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REGISTERED PROFESSIONAL ENGINEER
 STATE OF NORTH CAROLINA
 LICENSE NO. 00219
 ASSOCIATES, P.A.
 44 CHURCH STREET
 BATESBURG-LEESVILLE, SOUTH CAROLINA 29004

Star Hardee's
 HARDEE'S T24KE PROTOTYPE
 44 CHURCH STREET
 BATESBURG-LEESVILLE, SOUTH CAROLINA 29004

NO.	DATE	DESCRIPTION
1	5/22/2017	COORDINATION

MECHANICAL SCHEDULES	CHECKED BY #1	APPROVED BY #2	DATE
	BT	MJM	

DATE: 2-28-17

SHEET NUMBER: **M1**

I. SCOPE OF WORK
 INSTALL AIR CONDITIONING AND VENTILATION SYSTEM WHICH INCLUDES BUT NOT LIMITED TO AIR CONDITIONING UNITS, EXHAUST FANS, DUCTWORK, DIFFUSERS, REGISTERS, GRILLS AND CONTROLS. THE FINAL PRODUCT SHALL BE A COMPLETE WORKING, BALANCED SYSTEM.

A. UNLESS NOTED OTHERWISE, ROOF TOP A/C UNITS (RTU'S), EXHAUST FANS, HOODS, AND FLY FANS WILL BE PROVIDED BY OWNER AND DELIVERED TO JOB SITE.

B. FOR PROJECTS LOCATED WITHIN 5 MILES OF SALT WATER COASTS, PROVIDE ROOF TOP UNITS WITH FACTORY APPLIED CORROSION COATING ON THE CONDENSER COILS.

II. SUPERVISION OF CONTINGENT CONSTRUCTION.

A. INSPECT THE MATERIALS AND WORKMANSHIP OF THOSE TRADES WHOSE WORK WILL AFFECT THE INSTALLATION AND/OR THE OPERATION OF THE SYSTEMS. INSPECTION REPORTS WILL BE FORWARDED TO THE OWNER FOR THEIR FOLLOW-UP.

B. SPECIFIC TRADES SUBJECT TO INSPECTION, WHERE APPLICABLE, ARE:

(1) PLUMBING - FINAL CONNECTIONS OF ALL PIPING TO A/C EQUIPMENT AND/OR SYSTEMS.
 (2) ELECTRICAL - FINAL CONNECTIONS OF ALL LINE VOLTAGE WIRING AND ALL LINE AND LOW VOLTAGE CONDUIT TO A/C EQUIPMENT AND/OR SYSTEMS.
 (3) FRAMING - OPENINGS, CURBS, AND FLASHINGS FOR A/C EQUIPMENT AND/OR SYSTEMS.

C. MATERIALS AND WORKMANSHIP

(1) GENERAL - IN CONFORMITY WITH PLANS AND SPECIFICATIONS, LOCAL BUILDING CODES, AND ALL LEGALLY CONSTITUTED PUBLIC AUTHORITIES HAVING JURISDICTION.
 (2) APPLICABLE SPECIFICATIONS AND STANDARDS - MATERIALS AND WORKMANSHIP SPECIFIED TO BE IN ACCORDANCE WITH THE LATEST APPLICABLE FEDERAL N.F.P.A., A.S.A., A.S.M.E., A.S.T.M., A.G.A., AND S.M.A.C.N.A. STANDARDS OR SPECIFICATIONS.

D. PERMITS, LICENSES, PLAN CHECK, FEES, AND INSPECTIONS TO BE OBTAINED AND PAID FOR AS REQUIRED.

E. PROTECTION.
 PROVIDE FOR THE SAFETY AND GOOD CONDITION OF ALL MATERIALS, EQUIPMENT AND ACCESSORY ITEMS.

F. LOCATION OF DUCTWORK AND EQUIPMENT.

(1) INSTALL AS REQUIRED FOR PROPER INSTALLATION IN AVAILABLE SPACE AVOIDING INTERFERENCE WITH ARCHITECTURAL AND STRUCTURAL MEMBERS AND WORK OF OTHER TRADES.
 (2) PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR.
 (3) INSTALL DUCTS AS SHOWN IN A NEAT MANNER, SYMMETRICAL WITH BUILDING LINES, LIGHTS, ACOUSTICAL TILE PATTERN, ETC.
 (4) DRAWINGS ARE DIAGRAMMATIC AND APPROXIMATE AND ARE SUBJECT TO REARRANGEMENT FOR PROPER INSTALLATION. CERTAIN RUNS OF DUCTWORK AND PIPING SHOWN DISTORTED TO AVOID CONFLICTION.

