's installation instructions under provisions of Section 15010 and 15050 C. Provide electrical wiring diagram with each
- 1.06 OPERATION AND MAINTENANCE DATA: A. Submit manufacturer's descriptive literature operating instructions, and maintenance an repair data under provisions of Section 15010. PART 2 PRODUCTS
- 2.01 KITCHEN HOODS A These are furnished by the Kitchen Equipment provider and installed by this contractor as scheduled and shown on the drawings.
- B. The hoods shall be constructed with 18 gauge type 304, stainless steel interior liner and with 18 gauge, type 304, #3 polish, stainless steel exterior panels. The assembly at exposed external welds shall be ground down, smoothed and highly polished. Internal construction shall include galvanized structural steel framing members as required to prevent flexing and fatigue of the inner and outer shell. All unexposed interior surfaces shall be constructed of minimum 18 gauge galvanized steel, including but not limited to: ducts, plenums, framing and brackets. Provide backsplash panels.
- C. The hoods shall include a filter housing constructed of the same material as the interio liner complete with aluminum U.L. Classified grease filters of sufficient numbers and sizes to insure optimum performance as specified by the filter manufacturer. The filter housing shal terminate into a pitched internal full-length grease trough which shall drain into a removable recessed one-cup capacity grease drawer.
- D. Vaporproof U.L. listed marine incandescent light fixture shall be installed at approximately 3-foot centers. Hood manufacturer shall include enough light fixtures to provide the lighting levels required by the local codes. The lights shall be prewired to a junction box situated at the top of the hood for field connection to power. The wiring shall conform to the requirements if the National Electrical Code.
- E. The hoods shall be fabricated in accordance with N.F.P.A. Bulletin #96 shall bear the National Sanitation Seal of Approval (NSF). Hoods shall be U.L. Classified.
- F. The hood shall be provided with hanging brackets on centers of four (4) feet or less. The Contractor shall locate the hood as directed by Owner. The mounting height of the hood shall not exceed seven (7) feet between the finished floor and the lower edge of hood
- 2.02 HOOD FIRE PROTECTION SYSTEM: A. The Kitchen Equipment Supplier shall provide a fire suppression system B. It shall be the dry chemical pre-engineered piped, and fixed nozzle type. It shall be UL listed
- and installed in accordance with NFPA Standard #96 and conform to all state, municipal and local C. The design of the system shall provide protection
- of the supply and exhaust ducts and cooking equipment which may be a sources of ignition. shall also include an audible alarm and automatic shut-off of all fuel and heat sources as required NFPA Standard #96. The system shall also be capable of either manual or automatic operation.
- D. The Contractor shall secure the services of the fire protection equipment distributor for installation

- 5. Approval Written authority to proceed from the Architec 1.02 QUALITY ASSURANCE A. Workmen Qualifications: Skilled mechanics
- competent in their trades, licensed where required by authorities having jurisdiction. B. Requirements of Authorities Having Jurisdiction Determine authorities having jurisdiction and
- the applicable codes, rules and regulations of those authorities. Perform work in conformance with the
- requirements of authorities having jurisdiction 3. Obtain all permits, licenses and inspections a required by all authorities having jurisdiction. Give all notices and comply with all Laws, Ordinances, Rules, Regulations and Contract
- bearing on the work. In cases of differences between requirement of the various authorities having jurisdiction, exceed the lesser requirements and meet the greater, more stringent requirements.
- All fees and costs for permits, licenses, or inspections shall be paid by this Contractor unless expressly stated otherwise. Codes
- 1. The installation of the mechanical systems shall conform to the requirements of the National Fire Prevention Association (NFPA local and state codes having jurisdiction, and the requirements of the Utility Companies
- whose services are used. 2. Codes and ordinances having jurisdiction over the work shall serve as minimum requirements; but, if the Contract Documents indicate requirements which are in excess of those minimum requirements, then the requirements of the Contract Documents shall be followed. Should there be any conflicts between the Contract Documents and code or any ordinances having jurisdiction, report
- these to the Architect. Reference Standards: All systems installed by his contractor shall be updated and modified in accordance with the following codes and standards, but in no instance shall the standards be less than the requirements of other paragraphs of these contract documents.
- 1. Specified manufacturer's instructions and 2. American Society of Heating, Refrigeration
- and Air Conditioning Engineers (ASHRAE). Sheet Metal and Air Conditioning Contractors National Association. (SMACNA
- National Fire Protection Association (NFPA). Underwriters' Laboratories (UL Americans with Disabilities Act (ADA)
- Local code authorities SHOP DRAWINGS AND SUBMITTAL DATA:

1.03

- Before submittal of the data, the Contractor shall check each piece of apparatus, equipment and accessory to ensure compliance with the requirements of the Plans and Specifications and shall clearly mark each submittal with his signature to indicate that they are in full compliance with the specifications and plans The Contractor shall verify that all associated trades are aware of their work concerning the equipment submitted. Any submittals received without the Contractor's signature may be returned without being checked by the Architect's office. Include in the submittals all manufacturer's nstallation instructions. Coordinate with other rades any requirements that the manufacturer's installation instructions require, including but no limited to wire size, disconnects, switches, breaker types and sizes, and clearance space for Certificates
- 1. Provide certificates required by contract documents and by authorities having 2. Provide Underwriters' Laboratories seals
- affixed to materials. Test Reports: Provide copies of test reports required by contract documents and by
- authorities having jurisdiction. D. Approval, disapproval, or comments on submittals shall not relieve the contractor of the requirements of the specifications or the drawings
- and certification. The certification report shall be given to Owner upon completion and acceptance of all work. 2.03 SUPPLY FANS
- Supply fans for the kitchen hood shall be provided by the Kitchen Equipment supplier as scheduled on the drawings.
- EXHAUST FANS The Exhaust fans shall be provided by the Kitchen Equipemnt supplier as scheduled on the plans.
- B. Exhaust fan shall be upblast type designed specifically for Restaurant or Food Service applications and rated for continuous operation The roof curb shall be the ventilated type, factory
- fabricated by the fan manufacturer. 2.05 EXHAUST AND SUPPLY DUCTS: The exhaust and supply ductwork shall be installed as shown on the drawings. The exhaust duct shall be of 16 gauge galvanized steel, 16
- gauge black steel, or stainless steel and welded. Protect the welds by coating the weld with a noncorrosive protectant. The exhaust duct connecting collars shall be of the heat expansion type. The supply duct shall be of 18 gauge galvanized steel. All work shall conform to NFPA 96 recommendations.
- 2.06 CONTROLS A control panel shall be flush mounted on the front face of the canopy. This panel shall include two on/off toggle-type switches for the control of hood lights and fans. There shall be indicator lamp located next to each fan switch for positiv function status identification. The panel installe shall have a stainless steel bezel plate with integral etched switch and lamp function description
- PART 3 EXECUTION
- MAKE-UP AIR UNIT / SUPPLY FANS: 3.01 Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services B. Roof top unit shall be located where shown on the
- The design on the drawings (electrical, structural etc.) is based on the manufacturer listed. If the unit is furnished by a substitute manufacturer The Contractor shall be responsible for any
- modifications required to install such unit. This shall include, but not be limited to, increases in unit electrical feeder sizes, switch and fuse or breaker sizes, structural bracing, structural bracing, etc. Air unit to be supplied with filters during the
- construction phase of the project. After project completion, all filters to be changed. Provide one additional complete set of filters
- E. If in the opinion of the Roof Top Manufacturer additional external spring isolation is required to insure NC levels do not exceed 45 (max), said manufacturer shall include external spring when pricing Roof Top Unit to HVAC contractor Architect and Engineer shall be notified before bidding of additional spring isolation is required, in writing from the manufacturer.
- DUCTS: At all points where duct connect to fan, provide and install flexible connections. These flexible connections shall be made using "Vent Fab" canvas that has been chemically treated to mal it fire resistant, water-proof, mildew resistant and practically air-tight. The material must be at least 30 ounces per square yard before treating. Install the ducts with a minimum of 3 inches of air
- space between the exhaust ducts and the surrounding chase. Do not allow any combustibles within 3 inches of the duct work C. The insulation of the exhaust duct shall be a block
- type insulation banded in place to the ducts. All horizontal exhaust ductwork must be sloped to allow the grease to drain to appropriate receptors. Provide the necessary grease collection points and the access doors to maintain the grease collection points. TESTS AND ADJUSTMENTS
- The supply and exhaust systems shall be tested and effective quiet operation shall be obtained.

