AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

CITY OF TULSA, OKLAHOMA
TULSA METROPOLITAN UTILITY AUTHORITY

INDEX OF DRAWINGS

COVER SHEET

GENERAL

G-001 PAY ITEM SHEET
G-002 LEGENDS, CODE INFORMATION, PARTITION TYPES
G-101 CODE COMPLIANCE PLANS

STRUCTURAL
S-001 STRUCTURAL NOTES, PLATFORM PLANS AND DETAILS

ARCHITECTURAL

AD101 SECOND AND THIRD FLOOR DEMOLITION PLANS
AD102 SECOND AND THIRD FLOOR DEMOLITION CEILING PLANS
A-101 SECOND AND THIRD FLOOR PLANS
A-102 SECOND AND THIRD FLOOR REFLECTED CEILING PLANS
A-201 CASEWORK ELEVATIONS AND SCHEDULES

PLUMBING

P-001 PLUMBING SYMBOLS AND ABBREVIATIONS
P-002 PLUMBING GENERAL NOTES
P-101 SECOND AND THIRD FLOOR PLUMBING PLANS
P-102 ROOF PLUMBING PLAN
P-401 SECOND FLOOR ENLARGED PLUMBING PLAN
P-402 THIRD FLOOR ENLARGED PLUMBING PLANS
P-501 PLUMBING DETAILS
P-601 PLUMBING SCHEDULES

MECHANICAL

M-001 MECHANICAL SYMBOLS AND ABBREVIATIONS
M-002 MECHANICAL NOTES
M-101 SECOND AND THIRD FLOOR MECHANICAL PLANS
M-102 MECHANICAL ROOF PLAN
MD401 ENLARGED DEMOLITION PLAN
M-401 ENLARGED MECHANICAL PLANS
M-402 ENLARGED MECHANICAL PLANS
M-403 ENLARGED MECHANICAL PLANS
M-501 MECHANICAL DETAILS
M-502 MECHANICAL DETAILS
M-601 MECHANICAL SCHEDULES
M-602 MECHANICAL SCHEDULES
M-701 MECHANICAL CONTROLS
M-702 MECHANICAL CONTROLS

ELECTRICAL

E-001 ELECTRICAL SPECIFICATIONS
E-002 ELECTRICAL SPECIFICATIONS
E-003 ELECTRICAL SPECIFICATIONS, SYMBOLS, NOTES, ABBREVIATIONS AND SCHEDULES
E-101 SECOND FLOOR ELECTRICAL PLAN
E-102 THIRD FLOOR POWER PLAN
E-103 ROOF POWER PLAN

FIRE PROTECTION

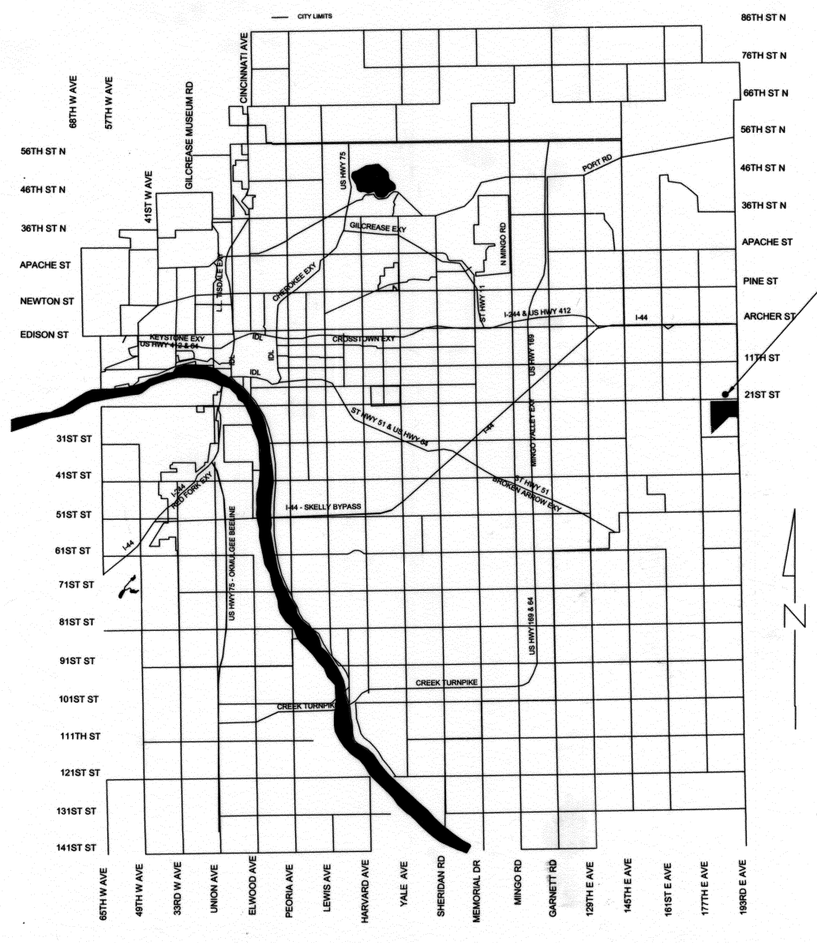
FX001 FIRE SUPPRESSION NOTES AND DETAILS
FX101 FIRE SUPPRESSION PLANS
FX102 FIRE SUPPRESSION CLEAN AGENT PLAN

UTILITY COORDINATION BOX

	NUMBER
ENGINEERING SERVICES	
WATER DESIGN	918-596-9566
WASTEWATER DESIGN	918-596-9564
TRANSPORTATION DESIGN	918-596-9636
TRAFFIC ENGINEERING DESIGN	918-596-9749
STORMWATER DESIGN	918-596-9498
OKLAHOMA NATURAL GAS CO.	918-831-8293
COX COMMUNICATIONS	918-286-4666
PUBLIC SERVICE CO. / AEP	918-599-2233
AT&T	918-576-2142

BEFORE YOU DIG CALL OKIE 811 1-800-552-6543

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811



AB JEWELL WTP
18707 E. 21ST ST
TULSA OK 74134

LICENSED PROFESSIONAL ENGINEER
LARRY LEE VORBA
11654
OKLAHOMA
9-13-2016

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

LARRY L. VORBA
ENGINEER OF RECORD

APPROVED BY:
CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICED DEPARTMENT

BY Clayton Edwards DATE 10-7-16
CLAYTON EDWARDS, PE
DIRECTOR, WATER AND SEWER DEPARTMENT

BY _____ DATE 10-10-16
PAUL ZACHARY, PE
CITY ENGINEER

PLANS PREPARED BY:

CYNTERGY, L.L.C.
810 SOUTH CINCINATI AVE
SECOND FLOOR
TULSA, OK 74119
918.877.6000

CYNTERGY ENGINEERING P.L.L.C.
CA # 3537 EXP. 6/30/2018

PROPOSAL
PROJECT NO. TMUA-W 16-04
AB JEWELL WTP LAB/OFFICE RENOVATION
BASE BID

ITEM NO.	SPEC NUMBER	ITEM DESCRIPTION	UNIT	PAY ITEM NOTES	QTY
1	011000, 015000	Mobilization	EA		1
2	024119	Protect existing - 2nd Floor	EA		1
3	024119	Interior Demolition - 2nd Floor	EA		1
4	092216	Interior Partition Walls and Soffits - 2nd Floor	SF		800
5	099123	Prep and Paint Interior Walls and Soffits - 2nd Floor	SF		3,360
6	081416, 081213, 087110	Interior doors / frames / hardware - 2nd Floor	EA		6
7	095123	Acoustical ceiling and suspension system - 2nd Floor	SF		900
8	096813	Flooring - 2nd Floor	SY		78
9	024119	Protect existing - 3rd Floor	EA		1
10	024119	Interior Demolition - 3rd Floor	EA		1
11	092216	Interior Partition Walls and Soffits - 3rd Floor	SF		800
12	099123	Prep and Paint Interior Walls and Soffits - 3rd Floor	SF		800
13	081416, 081213, 087110	Interior doors / frames / hardware - 3rd Floor	EA		1
14	095123	Acoustical ceiling and suspension system - 3rd Floor	SF		360
15	123216	Institutional Casework and Countertops - 3rd Floor	LF		33
16	096519	Flooring - 3rd Floor	SY		40
17	087110	Floor-mounted doorstop	EA		1
18	Refer to M-102	Demolition of makeup air unit	EA		1
19	Refer to M-102	Demolition of lab exhaust fan	EA		1
20	Refer to M-102	Demoltion of general exhaust fan	EA		1
21	Refer to M-102	Demolition of associated ductwork on roof	LF		100
22	Refer to M-401	Demolition of exhaust and supply ductwork in plenum	LF		400
23	233113, 233300	New general use ductwork	LF		350
24	233713	New diffusers: perforated, high flow, low velocity	EA		16
25	233713	New diffusers and grilles: general use	EA		16
26	232300, 230719	New refrigerant piping (Line set lengths)	LF		600
27	221316	New condensate drain piping	LF		185
28	237433	New makeup air unit (MAU-1) and installation	EA		1
29	233113, 233300	Large ductwork mains and connections to MAU-1	LF		100
30	231123	New gas connection to MAU-1 and GH-1	EA		1
31	238123.13	New CRAC-1 and installation	EA		1
32	223416 or 233413	New lab exhaust fan (LEF-1) and installation	EA		1
33	223416 or 233413	New general exhaust fan (EF-5) and installation	EA		1
34	238126	New split systems and installation	EA		1
35	220533	Heat trace	LF		50
36	238413	Gas fired humidifer	EA		1
37	Refer to M-601	Laboratory fume hood	EA		1
38	230900	Controls	EA		1
39	230593	Testing, Adjusting, and Balancing	EA		1
40	230800	Commissioning	EA		1
41	221316	Sanitary and vent piping	LF		120
42	226700	DI water piping to sink and fume hoods	LF		100
43	221116	DCW, DHW, DHWR to sink	LF		300
44	226313	Argon piping to instrument	LF		75
45	226213	Vacuum piping to hood	LF		75
46	226313	Nitrogen piping to hood	LF		90
47	226313	Helium piping to hood	LF		10
48	226113	Compressed air to hood	LF		30
49	Refer to P-601	Fixtures (emergency eye wash, emergency shower, floor drain, etc.)	EA		1
50	Refer to FX101	Semi-recessed sprinklers	EA		2
51	Refer to FX101	Dry Horizontal Sidewall	EA		2
52	Refer to E-001 / E-002 / E-003	New ceiling-mounted occupancy sensor and associated control wiring	EA		5
53	Refer to E-001 / E-002 / E-003	Demolition of existing light switch	EA		13
54	Refer to E-001 / E-002 / E-003	New light switch and installation, 3-way	EA		3
55	Refer to E-001 / E-002 / E-003	Demolition of existing receptacle / communications outlet	EA		13
56	Refer to E-001 / E-002 / E-003	Relocation of existing lab power receptacles	EA		4
57	Refer to E-001 / E-002 / E-003	New receptacle, quad	EA		7
58	Refer to E-001 / E-002 / E-003	New receptacle, quad GFCI	EA		2
59	Refer to E-001 / E-002 / E-003	New receptacle, duplex	EA		10
60	Refer to E-001 / E-002 / E-003	New receptacle, duplex GFCI	EA		2
61	Refer to E-001 / E-002 / E-003	New receptacle, duplex GFCI with in-use cover	EA		2
62	Refer to E-001 / E-002 / E-003	New blank box, bushings, and conduit to ceiling for communications	EA		14
63	Refer to E-001 / E-002 / E-003	New faceplate	EA		8
64	Refer to E-001 / E-002 / E-003	New L5-20R Receptacle	EA		2
65	Refer to E-001 / E-002 / E-003	New circuit breaker, 15A 3-pole	EA		1
66	Refer to E-001 / E-002 / E-003	New circuit breaker, 20A 1-pole	EA		25
67	Refer to E-001 / E-002 / E-003	New circuit breaker, 25A, 3-pole	EA		2
68	Refer to E-001 / E-002 / E-003	New circuit breaker, 30A 3-pole	EA		2
69	Refer to E-001 / E-002 / E-003	New circuit breaker, 60A 3-pole	EA		1
70	Refer to E-001 / E-002 / E-003	New circuit breaker, 80A 3-pole	EA		1
71	Refer to E-001 / E-002 / E-003	New circuit breaker, 100A 3-pole	EA		1
72	Refer to E-001 / E-002 / E-003	New circuit breaker, 125A 3-pole	EA		1
73	Refer to E-001 / E-002 / E-003	New circuit breaker, 150A 3-pole	EA		1
74	Refer to E-001 / E-002 / E-003	New surge protection device	EA		2
75	Refer to E-001 / E-002 / E-003	New motor-rated switch	EA		1
76	Refer to E-001 / E-002 / E-003	New 1-pole non-fused disconnect	EA		1
77	Refer to E-001 / E-002 / E-003	New 3-pole fused disconnect and required fuses	EA		7
78	Refer to E-001 / E-002 / E-003	New 2-pole fused disconnect and required fuses	EA		5
79	Refer to E-001 / E-002 / E-003	New roof penetration	EA		9
80	Refer to E-001 / E-002 / E-003	New variable frequency drive	EA		2
81	Refer to E-001 / E-002 / E-003	New #12 copper wire	LF		2,859
82	Refer to E-001 / E-002 / E-003	New #10 copper wire	LF		1,680
83	Refer to E-001 / E-002 / E-003	New #8 copper wire	LF		941
84	Refer to E-001 / E-002 / E-003	New #6 copper wire	LF		450
85	Refer to E-001 / E-002 / E-003	New #4 copper wire	LF		2,463
86	Refer to E-001 / E-002 / E-003	New #3 copper wire	LF		285
87	Refer to E-001 / E-002 / E-003	New #1 copper wire	LF		60
88	Refer to E-001 / E-002 / E-003	New 1/0 copper wire	LF		525
89	Refer to E-001 / E-002 / E-003	New 1/2" conduit and fittings	LF		588
90	Refer to E-001 / E-002 / E-003	New 1" conduit and fittings	LF		1,126
91	Refer to E-001 / E-002 / E-003	New 1-1/4" conduit and fittings	LF		105
92	Refer to E-001 / E-002 / E-003	New 1-1/2" conduit and fittings	LF		30
93	Refer to E-001 / E-002 / E-003	New 100A MLO panelboard	EA		1
94	Refer to E-001 / E-002 / E-003	New 125A MCB panelboard	EA		1
95	Refer to E-001 / E-002 / E-003	Demolish existing circuit breaker	EA		9
96	Refer to E-001 / E-002 / E-003	New cable tray and associated installation / mounting equipment	EA		1
97	Refer to E-001 / E-002 / E-003	Installation of server rack	EA		2
98	Refer to E-001 / E-002 / E-003	New strut rack mounting	LF		10
99	Refer to E-001 / E-002 / E-003	New surge arrestor	EA		2
100	Refer to S-001	W8X10 beams	LF		28
101	Refer to S-001	W8X18 beams	LF		26
102	Refer to S-001	W14x26 beams	LF		11
103	Refer to S-001	1"x1/8" galvanized bar grating	SF		240
104	Refer to S-001	1-1/2" rooftop handrail	LF		140
105	Refer to Detail 4/A-102	Roof curb support	LF		120
106	Refer to Detail 4/A-102	Piping through roof	EA		5
107		Restriction to construction sequencing	EA		1
108	012100	Owner's Allowance	ALLOW		1

PROPOSAL
PROJECT NO. TMUA-W 16-04
AB JEWELL WTP LAB/OFFICE RENOVATION
ADD-ALT NO. 1: CLEAN AGENT SUPPRESSION SYSTEM

ITEM NO.	SPEC NUMBER	ITEM DESCRIPTION	UNIT	PAY ITEM NOTES	QTY
109	212200	Clean agent suppression system	EA		1
110	Refer to E-001 / E-002 / E-003	New circuit breaker, 20A 1-pole with shunt trip	EA		7
111	Refer to E-001 / E-002 / E-003	New blank box, bushings, and conduit to ceiling for communications	EA		2
112	Refer to E-001 / E-002 / E-003	New circuit breaker, 15A 1-pole and associated conduit, fittings, and conductors	EA		1

PROPOSAL
PROJECT NO. TMUA-W 16-04
AB JEWELL WTP LAB/OFFICE RENOVATION
ADD-ALT NO. 2: SECOND FLOOR TRANSFORMER SYSTEM

ITEM NO.	SPEC NUMBER	ITEM DESCRIPTION	UNIT	PAY ITEM NOTES	QTY
113	Refer to E-001 / E-002 / E-003	Demolition of existing circuit breaker in first floor MDP	EA		1
114	Refer to E-001 / E-002 / E-003	New circuit breaker, 70A 3-pole, and phenolic label	EA		1
115	Refer to E-001 / E-002 / E-003	New transformer, 45 kVA, and grounding	EA	1	1
116	Refer to E-001 / E-002 / E-003	New #4 copper wire	LF		150
117	Refer to E-001 / E-002 / E-003	New #8 copper wire	LF		50
118	Refer to E-001 / E-002 / E-003	New 1" conduit and fittings	LF		50

GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH CURRENT CITY OF TULSA CODES AND ORDINANCES, ENGINEERING SERVICES STANDARDS AND SPECIFICATIONS. (CITY OF TULSA ORDINANCES AND CODE AMENDMENTS SUPERCEDE NATIONAL CODES.)
2. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO ALL STRUCTURES, LANDSCAPING, PAVING, AND ANY OTHER ITEMS LOCATED WITHIN AND OUTSIDE THE WORK AREA. ANY DAMAGE TO PERMANENT ITEMS INCURRED BY THE CONTRACTOR THROUGH HIS WORK IN THIS CONTRACT SHALL BE REPAIRED TO ORIGINAL CONDITION, BY THE CONTRACTOR, AT HIS OWN EXPENSE.
3. CONTRACTORS WILL COORDINATE WITH IDENTIFIED MAINTENANCE OPERATIONS PERSONNEL FOR APPLICATION, SHUT OFF, AND REMOVAL OF ALL UTILITIES.
4. ALL DISTURBED GRASS AREAS SHALL BE REPAIRED WITH SOLID SOD.
5. CONSTRUCTION WORK SHALL BE PHASED SO THAT ALL WORK ON SECOND FLOOR IS COMPLETED BEFORE THE WORK ON THIRD FLOOR BEGINS. THIS WILL ALLOW OCCUPANTS OF OFFICES ON THIRD FLOOR THAT ARE BEING CONVERTED TO LAB SPACE TO MOVE INTO THE NEW OFFICES ON SECOND BEFORE THE DEMOLITION WORK BEGINS.

PAY ITEM NOTES

1. REMOVE 3 EA FROM ITEM NO. 95 AND 1 EA FROM ITEM NO. 72.

BEFORE YOU DIG 811 1-800-552-6543 CALL OKIE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

STATE OF OKLAHOMA 3504 LICENSED ARCHITECT 10.14.2016

DAVID F. PHELPS
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

PAY ITEM SHEET

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EAE	08/2016	APPROVED:
	DESIGNED	LLV	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ETM	10/16	
	FIELD MGR.	RBA	10/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HBS	10/16	CITY ENGINEER

FILE: G-001.dwg DRAWING: DATE: 9/8/2016
ATLAS PAGE NO: 00016 SHEET 1 OF 40 SHEETS
SHEET NAME: PAY ITEM SHEET SHEET NO. G-001

Printed: 10/13/2016 9:15:45 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-29\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\G-001.dwg

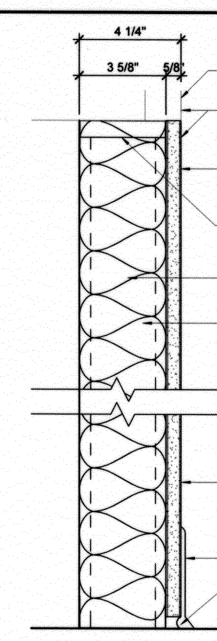
ABBREVIATIONS

ACC	ACCESSIBLE
ACT	ACOUSTICAL CEILING TILE
ADDM	ADDENDUM
ADJ	ADJACENT; ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFS	ABOVE FINISHED SLAB
ALUM	ALUMINUM
ANOD	ANODIZE
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASPH	ASPHALT
BAT	BATTEN
BITUM	BITUMINOUS
BLDG	BUILDING
BOT	BOTTOM
BTWN	BETWEEN
CAB	CABINET
CG	CORNER GUARD
CJ	CONTROL JOINT
CL	CENTER LINE
CLG	CEILING
CLO	CLOSET
CLR	CLEAR
CLRM	CLASSROOM
CMU	CONCRETE MASONRY UNIT
CO	CASED OPENING
COL	COLUMN
CONC	CONCRETE
CONF	CONFERENCE
CONSTR	CONSTRUCTION
CONT	CONTINUOUS
COORD	COORDINATE
CORR	CORRIDOR
CPT	CARPET
CT	CERAMIC TILE
CTB	CERAMIC TILE BASE
DEMO	DEMOLITION
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DISP	DISPENSER
DN	DOWN
DS	DOWNSPOUT
DW	DISHWASHER
DWR	DRAWER
EA	EACH
EHD	ELECTRIC HAND DRYER
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EOS	EDGE OF SLAB
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXT	EXTERIOR; EXTERNAL
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FACE
FHC	FIRE HOSE CABINET
FIN	FINISH
FIXT	FIXTURE
FLASH	FLASHING
FLEX	FLEXIBLE
FLR	FLOOR
FRMG	FRAMING
FURG	FURRING
GALV	GALVANIZED
GALV STL	GALVANIZED STEEL
GB	GRAB BAR
GL	GLASS
GLZ	GLAZING
GRAN	GRANITE
GT	GREASE TRAP
GYP BD	GYPSUM BOARD
HC	HANDICAP
HCP	HANDICAPPED
HCWD	HOLLOW CORE WOOD DOOR
HDR	HEADER
HDW	HARDWARE
HDWD	HARDWOOD
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HT	HEIGHT
ID	INSIDE DIAMETER
INFO	INFORMATION
INSUL	INSULATION
INT	INTERIOR
J-BOX	JUNCTION BOX
JAN	JANITOR
KIT	KITCHEN
KO	KNOCKOUT
LAM	LAMINATE
LAV	LAVATORY
LKR	LOCKER
LT	LIGHT
LTG	LIGHTING
LVR	LOUVER
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MEMB	MEMBRANE
MFD	MANUFACTURED
MFR	MANUFACTURER
MIN	MINIMUM
MIRR	MIRROR
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MTD	MOUNTED
MTG	MOUNTING
MTL	METAL
MULL	MULLION
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
O/O	OUT TO OUT
OA	OVERALL
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFD	OVERFLOW DRAIN
OH	OVERHANG
OPH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
PLAM	PLASTIC LAMINATE
PLAS	PLASTER
PLBG	PLUMBING
PLYWD	PLYWOOD
PR	PAIR
PRCST	PRE-CAST
PT	PAINT
QT	QUARRY TILE
QTR	QUARTER
QTY	QUANTITY
R	RADIUS; RISER
RB	RUBBER BASE
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
REF	REFRIGERATOR
REINF	REINFORCED
REQ	REQUIRE
REQD	REQUIRED
RESIL	RESILIENT
REST	RESTROOM
RM	ROOM
RO	ROUGH OPENING
SC	SOLID CORE
SCHED	SCHEDULE
SCWD	SOLID CORE WOOD DOOR
SD	SOAP DISPENSER
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
SPEC	SPECIFICATION
SST	STAINLESS STEEL
STD	STANDARD
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
SUB	SUBSTITUTE
SUSP	SUSPENDED
T	TREAD
T&G	TONGUE AND GROOVE
TEL	TELEPHONE
THK	THICKNESS
THRES	THRESHOLD
TMPD GL	TEMPERED GLASS
TS	TUBE STEEL
TV	TELEVISION
TYP	TYPICAL
UC	UNDERCUT
UGND	UNDERGROUND
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
VWC	VINYL WALL COVERING
VWF	VINYL WALL FABRIC
W	WIDE
W/	WITH
W/O	WITHOUT
WD	WOOD
WP	WATERPROOFING
WSCT	WAINSCOT
WT	WEIGHT

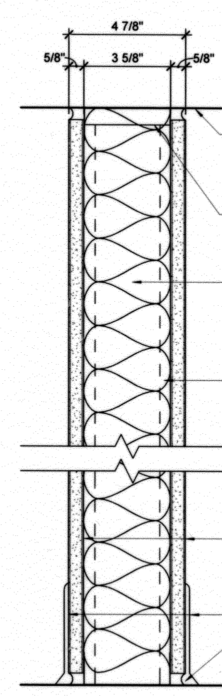
SYMBOLS LEGEND

AREA NAME 150 SF	AREA IDENTIFIER
1 A-501 SIM	CALLOUT INDICATOR
8'-0" AFF	CEILING HEIGHT INDICATOR
101A	DOOR IDENTIFIER
1 A-201	ELEVATION INDICATOR, EXTERIOR
1	GRID INDICATOR
22	KEYNOTE INDICATOR
MATCH LINE SEE X/X-XXX	MATCH LINE INDICATOR
N	NORTH INDICATOR
22	REVISION INDICATOR
ROOM NAME 101	ROOM IDENTIFIER
1 A-301	SECTION INDICATOR
A3	WALL TYPE INDICATOR
10	WINDOW TYPE INDICATOR
1 A-201	ELEVATION INDICATOR, INTERIOR
FIRST FLOOR 100'-0"	ELEVATION IDENTIFIER
234	FURNITURE, FIXTURE, AND EQUIPMENT INDICATOR

PARTITION TYPES



A3.1 3-5/8" METAL STUDS @ 16" O.C., 5/8" GYPSUM BOARD ON ONE SIDE, 3-1/2" SOUND ATTENUATING FIBERGLASS BATT INSULATION



A3.0 3-5/8" METAL STUDS @ 16" O.C., 5/8" GYPSUM BOARD EACH SIDE, 3-1/2" SOUND ATTENUATING FIBERGLASS BATT INSULATION

CODE INFORMATION

APPLICABLE CODES

2015 INTERNATIONAL BUILDING CODE
2015 INTERNATIONAL FIRECODE
2015 INTERNATIONAL PLUMBING CODE
2015 INTERNATIONAL MECHANICAL CODE
2014 NATIONAL ELECTRIC CODE
ASHRAE 90.1 2003
ICC/ANSI A117.1 2003 ACCESSIBLE AND USABLE BUILDING AND FACILITIES

OCCUPANCY USE GROUP

BUSINESS B1 — IBC 2015 304.1
OFFICE SPACE AND LABORATORIES

CONSTRUCTION TYPE

CONSTRUCTION TYPE: II-B (FULLY SPRINKLERED)

HEIGHT AND AREA

ALLOWABLE HEIGHT AND AREA - IBC 2015 TABLE 504.3 AND TABLE 506.2

HEIGHT:	3 STORIES / 75'
TOTAL ALLOWABLE HEIGHT:	3 STORIES / 75'-0"
ACTUAL HEIGHT TO T.O. PARAPET	3 STORIES / 40'-8"
AREA:	69,000 SF PER STORY
AREA: FLOOR 1:	10,361 SF
FLOOR 2:	5,255 SF
FLOOR 3:	5,255 SF
TOTAL:	20,871 SF

FIRE-RESISTANCE RATING REQUIREMENTS

PRIMARY STRUCTURAL FRAME	0	IBC 2015 TABLE 601
BEARING WALLS		
EXTERIOR	0	IBC 2015 TABLE 601
INTERIOR	0	IBC 2015 TABLE 601
NON-BEARING WALLS		
EXTERIOR 0-10'	0	IBC 2015 TABLE 602
EXTERIOR 10'-30'	0	IBC 2015 TABLE 602
INTERIOR	0	IBC 2015 TABLE 601
FLOOR CONSTRUCTION AND SECONDARY MEMBERS	0	IBC 2015 TABLE 601
ROOF CONSTRUCTION AND SECONDARY MEMBERS	0	IBC 2015 TABLE 601
SHAFT ENCLOSURES	1	IBC 2015 SECTION 713.4

OCCUPANCY LOAD - TABLE 1004.1.2

USE: OFFICE SPACE
BUSINESS AREAS: 100 GROSS
GROSS AREA PER FLOOR:

FLOOR 1: 10,361' / 100 = 104 OCC.
FLOOR 2: 5,255' / 100 = 53 OCC.
FLOOR 3: 5,255' / 100 = 53 OCC.

PLUMBING - TABLE 2902.1

CLASSIFICATION - BUSINESS

FIXTURE	WC (1 PER 25 TO 50)	LAV (1 PER 40 TO 80)	DF (1 PER 100)	SS (1 PER FLR)
FLOOR 1:	M (52) 3 - W (52) 3	M (52) 2 - W (52) 2	(104) 1 HI/LO	1
FLOOR 2:	M (26) 2 - W (26) 2	M (26) 2 - W (26) 2	(53) 1 HI/LO	1
FLOOR 3:	M (26) 2 - W (26) 2	M (26) 2 - W (26) 2	(53) 1 HI/LO	1

EGRESS

EGRESS WIDTH - IBC 2015 SECTION 1005
CORRIDORS: .2" PER OCCUPANT - 53 TOTAL OCCUPANTS / 2 EXITS = 26X.2" = 6" MINIMUM WIDTH 44" TABLE 1020.2 ACTUAL: 59"
STAIRS: .3" PER OCCUPANT - 53 TOTAL OCCUPANTS / 2 STAIRS = 26X.3" = 8" MINIMUM WIDTH 44" SECTION 1009.7.4 ACTUAL: 46"

MINIMUM WIDTH OF DOORS - IBS 2015 SECTION 1010.1.1
32" CLEAR OPENING

REQUIRED ACCESSIBLE MEANS OF EGRESS - IBC 2015 SECTION 1006
2 PROVIDED

EXIT ACCESS TRAVEL DISTANCE - IBC 2015 TABLE 1017.2
300' (SPRINKLERED)

INTERVENING ROOMS - IBC 2015 SECTION 1016.2
ALLOWED THROUGH ACCESSORY ROOMS THAT CANNOT BE LOCKED TO PREVENT EGRESS

DEAD END CORRIDORS - IBC 2015 SECTION 1020.4 EXCEPTION 2
50' MAXIMUM

NUMBER OF EXITS FOR OCCUPANT LOAD - IBC 2015 TABLE 1006.3.1
2 MINIMUM - LESS THAN 500 OCCUPANTS PER FLOOR

AREAS OF REFUGE - IBC 2015 SECTION 1009.4 EXCEPTION 2 & SECTION 1009.3 EXCEPTION 5
ELEVATORS DO NOT REQUIRE AN AREA OF REFUGE OR HORIZONTAL EXIT IF SPRINKLERED
STAIRS DO NOT REQUIRE AN AREA OF REFUGE IF SPRINKLERED

STAIRS - IBC 2015 SECTION 1009.3 EXCEPTION 2
A CLEAR WIDTH OF 48" IS NOT REQUIRED BETWEEN RAILS IF SPRINKLERED

ELEVATOR LOBBIES - IBC 2015 SECTION 30006.2 EXCEPTION 2
LOBBIES ARE NOT REQUIRED WHEN SPRINKLERED AND NOT A HIGH RISE BUILDING

OPENING PROTECTION - TABLE 705.8

WEST WALL - FIRE SEPARATION DISTANCE 10'-0" TO LESS THAN 15'-0" TO CENTERLINE OF ALLEY	UNPROTECTED, SPRINKLERED (UP, S) 45% - 481.60SF / FLOOR ALLOWABLE 387.50SF ACTUAL
NORTH/EAST WALL - FIRE SEPARATION DISTANCE 30'-0" OR GREATER TO CENTERLINE OF STREET	UNPROTECTED, NONSPRINKLERED (UP, NS) NO LIMIT
SOUTH WALL - SAME LOT FACING OPEN PARKING	NO REQUIREMENT

STATE OF OKLAHOMA — DAVID F. PHELPS 3504 — LICENSED ARCHITECT — 7.13.2016

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

LEGENDS, CODE INFORMATION, PARTITION TYPES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

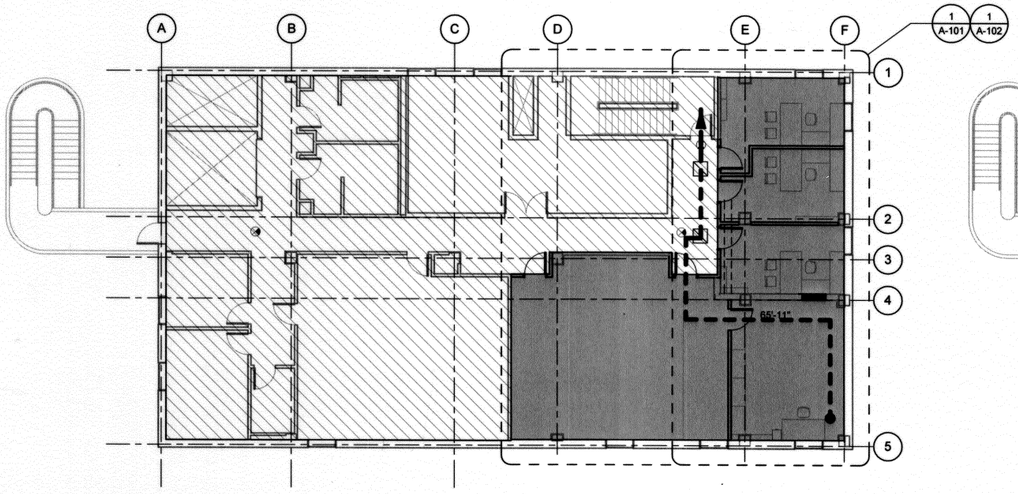
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EEW	APPROVED:
	DESIGNED	DFP	
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	CEW 9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	9/16	
	FIELD MGR.	9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS 9/16	CITY ENGINEER
FILE:	DRAWING:		DATE: 9/8/2016
ATLAS PAGE NO:			SHEET 2 OF 40 SHEETS
SHEET NAME: LEGENDS, CODE INFORMATION, PARTITION TYPES			SHEET NO. G-002

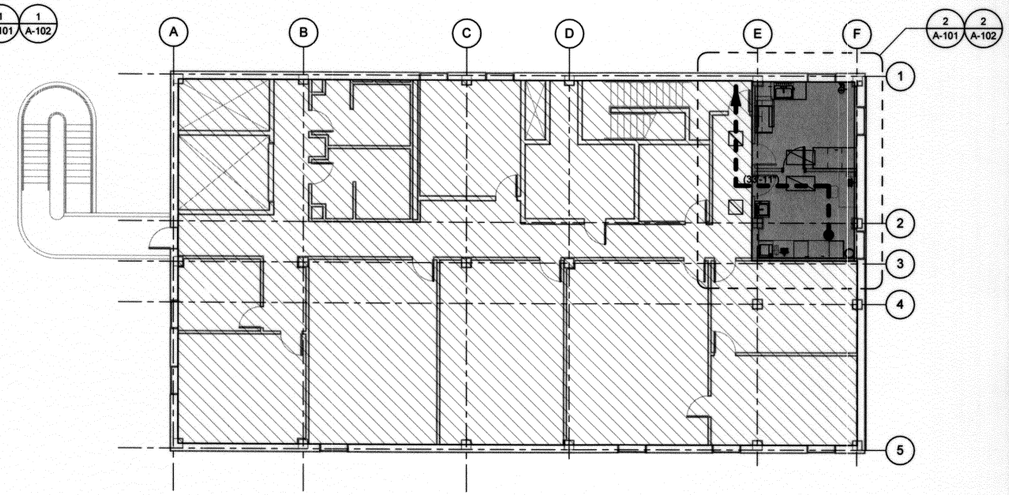
Printed: 9/8/2016 2:11:58 PM
C:\Users\Sgraves\Documents\Revit\AB Jewell WTP Lab-Office Remodel_Arch_2016_Sgraves.rvt

FIRE PROTECTION LEGEND

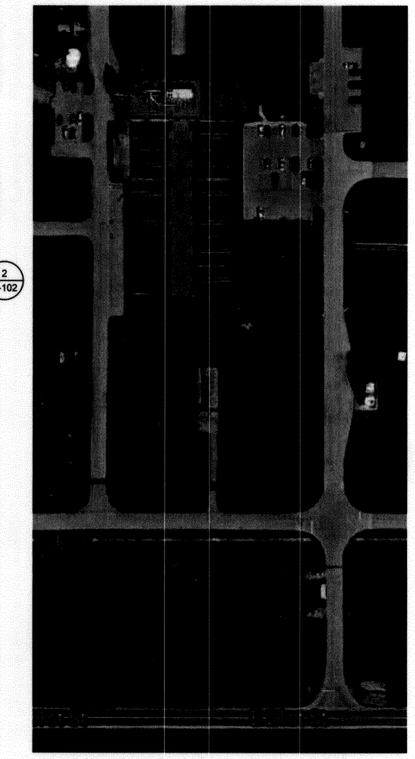
- 2X2 LIGHT FIXTURE WITH EMERGENCY BATTERY BACKUP
- EXIT SIGN - WITH BACK UP BATTERY
- AREA NOT INCLUDED IN SCOPE OF WORK - OCCUPANT GROSS AREA/SPRINKLERED
- AREA INCLUDED IN SCOPE OF WORK - OCCUPANT GROSS AREA/100% FULLY SPRINKLERED
- XXX' PATH OF EGRESS INCLUDING COMMON PATH OF TRAVEL



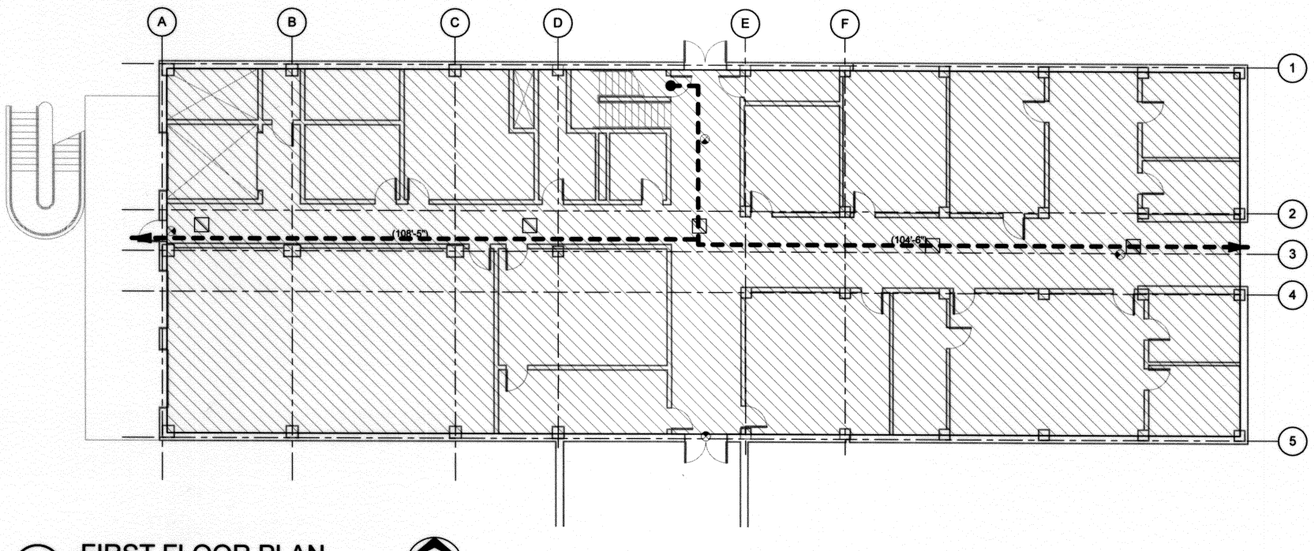
1 SECOND FLOOR PLAN
3/32" = 1'-0"



2 THIRD FLOOR PLAN
3/32" = 1'-0"



3 SITE PLAN
12" = 1'-0"



4 FIRST FLOOR PLAN
3/32" = 1'-0"

STATE OF OKLAHOMA
DAVID F. PHELPS
3504
LICENSED ARCHITECT
9.13.2016

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

CODE COMPLIANCE PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EEW	
	DESIGNED	DFP	
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16
HORIZONTAL: N/A	LEAD ENGR.	ZZM	9/16
	FIELD MGR.	RBW	9/16
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16

APPROVED:
CITY ENGINEER

FILE: DRAWING:
DATE: 9/8/2016
ATLAS PAGE NO:
SHEET 3 OF 40 SHEETS
SHEET NAME: CODE COMPLIANCE PLANS
SHEET NO. G-101

Printed: 9/8/2016 2:11:59 PM
C:\Users\Sgraves\Documents\Revit\AB Jewell WTP Lab-Office Remodel_Arch_2016_Sgraves.rvt

DESIGN CRITERIA

1. THE STRUCTURAL DESIGN IS BASED ON THE DESIGN REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE, 2015 EDITION.

2. ROOF DESIGN LOADS

LIVE LOAD	20	PSF
LIVE LOAD - ALLOWED PER EXISTING DRAWING	30	PSF

GENERAL

1. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATE TEMPORARY SUPPORT AND STABILITY OF EXISTING STRUCTURE DURING ALL PHASES OF CONSTRUCTION.

2. COORDINATE ALL DIMENSIONS WITH FLOOR PLAN; NOTIFY THE ARCHITECT/ENGINEER OF ANY CONFLICTS PRIOR TO CONSTRUCTION.

3. COORDINATE THE EXACT SIZE AND LOCATION OF ALL SLEEVES AND OPENINGS THROUGH CONCRETE, MASONRY, OR STUD WALLS AND CONCRETE FLOORS WITH ARCHITECTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS.

