

DESIGN WEATHER PARAMETERS	
Design Parameters:	
City Name	Springfield
Location	Missouri
Latitude	37.2 Deg
Longitude	93.4 Deg
Elevation	1270.0 ft
Summer Design Dry-Bulb	85.0 °F
Summer Coincident Wet-Bulb	74.0 °F
Summer Daily Range	20.8 °F
Winter Design Dry-Bulb	3.0 °F
Winter Design Wet-Bulb	1.2 °F
Atmospheric Clearness Number	0.85
Average Ground Reflectance	0.20
Soil Conductivity	0.800 BTU/(h-ft-F)
Local Time Zone (GMT +/- N hours)	6.0 hours
Consider Daylight Savings Time	No
Simulation Weather Data	Bridgeport (TM2)
Current Data is	2001 ASHRAE Handbook
Design Cooling Months	January to December

HVAC LOAD CALCULATIONS	
Air System Information	
Air System Name	Express RTU
Equipment Class	PKG ROOF
Air System Type	SCZAV
Sizing Calculation Information	
Calculation Months	Jan to Dec
Sizing Data	Calculated
Central Cooling Coil Sizing Data	
Total coil load	19.2 Tons
Total coil load	235.7 MBH
Sensible coil load	175.4 MBH
Coil CFM at 55°F	8000 CFM
Max block CFM	8000 CFM
Sum of peak zone CFM	8000 CFM
Sensible heat ratio	0.778
Wt/Fm	305.1
BTU/(h-ft²)	35.8
Water flow @ 10.0 °F rise	NA
Central Heating Coil Sizing Data	
Max col load	222.1 MBH
Coil CFM at Des Htg	8000 CFM
Max col CFM	8000 CFM
Water flow @ 20.0 °F drop	NA
Supply Fan Sizing Data	
Actual max CFM	8000 CFM
Standard CFM	7600 CFM
Actual max CFM1	1.07 CFM1
Fan motor BHP	1.44 BHP
Fan static	1.14 in wg
Fan static	1.00 in wg

DESIGN COOLING	
COOLING DATA AT JUL 1500	
COOLING OA DB / WB 85.0 °F / 74.0 °F	
HEATING DATA AT DES HGT	
HEATING OA DB / WB 3.0 °F / 1.2 °F	
ZONE LOADS	
Window & Skylight Solar Loads	352 Bt
Wall Transmission	2847 Bt
Roof Transmission	7500 Bt
Window Transmission	362 Bt
Skylight Transmission	0 Bt
Door Loads	191 Bt
Floor Transmission	7500 Bt
Partitions	0 Bt
Ceiling	0 Bt
Overhead Lighting	5670 W
Task Lighting	10875 W
Electric Equipment	4230 W
People	93
Institution	19449
Miscellaneous	1500
Safety Factor	11110
>> Total Zone Loads	12215
Zone Conditioning	127559
Plenum Wall Load	0
Plenum Roof Load	709
Plenum Lighting Load	306
Ratium Fan Load	8000 CFM
Ventilation Load	1675 CFM
Supply Fan Load	8000 CFM
Space Fan Coil Fans	0
Duct Heat Gain / Loss	0
>> Total System Loads	179416
Control Cooling Coil	179416
Control Heating Coil	0
>> Total Conditioning	179416
Key:	
Positive values are ckg loads	
Negative values are hkg loads	