PRODUCT DELIVERY, STORAGE AND

1.04

A. Delivery: Deliver equipment and materials in unopened manufacturer's standard packaging. Any piece of equipment placed on the job site without prior written review shall be subjected to

Mastic, Childers Products, St. Clair Rubber Co

Owens-Corning Fiberglass ED-100 FRK 25 Duct

Ductliner: A neoprene coated fiberglass board

conformance with Fed. Spec. HH-I-545B, Type

Owens-Corning Fiberglass Aeroflex duct liner or

having a density of not less than 1-1/2 pcf, in

Owens-Corning Fiberglass duct liner board or

At Contractor's option, concealed cold supply air

ducts and plenums, and elsewhere as indicated.

shall be lined with 1" thick Fiberglass 1-1/2 pound

density coated duct liner complying with NFPA

Sound Duct Insulation - Where indicated, sound

insulate air ducts with 1" thick Fiberglass 1-1/2

pound density coated duct liner, applied as

Benjamin Foster 85-15 insulation bonding

adhesive or approved equal.

Wrap or approved equal, 3/4# density with .0025#

aluminum foil exterior.

approved equal.

approved equal.

OA requirements.

specified above.

PART 1 - GENERAL

SCOPE

PART 2 - PRODUCTS

MATERIALS:

1.01

2.01

2.02

INSTALLATION:

PART 3 EXECUTION

3.01

PART 1 - GENERAL

1.01 DESCRIPTION

PART 2 - PRODUCTS

2.01

PART 3 - EXECUTION

3.01 INSPECTION:

3 02

3.03

- remova Storage: Store equipment and materials where not subject to damage from personnel and the
- Handling: Avoid damage to materials and surrounding surfaces and finishes before and
- during installation EXAMINATION OF PREMISES 1.05 This Contractor shall visit the site to become fully acquainted with the immediate and surrounding premises and the conditions under which the
- work will be executed SUBCONTRACT AND LABOR All provisions of this Section shall apply to all
- Subcontracts to the extent that they are applicable to such Subcontractor. 1.07 ACCEPTANCE OF WORK:
  - The work, when completed, will be accepted in a finished, perfect and undamaged state only. This Contractor shall provide for protection of the work during its progress and, if damaged, all patching or replacing necessary to its full and satisfactory completio
- 1.08 COMPLETE SYYSTEMS:
  - It is the intention that this Specification shall provide a complete installation. All auxiliary construction equipment and apparatus necessa or advantageous to the operation and testing of the work shall be included. The omission of specific reference to any part of the work necessary for such complete installation shall not be interpreted as relieving this Contractor from furnishing and installing such parts
  - WARRANTY Warrant the work for one year from and after date of beneficial occupancy to include freedom from defects for materials, equipment and labor. Replace defective work during the warranty period. All compressors shall be five year non-
- prorated warranty. The one year warranty provided in the General Conditions shall be in addition to and not in limitation of any guarantees or warranties of longer duration or other remedies provided by law of the Contract Documents
- The warranty shall include supervision and adjustment, any maintenance recommended by the equipment manufacturer or contractor or inspections. Also included in the warranty is an refrigerant lost or leaked in normal operation or in service of equipment. Provide four filter changes at appropriate intervals during the warranty
- PART 2 PRODUCTS
- 2.01 MATERIALS A. New, free from defects, of quality commercial grade standard product by reputable
- manufacturers. Listed by Underwriters' Laboratories for which
- standards apply In compliance with Contract Documents in regard to quality; dimensions, appearance, design and performance.
- Similar materials of same manufacture. First named under "Acceptable Manufacturers" is the manufacturer whose product was used for
- 2.02 SUBSTITUTIONS
- A. Substitute materials will be considered for approval after Contract has been awarded Approval of substitutions is specifically excluded from this Division prior to signing of contract.
- Requests for substitutions: In writing. Required data necessary for evaluation.
- . Difference in contract amount for each item. 4. In accordance with submittals procedure.
- The proper flow shall be adjusted to contain all cooking vapors and exhaust them from the area. A complete balance of the air supply and exhaust system shall include all cfm readings tabulate
- hree copies of the final balance reading shall be furnished to the Architect Any changes required to obtain the cfm as
- specified under actual job operating conditions shall be performed without additional cost to the
- DUCTWORK
- PART 1 GENERAL 1.01 SCOPE
- Furnish all labor, materials, tools, equipment and related items required for the complete installation of Ductwork as indicated by the Contract PART 2 PRODUCTS
- MATERIALS 2.01

threaded

indicated

and hammered flat.

- General: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL Steel Ducts: Galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per sq. ft.
- 82 g/sq m) for each side in conformance with Flexible Ducts: Interlocking spiral of galvanized steel or aluminum construction; rated to 2 inche WG (500 Pa) positive and 1.5 inches WG (375
- Pa) negative Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed b seamless aluminum pigmented plastic vapo barrier jacket, maximum 0.23 K value at 75 degrees F (0.034 KSI at 24 degrees C)

Fasteners: Rivets, bolts, or sheet metal screws.