4. SHOP DRAWINGS MUST INDICATE CHANGES TO CONSTRUCTION DOCUMENTS, THE CHANGES MUST BE CLEARLY IDENTIFIED. THE ARCHITECT/ENGINEER SHALL NOT BE RESPONSIBLE FOR CHANGES SHOWN ON SHOP DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL CHANGES TO THE DESIGN PROVIDED ON SHOP DRAWINGS. THE ARCHITECT/ENGINEER SHALL NOT BEAR THE COSTS OF SUCH REVIEWS OR REDESIGN.

5. PROJECT SPECIFICATIONS, IF PROVIDED, ARE PART OF THE CONSTRUCTION DOCUMENTS AND ARE TO BE USED IN CONJUNCTION WITH THE DRAWINGS.

6. VERIFY ALL CONDITIONS, EXISTING AND NEW, SHOWN ON THE CONSTRUCTION DOCUMENTS PRIOR TO PROCEEDING WITH WORK. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT OR ENGINEER IN WRITTEN FORM. THE ARCHITECT/ENGINEER SHALL NOT BE RESPONSIBLE FOR WORK DONE IN THESE AREAS WITHOUT CLARIFICATION IN WRITING FROM THE ARCHITECT/ENGINEER.

7. ALL PHASES OF CONSTRUCTION SHALL CONFORM TO THE MINIMUM STANDARDS OF THE BUILDING CODE(S) NOTED IN "DESIGN CRITERIA".

8. DIMENSIONS SHOWN ON CONSTRUCTION DOCUMENTS TAKE PRIORITY OVER SCALED DIMENSIONS. IN SOME CASES PLANS AND DETAILS MAY NOT BE DRAWN TO SCALE FOR CLARITY.

9. DETAILS LABELED "TYPICAL" ON THESE DRAWINGS APPLY TO SITUATIONS OCCURRING ON THE PROJECT THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. SUCH DETAILS APPLY WHETHER OR NOT DETAILS ARE REFERENCED AT EACH LOCATION. NOTIFY ENGINEER OF ANY CONDITIONS NOT APPLICABLE TO THESE "TYPICAL" DETAILS.

10. DO NOT LOAD THE CONCRETE SLAB ON GRADE WITH ERECTION EQUIPMENT. THE SLABS HAVE NOT BEEN DESIGNED FOR ERECTION EQUIPMENT LOADS. SHOULD THE CONTRACTOR REQUIRE ERECTION EQUIPMENT TO BE PLACED ON SLAB ON GRADE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE SLAB IN THE AFFECTED AREAS.

11. DO NOT STACK CONSTRUCTION MATERIALS ON FLOORS OR ROOFS DURING CONSTRUCTION IN EXCESS OF 80 PERCENT OF THE DESIGN LIVE LOAD NOTED ON THESE PLANS.

12. THESE STRUCTURAL CONSTRUCTION DOCUMENTS ARE TO BE USED IN CONJUNCTION WITH ANY ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, FIRE PROTECTION, LANDSCAPE, AND CIVIL CONSTRUCTION DOCUMENTS FOR THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING THE INFORMATION SHOWN ON ALL REFERENCED PLANS. THE ARCHITECT/ENGINEER SHALL BE NOTIFIED IN WRITING SHOULD DISCREPANCIES IN THE CONSTRUCTION DOCUMENTS BE FOUND PRIOR TO COMMENCING WITH WORK IN THE AREA WHERE THE DISCREPANCY OCCURS. THE ARCHITECT/ENGINEER SHALL NOT BE RESPONSIBLE FOR WORK DONE IN THESE AREAS WITHOUT CLARIFICATION IN WRITING FROM THE ARCHITECT/ENGINEER.

13. SUBSTITUTION REQUESTS: APPROVAL FROM THE ARCHITECT/ENGINEER IS REQUIRED PRIOR TO SUBSTITUTING COMPARABLE MATERIALS OR MANUFACTURED OR PRE-ENGINEERED PRODUCTS THAT ARE INDICATED IN THE CONSTRUCTION DOCUMENTS. ALL REQUESTS SHALL BE SUBMITTED TO THE OWNER'S REPRESENTATIVE. ALL NECESSARY INFORMATION REQUIRED TO DETERMINE THE EQUIVALENCY OF THE SUBSTITUTED PRODUCT SUCH AS ICC EVALUATION REPORTS AND TESTING REPORTS SHALL BE PROVIDED. COMPARABLE PRODUCTS SUBMITTED MUST INCLUDE A DETAILED LINE-BY-LINE COMPARISON OF HOW THE SUBMITTED PRODUCT MEETS OR EXCEEDS THE GENERAL DESIGN, PERFORMANCE, AND QUALITY INDICATED IN THE CONSTRUCTION DOCUMENTS. THE MANUFACTURER OR CATALOG NUMBERS SHOWN IN THE CONSTRUCTION DOCUMENTS ESTABLISH A STANDARD FOR THE GENERAL DESIGN, PERFORMANCE, AND QUALITY OF THE PRODUCT REQUIRED. WHERE "OR APPROVED EQUAL" IS INDICATED, OTHER PRODUCTS SIMILAR TO DESIGN AND OF EQUAL QUALITY AND PERFORMANCE, AND COMPLYING WITH THE PLANS AND SPECIFICATIONS MAY BE APPROVED IF FOUND ACCEPTABLE BY THE ARCHITECT/ENGINEER. ALL SUBSTITUTION REQUESTS, INCLUDING "ENGINEER APPROVED EQUALS", FOR EQUIPMENT AND MATERIALS SHALL BE SUBMITTED FOR REVIEW AFTER AWARD IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. UNLESS NOTED OTHERWISE, SUBSTITUTION REQUESTS SHALL BE SUBMITTED WITHIN 14 DAYS AFTER AWARD. THE ARCHITECT/ENGINEER SHALL NOT BEAR THE COSTS FOR REVIEW AND APPROVAL OF ALL REQUESTED SUBSTITUTIONS.

14. CONTRACTOR IS RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION, AS WELL AS SEQUENCE OF CONSTRUCTION THAT DOES NOT IMPACT THE FINAL DESIGN AS SHOWN ON CONSTRUCTION DOCUMENTS.

15. MECHANICAL UNITS AND OTHER SYSTEMS, SUCH AS ELEVATORS, SHOWN ON THE STRUCTURAL PLANS INDICATE A SPECIFIC WEIGHT AND LOCATION. SHOULD THE CONTRACTOR INSTALL UNITS AND SYSTEMS WITH DIFFERENT WEIGHTS OR LOCATIONS THAN SHOWN, THE CONTRACTOR SHALL PROVIDE THIS INFORMATION TO THE STRUCTURAL ENGINEER FOR APPROVAL, PRIOR TO PURCHASING, CLEARLY INDICATING THE DIFFERENCES IN SIZE, WEIGHT AND LOCATION. THE ARCHITECT/ENGINEER SHALL NOT BEAR THE COSTS OF SUCH REVIEWS OR REDESIGNS.

STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL BE DETAILED, DESIGNED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE REQUIREMENTS OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL BUILDINGS, AISC MANUAL OF STEEL CONSTRUCTION (ALLOWABLE STRESS DESIGN), AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES, AND THE AWS STRUCTURAL WELDING CODE. ALL CODES AND MANUALS SHALL BE THE LATEST ADOPTED EDITIONS.

2. STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

WIDE FLANGE SHAPES	A992 (F_y=50 KSI)
CHANNELS, ANGLES, PLATES, ETC.	A36 (F_y=36 KSI)
STRUCTURAL TUBE	A500 GRADE B (F_y=46 KSI)
STRUCTURAL PIPE	A53 TYPE B GRADE B (F_y=35 KSI)
BOLTS	A325 OR A490
WELDING ELECTRODES	E70XX
HARDENED STEEL WASHERS	ASTM F436

3. CONNECTION MATERIALS FOR STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING DESIGNATIONS:

BEAM OR COLUMN STIFFENER PLATES SHALL BE OF THE SAME GRADE OF STEEL AS THE STRUCTURAL ELEMENT.

ALL BOLTED CONNECTIONS ARE TO BE ERECTED WITH HIGH STRENGTH BOLTS, ASTM A325 OR ASTM A490, WITH BEARING TYPE "N" ALLOWABLE LOADS EXCEPT FOR BRACE CONNECTIONS WHICH ARE SLIP CRITICAL CONNECTIONS.

4. ALL BEAM TO BEAM AND COLUMN TO BEAM CONNECTIONS SHALL BE BOLTED UNLESS NOTED OTHERWISE.

5. ALL WELDING SHALL BE IN ACCORDANCE WITH THE AMERICAN WELDING SOCIETY (AWS) STANDARD D1.1. ALL WELDING SHALL BE PERFORMED BY WELDERS CERTIFIED IN THE TYPE OF WELD REQUIRED USING E70XX ELECTRODES OR IN A CERTIFIED SHOP TO DO SUCH WORK.

6. MINIMUM SIZE AND STRENGTH OF WELDS SHALL CONFORM TO THE FOLLOWING REQUIREMENTS.

PROVIDE MINIMUM SIZE OF FILLET WELDS AS SPECIFIED IN TABLE J2.4 OF THE AISC MANUAL.

PROVIDE THE MINIMUM EFFECTIVE THROAT THICKNESS OF PARTIAL PENETRATION GROOVE WELDS AS SPECIFIED IN TABLE J2.3 OF THE AISC MANUAL.

DEVELOP THE FULL TENSILE STRENGTH OF THE MEMBER ELEMENT JOINED, WITH SHOP AND FIELD WELDS, UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DOCUMENTS.

WHERE CONNECTIONS ARE NOTED ON CONSTRUCTION DOCUMENTS AS FULL MOMENT CONNECTIONS, PROVIDE WELDS TO DEVELOP THE FULL FLEXURAL CAPACITY OF THE LEAST CAPACITY MEMBER OF THE CONNECTION.

7. ALL NEW STRUCTURAL STEEL SHALL BE PAINTED IN ACCORDANCE WITH THE SPECIFICATIONS.

8. SPLICING OF STRUCTURAL STEEL MEMBERS IS NOT ALLOWED UNLESS SPECIFICALLY DETAILED ON THESE PLANS.

9. DO NOT FIELD CUT ANY STRUCTURAL STEEL MEMBERS IN CONFLICT WITH THE WORK WITHOUT APPROVAL BY THE ENGINEER OR UNLESS SPECIFICALLY SHOWN ON THE CONSTRUCTION DOCUMENTS.

10. PROVIDE HARDENED STEEL WASHERS CONFORMING TO ASTM F436 FOR CONNECTIONS WITH STANDARD AND SHORT-SLOTTED HOLES. FOR LONG SLOTTED HOLES, PROVIDE STRUCTURAL-GRADE STEEL 5/16" PLATE WASHERS OR CONTINUOUS BARS. IN ALL CASES, WASHER OR PLATE MUST BE OF SUFFICIENT SIZE TO COVER THE HOLE OR SLOT.

11. ALL HOLES IN STEEL MEMBERS SHALL BE DRILLED OR PUNCHED. TORCH CUT HOLES ARE NOT ALLOWED.

12. ERECT AND MAINTAIN TEMPORARY BRACING TO ENSURE THE ALIGNMENT AND STABILITY OF THE STRUCTURE DURING CONSTRUCTION UNTIL PERMANENT CONDITIONS HAVE BEEN COMPLETED.

13. SHOP DRAWINGS ARE REQUIRED TO BE REVIEWED PRIOR TO FABRICATION.

14. THE FABRICATOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ALL CONNECTIONS THAT ARE NOT FULLY DETAILED ON THESE DRAWINGS. BEAM CONNECTIONS SHALL BE DESIGNED TO RESIST ONE HALF THE TOTAL ALLOWABLE UNIFORM LOAD CAPACITY OF GIVEN SHAPE AND SPAN IN ADDITION TO ANY AXIAL FORCE NOTED ON THE PLANS IN ACCORDANCE WITH THE AISC SPECIFICATION. CALCULATIONS AND DETAILS SHALL BE PERFORMED, SIGNED AND SEALED BY AN ENGINEERING LICENSED IN THE STATE OF OKLAHOMA AND SHALL BE PROVIDED TO THE ENGINEER OF RECORD FOR APPROVAL. RE: DETAILS FOR TYPICAL CONNECTION REQUIREMENTS.

GRATING NOTES

1. GRATING SHALL BE PRESSURE LOCKED CLOSE MESH RECTANGULAR DESIGN TYPE CM-1, AS MANUFACTURED BY IKG INDUSTRIES OR EQUAL. MATERIAL SHALL BE STEEL.

2. BEARING (MAIN) BARS SHALL BE 1"x1/8" SPACED AT 1 3/16" CENTER TO CENTER.

3. CROSS BARS SHALL BE OF RECTANGULAR CROSS SECTION, FLUSH TOP AND SPACED AT 4" CENTER TO CENTER.

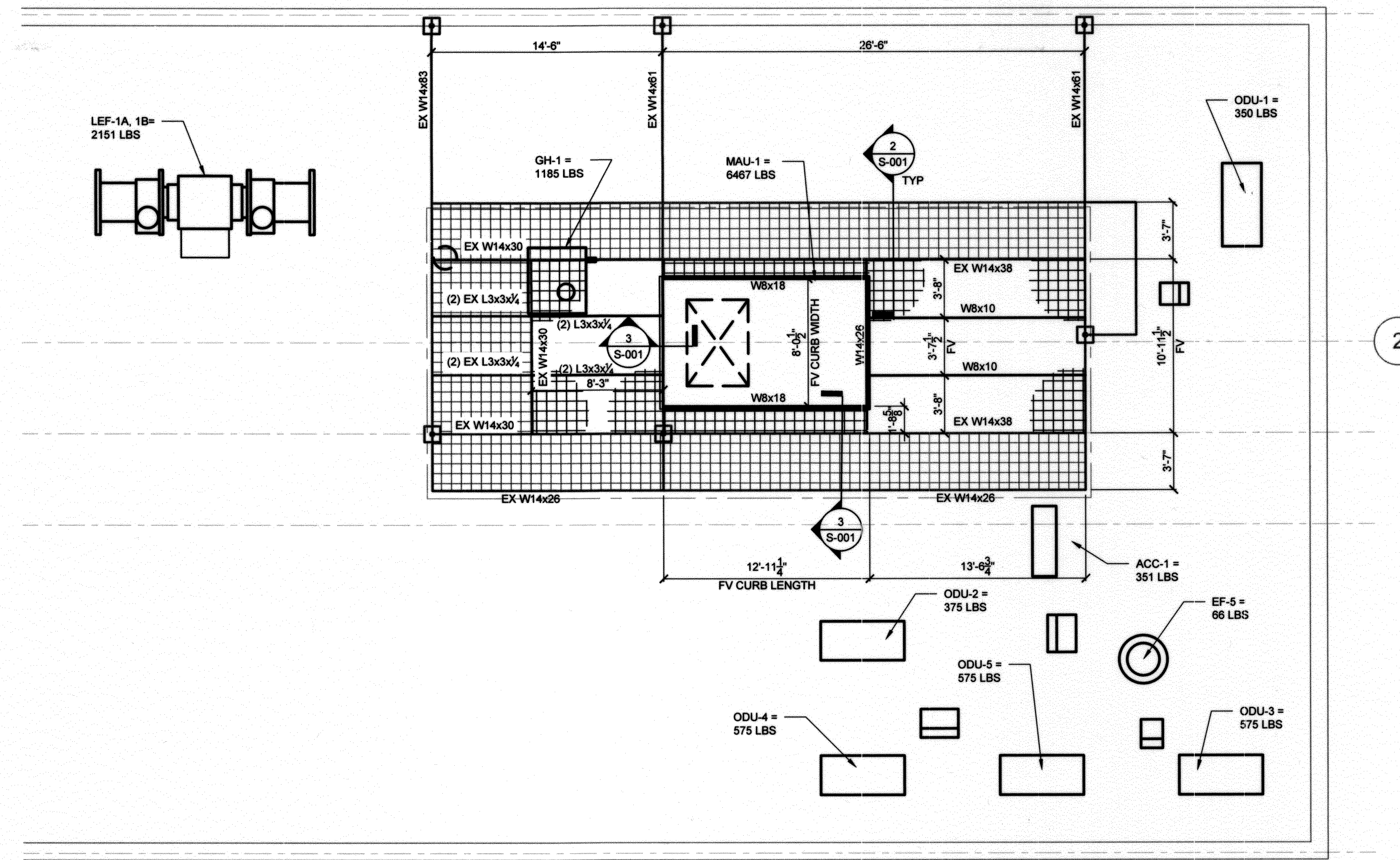
4. MAIN BARS AND CROSS BAR SHALL BE SLOTTED AT THE INTERSECTIONS SO AS NOT TO REMOVE EXCESSIVE MATERIAL FROM THE LOAD SUSTAINING MEMBERS.

5. GRATING SHALL SAFELY SUSTAIN A UNIFORMLY DISTRIBUTED LOAD OF 100 PSF WITH A MAXIMUM SPAN OF 44 INCHES AND DEFLECT LESS THAN 1/4 INCH.

6. FINISH SHALL BE GALVANIZED.

7. GRATING SHALL BE ATTACHED TO SUPPORT FRAMING WITH SELF DRIVING FASTENERS.

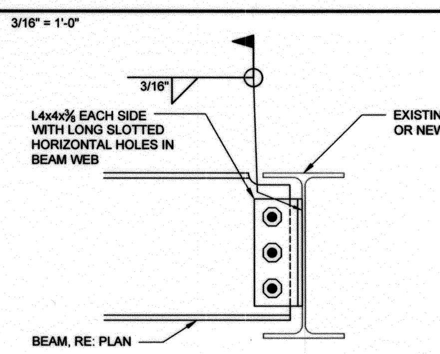
SPECIAL INSPECTIONS REQUIRED	
PERIODIC SPECIAL INSPECTIONS:	**CONTINUOUS SPECIAL INSPECTIONS:**
STEEL	STEEL
1. MATERIAL VERIFICATION OF HIGH STRENGTH BOLTS, NUTS, AND WASHERS 2. INSPECTIONS OF HIGH STRENGTH BOLTING (BEARING TYPE CONNECTIONS) 3. INSPECTION OF STRUCTURAL STEEL WELDING: A. SINGLE PASS FILLET WELDS ≤ 5/16" B. FLOOR AND DECK WELDING 4. INSPECTION OF STEEL FRAME JOINT DETAILS FOR COMPLIANCE WITH APPROVED CONSTRUCTION DOCUMENTS: A. DETAILS SUCH AS BRACING AND STIFFENING B. MEMBER LOCATIONS C. APPLICATION OF JOINT DETAILS AT EACH CONNECTION	1. INSPECTIONS OF HIGH STRENGTH BOLTING (SLIP-CRITICAL CONNECTIONS) 2. INSPECTION OF STRUCTURAL STEEL WELDING: A. COMPLETE AND PARTIAL PENETRATION GROOVE WELDS B. MULTIPASS FILLET WELDS C. SINGLE PASS FILLET WELDS GREATER THAN 5/16"



1 ROOF PLAN

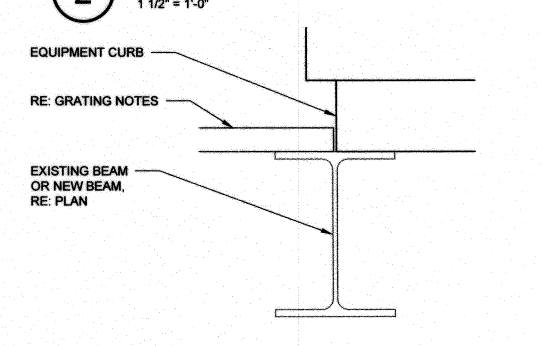
3/16" = 1'-0"

N



2 BEAM TO BEAM DETAIL

1 1/2" = 1'-0"



3 EQUIPMENT CURB

1 1/2" = 1'-0"

BEFORE YOU DIG CALL OKIE 811 1-800-552-6543

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

REGISTERED PROFESSIONAL ENGINEER LARRY LEE VORBA 11654 9-13-2016 OKLAHOMA

LARRY L. VORBA, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

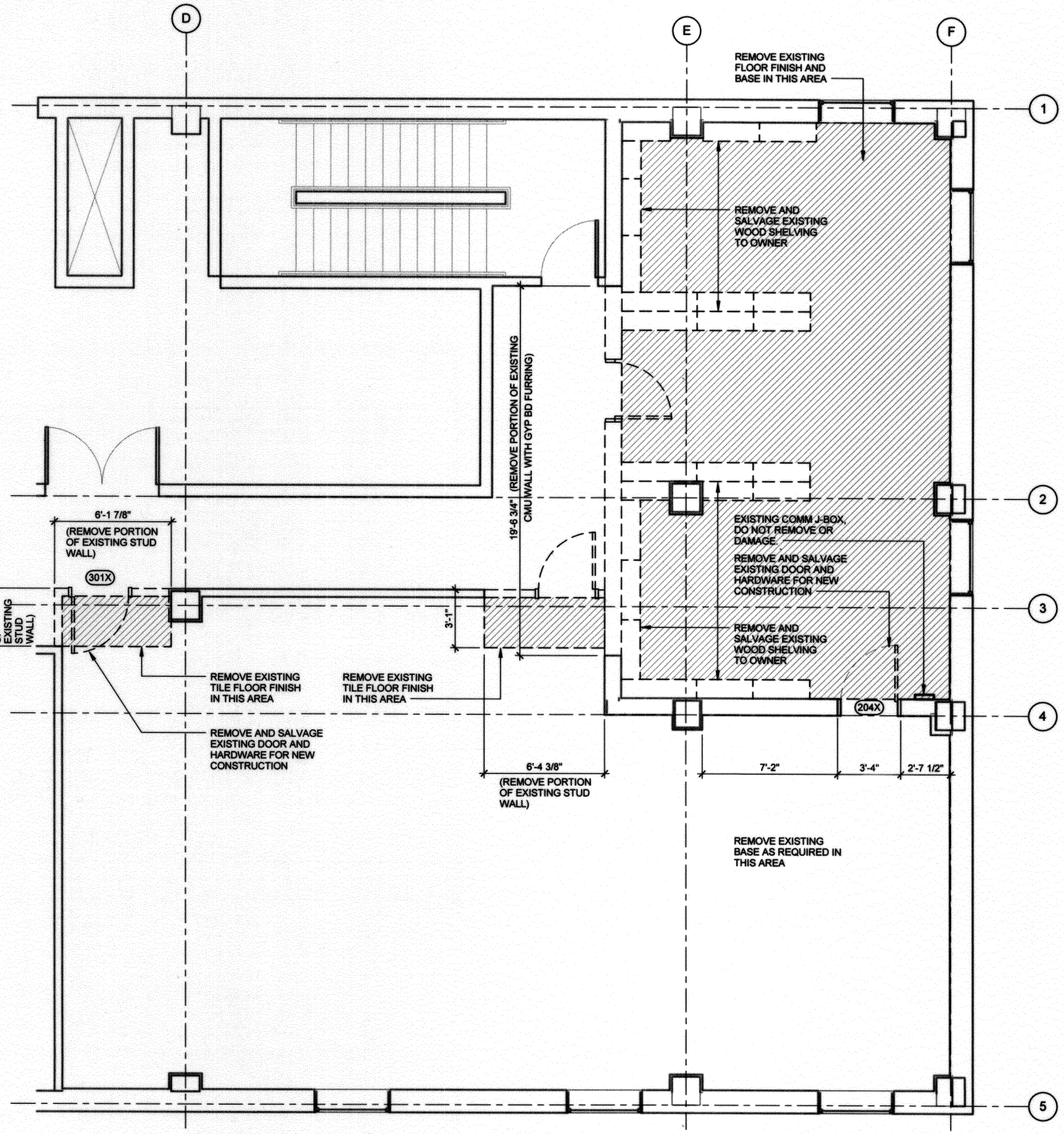
STRUCTURAL NOTES,
PLATFORM PLAN AND DETAILS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE:	DRAWN	EAE	08/2016	APPROVED:
AS INDICATED	DESIGNED	LLV	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	[illegible]	9/16	
	FIELD MGR.	[illegible]	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: S-001.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 4 OF 40 SHEETS
SHEET NAME: GENERAL NOTES				SHEET NO. S-001

Printed: 9/12/2016 10:29:11 AM
V:\Tulsa Public Works\Micellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheets\S-001.dwg

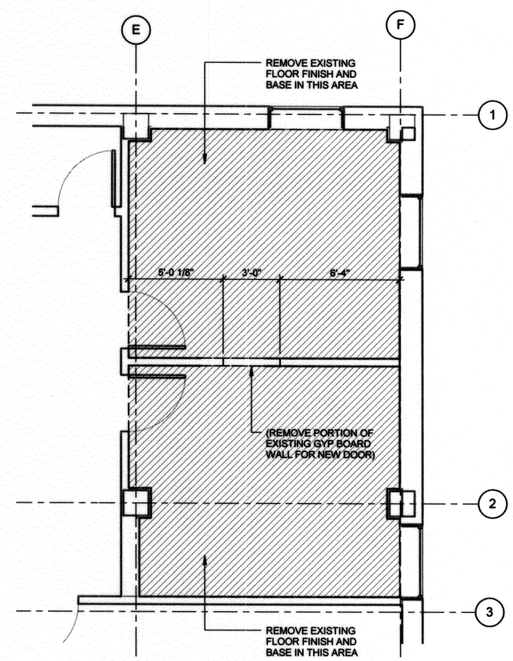


1 SECOND FLOOR DEMOLITION PLAN
1/4" = 1'-0"

N

DEMOLITION LEGEND

———	EXISTING
- - - -	DEMO
//////	DEMO FLOORING



2 THIRD FLOOR DEMOLITION PLAN
1/4" = 1'-0"

N

STATE OF OKLAHOMA
DAVID F. PHELPS
3504
LICENSED ARCHITECT
9.13.2016

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

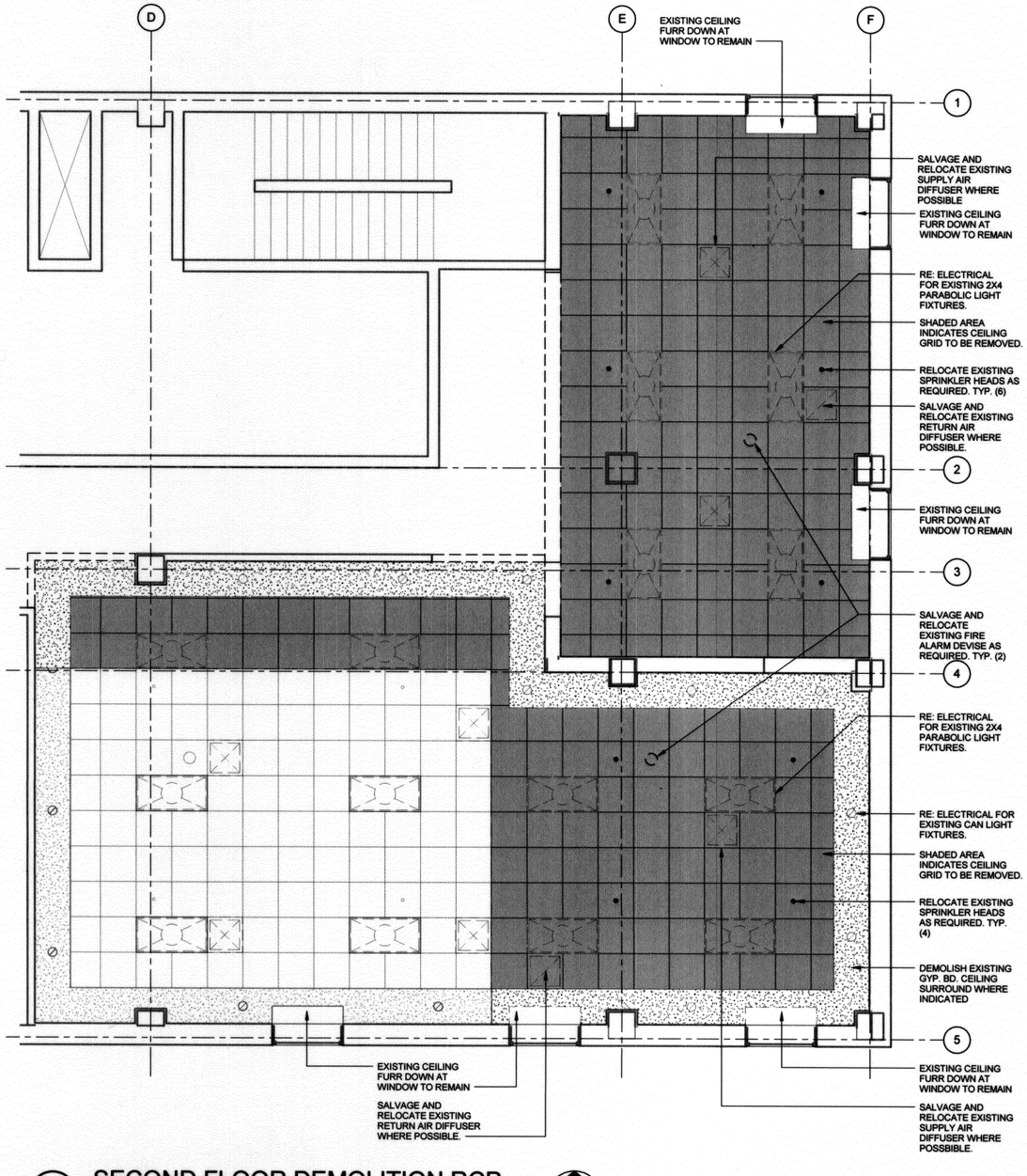
SECOND AND THIRD FLOOR DEMOLITION PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EEW		APPROVED:
	DESIGNED	DFP		
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	EEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZZM	9/16	
	FIELD MGR.	RBN	9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE:	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO:				SHEET 5 OF 40 SHEETS
SHEET NAME: SECOND AND THIRD FLOOR DEMOLITION PLANS				SHEET NO. AD101

Printed: 9/8/2016 2:11:57 PM
C:\Users\Sgraves\Documents\Revit\AB Jewell WTP Lab-Office Remodel_Arch_2016_Sgraves.rvt



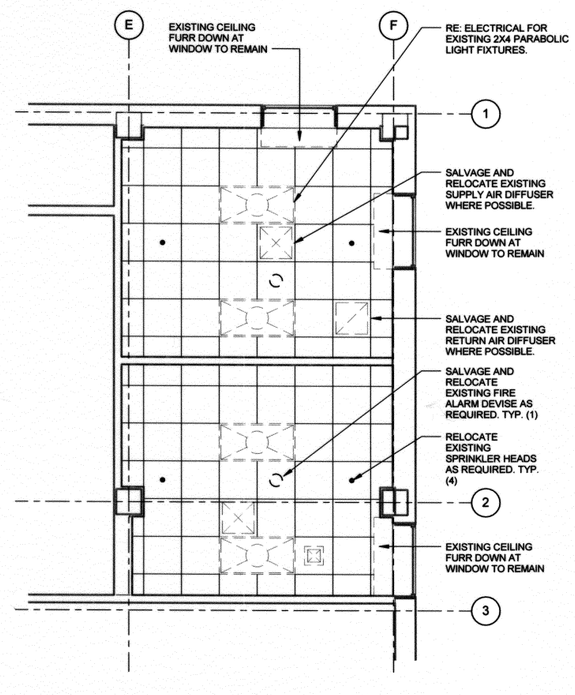
1 SECOND FLOOR DEMOLITION RCP

1/4" = 1'-0"

N

DEMOLITION LEGEND

———	EXISTING
— · — · —	DEMO
//////	DEMO FLOORING



2 THIRD FLOOR DEMOLITION RCP

1/4" = 1'-0"

N

STATE OF OKLAHOMA
DAVID F. PHELPS
3504
LICENSED ARCHITECT
9.13.2016

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

SECOND AND THIRD FLOOR DEMOLITION CEILING PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EEW	
	DESIGNED	DFP	
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16
HORIZONTAL: N/A	LEAD ENGR.	JZM	9/16
	FIELD MGR.	RBV	9/16
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16

APPROVED:

CITY ENGINEER

FILE: DRAWING:

DATE: 9/8/2016

ATLAS PAGE NO:

SHEET 6 OF 40 SHEETS

SHEET NAME: SECOND AND THIRD FLOOR DEMOLITION CEILING PLANS

SHEET NO. AD102

Printed: 9/8/2016 2:11:57 PM
C:\Users\Sgraves\Documents\Revit\AB Jewell WTP Lab-Office Remodel_Arch_2016_Sgraves.rvt

ROOM FINISH SCHEDULE

NUMBER	NAME	FLOOR	BASE	WALLS N	WALLS E	WALLS S	WALLS W	CEILING MATL	CEILING HEIGHT	NOTES
SECOND FLOOR										
200	CORRIDOR	VCT1	RB3	--	PT4	PT4	--	GYP BD. PAINT PT3	RE: REFLECTED CEILING PLAN	VCT1 ONLY AT AREA OF REMOVED TILE; PT4 TO MATCH EXISTING WALL COLOR; RB3 TO MATCH EXISTING RUBBER BASE
201	OFFICE	CPT1	RB2	PT1	PT2	PT1	PT1	ACT1	RE: REFLECTED CEILING PLAN	
202	OFFICE	CPT1	RB2	PT1	PT2	PT1	PT1	ACT1	RE: REFLECTED CEILING PLAN	
203	OFFICE	CPT1	RB2	PT1	PT2	PT1	PT1	ACT1	RE: REFLECTED CEILING PLAN	
204	SCADA	EXIST	RB2	PT1	PT1	PT2	PT1	OPEN	RE: REFLECTED CEILING PLAN	
205	TRAINING ROOM	EXIST	RB3	PT5	PT5	PT5	PT5	ACT1/ GYP BD. PAINT PT5	RE: REFLECTED CEILING PLAN	PT5 TO MATCH EXISTING WALL COLOR; RB3 TO MATCH EXISTING RUBBER BASE
THIRD FLOOR										
302	PREP AREA	RBF1	RB1	PT3	PT3	PT3	PT3	ACT2	RE: REFLECTED CEILING PLAN	PL1 CABINETS, ER1 COUNTERTOPS
303	LAB	RBF1	RB1	PT3	PT3	PT3	PT3	ACT2	RE: REFLECTED CEILING PLAN	PL1 CABINETS, ER1 COUNTERTOPS

GENERAL FINISH NOTES

A. PROVIDE APPROPRIATE RUBBER TRANSITION STRIPS BETWEEN RESILIENT FLOORING AND CARPET. CONTRACTOR TO PROVIDE SCHEDULE OF TRANSITIONS TYPES, LOCATIONS, AND SAMPLES. CONTRACTOR TO FIELD VERIFY EXISTING ADJACENT FLOORING AND PROVIDE APPROPRIATE TRANSITION STRIP. TRANSITIONS TO OCCUR UNDER CENTER OF DOORS.

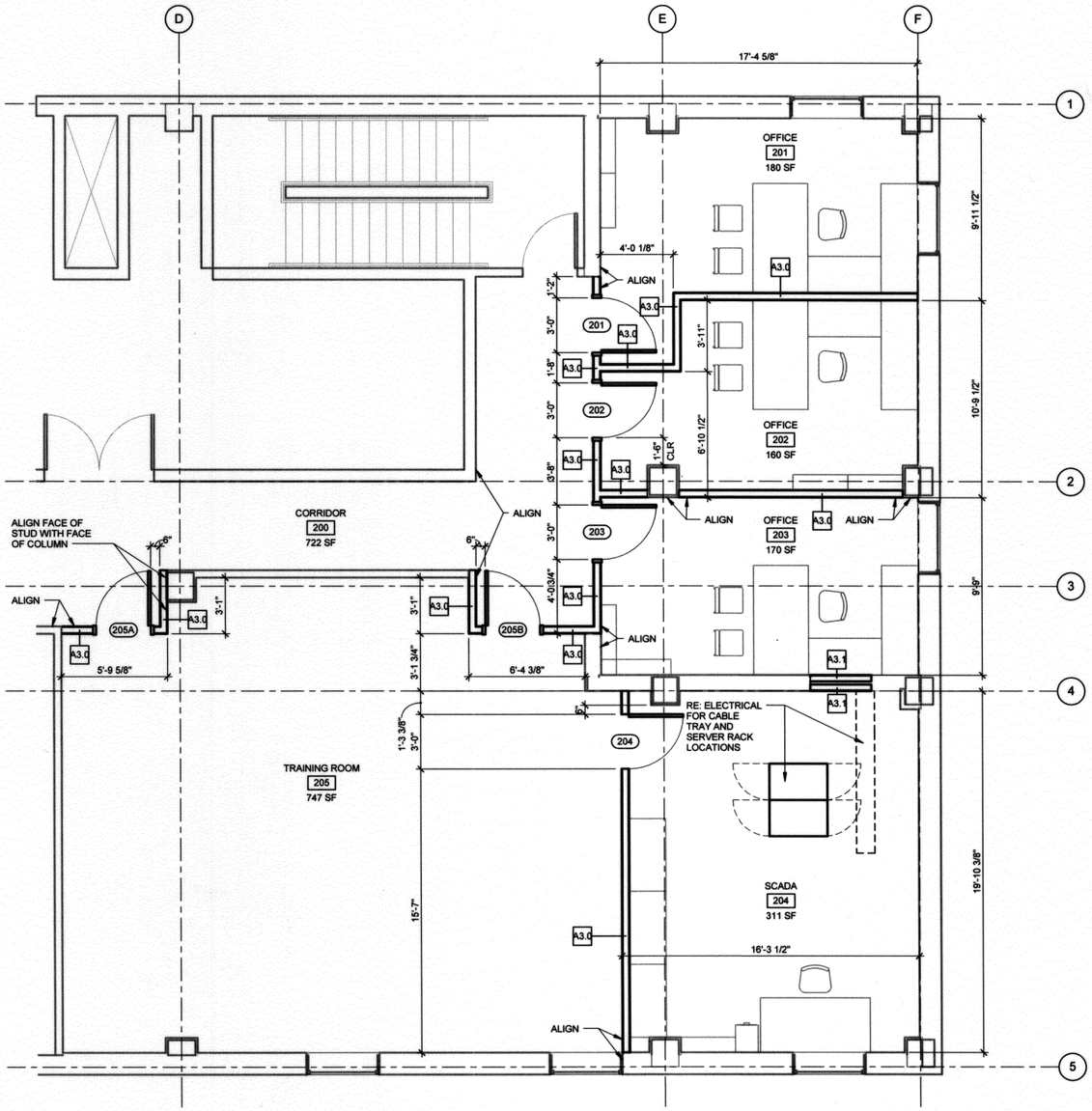
B. INTERIOR WOOD DOORS TO BE FACTORY FINISHED STAIN TO MATCH EXISTING.

C. INTERIOR HOLLOW METAL DOOR FRAMES TO BE PAINTED TO MATCH EXISTING.

D. CONTRACTOR TO REPAIR AND LEVEL ANY DAMAGED TO CONCRETE SUBSTRATE FOR PROPER INSTALLATION OF NEW FLOOR COVERINGS.

DOOR AND FRAME WORKSHEET

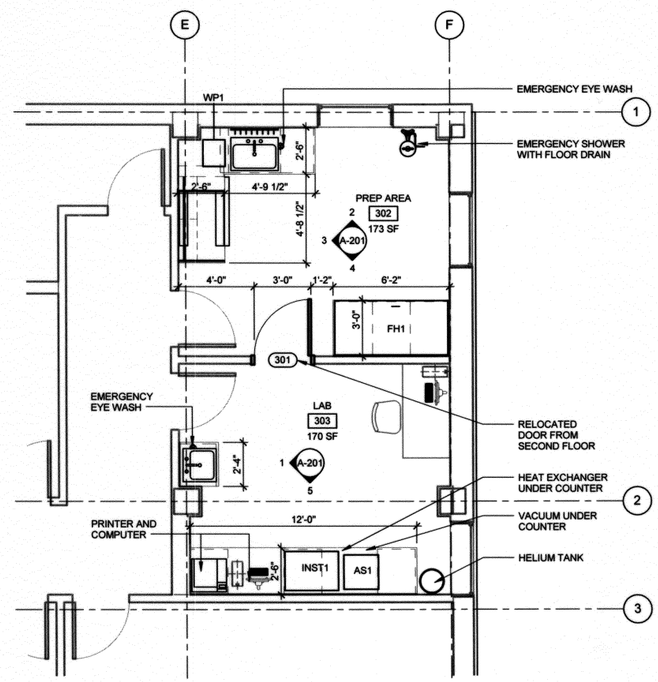
MARK	DOOR SIZE W	DOOR SIZE HT	DOOR SIZE THK	DOOR MATL	DOOR TYPE	FRAME TYPE	FRAME DETAIL HEAD	FRAME DETAIL JAMB	FIRE RATING	HDW SET	NOTES
SECOND FLOOR											
201	3'-0"	6'-8"	1 3/4"	SCWD	NL	HM	2/A-202	2/A-202		2	MATCH EXISTING FINISH
202	3'-0"	6'-8"	1 3/4"	SCWD	NL	HM	2/A-202	2/A-202		2	MATCH EXISTING FINISH
203	3'-0"	6'-8"	1 3/4"	SCWD	NL	HM	2/A-202	2/A-202		2	MATCH EXISTING FINISH; ADD PUSH BUTTON LOCK
204	3'-0"	6'-8"	1 3/4"	EXIST	F	HM	2/A-202	2/A-202		3	RELOCATED DOOR; NEW FRAME
205A	3'-0"	6'-8"	1 3/4"	SCWD	NL	HM	2/A-202	2/A-202		1	NEW PANIC HARDWARE
205B	3'-0"	6'-8"	1 3/4"	SCWD	NL	HM	2/A-202	2/A-202		1	NEW PANIC HARDWARE
THIRD FLOOR											
301	3'-0"	6'-8"	1 3/4"	EXIST	NL	HM	2/A-202	2/A-202		3	RELOCATED DOOR



1 ENLARGED SECOND FLOOR PLAN

1/4" = 1'-0"

NOTE: FURNITURE SHOWN FOR REFERENCE ONLY, NOT IN CONTRACT.