# OUTSIDE AIR CALCULATIONS

1. Summary

Ventilation Sizing Method

ASHRAE Std 62.1-2007

Design Condition

Heating operation

Occupant Diversity

1.000

Unoccupied Ventilation Airflow Rate

1811 CFM

System Ventilation Efficiency

0.902

Design Ventilation Airflow Rate

1678 CFM

2. Space Ventilation Analysis Table

Zone Name / Space Name	Supply Air (CFM)	Floor Area (ft²)	Required Outdoor Air (CFM/person)	Time Averaged Occupancy	Required Outdoor Air (CFM/person)	Air Distribution Effectiveness	Required Outdoor Air (CFM)	Unconnected Outdoor Air (CFM)	Space Ventilation Efficiency
Zone 1									
FITTING	303	382.0	0.12	2.5	7.50	0.80	31	65	0.921
NON-SALES	1307	1548.0	0.12	7.7	0.00	0.80	232	199	1.067
OFFICE	203	95.0	0.06	2.0	5.00	0.80	20	18	1.062
SALES	5395	5300.0	0.12	80.3	7.50	0.80	1648	1238	0.902
CORRIDOR	65	100.0	0.08	0.5	0.00	0.80	8	6	1.101
TOILET	196	75.0	0.00	0.0	0.00	0.80	0	0	1.189
Totals	8000						1511	0.902	