G. ACCESS TO DUCTS AND CONCEALED EQUIPMENT.
 PROVIDE ACCESS DOOR OR PANEL REQUIRED IN CEILING OR WALLS FOR ACCESS TO ALL CONCEALED DAMPERS, CONTROLLERS, ETC.

H. CLEANING OF PREMISES.
 REMOVAL OF SCRAPS AND INSTALLATION RELATED DEBRIS FROM AREA. LEAVE ENTIRE INSTALLATION IN A NEAT, CLEAN AND USABLE CONDITION.

I. HOISTING AND SETTING IN PLACE.
 HOISTING AND SETTING IN PLACE OF ALL FURNISHED HEATING, AIR CONDITIONING, EXHAUST AND MAKEUP AIR EQUIPMENT.

J. EQUIPMENT.
 TYPE AND SIZE AS SHOWN AND DESCRIBED ON THE DRAWINGS.

K. DUCTS.

(1) GREASE DUCT AND FAN ADAPTER PLATE SHALL BE SELKIRK METALBESTOS ZERO CLEARANCE FIRE RATED DUCT SYSTEM AND WILL BE PROVIDED BY OWNER AND DELIVERED TO THE JOB SITE.
 (2) GREASE DUCT MUST BE INSTALLED STRICTLY TO MANUFACTURERS INSTALLATION INSTRUCTIONS USING ALL REQUIRED CONNECTORS, STRAPS, SEALANT, ETC.
 (3) SELKIRK MODEL METALBESTOS FIRE RESISTANCE RATED GREASE DUCT IS UL CLASSIFIED IN ACCORDANCE WITH UL 2221, "STANDARD FOR TESTS OF FIRE RESISTIVE GREASE DUCT ENCLOSURE ASSEMBLIES" AS A 2 HOUR FIRE RESISTANCE RATED ASSEMBLY (INCORPORATING ITS OWN, INTEGRAL FIRE PROTECTIVE ENCLOSURE).
 AS SUCH AND IN VIEW OF THE FACT THAT THE FOLLOWING CODES/INSTALLATION STANDARDS MAKE DIRECT REFERENCE TO UL2221 AS BEING THE STANDARD BY WHICH GREASE DUCTS INCORPORATING THEIR OWN FIRE PROTECTIVE ENCLOSURE ARE TO BE EVALUATED, MODEL METALBESTOS IS IN FULL COMPLIANCE WITH THE FOLLOWING CODES AND INSTALLATION STANDARDS:
 2009 INTERNATIONAL MECHANICAL CODE
 2006 UNIFORM MECHANICAL CODE
 2011 NFPA96 - STANDARD FOR VENTILATION CONTROL AND FIRE PROTECTION OF COMMERCIAL COOKING OPERATIONS
 MODEL METALBESTOS IS ALSO ENTIRELY ACCEPTED AND MAY BE QUALIFIED UNDER THE "ALTERNATIVE SYSTEMS" (OR SIMILAR) CLAUSE FOUND IN EARLIER EDITIONS OF THESE CODES AND INSTALLATION STANDARDS.
 (4) GAUGE AND CONSTRUCTION GALVANIZED SHEET METAL IN ACCORDANCE WITH RECOMMENDATIONS OF THE LATEST EDITION OF S.M.A.C.N.A. WITH ALL NATIONAL AND LOCAL CODE REQUIREMENTS.
 (5) FLEXIBLE DUCT: ALLOWABLE LAST 10' OF RUN.
 (6) MATERIAL: PRE-INSULATED FLEXIBLE FIBER-GLASS AIR DUCT, ENCASED IN A VAPOR BARRIER JACKET, K FACTOR OF 0.24 AT 75 DEGREES, MEET REQUIREMENTS OF N.F.P.A. 90A FOR AIR DUCTS, SPINNING TYPE WITH MANUAL VOLUME DAMPER.