Sealant: Non-hardening, weather resistant, fire

Hanger Rod: Steel, galvanized; threaded both

Plumber's strap is not an acceptable duct hanger.

Duct longitudinal seams shall be double locked

used alone or with tape, or heavy mastic.

ends, threaded one end, or continuously

Fabricate and support in accordance with

indicated. Provide duct material, gages

MACNA Low Pressure Duct Construction

Standards and ASHRAE handbooks, except as

reinforcing, and sealing for operating pressures

Size round ducts installed in place of rectangula

variation of duct configuration or sizes permitted

Construct Tee's, bends, and elbows with radius of

ducts in accordance with ASHRAE table of

equivalent rectangular and round ducts. No

not less than 1-1/2 times width of duct on

centerline. Where not possible and where

rectangular elbows are used, provide turning

provide turning vanes of perforated metal with

Increase duct sizes gradually, not exceeding 15

Divergence upstream of equipment shall not

exceed 30 degrees; convergence downstream

Provide easements where low pressure ductwork

Use double nuts and lock washers on thread rod

easements exceed 10 percent duct area, split into

conflicts with piping and structure. Where

two ducts maintaining original duct area.

LOW PRESSURE FLEXIBLE DUCTWORK:

thickness of fiberglass insulation shall be

Low Pressure flexible duct shall conform to the

Class 1 requirements of the NFPA. A nominal 1

enclosed in a factory applied and sealed vapor

Insulated flexible duct shall be type SLR-181

Genflex as manufactured by the General

vanes. Where acoustical lining is indicated

degrees divergence wherever possible

shall not exceed 45 degrees.

except by written permission

glass fiber insulation.

barrier jacket.

2.03

resistive, compatible with mating materials; liquid

Requests for substitution imply no obligation on the Owner and his representatives.		will meet space and capacity requirements, etc., of the first named manufacturer.	
If approved substitutions cause changes in the work required, including work by other trades, pay all costs involved and effect all necessary changes to accommodate substitutions at no	C.	The use of one named manufacturer in the schedules on the Drawings is for guide purposes. The provisions of the above paragraph will govern in the selection of products to be used.	
additional cost to the Owner. - EXECUTION INSPECTION:	D.	Where the "or approved equal" clause is used in these specifications, the name, or names, mentioned are to be used as a basis of quality. Other manufacturer's products will, however, be considered as substitutions and the "	
Examine materials upon receipt for damages. Replace damaged materials. Examine building structure to which materials are to be secured for defects adversely affecting the quality and execution of work. Do not also the structure	E.	as a basis for pricing. Basis of quality shall be interpreted to include material, workmanship, weight, finish, gauges of material, appearances, canacity, performance	
quality and execution of work. Do not start work until defects are corrected. PREPARATION:	F.	etc. Manufacturer's representation as to availability of	
Field Measurements:		equipment parts and replacement and service personnel in the area will be a factor in	
<ol> <li>Refer conflicts to the Architect for review. Resolve conflicts in accordance with the Architect's written direction at no additional</li> </ol>	2.02	FLAME SPREAD PROPERTIES OF	
<ol> <li>costs to the Owner.</li> <li>Coordinate locations of materials with other trades by reference to Contract Documents and by conference with other trades. If work</li> </ol>	A.	Materials and adhesives used throughout the mechanical system for filters, acoustical lining, thermal (pipe) insulation, flexible connections,	
is later found to interfere with work of other trades, make necessary changes to eliminate interference at ne additional cost to the		duct tape, pneumatic tubing, etc., exposed in plenums, shall conform to the Federal Standard flame spread properties of materials. Under this	-
Owner. Preparation of Surfaces: Clean and otherwise modify surfaces to which materials are to be		requirement, the classification shall not exceed No. 11, with the range of index between 0 and 25 for the basic materials, their index of 50 in its	P
applied and secured in accordance with manufacturer's recommendations and Architects direction	в	Specification.	1
Verify proper type materials being installed for environmental conditions.	PART 3	requirements will be acceptable. - EXECUTION	
INSTALLATION:	3.01	FIREPROOFING PENETRATIONS:	
requirements of the authorities having jurisdiction and the manufacturer's recommendations. All	Α.	Provide fire sealing for penetrations through fire rated construction to maintain the fire rating of the	1
heights and clearances of equipment to be installed is to be as detailed on the Architectural	2.02	jurisdiction and Landlord's requirements.	
plans and as required by the ADA. Notify the Architect of all discrepancies in writing prior to	3.02 A.	The Mechanical Sub-Contractor shall have the	
rougn-in. Records for Owner: 1. Maintain full set of Contract Documents at Project Note daily changes made in		responsibility of rough-in for and assembly of various equipment and to make final connection to all equipment furnished by Owner and/or under Sections of these Specifications.	
connection with final installation. 2. Provide a complete set of "as-built"	В.	Roughing-in and assembling of this equipment shall be determined from the manufacturer's Shop	1
reproducible drawings to the owner showing exact locations of all equipment, valves,		Drawings or as directed and in no case shall the location be scaled from the Architectural or	
piping, ducts, etc. These drawings shall reflect any changes from contract documents and shall be drafted by competent perconnel	C.	Mechanical Drawings. The Contractor shall be aware that various	
to provide the owner with quality documents of facilities at project completion.		equipment, valves, strainers, unions, etc., shown on the plans furnished by others shall be coordinated and assembled before installation	P 2
	3.03	under this contract. CONSTRUCTION REQUIREMENTS:	2
BASIC MATERIALS AND METHODS	Α.	Where equipment is being fumished under another Division, request from the Architect an	
DESCRIPTION:		accepted drawing that will show exact dimensions of required locations of connections. Install the	
Work included in This Section: The following Specification applies to all work of the Mechanical		required facilities to the exact requirements of the approved drawing.	
and Plumbing Contractors. - PRODUCTS	В.	Assume responsibility for all costs or changes required that may be incurred if this Specification	2
STANDARDS FOR MATERIALS:	3.04	CLEAN-UP:	
All materials and equipment shall conform to the requirements of the Contract Documents. They	Α.	During the execution of the work remove all rubbish and excess materials accumulated as a	2
shall be new, free from defects, and they shall conform to the following standards where these organizations have set standards. All materials	В.	result of the work. Remove all dirt, paint, grease and stains from all	
and equipment shall be UL listed and labeled where possible.		exposed equipment. Upon completion of work, clean all equipment and the entire installation so	
<ol> <li>Underwriters Laboratories, Inc. (UL).</li> <li>National Electrical Manufacturer's Association</li> </ol>		occupancy. No loose parts or scraps of equipment shall be left on the premises.	2
(NEMA). 3. American National Standards Institute (ANSI). Manufacturar's names and estalog numbers are	С.	Equipment paint scars shall be repaired with paint kits supplied by the equipment manufacturer.	
used as a means of establishing product grade and guality. Where several manufacturers are	3.05	TESTS, ADJUSTMENTS AND INSPECTIONS:	
named, only these named manufacturers' are to be used on the job. Other named manufacturers,	Α.	all new equipment installed or existing equipment connected.	
although acceptable as manufacturers, must prove their product will conform satisfactorily and	В.	Pay all costs for labor, materials, equipment, etc., as required for testing and adjusting of the	
Environment Corporation or equal by Wiremold or	PART 3	- EXECUTION	
All flexible duct shall be installed per	3.01	INSPECTION:	
All joints and connections shall be made with	R.	insure work of preceding trades is completed.	
tape insulation joints.	р. С	for required insulation thickness.	
INSTALLATION:	D.	Do not proceed with application until conditions are satisfactory	
Provide openings in ductwork where required to accommodate thermometers and controllers.	3.02	THICKNESS:	
Provide pitot tube openings where required for testing of systems, complete with metal can with	Α.	Supply ductwork: 1. Concealed in attics or any unconditioned	
spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork install insulation material		<ol> <li>space - 2 inch thick ductwrap.</li> <li>Concealed in return air plenums or conditioned spaces - 1 inch thick ductwrap.</li> </ol>	
inside a metal ring. Locate ducts with sufficient space around		<ol> <li>Exposed in conditioned spaces - 1 inch thick liner.</li> </ol>	
equipment to allow normal operating and maintenance activities.		<ol> <li>Exposed in unconditioned spaces and equipment rooms - 2 inch thick liner.</li> </ol>	
Connect diffusers or troffer boots to low pressure ducts with 5 feet (1.5 m) maximum length of		<ol> <li>Where also indicated on drawings to be lined - 1 inch thick liner.</li> <li>All ductwork from air bandling unit or fan</li> </ol>	
flexible duct. Hold in place with strap or clamp. Flash and counter flash around all ducts passing		connection past first elbow or first fifteen feet - 1 inch thick liner.	
through the roof using galvanized sheet securely built into Roofing in accordance with the instructions of the Roofing Contractor, Provide	В. С.	Return air ductwork: 1 inch thick liner. Outside air and mixed return and outside air	
roof curb for all penetrations.	D.	ductwork: 1 inch thick liner. Ductwork exposed to weather except exhaust	
regardless of size. Longitudinal joints in all duct sizes may be flat lock joints. Transverse joints	E.	ductwork: 2 inch thick liner. General kitchen exhaust ductwork: 1 inch	
and intermediate bracing shall be constructed of galvanized sheet metal or galvanized structural	3.03 AP	(minimum) ductwrap (liner not acceptable). PLICATION:	
angles. Lock joints shall be hammered to make them airtight inside of duct shall present a superty	Α.	Duct to be insulated includes all supply air ductwork, all outside air ductwork, mixed return	
surface to flow of air.		and outside air ductwork, all return air ductwork, and where indicated on drawings, exhaust air	
less than the duct width. Duct tap from mixing boxes to main ducts shall be made with low loss	Β.	All plenums shall be insulated as required for ductwork	
fittings. Transformations shall have a ratio of not more than 1" in transformation to each 7" of length.	C.	Joints shall be lapped 6 inches in both directions, sealed with approved mastic applied over each joint and secured in place. When wrapped	
DUCTWORK INSULATION	D.	insulation meets lined ducts overlap the insulation types 24 inches. Insulation shall be installed in a vapor-tight	
- GENERAL	2.	manner and may be fastened with the use of staples or other fastening material as recommended by insulation manufacturer	
SCOPE: Furnish all labor, materials, tools, equipment and		provided the fasteners are covered with mastic or SMACNA tape.	
related items required for the complete installation of Ductwork Insulation as indicated by the	Ε.	Where rectangular ducts are 24" in width or greater, duct wrap insulation shall be additionally	
Contract Documents. All piping insulation values (R-values) must meet that required by the applicable energy codes regardless of the		secured to the bottom of the duct with mechanical fasteners such as pins and speed clip washers, spaced 18" on centers (maximum) to account	
applicable energy codes regardless of the thickness listed.	-	spaced to on centers (maximum) to prevent sagging of insulation.	
ACCEPTABLE MANUFACTURERS:	F.	the duct wrap insulation facing with tape or mastic to provide a vapor tight seal.	
Fiberglass insulation: Owens-Corning Fiberglass, Manville, Knauf, Certainteed	G.	Where indicated to be lined, ductwork shall be insulated internally rather than externally	
Mastics: Benjamin Foster, Insul-Coustic, Chicago	U U	For internal insulation, apply insulation to inside of	