## HVAC LOAD CALCULATIONS

NOT USED	
J	
GRD SCHEDULE	
E	
HVAC EQUIPMENT SCHEDULES	
A	

HVAC EQUIPMENT COMMISSIONING	
DETAILED HVAC COMMISSIONING INFORMATION IS INCLUDED IN THE ESD&C SITE MANUAL PROVIDED TO THE CONTRACTOR AT THE START OF THE PROJECT.	
CONTRACTOR MUST CONTACT HVAC EQUIPMENT MANUFACTURER/VENDOR DURING THE FIRST WEEK AFTER AWARD OF CONTRACT TO SET PRELIMINARY DATES FOR HVAC EQUIPMENT AND CONTROLS INSPECTION AND COMMISSIONING.	
LIST TO BE COMPLETED BY THE MECHANICAL CONTRACTOR PRIOR TO HVAC INSPECTION / COMMISSIONING:	
1. CONNECT AND BLEED CONDENSATE, DUCTWORK, NATURAL GAS, CHILLED WATER PIPING AND/OR CONDENSER WATER PIPING.	
2. CHARGE HVAC SYSTEMS WITH REFRIGERANT FOLLOWING MANUFACTURER'S GUIDELINES AND INSTRUCTIONS.	
3. COLD WEATHER CONDITIONS REQUIRE SPECIFIC PROCEDURES. CONTACT MANUFACTURER FOR TECHNICAL SUPPORT.	
4. DISCONNECT POWER TO THE HVAC EQUIPMENT FOR A MINIMUM OF 24 HOURS. NOTE: IN COLD WEATHER SITUATIONS, DO NOT OPERATE THE UNITS PRIOR TO COMMISSIONING!	
HVAC EQUIPMENT SHOULD BE STARTED UP EARLY IN THE PROJECT. COORDINATE EARLY START UP OF EQUIPMENT WITH MANUFACTURER.	
NOTE: THE GC MAY BE BACK CHARGED FOR ADDITIONAL HVAC VENDOR SITE VISITS BEYOND THE FIRST THREE (3) NECESSARY TO DOCUMENT THE RESOLUTION OF THE HVAC PUNCHLIST ITEMS.	
HVAC COMMISSIONING PROCESS	
VISIT 1: HVAC INSPECTION AND EQUIPMENT START-UP	
1. MECHANICAL CONTRACTOR AND ELECTRICAL CONTRACTOR MUST BE ON SITE DURING THIS HVAC INSPECTION AND START-UP VISIT. EACH CONTRACTOR SHALL INCLUDE 5 HOURS FOR THE HVAC INSPECTION AND EQUIPMENT START-UP. (NOTE: THESE HOURS ARE TO BE USED FOR THE COMPLETION OF THE COMMISSIONING PROCESS ONLY. ADDITIONAL HOURS WILL NOT BE APPROVED FOR WORK THAT WAS IN SCOPE AND NOT COMPLETED PRIOR TO THE COMMISSIONING PROCESS.)	
2. CONTRACTOR TO COMPLETE AND EMAIL (OR FAX) THE HVAC EQUIPMENT START UP SURVEY TO HVAC VENDOR PRIOR TO THIS VISIT.	
3. MECHANICAL CONTRACTOR WILL COORDINATE THE HVAC EQUIPMENT COMMISSIONING AND SHALL BE RESPONSIBLE FOR COMMUNICATING SCHEDULE DATE CHANGES TO HVAC VENDOR AND SUBCONTRACTORS.	
4. PROVIDED THERE ARE NO HVAC INSTALLATION ISSUES, SYSTEMS SHALL BE STARTED FOR TEMPORARY OPERATION ON LOCAL CONTROL DURING THIS VISIT.	
5. IF THERE ARE HVAC INSTALLATION PUNCHLIST ITEMS, THE GC MUST CORRECT THEM AND RESCHEDULE INSPECTION VISIT WITH HVAC VENDOR.	
VISIT 2: HVAC CONTROLS COMMISSIONING	
THE CONTROLS COMMISSIONING IS PERFORMED BY THE HVAC VENDOR IN CONJUNCTION WITH THE GENERAL CONTRACTOR, MECHANICAL CONTRACTOR AND ELECTRICAL CONTRACTOR. EACH CONTRACTOR SHALL INCLUDE 4 HOURS TO COMPLETE THE CONTROLS COMMISSIONING. (NOTE: THESE HOURS ARE TO BE USED FOR THE COMPLETION OF THE COMMISSIONING PROCESS ONLY. ADDITIONAL HOURS WILL NOT BE APPROVED FOR WORK THAT WAS IN SCOPE AND NOT COMPLETED PRIOR TO THE COMMISSIONING PROCESS.)	