(7) MANUFACTURER: CASCO DUCT OR EQUAL.

(8) INSTALLATION: INSTALL IN FULLY EXTENDED POSITION USING ONLY MINIMUM LENGTH REQUIRED TO MAKE THE CONNECTIONS WITH 1/2" WIDE POSITIVE LOCKING STEEL STRAPS OR APPROVED EQUAL. SUPPORT DUCT AT THREE FEET MAX. OR AS PER LOCAL CODES.

(9) MANUAL VOLUME DAMPERS:
 (A) DAMPERS WITH LOCKING AND INDICATING QUADRANTS TO BE INSTALLED IN EACH BRANCH OF ALL DUCTS AS INDICATED ON THE DRAWINGS IN ADDITION TO ANY VOLUME CONTROL AT OUTLETS. DAMPER HANDLE AND LOCK QUADRANTS SHALL BE ACCESSIBLE, EXPOSED, AND CLEARLY IDENTIFIED WITH FLAG.
 (B) AFTER FINAL ADJUSTMENT OF SYSTEM, LOCK QUADRANTS AND MARK CLEARLY SHOWING DAMPER POSITION, OPEN AND SHUT POSITIONS.
 (C) DAMPERS IN ROUND DUCTS SHALL BE OF THE SINGLE BLADE TYPE.
 (D) DAMPERS IN RECTANGULAR DUCTS:
 -DUCTS 11" IN HEIGHT OR LESS SHALL BE OF THE SINGLE BLADE TYPE.
 -DUCTS 12" IN HEIGHT OR HIGHER SHALL BE OF THE OPPOSED BLADE TYPE.
 - DAMPERS SHALL BE MANUFACTURED BY TERRI- AIR BALANCE INC., 13516 DESMOND ST., PACOIMA, CA 91331, TELEPHONE (213) 629-3341, OR AIR BALANCE INC., 3100 WEST GRAND AVE., CHICAGO, ILL 60622, TELEPHONE (312) 826-8000.
 (E) FIRE DAMPERS:
 -WHERE REQUIRED BY LOCAL CODES SHALL BE APPROVED AND FURNISHED AND INSTALLED.

L. INSULATION.

(1) DUCT INSULATION: ALL SUPPLY AIR AND RETURN AIR DUCTWORK INSTALLED IN CONCEALED SPACES SHALL BE WRAPPED WITH ONE-INCH (1") THICK ULTRALIGHT INSULATION 3/4 POUND DENSITY, WITH VAPOR BARRIER.
 (2) MINIMUM STANDARD OF INSTALLATION: END JOINTS ARE CLOSED WITH 2" OVERLAPPING VAPOR BARRIER FLAP AND 2" JOINT FLAP IS FORMED OVER LONGITUDINAL JOINT. OVERLAPPING FLAPS ARE STAPLED AND SEALED WITH PRESSURE SENSITIVE TAPE OR PLAIN TAPE APPLIED WITH MASTIC.
 (3) AS MANUFACTURED BY OWENS/CORNING OR APPROVED EQUAL.