ducts and plenums with fire retardant adhesive with faced side exposed to air stream. Form longitudinal joints in corners of duct or plenu only. Tightly butt joints together and size with fire-retardant adhesive to provide a smooth surface. In ducts and plenums with one side more than 24", secure insulation with adhered with welded mechanical fasteners in addition t adhesive, fasteners spaced at 14" centers in both directions

3.04 FIELD QUALITY CONTROL: Work will not be considered complete until inspected or approved by the Architect-Engineer

- for compliance with project specifications. . No insulation shall be installed on any duct before building is adequately closed in. Where necessary to install any insulation before it is protected by building enclosures, permission shal be secured from the Architect; and where ermission is granted, the covering must be effectively protected by roofing felt, wired on covering to make an absolute waterproof
- protection for covering. Gray duct tape is not an approved material

systems. Provide all apparatus, temporary piping connection or any other requirements for all tests Take due precautions to prevent damage to the building or its contents incurred by such tests. Repair and make good any damage so caused at o additional cost to Owner.

- C. Any leaks, defects or deficiencies discovered as a result of these tests or tests performed by the Owner-retained testing and balancing firm shall be repaired and test shall be repeated until test quirements are fully complete
- D. When practical, all piping tests shall be made before pipe is covered or concealed
- E. It is the intention of this section of the specifications to provide necessary tests during and at completion of the job to ensure tight piping and ductwork and a correctly adjusted system and the Contractor shall do everything necessary to accomplish this.
- F. All motors, bearings, etc., on all equipment shall be correctly oiled and greased before the equipment is operated and again at the completion of the job. Provide complete oiling and greasing instructions for Owner's designated personnel. Grease fittings shall be installed on equipment that requires periodic greasing.