FOLLOW THE CONSTRUCTION DRAWINGS AND MANUFACTURER'S DETAILS AND DRAWINGS DURING THE INSTALLATION OF THE HVAC CONTROL EQUIPMENT.	
1. CONTRACTOR TO COMPLETE AND EMAIL (OR FAX) THE CONTROLS COMMISSIONING SURVEY TO HVAC VENDOR PRIOR TO THE CONTROL COMMISSIONING.	
2. CONNECT THE HVAC CONTROLS TO AN OPERATIONAL ANALOG PHONE LINE OR ETHERNET CONNECTION TO ALLOW COMMUNICATION. IF NECESSARY, UTILIZE SITE FAX LINE TO CONNECT TO THE CONTROLS MODEM IN THE IFB.	
3. CONTACT HVAC VENDOR AT THE SCHEDULED TIME FOR THE CONTROLS COMMISSIONING.	
4. PROVIDED THERE ARE NO OPEN ISSUES, VISIT 2 IS COMPLETE. IN THE EVENT THERE ARE OPEN ITEMS, THE GC MUST CORRECT THEM AND RESCHEDULE THE CONTROLS COMMISSIONING.	
VISIT 3: FINAL HVAC INSPECTION	
THIS VISIT IS TO DO A FINAL INSPECTION OF THE HVAC EQUIPMENT AND CONTROL INSTALLATION. THIS VISIT MUST TAKE PLACE PRIOR TO CONSTRUCTION COMPLETION.	
THE FOLLOWING ITEMS MUST BE COMPLETED PRIOR TO THE INSPECTION:	
1. HVAC SYSTEM INSTALLATION IS COMPLETE - NO OPEN PUNCHLIST ITEMS EXCEPT FOR POSSIBLY THE PERMANENT PHONE LINE.	
2. AIR BALANCE IS COMPLETE. NOTE: AIR BALANCE IS IN THE CONTRACTOR'S SCOPE OF WORK.	
THE GC MUST COMPLETE THE HVAC VENDOR SITE VISIT #3 SURVEY FORM PRIOR TO SCHEDULING THIS VISIT.	
THE GENERAL CONTRACTOR, MECHANICAL CONTRACTOR AND ELECTRICAL CONTRACTOR SHALL BE ON SITE DURING THE FINAL INSPECTION. EACH CONTRACTOR SHALL INCLUDE 4 HOURS FOR THE FINAL HVAC INSPECTION. (NOTE: THESE HOURS ARE TO BE USED FOR THE COMPLETION OF THE INSPECTION ONLY. ADDITIONAL HOURS WILL NOT BE APPROVED FOR WORK THAT WAS IN SCOPE AND NOT COMPLETED PRIOR TO THE FINAL INSPECTION.)	
1. MECHANICAL CONTRACTOR WILL COORDINATE THE HVAC EQUIPMENT COMMISSIONING AND SHALL BE RESPONSIBLE FOR COMMUNICATING SCHEDULE DATE CHANGES TO HVAC VENDOR AND SUBCONTRACTORS.	
2. FILTERS ARE TO BE REPLACED DURING THIS VISIT. FILTERS ARE TO BE PROVIDED BY THE MECHANICAL CONTRACTOR AND SHALL BE ON SITE WHEN THE HVAC VENDOR TECHNICIAN ARRIVES.	
3. THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT OF SHUTTERS, RULLEYS, AND BELTS AS NEEDED FOR PROPER AIR BALANCE.	
4. WHEN COMPLETE AND OPEN CONTRACTOR HVAC ISSUES ARE RESOLVED A CONTROL NUMBER IS ISSUED BY THE HVAC VENDOR. IT IS RECORDED INSIDE THE CONTROL PANEL DOOR IN THE IFB ELECTRICAL PANEL AND ON THE FINAL VISIT CHECKLIST.	
5. IN THE EVENT THERE ARE OPEN ITEMS, THE CONTRACTOR MUST CORRECT THEM AND RESCHEDULE THE FINAL HVAC INSPECTION.	
6. THE HVAC CONTROL NUMBER WILL BE ISSUED AT THE END OF THE VISIT PROVIDED THERE ARE NO UNRESOLVED HVAC PUNCHLIST ITEMS.	
THE HVAC VENDOR TECHNICIAN WILL WRITE THE HVAC CONTROL NUMBER ON THE STICKER INSIDE THE CONTROL PANEL (OR THE CONTROL SECTION OF THE IFB PANEL) AND ON THE FINAL VISIT CHECKLIST.	

