MECHANICAL SYMBOLS ABBREVIATIONS

(SOME SYMBOLS MAY NOT BE USED ON THE DRAWINGS)

%	PERCENT
ABS	ABSOLUTE
ACC	AIR-COOLED CHILLER
ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
AF	AIR FOIL
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
ALT	ALTITUDE
AMB	AMBIENT
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
ARI	AIR-CONDITIONING AND REFRIGERATION INSTITUTE
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
AVG	AVERAGE
B	BOILER
BD	BACKDRAFT DAMPER
BG	BELOW GRADE
BEMCS	BUILDING ENERGY MANAGEMENT AND CONTROL SYSTEM
BHP	BRAKE HORSEPOWER
BI	BACKWARD INCLINED
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
CD	COLD DECK
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CHET	CHILLED WATER EXPANSION TANK
CMPR	COMPRESSOR
COND	CONDENSER
CRAC	COMPUTER ROOM AIR CONDITIONER
CT	COOLING TOWER
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CU IN	CUBIC INCH
dB	DECIBEL
DB	DRY BULB
DCP	DISTRIBUTED CONTROL PANEL
DEG	DEGREE
DIA	DIAMETER
DWG	DRAWING
DX	DIRECT-EXPANSION
EAT	ENTERING AIR TEMPERATURE
EDH	ELECTRIC DUCT HEATER
EF	EXHAUST FAN
EFF	EFFICIENCY
EL	ELEVATION
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
EXP	EXPANSION
F	FAHRENHEIT
FA	FACE AREA
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FH	FUME HOOD
FLEX	FLEXIBLE
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PIPE
FS	FLOW SWITCH
FSD	COMBINATION FIRE-SMOKE DAMPER
FT	FEET OR FOOT
FTU	FAN TERMINAL UNIT
GA	GAUGE OR GAGE
GAL	GALLONS
GALV	GALVANIZED
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GRAINS
H	ENTHALPY
HD	HEAD
HD	HOT DECK
HG	HEAT GAIN OR MERCURY
HGT	HEIGHT
HP	HORSEPOWER
HPS	HIGH PRESSURE STEAM
HR	HOUR
HTHW	HIGH TEMPERATURE HEATING WATER
HVAC	HEATING/VENTILATING/AIR-CONDITIONING
HVU	HEATING AND VENTILATING UNIT
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HZ	FREQUENCY
ID	INSIDE DIAMETER
IPS	INTERNATIONAL PIPE STANDARD
ips	IRON PIPE SIZE
K	THERMAL CONDUCTIVITY
KH	KITCHEN HOOD
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LF	LINEAR FEET
LG	LENGTH
LPS	LOW PRESSURE STEAM
LTHW	LOW TEMPERATURE HOT WATER
LWT	LEAVING WATER TEMPERATURE
MAT	MIXED AIR TEMPERATURE
MCA	MINIMUM CIRCUIT AMPACITY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MAX	MAXIMUM
MBH	BTU PER HOUR (THOUSAND)
MIN	MINIMUM
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
N/A	NOT APPLICABLE
NC	NOISE CRITERIA
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIAMETER
PD	PUMPED DISCHARGE
PBD	PARALLEL BLADE DAMPER
PH	PHASE (ELECTRICAL)
PPM	PARTS PER MILLION
PRESS	PRESSURE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	PSI ABSOLUTE
PSIG	PSI GAGE
R	RANKINE
R-22	REFRIGERANT (NUMBER INDICATES TYPE)
RA	RETURN AIR
RAF	RELIEF AIR FAN
RECIRC	RECIRCULATE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SC	SHADING COEFFICIENT
SCFM	CUBIC FEET PER MINUTE-STANDARD CONDITIONS
SD	SMOKE DAMPER
SEC	SECOND
SF	SQUARE FEET
SG	SPECIFIC GRAVITY
SHG	SENSIBLE HEAT GAIN
SHR	SENSIBLE HEAT RATIO
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SQ	SQUARE
SSD	SUB-SOIL DRAINAGE
STD	STANDARD
SUCT	SUCTION
t	TIME
T	TEMPERATURE
TD	TEMPERATURE DIFFERENCE
TEMP	TEMPERATURE
TOC	TOP OF CONCRETE
TOD	TOP OF DUCT
TONS	TONS OF REFRIGERATION
TOP	TOP OF PIPE
TOS	TOP OF STEEL
TSP	TOTAL STATIC PRESSURE
T-STAT	THERMOSTAT
TU	TERMINAL UNIT
TYP	TYPICAL
U	HEAT TRANSFER COEFFICIENT
UH	UNIT HEATER
UF	UNDER FLOOR
V	VOLT
VA	VOLT AMPERE
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VENT	VENTILATION
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VP	VELOCITY PRESSURE
W	HUMIDITY RATIO OR WATT
W.C.	WATER COLUMN
W.G.	WATER GAUGE
WB	WET BULB
WT	WEIGHT
YR	YEAR

SHEET SYMBOLS

X — DETAIL TITLE
SCALE: 1/?" = 1'-0"

TRUE NORTH N — NORTH ARROW

DEVICE TYPE / A / 200 / AIRFLOW — NECK/CFM BUBBLE

AHU-1 OR RTU-XXX — EQUIPMENT TAG

AIR FLOW INDICATOR

1 — NOTE BY SYMBOL (KEYNOTE)

1 — REVISION

POINT OF CONNECTION (NEW TO EXISTING)

POINT OF DISCONNECTION

MECHANICAL EQUIPMENT

FSD — COMBINATION FIRE/SMOKE DAMPER

FD — FIRE DAMPER

SD — SMOKE DAMPER

FSD — COMBINATION FIRE/SMOKE DAMPER IN VERTICAL SA DUCT

FSD — COMBINATION FIRE/SMOKE DAMPER IN VERTICAL RA DUCT

NEW EQUIPMENT (SIZE, SHAPE WILL VARY)

FUTURE KITCHEN / VENTILATION EQUIPMENT (SIZE, SHAPE WILL VARY)

EQUIPMENT TO REMAIN (SIZE, SHAPE WILL VARY)

SP — DUCT STATIC PRESSURE SENSOR

DP — DIFFERENTIAL PRESSURE SENSOR

T — WALL MOUNTED THERMOSTAT

T — WALL MOUNTED TEMPERATURE SENSOR

CO2 — CARBON DIOXIDE SENSOR

OS — OCCUPANCY SENSOR

DUCTWORK

DIFFUSER FLOW ARROWS (IF NO ARROWS ARE SHOWN, DIFFUSER IS 4-WAY THROW)

SUPPLY DIFFUSER

ROUND SUPPLY DIFFUSER

RETURN REGISTER

EXHAUST REGISTER

SIDEWALL SUPPLY GRILLE

SIDEWALL RETURN GRILLE

LOUVER W/ SCREEN (IN WALL)

SLOT DIFFUSER

LINEAR DIFFUSER

RETURN AIR SLOT DEVICE

MANUAL OPPOSED BLADE DAMPER

MANUAL BLADE DAMPER

90° ELBOW W/ TURNING VANES

90° MITERED ELBOW

45° MITERED ELBOW

90° LONG RADIUS ELBOW

45° LONG RADIUS ELBOW

CONCENTRIC TRANSITION

ECCENTRIC TRANSITION

RECTANGULAR TO ROUND TRANSITION

RECTANGULAR BRANCH TAP (SMACNA 45)

CONICAL BRANCH TAP

CONICAL LATERAL BRANCH TAKE-OFFS

DUCT CAP

DUCT CONTINUATION - ROUND

DUCT CONTINUATION - RECTANGULAR

AD — DUCT ACCESS DOOR

SUPPLY DUCT (UP / DOWN)

RETURN DUCT (UP / DOWN)

EXHAUST DUCT (UP / DOWN)

ROUND DUCT (UP / DOWN)

18/14 — RECTANGULAR DUCT SIZE (WIDTH / HEIGHT)

18Ø — ROUND DUCT SIZE

FLEXIBLE DUCT CONNECTION

SIDEWALL REGISTER TAP WITH DAMPER

M — MOTORIZED DAMPER

M — OPPOSED BLADE MOTORIZED DAMPER

BD — BACKDRAFT DAMPER

FLEXIBLE DUCT CONNECTION

MAJOR SPLIT

TRANSFER BOOT

PIPING SYMBOLS

PIPING UP

PIPING DOWN

CO — CLEANOUT

1/8"/FT — DIRECTION OF SLOPE

CD — CONDENSATE DRAIN

HVAC DESIGN CRITERIA

ASHRAE FUNDAMENTALS 2009:

KANSAS CITY WSO AP

ELEVATION: 973' LATITUDE: 39.32°N, 94.72°W

WINTER HEATING DESIGN (99.6%):

-1°F DRY BULB

SUMMER DEHUMIDIFCATION DESIGN (0.4%):

86.7°F DRY BULB

76.5°F DEWPOINT

SUMMER COOLING DESIGN (1.0%):