2 ENLARGED THIRD FLOOR PLAN

1/4" = 1'-0"

STATE OF OKLAHOMA
DAVID F. PHELPS
3901
LICENSED ARCHITECT
9.13.2016

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

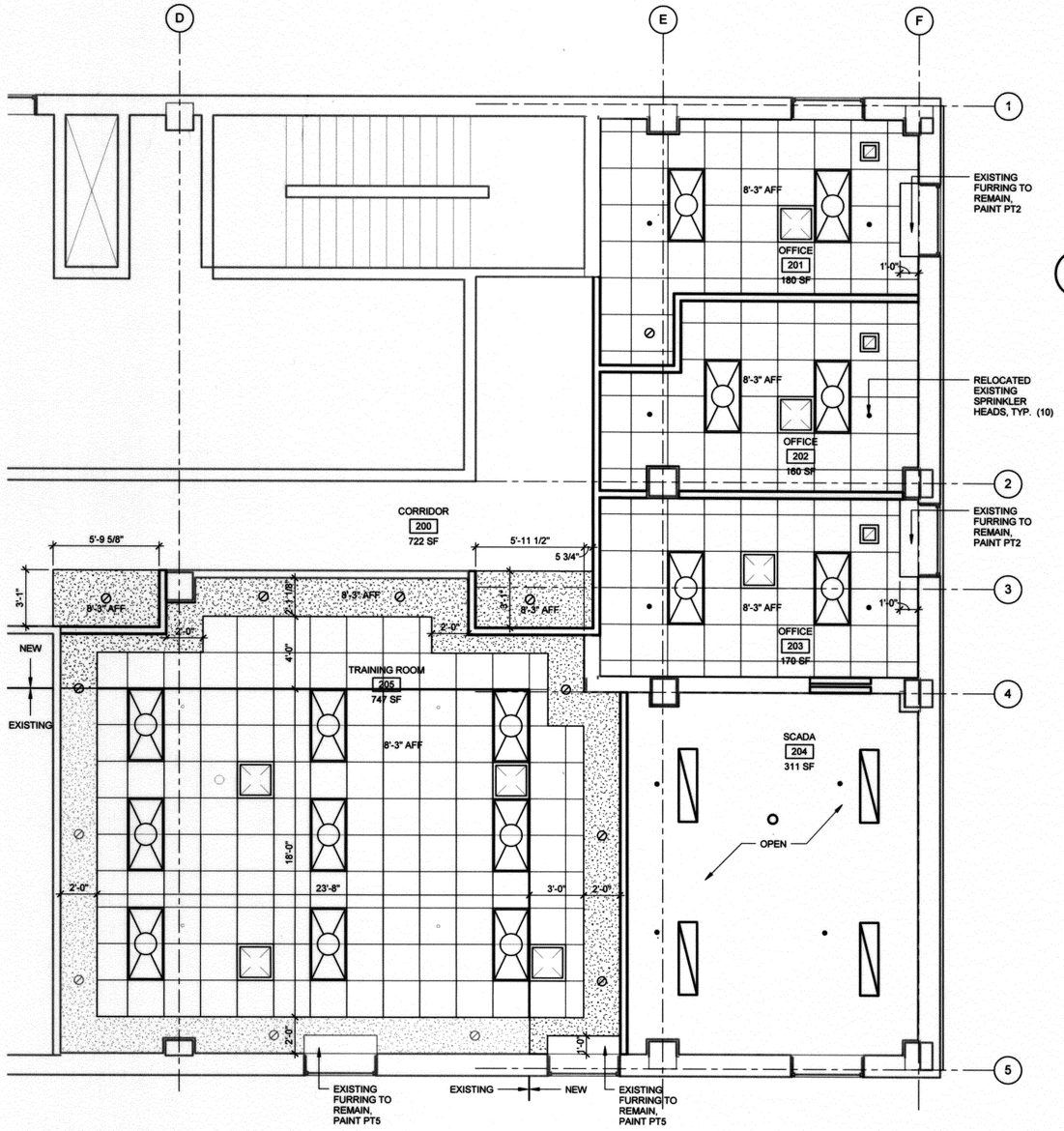
SECOND AND THIRD FLOOR ENLARGED PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

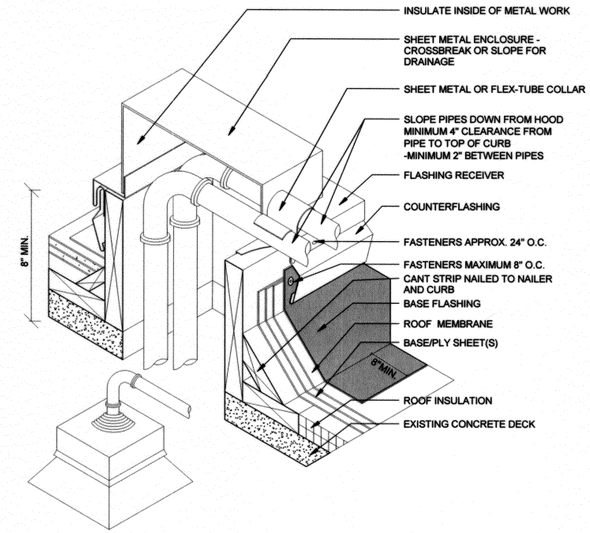
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EEW	APPROVED:
	DESIGNED	DFP	
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	EEW 9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	DFP 9/16	
	FIELD MGR.	EEW 9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS 9/16	CITY ENGINEER
FILE:	DRAWING:		DATE: 9/8/2016
ATLAS PAGE NO:			SHEET 7 OF 40 SHEETS
SHEET NAME: SECOND AND THIRD FLOOR ENLARGED PLANS			SHEET NO. A-101

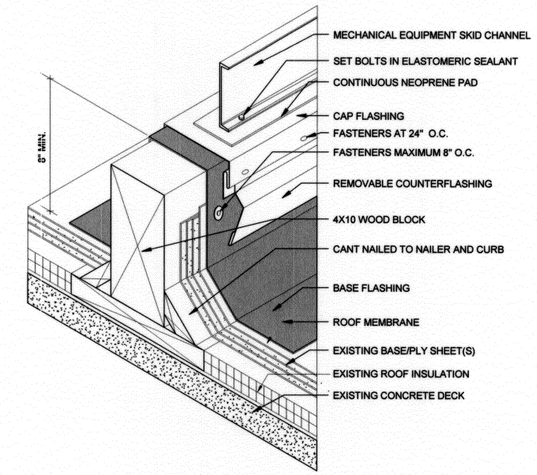
Printed: 9/8/2016 2:15:54 PM
C:\Users\jgreen\Documents\Revit\AB Jewell WTP Lab Office Remodel_Arch_2016_3greens.rvt



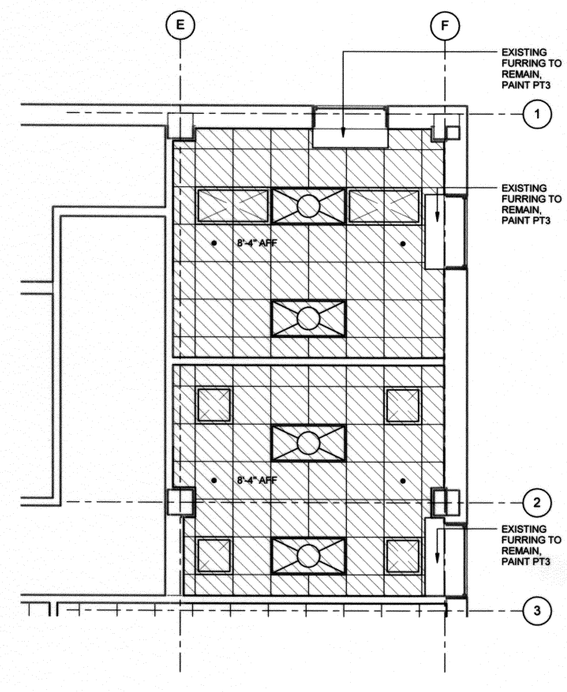
1 SECOND FLOOR RCP
1/4" = 1'-0"



5 PIPING THROUGH ROOF DETAIL
1 1/2" = 1'-0"

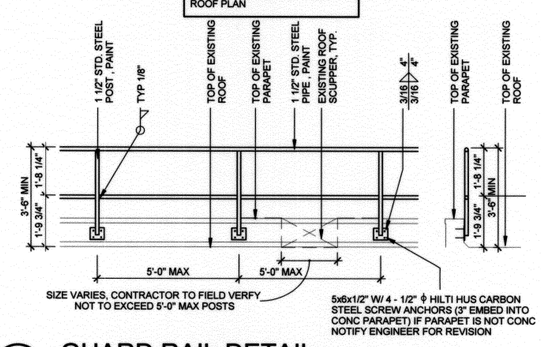


4 ROOF CURB SUPPORT
1 1/2" = 1'-0"



2 THIRD FLOOR RCP
1/4" = 1'-0"

NOTE: FIELD WELD ALL UNFINISHED SPLICES AT EXISTING HANDRAILS. SEE SHEET M-102 FOR ROOF PLAN



3 GUARD RAIL DETAIL
3/8" = 1'-0"

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

SECOND AND THIRD FLOOR REFLECTED CEILING PLANS

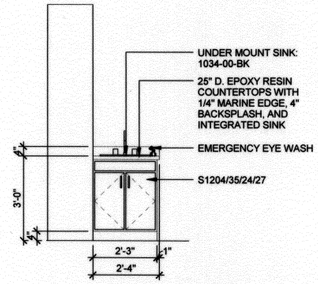
CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

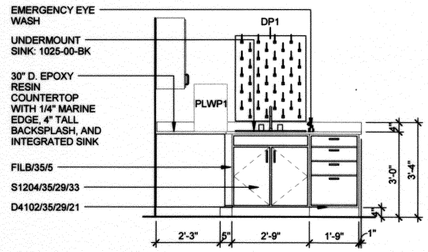
PLAN SCALE: AS INDICATED	DRAWN	EEW	APPROVED:
	DESIGNED	DFP	
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	CEW 9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	RBW 9/16	
	FIELD MGR.	RBW 9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS 9/16	CITY ENGINEER
FILE:	DRAWING:		DATE: 9/8/2016
ATLAS PAGE NO:			SHEET 8 OF 40 SHEETS
SHEET NAME: SECOND AND THIRD FLOOR REFLECTED CEILING PLANS			SHEET NO. A-102

STATE OF OKLAHOMA
DAVID F. PHELPS
6504
LICENSED ARCHITECT
9.12.2016

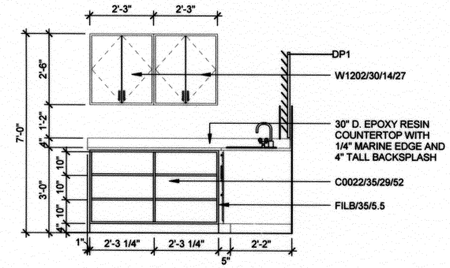
Printed: 9/8/2016 2:11:54 PM
C:\Users\Signature\Documents\Revit\AB Jewell WTP Lab-Office Remodel_Arch_2016_Signature.rvt



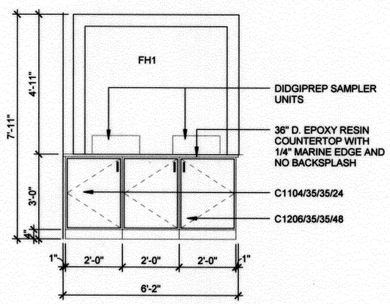
1 LAB SINK CASEWORK
3/8" = 1'-0"



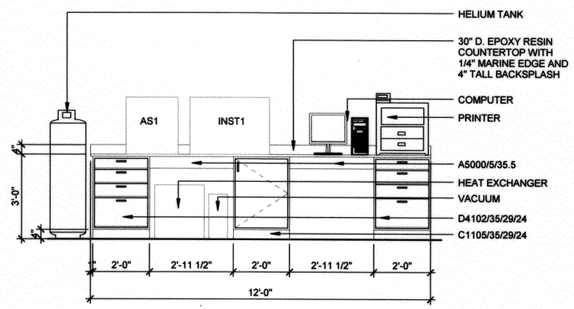
2 PREP SINK CASEWORK
3/8" = 1'-0"



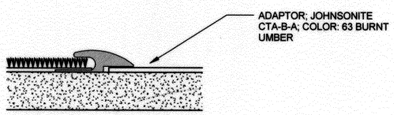
3 PREP CASEWORK
3/8" = 1'-0"



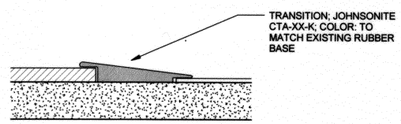
4 HOOD CASEWORK
3/8" = 1'-0"



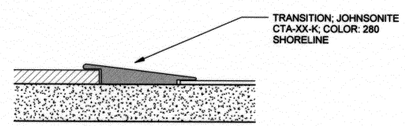
5 LAB CASEWORK
3/8" = 1'-0"



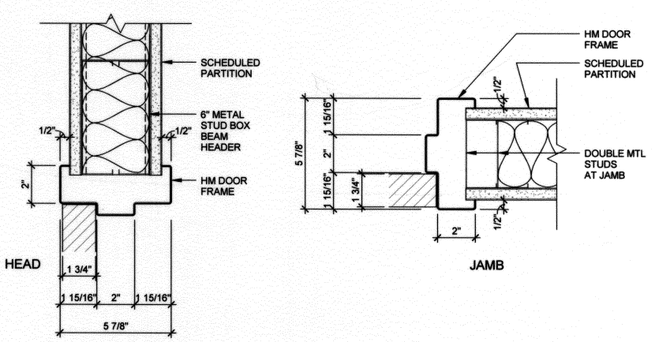
6 CPT TO EXISTING VCT
6" = 1'-0"



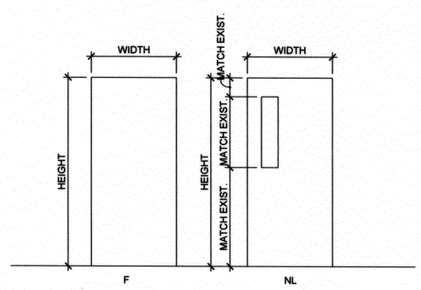
7 VCT TO EXISTING TILE
6" = 1'-0"



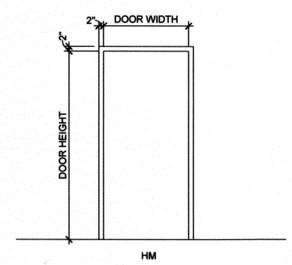
8 RBF TO EXISTING TILE
6" = 1'-0"



9 DOOR DETAILS
3" = 1'-0"



DOOR TYPES



DOOR FRAME TYPES

MATERIAL FINISH LEGEND

FINISH CODE	MANUFACTURER	DESCRIPTION	SIZE	COMMENTS/INSTALLATION NOTES
CEILING MATERIALS				
ACT1	ARMSTRONG	COLLECTION: ULTIMA; ITEM #1900; PROFILE: SQUARE LAY-IN; COLOR: WHITE; GRID: PRELUDE PLUS XL ALUMINUM 15/16" EXPOSED TEE; GRID COLOR: WHITE ALUMINUM	24" X 24" THICKNESS: 3/4"	INSTALL IN NEW OFFICES
ACT2	ARMSTRONG	COLLECTION: ULTIMA HEALTH ZONE; ITEM #1935; PROFILE: SQUARE LAY IN; COLOR: WHITE; GRID: PRELUDE PLUS XL ALUMINUM 15/16" EXPOSED TEE; GRID COLOR: WHITE ALUMINUM	24" X 24" THICKNESS: 3/4"	INSTALL IN NEW LAB AND PREP ROOM
FLOOR BASE				
RB1	MANNINGTON	COLLECTION: OPTIMUM EDGE; COLOR: FLAX 918	4" X 1/8" THICK	
RB2	MANNINGTON	COLLECTION: OPTIMUM EDGE; COLOR: BARK 904	4" X 1/8" THICK	
RB3	--	MATCH EXISTING	MATCH EXISTING	
FLOORING - RUBBER				
RBF1	MANNINGTON	COLLECTION: COLORSCAPE; COLOR: FLAX 918; PROFILE: SQUARE	18 1/8" X 18 1/8" THICKNESS: 1/8"	INSTALL MONOLITHIC
FLOORING MATERIALS - CARPET TILE				
CPT1	SHAW	STYLE: KINETIC 59359; COLOR: SILVER LINING 58530	24" X 24"	INSTALL 1/3 BRICK ASHLAR
FLOORING MATERIALS - VCT				
VCT1	--	MATCH EXISTING	MATCH EXISTING	
MILLWORK MATERIAL				
ER1	KEWAUNEE	KEMRESIN; EDGE: 1/4" MARINE EDGE; COLOR: BLACK	RE: FLOOR PLANS	RE: ELEVATIONS FOR CURB LOCATIONS. RE: SPECIFICATIONS
PL1	WILSONART	COLOR: CASUAL LINEN 4944-60; CHEMSURF FINISH		RE: SPECIFICATIONS
WALL FINISH - PAINT				
PT1	SHERWIN WILLIAMS	COLOR: ELLIE GRAY SW7650; PRMAR 200 SERIES		RE: SPECIFICATIONS
PT2	SHERWIN WILLIAMS	COLOR: MEDITATIVE SW6227; PROMAR 200 SERIES		RE: SPECIFICATIONS
PT3	SHERWIN WILLIAMS	COLOR: PURE WHITE SW7005; PROMAR 200 SERIES		RE: SPECIFICATIONS
PT4	SHERWIN WILLIAMS	MATCH EXISTING		
PT5	SHERWIN WILLIAMS	MATCH EXISTING		

SPECIALTIES SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL	DIMENSIONS	FINISH	Responsibility	NOTES	MOUNTING HEIGHT
AS1	AUTO SAMPLER	AGILENT TECHNOLOGIES	ASX-500 SERIES ICP-MS	1'-10" X 1'-10" X 2'		OPCI		
DP1	DRYING PEGBOARD	KEWAUNEE	X-0200015	32"X29"X1" THICK	BLACK	CPCI		
FH1	FUME HOOD	LABCONCO	PROTECTOR PVC LABORATORY HOOD; 141610002 6' HOOD	72" X 62.25" X 36"		CPCI		
INST1	INSTRUMENT	AGILENT TECHNOLOGIES	7700 SERIES ICP-MS	2'-10" X 2'-1" X 2'		OPCI		
WP1	WATER PURIFIER			1'-2" X 1'-5" X 1'-8"		OPCI	(CHECK)	

STATE OF OKLAHOMA
DAVID F. PHELPS
3504
LICENSED ARCHITECT
9.13.2016

DAVID F. PHELPS, AIA
ARCHITECT OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

CASEWORK ELEVATIONS & SCHEDULES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	EEW	APPROVED:
	DESIGNED	DFP	
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	SEW 9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	SEW 9/16	
	FIELD MGR.	RBH 9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS 9/16	CITY ENGINEER
FILE:	DRAWING:		DATE: 9/8/2016
ATLAS PAGE NO:			SHEET 9 OF 40 SHEETS
SHEET NAME: CASEWORK ELEVATIONS & SCHEDULES			SHEET NO. A-201

Printed: 9/8/2016 2:11:55 PM
C:\Users\SignageDocuments\Revit\AB_Jewell WTP Lab-Office Remodel_Arch_2016_Signers.rvt

PLUMBING ABBREVIATIONS

A

A	COMPRESSED AIR
ADD	ADDENDUM
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AR	ARGON GAS
AV	ACID VENT
AVTR	ACID VENT THRU THE ROOF
AW	ACID WASTE

B

BFF	BELOW FINISHED FLOOR
BFPD	BACK FLOW PREVENTION DEVICE

C

CD	CONDENSATE DRAIN
CL	CENTER LINE
CO	CLEANOUT
CONT	CONTINUATION
CP	PUMPED CONDENSATE

D

DCW	DOMESTIC COLD WATER
DF	DRINKING FOUNTAIN
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN
DI	DEIONIZED WATER
DF	DRINKING FOUNTAIN
DN	DOWN
DS	DISTILLED WATER
DWG	DRAWING
DWV	DRAIN WASTE AND VENT

E

(E)	EXISTING TO REMAIN
EEW	EMERGENCY EYE WASH
ESH	EMERGENCY SHOWER
ENGR	ENGINEER
EQUIP	EQUIPMENT
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
EXT	EXPANSION TANK

F

F	FAHRENHEIT
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FLR	FLOOR
FPWH	FREEZE PROOF WALL HYDRANT
FPM	FEET PER MINUTE
FT	FOOT, FEET
FS	FLOOR SINK

G

G	NATURAL GAS, LOW PRESSURE
GAL	GALLON, GALLONS
GPF	GALLONS PER FLUSH
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GCO	GRADE CLEAN OUT
GW	GREASE WASTE
GWH	GAS WATER HEATER

H

HB	HOSE BIBB
HD	HEAD
HE	HELIUM
HP	HORSEPOWER
HPG	NATURAL GAS, HIGH PRESSURE

I

IN	INCH, INCHES
INV	INVERT
INWC	INCHES OF WATER COLUMN
IW	IRRIGATION WATER

K

KW	KILOWATT
K	THOUSAND

L

LB	POUND, POUNDS
LFH	LABORATORY FUME HOOD
LS	LABORATORY SINK

M

M	THOUSAND
MBH	THOUSAND BTUH
MFG	MANUFACTURER
MPG	NATURAL GAS, MEDIUM PRESSURE
MIN	MINIMUM
MISC	MISCELLANEOUS
MSB	MOP SERVICE BASIN

N

N	NITROGEN GAS
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN or NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE

P

PH	PHASE
PRV	PRESSURE REDUCING VALVE
PRD	PRIMARY ROOF DRAIN
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAGE

R

(R)	EXISTING TO REMAIN, RELOCATE
RD	ROOF DRAIN
RE	REFER TO
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
RV	RELIEF VALVE
Ø	ROUND, DIAMETER

S

SD	STORM DRAIN
SS	SANITARY SEWER or STAINLESS STEEL
SQIN	SQUARE INCH/INCHES
SQFT	SQUARE FOOT/FEET
SRD	SECONDARY ROOF DRAIN

T

TEMP	TEMPERATURE
THRU	THROUGH
TMV	THERMOSTATIC MIXING VALVE
TYP	TYPICAL

U

UL	UNDERWRITER'S LABORATORIES
UNO	UNLESS NOTED OTHERWISE
UR	URINAL

V

V	VENT or VOLT
VAC	VACUUM
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THRU THE ROOF
VTW	VENT THRU THE WALL

W

WAG	WATER AND GAS
W	WATT
WB	WASHER BOX
WC	WATER CLOSET
WHA	WATER HAMMER ARRESTOR

Y

YH	YARD HYDRANT

PLUMBING SYMBOLS LEGEND

SYMBOL	DESCRIPTION
	BACKFLOW PREVENTER, SEE SPECS
	BALL VALVE
	BLIND FLANGE
	CAP
	CHECK VALVE
	CHECK VALVE, SILENT
	CIRCUIT SETTER
	FLEXIBLE CONNECTOR
	GENERAL VALVE, SEE SPECS
	PRESSURE AND TEMPERATURE RELIEF
	PRESSURE REDUCING VALVE
	RELIEF VALVE, ASME
	SOLENOID VALVE
	STRAINER
	TRIPLE DUTY VALVE
	UNION
	RISER DOWN (ELBOW)
	RISER UP (ELBOW)
	RISE OR DROP
	TEE DOWN
	TEE UP
	TOP CONNECTION
	BOTTOM CONNECTION
	SIDE CONNECTION
	FLOW IN DIRECTION OF ARROW
	PIPE SLOPE IN DIRECTION OF ARROW
	REMOVE EXISTING TO THIS POINT
	TIE-IN TO EXISTING AT THIS POINT
	PUMP
	EQUIPMENT TAG
XXX-X	EQUIPMENT NUMBER
CO	CLEANOUT PLUG
FCO	CLEANOUT, FLOOR
WCO	CLEANOUT, WALL
HB	HOSE BIBB
FPWH	FREEZE PROOF WALL HYDRANT
	GAS REGULATOR
FD	FLOOR DRAIN
SD	SHOWER DRAIN
FS	FLOOR SINK
PRD	PRIMARY ROOF DRAIN
SRD	SECONDARY ROOF DRAIN

SYMBOL	DESCRIPTION
DS	DISTILLED WATER
DI	DEMINERALIZED OR DEIONIZED WATER
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN
110°F	DOMESTIC HOT WATER (110°F)
140°F	DOMESTIC HOT WATER (140°F)
IW	IRRIGATION WATER
G	NATURAL GAS, LOW PRESS
MG	NATURAL GAS, MED PRESS
HG	NATURAL GAS, HIGH PRESS
PRD	PRIMARY ROOF DRAIN
RD	ROOF DRAIN
SRD	SECONDARY ROOF DRAIN
SD	STORM DRAIN
V	VENT, SANITARY SEWER
AV	VENT, ACID WASTE
GV	VENT, GREASE
A	COMPRESSED AIR
HE	HELIUM GAS
VAC	VACUUM
N	NITROGEN GAS
AR	ARGON GAS
AW	WASTE, ACID
GW	WASTE, GREASE
SS	WASTE, SANITARY SEWER

DEFINITION OF LINEWEIGHTS AND LINETYPES:

	DEMOLITION
	EXISTING TO REMAIN
	NEW CONSTRUCTION
	DOMESTIC COLD WATER
	DOMESTIC HOT WATER
	DOMESTIC HOT WATER RETURN
	OUTLINE OF NEW EQUIPMENT INSTALLED ABOVE THE FLOOR SHOWN (I.E., ROOF)

BEFORE YOU DIG 1-800-552-6543 811 CALL OKIE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER JEFFERY DON FERGUSON 7551 OKLAHOMA 9/23/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

PLUMBING SYMBOLS AND ABBREVIATIONS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZCW	9/16	
	FIELD MGR.	RBW	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: P-001.dwg	DRAWING:	DATE: 9/8/2016
ATLAS PAGE NO: 00016		SHEET 10 OF 40 SHEETS
SHEET NAME: PLUMBING SYMBOLS AND ABBREVIATIONS		SHEET NO. P-001

Printed: 9/8/2016 11:38:09 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-2B\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\P-001.dwg

RENOVATION NOTES

1. THE CONTRACTOR SHALL VISIT THE SITE BEFORE BIDDING AND SHALL BECOME FULLY INFORMED AS TO THE EXTENT AND CHARACTER OF THE WORK REQUIRED AND ITS RELATION TO OTHER WORK. FAILURE TO VISIT SITE SHALL NOT CONSTITUTE A BASIS FOR FUTURE CLAIMS.
2. FIELD VERIFY EXISTING SYSTEM PRESSURES AND TEMPERATURES PRIOR TO ANY SYSTEM TIE-INS. ALL NEW MATERIALS SHALL MEET OR EXCEED PERFORMANCE OF MATERIALS USED ON EXISTING SYSTEMS.
3. AVOID DISRUPTION OF BUILDING SERVICES DURING NORMAL BUSINESS HOURS. COORDINATE ALL SYSTEM SHUT DOWNS WITH OWNER. REQUIRED SYSTEM SHUT DOWNS AND DISRUPTION OF BUILDING SERVICES WILL BE SCHEDULED AFTER NORMAL BUSINESS HOURS AND/OR AS DIRECTED BY OWNER. CONTRACTOR SHOULD ANTICIPATE THAT SHUTDOWNS MAY OCCUR AT PREMIUM TIME. CONTRACTOR SHALL INDICATE ON THEIR BID PROPOSAL QUANTITY AND DURATION OF EACH BUILDING SYSTEM SHUTDOWN REQUIRED TO COMPLETE WORK AS DESCRIBED ON CONTRACT DOCUMENTS.
4. THE CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS AND EXACT LOCATION OF ALL EQUIPMENT, DUCTWORK, AND PIPING, INCLUDING SYSTEM TIE-INS. NOTIFY ARCHITECT AND ENGINEER OF ANY MODIFICATIONS REQUIRED FROM THE PLANS TO FACILITATE INSTALLATION PRIOR TO INSTALLATION.
5. THE CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL CONSTRUCTION WITH BUILDING OCCUPANTS LOCATED IN THE WORK AREA.
6. THE CONTRACTOR SHALL COORDINATE ALL PATCH AND REPAIR OF WALLS AND FLOORS WHEN DISTURBED BY NEW CONSTRUCTION.
7. WHERE SYSTEM TIE-INS ARE MADE AND AT ALL LOCATIONS WHERE DAMAGE OCCURRED FROM NEW CONSTRUCTION, PATCH AND REPAIR DAMAGED INSULATION WITH INSULATION TYPE AND THICKNESS TO MATCH EXISTING.
8. TEST AND BALANCE EXISTING HVAC SYSTEMS AS REQUIRED TO ACCOMMODATE SYSTEM MODIFICATIONS AND ADDITIONS. MAINTAIN ACCEPTABLE COMFORT LEVELS DURING TEST AND BALANCE AS REQUIRED. ENSURE THE INTEGRITY OF THE EXISTING SYSTEM BALANCE.
9. THE CONTRACTOR SHALL COORDINATE WORK WITH EXISTING FIRE PROTECTION PIPING AND/OR SPRINKLER HEADS. ANY WORK ASSOCIATED WITH MODIFYING THESE SYSTEMS SHALL BE PERFORMED BY A LICENSED AND APPROVED CONTRACTOR. NEW SPRINKLER HEADS SHALL MATCH EXISTING; FIELD VERIFY MANUFACTURER AND MODEL NUMBER. FIRE PROTECTION CONTRACTOR SHALL INFORM THE BUILDING SECURITY OFFICE EVERY DAY WHEN A SHUTDOWN OF SPRINKLER SYSTEM IS REQUIRED FOR CONSTRUCTION. THE CONTRACTOR SHALL RECONNECT AND FILL THE SPRINKLER SYSTEM INTO WORKING CONDITION AT THE END OF EACH WORKING DAY TO ASSURE PROTECTION DURING UNOCCUPIED PERIODS.

DEMOLITION NOTES

1. DEMOLISH EXISTING AS REQUIRED FOR NEW CONSTRUCTION AS DIRECTED BY ARCHITECT AND/OR AS NOTED ON DRAWINGS. AVOID DISRUPTION OF SERVICES DURING NORMAL BUSINESS HOURS. ALL SYSTEM SHUT-DOWNS AND DISRUPTION OF BUILDING SERVICES SHALL BE COORDINATED WITH OWNER AND SCHEDULED AFTER NORMAL BUILDING HOURS OR AS OTHERWISE APPROVED BY OWNER.
2. PRIOR TO DEMOLITION FIELD VERIFY AND IDENTIFY ANY EXISTING EQUIPMENT TO REMAIN IN SERVICE THAT IS SERVED BY SYSTEMS TO BE DEMOLISHED. NOTIFY ENGINEER OF ANY SUCH CONDITIONS AND REMOVE AND/OR RELOCATE THE SERVICES AS DIRECTED.
3. MEET WITH OWNER PRIOR TO DEMOLITION TO IDENTIFY WHETHER EXISTING MATERIALS SYSTEMS, EQUIPMENT, ETC. ARE CONSIDERED SALVAGE OR DEBRIS. REMOVE DEBRIS FROM SITE AND DISPOSE OF IN AN APPROVED MANNER. RETURN SALVAGE TO OWNER IN A LOCATION AND MANNER AS DIRECTED BY OWNER.
4. TERMINATE DEMOLISHED SYSTEM SERVICES IN A CONCEALED LOCATION IN AN APPROVED MANNER. COORDINATE WITH NEW AND EXISTING CONSTRUCTION.
5. FIELD VERIFY EXISTING PIPING LOCATIONS PRIOR TO WORK.
6. VERIFY EXTENT OF DEMOLITION OF SANITARY SEWER, DOMESTIC WATER AND FIRE PROTECTION PIPING PRIOR TO WORK. ALL DEMOLITION WORK SHALL BE IN COMPLIANCE WITH APPLICABLE CODES, STANDARDS AND THE AUTHORITY HAVING JURISDICTION.
7. WHERE REQUIRED, COORDINATE EQUIPMENT ELECTRICAL TERMINATION REQUIREMENTS WITH ELECTRICAL CONTRACTOR.

PHASING NOTES

1. WORK ON THE SECOND FLOOR SHALL BE ACCOMPLISHED BEFORE DISRUPTION OF THE THIRD FLOOR TAKES PLACE.
2. THE PLUMBING CONTRACTOR SHALL DEVELOP A DETAILED PHASING PLAN IN COORDINATION WITH THE OWNER AND SHALL PROVIDE THE PLAN TO THE OWNER FOR APPROVAL PRIOR TO STARTING WORK. THIS PLAN SHALL INCLUDE A DETAILED DESCRIPTION OF THE ORDER OF WORK, ANY DISRUPTIONS OF SPACE OPERATIONS DUE TO CONSTRUCTION ACTIVITIES, AND THE EXPECTED DURATION OF DISRUPTIONS.

GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE TO COMPLY WITH CURRENT APPLICABLE LOCAL, STATE, FEDERAL, FIRE, AND HEALTH CODES AND ORDINANCES AND IS RESPONSIBLE TO COMPLY WITH ALL REGULATIONS OF REGULATORY AGENCIES HAVING JURISDICTION. THE CONTRACTOR SHALL ALSO CONFORM TO THE REQUIREMENTS OF THE OWNER'S INSURANCE CARRIER. NOTIFY THE ARCHITECT AND ENGINEER OF ANY CONFLICTS PRIOR TO INSTALLATION. CODES, ORDINANCES AND REGULATIONS SHALL HAVE PRECEDENCE OVER SPECIFICATIONS AND DRAWINGS WHERE THERE IS A CONFLICT. OBTAIN CURRENT COPIES OF ALL ADOPTED CODES AND ORDINANCES PRIOR TO BID AND INCLUDE ALL COSTS TO COMPLY WITH CODES AND ORDINANCES IN BID.
2. PAY ALL LAWFUL FEES, PERMITS OR LICENSES REQUIRED TO ACCOMPLISH WORK. OBTAIN AND PAY FOR ALL NECESSARY CERTIFICATES OF APPROVAL.
3. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, SERVICE AND ANYTHING REASONABLY INCIDENTAL TO COMPLETE ALL WORK INDICATED ON THE DRAWINGS AND AS SPECIFIED IN ACCORDANCE WITH THE INTENT OF THE CONSTRUCTION DOCUMENTS.
4. THE CONTRACTOR IS RESPONSIBLE TO VISIT AND EXAMINE THE JOB SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS PERTINENT TO THE WORK TO BE PERFORMED.
5. INCORPORATE ALL CODE AND ORDINANCE REQUIREMENTS INTO THE BID AND INSTALLATION OF WORK. NO ADDITIONAL FUNDS WILL BE ALLOCATED FOR WORK REQUIRED TO CONFORM TO REGULATIONS AND REQUIREMENT AND/OR TO OBTAIN APPROVAL OF WORK.
6. THE DRAWINGS ARE DIAGRAMMATIC AND ARE ONLY INTENDED TO DEFINE THE BASIC FUNCTIONS REQUIRED. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION CONDITIONS AND COORDINATION WITH OTHER TRADES WILL ALLOW. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND ARE A PART OF THE WORK INCLUDED; HOWEVER, CHANGES THAT ALTER THE CHARACTER OF THE WORK ARE NOT PERMITTED. APPROVAL OF ARCHITECT AND ENGINEER SHALL BE OBTAINED BEFORE DEVIATIONS FROM THESE PLANS ARE MADE.
7. PLUMBING AND MECHANICAL SYSTEMS ARE NOT DIMENSIONED. DO NOT SCALE FROM DRAWING(S). THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES AND ENSURE THERE IS AVAILABLE SPACE FOR INSTALLATION BEFORE ORDERING EQUIPMENT AND FABRICATING PIPING AND/OR DUCTWORK.
8. THE CONTRACTOR SHALL STUDY THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND ELECTRICAL PLANS TO INSURE ALL MECHANICAL SYSTEMS WILL FIT WITH SUFFICIENT CLEARANCES FOR INSTALLATION, SERVICING AND MAINTENANCE. NOTIFY THE ARCHITECT AND ENGINEER OF ANY CONFLICTS PRIOR TO INSTALLATION.
9. THE CONTRACTOR SHALL COMPLY WITH SPECIFICATIONS AND INDUSTRY STANDARDS FOR ALL INSTALLATIONS.
10. REFER TO MECHANICAL DRAWINGS FOR ALL MECHANICAL EQUIPMENT LOCATIONS. REFER TO PLUMBING DRAWINGS FOR ALL PLUMBING EQUIPMENT.
11. SEAL ALL PENETRATIONS WATER TIGHT. SEAL AROUND ALL WALL PENETRATIONS. PROVIDE ESCUTCHEONS ON ALL PIPING ON EXTERIOR AND EXPOSED LOCATIONS. CAULK WITH REQUIRED THICKNESS 3M BRAND FIRE BARRIER CAULK CP-25 (OR OTHER APPROVED METHOD) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE RATED ASSEMBLIES.
12. ALL CUTTING AND PATCHING OF STRUCTURE SHALL BE APPROVED BY THE STRUCTURAL ENGINEER PRIOR TO PERFORMING WORK.
13. THE CONTRACTOR SHALL COORDINATE ALL ROUTING AND MOUNTING OF EQUIPMENT, DUCTWORK, PIPING, ETC (ALL WORK) WITH ALL OTHER TRADES.
14. ROUTE DUCTWORK AND PIPING ABOVE CEILING EQUIPMENT AS HIGH AS POSSIBLE ABOVE FINISHED CEILING TO AVOID CONFLICT WITH LIGHTS.
15. INSTALL ALL PIPING PARALLEL AND PERPENDICULAR TO BUILDING WALLS AND PARTITIONS UNLESS DISTINCTLY SHOWN OR NOTED OTHERWISE. ROUTE PIPING LOCATED NEAR EACH OTHER PARALLEL IN ALL PLANES AND WITH SUFFICIENT CLEARANCE.
16. ALL PIPING SHALL BE INSTALLED SO THAT IT MAY EXPAND AND CONTRACT FREELY WITHOUT DAMAGES TO EQUIPMENT, OTHER WORK, OR INJURY TO PIPING SYSTEM, ALL NECESSARY SWING JOINTS, EXPANSION JOINTS, OR OFFSETS TO PROTECT PIPING, ETC. SHALL BE INSTALLED WHETHER INDICATED OR NOT.
17. PROPERLY SUPPORT ALL PIPING. PROVIDE ALL REQUIRED ANCHORS, GUIDES AND EXPANSION DEVICES.
18. PAINT ALL EXTERIOR AND EXPOSED PIPING TO MATCH EXISTING.
19. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ALL MATERIAL, EQUIPMENT, APPARATUS AND WORK FROM DAMAGE. FAILURE TO DO SO TO THE SATISFACTION OF THE OWNER OR OWNER'S REPRESENTATIVE WILL BE SUFFICIENT CAUSE FOR THE REJECTION OF THE MATERIAL, EQUIPMENT, APPARATUS AND WORK IN QUESTION.
20. THE CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT, MATERIALS AND WORKMANSHIP FOR A PERIOD OF 1 YEAR FOLLOWING THE DATE OF ACCEPTANCE. THE CONTRACTOR'S GUARANTEE INCLUDES EQUIPMENT CAPACITY, PERFORMANCE RATINGS AND NOISE RATINGS. ANY DEFICIENCIES SHALL BE PROMPTLY CORRECTED. ROUTINE MAINTENANCE SHALL NOT BE INCLUDED.
21. THE CONTRACTOR SHALL CLEAN ALL FIXTURES, PIPES, EQUIPMENT AND EXPOSED WORK DURING PROJECT AND AFTER COMPLETION OF FINAL TESTING AND BEFORE ACCEPTANCE.
22. ALL PLATED AND OTHER FINISHED PRODUCTS SHALL BE THOROUGHLY CLEANED AND POLISHED.
23. THE MANUFACTURER MODEL OR CATALOG NUMBERS INDICATED IN THE CONSTRUCTION DOCUMENTS ESTABLISH A STANDARD FOR THE GENERAL DESIGN, PERFORMANCE, AND QUALITY OF THE PRODUCT REQUIRED.
25. ALTERNATE MANUFACTURERS LISTED IN THE SCHEDULE OR SPECIFICATIONS ARE APPROVED TO BID; HOWEVER, THE SUBMITTED PRODUCT MUST MEET THE GENERAL DESIGN, PERFORMANCE, DIMENSIONS, WEIGHT, AND QUALITY OF THE SCHEDULED PRODUCT. EACH MANUFACTURER WILL HAVE DIFFERENCES IN INSTALLATION REQUIREMENTS. IF THE CONTRACTOR ELECTS TO GO WITH A NON-BASIS OF DESIGN MANUFACTURER, THE CONTRACTOR SHALL BE RESPONSIBLE TO INCLUDE THE COST FOR ENGINEERING TIME, AS REQUIRED, TO ADJUST THE DESIGN TO THOSE DIFFERENCES IN THEIR BID, IF THE BASIS OF DESIGN IS NOT BID. THE CONTRACTOR IS RESPONSIBLE TO IDENTIFY THE DIFFERENCES IN THE INSTALLATION REQUIREMENTS BETWEEN THE BASIS OF DESIGN AND THE SUBMITTED MANUFACTURER DURING THE SUBMITTAL PHASE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL COSTS INCURRED BY OTHER TRADES, INCLUDING BUT NOT LIMITED TO: ELECTRICAL, STRUCTURAL, AND PLUMBING, DUE TO DEVIATIONS IN EQUIPMENT FROM THE BASIS OF DESIGN.
26. ALL MATERIALS, EQUIPMENT, ETC., INSTALLED UNDER THIS CONTRACT SHALL CONFORM TO ALL RULES, CODES, ETC., AS RECOMMENDED OR ADAPTED BY THE NATIONAL ASSOCIATION GOVERNING THE MANUFACTURER, RATING AND TESTING OF SUCH MATERIALS, EQUIPMENT, ETC., ALL ELECTRICALLY OPERATED EQUIPMENT SHALL BE U.L. APPROVED FOR THE USE INTENDED.
27. ALL FIRED AND UNFIRED PRESSURE VESSELS SHALL CONFORM TO THE RULES OF THE A.S.M.E. AND NATIONAL BOARD CODES AND SHALL BE SO LABELED. FURNISH A.S.M.E. AND NATIONAL BOARD CERTIFICATES.
28. MOTORS SHALL CONFORM TO THE RULES OF THE N.E.M.A. FOR THE SERVICE INTENDED AND TO THEIR STANDARDIZED FORM SIZES.
29. SHOP DRAWINGS, CATALOG CUTSHEETS AND PERFORMANCE DATA PERTAINING TO ALL MATERIALS AND EQUIPMENT PROPOSED FOR USE SHALL BE SUBMITTED.
30. JOINTS BETWEEN DISSIMILAR METALS SHALL BE MADE WITH DIELECTRIC NIPPLES DOWNSTREAM OF A VALVE.
31. ALL MATERIALS EXPOSED IN A RETURN AIR PLENUM SHALL COMPLY WITH NFPA 90A FLAME SPREAD UNDER 25 AND SMOKE DEVELOPED AND FUEL CONTRIBUTED UNDER 50.
32. THE DISCHARGE OF SAFETY VALVES, BLOWOFF PIPES AND OTHER OUTLETS SHALL BE LOCATED AND SUPPORTED SO AS TO PREVENT INJURY TO PERSONNEL.
33. EQUIPMENT SHOWN IN THE CONTRACT DOCUMENTS IS BASED ON ONE MANUFACTURER'S MODEL NUMBER OR EQUIPMENT SERIES, U.N.O., AS A BASIS OF DESIGN. THE CONTRACTOR SHALL CONFIRM THAT SUBMITTED AND/OR PROVIDED EQUIPMENT WILL MEET OR EXCEED THE PERFORMANCE REQUIREMENTS OF THE CONTRACT DOCUMENTS WITHOUT ADVERSELY AFFECTING THE STRUCTURAL AND ARCHITECTURAL REQUIREMENTS. REQUIREMENTS SHALL INCLUDE, EQUIPMENT'S PERFORMANCE, MATERIAL, QUALITY, WARRANTY, AESTHETICS, METHODS OF INSTALLATION CONSTRUCTION, SIZE, WEIGHT, PHYSICALLY FITTING THE SPACE WHILE MAINTAINING ALL WORKING AND MAINTENANCE CLEARANCES AND MAINTAINING ALL DESIGNED/REQUIRED STRUCTURAL SUPPORT. EQUIPMENT WEIGHING LESS AND/OR WITH A SMALLER FOOTPRINT MAY ADVERSELY AFFECT THE STRUCTURE. IN ADDITION TO THE SUBSTITUTION PROCEDURE REQUIREMENTS IN THE SPECIFICATIONS, CONTRACTOR SHALL PROVIDE A DETAILED AND CLEAR COMPARISON OF PERFORMANCE, MATERIAL, QUALITY, WARRANTY, AESTHETICS, SIZE, WEIGHT, LOCATION, AND METHOD OF INSTALLATION TO ARCHITECT AND TO ALL ENGINEERS WHOSE REQUIREMENTS MAY BE AFFECTED FOR ALL SUBMITTED EQUIPMENT DIFFERENT FROM THAT SPECIFIED AS THE BASIS OF DESIGN, PRIOR TO PURCHASING EQUIPMENT. CONTRACTOR(S) SHALL COORDINATE WITH OTHER TRADES AND BEAR THE COST OF ALL REQUIREMENTS RELEVANT TO THE PROVIDED EQUIPMENT THAT IS DIFFERENT THAN THAT SPECIFIED IN THE CONTRACT DOCUMENTS. THESE COSTS MAY INCLUDE: ENGINEER/ARCHITECT EVALUATIONS AND/OR REDESIGNS, BRANCH CIRCUIT/FEEDER PANELBOARD/DISCONNECT/CIRCUIT BREAKER MODIFICATIONS, MECHANICAL, PLUMBING, FIRE PROTECTION SYSTEM MODIFICATIONS AND STRUCTURAL SUPPORT SYSTEM MODIFICATIONS. ARCHITECT/ENGINEERS SHALL NOT BE RESPONSIBLE FOR WORK DONE IN AREAS WHERE ALL AFFECTED DISCIPLINES WERE NOT NOTIFIED IN A TIMELY MANNER OF CHANGES IN EQUIPMENT FROM THE BASIS OF DESIGN.
34. REFER TO STRUCTURAL SHEET S001 GENERAL NOTES PRIOR FOR ALL PIPE PENETRATIONS.