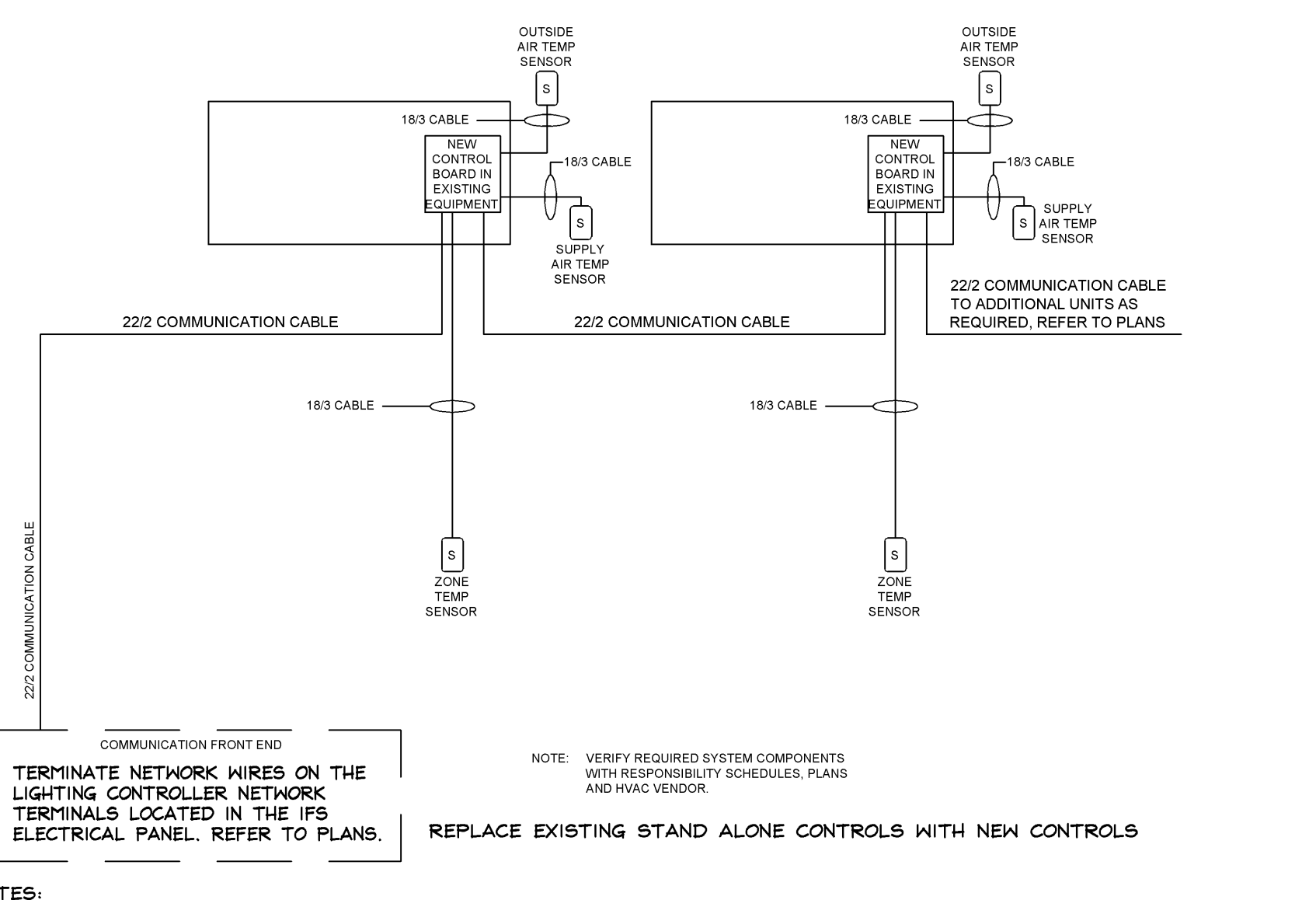
HVAC EQUIPMENT COMMISSIONING	
PRELIMINARY SEQUENCE OF OPERATION	
A COMPLETE HVAC CONTROL SYSTEM (PROGRAMMABLE, COMMUNICATING, REMOTE ADJUSTABLE, DDC SYSTEM) SHALL BE FURNISHED BY HVAC VENDOR AND INSTALLED BY MECHANICAL CONTRACTOR. REFER TO RESPONSIBILITY SCHEDULES AND HVAC VENDOR SUPPLIED CONTROLS INFORMATION. THE FINAL SEQUENCE OF OPERATION SHALL BE BY THE HVAC VENDOR. THE FOLLOWING IS A BRIEF DESCRIPTION OF THE CONTROL SEQUENCE OF OPERATION.	
UNIT SUPPLY AIR FANS SHALL ACTIVATE AND OUTSIDE AIR DAMPER SHALL OPEN TO MINIMUM POSITION DURING OCCUPIED MODE. OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND UNIT SUPPLY AIR FANS SHALL ACTIVATE ONLY ON A CALL FOR HEATING OR COOLING DURING UNOCCUPIED MODE. COOLING MODE SHALL ACTIVATE IF SPACE TEMPERATURE RISES ONE DEGREE FAHRENHEIT (1°F) ABOVE COOLING SETPOINT. HEATING MODE SHALL ACTIVATE IF SPACE TEMPERATURE FALLS ONE DEGREE FAHRENHEIT (1°F) BELOW HEATING SETPOINT. ANY APPLICABLE OVERRIDE MODES SHALL TAKE PRECEDENCE OVER COOLING OR HEATING MODE. ECONOMIZER MODE (IF APPLICABLE) SHALL TAKE PRECEDENCE OVER COOLING MODE.	
ADDITIONAL CONTROL MODES (REFER TO RESPONSIBILITY SCHEDULE TO DETERMINE WHICH MODES ARE APPLICABLE) MAY INCLUDE: ECONOMIZER OVERRIDE, POWER RELIEF, CO2 OVERRIDE, SMOKE OVERRIDE, FIRE ALARM OVERRIDE/INTERLOCK, FREEZE PROTECTION OVERRIDE, AIRFLOW HEAT OVERRIDE, DRAIN PAN HIGH WATER OVERRIDE, AUXILIARY HEAT, INTERLOCK, HEAT PUMP REVERSING TXV, VARIABLE SPEED FAN MODULATION, CONTROL VALVE MODULATION, LANDLORD HEATING/COOLING SIGNAL, INTERLOCK, MODULATING OUTSIDE DAMPER OPERATION OR OTHERS AS DETERMINED BY PROJECT SPECIFIC REQUIREMENTS.	
SETPOINTS:	
OCCUPIED: HEATING: 64°F COOLING: 72°F	
UNOCCUPIED: HEATING: 60°F COOLING: 65°F	