93.0°F DRY BULB

75°F MEAN COINCIDENT WET BULB

GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR MATERIALS AND METHODS FOR CONSTRUCTION.
2. DUCTWORK SIZES SHOWN ARE FREE AIR STREAM DIMENSIONS.
3. INSTALL DUCTWORK AND PIPING TO PROVIDE THE MAXIMUM POSSIBLE CLEAR HEIGHT UNDERNEATH. (BETWEEN STRUCTURE OR CEILING AND TOP OF DUCT).
4. WHERE APPROVAL CODES HAVE BEEN ESTABLISHED BY OSHA, UNDERWRITER'S LABORATORY, AMERICAN CODES, ANSI, ASME, ASA, ASHRAE, ASTM, ARI, NEL, NFPA, SMACNA, OR THE STATE FIRE INSURANCE REGULATORY BODY, FOLLOW THESE STANDARDS WHETHER OR NOT INDICATED ON THE DRAWINGS AND SPECIFICATIONS.
5. PROVIDE THE ENTIRE SYSTEM AND ITS COMPONENT ITEMS OF EQUIPMENT IN OPERATING CONDITION FREE OF OBJECTIONABLE VIBRATION OR NOISE.
6. PERFORM WORK IN ACCORDANCE WITH THE LATEST EDITIONS, REVISIONS, AMENDMENTS OR SUPPLEMENTS OF APPLICABLE STATUTES, ORDINANCES, CODES OR REGULATIONS OF FEDERAL, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION IN EFFECT ON THE DATE BIDS ARE RECEIVED.
7. COORDINATE WORK SO THAT INTERFERENCES BETWEEN PIPING, DUCTWORK, EQUIPMENT, PLUMBING WORK, ELECTRICAL WORK, AND BUILDING STRUCTURE WILL BE AVOIDED.
8. FURNISH ACCESS DOORS FOR INSTALLATION IN WALLS AND CEILINGS WHERE ACCESS IS REQUIRED TO CONCEALED MECHANICAL EQUIPMENT, VALVES, CONTROLS AND OTHER DEVICES.
9. COORDINATE THE EXACT LOCATION OF DRAIN AND MECHANICAL EQUIPMENT LOCATIONS WITH MECHANICAL, ARCHITECTURAL, AND STRUCTURAL DRAWINGS PRIOR TO INSTALLATION.
10. RECTANGULAR ELBOWS SHALL BE LONG-RADIUS ELBOWS UNLESS OTHERWISE SHOWN OR NOTED. SUPPLY AIR STANDARD NON-RADIUS 90° ELBOWS SHALL HAVE TURNING VANES.
11. AIR CONDITIONING LOAD CALCULATIONS BASED ON KANSAS CITY, MISSOURI CLIMATE DATA. ADJUST UNIT SIZES, AIRFLOW, DUCT SIZES AND AIR DEVICES TO HVAC LOAD CALCULATIONS BASED ON STORE LOCATION. COORDINATE RTU LOCATIONS, DIMENSIONS, AND WEIGHTS WITH STRUCTURAL ENGINEER AND ARCHITECT.

PRCOM20204900

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
01/13/2021

Joe Froggé

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT
1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E. CHRISTOFF
NUMBER PE-2012002143
PROFESSIONAL ENGINEER

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE

Project No.: 62-40497-01

Client Project No.:

Drawing Title:

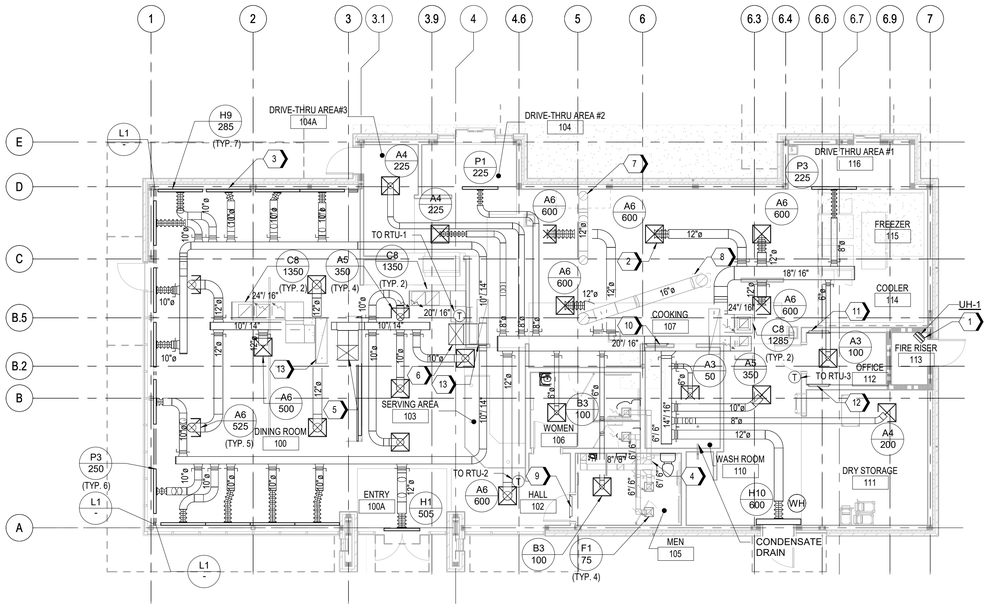
GENERAL NOTES, SYMBOLS AND ABBREVIATIONS

Date: 12/22/2020 *Phase:* BID SET

Designed: DCU
Drawn : DCU
Checked : KFF

Drawing No.: M0.1

C:_Backup\Revit\WB-Lees Summit-MO_V18_MECH_200921_dulm.rvt
1/27/2021 3:55:56 PM



A1 MECHANICAL FLOOR PLAN - LEVEL 1
1/8" = 1'-0"

GENERAL NOTES

A. REFER TO M0.1 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

B. SMOKE DETECTORS SHALL BE PROVIDED BY THE FIRE ALARM CONTRACTOR AND INSTALLED IN THE SUPPLY AND RETURN SIDES OF RTU. COORDINATE WIRING FOR SHUTDOWN WITH ELECTRICAL SCOPE. MOUNT SMOKE DETECTORS IN ACCESSIBLE LOCATIONS. REFERENCE M6.1 FOR RTU SCHEDULE. ACTIVATION OF SMOKE DETECTORS SHALL SHUT DOWN RTU AND ACTIVATE THE AUDIBLE AND VISUAL SIGNAL PROVIDED.

C. THE EMERSON SITE SUPERVISOR DISPLAY AND CONTROLLER PANEL SHALL BE MOUNTED AND INSTALLED FLUSH IN THE MANAGER'S OFFICE AT 5' AFF TO CENTER.

D. PER IECC 2018, PARAGRAPH C408.2.1, A THIRD PARTY SHALL BE HIRED BY THE OWNER AS PART OF THIS PROJECT TO PROVIDE/PERFORM THE FOLLOWING ITEMS:

- A NARRATIVE DESCRIPTION OF THE ACTIVITIES THAT WILL BE ACCOMPLISHED DURING EACH PHASE OF COMMISSIONING, INCLUDING THE PERSONNEL INTENDED TO ACCOMPLISH EACH OF THE ACTIVITES.
- A LISTING OF THE SPECIFIC EQUIPMENT, APPLIANCES OR SYSTEMS TO BE TESTED AND A DESCRIPTION OF THE TESTS TO BE PERFORMED.
- FUNCTIONS TO BE TESTED INCLUDING, BUT NOT LIMITED TO, CALIBRATIONS AND ECONOMIZER CONTROLS.
- CONDITIONS UNDER WHICH THE TEST WILL BE PERFORMED. TESTING SHALL AFFIRM WINTER AND SUMMER DESIGN CONDITIONS AND FULL OUTSIDE AIR CONDITIONS.
- MEASURABLE CRITERIA FOR PERFORMANCE.

E. KITCHEN HOODS, ANSUL FIRE SUPPRESSION SYSTEM AND HOOD CONTROLS SHALL BE OWNER-FURNISHED AND CONTRACTOR-INSTALLED.

KEYNOTES

1 ELECTRIC UNIT HEATER, REFER TO VIEW B2 ON SHEET M5.2.
2 SUPPLY AIR DIFFUSER (TYP.), REFER TO VIEW B2 ON SHEET M5.1.
3 SUPPLY AIR SLOT DIFFUSER, REFER TO VIEW A3 ON SHEET M5.1.
4 2'X2' LOCKABLE ACCESS DOOR IN HARD CEILING FOR ACCESS TO BATHROOM EXHAUST DAMPERS. RE: ARCHITECTURE.
5 28/20 SUPPLY DUCT UP TO RTU-1.
6 28/20 SUPPLY DUCT UP TO RTU-2.
7 CONNECT KITCHEN EXHAUST HOOD ABOVE FRYER UP TO KEF-2 WITH 12" DIA. PRE-FABRICATED UL 710 LISTED AND LABELED GREASE DUCT. PROVIDE TRANSITIONS AS REQUIRED.
8 CONNECT KITCHEN EXHAUST HOOD ABOVE GRILLS UP TO KEF-1 WITH 16" DIA. PRE-FABRICATED UL 710 LISTED AND LABELED GREASE DUCT. PROVIDE TRANSITIONS AS REQUIRED.
9 RTU-1 DDC CONTROLLER PANEL. RECESSED MOUNTED IN WALL.
10 RTU-2 DDC CONTROLLER PANEL. RECESSED MOUNTED IN WALL.
11 EMERSON SITE SUPERVISOR DISPLAY AND CONTROLLER PANEL. RECESSED MOUNTED IN WALL.
12 RTU-3 DDC CONTROLLER PANEL. RECESSED MOUNTED IN WALL.
13 61/15 RETURN AIR DUCT UP TO RTU-1 ON ROOF, REFER TO VIEW A1 ON SHEET M2.1, AND VIEW C4 ON SHEET M5.1.