BEFORE YOU DIG
1-800-552-6543
811
CALL OKIE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
19755
OKLAHOMA
09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

PLUMBING GENERAL NOTES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

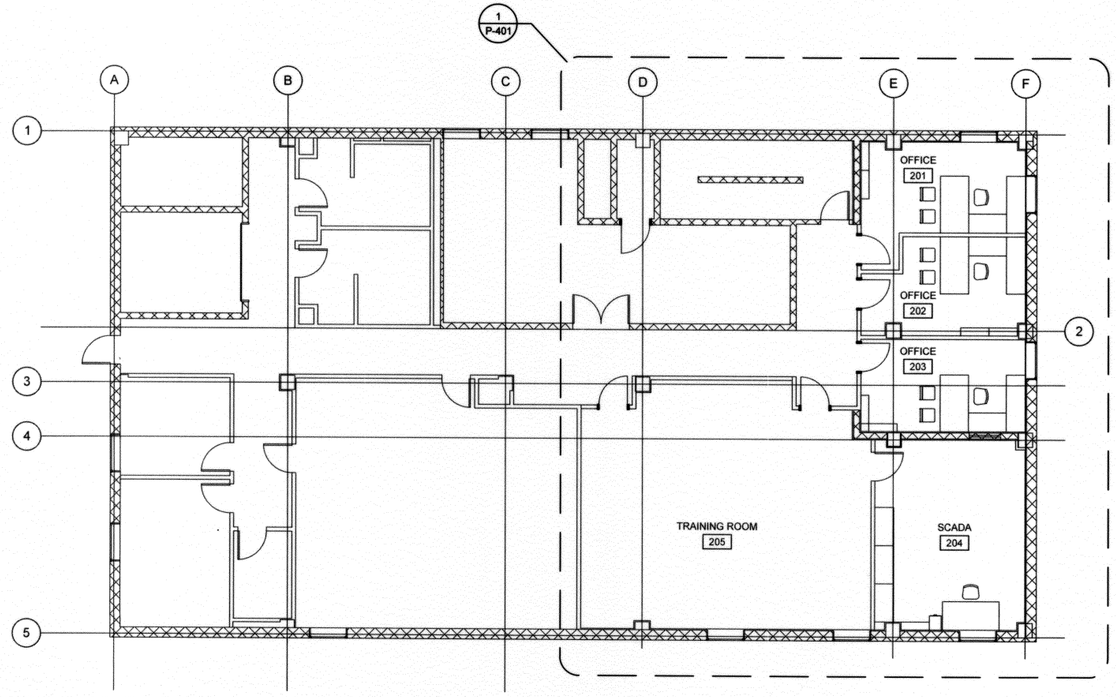
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE:	DRAWN	SKG	08/2016	APPROVED:
AS INDICATED	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	[illegible]	9/16	
	FIELD MGR.	RBW	9/16	
VERTICAL N/A	RECOMMENDED:	HAS	9/16	
	DESIGN MANAGER			CITY ENGINEER
FILE: P-002.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 11 OF 40 SHEETS
SHEET NAME: PLUMBING GENERAL NOTES				SHEET NO. P-002

Printed: 9/8/2016 11:38:10 AM
V:\Tulsa Public Works\Micellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\P-002.dwg

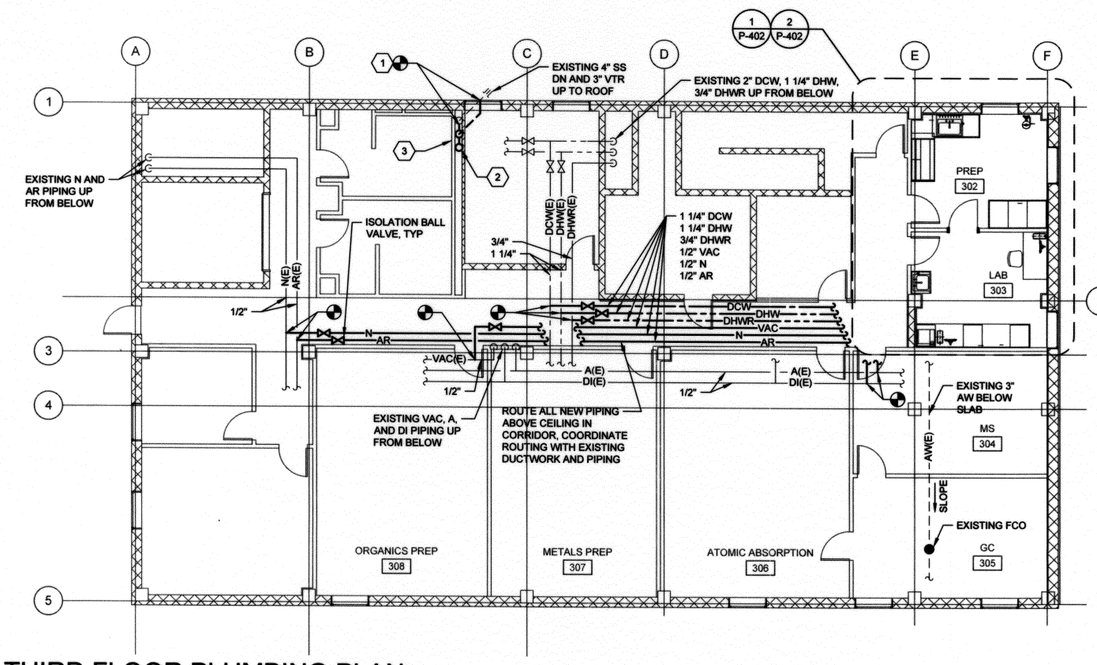
KEYNOTES

1. CAST IRON 3" STANDPIPE FOR GH-1 AND HUMIDIFIER DISTRIBUTION MANIFOLD DRAIN. CONNECT NEW VENT TO EXISTING 3" VENT LINE. RE: 7/P-501. CONTRACTOR TO CONFIRM THAT EXISTING DRAIN, WASTE, AND VENT PIPING IN RESTROOM IS CAST IRON. COORDINATE WITH ENGINEER IF THE PIPING IS NOT CAST IRON. RE: 7/P-501.
2. 2" CD SHALL ROUTE DOWN TO CAST IRON STANDPIPE IN WALL. TERMINATE IN AIR GAP.
3. PROVIDE 12x12 ACCESS PANEL, RE: ARCH SPECS.



1 SECOND FLOOR PLUMBING PLAN

1/8" = 1'-0"



2 THIRD FLOOR PLUMBING PLAN

1/8" = 1'-0"

JEFFERY DON FERGUSON
JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

SECOND AND THIRD FLOOR PLUMBING PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.		9/16	
	FIELD MGR.		9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: P-101.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 12 OF 40 SHEETS
SHEET NAME: SECOND AND THIRD FLOOR PLUMBING PLANS				SHEET NO. P-101

Printed: 9/8/2016 11:36:14 AM
V:\Tulsa Public Works\Maintenance Elec & Mech 065100-250-AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\P-101.dwg

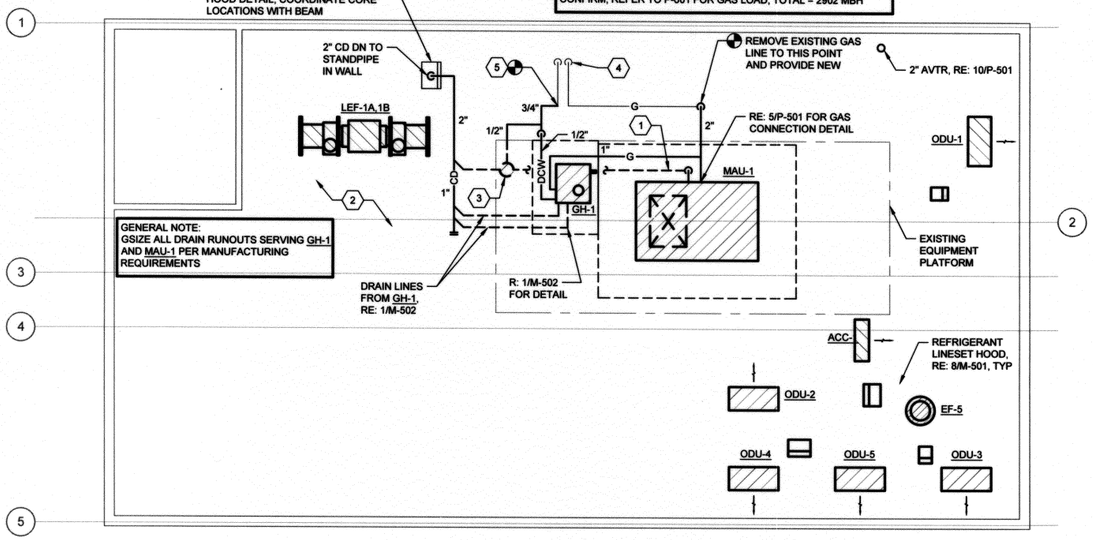
KEYNOTES

1. CONDENSATE DRAIN LINE FROM STEAM DISTRIBUTION MANIFOLD, RE: 1/M-502. ROUTE UNDER PLATFORM AND HANG FROM PLATFORM ABOVE.
2. REMOVE EXISTING HEAT TRACE AND PROVIDE NEW FOR ALL EXPOSED WATER AND DRAIN LINES. REFER TO MECHANICAL SCHEDULES.
3. STEAM CONDENSATE DRAIN WATER COOLER, PROVIDE HEAT TRACE AND HANG UNDER EXISTING PLATFORM. REFER TO GH-1 SCHEDULE.
4. EXISTING 2" GAS AND 3/4" DCW UP FROM BASEMENT.
5. REMOVE EXISTING DCW ON ROOF TO POINT INDICATED AND PROVIDE NEW.

CONTRACTOR SHALL COORDINATE ALL DETAILS OF THE GAS PIPING SYSTEM WITH THE LOCAL GAS COMPANY. THIS SHALL INCLUDE GAS METER, GAS REGULATOR AND GAS PRESSURE REQUIREMENTS. VERIFY CORRECT GAS PRESSURE DOWNSTREAM OF SERVICE REGULATOR. THE NATURAL GAS DEMAND SHOWN IN MBH IS BASED ON A HEATING VALUE OF 1000 BTU (1 MBH) PER CUBIC FOOT, A SPECIFIC GRAVITY OF 0.6, AND ON PRIMARY EQUIPMENT INDICATED ON PLANS. GAS PIPING SIZES SHALL BE AS NOTED ON PLANS.

GAS COMPANY CONTACT:
OKLAHOMA NATURAL GAS
JOHN WATKINS
(918) 688-6353

GENERAL NOTE:
GAS PRESSURE IS ASSUMED TO BE 2 PSI AT THE BUILDING REGULATOR BASED ON EXISTING DRAWINGS, CONTRACTOR TO CONFIRM; REFER TO P-601 FOR GAS LOAD, TOTAL = 2902 MBH



1 PLUMBING ROOF PLAN

1/8" = 1'-0"

N

BEFORE YOU DIG CALL OKIE 811 1-800-552-6543

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER JEFFERY DON FERGUSON

09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

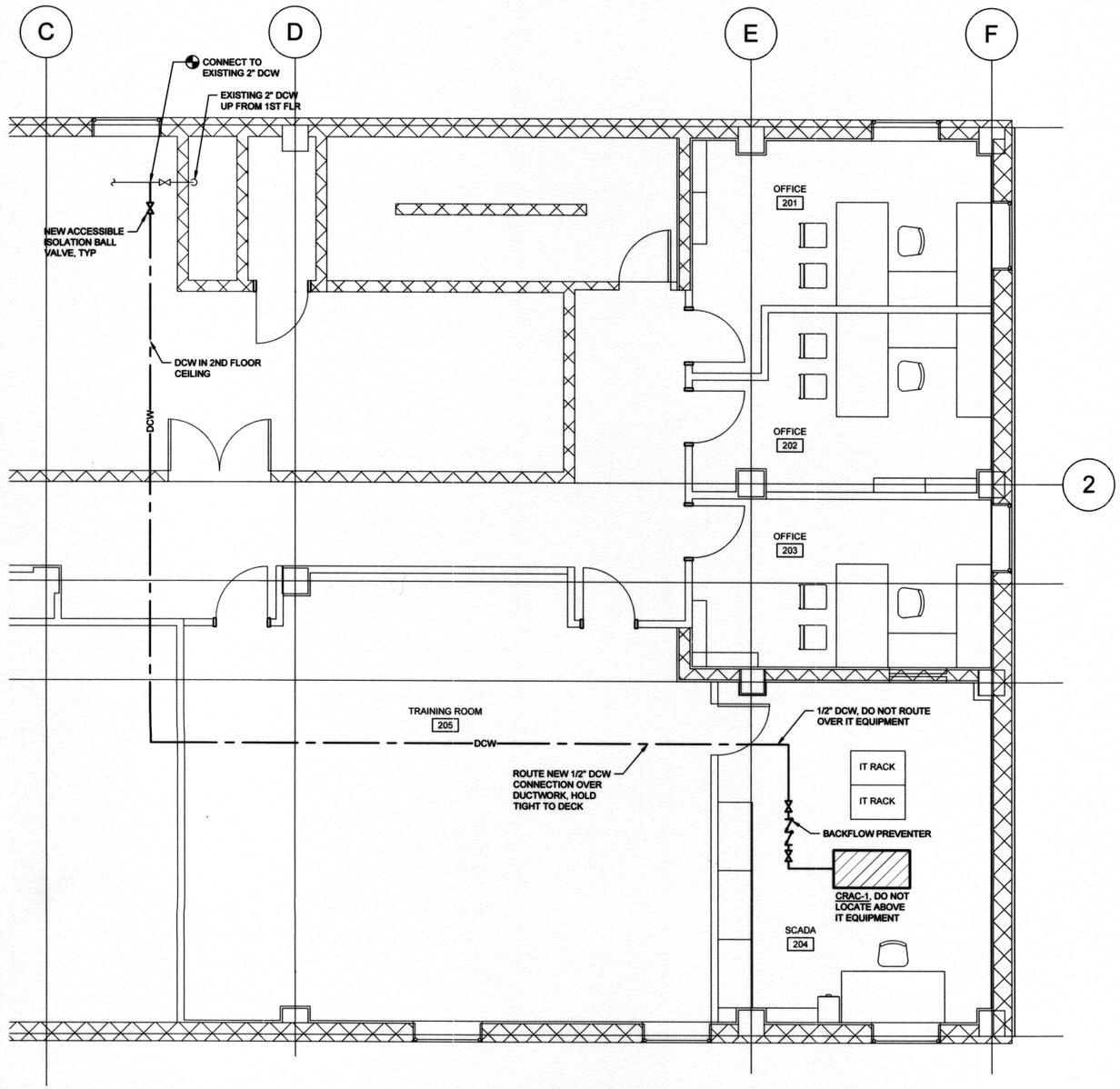
ROOF PLUMBING PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	BZM	9/16	
	FIELD MGR.	BSV	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: P-102.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 13 OF 40 SHEETS
SHEET NAME: ROOF PLUMBING PLAN				SHEET NO. P-102

Printed: 9/8/2016 11:36:16 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-29\AB Jewell WTP Lab-Office Remodel\Drawings\Sheets\P-102.dwg



1 SECOND FLOOR PLUMBING ENLARGED PLAN

1/4" = 1'-0"

N

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

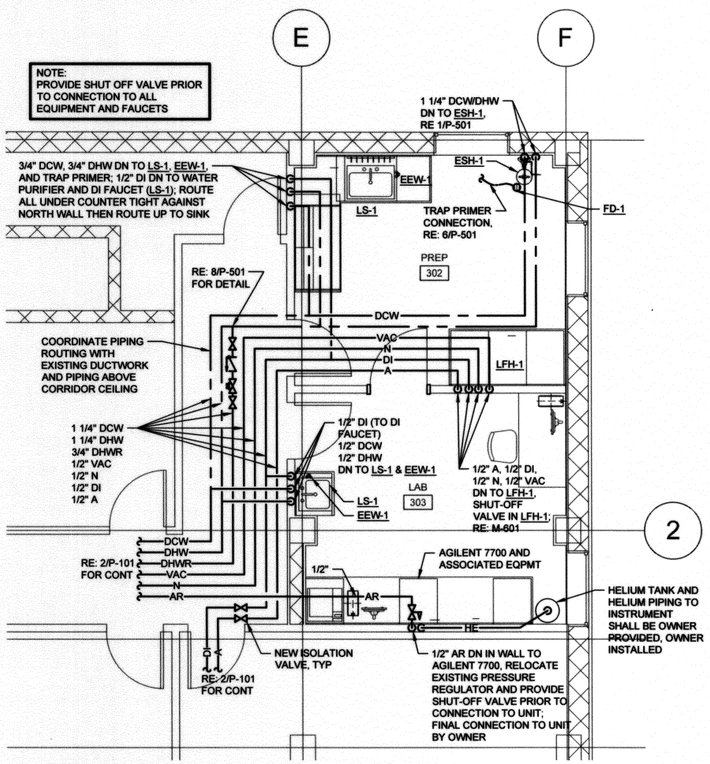
SECOND FLOOR ENLARGED PLUMBING PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

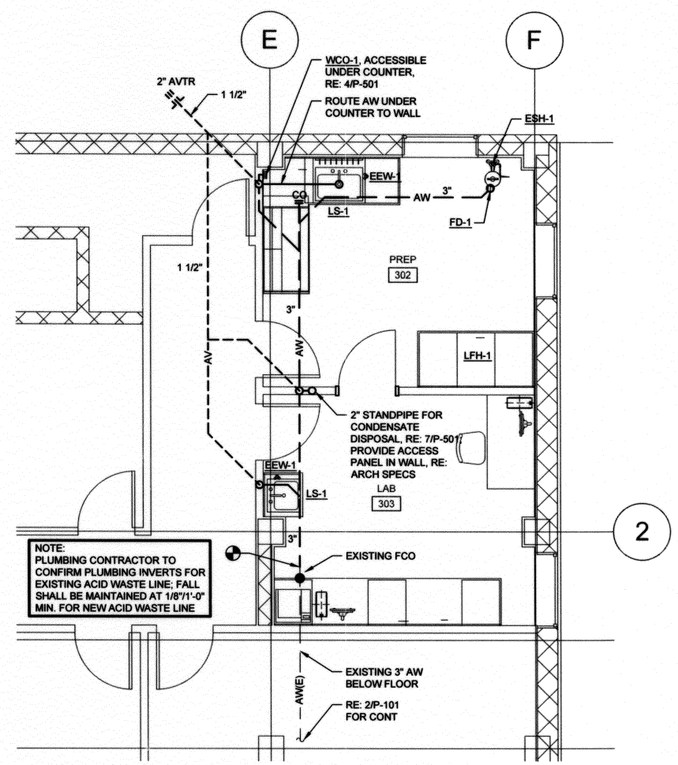
PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	RCW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	RCW	9/16	
	FIELD MGR.	RCW	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: P-401.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 14 OF 40 SHEETS
SHEET NAME: SECOND FLOOR ENLARGED PLUMBING PLAN				SHEET NO. P-401

Printed: 9/8/2016 11:38:18 AM
V:\Tulsa Public Works\Miscellaneous Misc & Mech 065100-29\AB Jewell WTP Lab Office Remodel\Drawings\Sheet\P-401.dwg



1 NEW THIRD FLOOR LABORATORY WAG PLAN

1/4" = 1'-0"



2 NEW THIRD FLOOR LABORATORY DWV PLAN

1/4" = 1'-0"

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA

9/8/2016

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

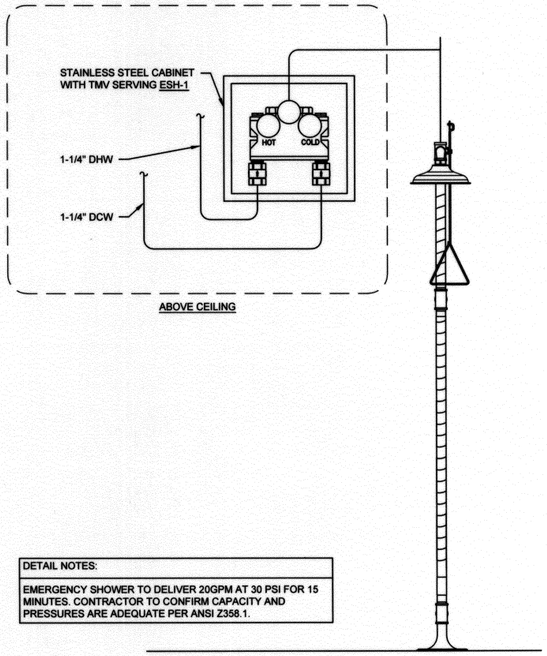
THIRD FLOOR ENLARGED PLUMBING PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEJ	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.		9/16	
	FIELD MGR.		9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: P-402.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 15 OF 40 SHEETS
SHEET NAME: THIRD FLOOR ENLARGED PLUMBING PLANS				SHEET NO. P-402

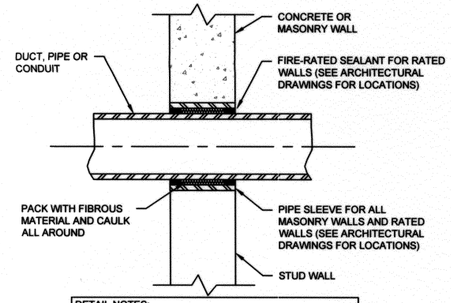
Printed: 9/8/2016 11:36:21 AM
V:\Tulsa Public Work\Maintenance Elec & Mech 065100-3\NAB Jewell WTP Lab-Office Remodel\Drawings\Sheet\P-402.dwg



DETAIL NOTES:
EMERGENCY SHOWER TO DELIVER 20GPM AT 30 PSI FOR 15 MINUTES. CONTRACTOR TO CONFIRM CAPACITY AND PRESSURES ARE ADEQUATE PER ANSI Z358.1.

1 EMERGENCY SHOWER DETAIL

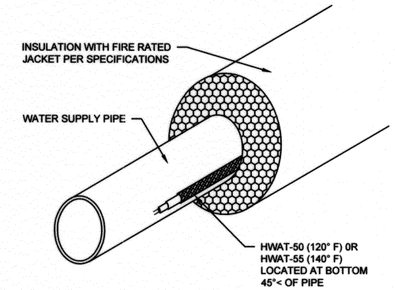
NOT TO SCALE



DETAIL NOTES:
1. FOR INSULATED PIPING SIZE SLEEVE ACCORDINGLY. 2. PROVIDE ESCUTCHEONS OR ANGLED STRIPS WHERE PENETRATIONS ARE EXPOSED TO VIEW.

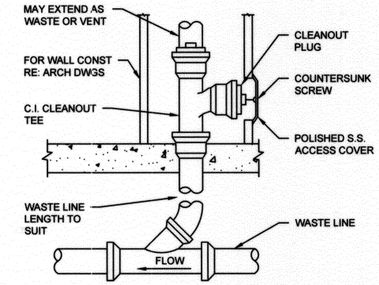
2 TYPICAL PENETRATION DETAIL

NOT TO SCALE



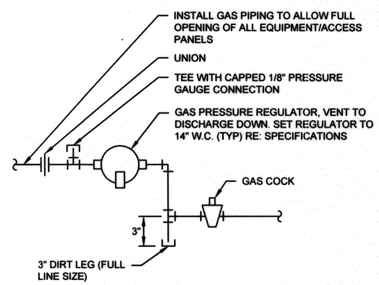
3 HEAT TRACE DETAIL

NOT TO SCALE



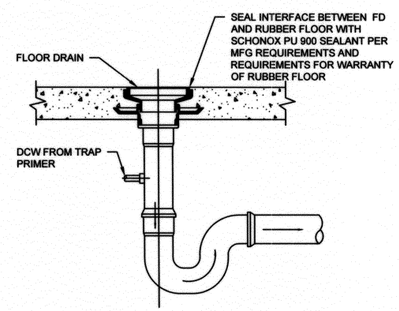
4 WALL CLEANOUT DETAIL

NOT TO SCALE



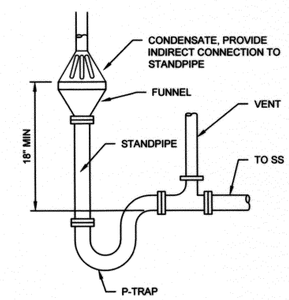
5 GAS CONNECTION DETAIL

NOT TO SCALE



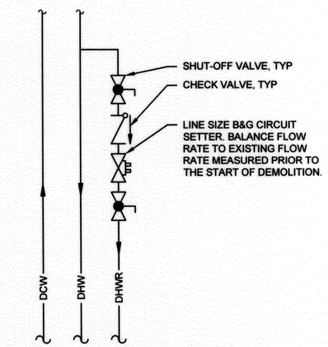
6 FLOOR DRAIN DETAIL

NOT TO SCALE



7 CONDENSATE STANDPIPE DETAIL

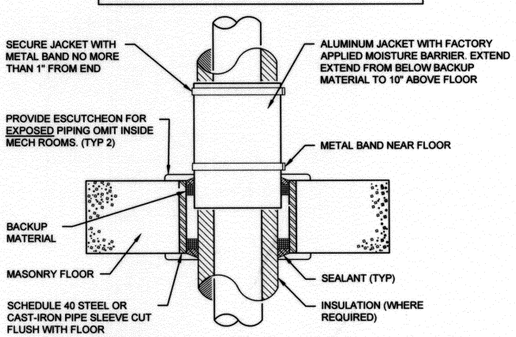
NOT TO SCALE



8 DOMESTIC WATER RETURN VALVING SCHEMATIC

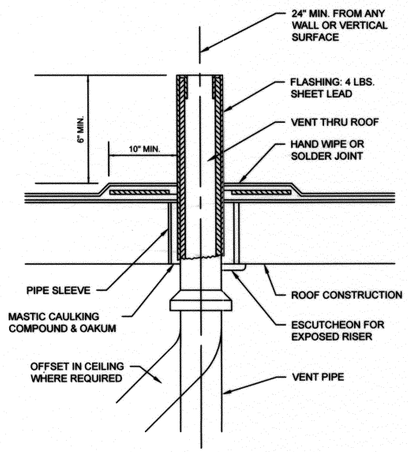
NOT TO SCALE

DETAIL NOTES:
1. PROVIDE FIRE-RATED SEALANT FOR RATED WALLS (SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS). 2. OMIT ALUMINUM JACKET IF PIPING IS UNINSULATED.



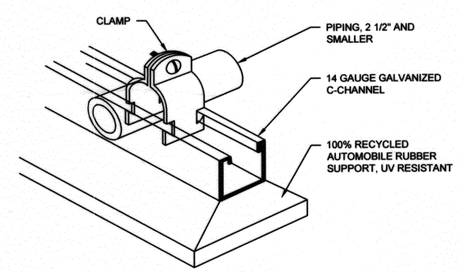
9 FLOOR PENETRATION DETAIL

NOT TO SCALE



10 VENT THROUGH ROOF DETAIL

NOT TO SCALE



DETAIL NOTES:
1. PIPE SUPPORTS TO BE SPACED 5'-0" MAXIMUM SPACING AND AT EVERY CHANGE IN DIRECTION. 2. PROVIDE COPPER B-LINE DURA-BLOK PIPE SUPPORT OR APPROVED EQUAL.

11 ROOF PIPE SUPPORT DETAIL

NOT TO SCALE

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA
09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

PLUMBING DETAILS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE:	DRAWN	SKG	08/2016	APPROVED:
AS INDICATED	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CGW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	RWM	9/16	
	FIELD MGR.	RBH	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: P-501.dwg DRAWING:
DATE: 9/8/2016
ATLAS PAGE NO: 00016
SHEET 16 OF 40 SHEETS
SHEET NAME: PLUMBING DETAILS
SHEET NO. P-501

Print: 9/8/2016 11:36:20 AM
V:\Data Public Works\Maintenance Elec & Mech 005100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\P-501.dwg

NATURAL GAS SUMMARY SCHEDULE

APPLIANCE MARK	QUANTITY	GAS LOAD (MBH)	MAX DEVELOPED DISTANCE FROM REGULATOR (FT)	MAIN SIZE (IN)
EXISTING GWH	1	120	--	--
EXISTING BOILER	2	1282	--	--
GH-1*	1	420	--	--
MAU-1	1	1080	--	--
BUILDING TOTAL	--	2902	120	2"

NOTES:

1. SIZING BASED ON THE 125 FT ROW OF TABLE 402.4(5) OF THE 2015 INTERNATIONAL FUEL GAS CODE.
2. *DENOTES FURTHEST FIXTURE FROM NATURAL GAS REGULATOR.
3. BASED UPON EXISTING DRAWINGS, GAS IS CONSIDERED TO BE MEDIUM PRESSURE NATURAL GAS AT 2 PSI AT THE BUILDING.

PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	MANUFACTURER MODEL	TRIM	CONNECTIONS					REMARKS
				WASTE	VENT	DCW	DI	DHW	
LS-1	LABORATORY SINK (INTEGRAL WITH COUNTERTOP)	BY ARCHITECT	FAUCET: MARQUEST SCIENTIFIC LG-DD-HC1 PVC LABORATORY FAUCET DI FAUCET: MARQUEST SCIENTIFIC DL-DD-1 PVC DECK MOUNT DI FAUCET	2"	1 1/2"	1/2"	1/2"	1/2"	1,2,3,4,10
ESH-1	EMERGENCY SHOWER	BRADLEY S19-110SS	STAINLESS STEEL SHOWER SHROUD; INTEGRAL FLOW CONTROL; DOME STRAINER	2"	1 1/2"	1/2"	--	--	1,7,9
EEW-1	EMERGENCY EYE WASH	BRADLEY S19-270B	SWING-AWAY EYEWASH WITH PUSH HANDLE	--	--	1/2"	--	1/2"	7,8
WHA-1	WATER HAMMER ARRESTOR	ZURN-WILKINS 1250XL SERIES	COPPER CHAMBER WITH O-RING PISTON	--	--	--	--	--	5
WCO-1	WALL CLEANOUT	ZURN Z1441	ADJUSTABLE, STAINLESS STEEL WALL COVER	--	--	--	--	--	6

REMARKS:

1. REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR FINAL FIXTURE LOCATION AND MOUNTING HEIGHTS, MOUNT PER ADA REQUIREMENTS WHERE INDICATED.
2. PROVIDE PVC, HEAVY DUTY, COMMERCIAL GRADE, ANGLE SUPPLY (HOT AND COLD, AS REQUIRED) WITH WHEEL HANDLE STOP(S), FLEXIBLE PLASTIC RISER HOSE(S), AND PLASTIC WALL ESCUTCHEON(S).
3. PROVIDE ACID RESISTANT PLASTIC P-TRAP WITH CLEANOUT AND WALL ESCUTCHEON.
4. PROVIDE THERMOSTATIC MIXING VALVE ZURN MODEL ZW1070XL SET TO 110° F MAXIMUM (MOUNT ABOVE CEILING OR UNDER CABINET WITH ACCESS DOOR AS REQUIRED, REFER TO ARCHITECT FOR EXACT LOCATION).
5. WATER HAMMER ARRESTORS SHALL BE PROPERLY SIZED, PROPERLY LOCATED IN AN EFFECTIVE RANGE FROM EQUIPMENT, AND IN ACCORDANCE WITH PDI STANDARD WH201.
6. PROVIDE CAULKED OR THREADED CLEANOUT, EXTEND ACCESS COVER TO FINISHED WALL SURFACE. ENSURE AMPLE CLEARANCE AT CLEANOUT FOR RODDING OF DRAINAGE SYSTEM.
7. MEETS ANSI Z358.1 REQUIREMENTS. CONTRACTOR TO CONFIRM EMERGENCY SHOWER MEETS 20 GPM AT 30 PSI FOR 15 MINUTES AND EMERGENCY EYE WASH MEETS 0.4 GPM AT 30 PSI FOR 15 MINUTES. CONTRACTOR TO CONFIRM MINIMUM PRESSURES AND FLOW RATES ARE MAINTAINED.
8. PROVIDE BRADLEY MODEL S19-2000 NAVIGATOR EFX8 EMERGENCY THERMOSTATIC MIXING VALVE SET TO 85°F MAXIMUM. MOUNT IN ACCESSIBLE LOCATION (BELOW CEILING OR IN CABINET BELOW).
9. PROVIDE BRADLEY MODEL S19-2100 NAVIGATOR EFX25 EMERGENCY THERMOSTATIC MIXING VALVE SET TO 85°F MAXIMUM. MOUNT ON WALL ABOVE CEILING PER DETAIL.
10. MOUNT DI FAUCET TO THE RIGHT OF SINK AS SHOWN ON DRAWINGS AND IN ARCHITECTURAL ELEVATIONS. FOLLOW MANUFACTURER'S REQUIREMENTS FOR INSTALLATION LOCATION OF DI FAUCET.

ROOF & FLOOR DRAIN SCHEDULE

MARK	FIXTURE	MANUFACTURER MODEL	TRIM	CONNECTIONS				REMARKS
				WASTE	VENT	DCW	DHW	
FD-1	ACID RESISTANT FLOOR DRAIN	ZURN Z9A-FD1	5" DIAMETER ROUND POLYPROPYLENE BODY WITH BOTTOM OUTLET, ADJUSTABLE POLISHED STAINLESS STEEL STRAINER	3"	2"	1/2"	--	1,2,3

REMARKS:

1. REFER TO ARCHITECTURAL FOR FLOOR DRAIN LOCATIONS, COORDINATE WITH FLOOR FINISH AND INSTALL PER MANUFACTURERS RECOMMENDATIONS.
2. COMBINATION INVERTIBLE MEMBRANE CLAMP AND ADJUSTABLE COLLAR.
3. PROVIDE TRAP PRIMER CONNECTION AND PRESSURE DROP ACTIVATED TRAP PRIMER - MIFAB MODEL (M-500).