### PIPING INSULATION

ART 1 - GENERAL 1.01 SCOPE:

- A. Furnish all labor, materials, tools, equipment and related items required for the complete installation of insulation as indicated by the Contract Documents. All piping insulation values (Rvalues) must meet that required by the applicable energy codes regardless of the thickness listed 02 QUALITY ASSURANCE:
- A. Applicator: Company specializing in piping insulation application with three years minimum experience.
- B. Materials: Flame spread/fuel contributed/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255, UL 723. Under no circumstances will materials containing
- asbestos be allowed on this project site. .03 SUBMITTALS: A. Submit product data prior to ordering.
- B. Include product description, list of materials and hickness for each service, and locations C. Submit manufacturer's installation instructions. ART 2 - PRODUCTS
- 2.01 ACCEPTABLE MANUFACTURERS A. Manville., Knauf, Owens-Corning.
- 2.02 GENERAL A. All materials used shall have a flame spread rating of not more than 25 without evidence of continuous progressive combustion, and with a smoke developed rating of not higher than 50. Shop drawing submittals shall show this in form ation
- 2.03 A/C UNIT CONDENSATE DRAIN PIPING A. Use 1/2" thick "Armaflex" or equal pipe insulation ne insulation shall be threaded on the pipe, pulled back, then the connection should be made. All seams will be butt joint connection.
- .04 REFRIGERANT PIPING A Use 1/2" thick "Armaflex" of approved equal pipe insulation on the suction line. The insulation shall be threaded on the pipe, pulled back, then the connection should be made. All seams will be butt joint connection
- 2.05 ACCESSORIES A. Insulation Bands: 3/4 inch wide; 0.015 inch thick
- galvanized stee B. Metal Jacket Bands: 3/8 inch wide: 0.015 inch thick aluminum
- C. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool D. Finishing Cement: ASTM C449.

## DUCTWORK ACCESSORIES

- PART 1 GENERA 1.01 SCOPE:
- A. Furnish all labor, materials, tools, equipment and related items required for the complete installation of Ducts and all devices for proper air flow as indicated by the Contract Documents or as
- required for good practice.
- 1.02 REFERENCES:
- A. NFPA 90A Installation of Air Conditioning and Ventilating Systems.
- B. SMACNA Low Pressure Duct Construction Standards
- C. UL 33 Heat Responsive Links for Fire-Protection
- D. UL 555S Fire Dampers and Ceiling Dampers. PART 2 PRODUCTS
- 2.01 GENERAL
- A. In each square elbow, provide airfoil pattern double thickness turning vanes. Turning vanes shall be constructed in accordance with SMACNA Manual. Turning vanes shall be equal to Barber Coleman, "Air-Tums", Tuttle and Bailey "Duct-
- B. At each low pressure ductwork branch from a low pressure duct and at each sweeping elbow takeoff to a grille, provide a splitter damper consisting of blade on a square operating rod fitted with a adjusting device except at flexible duct take-off Unless otherwise indicated on plans, the adjusting devices shall consist of a control rod
- and Ventfabric, Inc. No 603 ball joint bracket. Provide where indicated a Model SM-2DE spin-in fitting with extractor and damper operator as manufactured by General Environment Corporation, or approved equal, for low pressure
- aps to ceiling diffusers D. Each individual air supply or return unit, whether sidewall or ceiling diffuser shall be fitted with a device to permit the adjustment of the amount of air supplied to the unit independently of any othe outlet. These devices may take the form of outlet boots with Santrols, or of branch duct with splitter dampers, as installation conditions dictate, but in any case, each shall be fitted with a means of manual adjustment of the amount of air delivered
- to the outlet. E. Flash and counter flash around all ducts passing through the roof using galvanized sheet securely built into the roofing in accordance with the nstructions of the Roofing Contractor. Provide
- roof curb for all penetrations F. Ductwork where required shall have 1", 1 1/2 lb. Johns-Manville "Micro-Bar" duct liner G. Flexible ductwork shall be installed to supply
- diffusers, with length not to exceed five feet (5'-2.02 FIRE DAMPERS, SMOKE DAMPERS, AND
- COMBINATION FIRE AND SMOKE DAMPERS: A. Fire Dampers
- 1. Fabricate in accordance with NFPA 90A and UL 555S requirements and shall carry the corresponding label and shall be in accordance, also with pertinent regulations of
- the Local Governing Authorities. 2. Fire dampers shall be of solid steel curtain type with corrosion resistant steel blades and with frames which shall be continuous onepiece roll formed construction with mounting langes. In closed position the blades sha interlock completely. Horizontally mounted dampers shall close and shall be locked by the use of stainless steel springs. Damper reset shall be accomplished by use of acces
- panels which shall be furnished and installed Fire dampers for low pressure rectangular ducts shall be Type B with 95% or greater free area. Fire dampers for round or oval ducts shall be Type C with 100% free area. Fire ampers for medium pressure rectangula ducts shall be Type C with 100% free area
- 4 Fabricate ceiling firestop flaps of galvanized steel, 22 gauge (0.76 mm) frame and 16 gage 1.5 mm) flap, two lavers 0,125 inch (3.2 mr eramic fiber on top side and one laver on bottom side for round flaps, with locking clip.