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
01/13/2021

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT
1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E. CHRISTOFF
NUMBER
PE-2012002143
PROFESSIONAL ENGINEER

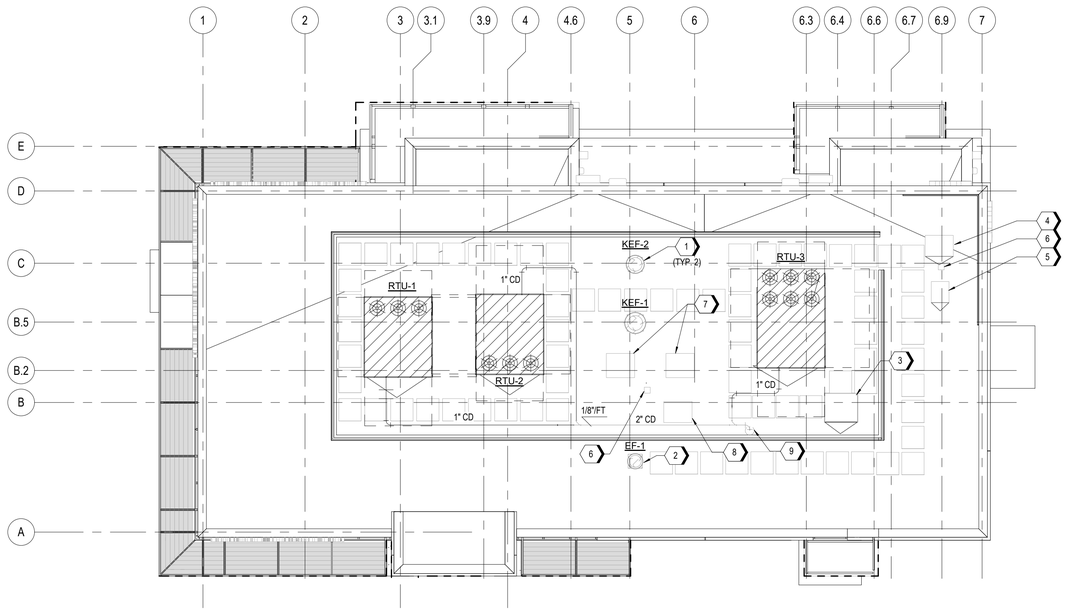
12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE
1	REV-1 Plan Revision	01/27/21

Project No.: 62-40497-01
Client Project No.:
Drawing Title:

MECHANICAL FLOOR PLAN - LEVEL 1

Date: 12/22/2020 *Phase:* BID SET
Designed: DCU
Drawn : DCU
Checked : KFF
Drawing No.: M1.1



A1 MECHANICAL ROOF PLAN

1/8" = 1'-0"

GENERAL NOTES

A. REFER TO M0.1 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.

B. SMOKE DETECTORS SHALL BE PROVIDED BY THE FIRE ALARM CONTRACTOR AND INSTALLED IN THE SUPPLY AND RETURN SIDES OF ROOFTOP UNIT. COORDINATE WIRING FOR SHUTDOWN WITH ELECTRICAL SCOPE. MOUNT SMOKE DETECTORS IN ACCESSIBLE LOCATIONS. REFERENCE M6.1 FOR RTU SCHEDULE. ACTIVATION OF SMOKE DETECTORS SHALL SHUT DOWN RTU AND ACTIVATE THE AUDIBLE AND VISUAL SIGNAL PROVIDED.

C. THE EMERSON SITE SUPERVISOR DISPLAY AND CONTROLLER PANEL SHALL BE MOUNTED AND INSTALLED FLUSH IN THE MANAGER'S OFFICE AT 5' AFF TO CENTER.

D. PER IECC 2018, PARAGRAPH C408.2.1, A THIRD PARTY SHALL BE HIRED BY THE OWNER AS PART OF THIS PROJECT TO PROVIDE/PERFORM THE FOLLOWING ITEMS:

- A NARRATIVE DESCRIPTION OF THE ACTIVITIES THAT WILL BE ACCOMPLISHED DURING EACH PHASE OF COMMISSIONING, INCLUDING THE PERSONNEL INTENDED TO ACCOMPLISH EACH OF THE ACTIVITES.
- A LISTING OF THE SPECIFIC EQUIPMENT, APPLIANCES OR SYSTEMS TO BE TESTED AND A DESCRIPTION OF THE TESTS TO BE PERFORMED.
- FUNCTIONS TO BE TESTED INCLUDING, BUT NOT LIMITED TO, CALIBRATIONS AND ECONOMIZER CONTROLS.
- CONDITIONS UNDER WHICH THE TEST WILL BE PERFORMED. TESTING SHALL AFFIRM WINTER AND SUMMER DESIGN CONDITIONS AND FULL OUTSIDE AIR CONDITIONS.
- MEASURABLE CRITERIA FOR PERFORMANCE.

E. KITCHEN HOODS, ANSUL FIRE SUPPRESSION SYSTEM AND HOOD CONTROLS SHALL BE OWNER-FURNISHED AND CONTRACTOR-INSTALLED.

F. MAINTAIN A MINIMUM CLEARANCE OF 10 FEET BETWEEN OUTSIDE AIR INTAKES AND ANY EXHAUST, FLUES, OR VENTS THROUGH ROOF.

KEYNOTES

1 CENTRIFUGAL UPBLAST GREASE HOOD EXHAUST FAN MOUNTED ON MANUFACTURER PROVIDED ROOF CURB, REFER TO VIEW A2 ON SHEET M5.1.
2 CENTRIFUGAL DOWNBLAST EXHAUST FAN MOUNTED ON MANUFACTURER PROVIDED ROOF CURB, REFER TO VIEW A1 ON SHEET M5.1.
3 ROOF ACCESS HATCH REFER TO ARCHITECTURAL SHEETS.
4 KITCHEN FREEZER CONDENSING UNIT MOUNTED ON ROOFTOP; PROVIDED BY OWNER, COORDINATE EXACT LOCATION ON SITE AND ROUTE REFERIGERATION PIPING THROUGH ROOF PENETRATION (BY OTHERS).
5 KITCHEN REFRIGERATOR CONDENSING UNIT MOUNTED ON ROOFTOP; PROVIDED BY OWNER, COORDINATE EXACT LOCATION ON SITE AND ROUTE REFERIGERATION PIPING THROUGH ROOF PENETRATION (BY OTHERS).
6 REFRIGERATION PIPING ROOF PENETRATION (BY OTHERS).
7 KITCHEN ICEMAKER CONDENSING UNIT MOUNTED ON ROOFTOP, PROVIDED BY OWNER. COORDINATE EXACT LOCATION ON SITE AND ROUTE REFRIGERANT PIPING THROUGH ROOF PENETRATION (BY OTHERS).
8 KITCHEN MULTIPLEX CONDENSING UNIT MOUNTED ON ROOFTOP, PROVIDED BY OWNER. COORDINATE EXACT LOCATION ON SITE AND ROUTE REFRIGERANT PIPING THROUGH ROOF PENETRATION (BY OTHERS).
9 ROUTE CONDENSATE LINE DOWN THROUGH ROOF. REFER TO SHEET M1.1 FOR CONTINUATION.

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
01/13/2021

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT
1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E CHRISTOFF
NUMBER
PE-2012002143
PROFESSIONAL ENGINEER

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE

Project No.: 62-40497-01

Client Project No.:

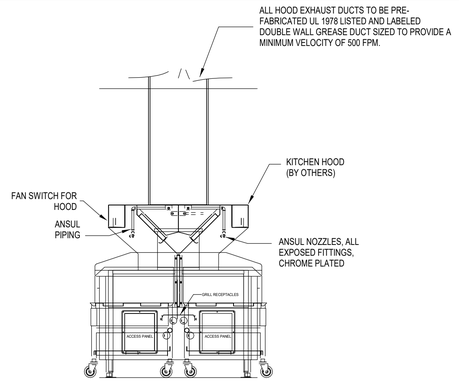
Drawing Title:

MECHANICAL ROOF PLAN

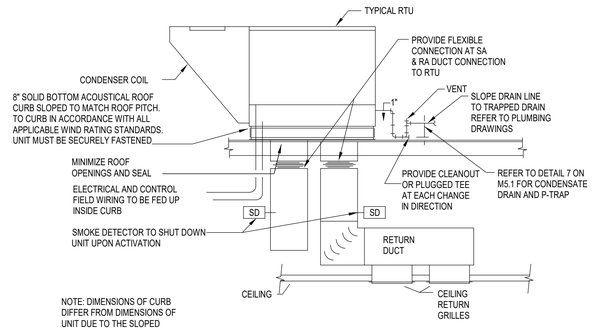
Date: 12/22/2020 *Phase:* BID SET

Designed: DCU
Drawn : DCU
Checked : KFF

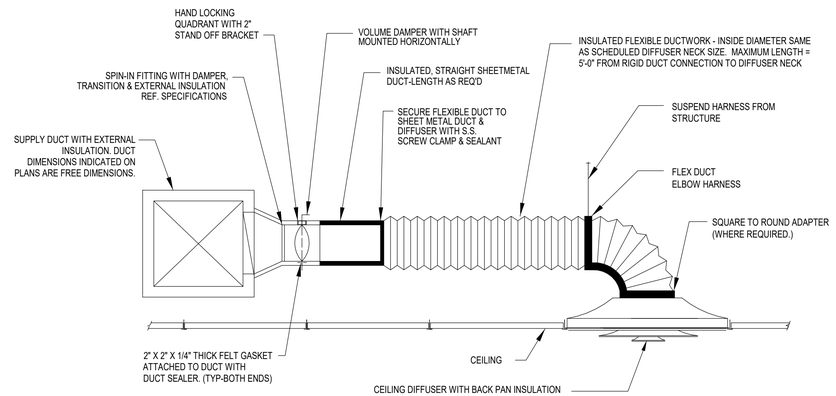
Drawing No.:
M2.1



C3 LOW PROFILE HOOD DETAIL
N.T.S.