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA
9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

PLUMBING SCHEDULES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CGW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	JTan	9/16	
	FIELD MGR.	PBW	9/16	
VERTICAL N/A	RECOMMENDED: HAS 9/16 DESIGN MANAGER			CITY ENGINEER
FILE: P-601.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 17 OF 40 SHEETS
SHEET NAME: PLUMBING SCHEDULES				SHEET NO. P-601

Printed: 9/8/2016 11:38:25 AM
V:\Tulsa Public Works\Maintenance Elec & Mech 005100-28\AB Jewell WTP Lab Office Remodel\Drawings\Sheet\P-601.dwg

HVAC ABBREVIATIONS

A

AC	AIR COMPRESSOR
ACC	AIR COOLED CHILLER
ACFM	ACTUAL CUBIC FEET PER MINUTE
ADD	ADDENDUM
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY
APD	AIR PRESSURE DROP
AR	AIR RECEIVER

B

BA	BREATHING AIR, COMPRESSED
BAC	BREATHING AIR COMPRESSOR
BCU	BLOWER COIL UNIT
BFPD	BACK FLOW PREVENTION DEVICE
BFW	BOILER FEED WATER
BTUH	BRITISH THERMAL UNIT PER HOUR

C

CA	COMPRESSED AIR
CC	COOLING COIL
CD	CONDENSATE DRAIN
CF	CEILING FAN
CFM	CUBIC FEET PER MINUTE
CH	CHILLER (WATER COOLED)
CHWP	CHILLED WATER PUMP
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CL	CENTER LINE
CO	CLEANOUT
CONT	CONTINUATION
CP	PUMPED CONDENSATE
CT	COOLING TOWER
CU	CONDENSING UNIT
CWP	CONDENSER WATER PUMP
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN

D

DCW	DOMESTIC COLD WATER
DN	DOWN
DOAU	DEDICATED OUTDOOR AIR UNIT
DP	DEWPOINT
DWG	DRAWING

E

(E)	EXISTING TO REMAIN
E/A	EXHAUST AIR
EAG	EXHAUST AIR GRILLE
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB
EEW	EMERGENCY EYE WASH
EF	EXHAUST FAN
ENGR	ENGINEER
EPO	EMERGENCY POWER OFF
ESP	EXTERNAL STATIC PRESSURE
EQUIP	EQUIPMENT
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
EXT	EXPANSION TANK

F

F	FAHRENHEIT
FCU	FAN COIL UNIT
FH	FUME HOOD
FLR	FLOOR
FMPB	FAN POWERED MIXING BOX
FP	FIRE PROTECTION
FPM	FEET PER MINUTE
FT	FOOT, FEET

G

G	NATURAL GAS, LOW PRESSURE
GAL	GALLON, GALLONS
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GCO	GRADE CLEAN OUT
GWH	GAS WATER HEATER

H

HB	HOSE BIBB
HD	HEAD
HP	HORSEPOWER
HPC	HIGH PRESSURE CONDENSATE
HPG	NATURAL GAS, HIGH PRESSURE
HPS	HIGH PRESSURE STEAM
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HEX	HEAT EXCHANGER

I

IDU	INDOOR UNIT
IH	INTAKE HOOD
IN	INCH, INCHES
INWC	INCHES OF WATER COLUMN

K

KW	KILOWATT
K	THOUSAND

L

L	LOUVER
LAT	LEAVING AIR TEMPERATURE
LB	POUND, POUNDS
LDB	LEAVING DRY BULB
LFH	LABORATORY FUME HOOD
LPC	LOW PRESSURE CONDENSATE
LPS	LOW PRESSURE STEAM
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE

M

M	THOUSAND
MBH	THOUSAND BTUH
MFG	MANUFACTURER
MPG	NATURAL GAS, MEDIUM PRESSURE
MIN	MINIMUM
MISC	MISCELLANEOUS
MPC	MEDIUM PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM
MVD	MANUAL VOLUME DAMPER

N

NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN or NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE

O

O/A	OUTSIDE AIR
ODU	OUTDOOR UNIT

P

PH	PHASE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAGE

Q

QT	TOTAL CAPACITY
QS	SENSIBLE CAPACITY
QL	LATENT CAPACITY

R

(R)	EXISTING TO REMAIN, RELOCATE
R	REFRIGERANT
R/A	RETURN AIR
RAD	REFRIGERATED AIR DRYER
RAG	RETURN AIR GRILLE
RD	ROOF DRAIN
RE	REFER TO
RG	REFRIGERANT GAS
RH	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
RL/A	RELIEF AIR
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
RV	RELIEF VALVE
Ø	ROUND, DIAMETER

S

S/A	SUPPLY AIR
SAG	SUPPLY AIR GRILLE
SCFM	STANDARD CUBIC FEET PER MINUTE
SF	SUPPLY FAN
SP	STATIC PRESSURE
SS	STAINLESS STEEL
STM	STEAM
SQIN	SQUARE INCH/INCHES
SQFT	SQUARE FOOT/FEET

T

T/A	TRANSFER AIR
TAG	TRANSFER AIR GRILLE
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE
TEFC	TOTALLY ENCLOSED, FAN COOLED
THRU	THROUGH
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TYP	TYPICAL

U

UH	UNIT HEATER
UL	UNDERWRITER'S LABORATORIES
UNO	UNLESS NOTED OTHERWISE

V

V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW

W

W	WATT
WB	WET BULB

HVAC SYMBOLS LEGEND

SYMBOL	DESCRIPTION
AAV	AUTOMATIC AIR VENT
	BACKFLOW PREVENTER
	BALL VALVE
	BASKET STEAM TRAP
	BLIND FLANGE
	BUTTERFLY VALVE
	CAP
	CHECK VALVE
S	CHECK VALVE, SILENT
	CIRCUIT SETTER
	COMPRESSED AIR CONNECTION
	CONTROL VALVE, 2-WAY
	CONTROL VALVE, 3-WAY
	FLEXIBLE CONNECTOR
	GATE VALVE
	GATE VALVE, ANGLE
	GENERAL VALVE, SEE SPECS
	GLOBE VALVE
	GLOBE VALVE, ANGLE
	PLUG VALVE
	PRESSURE AND TEMPERATURE RELIEF
PRS	PRESSURE REDUCING STATION, STEAM
	PRESSURE REDUCING VALVE
	RELIEF VALVE, ASME
SD	SMOKE DETECTOR
	SOLENOID VALVE
	STRAINER
PSD	SUCTION DIFFUSER
T H	THERMOSTAT, HUMIDISTAT
T H CO2	TEMPERATURE, HUMIDITY & CO2 SENSOR
	TRIPLE DUTY VALVE
	UNION
	VENTURI
	RISER DOWN (ELBOW)
	RISER UP (ELBOW)
	RISE OR DROP
	TEE DOWN
	TEE UP
	TOP CONNECTION
	BOTTOM CONNECTION
	SIDE CONNECTION
	FLOW IN DIRECTION OF ARROW
	PIPE SLOPE IN DIRECTION OF ARROW
	REMOVE EXISTING TO THIS POINT
	TIE-IN TO EXISTING AT THIS POINT
	PUMP
	EQUIPMENT TAG
XXX-X	EQUIPMENT NUMBER
XXxXX	NECK SIZE IN INCHES
XXX	AIRFLOW IN CFM
X	DEVICE TYPE, REFER TO SCHEDULE
X"Ø (e.g., 6"Ø)	ROUND DUCT SIZE IN INCHES
XxX (e.g., 10x10)	RECTANGULAR DUCT SIZE IN INCHES

SYMBOL	DESCRIPTION
	90° RECTANGULAR ELBOW WITH SINGLE THICKNESS TURNING VANES
	45° RECTANGULAR BEND
	45° RECTANGULAR BEND, RADIUS/DIAMETER=1.5
	90° ROUND ELBOW, RADIUS/DIAMETER=1.5
	45° ROUND BEND, RADIUS/DIAMETER=1.5
	DUCTWORK 90° TAP (ROUND-TO-ROUND)
	DUCTWORK CONICAL TAP (ROUND-TO-ROUND)
	DUCTWORK 45° LATERAL TAP (ROUND-TO-ROUND)
	90° ROUND ELBOW DOWN
	90° ROUND ELBOW UP
	90° RECTANGULAR ELBOW DOWN WITH SINGLE THICKNESS TURNING VANES
	90° RECTANGULAR ELBOW UP WITH SINGLE THICKNESS TURNING VANES
	END CAP
F	F=FALL IN DUCT ELEV R=RISE IN DUCT ELEV
	SIDEWALL REGISTER OR GRILLE
	DUCTWORK TOE-HEEL TAP (RECTANGULAR TO RECTANGULAR)
	DUCTWORK CONICAL TAP (RECTANGULAR TO ROUND)
	DUCTWORK SPIN-IN TAP (RECTANGULAR TO ROUND)
	RECTANGULAR TO ROUND TRANSITION

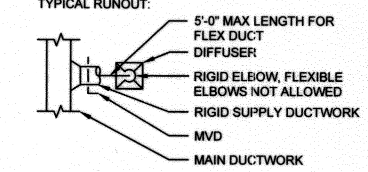
NOTE: AIR DISTRIBUTION DEVICES ARE ARE DENOTED AS ILLUSTRATED BELOW:

	SUPPLY DIFFUSER
	RETURN GRILLE
	EXHAUST GRILLE
	DUCT SECTION, SUPPLY
	DUCT SECTION, RETURN
	DUCT SECTION, EXHAUST
	S/A DIFFUSER WITH FACTORY INSTALLED QUADRANT BLANKS. PROVIDE BLANKS AS SHOWN ON DRAWINGS.
	CEILING DIFFUSER SQUARE PATTERN. NO ARROWS INDICATE 4-WAY AIR PATTERN
	CEILING DIFFUSER ROUND PATTERN. NO ARROWS INDICATE 4-WAY AIR PATTERN
	LINEAR DIFFUSER, NO ARROWS INDICATE 2-WAY AIR PATTERN

NOTE: SINGLE LINE DUCT TAP SYMBOLS ARE DENOTED AS ILLUSTRATED BELOW:

	RECTANGULAR TO RECTANGULAR
	RECTANGULAR TO ROUND
	ROUND TO ROUND
	DUCT SIZE TRANSITION
	SIDEWALL GRILLE

TYPICAL RUNOUT:



DAMPER SYMBOLS:

FS	FIRE/SMOKE DAMPER
F	FIRE DAMPER
S	SMOKE DAMPER
M	MOTORIZED DAMPER

PIPE LABEL	DESCRIPTION
—BFW—	BOILER FEED WATER
—CHWS—	CHILLED WATER SUPPLY
—CHWR—	CHILLED WATER RETURN
—BA—	COMPRESSED AIR, BREATHING AIR
—CA—	COMPRESSED AIR
—CD—	CONDENSATE, DRAIN
—CP—	CONDENSATE, PUMPED
—LPC—	CONDENSATE, LOW PRESS 0-15 PSI
—MPC—	CONDENSATE, MED PRESS 16-124 PSI
—HPC—	CONDENSATE, HIGH PRESS 125 PSI & ABOVE
—CWS—	CONDENSER WATER SUPPLY
—CWR—	CONDENSER WATER RETURN
—HWS—	HEATING WATER SUPPLY
—HWR—	HEATING WATER RETURN
—R—	REFRIGERANT
—RG—	REFRIGERANT GAS
—RL—	REFRIGERANT LIQUID
—RS—	REFRIGERANT SUCTION
—S—	STEAM, LOW PRESS 0-15 PSI
—MPS—	STEAM, MED PRESS 16-124 PSI
—HPS—	STEAM, HIGH PRESS 125 PSI & ABOVE

DEFINITION OF LINEWEIGHTS AND LINETYPES:

— — —	DEMOLITION
———	EXISTING TO REMAIN
- - - - -	EXISTING TO REMAIN (UNDER SLAB)
———	NEW CONSTRUCTION
— —	OUTLINE OF NEW EQUIPMENT INSTALLED ABOVE THE FLOOR SHOWN (I.E., ROOF)

PROFESSIONAL ENGINEER JEFFERY DON FERGUSON 19555 OKLAHOMA 09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL SYMBOLS AND ABBREVIATIONS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE:	DRAWN	SKG	08/2016	APPROVED:
AS INDICATED	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.		9/16	
	FIELD MGR.	RBV	9/16	
VERTICAL N/A	RECOMMENDED: HAS 9/16 DESIGN MANAGER			CITY ENGINEER
FILE: M-001.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 18 OF 40 SHEETS
SHEET NAME: MECHANICAL SYMBOLS AND ABBREVIATIONS				SHEET NO. M-001

Printed: 9/8/2016 11:39:42 AM
V:\Tulsa Public Works\Micellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\M-001.dwg

RENOVATION NOTES

1. THE CONTRACTOR SHALL VISIT THE SITE BEFORE BIDDING AND SHALL BECOME FULLY INFORMED AS TO THE EXTENT AND CHARACTER OF THE WORK REQUIRED AND ITS RELATION TO OTHER WORK. FAILURE TO VISIT SITE SHALL NOT CONSTITUTE A BASIS FOR FUTURE CLAIMS.
2. FIELD VERIFY EXISTING SYSTEM PRESSURES AND TEMPERATURES PRIOR TO ANY SYSTEM TIE-INS. ALL NEW MATERIALS SHALL MEET OR EXCEED PERFORMANCE OF MATERIALS USED ON EXISTING SYSTEMS.
3. AVOID DISRUPTION OF BUILDING SERVICES DURING NORMAL BUSINESS HOURS. COORDINATE ALL SYSTEM SHUT DOWNS WITH OWNER. REQUIRED SYSTEM SHUT DOWNS AND DISRUPTION OF BUILDING SERVICES WILL BE SCHEDULED AFTER NORMAL BUSINESS HOURS AND/OR AS DIRECTED BY OWNER. CONTRACTOR SHOULD ANTICIPATE THAT SHUTDOWNS MAY OCCUR AT PREMIUM TIME. CONTRACTOR SHALL INDICATE ON THEIR BID PROPOSAL QUANTITY AND DURATION OF EACH BUILDING SYSTEM SHUTDOWN REQUIRED TO COMPLETE WORK AS DESCRIBED ON CONTRACT DOCUMENTS.
4. THE CONTRACTOR TO FIELD VERIFY EXISTING CONDITIONS AND EXACT LOCATION OF ALL EQUIPMENT, DUCTWORK, AND PIPING, INCLUDING SYSTEM TIE-INS. NOTIFY ARCHITECT AND ENGINEER OF ANY MODIFICATIONS REQUIRED FROM THE PLANS TO FACILITATE INSTALLATION PRIOR TO INSTALLATION.
5. THE CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL CONSTRUCTION WITH BUILDING OCCUPANTS LOCATED IN THE WORK AREA.
6. THE CONTRACTOR SHALL COORDINATE ALL PATCH AND REPAIR OF WALLS AND FLOORS WHEN DISTURBED BY NEW CONSTRUCTION.
7. WHERE SYSTEM TIE-INS ARE MADE AND AT ALL LOCATIONS WHERE DAMAGE OCCURRED FROM NEW CONSTRUCTION, PATCH AND REPAIR DAMAGED INSULATION WITH INSULATION TYPE AND THICKNESS TO MATCH EXISTING.
8. TEST AND BALANCE EXISTING HVAC SYSTEMS AS REQUIRED TO ACCOMMODATE SYSTEM MODIFICATIONS AND ADDITIONS. MAINTAIN ACCEPTABLE COMFORT LEVELS DURING TEST AND BALANCE AS REQUIRED. ENSURE THE INTEGRITY OF THE EXISTING SYSTEM BALANCE.
9. THE CONTRACTOR SHALL COORDINATE WORK WITH EXISTING FIRE PROTECTION PIPING AND/OR SPRINKLER HEADS. ANY WORK ASSOCIATED WITH MODIFYING THESE SYSTEMS SHALL BE PERFORMED BY A LICENSED AND APPROVED CONTRACTOR. NEW SPRINKLER HEADS SHALL MATCH EXISTING; FIELD VERIFY MANUFACTURER AND MODEL NUMBER. FIRE PROTECTION CONTRACTOR SHALL INFORM THE BUILDING SECURITY OFFICE EVERY DAY WHEN A SHUTDOWN OF SPRINKLER SYSTEM IS REQUIRED FOR CONSTRUCTION. THE CONTRACTOR SHALL RECONNECT AND FILL THE SPRINKLER SYSTEM INTO WORKING CONDITION AT THE END OF EACH WORKING DAY TO ASSURE PROTECTION DURING UNOCCUPIED PERIODS.

DEMOLITION NOTES

1. DEMOLISH EXISTING AS REQUIRED FOR NEW CONSTRUCTION AS DIRECTED BY ARCHITECT AND/OR AS NOTED ON DRAWINGS. AVOID DISRUPTION OF SERVICES DURING NORMAL BUSINESS HOURS. ALL SYSTEM SHUT-DOWNS AND DISRUPTION OF BUILDING SERVICES SHALL BE COORDINATED WITH OWNER AND SCHEDULED AFTER NORMAL BUILDING HOURS OR AS OTHERWISE APPROVED BY OWNER.
2. PRIOR TO DEMOLITION FIELD VERIFY AND IDENTIFY ANY EXISTING EQUIPMENT TO REMAIN IN SERVICE THAT IS SERVED BY SYSTEMS TO BE DEMOLISHED. NOTIFY ENGINEER OF ANY SUCH CONDITIONS AND REMOVE AND/OR RELOCATE THE SERVICES AS DIRECTED.
3. MEET WITH OWNER PRIOR TO DEMOLITION TO IDENTIFY WHETHER EXISTING MATERIALS SYSTEMS, EQUIPMENT, ETC. ARE CONSIDERED SALVAGE OR DEBRIS. REMOVE DEBRIS FROM SITE AND DISPOSE OF IN AN APPROVED MANNER. RETURN SALVAGE TO OWNER IN A LOCATION AND MANNER AS DIRECTED BY OWNER.
4. TERMINATE DEMOLISHED SYSTEM SERVICES IN A CONCEALED LOCATION IN AN APPROVED MANNER. COORDINATE WITH NEW AND EXISTING CONSTRUCTION.
5. FIELD VERIFY EXISTING PIPING LOCATIONS PRIOR TO WORK.
6. VERIFY EXTENT OF DEMOLITION OF SANITARY SEWER, DOMESTIC WATER AND FIRE PROTECTION PIPING PRIOR TO WORK. ALL DEMOLITION WORK SHALL BE IN COMPLIANCE WITH APPLICABLE CODES, STANDARDS AND THE AUTHORITY HAVING JURISDICTION.
7. WHERE REQUIRED, COORDINATE EQUIPMENT ELECTRICAL TERMINATION REQUIREMENTS WITH ELECTRICAL CONTRACTOR.

GENERAL CONTROLS NOTES

1. CONTROLS CONTRACTOR SHALL BE REQUIRED TO PARTICIPATE IN THE COMMISSIONING PROCESS AND SHALL BE ON SITE UNTIL SYSTEM THE IS ACCEPTED BY THE OWNER SUBSEQUENT TO COMMISSIONING. THE CONTROLS CONTRACTOR SHALL BE RESPONSIBLE TO DEMONSTRATE THE COMPLETE OPERATION OF ALL CONTROL MODES OF ALL EQUIPMENT.
2. DO NOT RUN LOW VOLTAGE CABLE WITH HIGHER VOLTAGES.
3. FOR ALL EXCEPT BACNET COMMUNICATION: CONNECT THE SHIELD TO THE "SHLD" TERMINALS AT THE DDC CONTROLLER AS NOTED. IF NOT NOTED CONNECT THE SHIELD TO EARTH GROUND AT THE PANEL END. TAPE BACK AND INSULATE THE SHIELD AT THE DEVICE END.
4. UNLESS OTHERWISE NOTED ALL CABLE SHALL BE AS FOLLOWS:
   - 4.1. ANALOG AND DIGITAL INPUTS - 22/2AWG TWISTED AND SHIELDED PLENUM CABLE
   - 4.2. ANALOG OUTPUTS - 22/2AWG TWISTED AND SHIELDED PLENUM CABLE
   - 4.3. DIGITAL OUTPUTS - 18/2AWG TWISTED UNSHIELDED PLENUM CABLE
   - 4.4. BACNET COMMUNICATION CABLE - 22/2 CAT4 SHIELDED PLENUM CABLE
5. BACNET COMMUNICATION CABLE MUST BE CAT4. DO NOT OVERSTRESS CABLE OR OVER TIGHTEN TIE WRAPS AROUND CABLE. USE SWEEPING BENDS ON CABLE INSIDE BOXES AND PANELS, DO NOT FORM TIGHT 90 DEGREE ANGLES OR KINK CABLE. DO NOT UNTWIST MORE THAN 1/2" OF CABLE PAIRS, STRIP ONLY AS MUCH JACKET AS NEEDED. CONNECT THE SHIELDS TOGETHER AND INSULATE FROM GROUND.
6. ALL LOW VOLTAGE CABLE IN CONCEALED, ACCESSIBLE AREAS WILL BE PLENUM CABLE INSTALLED OPEN IN A NEAT WORKMAN-LIKE MANNER. ROUTE PARALLEL AND PERPENDICULAR TO BUILDING WALLS.
7. MOUNT THE LOW LIMIT FREEZE THERMOSTAT (LLT) AND THE MIXED AIR SENSOR (TE-X) NEAR THE TOP OF THE DUCTWORK AND RUN THE CAPILLARIES FROM SIDE TO SIDE IN A SERPENTINE FASHION FROM THE TOP TO BOTTOM COVERING AS MUCH OF THE DUCT AS POSSIBLE.
8. THE SPACE SENSORS AND THERMOSTATS WILL BE MOUNTED AT THE SAME HEIGHT AS THE ELECTRICAL WALL SWITCHES.
9. MECHANICAL CONTRACTOR SHALL COORDINATE ANY REQUIRED POWER (24V) WITH RESPECTIVE CONTRACTOR (I.E., CONTROLS, FIRE ALARM, AND ELECTRICAL CONTRACTOR, ETC.).

GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE TO COMPLY WITH CURRENT APPLICABLE LOCAL, STATE, FEDERAL, FIRE, AND HEALTH CODES AND ORDINANCES AND IS RESPONSIBLE TO COMPLY WITH ALL REGULATIONS OF REGULATORY AGENCIES HAVING JURISDICTION. THE CONTRACTOR SHALL ALSO CONFORM TO THE REQUIREMENTS OF THE OWNER'S INSURANCE CARRIER. NOTIFY THE ARCHITECT AND ENGINEER OF ANY CONFLICTS PRIOR TO INSTALLATION. CODES, ORDINANCES AND REGULATIONS SHALL HAVE PRECEDENCE OVER SPECIFICATIONS AND DRAWINGS WHERE THERE IS A CONFLICT. OBTAIN CURRENT COPIES OF ALL ADOPTED CODES AND ORDINANCES PRIOR TO BID AND INCLUDE ALL COSTS TO COMPLY WITH CODES AND ORDINANCES IN BID.
2. PAY ALL LAWFUL FEES, PERMITS OR LICENSES REQUIRED TO ACCOMPLISH WORK. OBTAIN AND PAY FOR ALL NECESSARY CERTIFICATES OF APPROVAL.
3. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, SERVICE AND ANYTHING REASONABLY INCIDENTAL TO COMPLETE ALL WORK INDICATED ON THE DRAWINGS AND AS SPECIFIED IN ACCORDANCE WITH THE INTENT OF THE CONSTRUCTION DOCUMENTS.
4. THE CONTRACTOR IS RESPONSIBLE TO VISIT AND EXAMINE THE JOB SITE AND BECOME FAMILIAR WITH ALL EXISTING CONDITIONS PERTINENT TO THE WORK TO BE PERFORMED.
5. INCORPORATE ALL CODE AND ORDINANCE REQUIREMENTS INTO THE BID AND INSTALLATION OF WORK. NO ADDITIONAL FUNDS WILL BE ALLOCATED FOR WORK REQUIRED TO CONFORM TO REGULATIONS AND REQUIREMENT AND/OR TO OBTAIN APPROVAL OF WORK.
6. THE DRAWINGS ARE DIAGRAMMATIC AND ARE ONLY INTENDED TO DEFINE THE BASIC FUNCTIONS REQUIRED. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS ACTUAL CONSTRUCTION CONDITIONS AND COORDINATION WITH OTHER TRADES WILL ALLOW. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND ARE A PART OF THE WORK INCLUDED; HOWEVER, CHANGES THAT ALTER THE CHARACTER OF THE WORK ARE NOT PERMITTED. APPROVAL OF ARCHITECT AND ENGINEER SHALL BE OBTAINED BEFORE DEVIATIONS FROM THESE PLANS ARE MADE.
7. PLUMBING AND MECHANICAL SYSTEMS ARE NOT DIMENSIONED. DO NOT SCALE FROM DRAWING(S). THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES AND ENSURE THERE IS AVAILABLE SPACE FOR INSTALLATION BEFORE ORDERING EQUIPMENT AND FABRICATING PIPING AND/OR DUCTWORK.
8. THE CONTRACTOR SHALL STUDY THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND ELECTRICAL PLANS TO INSURE ALL MECHANICAL SYSTEMS WILL FIT WITH SUFFICIENT CLEARANCES FOR INSTALLATION, SERVICING AND MAINTENANCE. NOTIFY THE ARCHITECT AND ENGINEER OF ANY CONFLICTS PRIOR TO INSTALLATION.
9. THE CONTRACTOR SHALL COMPLY WITH SPECIFICATIONS AND INDUSTRY STANDARDS FOR ALL INSTALLATIONS.
10. REFER TO MECHANICAL DRAWINGS FOR ALL MECHANICAL EQUIPMENT LOCATIONS. REFER TO PLUMBING DRAWINGS FOR ALL PLUMBING EQUIPMENT.
11. SEAL ALL PENETRATIONS WATER TIGHT. SEAL AROUND ALL WALL PENETRATIONS. PROVIDE ESCUTCHEONS ON ALL PIPING ON EXTERIOR AND EXPOSED LOCATIONS. CAULK WITH REQUIRED THICKNESS 3M BRAND FIRE BARRIER CAULK CP-25 (OR OTHER APPROVED METHOD) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE RATED ASSEMBLIES.
12. ALL CUTTING AND PATCHING OF STRUCTURE SHALL BE APPROVED BY THE STRUCTURAL ENGINEER PRIOR TO PERFORMING WORK.
13. THE CONTRACTOR SHALL COORDINATE ALL ROUTING AND MOUNTING OF EQUIPMENT, DUCTWORK, PIPING, ETC (ALL WORK) WITH ALL OTHER TRADES.
14. ROUTE DUCTWORK AND PIPING ABOVE CEILING EQUIPMENT AS HIGH AS POSSIBLE ABOVE FINISHED CEILING TO AVOID CONFLICT WITH LIGHTS.
15. INSTALL ALL PIPING PARALLEL AND PERPENDICULAR TO BUILDING WALLS AND PARTITIONS UNLESS DISTINCTLY SHOWN OR NOTED OTHERWISE. ROUTE PIPING LOCATED NEAR EACH OTHER PARALLEL IN ALL PLANES AND WITH SUFFICIENT CLEARANCE.
16. ALL PIPING SHALL BE INSTALLED SO THAT IT MAY EXPAND AND CONTRACT FREELY WITHOUT DAMAGES TO EQUIPMENT, OTHER WORK, OR INJURY TO PIPING SYSTEM, ALL NECESSARY SWING JOINTS, EXPANSION JOINTS, OR OFFSETS TO PROTECT PIPING, ETC. SHALL BE INSTALLED WHETHER INDICATED OR NOT.
17. PROPERLY SUPPORT ALL PIPING. PROVIDE ALL REQUIRED ANCHORS, GUIDES AND EXPANSION DEVICES.
18. PAINT ALL EXTERIOR AND EXPOSED PIPING TO MATCH EXISTING.
19. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ALL MATERIAL, EQUIPMENT, APPARATUS AND WORK FROM DAMAGE. FAILURE TO DO SO TO THE SATISFACTION OF THE OWNER OR OWNER'S REPRESENTATIVE WILL BE SUFFICIENT CAUSE FOR THE REJECTION OF THE MATERIAL, EQUIPMENT, APPARATUS AND WORK IN QUESTION.
20. THE CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT, MATERIALS AND WORKMANSHIP FOR A PERIOD OF 1 YEAR FOLLOWING THE DATE OF ACCEPTANCE. THE CONTRACTOR'S GUARANTEE INCLUDES EQUIPMENT CAPACITY, PERFORMANCE RATINGS AND NOISE RATINGS. ANY DEFICIENCIES SHALL BE PROMPTLY CORRECTED. ROUTINE MAINTENANCE SHALL NOT BE INCLUDED.
21. THE CONTRACTOR SHALL CLEAN ALL FIXTURES, PIPES, EQUIPMENT AND EXPOSED WORK AFTER COMPLETION OF FINAL TESTING AND BEFORE ACCEPTANCE.
22. ALL PLATED AND OTHER FINISHED PRODUCTS SHALL BE THOROUGHLY CLEANED AND POLISHED.
23. THE MANUFACTURER MODEL OR CATALOG NUMBERS INDICATED IN THE CONSTRUCTION DOCUMENTS ESTABLISH A STANDARD FOR THE GENERAL DESIGN, PERFORMANCE, AND QUALITY OF THE PRODUCT REQUIRED.
25. ALTERNATE MANUFACTURERS LISTED IN THE SCHEDULE OR SPECIFICATIONS ARE APPROVED TO BID; HOWEVER, THE SUBMITTED PRODUCT MUST MEET THE GENERAL DESIGN, PERFORMANCE, DIMENSIONS, WEIGHT, AND QUALITY OF THE SCHEDULED PRODUCT. EACH MANUFACTURER WILL HAVE DIFFERENCES IN INSTALLATION REQUIREMENTS. IF THE CONTRACTOR ELECTS TO GO WITH A NON-BASIS OF DESIGN MANUFACTURER, THE CONTRACTOR SHALL BE RESPONSIBLE TO INCLUDE THE COST FOR ENGINEERING TIME, AS REQUIRED, TO ADJUST THE DESIGN TO THOSE DIFFERENCES IN THEIR BID, IF THE BASIS OF DESIGN IS NOT BID. THE CONTRACTOR IS RESPONSIBLE TO IDENTIFY THE DIFFERENCES IN THE INSTALLATION REQUIREMENTS BETWEEN THE BASIS OF DESIGN AND THE SUBMITTED MANUFACTURER DURING THE SUBMITTAL PHASE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL COSTS INCURRED BY OTHER TRADES, INCLUDING BUT NOT LIMITED TO: ELECTRICAL, STRUCTURAL, AND PLUMBING, DUE TO DEVIATIONS IN EQUIPMENT FROM THE BASIS OF DESIGN.
26. ALL MATERIALS, EQUIPMENT, ETC., INSTALLED UNDER THIS CONTRACT SHALL CONFORM TO ALL RULES, CODES, ETC., AS RECOMMENDED OR ADAPTED BY THE NATIONAL ASSOCIATION GOVERNING THE MANUFACTURER, RATING AND TESTING OF SUCH MATERIALS, EQUIPMENT, ETC., ALL ELECTRICALLY OPERATED EQUIPMENT SHALL BE U.L. APPROVED FOR THE USE INTENDED.
27. ALL FIRED AND UNFIRED PRESSURE VESSELS SHALL CONFORM TO THE RULES OF THE A.S.M.E. AND NATIONAL BOARD CODES AND SHALL BE SO LABELED. FURNISH A.S.M.E. AND NATIONAL BOARD CERTIFICATES.
28. MOTORS SHALL CONFORM TO THE RULES OF THE N.E.M.A. FOR THE SERVICE INTENDED AND TO THEIR STANDARDIZED FORM SIZES.
29. SHOP DRAWINGS, CATALOG CUTSHEETS AND PERFORMANCE DATA PERTAINING TO ALL MATERIALS AND EQUIPMENT PROPOSED FOR USE SHALL BE SUBMITTED.
30. JOINTS BETWEEN DISSIMILAR METALS SHALL BE MADE WITH DIELECTRIC NIPPLES DOWNSTREAM OF A VALVE.
31. ALL MATERIALS EXPOSED IN A RETURN AIR PLENUM SHALL COMPLY WITH NFPA 90A FLAME SPREAD UNDER 25 AND SMOKE DEVELOPED AND FUEL CONTRIBUTED UNDER 50.
32. THE DISCHARGE OF SAFETY VALVES, BLOWOFF PIPES AND OTHER OUTLETS SHALL BE LOCATED AND SUPPORTED SO AS TO PREVENT INJURY TO PERSONNEL.
33. EQUIPMENT SHOWN IN THE CONTRACT DOCUMENTS IS BASED ON ONE MANUFACTURER'S MODEL NUMBER OR EQUIPMENT SERIES, U.N.O., AS A BASIS OF DESIGN. THE CONTRACTOR SHALL CONFIRM THAT SUBMITTED AND/OR PROVIDED EQUIPMENT WILL MEET OR EXCEED THE PERFORMANCE REQUIREMENTS OF THE CONTRACT DOCUMENTS WITHOUT ADVERSELY AFFECTING THE STRUCTURAL AND ARCHITECTURAL REQUIREMENTS. REQUIREMENTS SHALL INCLUDE, EQUIPMENT'S PERFORMANCE, MATERIAL, QUALITY, WARRANTY, AESTHETICS, METHODS OF INSTALLATION CONSTRUCTION, SIZE, WEIGHT, PHYSICALLY FITTING THE SPACE WHILE MAINTAINING ALL WORKING AND MAINTENANCE CLEARANCES AND MAINTAINING ALL DESIGNED/REQUIRED STRUCTURAL SUPPORT. EQUIPMENT WEIGHING LESS AND/OR WITH A SMALLER FOOTPRINT MAY ADVERSELY AFFECT THE STRUCTURE. IN ADDITION TO THE SUBSTITUTION PROCEDURE REQUIREMENTS IN THE SPECIFICATIONS, CONTRACTOR SHALL PROVIDE A DETAILED AND CLEAR COMPARISON OF PERFORMANCE, MATERIAL, QUALITY, WARRANTY, AESTHETICS, SIZE, WEIGHT, LOCATION, AND METHOD OF INSTALLATION TO ARCHITECT AND TO ALL ENGINEERS WHOSE REQUIREMENTS MAY BE AFFECTED FOR ALL SUBMITTED EQUIPMENT DIFFERENT FROM THAT SPECIFIED AS THE BASIS OF DESIGN, PRIOR TO PURCHASING EQUIPMENT. CONTRACTOR(S) SHALL COORDINATE WITH OTHER TRADES AND BEAR THE COST OF ALL REQUIREMENTS RELEVANT TO THE PROVIDED EQUIPMENT THAT IS DIFFERENT THAN THAT SPECIFIED IN THE CONTRACT DOCUMENTS. THESE COSTS MAY INCLUDE: ENGINEER/ARCHITECT EVALUATIONS AND/OR REDESIGNS, BRANCH CIRCUIT/FEEDER PANELBOARD/DISCONNECT/CIRCUIT BREAKER MODIFICATIONS, MECHANICAL, PLUMBING, FIRE PROTECTION SYSTEM MODIFICATIONS AND STRUCTURAL SUPPORT SYSTEM MODIFICATIONS. ARCHITECT/ENGINEERS SHALL NOT BE RESPONSIBLE FOR WORK DONE IN AREAS WHERE ALL AFFECTED DISCIPLINES WERE NOT NOTIFIED IN A TIMELY MANNER OF CHANGES IN EQUIPMENT FROM THE BASIS OF DESIGN.
34. REFER TO STRUCTURAL SHEET S001 GENERAL NOTES PRIOR FOR ALL PIPE PENETRATIONS. CORE DRILLING IS NOT ALLOWED.
35. MECHANICAL CONTRACTOR SHALL BE REQUIRED TO PARTICIPATE IN THE COMMISSIONING PROCESS AND SHALL BE ON SITE UNTIL THE SYSTEM IS ACCEPTED BY THE OWNER SUBSEQUENT TO COMMISSIONING.

PHASING NOTES

1. WORK ON THE SECOND FLOOR SHALL BE ACCOMPLISHED BEFORE DISRUPTION OF THE THIRD FLOOR TAKES PLACE.
2. THE MECHANICAL CONTRACTOR SHALL DEVELOP A DETAILED PHASING PLAN IN COORDINATION WITH THE OWNER AND SHALL PROVIDE THE PLAN TO THE OWNER FOR APPROVAL PRIOR TO STARTING WORK. THIS PLAN SHALL INCLUDE A DETAILED DESCRIPTION OF THE ORDER OF WORK, ANY DISRUPTIONS OF SPACE OPERATIONS DUE TO CONSTRUCTION ACTIVITIES, AND THE EXPECTED DURATION OF DISRUPTIONS.

REGISTERED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA

9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL NOTES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

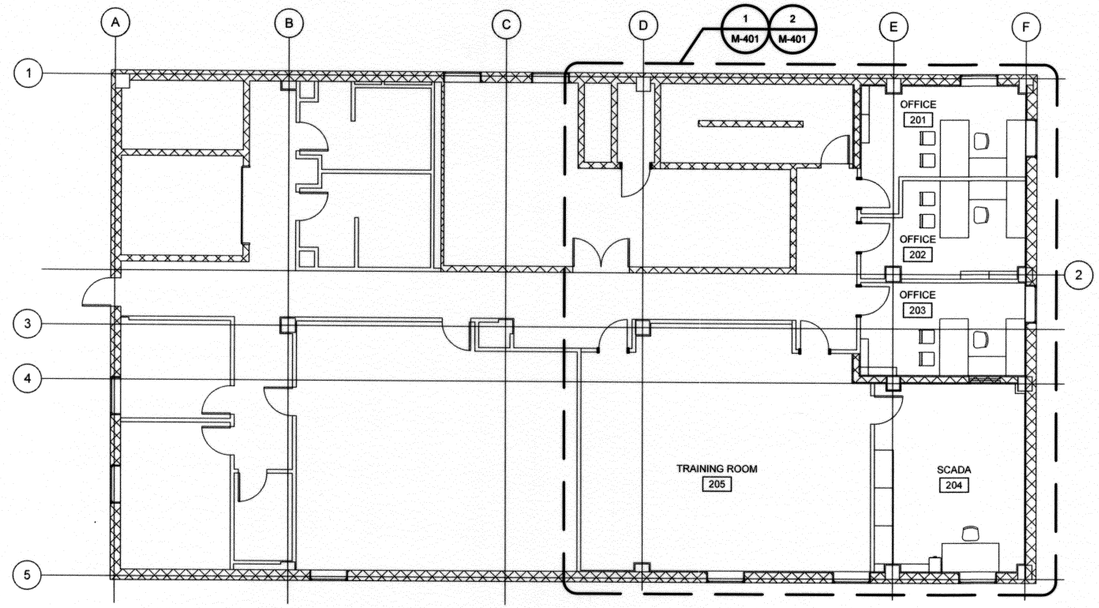
PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	RGW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	RGW	9/16	
	FIELD MGR.	RGW	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	JAS	9/16	CITY ENGINEER

FILE: M-002.dwg DRAWING: DATE: 9/8/2016

ATLAS PAGE NO: 00016 SHEET 19 OF 40 SHEETS

SHEET NAME: MECHANICAL NOTES SHEET NO. M-002

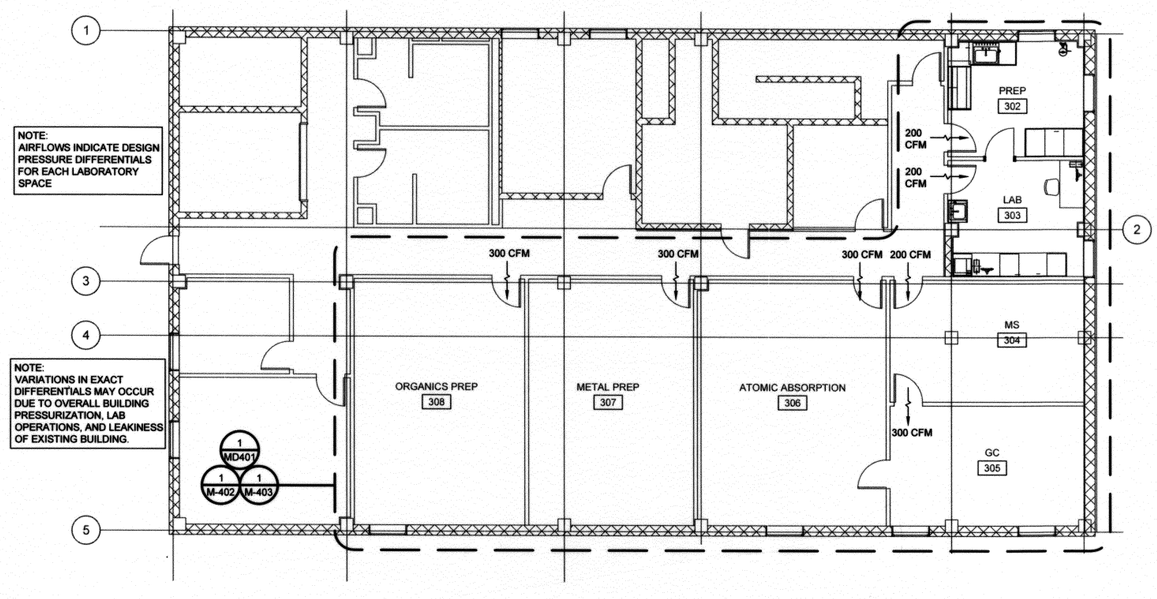
Printed: 9/8/2016 11:36:44 AM
V:\Tulsa Public Works\Maintenance Elec & Mech 065100-28\AB Jewell WTP Lab Office Remodel\Drawings\Sheet\M-002.dwg



1 SECOND FLOOR MECHANICAL PLAN

1/8" = 1'-0"

N



2 THIRD FLOOR MECHANICAL PLAN

1/8" = 1'-0"

N

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA

9/23/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

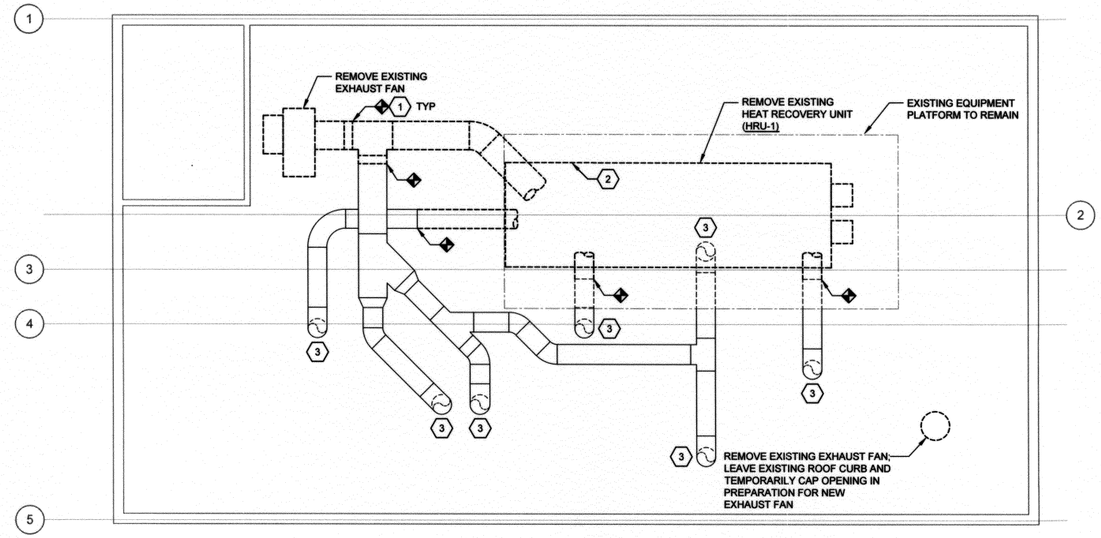
SECOND AND THIRD FLOOR MECHANICAL PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZBM	9/16	
	FIELD MGR.	RBM	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAB	9/16	CITY ENGINEER
FILE: M-101.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 20 OF 40 SHEETS
SHEET NAME: SECOND AND THIRD FLOOR MECHANICAL PLAN				SHEET NO. M-101

Printed: 9/8/2016 11:39:47 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 06\100-28\AB Jewell WTP Lab Office Remodel\Drawings\Sheet\M-101.dwg

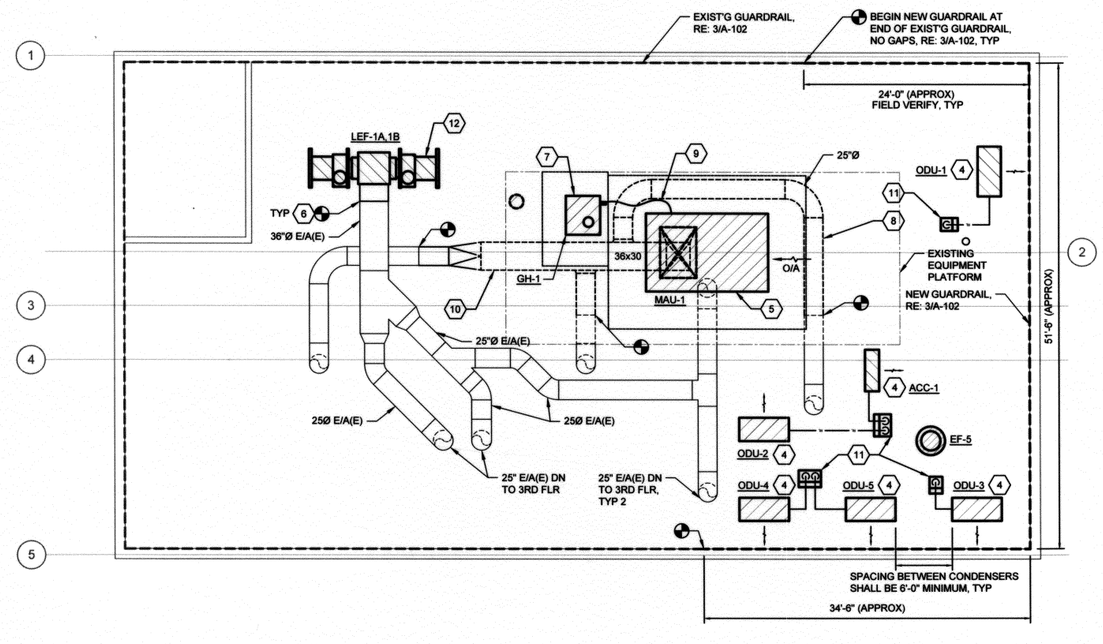


1 MECHANICAL ROOF DEMOLITION PLAN

1/8" = 1'-0"

KEYNOTES

1. REMOVE DUCTWORK AS SHOWN TO NOTED LOCATION. REMAINING DUCTWORK SHALL BE TEMPORARILY CAPPED FOR LATER CONNECTION TO PREVENT INFILTRATION INTO BUILDING.
2. REMOVE EXISTING MAKEUP AIR UNIT HRU-1 AND ASSOCIATED MAIN DUCTWORK BELOW. EXISTING STRUCTURAL FRAME SHALL REMAIN.
3. EXISTING DUCT PENETRATION DN TO 3RD FLOOR PLENUM TO REMAIN.
4. INSTALL NEW CONDENSING UNITS, SECURELY MOUNT CONDENSING UNIT ON ROOF CURB, RE: ARCH. PIPING SHALL BE SUPPORTED SECURELY ON DURABLOK USING ALL NECESSARY DURABLOK BRAND ACCOUTREMENTS.
5. NEW MAKEUP AIR UNIT MAU-1. UNIT SHALL BE MOUNTED ON EXISTING EQUIPMENT SUPPORTS. ROUTE FULL-SIZED CONDENSATE DRAIN LINE TO EXISTING CONDENSATE DRAIN PIPING. UNUSED CONDENSATE TRAPS SHALL BE REMOVED AND REPLACED WITH STRAIGHT PIPE. LOCATE UNIT SUCH THAT INTAKE IS 10'-0" MINIMUM FROM ANY SOURCES OF CONTAMINATED AIR (EXHAUST, PLUMBING VENTS, ETC).
6. CONNECT TO EXISTING DUCTWORK AS SHOWN.
7. NEW GH-1, MOUNT ON EXISTING RAISED PLATFORM.
8. DUCTWORK LOCATED UNDER EXISTING PLATFORM, TYP.
9. HUMIDIFIER MANUFACTURER-SUPPLIED STEAM HOSE FROM HUMIDIFIER TO DISTRIBUTION MANIFOLD. INSTALL PER MANUFACTURER'S RECOMMENDATIONS. DO NOT IMPEDE REQUIRED MAU-1 CLEARANCES WITH STEAM LINE.
10. ROUTE NEW 36"x30" S/A UNDER PLATFORM, HANG FROM PLATFORM. NEW DUCT SUPPORT SHALL MATCH EXISTING.
11. RE: 8/M-501 FOR PENETRATION AND HOOD DETAIL, COORDINATE CORE LOCATIONS WITH BEAMS, TYP3
12. REFER TO ARCHITECTURAL FOR MOUNTING REQUIREMENTS.