- E. Fibrous Glass Cloth: Untreated; 9 oz/sq. yd. (305 g/sq. m) weight. Adhesives: Compatible with insulation and suitable for return air use if used in those spaces.
- PART 3 EXECUTION PREPARATION 3.01
- Do not apply any insulation until piping has been inspected, pressure tested and found tight. B. All surfaces to be insulated shall be cleaned and
- dried before applying insulation. 3.02 INSTALLATION:
- A. Install materials in accordance with manufacturer's instruction
- Continue insulation with vapor barrier through penetrations. In exposed piping, locate insulation and cover
- eams in least visible locations On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible
- onnections, and expansion joints Provide an insert, not less than 6 inches (150 mm) long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2 nches (50 mm) diameter or larger, to prevent insulation from sagging at support points. Inserts shall be cork or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used. Neatly finish insulation at supports, protrusions,
- and interruptions A/C UNIT CONDENSATE DRAIN PIPING 3.03 INSULATION INSTALLATION:
- Insulate all condensate drain piping and fittings within the building.
- B. Install insulation in strict accordance with manufacturer's instruction. Seal all joints and seams with manufacturer's recommended adhesive to provide continuous vapor seal.
- AIR CONDITIONING EQUIPMENT
- PART 1 GENERAL
- 1.01 SCOPE:
- A. Furnish all labor, materials, tools, equipment items required for the complete installation of Air Conditioning Equipment as indicated by the Contract Documents
- 1.02 WARRANTY: A. Provide five year unconditional warranty on
- mpressor units B. Provide a ten (10) year unconditional warranty for
- all heat exchangers from the manufacturer. 1.03 QUALITY ASSURANCE:
- A. Meet the requirements of UL and applicable
- B. Test and rate cooling systems to Air-Conditioning and Refrigeration Institute Standard 210. PART 2 - PRODUCTS
- PACKAGED ROOFTOP UNITS: 2.01
- A. Roof Top Constant Volume, Gas Fired Heating and Cooling units shall be as scheduled and shown on plans. Cooling capacity ratings shall be based upon test in accordance with ARI standard 360. Units shall consist of insulated roof curb, compressor, air cooled condenser coil, condenser fans, Gas Fired Heat exchanger, condensate drain pans, evaporator fans, return fans (if applicable), motors and drives. Units shall also include filters and unit controls. B. Unit shall be provided with economizer if
- scheduled on the drawings.
- Cabinet: Steel with baked enamel finish, access doors or removable access panels with quick fasteners, screwdriver operated flush cam type. Structural members shall be minimum 18 gage with access doors or removable panels, minimum 20 gage.
- 5. Fabricate ceiling dampers of galvanized steel, 2 gage (0.76 mm) frame, stainless stee closure spring, and light weight, heat retardant PART 1 - GENERAL ion-asbestos fabric blanket closure
- Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades
- out of air stream except for low pressure ducts up to 12 inches (300 mm) in height. . Fabricate multiple blade fire dampers with 16 gage (1.5 mm) galvanized steel frame and lades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles 1/8 x 1/2 inch (3.2 x 12.7 mm) plated steel
- concealed linkage, stainless steel closure spring, blade stops, and lock. 8. Fusible links, UL 33, shall separate at 160 degrees F. Provide adjustable link straps for
- combination fire/balancing dampers C. Combination Fire and Smoke Dampers: Fabricate in accordance with NFPA 90A and UL 555S, and as indicated.
- Provide factory sleeve for each dampe Install damper operator on exterior of sleeve and link to damper operating shaft
- 3. Fabricate with multiple blades with 16 gage (1.5 mm) galvanized steel frame and blades oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles stainless steel jamb seals, 1/8 x 1/2 inch (3.2 x 12.7 mm) plated steel concealed linkage stainless steel closure spring, blade stops and lock, and 1/2 inch (12.7 mm) actuator
- 4. Operators shall be spring return electric type suitable to operate on 120 V AC, 60 cycle Operators shall be UL listed and labelled Provide end switches to indicate damper
- Smoke Dampers: 1. Fabricate in accordance with NFPA 90A and UL 555S, and as indicated. 2. Normally Closed Smoke Vent Dampers Curtain type, opening by gravity upor
- actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure. 3. Normally Open Smoke Damper: Curtain type,
- losing upon actuation of electro thermal link flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices ensure positive closure for units mounted horizontally. PART 3 EXECUTION

3.01 INSTALLATION:

- Install accessories in accordance with manufacturer's instructions.
- Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.
- Provide fire dampers, combination fire and smoke dampers and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistan springs, bearings, bushings and hinges. Install fire dampers of equal or greater fire rating as the wall or ceiling penetrated.
- Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative. Provide backdraft dampers on all exhaust fans or
- exhaust ducts nearest to outside and where Provide flexible connections immediately adjacent
- to equipment in ducts associated with fans and motorized equipment.
- Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, adjustmen of backdraft dampers and elsewhere as indicated Provide minimum 8 X 8 inch size for hand access 18 X 18 inch size for shoulder access, and as indicated.

- Insulation: Neoprene coated glass fiber on surface where conditioned air is handled. Protect edges from erosion Supply Fan: Centrifugal class 1 type rubber
- mounted V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounte motor. Fan motor shall have overcurrent and high temperature protection. Complete fan assembly shall be vibration isolated.
- Air Filters: 2 inch thick glass fiber disposable media in metal frames arranged for easy replacement.
- G. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection, capillary tubes, and expansion valve. Evaporator coil shall have full active face to assure proper treatment of all air flowing through unit. The coil shall be leak tested to 200 PSI and pressure tested to 450 PSI
- Refrigeration system shall contain sealed hermetic high efficiency compressors with service valves, vibration isolation crankcase heaters. sight glasses, and filter driers. Provide internal overcurrent and over temperature protection on
- Crankcase heaters shall be standard on all units. Provide copper tube aluminum fin condenser coil assembly with sub-cooling row Condenser fans shall be direct drive, statically
- and dynamically balanced with permanently lubricated bearings and built-in thermal overload
- L. Provide refrigerant pressure switch to cycle condenser fans. M. Heating Section shall be gas fired, completely
- assembled and integral with the unit complete with electronic ignition. The heat exchanger shall be tubular two-pass design with 16 gauge aluminized steel primary and 18 gauge secondar heat exchanger surfaces. Free-floating design to eliminate contraction and expansion stresses and noises. The burner shall be industrial type power burner with air proving switch. Automatic pressure sensing safety switch to prevent burne operation if burner is open for maintenance or inspection. The ceramic burner cone shall shape the flame to prevent impingement on sides of heat exchanger drum Burner assembly shall house the electronic ignition. Provide all operating and safety controls with continuous electronic
- ame supervision. Dampers: Provide motorized minimum outside air dampers with damper operator and control package to automatically open when the unit is running in the occupied mode. Outside air damper shall fail to closed position. Provide tig fitting dampers with edge gasket: 24 volt, spring return with motor and gear train sealed in oil. Unit connection - power wires in the unit shall be powered by single-point terminal connections. All

utility connections shall be routed through bottom

P. Provide complete roof insulation roof curb. Unit

shall be mounted on curb with an airtight seal

Roof curb shall be of the same manufacturer as

unit and shall include an insulated panel under

compressor section to prevent condensation from

to allow for easy duct location and connection to

roof curb prior to unit placement. Curb design

Association requirements.

shall comply with National Roofing Contractor's

Compressor circuit breakers current sensitive and

temperature compensated to shut off compresso

protection with automatic reset to de-energize the

protected by: fusible plug, low and high pressure

Low-pressure switch to automatically shuts off the

compressor if refrigerant pressure drops below

The work included in this Section consists of the

services required in connection with the Testing

Ventilating and Air Conditioning (HVAC) systems

furnishing of all labor, instruments, tools and

Adjusting and Balancing (TAB) of the Heating.

as described in the mechanical specifications

The TAB Firm is responsible to and shall submit

and/or shown on the mechanical plans, or

all reports directly to the Architect/Engineer

temperature, airflow and noise levels in the

The following basic components of the HVAC

systems shall be tested, adjusted and balanced:

reviewing the HVAC plans and specifications

TAB services shall result in the optimum

conditioned spaces of the project.