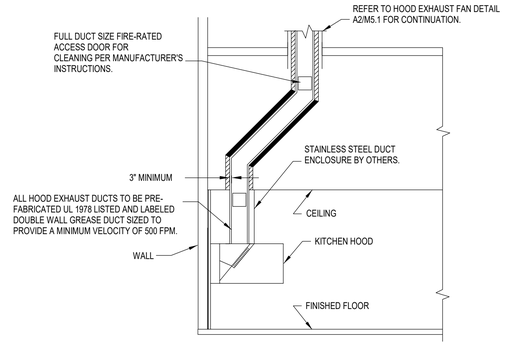


C4 ROOFTOP HVAC UNIT DETAIL
N.T.S.

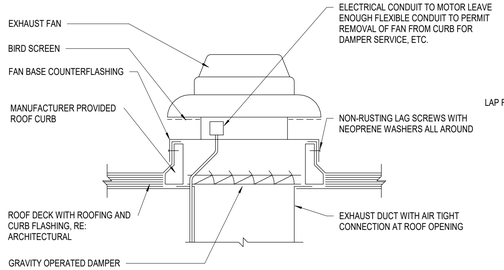


NOTE: INSTALL FLEXIBLE DUCTWORK SUPPORTS AT ALL ROUND NECK OUTLETS/INLETS UNLESS OTHERWISE NOTED ON DRAWINGS.

B2 DIFFUSER CONNECTION DETAIL
N.T.S.

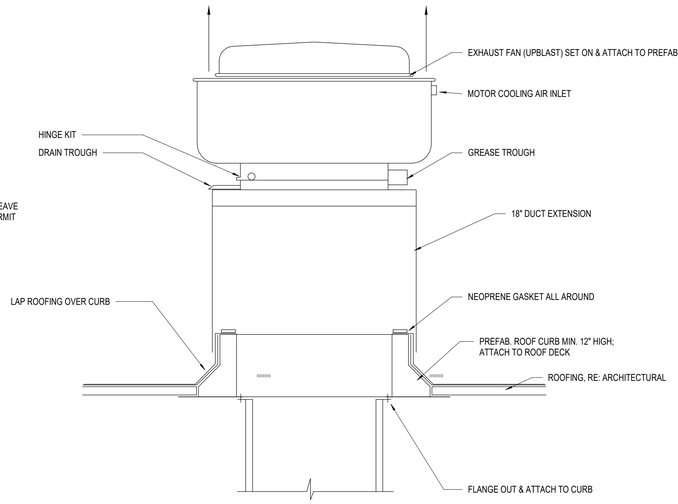


B4 HOOD EXHAUST DUCT DETAIL
N.T.S.

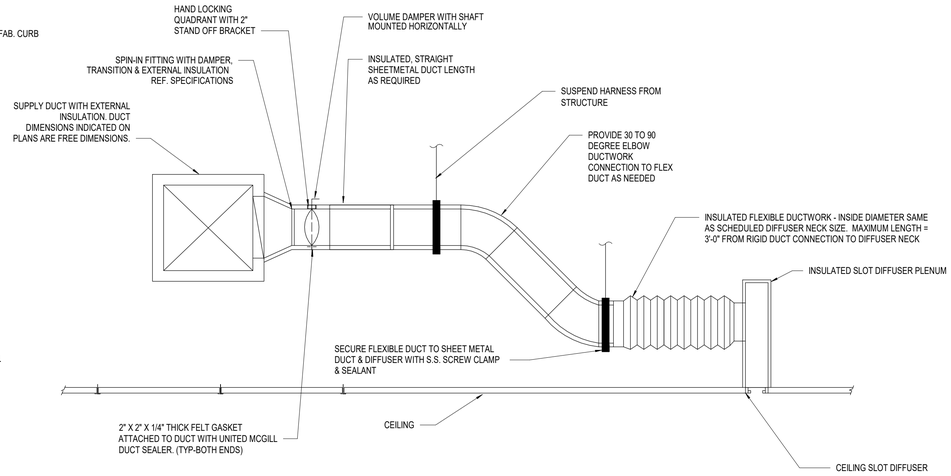


NOTE: COORDINATE FINAL DIMENSIONS WITH ROOF INSTALLER.

A1 ROOF MOUNTED EXHAUST FAN AND CURB DETAIL
N.T.S.



A2 ROOFTOP GREASE EXHAUST FAN DETAIL
N.T.S.



NOTE : INSTALL FLEXIBLE DUCTWORK SUPPORTS AT ALL ROUND NECK OUTLETS/INLETS UNLESS OTHERWISE NOTED ON DRAWINGS.

A3 PLENUM SLOT DIFFUSER DETAIL
N.T.S.

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
01/13/2021

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT

1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E. CHRISTOFF
NUMBER PE-2012002143
PROFESSIONAL ENGINEER

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.2001200143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE

Project No.: 62-40497-01
Client Project No.:

Drawing Title:

MECHANICAL DETAILS

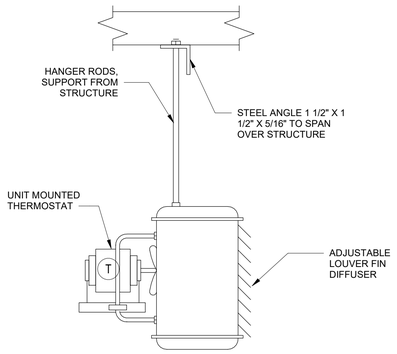
Date: 12/22/2020 Phase: BID SET
Designed: DCU
Drawn : DCU
Checked : KFF
Drawing No.: M5.1

C:_Backup\Revit\WB-Lees Summit-MO_V18_MECH_200921_dulm.rvt
1/27/2021 3:56:10 PM

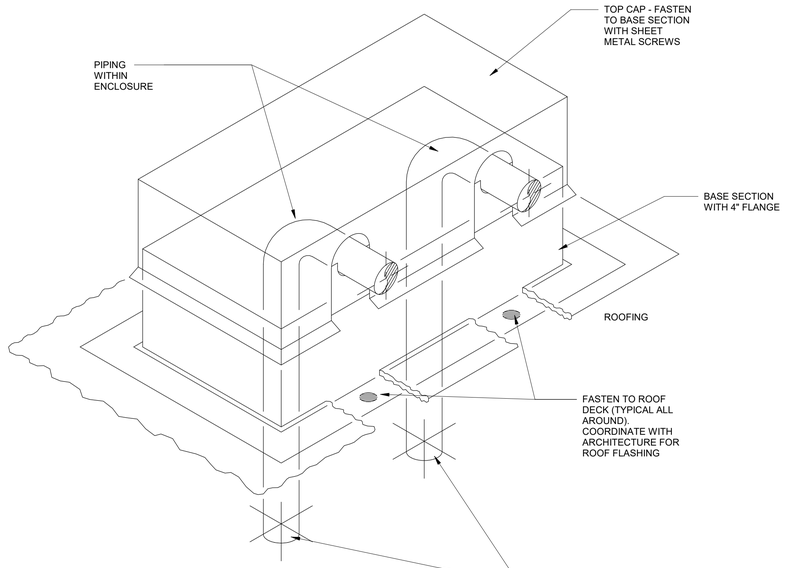
ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT

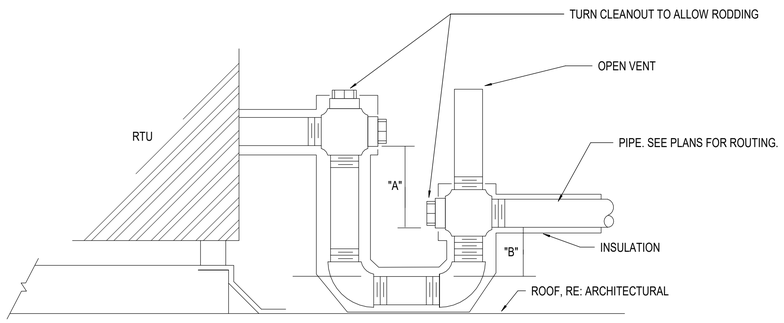
1460 NE DOUGLAS ST
LEE'S SUMMIT, MO



B2 ELECTRIC UNIT HEATER
N.T.S.