2 MECHANICAL ROOF PLAN

1/8" = 1'-0"

REVISION	BY	DATE

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL ROOF PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZZZ	9/16	
	FIELD MGR.	DBH	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: M-102.dwg DRAWING:	DATE: 9/8/2016
ATLAS PAGE NO: 00016	SHEET 21 OF 40 SHEETS
SHEET NAME: MECHANICAL ROOF PLAN	SHEET NO. M-102

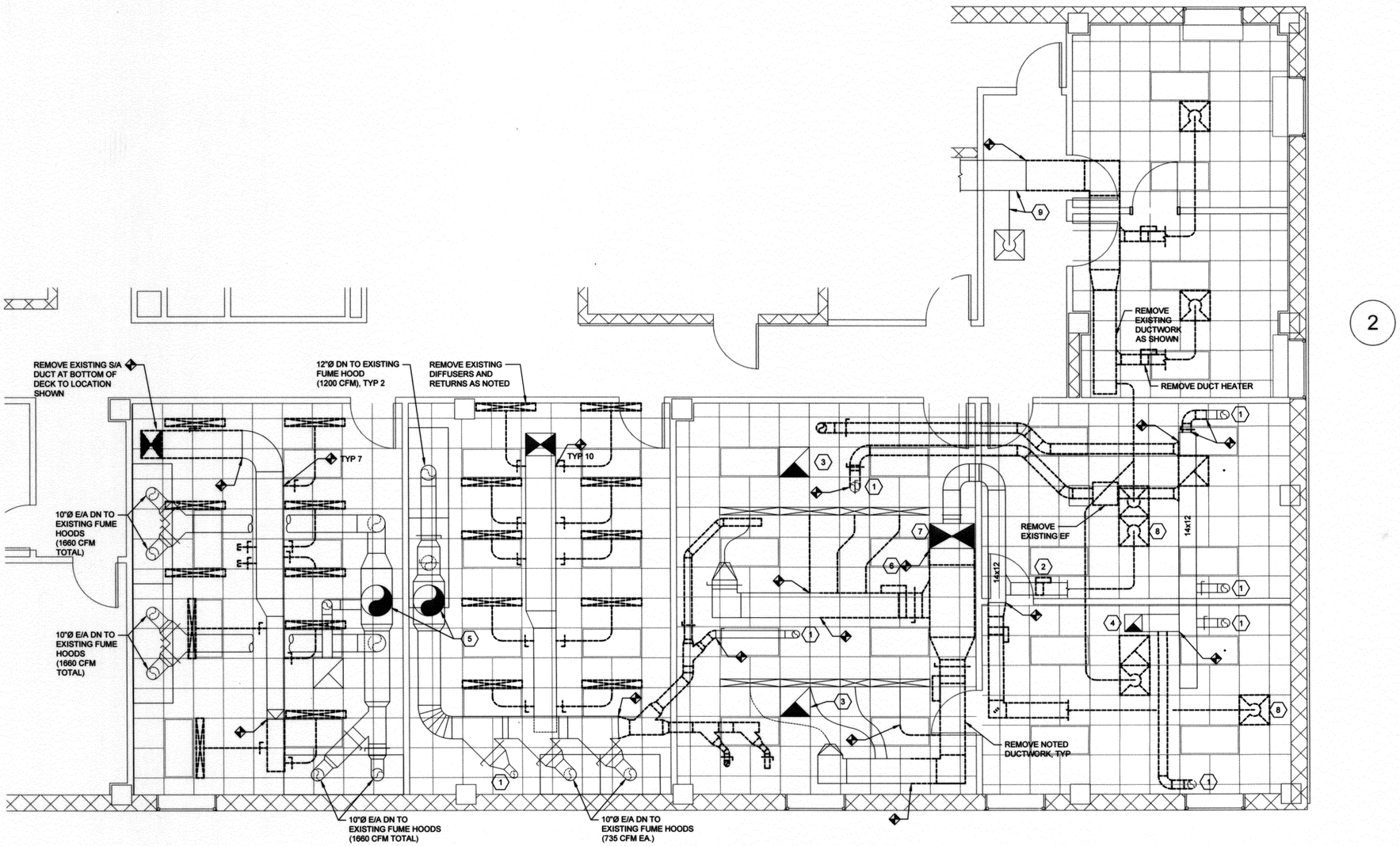
Printed: 9/8/2016 11:36:29 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 365100-29\AB Jewell WTP Lab Office Remodel\Drawings\Sheets\M-102.dwg

GENERAL NOTES

1. LABORATORY SPACES INCLUDE MANY SENSITIVE AND DELICATE PIECES OF EQUIPMENT USED IN LABORATORY PROCESSES. THIS EQUIPMENT IN MANY CASES CANNOT BE TEMPORARILY RELOCATED DUE TO THE DIFFICULTY IN RE-INSTALLING. CONTRACTOR SHALL CAREFULLY REVIEW THE LOCATIONS OF ALL EQUIPMENT WITH OWNER AND SHALL PROVIDE THE OWNER WITH A WRITTEN PLAN OF PROTECTION FROM DUST, DEBRIS, AND PHYSICAL DAMAGE DURING RENOVATION. 24-HOUR ADVANCE NOTICE SHALL BE GIVEN TO THE OWNER PRIOR TO CONSTRUCTION ACTIVITIES PRODUCING SIGNIFICANT DUST AND DEBRIS.
2. PROJECT PHASING SHALL BE COORDINATED SUCH THAT THE DISTURBANCE TO LABORATORY OPERATIONS IS MINIMIZED.

KEYNOTES

1. EXISTING E/A DUCTWORK DN TO INSTRUMENT TO REMAIN.
2. REMOVE DUCT HEATER.
3. EXISTING E/A GRILLE AND E/A BRANCH UP TO ROOF.
4. EXISTING 14"x14" E/A UP TO EF-5 ON ROOF.
5. 25"Ø E/A UP TO ROOF.
6. REMOVE EXISTING O/A DUCT RUNOUT AND CAP EXISTING OPENING. PATCH INSULATION TO MATCH EXISTING.
7. EXISTING 36"x20" E/A TRANSITIONS TO 25"Ø UP TO ROOF.
8. DIFFUSER TO BE RELOCATED, RE: 1/M-402.
9. EXISTING S/A DUCTWORK.



1 THIRD FLOOR DEMOLITION PLAN

1/4" = 1'-0"

N

JEFFERY DON FERGUSON
LICENSED PROFESSIONAL ENGINEER
OKLAHOMA

9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTIERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

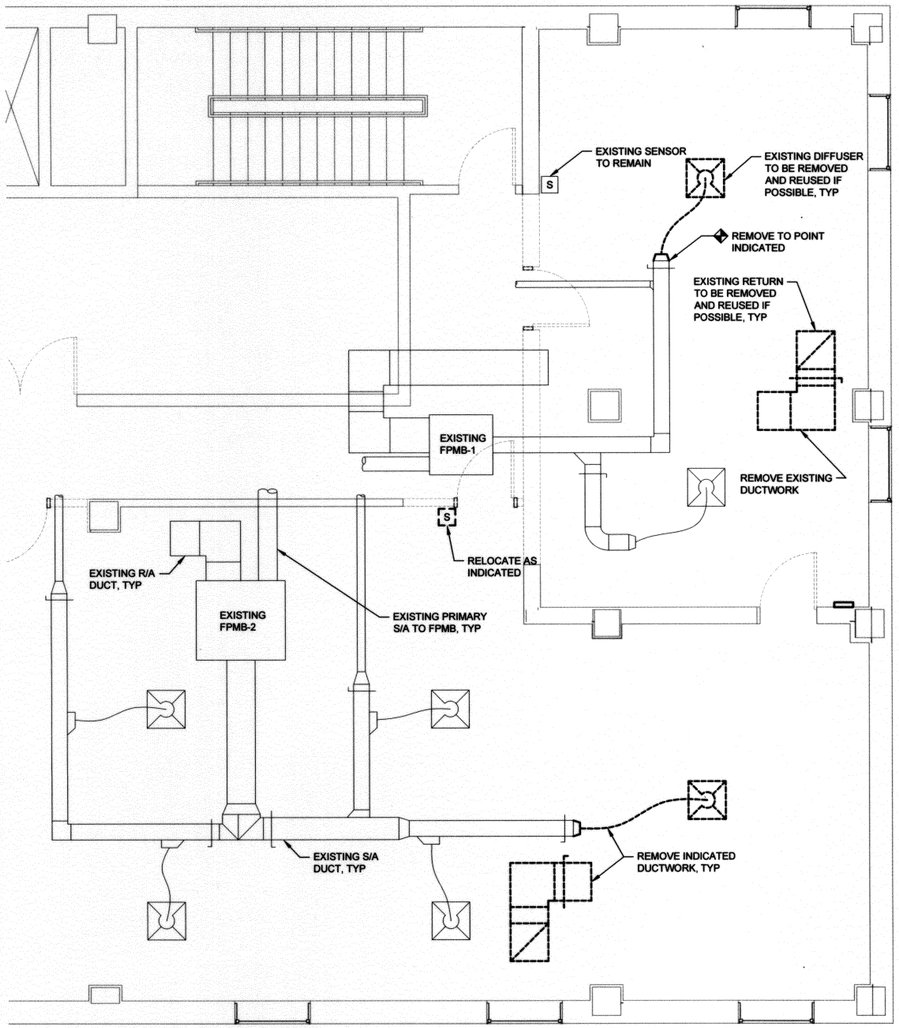
ENLARGED MECHANICAL DEMOLITION PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

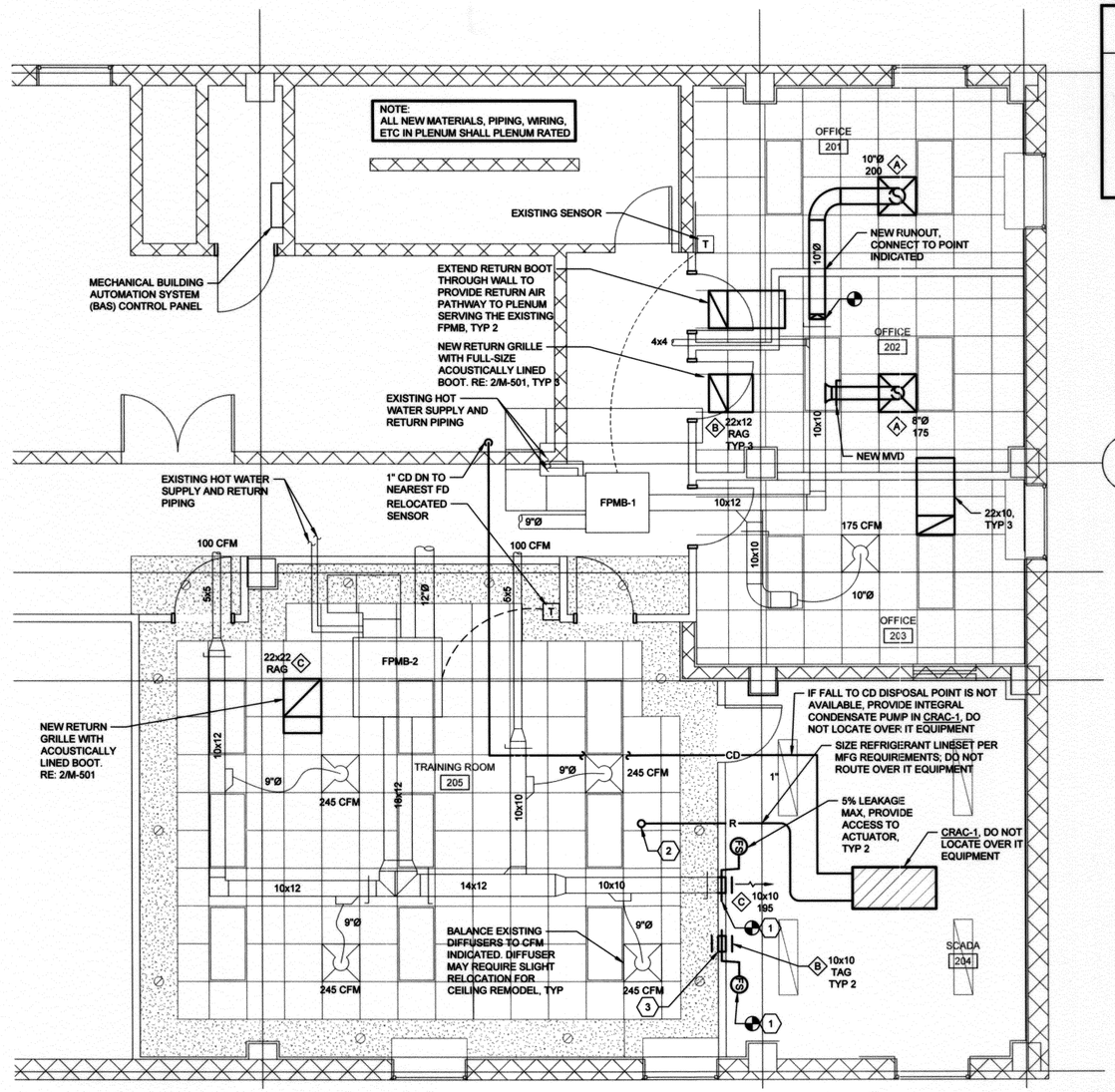
PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CGW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	BZW	9/16	
	FIELD MGR.	RBW	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: MD401.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 22 OF 40 SHEETS
SHEET NAME: ENLARGED MECHANICAL DEMOLITION PLANS				SHEET NO. MD401

Printed: 9/8/2016 11:39:52 AM
V:\Tulsa Public Works\Maintenance Elec & Mech 06\100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\MD401.dwg



1 ENLARGED SECOND FLOOR MECHANICAL DEMO PLAN

1/4" = 1'-0"



2 ENLARGED SECOND FLOOR MECHANICAL PLAN

1/4" = 1'-0"

KEYNOTES

1. ADD ALTERNATE ONLY: CONNECT NEW FIRE/SMOKE DAMPER TO FIRE ALARM PANEL. FINAL CONNECTION SHALL BE BY FIRE ALARM CONTRACTOR.
2. REFRIGERANT LINE-SET UP TO ACC-1 ON ROOF THROUGH THIRD FLOOR MECHANICAL ROOM. HOLD TIGHT TO MECHANICAL ROOM WALL. RE: 8/M-501 FOR ROOF PENETRATION DETAIL.
3. TRANSFER AIR GRILLES SHALL CONNECT SCADA ROOM AND ADJACENT ROOM PLENUM FOR RETURN AIR PATH.

JEFFERY DON FERGUSON 19755 LICENSED PROFESSIONAL ENGINEER

9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

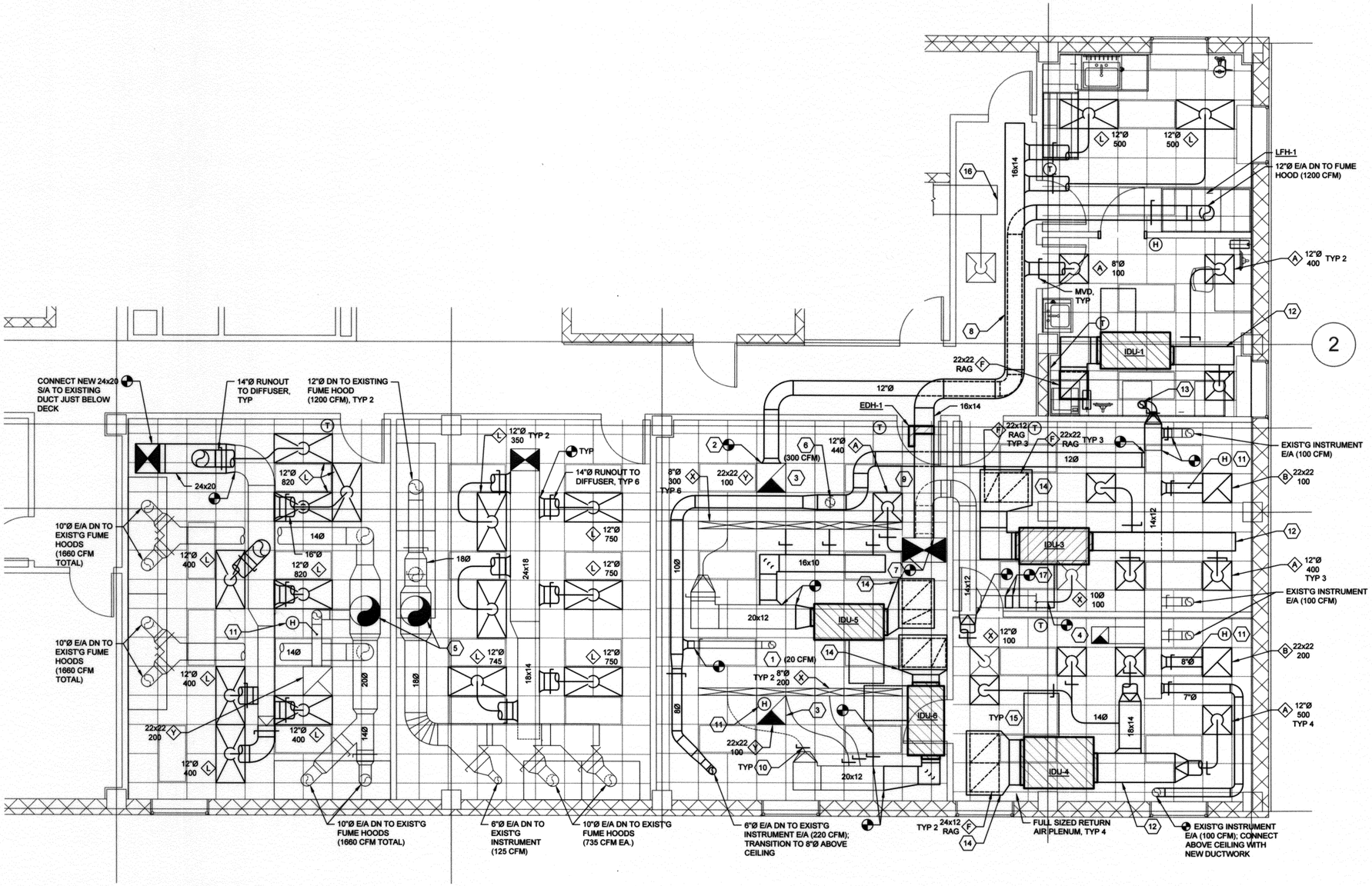
ENLARGED MECHANICAL PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZEW	9/16	
	FIELD MGR.	RBW	9/16	
VERTICAL N/A	RECOMMENDED: HPS 9/16 DESIGN MANAGER			CITY ENGINEER
FILE: M-401.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 23 OF 40 SHEETS
SHEET NAME: ENLARGED MECHANICAL PLANS				SHEET NO. M-401

Printed: 9/8/2016 11:39:53 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\M-401.dwg



1 ENLARGED THIRD FLOOR DUCTWORK PLAN

1/4" = 1'-0"

N

KEYNOTES

1. EXISTING E/A DUCTWORK DN TO INSTRUMENT (20 CFM). DUCTWORK TO REMAIN. INSTRUMENT CONNECTION TO DUCTWORK SHALL BE MADE PERMANENT WITHOUT THE USE OF FOIL, TAPE, OR ANY OTHER TEMPORARY MEANS.
2. CONNECT 12"Ø E/A DUCT TO EXISTING E/A BRANCH UP TO ROOF.
3. EXISTING E/A GRILLE AND E/A BRANCH UP TO ROOF.
4. EXISTING 14"x14" E/A UP TO EF-5 ON ROOF.
5. 25"Ø E/A UP TO ROOF.
6. CONNECT EXISTING 8"Ø INSTRUMENT RUNOUT TO 12"Ø E/A MAIN. PROVIDE MANUAL VOLUME DAMPER (IF NOT ALREADY INSTALLED) IN RUNOUT.
7. CONNECT NEW O/A DUCTS TO EXISTING O/A RISER UP TO ROOF.
8. O/A DUCT ROUTED DIRECTLY ABOVE E/A DUCT.
9. ROUTE NEW O/A DUCT STACKED OVER EXISTING O/A DUCT.
10. WHERE EXISTING RUNOUTS ARE NOT SERVED WITH MVD'S, PROVIDE NEW HARD DUCTWORK SECTION MATCHING THE RUNOUT SIZE AND PROVIDE MVD.
11. INSTALL HUMIDITY SENSOR IN E/A DUCTWORK IN ORDER TO READ A STABLE AND ACCURATE HUMIDITY IN THE SPACE. INSTALL DUCT ACCESS DOORS IN ALL DUCTWORK IN WHICH HUMIDITY SENSORS ARE MOUNTED.
12. PROVIDE FULL-SIZED S/A PLENUM.
13. 6"Ø E/A DN TO INSTRUMENT (300 CFM)
14. PROVIDE FULL-SIZED R/A PLENUM AND EXPAND TO ACCOMMODATE R/A GRILLES.
15. MAINTAIN MANUFACTURER'S REQUIRED CLEARANCES.
16. CAP EXISTING SUPPLY AIR MAIN DUCT.
17. PROVIDE NEW SECTION OF DUCTWORK WHERE DUCT HEATER WAS REMAINED, SAME SIZE AND INSULATION AS EXISTING.

GENERAL NOTES

1. LABORATORY SPACES INCLUDE MANY SENSITIVE AND DELICATE PIECES OF EQUIPMENT USED IN LABORATORY PROCESSES. THIS EQUIPMENT IN MANY CASES CANNOT BE TEMPORARILY RELOCATED DUE TO THE DIFFICULTY IN RE-INSTALLING. CONTRACTOR SHALL CAREFULLY REVIEW THE LOCATIONS OF ALL EQUIPMENT WITH OWNER AND SHALL PROVIDE THE OWNER WITH A WRITTEN PLAN OF PROTECTION FROM DUST, DEBRIS, AND PHYSICAL DAMAGE DURING RENOVATION. 24-HOUR ADVANCE NOTICE SHALL BE GIVEN TO THE OWNER PRIOR TO CONSTRUCTION ACTIVITIES PRODUCING SIGNIFICANT DUST AND DEBRIS.
4. PROJECT PHASING SHALL BE COORDINATED SUCH THAT THE DISTURBANCE TO LABORATORY OPERATIONS IS MINIMIZED.
5. NEW DUCTED INDOOR UNITS AND ASSOCIATED SUPPLY AND RETURN DUCTWORK SHALL BE MOUNTED HIGH ABOVE EXISTING DUCTWORK WHERE POSSIBLE TO AVOID CONFLICTS BETWEEN EXISTING DUCTWORK AND AIR TERMINALS. LOCATE INDOOR UNITS SUCH THAT ACCESS FROM BELOW IS MAINTAINED.
6. DUCTWORK SIZES INDICATED ON PLANS ARE DETERMINED FROM FIELD MEASUREMENTS. CONTRACTOR TO CONFIRM DUCTWORK SIZES PRIOR TO BEGINNING WORK. ANY DEVIATIONS TO BE COORDINATED WITH ENGINEER.

REGISTERED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
19751
OKLAHOMA
09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

ENLARGED MECHANICAL PLANS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

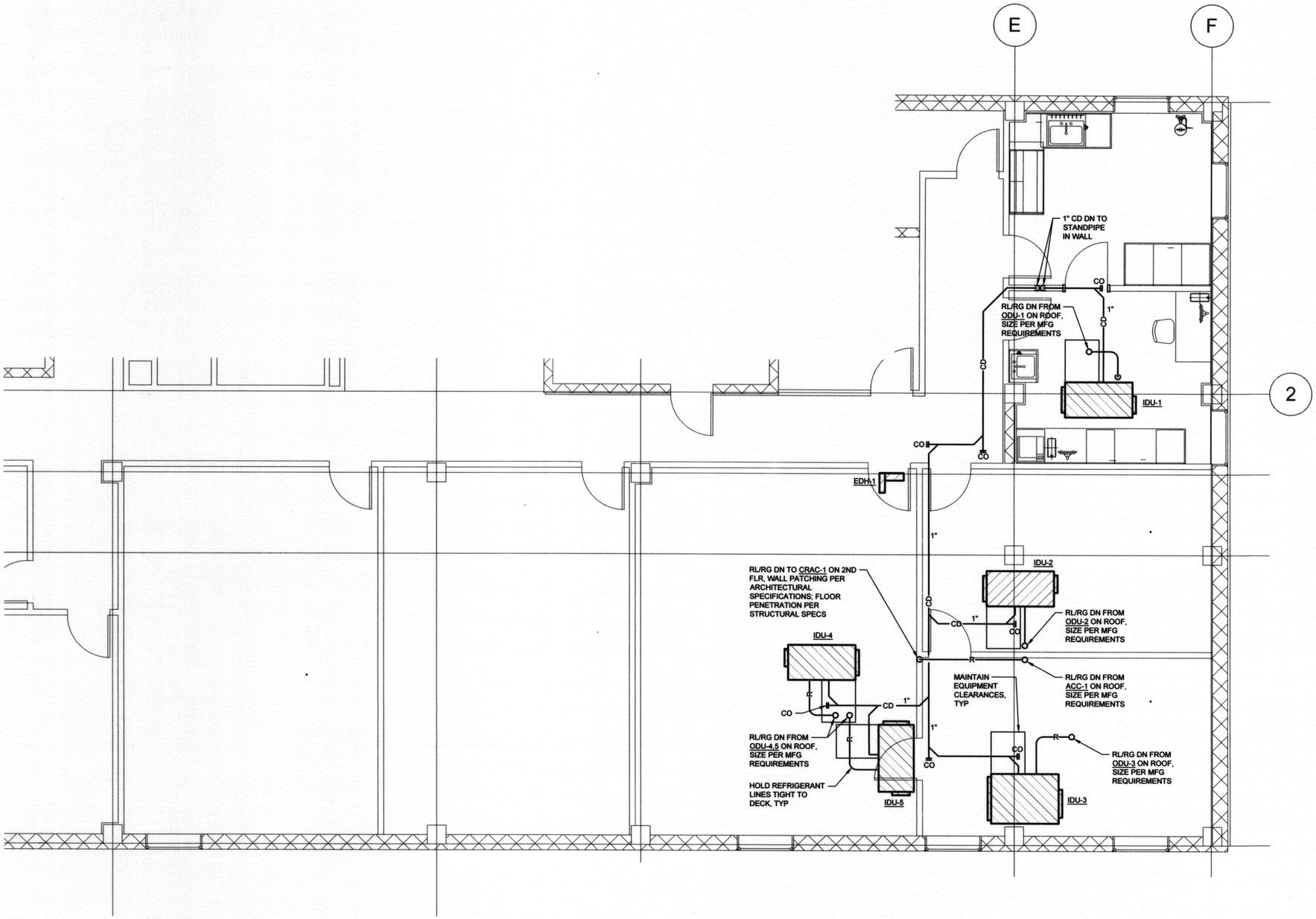
PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZTM	9/16	
	FIELD MGR.	RBM	9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: M-402.dwg DRAWING:	DATE: 9/8/2016
ATLAS PAGE NO: 00016	SHEET 24 OF 40 SHEETS
SHEET NAME: ENLARGED MECHANICAL PLANS	SHEET NO. M-402

Printed: 9/8/2016 11:39:59 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-39A\B Jewell WTP Lab Office Remodel\Drawings\Sheet\M-402.dwg

GENERAL NOTES

1. REFRIGERANT PIPING SYSTEM SHALL BE SIZED AND CONSTRUCTED PER MFG REQUIREMENTS. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS SHOWING ACTUAL ROUTING OF PIPING PRIOR TO INSTALLATION FOR COORDINATION WITH MANUFACTURER.
2. CONDENSATE PIPING AND REFRIGERANT PIPING SHALL NOT BE ROUTED ABOVE LABORATORY EQUIPMENT. ROUTING SHOWN ATTEMPTS TO LIMIT PIPING OVER EXISTING LABORATORY EQUIPMENT. WHERE PIPING CROSSES OVER EQUIPMENT, PROVIDE DRAIN PAN WITH MOISTURE SENSOR WIRED TO SHUT DOWN SPLIT SYSTEM AND PROVIDE ALARM TO BAS, RE:7/M-702.
3. CONDENSATE PIPING AND REFRIGERANT PIPING SHALL BE ROUTED SO AS NOT TO IMPEDE THE MANUFACTURER'S REQUIRED CLEARANCES AS SHOWN ON PLANS AND AS INDICATED IN MANUFACTURER'S LITERATURE.



1 ENLARGED THIRD FLOOR MECHANICAL PIPING PLAN

1/4" = 1'-0"

N

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL ENLARGED PLANS

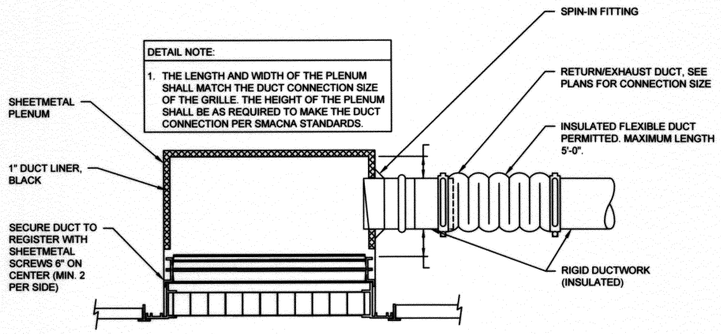
CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CGW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZZM	9/16	
	FIELD MGR.	RBW	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: M-403.dwg DRAWING:
DATE: 9/8/2016
ATLAS PAGE NO: 00016
SHEET 25 OF 40 SHEETS
SHEET NAME: MECHANICAL ENLARGED PLANS
SHEET NO. M-403

Printed: 9/8/2016 11:39:58 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\M-403.dwg

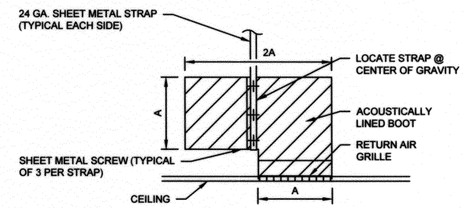


DETAIL NOTE:

1. THE LENGTH AND WIDTH OF THE PLENUM SHALL MATCH THE DUCT CONNECTION SIZE OF THE GRILLE. THE HEIGHT OF THE PLENUM SHALL BE AS REQUIRED TO MAKE THE DUCT CONNECTION PER SMACNA STANDARDS.

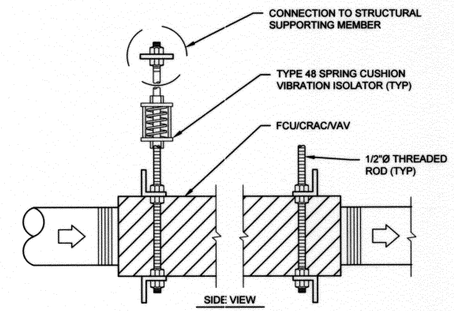
1 RETURN/EXHAUST GRILLE DETAIL

NOT TO SCALE



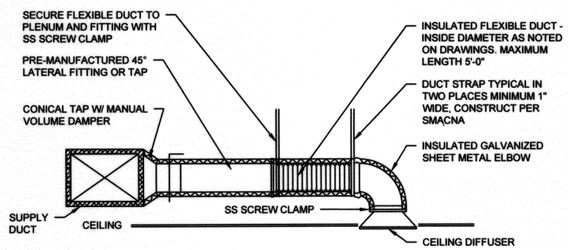
2 RETURN GRILLE BOOT

NOT TO SCALE



3 IDU/CRAC MOUNTING DETAIL

NOT TO SCALE

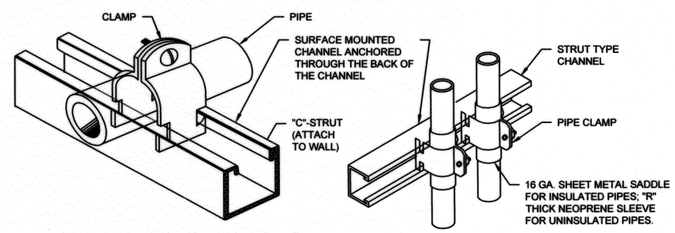


DETAIL NOTE:

1. INSULATED (MINIMUM R-6), FLEXIBLE DUCTWORK SHALL BE SUPPORTED PER SMACNA AND INDUSTRY STANDARDS. MAXIMUM 5'-0" PER HVAC DUCT CONSTRUCTION STANDARDS, FIGURE 3-9, FLEXIBLE DUCT SUPPORTS. AVOID TIGHT RADIUS TURNS THAT RESTRICT AIRFLOW. WHERE TIGHT RADIUS TURNS ARE NECESSARY PROVIDE RIGID SHEET METAL ELBOWS.

4 CEILING DIFFUSER BRANCH DUCT DETAIL

NOT TO SCALE

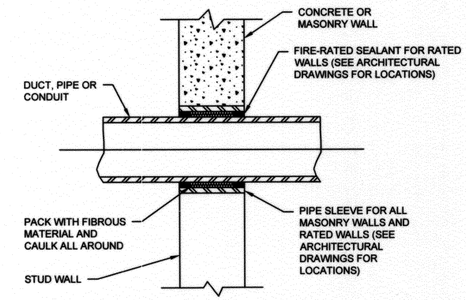


DETAIL NOTES:

1. CLAMP AROUND PIPING INSULATION INSERT.
2. 60" MAXIMUM SPACING BETWEEN SUPPORTS

5 C-STRUT PIPE SUPPORT DETAILS

NOT TO SCALE

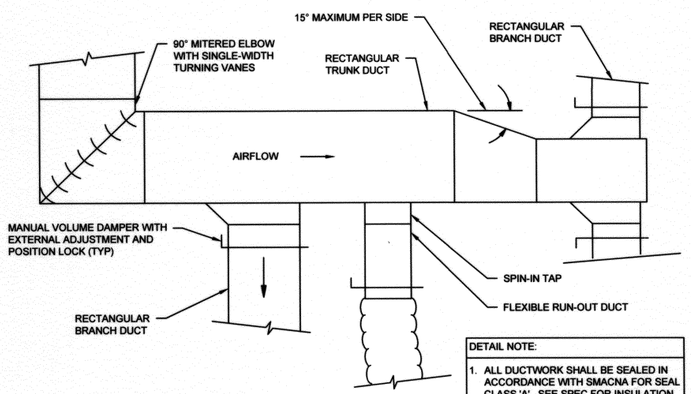


DETAIL NOTE:

1. FOR INSULATED PIPING SIZE SLEEVE ACCORDINGLY.
2. PROVIDE ESCUTCHEONS OR ANGLED STRIPS WHERE PENETRATIONS ARE EXPOSED TO VIEW.

6 TYPICAL PENETRATION DETAIL

NOT TO SCALE

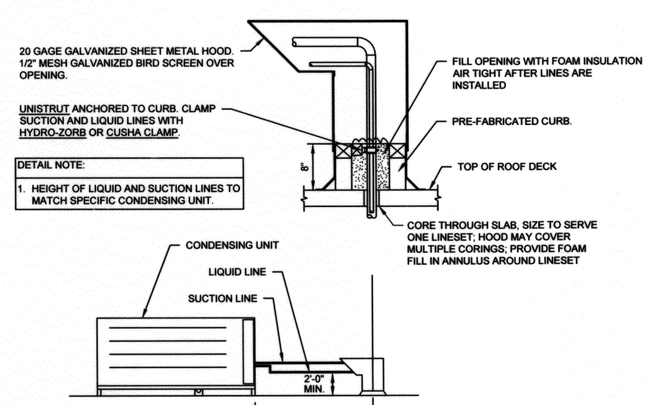


DETAIL NOTE:

1. ALL DUCTWORK SHALL BE SEALED IN ACCORDANCE WITH SMACNA FOR SEAL CLASS 'A'. SEE SPEC FOR INSULATION REQUIREMENTS.

7 LOW PRESSURE DUCT CONSTRUCTION DETAIL

NOT TO SCALE



DETAIL NOTE:

1. HEIGHT OF LIQUID AND SUCTION LINES TO MATCH SPECIFIC CONDENSING UNIT.

8 ROOF PIPING PENETRATION DETAIL

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA

9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL DETAILS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

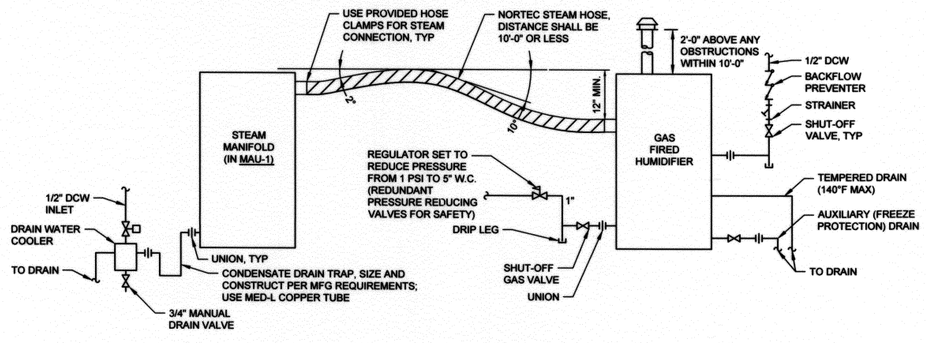
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZAK	9/16	
	FIELD MGR.	RBV	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: M-501.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 26 OF 40 SHEETS
SHEET NAME: MECHANICAL DETAILS				SHEET NO. M-501

Printed: 9/8/2016 11:40:00 AM
V:\Tulsa Public Works\Maintenance Elec & Mech 005105-29\AB Jewell WTP Lab Office Remodel\Drawings\Sheet\M-501.dwg

DETAIL NOTES

1. STEAM PIPING SHALL NOT INCLUDE ANY LOCAL LOW POINTS WHERE CONDENSATE CAN BE TRAPPED IN THE PIPING. STEAM PIPING SHALL BE SLOPED TOWARDS STEAM MANIFOLD AND GAS HUMIDIFIER AS SHOWN IN DETAIL.
2. STEAM LINE MUST ROUTE 12" VERTICALLY BEFORE CONNECTING TO STEAM MANIFOLD.
3. DISTANCE BETWEEN HUMIDIFIER AND STEAM MANIFOLD STEAM CONNECTIONS SHALL BE 10'-0" MAXIMUM. IF DISTANCE IS GREATER THAN 10'-0", MANUFACTURER'S STEAM HOSE CANNOT BE USED. FOLLOW MANUFACTURER'S DISTRIBUTION INSTALLATION MANUAL REQUIREMENTS FOR STEAM AND CONDENSATE PIPING MATERIAL, CONDENSATE TRAPPING, AND ROUTING REQUIREMENTS.
4. INSTALL DRAIN WATER COOLER BELOW EXISTING RAISED PLATFORM. HANG FROM PLATFORM.
5. ALL EXPOSED WATER SUPPLY AND DRAIN LINES SHALL BE HEAT TRACED AND INSULATED.