. Air Distribution Systems

Air Moving Equipment

Document Review

QUALIFICATIONS:

. Heating Systems (HVAC

Control Systems Verification

1. The TAB Firm shall be responsible for

relating to the TAB services for proper

arrangement and adequate provisions of

2. TAB Firm shall review HVAC manufacturer's

submittal data relative to balanceability

TAB Firm shall review submitted HVAC

All work is to be performed by an independent

Test and Balance Agency (TAB Agency) that

the testing and balancing of air and hydronic

specializes in, and whose business is limited t

systems. The TAB Agency shall be fully certified

All instruments shall be accurately calibrated and

by the Associated Air Balance Council (AABC)

maintained in good working order. If requested

the TAB Agency shall provide proof of having

successfully completed at least five projects of

All personnel used on the job site shall be eithe

TAB engineers or TAB technicians, who shall

Firm for a minimum of six (6) months prior to

SERVICES OF CONTRACTOR To prepare for

specifications the term "Contractor" refers to the

lechanical Contractor and Electrical Contractor

The term TAB Agency refers to the company

The Contractor shall start up and test all materials

and equipment which normally require testing. A

equipment is free from mechanical defects, runs

moothly and quietly and performs satisfactoril

at the Contractor's expense to prove to the

Architect/Engineer and/or Owner that the

to meet the requirements set forth in the

In order that all HVAC systems can be properly

ested, adjusted and balanced, the Contractor

shall operate the HVAC systems at his expens

for the length of time necessary to properly veri

further operate and pay all costs of operation

paid for by the Contractor will include, but not

Utility costs; electrical, water, gas, etc.

necessarily be limited to, the following:

All start-up labor and material costs

The plans and specifications have indicated

valves, dampers and miscellaneous adjustme

devices for the purpose of testing, adjusting and

balancing the HVAC systems to obtain optimur

HVAC equipment.

All maintenance costs.

their completion and readiness for TAB, and shall

during the TAB period. Operating expenses to be

Personnel costs to start, operate and stop all

mechanical plans and specifications.

equipment shall operate a sufficient length of time

working on this specific project.

For the purposes of this section of the

joint combination of General Contractor

performing the tests and adjustments.

1.03

have been permanent, full-time employees of the

The tab agency shall be approved by the

similar size and scope during the past five years.

onformity to the specifications.

devices for testing, adjusting and balancing

automatic temperature control sequences for

reasonably implied therefrom.

and/or Owner

being subjected to starting current more than

if current draw is excessive. Must be manually

reset. Provide inherent compressor thermal

control circuit if extreme motor temperature

should occur due to excessive suction gas

Safety controls - Cooling section shall be

stat, compressor; the compressor motor fr

setting for loss of charge protection.

HVAC TESTING AND BALANCING

temperature or motor overloading.

once every 5 minutes.

1.01 SCOPE

forming on bottom. Dimensions shall be provided

of unit

- Fusible plugs located in the refrigerant system protect against excessive pressures or temperatures in case of fire or other abnormal high-temperature condition. Inherent outdoor fan motor protection with
- automatic reset. Power circuit opens if motor emperature becomes excessive. When the unit is running during the occupied hours the minimum outside air damper shall b open. When the unit is off or is running in the inoccupied mode the outdoor air dampers shall be closed
- The dry-bulb economizer shall allow the outside air dampers to open and the return air dampers to close to provide "free cooling" when the outside air is below 57°F. Maintain selected mixed air temperature and lock out compressor below approximately 57°F ambient, return dampers to minimum position above approximately 70°F
- Provide a programmable room thermostat with a remote sensor with fan ON-AUTO and system HEAT-OFF-COOL-AUTO switches When the rooftop unit is factory furnished with one or more smoke detectors provide a switch and pilot light indicator to remotely show if it is in the tripped position and to reset the smoke
- SPLIT SYSTEM UNITS: 2.02 Unit shall be quiet operating and designed to mount horizontal or vertical, suspended or pa mounted as indicated on the Drawings. Indoo furnace coil unit and condensing units shall be matched systems provided by the same manufacturer.
- Blower(s) shall be forward curved complete with motor and adjustable speed drive. Heat Exchanger shall be welded heavy gauge steel and designed for even heat distributio without cracking of snapping on start-up. Gas burners shall be designed for high combustion efficiency and long life. Heating section shall be complete with shut-off valve, fan and limit control, 24-volt gas valve and pressure regulator, all factory mounted. Heater shall be located upstream of cooling coil. Unit shall be supplied
- with natural draft combustion system. Direct expansion refrigerant cooling coils shall be non-ferrous tubes mechanically bonded to non ferrous fins. Units shall be furnished with expansion valves
- Casings shall be bonderized or phosphatized and inished with a baked enamel coating. Casings shall be insulated internally, shall be complete with drain pan and connection and shall be arranged to provide access to all internal parts by the convenient removal of panels, access doors, etc. Unit shall incorporate standard size filters. Units shall be mounted on or suspended with approved vibration isolators.
- Units shall be complete with filter section. Units shall have condensate drain pans internally Where required by local authorities fabricate secondary drain pans from a piece of single galvanized steel with welded corners. Provide drain pans under coils. Coordinate drain pan and condensate drain with plumbing installer. CONDENSING UNIT
- Unit shall be air cooled designed for installation outdoors. Unit shall be self-contained, factory wired and requiring no field assembly. Unit shall operate properly from 40°F to 150°F ambient temperature unless low-ambient controls are ndicated on the drawings Units shall be provided with all operating and
- safety controls including unloaders, when available for the size unit provided, high and low pressure control, starter, overcurrent protectio levices, crankcase heater, short-cycle preventio control, lubrication system, charging valves and where normally available, filter-dryer, sight glass and moisture indicator. Units shall be factory charged and tested
- Condenser coil construction shall be copper tube and aluminum fin. Condenser fan shall be axial flow propeller type with weather-proof moto

operating conditions. It will be the responsibility of the Contractor to install these devices in a manner that will leave them accessible and readilv adiustable. The TAB firm shall be consulted if there is a questionable arrangement of a control or adjustable device. Should any such device not be readily accessible, the Contractor shall provide access as required by the TAB firm