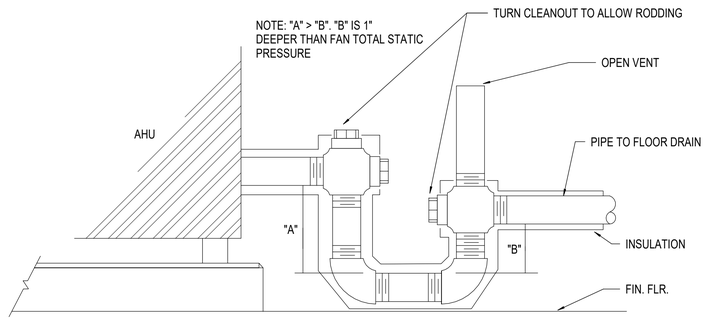


B4 PIPING THROUGH ROOF DETAIL
N.T.S.

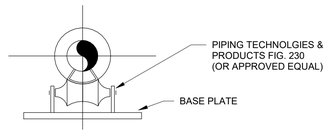


A1 DRAW-THRU RTU CONDENSATE DRAIN
N.T.S.

NOTE: "A" = TSP+1
"B" = 1/2TSP+1



A3 BLOW-THRU AHU CONDENSATE DRAIN
N.T.S.



A4 PIPE SUPPORT ROLLER STAND
N.T.S.

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE

Project No.: 62-40497-01
Client Project No.:
Drawing Title:

MECHANICAL DETAILS

Date: 12/22/2020 *Phase:* BID SET
Designed: DCU
Drawn : DCU
Checked : KFF
Drawing No.: M5.2

ROOFTOP UNIT SCHEDULE

TAG	SERVES	MANUFACTURER	MODEL	REFRIGERANT	AIR FLOW	AIR FLOW VENTILATION	FAN							COOLING						HEATING			VOLTAGE	PHASE	MCA	WEIGHT (LB)	NOTES
							FAN TYPE	MOTOR HP	QUANTITY FANS	DRIVE TYPE	RPM	ESP (IN W.C.)	TSP (IN W.C.)	TOTAL CAPACITY (MBH)	CAPACITY SENSIBLE (MBH)	EAT DB	EAT WB	LAT DB	LAT WB	TOTAL CAPACITY (KW)	EAT (°F)	MAX LAT (°F)					
RTU-1	DINING PERIMETER	LENNOX	LCH156H4M	R-410A	4000 CFM	1300 CFM	BELT	3	1	BELT	998	1.00	1.51	154	150	81.6	76.7	56.9	56.3	60	-1	95	208 V	3	139	2056	1,2,3,4,5,6,7,8,9
RTU-2	DINING INTERIOR	LENNOX	LCH156H4M	R-410A	4000 CFM	1300 CFM	BELT	3	1	BELT	998	1.00	1.51	154	150	81.6	76.7	56.9	56.3	60	-1	95	208 V	3	139	2056	1,2,3,4,5,6,7,8,9
RTU-3	KITCHEN	LENNOX	LCH240H4M	R-410A	6000 CFM	1500 CFM	BELT	5	1	BELT	895	1.00	1.15	235	146	81.6	76.7	53.4	54.1	90	-1	95	208 V	3	209	2446	1,2,3,4,5,6,7,8,9

NOTES:
1. PROVIDE WITH PREMIUM EFFICIENCY MOTORS IN ACCORDANCE WITH NEMA MG-1.
2. PROVIDE WITH SUPPLY AND RETURN SMOKE DETECTORS TO SHUT DOWN UNIT UPON SMOKE DETECTION.
3. PROVIDE WITH NETWORK CARD FOR INTERFACE WITH BUILDING MANAGEMENT SYSTEM.
4. SIZE AND SELECT ROOFTOP UNITS BASED ON 0.4% DEHUMIDIFICATION DESIGN DAY CONDITIONS OF 86.7°F DB, 76.5°F DEWPOINT.
5. PROVIDE HOT GAS REHEAT.
6. PROVIDE VARIABLE SPEED MOTOR.
7. PROVIDE MODULATING OUTSIDE AIR DAMPER.
8. PROVIDE ULTRA LOW LEAKAGE ECONOMIZER WITH BAROMETRIC RELIEF DAMPER, AND FAULT DETECTION AND DIAGNOSTIC.
9. PROVIDE FACTORY MOUNTED AND WIRED CONDENSATE OVERFLOW SWITCH.

EXHAUST FAN SCHEDULE

TAG	TYPE	MANUFACTURER	MODEL	AIR FLOW	TSP (IN W.C.)	RPM	BHP	HP	DRIVE TYPE	VOLTAGE	PHASE	WEIGHT (LBS.)	NOTES
EF-1	ROOF-MOUNTED CENTRIFUGAL DOWNBLAST	GREENHECK	G-098-VG	300 CFM	0.60	1257	0.07	0.07	DIRECT	120	1	38	1,2
KEF-1	ROOF-MOUNTED CENTRIFUGAL UPBLAST	GREENHECK	CUBE-161HP-10	1913 CFM	0.75	1356	0.57	0.75	BELT	208	1	81	2,3,4
KEF-2	ROOF-MOUNTED CENTRIFUGAL UPBLAST	GREENHECK	CUBE-121	1216 CFM	0.75	1418	0.30	0.33	BELT	208	1	64	2,3,4

NOTES:
1. PROVIDE INSULATED 12" ROOF CURB.
2. PROVIDE WITH INTEGRAL DISCONNECT SWITCH.
3. PROVIDE GREASE BOX.
4. PROVIDE INSULATED AND VENTED 18" ROOF CURB.

AIR DEVICE SCHEDULE

TAG	MANUFACTURER	MODEL	FACE SIZE	NECK SIZE (IN.)	MAX NC	PATTERN	MOUNTING	SLOT LENGTH	SLOT WIDTH	SLOT QTY	SYSTEM CLASSIFICATION	COMMENTS
A3	TITUS	TMS	24 X 24	6	30	4-WAY	LAY-IN	-	-	-	SUPPLY AIR	1
A4	TITUS	TMS	24 X 24	8	30	4-WAY	LAY-IN	-	-	-	SUPPLY AIR	1
A5	TITUS	TMS	24 X 24	10	30	4-WAY	LAY-IN	-	-	-	SUPPLY AIR	1
A6	TITUS	TMS	24 X 24	12	30	4-WAY	LAY-IN	-	-	-	SUPPLY AIR	1
B3	TITUS	TMS	24 X 24	6	30	4-WAY	FLANGE	-	-	-	SUPPLY AIR	1,2
C8	TITUS	50F	24 X 24	18 X 18	30	4-WAY	LAY-IN	-	-	-	RETURN AIR	
F1	TITUS	50F	12 X 12	6 X 6	30	4-WAY	FLANGE	-	-	-	EXHAUST AIR	2
H1	TITUS	TBDI-30	24 X 3-1/2	12	30	2-WAY	FLANGE	48	3/4	2	SUPPLY AIR	3
H9	TITUS	TBDI-30	60 X 3-1/2	8	30	2-WAY	FLANGE	60	3/4	2	SUPPLY AIR	3
H10	TITUS	TBDI-80	60 X 7-1/2	12	30	2-WAY	FLANGE	60	1-1/2	3	SUPPLY AIR	3
L1	TITUS	FL-15-JT	SEE PLANS		30	1-WAY	FLANGE	CONTINUOUS	1-1/2	1		4
P1	TITUS	FBPI	48 X 3-1/2	8	30	-	FLANGE	60	-	-	SUPPLY AIR	3
P3	TITUS	FBPI	60 X 3-1/2	8	30	-	FLANGE	60	-	-	SUPPLY AIR	3

NOTES:
1. PROVIDE BACKPAN INSULATION.
2. PROVIDE PLASTER FRAME FOR MOUNTING IN GYP. CEILING.
3. PROVIDE INSULATED PLENUM.
4. CONTINUOUS LINEAR SLOT DIFFUSER TO BE INSTALLED IN GYP. CEILING. PROVIDE INSULATED SUPPLY AIR PLENUMS AS SCHEDULED FOR A COMPLETE SYSTEM.

ELECTRIC UNIT HEATER SCHEDULE

TAG	MANUFACTURER	MODEL	HEATING TOTAL CAPACITY (BTU/HR.)	VOLTAGE	PHASE	WEIGHT (LB.)
UH-1	REZNOR	EGW	5118	208 V	1	20

AIR BALANCE AND VENTILATION CALCULATION:

TOTAL OUTSIDE AIR INTAKE = 4100 CFM

TOTAL GREASE HOOD EXHAUST = 3129 CFM
TOTAL RESTROOM EXHAUST = 300 CFM

OUTSIDE AIRFLOW - (GREASE HOOD EXHAUST AIRFLOW + RESTROOM EXHAUST AIRFLOW) = NET POSITIVE AIRFLOW

4100 CFM - (3129 + 300) = 671 CFM

ASHRAE 62.1 VENTILATION AIRFLOW REQUIRED = 1457 CFM
IMC 2018 VENTILATION AIRFLOW REQUIRED = 1457 CFM

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
01/13/2021

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT
1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E. CHRISTOFF
NUMBER
PE-2012002143
PROFESSIONAL ENGINEER

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

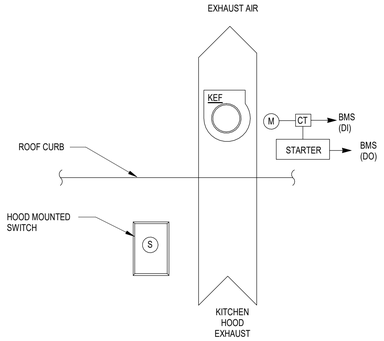
REV	DESCRIPTION	DATE

Project No.: 62-40497-01
Client Project No.:
Drawing Title:
MECHANICAL SCHEDULES

Date: 12/22/2020 *Phase:* BID SET
Designed: DCU
Drawn : DCU
Checked : KFF
Drawing No.: M6.1