1 GAS HUMIDIFIER PIPING SCHEMATIC

NOT TO SCALE

LICENSED PROFESSIONAL ENGINEER JEFFERY DON FERGUSON

9/12/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL DETAILS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CGD	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	JDF	9/16	
	FIELD MGR.	RBH	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	MAS	9/16	CITY ENGINEER
FILE: M-502.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 27 OF 40 SHEETS
SHEET NAME: MECHANICAL DETAILS				SHEET NO. M-502

Printed: 9/8/2016 11:40:03 AM
V:\Water Public Works\Maintenance Elec & Mech (365100-28)\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\M-502.dwg

EXHAUST FAN SCHEDULE

MARK	MANUFACTURER MODEL	CFM	PLUME HEIGHT (FT)	ESP (INWC)	MOTOR HP	V/PH/HZ	WEIGHT (LBS)	REMARKS
EF-5	GREENHECK CUE-141-VG	1,540	-	0.5	1/2	115/1/60	66	1-7,9
LEF-1A LEF-1B	GREENHECK VEKTOR-CH-22-10-II	10,375	38	1.1	10	460/3/60	2151	1-3,8,10-22

REMARKS:

1. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR
2. SEE CONTROLS DRAWINGS FOR CONTROLS & SEQUENCE OF OPERATION.
3. PROVIDE CONTINUOUS DUTY OPERATION, COORDINATE WITH ELECTRICAL CONTRACTOR.
4. PROVIDE BACKDRAFT DAMPER.
5. PROVIDE FACTORY-MOUNTED MOTOR DISCONNECT WITH NEMA 3R ENCLOSURE.
6. PROVIDE MANUFACTURER'S ALUMINUM BIRDSCREEN.
7. PROVIDE MANUFACTURER'S CURB ADAPTOR FOR EXISTING CURB.
8. PROVIDE MANUFACTURER'S CURB.
9. UNIT SHALL BE CAPABLE OF OPERATING CONTINUOUSLY AT AN AIRFLOW TEMPERATURE OF 400°F.
10. MECHANICAL CONTRACTOR SHALL PROVIDE AND INSTALL VFD FOR EACH FAN IN SYSTEM. REFER TO ELECTRICAL SPECIFICATIONS FOR VFD SELECTION. WIRING SHALL BE BY ELECTRICAL CONTRACTOR. VFD SHALL BE EQUIPPED WITH BACNET CONNECTION FOR INTERFACE WITH BAS. REFER TO ELECTRICAL DRAWINGS FOR INSTALLATION LOCATION.
11. PROVIDE SHAFT GROUNDING AND PREMIUM EFFICIENCY MOTOR.
12. PROVIDE ACID RESISTANT COATING, GREENHECK MODEL LABCOAT GRAY-RAL 7023, ENTIRE UNIT.
13. UNIT SHALL MEET THE REQUIREMENTS OF UL-705.
14. PROVIDE ISOLATION DAMPER WITH 120V/1PH ACTUATORS FOR STAGING OF EXHAUST FANS.
15. PROVIDE MANUFACTURER'S SPRING ISOLATORS.
16. PROVIDE ACCESS DOOR.
17. PROVIDE GREENHECK SURE-AIRE FLOW STATION WITH ELECTRONICS FOR CONVERTING PRESSURES TO AIRFLOWS. PROVIDE SIGNAL TO BAS.
18. CONDUCT FACTORY VIBRATION TEST.
19. PROVIDE STEEL WEATHERHOOD OVER FAN/MOTOR.
20. PIPE 1" DRAIN CONNECTION TO NEAREST ROOF DRAIN.
21. PROVIDE NON-FUSED DISCONNECT, FACTORY-MOUNTED. REFER TO ELECTRICAL FOR REQUIRED SIGNAGE.
22. PERFORMANCE SHALL BE RATED AT 660 FT ELEVATION.

COMPUTER ROOM AIR-CONDITIONING UNIT SCHEDULE

MARK	MANUFACTURER MODEL	CFM	ESP (INWC)	V/PH	MCA	COOLING CAPACITY		REHEAT CAPACITY (KW)	HUMIDIFIER CAPACITY (LBS/HR)	WEIGHT (LBS)	REMARKS
		O/A	HP		FLA	QT (MBH)	QS (MBH)				
CRAC-1	LIEBERT MMD36E	1,250	0.3	460/3	16.5	31.8	25.3	7.3	4.3	225	1-11
		---	0.5		13.2						
ACC-1	LIEBERT PFH037A-AH7	3,000	---	460/3	9.7	---	---	---	---	351	
		---	0.2		8.1						

REMARKS:

1. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR
2. PROVIDE ADVANCED MICROPROCESSOR (AM) CONTROLS.
3. PROVIDE (2) SETS 4", 65% EFFICIENT FILTERS (ASHRAE 52-76).
4. PROVIDE TIME DELAY RE-START (REFER TO SEQUENCE OF CONTROL) PROGRAMMED BY FACTORY AUTHORIZED SERVICE SPECIALIST.
5. UNIT PERFORMANCE BASED ON 72°F DB/50% RH, 105°F AMBIENT TEMPERATURE.
6. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR, PROVIDE STARTUP SERVICES BY FACTORY AUTHORIZED SERVICE SPECIALIST.
7. PROVIDE UNIT CONDENSATE PUMP (AS NECESSARY), CONDENSATE OVERFLOW SWITCH, AND ALL REQUIRED CONTROLS (TRANSFORMER, WIRING ETC.)
8. PROVIDE SINGLE POINT POWER CONNECTION.
9. PROVIDE BELT-DRIVE CONFIGURATION.
10. PROVIDE ELECTRIC REHEAT.
11. PROVIDE WITH HIGH AND LOW AMBIENT COOLING.

LABORATORY FUME HOOD SCHEDULE

MARK	MANUFACTURER MODEL	ROOM SERVICED	LENGTH (FT)	FACE VELOCITY (FPM)	CFM	ESP (INWC)	V/PH/HZ	WEIGHT (LBS)	REMARKS
LFH-1	LABCONCO PROTECTOR 141610000	302	6	100	1,180	0.38	115/1/60	860	1-9

REMARKS:

1. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR.
2. PROVIDE ONE (1) GFCI RATED 115/1 SERVICE FIXTURE, 20A. LOCATE IN LOWER PART OF RIGHT INTERIOR FUME HOOD WALL.
3. MODEL MUST CONFORM TO THE FOLLOWING STANDARDS: CRF 29, PART1910, SEFA1-2010, SEFA 8-20, NFPA 45-2011, ASTM E84-09C, ASHRAE 110-95, ANSI Z9.5-2012, UL 61010-1, UL 1805.
4. PROVIDE 1/4" THICK LEXAN POLYCARBONATE VERTICAL-RISING SASH WITH CABLE PULLEY.
5. PROVIDE GUARDIAN AIRFLOW MONITOR KIT WITH OUTPUT TO BAS FOR MONITORING.
6. PROVIDE SASH STOP KITS, SHIPPED LOOSE FOR FIELD INSTALLATION. COORDINATE FINAL HEIGHT WITH OWNER.
7. PROVIDE MANUFACTURERS' STANDARD GLACIER WHITE POWDER-COATED STEEL EXTERIOR.
8. PROVIDE HEAT-WELDED TYPE 1 UNPLASTICIZED PVC LINER INTEGRAL WORK SURFACE, DRAINAGE TROUGH AND PRE-SET BAFFLES.
9. PROVIDE FOUR PRE-PLUMBED SERVICE FIXTURES: RIGHT SIDE WHEN STANDING AT HOOD FACE - (1) DI WATER CONNECTION WITH GRAY PVC GOOSENECK, (1) NITROGEN WITH PLASTIC SERRATED HOSE CONNECTOR, (1) COMPRESSED AIR WITH SERRATED HOSE CONNECTOR, (1) VACUUM WITH PLASTIC SERRATED HOSE CONNECTOR. PROVIDE APPROPRIATE VALVE MATERIAL FOR SERVICE WITH KNOB LOCATED ON POST. CONNECTION TO HOOD SHALL BE ON THE SIDE.

MAKE-UP AIR UNIT SCHEDULE

MARK		MAU-1
AREA SERVED		3RD FLR LAB
MANUFACTURER		AAON
MODEL		RN-070-3-0-EA09-3E9:M000-U0B-DLS-EFC-DDFBLBF-00-0000000AB
SUPPLY FAN AIR FLOW (CFM)		10,115
EXTERNAL STATIC PRESSURE (IN. WG)		1.2
SUPPLY FAN MOTOR (HP)		7.5
DX CONDENSING COIL (SUMMER)	TOTAL CAPACITY (MBH)	700.0
	SENSIBLE CAPACITY (MBH)	465.1
	EAT - DB/WB (°F)	100/76
	LAT - DB/WB (°F)	55.0/53.9
	AMBIENT TEMPERATURE (°F)	105
DX CONDENSING COIL (DEHUMID)	TOTAL CAPACITY (MBH)	811.0
	SENSIBLE CAPACITY (MBH)	318.6
	EAT - DB/WB (°F)	85.5/78.5
	LAT - DB/WB (°F)	55.4/54.4
	AMBIENT TEMPERATURE (°F)	85.5
GAS HEAT EXCHANGER	INPUT (MBH)	1080
	OUTPUT (MBH)	864
	EAT - DB/WB (°F)	0/-1
	LAT - DB/WB (°F)	79.1/48.9
HOT GAS REHEAT	INPUT (MBH)	234
	EAT - DB/WB (°F)	55.0/53.9
	LAT - DB/WB (°F)	75.0/61.6
ELECTRICAL (VOLTS/PHASE/HERTZ)		460/3/60
WEIGHT (LBS)		6467
REMARKS:		1-22

REMARKS:

1. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR.
2. PROVIDE VARIABLE CAPACITY SCROLL COMPRESSOR FOR MODULATING COOLING CAPACITY.
3. PROVIDE STAINLESS STEEL NATURAL GAS HEAT EXCHANGER.
4. PROVIDE MOTORIZED 100% OUTSIDE AIR DAMPER WITH 2 POSITION ACTUATOR.
5. PROVIDE 115/1 CONVENIENCE OUTLET, FACTORY-WIRED.
6. PROVIDE VFD FOR SUPPLY AIR FAN (FOR BALANCING ONLY)
7. PROVIDE 2" PLEATED PRE-FILTER (MERV 8 MIN.)
8. PROVIDE 4" PLEATED UNIT FILTER (MERV 11 MIN.)
9. PROVIDE CLOGGED FILTER SWITCH AND MAGNEHELIC GAUGE.
10. PROVIDE ADJUSTABLE COMPRESSOR LOCKOUT FOR EACH CIRCUIT.
11. PROVIDE MODULATING HOT GAS REHEAT.
12. PROVIDE VFD'S FOR CONDENSER FANS, CONTROLLED BY ON-BOARD CONTROLS.
13. PROVIDE NON-FUSED DISCONNECT.
14. PROVIDE S/A SMOKE DETECTOR AND REMOTE SAFETY SHUTDOWN TERMINALS. WIRE TO SHUT DOWN UNIT ON DETECTION. PROVIDE SIGNAL TO FIRE ALARM PANEL. FIRE ALARM CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL CONNECTION TO FIRE ALARM PANEL.
15. PROVIDE PHASE AND BROWN OUT PROTECTION.
16. PROVIDE WATTMASTER VCM-X CONTROLS FOR CONSTANT VOLUME OPERATION. CONTROLS SHALL BE EQUIPPED WITH BACNET CARD FOR INTERFACE WITH BAS. CONTROLS SHALL PROVIDE ALL REQUIRED POINTS TO BAS AS INDICATED IN CONTROLS DRAWINGS.
17. CABINET SHALL BE PROVIDED WITH DOUBLE WALL CONSTRUCTION AND R-13 INSULATION.
18. PROVIDE STAINLESS STEEL DRAIN PAN.
19. ETL USA LISTED.
20. SINGLE POINT POWER CONNECTION.
21. LOW AMBIENT COOLING OPERATION TO 0°F.
22. PROVIDE MANUFACTURER'S CURB FOR MOUNTING ON STRUCTURAL FRAME.

SPLIT SYSTEM SCHEDULE

MARK	MANUFACTURER MODEL	QTY	CFM	ESP (INWC)	V/PH	MCA / FLA	COOLING				HEATING	WEIGHT (LBS)	REMARKS
			O/A	# FANS		MOCP	QT (MBH)	QS (MBH)	EAT (DB/WB, °F)	LAT (DB/WB, °F)	QT (MBH)		
ODU-1	CFA-002-A-0-3-AJ00G:A-G0-00-00-000-B-A000-0000A00-0A000DB	1	-	-	460/3	7/6	-	-	-	-	-	350	1,2,7,12-17
			-	-		15							
ODU-2	CFA-003-A-0-3-BJ00G:A-G0-00-00-000-B-A000-0000A00-0A000DB	1	-	-	460/3	8/6	-	-	-	-	-	375	1,2,7,12-18
			-	-		15							
ODU-3	CFA-005-A-0-3-BJ00G:A-G0-00-00-000-B-A000-0000A00-0A000DB	1	-	-	460/3	11/9	-	-	-	-	-	575	1,2,7,12-18
			-	-		15							
ODU-4,5	CFA-005-A-0-3-BJ00G:A-G0-00-00-000-B-A000-0000A00-0A000DB	2	-	-	460/3	11/9	-	-	-	-	-	575	1,2,7,12-18
			-	-		15							
IDU-1	H3-AXB-3-A-141D-000:ADFA-C0A-000-000-0AA0AA0-00-00000000X	1	800	0.65	460/3	2/1.4	24.0	19.6	75/62.5	52.3	19.4	400	1-11
			0	1		15							
IDU-2	H3-BXB-3-A-141D-000:AACA-C0A-000-000-0AA0AB0-00-00000000X	1	1200	0.65	460/3	2/1.7	31.5	27.3	75/62.5	53.9	23.6	500	1-11
			0	1		15							
IDU-3	H3-CXB-3-A-141D-000:BACA-C0A-000-000-0AA0AD0-00-00000000X	1	2000	0.65	460/3	3/2.6	51	45	75/62.5	53.9	35.8	675	1-11
			0	1		15							
IDU-4,5	H3-AXB-3-A-161C-000:ADFA-C0A-000-000-0AA0AD0-00-00000000X	2	1100	0.65	460/3	2/1.4	42.6	30.7	75/62.5	49.0	35.1	425	1-11
			0	1		15							

REMARKS:

1. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR. PROVIDE STARTUP SERVICES BY FACTORY AUTHORIZED SERVICE SPECIALIST.
2. UNIT PERFORMANCE BASED ON 75°F DB/50% RH, 105°F AMBIENT TEMPERATURE.
3. PROVIDE UNIT CONDENSATE PUMP, CONDENSATE OVERFLOW SWITCH, AND ALL REQUIRED CONTROLS (TRANSFORMER, WIRING ETC.) AS NECESSARY.
4. PROVIDE SECONDARY CONDENSATE PAN BELOW UNIT WITH MOISTURE SENSOR INSTALLED IN PAN. WIRE TO SHUT OFF UNIT UPON DETECTION AND PROVIDE ALARM AT BAS.
5. PROVIDE MANUFACTURER'S THERMOSTAT/CONTROLLER FOR EACH SPLIT SYSTEM (AS INDICATED ON PLANS) INCLUDING LCD DISPLAY AND 7 DAY PROGRAMMABLE SETPOINTS. SPLIT SYSTEM SHALL BE FACTORY-PROGRAMMED AND EQUIPPED TO RECEIVE A SIGNAL FROM THE THERMOSTAT AND OPERATE AS NECESSARY TO MAINTAIN SPACE TEMPERATURE.
6. PROVIDE POTENTIOMETER SUPPLY FAN CONTROL.
7. PROVIDE PHASE AND BROWN OUT PROTECTION.
8. PROVIDE THERMAL EXPANSION VALVES.
9. PROVIDE CORROSION RESISTANT POLYMER COATING FOR CABINET INTERIOR, CABINET EXTERIOR, AND EVAPORATOR COIL.
10. PROVIDE STANDARD 1-YEAR WARRANTY FOR INDOOR UNIT.
11. COORDINATE RIGHT HAND V. LEFT HAND UNIT WITH FINAL LAYOUT OF DUCTWORK AND PIPING. INDICATE RIGHT HAND AND LEFT HAND UNITS ON SHOP DRAWINGS.
12. PROVIDE EXTENDED RANGE LOW AMBIENT, HIGH AMBIENT HEATING AND COOLING, RESPECTIVELY.
13. PROVIDE FACTORY-PROGRAMMED MINIMUM RUNTIME AND SHORT-CYCLING PREVENTION TIMER.
14. PROVIDE WITH TERMINAL BLOCK FOR THERMOSTAT CONTROL AND ISOLATION RELAYS. PROVIDE DRY CONTACTS FOR ALARM TO BAS.
15. PROVIDE SINGLE POINT POWER BLOCK.
16. PROVIDE CONDENSER COIL HAIL GUARDS.
17. PROVIDE EXTENDED COMPRESSOR 5-YEAR WARRANTY.
18. COMPRESSOR TO BE 2-STEP VARIABLE CAPACITY.

HEAT TRACE SCHEDULE

MARK	MFG MODEL	SERVICE	V/PH/HZ	W/FT	REMARKS
HT-1	CHROMALOX SRL3-1CT	DCW & HUMIDIFIER DRAINS	120/1/60	3.26	1-8

REMARKS:

1. INSTALL PER MANUFACTURER'S REQUIREMENTS.
2. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR.
3. PROVIDE CHROMALOX U SERIES POWER CONNECTION SET KIT.
4. AFFIX TO PIPE USING FIBERGLASS TAPE.
5. HEAT TRACE TO MAINTAIN 35°F FLUID TEMPERATURE AT 0°F.
6. PROVIDE ONE MANUFACTURER'S LOCAL THERMOSTAT PER CIRCUIT WITH NEMA 4X ENCLOSURE RATED FOR OUTDOOR APPLICATION. HEAT TRACE TO BE ENABLED AT 40°F AMBIENT.
7. PROVIDE END SEGMENTS AND JUNCTION BOXES AS REQUIRED.
8. WRAP VALVES AND FITTINGS PER MANUFACTURER'S REQUIREMENTS, SO THAT VALVES AND FITTINGS CAN BE DISASSEMBLED AND REMOVED WITHOUT COMPLETELY REMOVING HEAT TRACE FROM EACH LINE.

EXISTING FAN POWERED MIXING BOX SCHEDULE

MARK	AHU SERVED	INLET SIZE	AIRFLOW CAPACITY	
			MAX	%OA
FPMB-1	AHU-2	9	550	20
FPMB-2	AHU-2	12	1,275	20

NOTE: FPMB-1 AND FPMB-2 SHALL BE REBALANCED TO THE APPROPRIATE FLOW RATES AS SHOWN IN THE SCHEDULE AND ASSOCIATED DIFFUSERS SHALL BE BALANCED TO FLOWS INDICATED ON PLANS.

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
19755
OKLAHOMA
09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL SCHEDULES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	[illegible]	9/16	
	FIELD MGR.	RBV	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: M-601.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 28 OF 40 SHEETS
SHEET NAME: MECHANICAL SCHEDULES				SHEET NO. M-601

Printed: 9/8/2016 11:40:05 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\M-601.dwg

ROOM AIR BALANCE / VENTILATION DATA

ROOM	USE	MAU-1 O/A (CFM)	MAU-1 E/A (CFM)			EF-5 E/A (CFM)			PRESSURE
			HOOD	EQPMT	SPACE	HOOD	EQPMT	SPACE	
RM 302	PREP	1000	1200	0	0	0	0	0	-200
RM 303	LAB	100	0	0	0	0	300	0	-200
RM 304	MASS SPECTROMETRY	100	0	0	0	0	200	100	-200
RM 305	GAS CHROMATOGRAPHY	100	0	0	0	0	200	200	-300
RM 306	ATOMIC ABSORPTION	440	0	0	200	0	540	0	-300
RM 307	METALS PREP	3695	3870	125	0	0	0	0	-300
RM 308	ORGANICS PREP	4880	4980	0	200	0	0	0	-300
TOTALS:	---	10115	10375			1540			-1710

BUILDING AIR BALANCE / VENTILATION DATA

EQPMT	SERVICE	E/A (CFM)	O/A (CFM)	PRESSURE
AHU-1	EXISTING GENERAL SUPPLY	-	950	+950
AHU-2	EXISTING GENERAL SUPPLY	-	600	+600
AHU-3	EXISTING GENERAL SUPPLY	-	6155	+6155
EF-1	EXISTING GENERAL EXHAUST	930	-	-930
EF-2	EXISTING GENERAL EXHAUST	390	-	-390
EF-3	EXISTING GENERAL EXHAUST	410	-	-410
EF-4	EXISTING GENERAL EXHAUST	585	-	-585
EF-5	EXISTING GENERAL EXHAUST	475	-	-475
LEF-1	LABORATORY EXHAUST FAN	10375	-	10375
MAU-1	LABORATORY MAKEUP AIR	-	10115	-10115
TOTALS:	---	13165	17820	+4655

ELECTRIC DUCT HEATER SCHEDULE

MARK	MANUFACTURER MODEL	AREA SERVED	HEATING CAPACITY (KW)	CFM	TEMP RISE (°F)	V/PH/HZ	WxH (IN)	REMARKS
EDH-1	NEPTRONIC DFCF11H	RM 302 PREP	8	1000	20	460/3/60	16x14	1-7

REMARKS:

1. COORDINATE ELECTRICAL INSTALLATION WITH ELECTRICAL CONTRACTOR.
2. REFER TO CONTROLS DRAWINGS FOR SEQUENCE OF OPERATION.
3. PROVIDE NEPTRONIC HEC CONTROLLER FOR MODULATING CONTROL BASED ON ELECTRICAL SIGNAL FROM BAS.
4. PROVIDE NON-FUSED DISCONNECT, FACTORY-MOUNTED.
5. PROVIDE AIRFLOW SWITCH WIRED TO HEC CONTROLLER TO SHUT UNIT OFF IN THE EVENT OF LOSS OF AIRFLOW.
6. PROVIDE FLANGED CONSTRUCTION.
7. UNIT CONTROLLER SHALL BE EQUIPPED WITH THERMAL CUTOUT TO PREVENT OVERHEATING.

AIR DEVICE SCHEDULE

MARK	MANUFACTURER MODEL	SERVICE	TYPE	MOUNTING	FACE SIZE	REMARKS
A	TITUS TMS	S/A	LOUVERED	LAY-IN (UNO)	24x24 UNO	1-4
B	TITUS 25RL	R/A,E/A,T/A	LOUVERED	LAY-IN (UNO)	24x24 UNO	1-4
C	TITUS 300RL	S/A	DOUBLE DEFLECTION	SIDEWALL	SEE PLANS	2,3
L	TITUS VERSATEC-AL	S/A	PERFORATED	LAY-IN (UNO)	24x48	1-5
F	TITUS 350R	R/A	FILTERED	LAY-IN (UNO)	24x24 UNO	1-4,6
X	EXISTING DIFFUSER	S/A	SEE PLANS	SEE PLANS	SEE PLANS	7
Y	EXISTING GRILLE	E/A, R/A	SEE PLANS	SEE PLANS	SEE PLANS	7

REMARKS:

1. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR ACTUAL MOUNTING REQUIREMENTS.
2. PROVIDE STANDARD WHITE FINISH.
3. REFER TO PLANS FOR NECK SIZES.
4. PROVIDE ALUMINUM GRILLES.
5. PROVIDE HEMISPHERICAL DISCHARGE PATTERN.
6. PROVIDE 1" MERV 8 FILTER, INSTALLED POST CONSTRUCTION.
7. BALANCE TO NEW FLOWS AS SHOWN ON PLANS.

GAS FIRED HUMIDIFIER SCHEDULE

MARK	MANUFACTURER MODEL	CAPACITY (LB/HR)	MINIMUM OUTPUT (LB/HR)	INPUT (MBH)	DISTRIBUTION WxH (IN)	DISTRIBUTION DIST (FT)	V/PH/HZ	RATED AMPS	WEIGHT, WETTED (LBS)	REMARKS
GH-1	NORTEC GSTC-300	300	25	420	86x54	0.73	115/1/60	13.7	1185	1-12

REMARKS:

1. COORDINATE ELECTRICAL REQUIREMENTS WITH ELECTRICAL CONTRACTOR
2. UNIT SHALL BE APPROPRIATE FOR OUTDOOR INSTALLATION WITH WEATHER PROOF INTEGRAL CABINET AND COOLING FANS TO MAINTAIN OPTIMAL PERFORMANCE,.
3. PROVIDE ATMOSPHERIC STEAM DISTRIBUTION, STAINLESS STEEL SAM-e 27 STEAM HEADER (9" CENTERS) FOR FIELD INSTALLATION IN MAU-1 CABINET. PROVIDE ALL NECESSARY INLET KITS, MOUNTING FRAMES, AND DISTRIBUTION TUBES.
4. PROVIDE AIR PROVING SWITCH AND WIRE TO CONTROLLER IN HUMIDIFIER.
5. PROVIDE MANUFACTURER'S ON-BOARD CONTROLLER TO CONTROL UNIT. UNIT SHALL INCLUDE BACK-LIT LCD GRAPHIC DISPLAY FOR LOCAL ADJUSTMENT AND SHALL CONNECT TO THE BAS THROUGH BACNET PROTOCOL. REFER TO CONTROLS DRAWINGS FOR SEQUENCE OF OPERATION.
6. PROVIDE MANUFACTURER'S MODULATING HUMIDISTAT IN EACH ROOM AS INDICATED ON PLANS. ON-BOARD CONTROLS SHALL POLL FOR OUT-OF-RANGE HUMIDISTAT READINGS AND SHALL OPERATE HUMIDIFICATION AS NECESSARY TO MAINTAIN SETPOINT.
7. PROVIDE MANUFACTURER'S STAINLESS STEEL DRAIN WATER COOLER FOR FIELD INSTALLATION. PROVIDE 120 VAC/24 VAC PLUG-IN TRANSFORMER PART # 1603032. POWERED THROUGH HUMIDIFIER CONTROL PANEL.
8. PROVIDE MANUFACTURER'S FREEZE PROTECTION.
9. PROVIDE KEEP-WARM FEATURE TO MAINTAIN WATER TEMPERATURE OF 160°F FOR RAPID RESPONSE AND FREEZE PROTECTION.
10. PROVIDE PRE-INSTALLED AND DUCTED FLUE GAS VENTING TO EXTERIOR OF CABINET.
11. PROVIDE 316L STAINLESS STEEL HEAT EXCHANGER.
12. PROVIDE MANUFACTURER'S STEAM HOSE AND NECESSARY CLAMPS FOR CONNECTION BETWEEN HUMIDIFIER AND DISTRIBUTION MANIFOLD.

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
OKLAHOMA

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL SCHEDULES

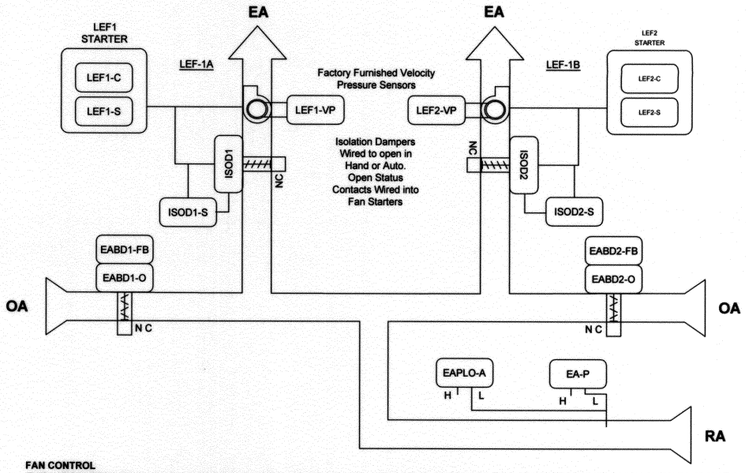
CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	EWJ	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZEM	9/16	
	FIELD MGR.	REM	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: M-602.dwg DRAWING:
DATE: 9/8/2016
ATLAS PAGE NO: 00016
SHEET 29 OF 40 SHEETS
SHEET NAME: MECHANICAL SCHEDULES
SHEET NO. M-602

Printed: 9/8/2016 11:40:07 AM
V:\Tulsa Public Works\Maintenance Doc & Mech 085100-2\M-B Jewell WTP Lab Office Remodel\Drawings\Sheet\M-602.dwg



FAN CONTROL
THIS LABORATORY EXHAUST FAN SYSTEM OPERATES CONSTANTLY ALL YEAR LONG. THERE ARE TWO EXHAUST FANS OF WHICH ONE WILL RUN AT ALL TIMES. UPON A COMMAND FROM THE LAB EXHAUST FAN CONTROLLER, THE LEAD EXHAUST FAN'S ASSOCIATED ISOLATION DAMPER SHALL OPEN. ONCE THE DAMPER IS PROVEN OPEN, THE LEAD EXHAUST FAN SHALL START. THE LEAD FAN WILL BE ROTATED WEEKLY USING A LEAD/LAG PROGRAM IN THE LAB EXHAUST FAN CONTROLLER. IF THE LEAD EXHAUST FAN STATUS DOES NOT MATCH ITS COMMANDED VALUE AFTER 30 SECONDS (ADJ.), AN ALARM WILL BE GENERATED, THE FAN WILL BE STOPPED, AND THE STANDBY EXHAUST FAN WILL BE ENABLED.

INTAKE DAMPER CONTROL
TWO OUTSIDE AIR INTAKE DAMPERS WILL BE MODULATED TO MAINTAIN A CONSTANT NEGATIVE STATIC PRESSURE IN THE EXHAUST AIR DUCT. AS THE NEGATIVE PRESSURE INCREASES, THE OUTSIDE AIR DAMPERS WILL BE MODULATED OPEN.

AIRFLOW MONITORING
THE FACTORY-INSTALLED PRESSURE READINGS SHALL BE CONVERTED IN THE LAB EXHAUST FAN CONTROLLER TO AIRFLOW (CFM) AND SHALL BE TRENDED.

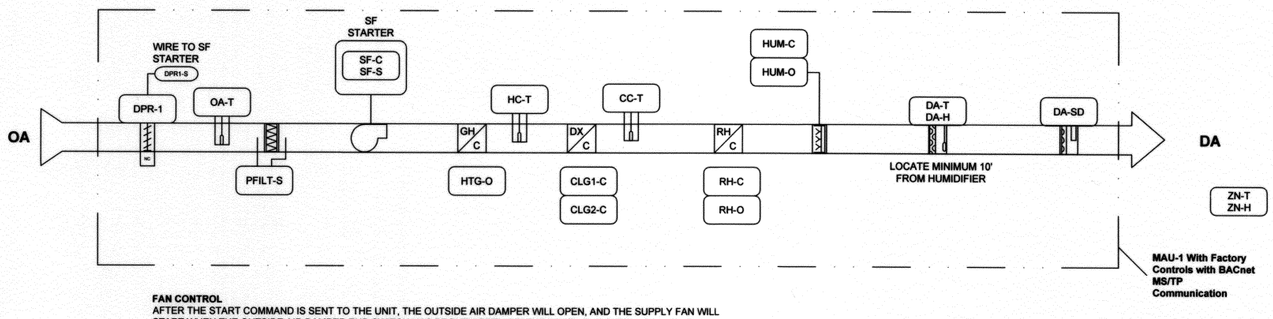
SAFETY
UPON AN ACTIVATION OF THE LOW PRESSURE SAFETY SWITCH, THE FANS SHALL BE DISABLED.

1 LABORATORY EXHAUST CONTROLS SCHEMATIC

NOT TO SCALE

LAB EXHAUST FAN SYSTEM POINTS LIST

POINT TYPE	OBJECT NAME	EXPANDED ID	END DEVICE	TREND
AI	EA-P	Exhaust Air Pressure	Diff Pressure Sensor	
AI	LEF1-VP	Lab Exhaust Fan 1 Flow	Diff Pressure Sensor	*
AI	LEF2-VP	Lab Exhaust Fan 2 Flow	Diff Pressure Sensor	*
AI	EABD1-FB	Exhaust Air Damper 1 Position	Damper Position Feedback	
AI	EABD2-FB	Exhaust Air Damper 2 Position	Damper Position Feedback	
BI	LT-A	Low Temperature Alarm	Temperature Switch	
BI	LEF1-S	Lab Exhaust Fan 1 Status	Current Sensor	
BI	LEF2-S	Lab Exhaust Fan 2 Status	Current Sensor	
BI	ISOD1-S	Isolation Damper 1 Status	Damper End Switch	
BI	ISOD2-S	Isolation Damper 2 Status	Damper End Switch	
BI	EAPLO-A	Exhaust Air Pressure Low Alarm	Pressure Switch	
BO	LEF1-C	Lab Exhaust Fan 1 Command	Relay	
BO	LEF2-C	Lab Exhaust Fan 2 Command	Relay	
AO	EABD1-O	Exhaust Air Damper 1 Output	Electric Damper Actuator	
AO	EABD2-O	Exhaust Air Damper 2 Output	Electric Damper Actuator	



FAN CONTROL
AFTER THE START COMMAND IS SENT TO THE UNIT, THE OUTSIDE AIR DAMPER WILL OPEN, AND THE SUPPLY FAN WILL START WHEN THE OUTSIDE AIR DAMPER END SWITCH HAS PROVEN OPEN STATUS. WHEN THE SUPPLY FAN STATUS INDICATES THE FAN STARTED, THE CONTROL SEQUENCE WILL BE ENABLED.

DISCHARGE TEMPERATURE CONTROL
THE DISCHARGE AIR TEMPERATURE SETPOINT WILL BE RESET TO MAINTAIN THE SPACE TEMPERATURE SETPOINT (ADJ.). AN ALARM WILL BE GENERATED IF THE DISCHARGE AIR TEMPERATURE EXCEEDS OR IS BELOW THE SETPOINT BY 10°F (ADJ.)

SPACE MONITORING
AN ALARM WILL BE GENERATED IF THE SPACE TEMPERATURE EXCEEDS OR IS BELOW THE SPACE TEMPERATURE SETPOINT BY 10°F (ADJ.) AN ALARM WILL BE GENERATED IF THE SPACE HUMIDITY EXCEEDS THE HIGH SETPOINT (60%, ADJ.) OR IS BELOW THE LOW SETPOINT (30%, ADJ.) BY 10% (ADJ.)

GAS HEAT
THE GAS HEAT WILL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT.

DX COOLING
THE DX COOLING WILL BE STAGED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT.

DEHUMIDIFICATION
THE DX COOLING WILL BE STAGED ON TO MAINTAIN THE SPACE RELATIVE HUMIDITY BELOW THE HIGH SETPOINT (ADJ.). THE HOT GAS REHEAT WILL BE MODULATED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT SETPOINT.

HUMIDIFICATION
THE PACKAGE HUMIDIFIER WILL BE ENABLED AND MODULATE THE SPACE RELATIVE HUMIDITY ABOVE THE LOW SETPOINT (ADJ.). THE DISCHARGE AIR HUMIDITY SENSOR WILL OVERRIDE THE HUMIDIFIER OUTPUT IF NECESSARY TO PREVENT THE DISCHARGE AIR HUMIDITY LEVEL FROM EXCEEDING THE HIGH LIMIT SETPOINT (ADJ.).

FILTER MONITORING
THE DIFFERENTIAL PRESSURES ACROSS EACH OUTSIDE AIR FILTER WILL BE MONITORED. AN ALARM WILL BE GENERATED WHEN THE DIFFERENTIAL PRESSURE ACROSS EITHER FILTER EXCEEDS THE SETPOINT (ADJ.).

SMOKE DETECTOR
THE DISCHARGE AIR SMOKE DETECTOR SHALL DISABLE THE UNIT'S FAN VIA HARD WIRED SHUTDOWN CIRCUIT UPON DETECTION OF SMOKE IN THE SUPPLY DUCT AND AN ALARM WILL BE GENERATED.