- The Contractor shall provide and coordinate the services of qualified, responsible sub-contractors suppliers, and personnel as required to correct repair or replace any and all deficient items or conditions found before and during the TAB
- As a part of this Project Contract, the Contractor shall make any changes in the sheaves, belts, motors, dampers or the addition of dampers and/or valves as required to correctly balance the HVAC systems as required by the TAB firm at no additional cost
- Provide sufficient time in Project Contract ompletion schedule to permit the completion of TAB services prior to Owner occupancy of the
- H. The Contractor shall furnish without charge to the 1. One set of mechanical specifications and all
- All pertinent change orders Two complete sets of mechanical plans with
- latest revisions. "As-installed" drawings Approved control diagrams and submittals
- Approved manufacturer's submittals for all HVAC equipment. Have all HVAC systems complete and in perational readiness prior to notifying the TAB Firm that the project is ready for TAB services. So certify in writing to the Architect/Engineer and/or Owner that such a condition exists. Complete operational readiness prior to
- commencement of TAB Services shall include the 1. Construction status of building shall permit the closing of doors and windows, ceilings
- installed, etc., to permit the obtaining of projected actual operating conditions. Air Distribution Systems: Verify installation for conformity to design of all supply, return and exhaust ducts Document and certify that all duct leakage
- tests as required by the mechanical specifications have been performed and the test results are within specified limits. b. Verify that all volume dampers, smoke dampers and fire dampers are properly located, functional and open.
- Verify that minimum outside air, maximum outside air, return air and relief air dampers provide tight closure, open fully and have smooth and free operation d. Verify that all supply, return, exhaust and
- transfer diffusers, grilles and registers are installed as indicated on the mechanical e. Verify that the correct size and type of
- terminal boxes are installed as indicated on the mechanical plans, and that they are operational. f. Install clean filters at each air handling unit
- and maintain these filters for the complete period that the subject system is being tested, adjusted, and balanced. g. Verify that all (supply, return, relief and
- exhaust) fans are operational including proper fan rotation, free from vibrations and proper belt tension. h. Verify that all motor starter overload heater
- elements are of proper size and rating. Make a record of actual motor amperag and voltage and verify that they do not exceed nameplate ratings. Automatic Controls:
- Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks damper sequences, air resets, firestat, freezestat safeties, etc.
- b. Verify that all controlling instruments are calibrated and set for designed operating

PART 3 - EXECUTION INSTALLATION: 3.01

- A. The design on the drawings (electrical, structural, etc.) is based on the manufacturer listed. If the unit is furnished by one of the other listed manufacturers, the Contractor shall be responsible or any modifications required to nstall such manufacturers unit. This shall include, but not be limited to, increases in uni electrical feeder sizes, switch and fuse or breake sizes, structural bracing, etc.
- Air unit to be supplied with filters during the construction phase of the project. After project completion, all filters to be changed. Provide one additional complete set of filters. All wiring shall be in accordance with the National
- Electric Code Mount units level on factory built roof mounting frame providing watertight enclosure to protec
- ductwork and utility services. Mount units level. Roof top unit shall be located where shown on the drawings. All equipment is to be installed with service clearance as recommended by the manufacture or as required by applicable codes Install rooftop equipment sufficiently away from
- inprotected edges of the roof as required by OSHA. Install all fresh air intakes at least ten feet from exhaust outlets or plumbing vents. If in the opinion of the Roof Top Manufacturer additional external spring isolation is required to
- insure NC levels do not exceed 35 (max), said manufacture shall include external spring when pricing Roof Top Unit to contractor. Architect and Engineer shall be notified before bidding if additional spring isolation is required, in writing from the manufacturer. SEQUENCE OF OPERATIONS
- A. Cooling
- 1. The room thermostat shall control the cooling 2. The fan may either run continuously or be cycled by the thermostat. This function shall be set at the thermostat.
- Heating 1. The furnace shall be controlled by the room 2. In the 'AUTO' position, the fan shall be
- ontrolled by a bonnet switch of timer 3. The fan may either run continuously or be
- cycled by the thermostat. This function shall be set at the thermostat. Minimum outside air damper: open on fan start and close on fan stop.

### KITCHEN VENTILATION SYSTEMS

- PART 1 GENERAL SCOPE: 1.01
- Furnish all labor, materials, tools, equipment items required for the complete installation of kitchen hoods, grease exhaust ducts, make-up ai units, and controls as indicated by the Contract Documents. This contractor shall inspect the kitchen plans for the items to be furnished by the Kitchen Equipment Supplier. At times some of the mechanical equipment, hoods, fans and accessories will be provided by that supplie This contractor shall provide the items not listed by the kitchen supplier and other miscellaneous items to make a complete installation.
- WORK INCLUDED Make-Up Air Unit.
- Roof mounting frame. Kitchen Hood
- Kitchen Hood Fire Protection
- Grease Ducts Exhaust Fans
- Controls. 1.03
- REFERENCES: AMCA - Air Movement and Control Association
- ASHRAE American Society of Heating Refrigeration and Air Conditioning Engineer SMACNA - Low Pressure Duct Construction Standards.

conditions with the exception of roon thermostats or sensors which shall be calibrated at the completion of TAB services with cooperation between TAE

- Firm and controls contractor. The Automatic Temperature Control contracto and/or Energy Management System contracto shall thoroughly check all controls. sensors operators, sequences, etc. before notifying the TAB agency that the Automatic Temperature Controls and Energy Management System are operational. The Automatic Temperature Control contractor and/or Energy Management System contractor shall provide technical support (technicians and necessary computers) to the TAB agency for a complete check of these
- K. The mechanical and/or sheet metal contractor shall correct any deficiencies at no additional cost to the owner.
- The scope of the TAB work as defined herein is indicated in order that the Contractor will be apprised of his responsibility regarding the coordination and assistance required to complet the Project Requirements for final TAB. The TAB Firm will be responsible to the Architect/Enginee and/or Owner for the satisfactory execution of the TAB services.
- SERVICES REQUIRED of the TAB Agency A. Liaison: The TAB personnel on the job shall act as liaison between the Architect/Engineer, Owner and Contractor.
- B. Early Inspection: Inspect the installation of sheet metal work, temperature controls and other component parts of the HVAC systems during the construction stage for the purpose of reviewing that part of the work relating to proper arrangement and adequate provisions for TAB 2. TAB Firm Services
- 1. The TAB personnel shall test, adjust and balance the HVAC systems to provide optimum temperature, airflow and noise conditions in the conditioned spaces in the building while the HVAC equipment is
- perating efficiently. The Firm shall be responsible for testing adjusting, balancing and logging actual data on all air distribution and air moving equipment, pumps, heating and cooling equipment and the operating conditions of a
- motors, etc. as indicated in this specification Upon completion of the installation and start-up of the systems, the TAB Agency shall be responsible to inspect, check, test, adjust, balance and record data on the performance of the air systems and components thereof in accordance with AABC National Standards for Field Measurement and instrumentation and other standards as published by the AABC. E. In all fan systems, the air quantities shown on the plans may be varied as required, but the total air quantity indicated for each zone must be
- Guarantee

1.09

1 04

- Provide extended warranty of twelve (12) months after occupancy during which time the Architect/Engineer and/or Owner may, at his discretion, request check of the balance of any HVAC equipment. Provide TAB technicians to assist as required in making such tests. When any device is found not balanced in accordance with the mechanical plans and specifications, that HVAC system shall be completely rebalanced as directed by the Architect/Engineer and/or Owner at the TAB firm's expense.
- B. Submit six (6) copies of a written report to the Engineer within 30 days after inspection is complete. List all complaints and malfunctions encountered and indicate steps taken or needed to be taken to correct

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Release/Revision

Designed:

Drawn:

Checked:

Sheet Title:

AE Project No :

GENERAL

MECHANCIAL

SPECIFICATIONS

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