CONTROL SYMBOLS

AE	ANALYZER ELEMENT
DDC	DIRECT DIGITAL CONTROL
BMS	BUILDING MANAGEMENT SYSTEM
RDC	ROOFTOP UNIT DDC CONTROLLER
FACP	FIRE ALARM CONTROL PANEL
DPI	DIFFERENTIAL PRESSURE INDICATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
EDH	ELECTRIC DUCT HEATER
EF	EXHAUST FAN
FE	FLOW ELEMENT
FLTR	FILTER
FS	FLOW SWITCH
H	HUMIDISTAT
HL	HIGH TEMPERATURE LIMIT SWITCH
M	MOTOR
PCV	PRESSURE CONTROL VALVE
PT	PRESSURE TRANSMITTER
SMK	SMOKE DETECTOR
T	TEMPERATURE SENSOR
TCV	TEMPERATURE CONTROL VALVE
TSL	LOW LIMIT THERMOSTAT (FREEZESTAT)
TT	TEMPERATURE TRANSMITTER
VFD	VARIABLE FREQUENCY DRIVE
STARTER	MOTOR STARTER (PROVIDE CONTROL RELAY)
CT	CURRENT TRANSDUCER
OS	OCCUPANCY SENSOR
CO	CARBON MONOXIDE SENSOR
	COMMUNICATION SIGNAL
HPS	HIGH STATIC PRESSURE SENSOR
DA	DAMPER ACTUATOR
CV	CONTROL VALVE
CC	CHILLED WATER HEATING COIL
HC	HOT WATER HEATING COIL
SF	SUPPLY AIR FAN



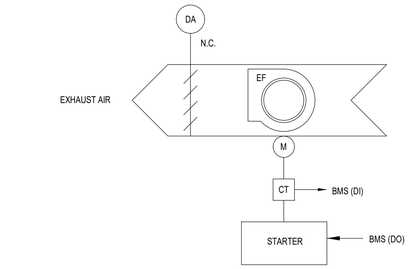
SEQUENCE OF OPERATION

OPERATING CONDITIONS - CONTINUOUS 24/7:
THE KITCHEN HOOD EXHAUST FAN SHALL RUN CONTINUOUSLY WHEN THE KITCHEN HOOD MOUNTED SWITCH IS ON.

INTEGRATED ANSUL FIRE SUPPRESSION SYSTEM
UPON ACTIVATION OF THE INTEGRATED ANSUL FIRE SUPPRESSION SYSTEM DURING NORMAL KITCHEN OPERATION, THE KITCHEN HOOD EXHAUST FAN SHALL REMAIN ENERGIZED.

FIRE/SMOKE CONTROL:
UPON SENSING A BUILDING FIRE ALARM, THE KITCHEN EXHAUST FAN SHALL BE CYCLED OFF THRU THE FIRE ALARM PANEL. FAN STATUS SHALL BE REPORTED TO THE BAS.

C2 KITCHEN HOOD EXHAUST FAN CONTROL DIAGRAM
N.T.S.

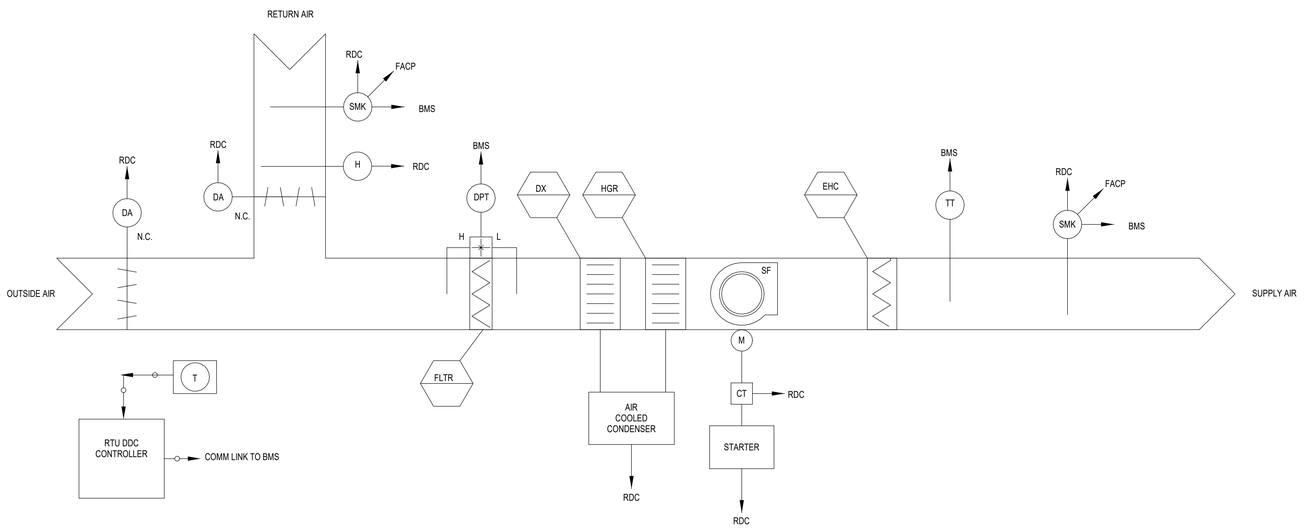


SEQUENCE OF OPERATION

OPERATING CONDITIONS - CONTINUOUS 24/7:
THE GENERAL EXHAUST FAN SHALL RUN CONTINUOUSLY. THE EXHAUST FAN SHUTOFF DAMPER SHALL BE INTERLOCKED WITH THE EXHAUST FAN TO OPEN WHEN THE FAN IS ENERGIZED AND CLOSE WHEN THE FAN IS DE-ENERGIZED

ALARMS:
ALARMS SHALL BE PROVIDED AS FOLLOWS:
1. FAN FAILURE: FAN COMMANDED ON BUT STATUS IS OFF.
2. FAN IN HAND: FAN COMMANDED OFF BUT STATUS IS ON.
3. FAN BELT FAILURE: MOTOR AMPERAGE READS ZERO AS MEASURED BY CURRENT TRANSDUCER.

C3 GENERAL EXHAUST FAN CONTROL DIAGRAM
N.T.S.



SEQUENCE OF OPERATION

OPERATING CONDITION - CONTINUOUS 24/7

THE RTU DDC CONTROLLER (RDC) SHALL PERFORM ALL CONTROL, SAFETY AND INTERLOCKS AS DESCRIBED IN THE SEQUENCE OF OPERATION. THE BMS SHALL MONITOR THE RTU DDC CONTROLLER VIA BMS PROTOCOL COMMUNICATION AND/OR COMBINATION OF DISCRETE INPUT/OUTPUT POINTS. THE BMS SHALL OPERATE THE UNIT CONTINUOUS 24/7. WHEN THE UNIT IS DE-ENERGIZED BY THE BMS, THE FAN SHALL SHUT DOWN, THE OA DAMPER SHALL CLOSE. THE REFRIGERATION SYSTEM SHALL ALSO BE DE-ENERGIZED AND THE HEATING SYSTEM LOCKED OUT OF HEATING MODE.

TEMPERATURE CONTROL
OCCUPIED MODE - THE BMS WILL MAINTAIN THE FOLLOWING SPACE TEMPERATURE SETPOINTS:
- COOLING: 75°F (ADJUSTABLE)
- HEATING: 70°F (ADJUSTABLE)

HUMIDITY CONTROL
IF THE RELATIVE HUMIDITY OF THE RETURN AIR EXCEEDS 60% (ADJUSTABLE) AND THERE IS NO CALL FOR COOLING IN THE SPACE, THE RDC SHALL ENABLE DEHUMIDIFICAITON MODE OF THE RTU BASED ON ITS OWN INTERNAL CONTROLS UTILIZING HOT GAS REHEAT.

VARIABLE SPEED OPPERATION
BASED ON THE RTU INTERNAL CONTROLS, THE RDC SHALL VARY THE FAN SPEED AND OUTSIDE AIR DAMPER POSTION, BASED ON CALL FOR COOLING IN THE SPACE. THERE SHALL BE A MINIMUM OF TWO FAN SPEEDS AND TWO DAMPER POSTIONS TO MAINTAIN CONSTANT OUTSIDE AIRFLOW FOR EACH FAN SPEED SETTINGS. THE RDC SHALL LOAD AND UNLOAD COMPRESSORS BASED ON THE UNIT INTERNAL CONTROLS TO CONDITION OR DEHUMIDIFY THE SPACE AS NEEDED.

SEQUENCE OF OPERATION (CONTINUED)

THE BMS SHALL BE PROGRAMMED SO THAT THE HEATING AND COOLING SYSTEMS SHALL NEVER OPERATE SIMULTANEOUSLY.

UNIT SHUTDOWN:
UNIT SHALL BE DE-ENERGIZED UPON DETECTION OF SMOKE IN DUCT OR BUILDING FIRE ALARM.

ALARMS
THE BMS SHALL MONITOR ALL SAFETIES ON THE REFRIGERATION SYSTEM AND THE HEATING SYSTEM THROUGH THE RDC COMMUNICATION PROTOCOL. ALL ABNORMAL CONDITIONS SHALL BE ALARMED AT THE BMS.