M. BALANCING.

(1) CONTRACTOR SHALL BALANCE, ADJUST AND TEST ALL MOVING EQUIPMENT, AIR DISTRIBUTION, HEATING SYSTEMS, EXHAUST AND MAKE-UP AIR SYSTEMS AS SPECIFIED AND AS INDICATED ON DRAWINGS AND PROVIDE CERTIFIED BALANCE REPORT.
 (2) BALANCING AND TESTING SHALL NOT BEGIN UNTIL ALL SYSTEMS ARE COMPLETED AND IN FULL WORKING ORDER.
 (3) CHANGES IN FILTERS, DRIVES, AND DAMPERS OR THE ADDITION OF DAMPERS, CONTROL DEVICES OR GAUGES REQUIRED TO CORRECT BALANCE AS REQUIRED SHALL BE MADE AT NO ADDITIONAL COST TO OWNER.
 (4) ALL EQUIPMENT AND SYSTEMS SHALL BE RUN THROUGH THEIR CYCLE TO CHECK FOR CORRECT WIRING AND SEQUENCING.
 (5) ALL INSTRUMENTS, FORMS AND PROCEDURES SHALL MEET THE REQUIREMENTS SET FORTH BY THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (N.E.B.B.).
 (6) G.C. TO ALSO HIRE AN INDEPENDENT, CERTIFIED AIR BALANCE COMPANY TO VERIFY INSTALLATION, QUALITY OF OVERALL MECHANICAL INSTALL, TEST AND BALANCE TO PROVIDE OWNER WITH A CERTIFIED BALANCE REPORT.

N. WARRANTY

(1) THE ENTIRE H.V.A.C. SYSTEM TO BE FREE OF DEFECTIVE WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR FROM DATE OF START-UP.
 (2) THAT ALL EQUIPMENT FURNISHED AND INSTALLED SHALL CARRY A MANUFACTURER'S REPLACEMENT - PART WARRANTY FOR A PERIOD OF ONE YEAR FROM THE DATE OF START-UP.
 (3) FURNISH, AT NO CHARGE WITHIN 30 DAYS FROM DATE OF START-UP, ANY LABOR NECESSARY TO PROPERLY IMPLEMENT THE ABOVE EQUIPMENT WARRANTY REQUIREMENTS.
 (4) THAT ALL REPAIRS INCLUDING COMPRESSORS FURNISHED AND INSTALLED SHALL CARRY A ONE YEAR MANUFACTURER'S REPLACEMENT WARRANTY.
 (5) TRANSMISSION EQUIPMENT, TELEPHONE NUMBER (919) 232-1229.
 (6) CAPTIVE-EXHAUST HOODS, TELEPHONE NUMBER (800) 334-9222.

GAS/ELECTRIC AIR CONDITIONING UNITS - PROVIDED BY GENERAL CONTRACTOR

MARK	MFG/CO. NO.	CFM	IN. SP. (IN. W.C.)	FT. SP. (IN. W.C.)	HP	HP MOTOR	HEATING WTR. INPUT	HEATING WTR. OUTPUT	NOMINAL COOLING (TONS)	SEER/EER	FLA	MCA	MCPD	VOLTAGE	OPER. WEIGHT
RTU-1	TRANE YHC92	3,000	0.60	0.80	961	3.0	150.0	120.0	7.5	12.6	40.3	42.4	50.0	208/3	1291#
RTU-2	TRANE YHC120	3,200	0.58	0.88	1139	3.0	250.0	200.0	10.0	12.4	41.9	46.1	60.0	208/3	1608#
RTU-3	TRANE YHC120	3,200	0.56	0.86	1186	3.0	200.0	160.0	10.0	12.4	41.9	46.1	60.0	208/3	1608#

NOTES:

- DAMPER ASSEMBLY FOR ALL ROOF TOP UNITS ARE TWO POSITION DAMPER ASSEMBLIES.
- ECONOMIZERS ARE REQUIRED FOR RTUS FOR THIS PARTICULAR LOCATION. PROVIDE DUAL ENTHALPY CONTROL AND BAROMETRIC RELIEF.
- ROOF TOP UNITS AND CURBS WILL BE PROVIDED AND INSTALLED BY THE G.C. THE G.C. SHALL INCLUDE COST OF RECEIVING, HANDLING, STORAGE (IF REQUIRED), INSTALLING, STARTING UP, TROUBLESHOOTING, ETC. OF THE G.C. FURNISHED EQUIPMENT.
- ASSEMBLE AND INSTALL 14" HIGH STANDARD ROOF CURBS (INCLUDED WITH TRANE RTU, PROVIDED BY HED) PER THE MANUFACTURER'S INSTRUCTIONS. ROOF CURBS TO BE INSULATED BY CONTRACTOR.
- ASSEMBLE AND INSTALL FRESH AIR INTAKE, TYPICALLY SHIPPED WITH UNITS, PER MANUFACTURER'S GUIDELINES.
- STARTUP CHECK TEST, AND SYSTEM AIR BALANCE ARE TO BE PERFORMED BY THE INSTALLING CONTRACTOR. SEE ROOF TOP UNIT SCHEDULE AND AIR BALANCING SCHEDULE FOR BALANCING REQUIREMENTS. SEE THIS SHEET FOR BALANCING PROCEDURE.
- RTUS SHALL INCLUDE FACTORY INSTALLED RETURN AIR DUCT SMOKE DETECTOR AND NON-POWERED CONVENIENCE OUTLET.
- RTUS SHALL INCLUDE A 10 YEAR PARTS AND LABOR ALLOWANCE FOR THE ENTIRE UNIT AND FIVE ADDITIONAL YEARS FOR THE HEAT EXCHANGER PER THE MANUFACTURER'S STANDARD WARRANTY PROGRAM. TRIP TIME, MILEAGE, TROUBLESHOOTING TIME, ETC. ARE NOT INCLUDED AND MUST BE PROVIDED.
- RTU-1, RTU-2 AND RTU-3 SHALL HAVE A HOT GAS REHEAT COIL, DEHUMIDIFICATION CONTROL PACKAGE, AND HUMIDISTAT.
- CONTROL PANEL IS IN THE O/P PANEL. WALL SENSORS AND DUCT SENSORS WILL BE FURNISHED BY THE OWNER AND INSTALLED BY THE MECHANICAL CONTRACTOR. AUDIBLE ALARMS FOR THE FACTORY INSTALLED SMOKE DETECTORS WILL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- ROOF TOP UNITS ARE ELECTRONICALLY INTERLOCKED WITH HOODS THROUGH BUILDING CONTROLS PANEL.

KITCHEN EXHAUST HOODS - PROVIDED BY OWNER (UNO)

SYMBOL	MFR.	SERVING	MODEL NO.	SIZE	EXH. CFM	EXH. DUCT SIZE	EXH. VEL. FPM	FLAM EGARD FILTERS	MAKE-UP AIR CFM	REMARKS
H-1	CAPTIVARE	BROILER								SEE HOOD SHEETS
H-2	CAPTIVARE	BLODGETT OVEN								SEE HOOD SHEETS
H-3	CAPTIVARE	GRIDDLE								SEE HOOD SHEETS
H-4	CAPTIVARE	4-VAT FRYER								SEE HOOD SHEETS

EXHAUST FANS - PROVIDED BY OWNER (UNO)

SYM. NO.	MFR.	MODEL	CFM	ERT. SP.	SERVING	ELECTRICAL				WEIGHT (LBS)	REMARKS
						FLA	HP	VOLT	PHASE		
EF-1	CAPTIVE AIRE	NLA14HFA	660	1.00	BROILER HOOD H-1	7.7	0.50	115	1	170	SEE HOOD SHEET
EF-2	CAPTIVE AIRE	DUS0HFA	900	1.00	OVEN HOOD H-2	8.4	0.50	115	1	114	SEE HOOD SHEET
EF-3	CAPTIVE AIRE	DUS0HFA	650	0.80	GRIDDLE HOOD H-3	8.4	0.50	115	1	114	SEE HOOD SHEET
EF-4	CAPTIVE AIRE	DUS0HFA	838	0.75	4-VAT FRYER H-4	8.4	0.50	115	1	114	SEE HOOD SHEET
EF-5	CAPTIVE AIRE	DR12HFA	300	0.35	MEN'S/WOMEN'S RESTROOMS	2.4	0.18	115	1	71	SEE HOOD SHEET

VENTILATION SCHEDULE

AREA	SEATS	VENT./EXHAUST REQ'D.	MIN. REQUIRED VENT. (CFM)	PROVIDED VENT. (CFM)	MIN. REQUIRED EXHAUST (CFM)	PROVIDED EXHAUST (CFM)
KITCHEN	-	SEE 2012 MC CALCS	-	2,350	250	2,210
MEN'S/WOMEN'S TOILET	-	SEE 2012 MC CALCS	-	TRANSFER	300	300
DINING ROOM	66	SEE 2012 MC CALCS	870	1,800	-	-
TOTALS	66		870	4,200	554	2,510