## HVAC EQUIPMENT COMMISSIONING

HVAC EQUIPMENT COMMISSIONING	
L	
EQUIPMENT VENDOR CONTACT INFORMATION	
G	

## SEQUENCE OF OPERATION

P	
K	



NOTES:

1. 18/3 PLENUM RATED CONTROL WIRE SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR.
2. 22/2 PLENUM RATED CONTROL WIRE SHALL BE FURNISHED BY HVAC VENDOR AND INSTALLED BY CONTRACTOR.
3. SCHEMATIC IS FOR REFERENCE ONLY. THE HVAC VENDOR WILL PROVIDE A WIRING DIAGRAM FOR INSTALLATION. SEE RESPONSIBILITY SCHEDULES ON SHEET M04.2 FOR A LIST OF ALL CONTROL COMPONENTS AND SENSORS.

## CONTROLS SCHEMATIC

NTS	
H	
FAN SCHEDULE	
D	

## EQUIPMENT VENDOR CONTACT INFORMATION

JODY SOWERS	
TRANE PRIMARY TECHNICAL SUPPORT	
EMAIL: jsowers@trane.com	
PHONE NO.: 866-415-2498	
FAX NO.: 614.473.3587	
JOHN D'AGOSTINO	
TRANE SHIPPING, SECONDARY TECHNICAL SUPPORT	
EMAIL: john.dagostino@trane.com	
PHONE NO.: 866-415-2498	
FAX NO.: 614.473.3587	

<b>ACCESSORIES:</b>	
1. OPPOSED BLADE DAMPER OPERABLE FROM FACE OF GRD, PROVIDED BY MANUFACTURER.	
2. LOOKING QUADRANT VOLUME DAMPER, PROVIDED BY MECHANICAL CONTRACTOR. SEE MECHANICAL SPECIFICATIONS ON SHEET M04.1.	
3. RAPID MOUNT FRAME FURNISHED BY MANUFACTURER AND INSTALLED BY MECHANICAL CONTRACTOR WHERE LAY-IN GRD TO BE INSTALLED IN DRYWALL CEILINGS	
4. 12" TALL INSULATED PLENUM, LENGTH AND WIDTH TO BE DIFFUSER NECK SIZE, PROVIDED BY MECHANICAL CONTRACTOR.	