A. FILTERS
THE RDC SHALL MONITOR THE STATIC PRESSURE DROP ACROSS THE FILTER BANK AND ALARM ON HIGH STATIC PRESSURE DROP. A DIFFERENTIAL PRESSURE SWITCH ACROSS THE FILTER SHALL INITIATE FILTER ALARM WHEN THE PRESSURE DROP ACROSS THE FILTER REACHES THE SETPOINT OF 1.0 INCHES W.C. (ADJUSTABLE).

B. FIRE/SMOKE CONTROL
UPON ACTIVATION OF A DUCT SMOKE DETECTOR, THE BMS AND THE FIRE ALARM CONTROL PANEL SHALL RECEIVE AN ALARM.

C. GENERAL ALARM
ANY TROUBLE ALARM OR FAULT WITHIN THE UNIT ONBOARD CONTROLS WILL GENERATE A GENERAL ALARM TO THE BMS.

A1 PACKAGED ROOFTOP UNIT CONTROLS DIAGRAM
N.T.S.

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
09/13/2021

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT

1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E. CHRISTOFF
NUMBER PE-2012002143
PROFESSIONAL ENGINEER

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE

Project No.: 62-40497-01

Client Project No.:

Drawing Title:

MECHANICAL CONTROLS

Date: 12/22/2020 *Phase:* BID SET

Designed: DCU
Drawn : DCU
Checked : KFF

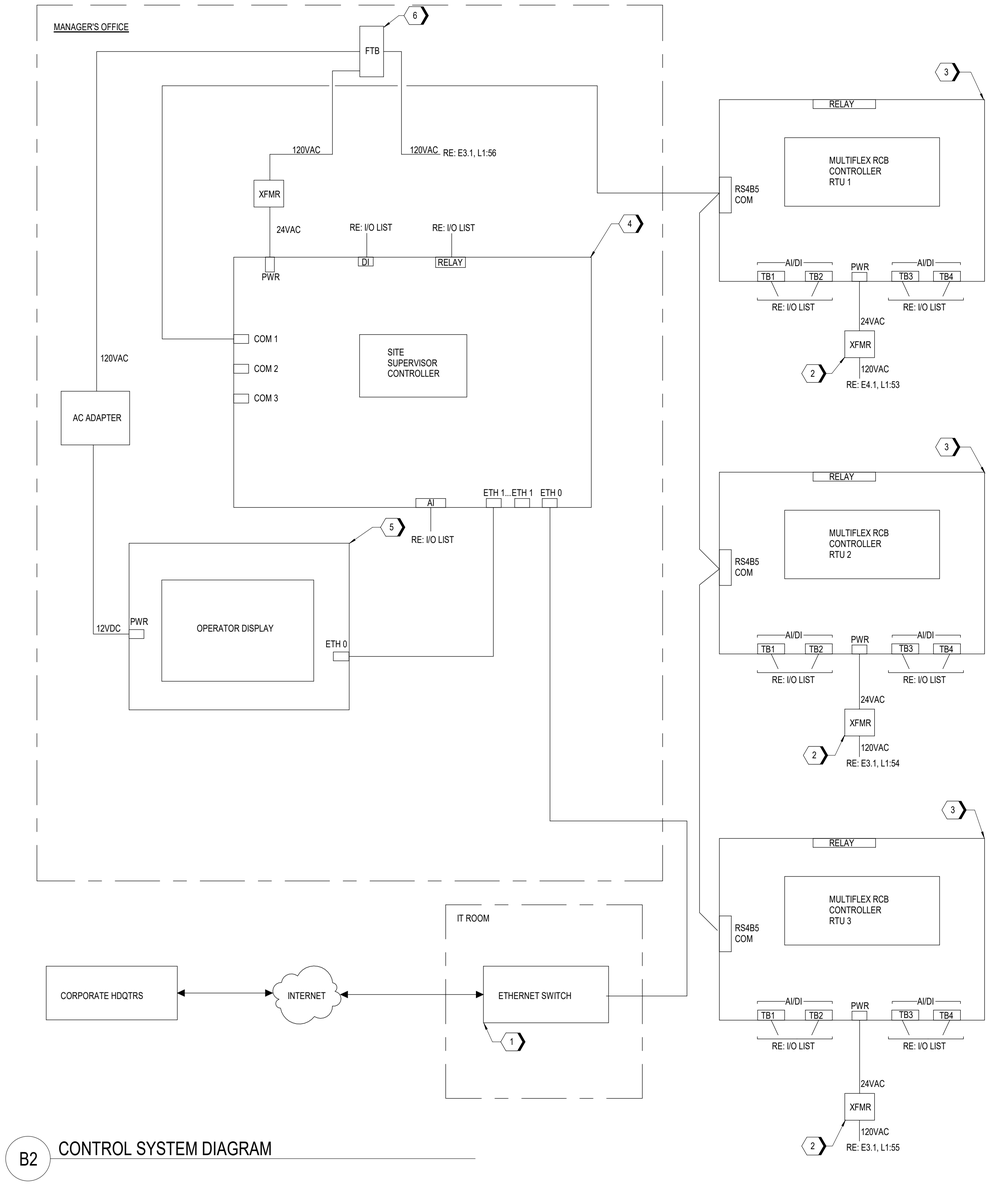
Drawing No.: M7.1

C:_Backup\Revit\WB-Lees Summit-MO_V18_MECH_200921_dulm.rvt
1/27/2021 3:56:12 PM

CONTROLS I/O LIST

Device No.	Service	I/O Board Point	Terminals	Description	AI	AO	DI	DO	Remarks
RTU-1	Kitchen	Input 1	TB1-1/2	Space Temperature	1				
RTU-1	Kitchen	Input 2	TB1-3/4	Supply Temperature	1				
RTU-1	Kitchen	Input 3	TB1-5/6	Return Humidity	1				
RTU-1	Kitchen	Input 4	TB1-7/8	Outside Air Damper Actuator Postion	1				
RTU-1	Kitchen	Input 1	TB2-1/2	Return Air Damper Position	1				
RTU-1	Kitchen	Input 2	TB2-3/4	SPARE					
RTU-1	Kitchen	Input 3	TB2-5/6	SPARE					
RTU-1	Kitchen	Input 4	TB2-7/8	Clogged Filter			1		Dry Contact
RTU-1	Kitchen	Input 1	TB3-1/2	Return Air Smoke Detector			1		Dry Contact
RTU-1	Kitchen	Input 2	TB3-3/4	Supply Air Smoke Detector			1		Dry Contact
RTU-1	Kitchen	Input 3	TB3-5/6	Supply Fan Run Status			1		Dry Contact
RTU-1	Kitchen	Input 4	TB3-7/8	Electric Heating Coil Status			1		Dry Contact
RTU-1	Kitchen	Input 1	TB4-1/2	Compressor Status			1		Dry Contact
RTU-1	Kitchen	Input 2	TB4-3/4	Kitchen Exhaust Fan 1 Run Status			1		Dry Contact
RTU-1	Kitchen	Input 3	TB4-5/6	Kitchen Exhaust Fan 2 Run Status			1		Dry Contact
RTU-1	Kitchen	Input 4	TB4-7/8	Kitchen Exhaust Fan 3 Run Status			1		Dry Contact
RTU-1	Kitchen	Output 1	+/-	Outside Air Damper Actuator Postion Cmd		1			Modulating Damper
RTU-1	Kitchen	Output 2	+/-	Return Air Damper Position Cmd		1			Modulating Damper
RTU-1	Kitchen	Output 3	+/-	SPARE					
RTU-1	Kitchen	Output 4	+/-	SPARE					
RTU-1	Kitchen	Relay Out 1	NO/C	Supply Fan Start/Stop Cmd				1	Relay is Form C (NO/C/NC) and can be set in field
RTU-1	Kitchen	Relay Out 2	NO/C/NC	SPARE					
RTU-1	Kitchen	Relay Out 3	NO/C/NC	SPARE					
RTU-1	Kitchen	Relay Out 4	NO/C/NC	SPARE					
RTU-1	Kitchen	Relay Out 5	NO/C/NC	SPARE					
RTU-1	Kitchen	Relay Out 6	NO/C/NC	SPARE					
RTU-1	Kitchen	Relay Out 7	NO/C/NC	SPARE					
RTU-1	Kitchen	Relay Out 8	NO/C/NC	SPARE					
				Sub-total Points Connected	5	2	9	0	Multiflex RCB Controller has 16 Inputs (AI or DI), 8 Relay Outputs, 4 Analog Outputs (AO)
RTU-2	Dining Room	Input 1	TB1-1/2	Space Temperature	1				
RTU-2	Dining Room	Input 2	TB1-3/4	Supply Temperature	1				
RTU-2	Dining Room	Input 3	TB1-5/6	Return Humidity	1				
RTU-2	Dining Room	Input 4	TB1-7/8	Outside Air Damper Actuator Postion	1				
RTU-2	Dining Room	Input 1	TB2-1/2	Return Air Damper Position	1				
RTU-2	Dining Room	Input 2	TB2-3/4	SPARE					
RTU-2	Dining Room	Input 3	TB2-5/6	SPARE					
RTU-2	Dining Room	Input 4	TB2-7/8	SPARE					
RTU-2	Dining Room	Input 1	TB3-1/2	SPARE					
RTU-2	Dining Room	Input 2	TB3-3/4	SPARE					
RTU-2	Dining Room	Input 3	TB3-5/6	Return Air Smoke Detector			1		Dry Contact
RTU-2	Dining Room	Input 4	TB3-7/8	Supply Air Smoke Detector			1		Dry Contact
RTU-2	Dining Room	Input 1	TB4-1/2	Supply Fan Run Status			1		Dry Contact
RTU-2	Dining Room	Input 2	TB4-3/4	Electric Heating Coil Status			1		Dry Contact
RTU-2	Dining Room	Input 3	TB4-5/6	Air Cooled Condenser Status			1		Dry Contact
RTU-2	Dining Room	Input 4	TB4-7/8	Clogged Filter			1		Dry Contact
RTU-2	Dining Room	Output 1	+/-	Outside Air Damper Actuator Postion Cmd		1			Modulating Damper
RTU-2	Dining Room	Output 2	+/-	Return Air Damper Position Cmd		1			Modulating Damper
RTU-2	Dining Room	Output 3	+/-	SPARE					
RTU-2	Dining Room	Output 4	+/-	SPARE					
RTU-2	Dining Room	Relay Out 1	NO/C	Supply Fan Start/Stop Cmd				1	Relay is Form C (NO/C/NC) and can be set in field
RTU-2	Dining Room	Relay Out 2	NO/C/NC	SPARE					
RTU-2	Dining Room	Relay Out 3	NO/C/NC	SPARE					
RTU-2	Dining Room	Relay Out 4	NO/C/NC	SPARE					
RTU-2	Dining Room	Relay Out 5	NO/C/NC	SPARE					
RTU-2	Dining Room	Relay Out 6	NO/C/NC	SPARE					
RTU-2	Dining Room	Relay Out 7	NO/C/NC	SPARE					
RTU-2	Dining Room	Relay Out 8	NO/C/NC	SPARE					
				Sub-total Points Connected	5	2	6	1	Multiflex RCB Controller has 16 Inputs (AI or DI), 8 Relay Outputs, 4 Analog Outputs (AO)
RTU-3	Dining Room	Input 1	TB1-1/2	Space Temperature	1				
RTU-3	Dining Room	Input 2	TB1-3/4	Supply Temperature	1				
RTU-3	Dining Room	Input 3	TB1-5/6	Return Humidity	1				