2012 IMC VENTILATION CALCULATIONS

DINING AREA

* SECTION 403.3.1.1 - EQUATION 4-1 $V_{bz} = R_p \cdot P_{bz} \cdot A_{bz}$

$R_p = 88$ (PERSONS/TABLE)

$P_{bz} = 0.18$ CFM/PERSON (TABLE 403.3)

$A_{bz} = 1117$ FT²

$V_{bz} = 696$ CFM MIN. OUTDOOR AIR FLOW AT THE BREATHING ZONE

* SECTION 403.3.1.2 - EQUATION 4-2 $V_{oz} = V_{bz} / E_z$

$V_{bz} = 696$ CFM MIN. OUTDOOR AIR FLOW AT THE BREATHING ZONE

$E_z = 0.80$ ZONE AIR DISTRIBUTION EFFECTIVENESS (TABLE 403.3.1.2)

$V_{oz} = 870$ CFM MIN. ZONE OUTDOOR AIR FLOW

2012 IMC EXHAUST CALCULATIONS

KITCHEN

* SECTION 403.3.1.2 $V_{oz} = V_{bz} / E_z$

$V_{bz} = 696$ CFM MIN. OUTDOOR AIR FLOW AT THE BREATHING ZONE

$E_z = 0.80$ ZONE AIR DISTRIBUTION EFFECTIVENESS (TABLE 403.3.1.2)

$V_{oz} = 870$ CFM MIN. ZONE OUTDOOR AIR FLOW

EXHAUST RATE = 854 CFM MIN. REQUIRED EXHAUST RATE

TOILETS

* SECTION 403.3.1.2 $V_{oz} = V_{bz} / E_z$

$V_{bz} = 70$ CFM MIN. (TABLE 403.3)

4 UNITS

EXHAUST RATE = 280 CFM MIN. REQUIRED EXHAUST RATE

- HOOD MATERIALS**
- ALL EXPOSED SURFACES TO BE 18 GA. TYPE 304 STAINLESS STEEL WITH #4 FINISH.
 - ALL NON-EXPOSED STRUCTURAL SURFACES TO BE 18 GA. GALVANIZED STEEL.
 - GREASE EXHAUST PLENUM TO BE 16 GA. GALVANIZED STEEL, CONTINUOUSLY WELDED AND PITCHED AT A MINIMUM 1/4" PER FOOT TO A CLEANABLE RECEPTOR.
 - HOODS ARE U.L. LISTED AND ARE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH ALL U.L. SPECIFICATIONS.
- NOTES:**
 GREASE FILTERS SHALL BE CLASS 1 WHEN TESTED IN ACCORDANCE WITH THE TEST METHOD IN SFM 12-71-1.

LEGEND

☒	SUPPLY AIR DUCT	C.F.M.	CUBIC FEET OF AIR PER MIN.
☐	RETURN AIR DUCT	S.P.	STATIC PRESSURE
☒	GREASE EXHAUST AIR DUCT	UC	UNDER CUT DOOR
☒		U.T.R.	UP THRU ROOF
☒		C.D.	CEILING DIFFUSER
☒		C.G.	CEILING GRILLE
☒		S.W.S.	SIDEWALL SUPPLY
☒	M.V.D. MANUAL VOLUME DAMPER	S.A.	SUPPLY AIR
☒		R.A.	RETURN AIR
☒		EXH.	EXHAUST AIR
☒		H.P.	HORSEPOWER
☒		BTUH	BRITISH THERMAL UNITS PER HOUR
☒		FLA	FULL LOAD AMPS
☒		ARI.	AMERICAN REFRIGERATION INSTITUTE
☒		OPER.	OPERATING
☒		EXH.	EXHAUST
☒	VEL.		VELOCITY
☒	M.V.D.		MANUAL VOLUME DAMPER
☒	O.A.		OUTSIDE AIR
☒	UNO		UNLESS NOTED OTHERWISE