NOT USED	
J	
GRD SCHEDULE	
E	
HVAC EQUIPMENT SCHEDULES	
A	

EXHAUST AND VENTILATION FAN SCHEDULE	
MARK	EF-1
MANUFACTURER	GREEN COOK
MODEL	KEPINI 220
TYPE	CEILING MOUNTED
DRIVE TYPE	DIRECT
PERFORMANCE	
AIR FLOW (CFM)	175
EXT. STATIC (IN W.C.)	0.375
FAN SPEED (RPM)	1800
ELECTRICAL	
VOLTS/PH/Hz	120/1/60
FAN MOTOR WATTS	70
APPROX. WEIGHT (LBS)	15
SERVES	RESTROOM
ACCESSORIES	1,2
NOTES	1,2
ACCESSORIES FURNISHED BY MANUFACTURER (VERIFY FIELD INSTALLATION REQUIREMENTS):	
1. BACKDRAFT DAMPER	
2. DISCONNECT SWITCH	
NOTES:	
1. INTERLOCK WITH RESTROOM LIGHTS	
2. CONNECT TO ROOF CAP	

## FAN SCHEDULE

EXISTING ROOFTOP UNIT WITH ELECTRIC HEAT SCHEDULE				
MARK	RTU-1	RTU-2	RTU-3	
CARRIER MODEL NUMBER	50TC-D08	50TC-A06	50TC-D08	
ENERGY RATING (SEER)	11.2	13.0	11.2	
SUPPLY AIR CFM	3,000	2,000	3,000	
OUTSIDE AIR CFM	625	425	625	
OUTSIDE AIR AMBIENT TEMP	101	101	101	
EXTERNAL STATIC PRESSURE	1.0	1.0	1.0	
COOLING				
ENTERING AIR TEMP (DB/WH)	81/66	84/69	81/66	
TOTAL CAPACITY (MBH)	89.0	69.5	89.0	
SENSIBLE CAPACITY (MBH)	69.4	50.0	69.4	
HEATING				
POWER INPUT (KW)	24	19.9	24	
HEAT OUTPUT (MBH)	81.9	67.9	81.9	
STAGES	2	2	2	
ELECTRICAL				
VOLTS/PH/Hz	208/3/60	208/3/60	208/3/60	
MOTOR HORSEPOWER	3.0	3.0	3.0	
MCA	-	-	-	
MCCP	-	-	-	
APPROXIMATE WEIGHT (LBS)	1125	900	1125	
ACCESSORIES	1-3, A, B	1-3, A, B	1-3, A, B	
NOTES	1,2	1,2	1,2	
EXISTING ACCESSORIES FURNISHED BY MANUFACTURER (VERIFY FIELD INSTALLATION REQUIREMENTS):				
1. UNITS SHALL BE HI-EFFICIENCY, EER AS SHOWN IN SCHEDULE.				
2. PROVIDE THE FOLLOWING FACTORY INSTALLED ACCESSORIES				
THROUGH THE BASE ELECTRIC CONNECTIONS.				
- ELECTRIC STRIP HEATER IF GAS IS NOT USED (KW AS SCHEDULED).				
- UNIT MAIN POWER DISCONNECT SWITCH.				
- HINGED ACCESS DOORS.				
- LOUVERED HAIL GUARDS.				
- MOTORIZED ENTHALPY ECONOMIZER DAMPER WITH BAROMETRIC RELIEF.				
3. PROVIDE THE FOLLOWING FIELD INSTALLED ACCESSORIES.				
- MANUFACTURERS 14" INSULATED ROOFGUARD.				
- PROGRAMMABLE NIGHT SETBACK THERMOSTAT.				
ACCESSORIES FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR:				
A. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS (FILTERS, O&M MANUAL, ETC.)				
B. REPLACE EXISTING CONTROLS WITH NEW CONTROLS PROVIDED BY TRANE.				
NOTES:				
1. REFER TO MANUFACTURER'S INSTALLATION INSTRUCTION AND WIRING SCHEMATICS FOR MORE INFORMATION.				
2. OUTSIDE AIR DAMPER MIN. OPEN POSITION TO BE SET AS SPECIFIED ABOVE AND SHALL FULLY CLOSE ON UNIT SHUTDOWN				

REVISIONS:	
REQUIRED BY:	DATE:
ELITE CONSTRUCTION GROUP	
LAKE JACKSON, TX	
PHONE: 979-285-0712	