RTU-3	Dining Room	Input 4	TB1-7/8	Outside Air Damper Actuator Postion	1				
RTU-3	Dining Room	Input 1	TB2-1/2	Return Air Damper Position	1				
RTU-3	Dining Room	Input 2	TB2-3/4	SPARE					
RTU-3	Dining Room	Input 3	TB2-5/6	SPARE					
RTU-3	Dining Room	Input 4	TB2-7/8	SPARE					
RTU-3	Dining Room	Input 1	TB3-1/2	SPARE					
RTU-3	Dining Room	Input 2	TB3-3/4	SPARE					
RTU-3	Dining Room	Input 3	TB3-5/6	Return Air Smoke Detector			1		Dry Contact
RTU-3	Dining Room	Input 4	TB3-7/8	Supply Air Smoke Detector			1		Dry Contact
RTU-3	Dining Room	Input 1	TB4-1/2	Supply Fan Run Status			1		Dry Contact
RTU-3	Dining Room	Input 2	TB4-3/4	Electric Heating Coil Status			1		Dry Contact
RTU-3	Dining Room	Input 3	TB4-5/6	Air Cooled Condenser Status			1		Dry Contact
RTU-3	Dining Room	Input 4	TB4-7/8	Clogged Filter			1		Dry Contact
RTU-3	Dining Room	Output 1	+/-	Outside Air Damper Actuator Postion Cmd		1			Modulating Damper
RTU-3	Dining Room	Output 2	+/-	Return Air Damper Position Cmd		1			Modulating Damper
RTU-3	Dining Room	Output 3	+/-	SPARE					
RTU-3	Dining Room	Output 4	+/-	SPARE					
RTU-3	Dining Room	Relay Out 1	NO/C	Supply Fan Start/Stop Cmd				1	Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 2	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 3	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 4	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 5	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 6	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 7	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
RTU-3	Dining Room	Relay Out 8	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
				Sub-total Points Connected	5	3	4	1	Multiflex RCB Controller has 16 Inputs (AI or DI), 8 Relay Outputs, 4 Analog Outputs (AO)
SSC	Supervisor Controller	RL1	NO/C (16/17)	Relay Output #1 to Lighting Panel				1	Relay is Form C (NO/C/NC) and can be set in field
SSC	Supervisor Controller	RL2	NO/C (19/17)	Relay Output #2 to Lighting Panel				1	Relay is Form C (NO/C/NC) and can be set in field
SSC	Supervisor Controller	RL3	NO/C (21/24)	Alarm (Combo Audible/Visual Unit)					Relay is Form C (NO/C/NC) and can be set in field
SSC	Supervisor Controller	RL4	NO/C/NC	SPARE					Relay is Form C (NO/C/NC) and can be set in field
SSC	Supervisor Controller	Pb1	+/-	Outside Air Temperature	1				From Outdoor Weather Station (Emerson 809-7001)
SSC	Supervisor Controller	Pb2	+/-	Outdoor Humidity	1				From Outdoor Weather Station (Emerson 809-7001)
SSC	Supervisor Controller	Pb3	+/-	Light Level Sensor	1				From Outdoor Weather Station (Emerson 809-7001)
SSC	Supervisor Controller	Pb4	+/-	Walk-In Freezer Temperature	1				
SSC	Supervisor Controller	Pb5	+/-	Walk-In Cooler Temperaure	1				
SSC	Supervisor Controller	Pb6	+/-	Reach In Meat Box Temperature	1				
SSC	Supervisor Controller	Pb7	+/-	SPARE					
SSC	Supervisor Controller	Pb8	+/-	SPARE					
SSC	Supervisor Controller	DI1	10/9	Emergency Shutdown Pushbutton #1			1		Dry Inputs
SSC	Supervisor Controller	DI2	11/9	Emergency Shutdown Pushbutton #2			1		Dry Inputs
SSC	Supervisor Controller	DI3	12/9 or 14	SPARE					Dry Contact
SSC	Supervisor Controller	DI4	13/9 or 14	SPARE					Dry Contact
									MultiFlex RCB Controller has 16 Inputs (AI or DI), 8 Relay Outputs, 4 Analog Outputs (AO)
				Total Points Connected	21	7	21	4	

A1 CONTROLS I/O List



B2 CONTROL SYSTEM DIAGRAM

GENERAL NOTES

A. DIAGRAM IS FUNCTIONAL REPRESENTATION OF SYSTEM ARCHITECTURE, FINAL CONFIGURATION DEPENDENT UPON ACTUAL EQUIPMENT SELECTED.

B. SENSORS SHALL BE PROVIDED AND USED AS SHARED INFORMATION POINTS IN THE DDC SYSTEM CONTROL PROGRAMS.

C. PANELS SHALL BE FABRICATED, PRE-WIRED AND TESTED AT THE VENDOR FACILITY TO PROVIDE A COMPLETE INSTALLATION.

D. PROVIDE PROGRAMMING OF THE DDC SYSTEM AND COMMISSIONING REPORT THAT INCLUDES SIGN-OFF BY RESTAURANT MANAGER AND CORPORATE HEADQUARTERS OF THE INSTALLATION.

E. PROVIDE REQUIRED WIRING AND ASSOCIATED ACCESSORIES TO INTERCONNECT THE KITCHEN HOOD ANSUL SYSTEMS WITH THE KITCHEN UNIT RTU TO SHUT DOWN UNIT IF ANSUL SYSTEM IS ACTIVATED.

F. REFER TO DWG M1.1 FOR DDC CONTROL PANEL LOCATIONS.

KEYNOTES

1	ETHERNET SWITCH (BY CORPORATE HEADQUARTERS).
2	TRANSFORMER 120VAC TO 24VAC (75VA).
3	EMERSON MULTIFLEX RCB CONTROLLER (810-3062).
4	EMERSON SITE SUPERVISOR CONTROLLER.
5	EMERSON SITE SUPERVISOR DISPLAY 10.1 IN W/AC ADAPTER (818-7240).
6	FUSED TERMINAL BLOCK.

RELEASE FOR CONSTRUCTION
AS NOTED ON PLANS REVIEW
DEVELOPMENT SERVICES
LEE'S SUMMIT, MISSOURI
10/13/2021

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229
p 614.898.7100
f 614.898.7570
www.msconsultants.com

WHATABURGER 20-M
LEE'S SUMMIT

1460 NE DOUGLAS ST
LEE'S SUMMIT, MO

WHATABURGER

STATE OF MISSOURI
JASON E. CHRISTOFF
NUMBER PE-2012002143
PROFESSIONAL ENGINEER

12/22/20
PROFESSIONAL OF RECORD:
JASON E. CHRISTOFF No.20012002143
EXP DATE: 12/31/20

REV	DESCRIPTION	DATE

Project No.: 62-40497-01

Client Project No.:

Drawing Title:

CONTROL SYSTEM DIAGRAM

Date: 12/22/2020 *Phase:* BID SET

Designed: DCU
Drawn : DCU
Checked : KFF

Drawing No.:

M8.1

C:_Backup\Revit\WB-Lees Summit-MO_V18_MECH_200921_dulm.rvt

1/27/2021 3:56:14 PM