1 MAKEUP AIR UNIT CONTROLS SCHEMATIC

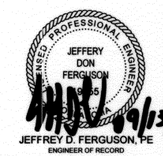
NOT TO SCALE

MAU POINTS LIST

POINT TYPE	OBJECT NAME	EXPANDED ID	END DEVICE	TREND
AI	OA-T	Outside Air Temperature	Temperature Sensor	*
AI	HC-T	Post-Heating Coil Air Temperature	Temperature Sensor	*
AI	CC-T	Post-Cooling Coil Air Temperature	Temperature Sensor	*
AI	DA-T	Discharge Air Temperature	Temperature Sensor	*
AI	DA-H	Discharge Air Humidity	Humidistat	*
AI	PFILT-S	Filter Differential Pressure	Diff Pressure Sensor	
AI	ZN-T	Space Temperature	Temperature Sensor	*
AI	ZN-H	Space Humidity	Humidistat	*
BI	LDAT-A	Low Discharge Air Temperature Alarm	Temperature Switch	
BI	HDAT-A	High Discharge Air Temperature Alarm	Temperature Switch	
BI	LSPH-A	Low Space Relative Humidity	Humidistat	
BI	HSPH-A	High Space Relative Humidity	Humidistat	
BI	SMK-A	Smoke Alarm	Switch	
BO	MAUC-1	MAU-1 Command	Relay	

CONTROLS PERFORMANCE SPECIFICATIONS

1. CONTROLS DESCRIPTION
   1.1. FURNISH ALL MATERIALS, EQUIPMENT AND TECHNICAL LABOR NECESSARY FOR A COMPLETE AND OPERATING CONTROL SYSTEM UTILIZING DIRECT DIGITAL CONTROLS. THIS SHALL INCLUDE, BUT IS NOT LIMITED TO, CONTROLLERS, SENSORS, POWER SUPPLIES, CABLE, CONDUIT, ETC.
   1.2. CONTROLLER SOFTWARE: PROVIDE ALL SOFTWARE AND COMMUNICATION ACCESSORIES REQUIRED TO PROGRAM AND COMMISSION THE CONTROLS PROVIDED. THE CONTROLLER SOFTWARE MUST HAVE THE CAPABILITY TO BE INSTALLED AND OPERATED ON A MINIMUM OF (5) COMPUTERS CONCURRENTLY.
   1.3. COMPATIBILITY: THE SYSTEM MUST UTILIZE THE LATEST FIELD PROVEN TECHNOLOGIES INCLUDING SURFACE MOUNT TECHNOLOGY AND PEER-TO-PEER COMMUNICATION. THE TEMPERATURE CONTROLS CONTRACTOR SHALL ONLY PROVIDE DEVICE LEVEL DDC CONTROLLERS WHICH USE THE BACNET MS/TP PROTOCOL FOR COMMUNICATION. ONLY FULLY PROGRAMMABLE CONTROLLERS FOR DIRECT CONNECTION OF ALL MECHANICAL AND MISCELLANEOUS EQUIPMENT, SENSORS AND CONTROLS SHALL BE PROVIDED.
   1.4. THE TEMPERATURE CONTROLS CONTRACTOR SHALL PROVIDE ALL HARDWARE AND SOFTWARE REQUIRED TO ALLOW COMMUNICATION AND FULL FUNCTIONALITY TO THE EXISTING WEB-BASED CONTROLS FRONT-END.
   1.5. WIRELESS CONTROLS SYSTEMS ARE NOT ALLOWED.
2. UNACCEPTABLE BIDS
   2.1. DDC CONTROLLERS PROVIDED BY WHOLESALERS, HVAC EQUIPMENT MANUFACTURERS, CONTRACTORS, FRANCHISE DEALERS OR ANY OTHER FIRM WHOSE PRINCIPLE BUSINESS IS NOT THAT OF MANUFACTURING OR INSTALLING AUTOMATIC TEMPERATURE CONTROL SYSTEMS SHALL NOT BE ACCEPTABLE.
3. WARRANTY
   3.1. THE TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE A ONE YEAR WARRANTY ON ALL HARDWARE AND SOFTWARE THAT WILL COMMENCE FROM THE POINT OF PROJECT ACCEPTANCE BY THE OWNER. THIS CONTRACTOR SHALL ALSO ASSUME RESPONSIBILITY FOR ALL SYSTEM UPGRADES AND PATCHES FROM THE MANUFACTURER DURING THE TERM OF THE WARRANTY.
   3.2. THE CONTRACTOR'S OFFICE SHALL BE WITHIN A 50 MILE RADIUS OF THE JOBSITE.
4. QUALITY ASSURANCE
   4.1. ELECTRICAL STANDARDS: PROVIDE ELECTRICAL PRODUCTS WHICH HAVE BEEN TESTED, LISTED AND LABELED BY UNDERWRITERS' LABORATORIES (UL) AND COMPLY WITH NEMA STANDARDS.
5. OWNER'S INSTRUCTIONS
   5.1. THE CONTROLS CONTRACTOR FURNISHING THE DDC CONTROLLERS AND OR DEVICES SHALL PROVIDE THE OWNER AND ENGINEER WITH DETAILS OF THE PROPOSED INTERFACE INCLUDING PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) FOR BACNET EQUIPMENT, HARDWARE AND SOFTWARE IDENTIFIERS FOR THE INTERFACE POINTS, NETWORK IDENTIFIERS, WIRING REQUIREMENTS, COMMUNICATION SPEEDS, AND REQUIRED NETWORK ACCESSORIES. THE CONTROLS CONTRACTOR SHALL INSURE THERE ARE NO UNRESOLVED ISSUES REGARDING THE INTEGRATION OF THESE PRODUCTS INTO THE DDC NETWORK.
6. HARDWARE SUPPORT
   6.1. THE TEMPERATURE CONTROLS CONTRACTOR SHALL MAINTAIN A MAINTENANCE SUPPORT FACILITY COMPLETE WITH SYSTEM TECHNICIANS, DIAGNOSTIC AND TEST EQUIPMENT AND ROUTINES, AND NEW SPARE DIGITAL CONTROLLERS, CONTROL COMPONENTS (INCLUDING ALL SPECIALTY CONTROL DEVICES), AND OPERATOR'S TERMINAL.
7. DIRECT DIGITAL CONTROLLERS
   7.1. CONTROLLERS SHALL BE A FULLY PROGRAMMABLE DDC CONTROLLER UTILIZING THE BACNET MS/TP PROTOCOL FOR COMMUNICATION IN A PEER-TO-PEER TOPOLOGY.
   7.2. THE CONTROLLERS AND SOFTWARE SHALL ALLOW FOR COMPLETE FUNCTIONALITY FROM THE EXISTING WEB-BASED CONTROLS FRONT-END.
   7.3. THE GRAPHICS SHALL DISPLAY THE STATUS OF ANY EQUIPMENT OR ZONE TO THE FRONT END AS A PRE-DEFINED COLOR.
   7.4. THE FOLLOWING PERFORMANCE SHALL BE REQUIRED.
      7.4.1. OPERATOR INTERFACE SHALL ALLOW EACH AUTHORIZED OPERATOR TO EXECUTE THE FOLLOWING FUNCTIONS AS A MINIMUM:
      7.4.2. LOG-IN AND LOG-OUT - SYSTEM SHALL REQUIRE USER NAME AND PASSWORD TO LOG-IN TO OPERATOR INTERFACE.
      7.4.3. POINT-AND-CLICK NAVIGATION - OPERATOR INTERFACE SHALL BE GRAPHICALLY BASED AND SHALL ALLOW OPERATORS TO ACCESS GRAPHICS FOR EQUIPMENT AND GEOGRAPHIC AREAS USING POINT-AND-CLICK NAVIGATION.
      7.4.4. VIEW AND ADJUST EQUIPMENT PROPERTIES - OPERATORS SHALL BE ABLE TO VIEW CONTROLLED EQUIPMENT STATUS AND TO ADJUST OPERATING PARAMETERS SUCH AS SETPOINTS, PID GAINS, ON AND OFF CONTROLS, AND SENSOR CALIBRATION.
      7.4.5. VIEW AND ADJUST OPERATING SCHEDULES - OPERATORS SHALL BE ABLE TO VIEW SCHEDULED OPERATING HOURS OF EACH SCHEDULABLE PIECE OF EQUIPMENT ON A WEEKLY OR MONTHLY CALENDAR-BASED GRAPHICAL SCHEDULE DISPLAY, TO SELECT AND ADJUST EACH SCHEDULE AND TIME PERIOD, AND TO SIMULTANEOUSLY SCHEDULE RELATED EQUIPMENT. SYSTEM SHALL CLEARLY SHOW EXCEPTION SCHEDULES AND HOLIDAYS ON THE SCHEDULE DISPLAY.
      7.4.6. VIEW AND RESPOND TO ALARMS. OPERATORS SHALL BE ABLE TO VIEW A LIST OF CURRENTLY ACTIVE SYSTEM ALARMS, TO ACKNOWLEDGE EACH ALARM, AND TO CLEAR (DELETE) UNNEEDED ALARMS.
      7.4.7. VIEW AND CONFIGURE TRENDS - OPERATORS SHALL BE ABLE TO VIEW A TREND GRAPH OF EACH TRENDED POINT AND BE ABLE TO EDIT GRAPH CONFIGURATION TO DISPLAY A SPECIFIC TIME PERIOD OR DATA RANGE. OPERATOR SHALL BE ABLE TO CREATE CUSTOM TREND GRAPHS TO DISPLAY DATA FROM MULTIPLE TRENDED POINTS ON THE SAME PAGE.
      7.4.8. VIEW AND CONFIGURE REPORTS - OPERATORS SHALL BE ABLE TO RUN PRECONFIGURED REPORTS, TO VIEW REPORT RESULTS, AND TO CUSTOMIZE REPORT CONFIGURATION TO SHOW DATA OF INTEREST.
      7.4.9. MANAGE CONTROL SYSTEM HARDWARE - OPERATORS SHALL BE ABLE TO VIEW CONTROLLER STATUS, TO RESTART (REBOOT) EACH CONTROLLER, AND TO DOWNLOAD NEW CONTROL SOFTWARE TO EACH CONTROLLER.
      7.4.10. MANAGE OPERATOR ACCESS - TYPICALLY, ONLY A FEW OPERATORS ARE AUTHORIZED TO MANAGE OPERATOR ACCESS. AUTHORIZED OPERATORS SHALL BE ABLE TO VIEW A LIST OF OPERATORS WITH SYSTEM ACCESS AND OF FUNCTIONS THEY CAN PERFORM WHILE LOGGED IN. OPERATORS SHALL BE ABLE TO ADD OPERATORS, TO DELETE OPERATORS, AND TO EDIT OPERATOR FUNCTION AUTHORIZATION. OPERATOR SHALL BE ABLE TO AUTHORIZE EACH OPERATOR FUNCTION SEPARATELY.
      7.4.11. SYSTEM SHALL MONITOR ALL OCCUPIED ZONES AND COMPILE AN INDEX THAT PROVIDES A NUMERICAL INDICATION OF THE ENVIRONMENTAL COMFORT WITHIN THE ZONE. AS A MINIMUM, THIS INDICATION SHALL BE BASED UPON THE DEVIATION OF THE ZONE TEMPERATURE FROM THE HEATING OR COOLING SETPOINT. IF HUMIDITY IS BEING MEASURED WITHIN THE ZONE THEN THE ENVIRONMENTAL INDEX SHALL BE ADJUSTED TO REFLECT A LOWER COMFORT LEVEL FOR HIGH OR LOW HUMIDITY LEVELS. SIMILARLY, IF CARBON DIOXIDE LEVELS ARE BEING MEASURED AS AN INDICATION OF VENTILATION EFFECTIVENESS THEN THE ENVIRONMENTAL INDEX SHALL BE ADJUSTED TO INDICATE DEGRADED COMFORT AT HIGH CARBON DIOXIDE LEVELS. OTHER ADJUSTMENTS MAY BE MADE TO THE ENVIRONMENTAL INDEX BASED UPON ADDITIONAL MEASUREMENTS. THE SYSTEM SHALL MAINTAIN A TREND OF THE ENVIRONMENTAL INDEX FOR EACH ZONE IN THE TREND LOG. THE SYSTEM SHALL ALSO COMPUTE AN AVERAGE COMFORT INDEX FOR EVERY BUILDING INCLUDED IN THIS CONTRACT AND MAINTAIN TREND LOGS OF THESE BUILDING ENVIRONMENTAL INDICES. SIMILARLY, THE SYSTEM SHALL COMPUTE THE PERCENTAGE OF OCCUPIED TIME THAT COMFORTABLE CONDITIONS WERE MAINTAINED WITHIN THE ZONES. THROUGH THE USER INTERFACE, THE USER SHALL BE ABLE TO ADD A WEIGHTING FACTOR TO ADJUST THE CONTRIBUTION OF EACH ZONE TO THE AVERAGE INDEX BASED UPON THE FLOOR AREA OF THE ZONE, IMPORTANCE OF THE ZONE, OR OTHER STATIC CRITERIA.
8. EASY FIRMWARE UPGRADES USING REMOTE DOWNLOADING - (CHIP REPLACEMENT NOT ACCEPTABLE)
9. THE EXISTING BUILDING AUTOMATION SYSTEM (BAS) CONSISTS OF A HIGH-SPEED, PEER-TO-PEER NETWORK OF DIRECT DIGITAL (DDC) CONTROLLERS, A CONTROL SYSTEM SERVER, AND A WEB-BASED OPERATOR INTERFACE.
10. THE WEB-BASED OPERATOR INTERFACE SHALL BE DEVELOPED TO INCLUDE ALL HVAC AND PLUMBING EQUIPMENT. THE FLOOR PLAN SHALL HAVE PENETRATING GRAPHICS TO ALLOW INDIVIDUAL MONITORING OF EACH UNIT. ALL SET POINTS, MINIMUM POSITIONS, RESET SCHEDULES, ETC. SHALL BE ADJUSTABLE BY THE OPERATOR AT THE WEB-BASED OPERATOR INTERFACE.
11. SYSTEM SOFTWARE SHALL BE BASED ON A SERVER/THIN CLIENT ARCHITECTURE, DESIGNED AROUND THE OPEN STANDARDS OF WEB TECHNOLOGY. THE CONTROL SYSTEM SERVER SHALL BE ACCESSED USING A WEB BROWSER OVER THE CONTROL SYSTEM NETWORK, THE OWNER'S LOCAL AREA NETWORK, AND (AT THE OWNER'S DISCRETION) OVER THE INTERNET.
12. THE INTENT OF THE THIN-CLIENT ARCHITECTURE IS TO PROVIDE OPERATORS COMPLETE ACCESS TO THE CONTROL SYSTEM VIA A WEB BROWSER. NO SPECIAL SOFTWARE OTHER THAN A WEB BROWSER SHALL BE REQUIRED TO ACCESS GRAPHICS, POINT DISPLAYS, AND TRENDS, CONFIGURE TRENDS, CONFIGURE POINTS AND CONTROLLERS, OR TO DOWNLOAD PROGRAMMING INTO THE CONTROLLERS.
13. SYSTEM SHALL USE THE BACNET PROTOCOL FOR COMMUNICATION TO THE OPERATOR WORKSTATION OR WEB SERVER AND FOR COMMUNICATION BETWEEN CONTROL MODULES. ALL I/O POINTS, SCHEDULES, SETPOINTS, TRENDS AND ALARMS SHALL BE BACNET OBJECTS.
14. ALL HARDWARE AND SOFTWARE POINTS REFERRED TO IN THE SEQUENCE OF OPERATION BUT NOT SHOWN ON THE PLANS ARE REQUIRED. LIKEWISE ALL HARDWARE AND SOFTWARE POINTS SHOWN ON THE PLANS BUT NOT MENTIONED IN THE SEQUENCE OF OPERATION ARE REQUIRED. ALL HARDWARE AND SOFTWARE REQUIRED FOR A COMPLETE AND OPERATIONAL CONTROLS SYSTEM ARE REQUIRED.
15. VFD START/STOP: DIRECTLY START/STOP THE VFD FROM THE FIELD CONTROL DEVICE. DO NOT START/STOP THE VFD OVER THE NETWORK VIA THE BACNET CARD.



9/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL CONTROLS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

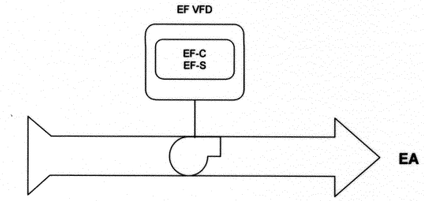
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	BZM	9/16	
	FIELD MGR.	BZM	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HBS	9/16	CITY ENGINEER

FILE: M-701.dwg DRAWING: DATE: 9/8/2016
ATLAS PAGE NO: 00016 SHEET 30 OF 40 SHEETS
SHEET NAME: MECHANICAL CONTROLS SHEET NO. M-701

Printed: 9/8/2016 11:40:09 AM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 085100-28\AB Jewell WTP Lab Office Remodel\Drawings\Sheet\M-701.dwg

GENERAL EXHAUST FAN



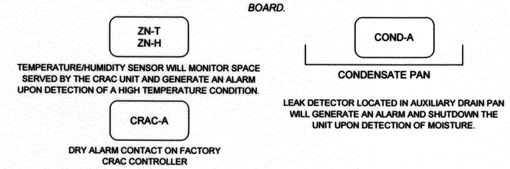
GENERAL EXHAUST FAN
THE EXHAUST FAN SHALL BE STARTED AND STOPPED FROM THE BUILDING MANAGEMENT SYSTEM. IF THE EXHAUST FAN STATUS, AS SENSED BY A CURRENT SENSOR, DOES NOT MATCH ITS COMMANDED VALUE AFTER 30 SECOND (ADJ.), AN ALARM WILL BE GENERATED

1 GENERAL EXHAUST FAN CONTROLS SCHEMATIC

NOT TO SCALE

COMPUTER ROOM AIR CONDITIONING UNIT

CRAC UNIT WILL BE CONTROLLED BY FACTORY FURNISHED CONTROL BOARD.



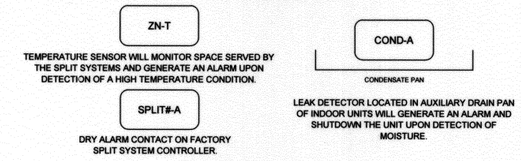
CLEAN AGENT SHUTDOWN (ALTERNATE ONLY):
UNIT SHALL BE WIRED TO SHUT DOWN UPON SIGNAL FROM CLEAN AGENT CONTROL PANEL. REFER TO CLEAN AGENT DRAWINGS.

2 CRAC CONTROLS SCHEMATIC

NOT TO SCALE

SPLIT SYSTEM UNITS

SPLIT SYSTEM WILL BE CONTROLLED BY FACTORY FURNISHED CONTROL BOARD

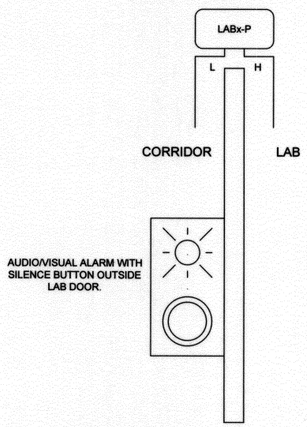


3 SPLIT SYSTEM CONTROLS SCHEMATIC

NOT TO SCALE

LAB ROOM PRESSURE

Typical of 7



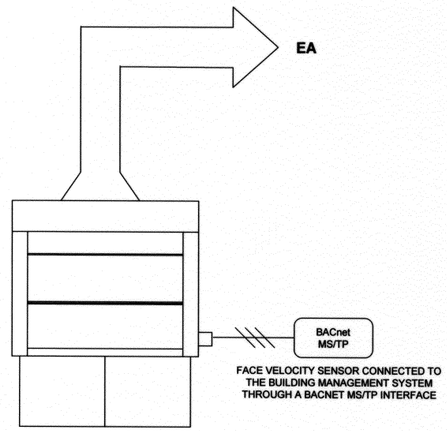
LAB PRESSURE MONITOR
THE BUILDING MANAGEMENT SYSTEM SHALL CONTINUALLY MONITOR THE ROOM PRESSURE DIFFERENTIAL BETWEEN THE LAB AND THE SURROUNDING SPACES TO ENSURE THE LAB IS NEGATIVELY PRESSURIZED COMPARED TO THE SURROUNDING SPACES. IF THE ROOM PRESSURE DIFFERENTIAL BECOMES POSITIVE, AN AUDIBLE AND VISUAL ALARM OUTSIDE THE LAB DOORS WILL BE ENERGIZED.

4 LABORATORY ROOM PRESSURE MONITORING

NOT TO SCALE

LABORATORY FUME HOODS

Typical of 8

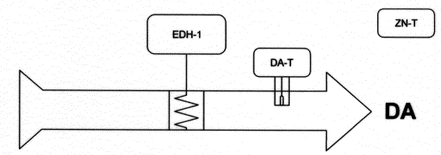


FUME HOOD VELOCITY MONITOR
THE FACE VELOCITY OF THE FUME HOOD WILL BE MONITORED BY THE BUILDING MANAGEMENT SYSTEM. IF THE FACE VELOCITY DROPS BELOW THE SETPOINT, AN AUDIBLE AND VISUAL ALARM ON THE OUTSIDE OF THE FUME HOOD WILL BE ENERGIZED.

5 LABORATORY FUME HOOD FLOW MONITORING

NOT TO SCALE

ELECTRIC DUCT HEATER



ELECTRIC DUCT REHEAT CONTROLS
REHEAT CONTROL SHALL RUN TO MAINTAIN SPACE TEMPERATURE SETPOINT (ADJ.) THE CONTROLLER SHALL MEASURE THE SPACE TEMPERATURE AND SHALL MODULATE THE REHEATING COIL TO MAINTAIN THE SPACE SETPOINT. THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.

THE HEATING SHALL BE MODULATED BY THE ON-BOARD PACKAGED CONTROLLER (FACTORY INSTALLED AND PROGRAMMED).

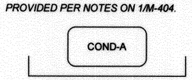
ALARMS SHALL BE PROVIDED AS FOLLOWS:
HIGH DISCHARGE AIR TEMPERATURE
LOW DISCHARGE AIR TEMPERATURE

6 ELECTRIC DUCT HEATER CONTROLS SCHEMATIC

NOT TO SCALE

CONDENSATE OVERFLOW PAN ALARM

PROVIDED PER NOTES ON 1/M-404.



LEAK DETECTOR LOCATED IN AUXILIARY DRAIN PAN WILL GENERATE AN ALARM AND SHUTDOWN ALL SPLIT UNITS UPON DETECTION OF MOISTURE.

7 CONDENSATE OVERFLOW PAN ALARM

NOT TO SCALE

LICENSED PROFESSIONAL ENGINEER
JEFFERY DON FERGUSON
VOL. 22
09/13/16

JEFFREY D. FERGUSON, PE
ENGINEER OF RECORD
CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

MECHANICAL CONTROLS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	SKG	08/2016	APPROVED:
	DESIGNED	SKG	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CSW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZRM	9/16	
	FIELD MGR.	PBM	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER

FILE: M-702.dwg DRAWING: DATE: 9/8/2016
ATLAS PAGE NO: 00016 SHEET 31 OF 40 SHEETS
SHEET NAME: MECHANICAL CONTROLS SHEET NO. M-702

Printed: 9/8/2016 11:40:11 AM
V:\Tulsa Public Works\Maintenance Elec & Mech 365100-28\AB Jewell WTP Lab Office Remodel\Drawings\Sheets\M-702.dwg

PART 1 GENERAL

1.1 GENERAL PROVISIONS:

A. FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS AND TEMPORARY POWER REQUIRED TO COMPLETE THE INSTALLATION OF THE ELECTRICAL SYSTEMS.

B. OBTAIN ALL PERMITS, INSPECTIONS AND APPROVALS AS REQUIRED BY THE LOCAL AUTHORITIES HAVING JURISDICTION (AHJ). ALL ASSOCIATED FEES SHALL BE PAID BY THE CONTRACTOR AND/OR CONSTRUCTION MANAGER. COORDINATE WITH THE CONSTRUCTION MANAGER.

C. ALL MATERIALS, EQUIPMENT AND SYSTEM APPURTENANCES OF THE ELECTRICAL SYSTEMS NECESSARY FOR ITS PROPER OPERATION AND INSTALLATION, BUT NOT NECESSARILY STATED OR SHOWN ON THE DRAWINGS SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR AND BE INCLUDED IN THEIR SCOPE OF WORK AND BID.

D. THE ELECTRICAL CONTRACTOR SHALL FULFILL ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS AND SHALL COMPLETE THE IMPROVEMENTS SHOWN IN THE CONTRACT DOCUMENTS. ALL SYSTEMS SHALL BE PROVIDED AND PROVEN TO BE FULLY OPERATIONAL AND FUNCTIONAL.

E. WORK SHALL BE IN ACCORDANCE WITH ALL OF THE FOLLOWING MINIMUM APPLICABLE REQUIREMENTS OF THE LATEST GOVERNING CODES. FINAL APPROVAL OF ALL WORK SHALL BE IN COMPLIANCE WITH THE AUTHORITIES HAVING JURISDICTION. WHERE THERE ARE CONFLICTS WITH CODES AND OR AUTHORITIES HAVING JURISDICTION, THE MOST STRINGENT SHALL APPLY AND BE IMPLEMENTED.

1. NATIONAL ELECTRICAL CODE (NEC)
2. INTERNATIONAL BUILDING CODE (IBC)
3. INTERNATIONAL MECHANICAL CODE (IMC)
4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
5. AMERICANS WITH DISABILITIES ACT (ADA)
6. LOCAL CODES AND AMENDMENTS
7. NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)
8. OWNER'S CONSTRUCTION STANDARDS
9. BUILDING STANDARDS

F. MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL CONFORM TO THE FOLLOWING CURRENT APPLICABLE INDUSTRY STANDARDS:
1. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
2. ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)
3. UL (UNDERWRITERS LABORATORIES)
4. IEEE (INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS)
5. IPCEA (INSULATED POWER CABLE ENGINEERS ASSOCIATION)

G. SUBSTITUTION REQUESTS: ALL SUBSTITUTION REQUESTS FOR EQUIPMENT AND MATERIALS SHALL BE SUBMITTED FOR REVIEW PRIOR TO BID IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. REFER TO SPECIFICATION SECTION 012500.

H. CONTRACTOR SHALL REVIEW ALL DOCUMENTS, PRIOR TO SUBMITTING BID PROPOSAL, INCLUDING, BUT NOT LIMITED TO, DOOR SCHEDULES, REFLECTED CEILING PLANS, ARCHITECTURAL DETAILS, MECHANICAL DRAWINGS, AND MECHANICAL SCHEDULES. REQUIREMENTS AND INFORMATION NECESSARY FOR THE ELECTRICAL MAY BE FOUND IN OTHER DISCIPLINE'S DOCUMENTS.

I. COORDINATE AND VERIFY ALL WORK SHOWN ON THESE DOCUMENTS WITH ALL OTHER DISCIPLINE'S CONTRACT DOCUMENTS DRAWINGS AND EXISTING CONDITIONS. IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF DISCREPANCIES FOUND.

J. COORDINATE WITH THE WORK OF ALL OTHER TRADES INVOLVED IN THIS PROJECT. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO VERIFY THE ACTUAL LOCATION OF THE EQUIPMENT, DUCTWORK, PIPING, STRUCTURE, ETC., AND COORDINATE THE INSTALLATION ACCORDINGLY.

K. CONTRACTOR SHALL SURVEY SITE DURING BIDDING PROCESS AND FULLY FAMILIARIZE THEMSELVES WITH ALL CONDITIONS THAT AFFECT THE WORK OR COST THEREOF. PROVIDE REQUESTS FOR INFORMATION, AS REQUIRED AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

L. COORDINATE WITH ALL UTILITY COMPANIES FROM WHO SERVICES SHALL BE SUPPLIED; VERIFY LOCATIONS OF UTILITY SERVICE POINTS, DEMARCATIONS AND INTERFACES AND DETERMINE EXACT REQUIREMENTS.

M. THE ELECTRICAL SYSTEMS SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC. EXACT LOCATION OF EQUIPMENT SHALL BE COORDINATED WITH ARCHITECT, OTHER TRADES AND FIELD CONDITIONS.

N. CONDUIT RUNS SHOWN ARE DIAGRAMMATIC IN NATURE. CONTRACTOR IS RESPONSIBLE FOR SIZING AND LOCATING PULL BOXES PER NEC AND FOR COORDINATION WITH OTHER TRADES.

O. EQUIPMENT SHOWN ON DRAWINGS REPRESENTS ONE MANUFACTURER. CONTRACTOR SHALL CONFIRM SUBMITTED EQUIPMENT WILL FIT THE SPACE AS SHOWN ON THE CONTRACT DOCUMENTS AND MAINTAIN ALL WORKING CLEARANCE REQUIREMENTS PER NATIONAL ELECTRICAL CODE OR AS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.

P. DO NOT SCALE OR DIMENSION LOCATIONS FROM THESE DRAWINGS.

PART 2 PRODUCTS

2.1. MATERIALS, EQUIPMENT, AND DEVICES SHALL BE LISTED AND LABELED BY A NATIONALLY RECOGNIZED AND APPROVED TESTING AGENCY AS OUTLINED IN THE NATIONAL ELECTRICAL CODE.

2.2. FIRESTOPPING MATERIAL SHALL BE MANUFACTURED BY 3M OR ENGINEER APPROVED EQUAL.

2.3. CONDUIT RACEWAYS:

A. CONDUIT SIZES SHOWN ON DRAWINGS ARE BASED ON THHN/THWN INSULATION AND EMT. CONTRACTOR SHALL ADJUST CONDUIT SIZE FOR CONDUCTORS OF DIFFERENT INSULATION AND CONDUIT OTHER THAN EMT.

B. CONDUIT TYPES PERMITTED:

1. RIGID METAL CONDUIT (RMC)-EXTERIOR ABOVE GRADE.
2. PVC SCHEDULE 40 (MINIMUM)-BELOW GRADE.
3. ELECTRICAL METALLIC TUBING (EMT)-INTERIOR.
4. LIQUID TIGHT FLEXIBLE METAL CONDUIT: SEAL-TIGHT, WITH PVC JACKET. FINAL CONNECTIONS TO MECHANICAL EQUIPMENT. NOT TO EXCEED 6'-0".
5. METAL CLAD CABLE (MC)-MAY BE USED FOR FIXTURE WHIPS ONLY. WHIPS SHALL NOT EXCEED 6'-0" IN LENGTH.
6. PROVIDE FACTORY PVC COATED GALVANIZED RIGID CONDUIT ELBOWS ON ALL UNDERGROUND CONDUITS AND USE PVC COATED GALVANIZED RIGID CONDUIT WHERE STUBBED UP THROUGH A SLAB. ALL UNDERGROUND METALLIC SURFACES, INCLUDING FITTINGS, SHALL BE FACTORY PVC COATED.
7. FLEXIBLE METAL CONDUIT (FMC) - FINAL CONNECTIONS TO LIGHT FIXTURES, EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS. NOT TO EXCEED 6'-0".
8. INTERMEDIATE METAL CONDUIT (IMC)-USES PERMITTED BY NEC.

ALL CONDUITS NOT SPECIFICALLY LISTED ABOVE SHALL NOT BE ALLOWED.

C. STEEL CONDUIT:

1. "HEAVY WALL" GALVANIZED RIGID METAL CONDUIT (RMC) SHALL BE USED IN THE FLOOR SLAB FOR ALL FEEDERS AND FOR INSTALLATION IN CONCRETE OR IN WET LOCATIONS OR WHERE THE RACEWAY MAY BE EXPOSED TO WEATHER OR SUBJECT TO MECHANICAL DAMAGE. WHERE EXTERIOR CONDUITS TERMINATE AT AN INTERIOR PANEL, PROVIDE CABLE TERMINATORS TO SEAL CONDUITS FROM WATER ENTRY.
2. "THIN WALL" GALVANIZED ELECTRICAL METALLIC TUBING (EMT) SHALL BE USED IN WALLS, CEILINGS, AND FOR EXPOSED SURFACE MOUNTED OUTLET LOCATIONS.
3. FLEXIBLE STEEL CONDUIT, USE 1/2" MINIMUM. FLEXIBLE CONDUIT SHALL BE USED FOR THE FOLLOWING APPLICATION ONLY.
   a. FOR FINAL CONNECTION TO MOTOR. 6'-0" MAX.
   b. FROM BOX TO RECESSED LIGHTING FIXTURE 4' MIN., 6' MAX.

D. MINIMUM INTERIOR CONDUIT SIZE SHALL BE 1/2", MINIMUM EXTERIOR CONDUIT SIZE SHALL BE 3/4".

E. PVC- WHERE APPROVED BY LOCAL AND STATE CODE AUTHORITIES FOR THE UNDERGROUND INSTALLATION. PVC CONDUIT SHALL BE SCHEDULE 40 (MINIMUM), 90 DEGREES C, LISTED. ALL JOINTS SHALL BE SOLVENT CLEANED AND WELDED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER.

F. UNLESS NOTED OTHERWISE NON-METALIC RACEWAYS ARE PROHIBITED.

2.1. OUTLET BOXES AND CONDUIT FITTINGS:

A. FURNISH OUTLETS AND BOXES WHERE REQUIRED BY DOCUMENTS, EQUIPMENT REQUIREMENTS, OR CODE. ALL OUTLET AND SWITCH BOXES SHALL BE SIZED TO PROVIDE SPACE FOR WIRING DEVICES, CONDUCTORS, AND GROUNDING CONDUCTORS. NON-METALLIC OUTLET BOXES ARE NOT ACCEPTABLE.

B. INTERIOR BOXES SHALL BE HOT-DIPPED GALVANIZED, 4 INCH MINIMUM SQUARE 1-1/2 INCH DEEP, UNLESS OTHERWISE NOTED. BOX OPENING FOR OUTLETS INSTALLED FLUSH IN DRYWALL MAY BE SINGLE OR MULTIPLE GANG (MUD-RING) AS REQUIRED. BOXES SHALL BE SET BACK TO ALLOW THE INSTALLATION OF A SQUARE CUT AND RAISED ADAPTER RING; DEPTH OF RAISED PORTION SHALL MATCH THE WALL CONSTRUCTION.

C. PULL AND JUNCTION BOXES ARE NOT COMPLETELY SHOWN ON DRAWINGS. THEY SHALL BE INSTALLED WHERE REQUIRED, IN ACCORDANCE WITH THE NEC. ALL BOXES SHALL BE CONSTRUCTED OF #14 GAUGE MINIMUM HOT DIPPED GALVANIZED STEEL, CAST OR SHEET ALUMINUM WITH SCREWED OR HINGED COVER. FASTENERS SHALL BE BRASS OR ZINC COATED SCREWS. WHERE EXPOSED TO WEATHER, MOISTURE-TIGHT GASKET SHALL BE PROVIDED. ELECTRICAL BOXES WITH UNUSED KNOCKOUTS SHALL BE PLUGGED. ALL BOXES SHALL BE OF ADEQUATE SIZE WITHOUT THE USE OF EXTENSION RINGS.

D. PROVIDE A BLANK COVER FOR EACH BOX WHERE A DEVICE IS NOT INSTALLED.

E. UNLESS OTHERWISE NOTED NON-METALLIC BOXES ARE PROHIBITED.

F. CONDUIT CONNECTORS:
1. ALL FITTINGS FOR RIGID METAL CONDUITS SHALL BE THREADED TYPE UNLESS NOTED OTHERWISE.
2. DIE CAST FITTINGS ARE PROHIBITED.
3. INDOOR EXPOSED EMT FITTINGS SHALL BE STEEL COMPRESSION TYPE FOR ALL SURFACE MOUNT OR EXPOSED RACEWAY BELOW 10'-0". SCREW TYPE COUPLINGS AND FITTINGS MAY BE USED WHERE CONDUIT IS ROUTED CONCEALED IN WALLS OR IN CEILING ABOVE 10'-0".
4. INDOOR CONCEALED EMT FITTINGS MAY BE SET SCREW TYPE.
5. OUTDOOR RMC OR IMC CONNECTIONS INTO SHEET METAL BOXES SHALL BE MADE WITH MEYERS SEAL-TIGHT HUBS WHERE ENTERING FROM THE SIDE OR TOP OF BOX.
6. THREADLESS RMC OR IMC FITTINGS SHALL NOT BE USED. INDOOR RMC OR IMC CONNECTIONS SHALL BE MADE WITH DOUBLE LOCK NUTS AND BUSHINGS. PROVIDE INSULATED BUSHINGS FOR COMMUNICATION CONDUITS.
7. INDOOR MC FITTINGS SHALL BE SET SCREW TYPE.

G. COMPLY WITH NECA FOR INSTALLATION OF HANGERS, AND RACEWAYS FOR ELECTRICAL EQUIPMENT AND SYSTEMS EXCEPT IF REQUIREMENTS IN THIS SECTION ARE MORE STRINGENT.

2.5 SUPPORTING DEVICES:

A. ANCHORS AND FASTENERS
1. STEEL STRUCTURAL ELEMENTS: USE BEAM CLAMPS. WELDED FASTENERS MAY BE USED WITH APPROVAL FROM STRUCTURAL ENGINEER.
2. CONCRETE SURFACES: USE SELF-DRILLING ANCHORS AND EXPANSION ANCHORS.
3. MASONRY, PLASTER, AND GYPSUM BOARD: USE TOGGLE BOLTS AND HOLLOW WALL FASTENERS.
4. SOLID MASONRY WALLS: USE EXPANSION ANCHORS.
5. SHEET METAL: USE SHEET METAL SCREWS.
6. WOOD ELEMENTS: USE WOOD SCREWS.

B. INSTALLATION
1. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DO NOT FASTEN SUPPORTS TO PIPES, DUCTS, MECHANICAL EQUIPMENT, AND CONDUIT.
3. DO NOT USE SPRING STEEL CLIPS AND CLAMPS.
4. DO NOT USE POWDER-ACTUATED ANCHORS.
5. DO NOT DRILL OR CUT STRUCTURAL MEMBERS.
6. PROVIDE SUPPORTS LOCATED PER NEC CODE.
7. NO RACEWAYS SHALL BE SUPPORTED FROM CEILING, CEILING GRID SUPPORTS OR OTHER TYPE OF SUPPORT WIRE.

C. COMPLY WITH NECA FOR INSTALLATION OF SUPPORTS FOR ELECTRICAL EQUIPMENT AND SYSTEMS EXCEPT IF REQUIREMENTS IN THIS SECTION ARE STRICTER.

2.6 CONDUCTORS:

A. CONDUCTORS AS INDICATED AND REQUIRED BY THE DRAWINGS SHALL BEAR THE UL LABEL AND STAMPING INDICATING CONDUCTOR SIZE, TYPE, VOLTAGE, AND GRADE, AND SHALL MEET THE STANDARD SPECIFICATIONS AND TEST ESTABLISHED FOR SUCH MATERIALS AND CONSTRUCTION BY ASTM, NEMA, ANSI, AND IPCEA WHERE APPLICABLE.

B. CONDUCTOR SHALL BE CODE GAUGE, SOFT COPPER, NOT LESS THAN 98% CONDUCTIVITY AND OF THE 600 VOLT INSULATION UNLESS OTHERWISE NOTED.

C. COLOR CODE CONDUCTORS IN ACCORDANCE WITH NEC, LOCAL CODES, AND THE FOLLOWING:

1. 120/208 VOLT

PHASE A	BLACK
PHASE B	RED
PHASE C	BLUE
NEUTRAL	WHITE
GROUND	GREEN
ISOLATED GND	GREEN WITH YELLOW STRIPE
SWITCH LEG	PURPLE
3 WAY TRAVELER	PINK

2. 277/480 VOLT

PHASE A	BROWN
PHASE B	ORANGE
PHASE C	YELLOW
NEUTRAL	GRAY
GROUND	GREEN
SWITCH LEG	PURPLE WITH STRIPE
3 WAY TRAVELER	PINK WITH STRIPE

D. #10 AWG AND SMALLER CONDUCTORS SHALL BE COLOR CODED BY A CONTINUOUS OUTER COVERING. CONDUCTORS LARGER THAN #10 AWG MAY BE COLOR CODED BY TAPE OR CONTINUOUS OUTER COVERING.

E. EXPOSED FEEDERS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

F. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THHN-THWN SINGLE CONDUCTORS IN RACEWAY.

G. FEEDERS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN-THWN-2, SINGLE CONDUCTORS IN RACEWAY.

H. EXPOSED BRANCH CIRCUITS, INCLUDING IN CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

I. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

J. BRANCH CIRCUITS CONCEALED IN UNFILLED CELLS OF CONCRETE BLOCK WALLS: METAL CLAD CABLE, TYPE MC.

K. BRANCH CIRCUITS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.

L. BRANCH CIRCUIT AND FEEDER CONDUCTORS SIZE #10 AWG AND SMALLER SHALL BE SOLID. BRANCH CIRCUIT AND FEEDER CONDUCTORS SIZE #8 AWG AND LARGER SHALL BE STRANDED.

2.7 CONDUCTOR CONNECTIONS AND DEVICES:

A. MAKE SPLICES IN #8 AWG AND SMALLER WITH INSULATED TWIST-ON WIRE CONNECTORS. MAKE SPLICES IN #6 AWG AND LARGER WITH CU/AL LISTED COMPRESSION CONNECTORS.

B. DO NOT INSTALL MORE THAN THREE PHASE, ONE NEUTRAL, ONE INSULATED EQUIPMENT GROUNDING CONDUCTOR AND/OR ISOLATED GROUND CONDUCTORS IN ANY ONE CONDUIT, UNLESS NOTED OTHERWISE. ALL CONDUITS SHALL CONTAIN A SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR.

C. RECEPTACLE DEVICES SHALL BE GROUNDING TYPE COMMERCIAL GRADE AS FOLLOWS:
1. DUPLEX RECEPTACLE 20A 125V, NEMA 5-20R
2. BACK AND SIDE WIRED
3. EXTERIOR DUPLEX 20A 125V, NEMA 5-20R GFCI PROTECTED
4. GROUND FAULT CIRCUIT INTERRUPTER 20A 125V, NEMA 5-20R
5. ALL RECEPTACLES IN CORRIDORS AND AREAS SUBJECT TO ABUSE SHALL BE HOSPITAL GRADE

D. SWITCHES SHALL BE COMMERCIAL GRADE, BACK AND SIDE WIRED, 120/277V AND 20A RATED.

E. FINISH OF DEVICES AND COVER PLATES SHALL BE IVORY.

F. COVER PLATES:
1. MATERIAL OF INTERIOR DEVICE COVER PLATES SHALL BE AS SELECTED BY THE ARCHITECT.
2. WEATHERPROOF WHILE IN USE COVER PLATES SHALL BE CAST METAL. PLASTIC WEATHERPROOF COVER PLATES WILL NOT BE ALLOWED.

N. ACCEPTABLE MANUFACTURERS:
1. WIRING DEVICES AND PLATES AS MANUFACTURED BY ARROW HART, P&S, BRYANT, HUBBELL, LEVITON, GE OR APPROVED EQUALS.
2. DEVICES OR PLATES FOUND NOT TO BE AS SPECIFIED SHALL BE REMOVED AND REPLACED WITH SPECIFIED DEVICE AT CONTRACTOR'S EXPENSE.

2.8 LIGHTING:

A. LIGHTING FIXTURES SHALL BE BASED ON LIGHT FIXTURES SPECIFIED IN ELECTRICAL DRAWINGS.

2.9 SAFETY SWITCHES:

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE SWITCHES BY ONE OF THE FOLLOWING:
1. EATON ELECTRICAL INC.; CUTLER-HAMMER PRODUCTS
2. GENERAL ELECTRIC
3. SIEMENS
4. SQUARE D

B. FURNISH FUSIBLE OR NON-FUSIBLE SWITCHES AS SHOWN ON THE DRAWINGS. SWITCHES SHALL BE HORSEPOWER-RATED. INDOOR SWITCHES SHALL BE NEMA 1; OUTDOOR SWITCHES SHALL BE NEMA 3R, UNLESS NOTED OTHERWISE. SWITCHES SHALL BE RATED FOR THE CONNECTED SYSTEM VOLTAGE. SWITCHES SHALL BE HEAVY DUTY QUICK MAKE, QUICK BREAK. FURNISH REJECTION TYPE FUSE HOLDERS AND TYPE R FUSES UNLESS OTHERWISE NOTED.

2.10 PANELBOARDS:

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PANELBOARDS BY ONE OF THE FOLLOWING:
1. EATON ELECTRICAL INC.; CUTLER-HAMMER PRODUCTS
2. GENERAL ELECTRIC
3. SIEMENS
4. SQUARE D

B. THE CONTRACTOR SHALL INSTALL FULLY RATED, TOTALLY ENCLOSED, DEAD FRONT, PANELBOARDS IN ACCORDANCE WITH THE LATEST APPLICABLE STANDARDS OF NEMA AND UL.

C. PANELBOARD ENCLOSURE SHALL BE CONSTRUCTED OF STEEL WITH RIGIDITY AND GAUGE IN ACCORDANCE WITH UL 50. TRIMS SHALL BE COMPLETE WITH DOORS CONTAINING LOCK. ENCLOSURE AND TRIMS SHALL BE FINISHED WITH RUST INHIBITING PRIME COAT WITH BAKED-ON ENAMEL FINISH COAT IN MANUFACTURER'S COLOR.

D. BUS STRUCTURE AND MAIN BREAKER SHALL HAVE AMPACITY RATINGS AS INDICATED ON THE DRAWINGS. THE BUS BARS SHALL BE OF SUCH SIZE, QUANTITY, AND SPACING SO THAT UNDER FULLY LOADED CONDITIONS, THE TEMPERATURE RISE SHALL NOT EXCEED 50 DEGREES C. ABOVE AMBIENT. HEAT TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH UL 67.

E. BUS BARS SHALL BE TIN PLATED ALUMINUM OR TIN PLATED COPPER.

F. EACH PANELBOARD, AS A COMPLETE UNIT, SHALL HAVE A SHORT CIRCUIT RATING EQUAL TO OR GREATER THAN THE MINIMUM INTEGRATED AIC RATING INDICATED ON THE DRAWINGS.

G. ALL DISTRIBUTION CIRCUIT BREAKERS SHALL BE MANUALLY OPERATED, THERMAL-MAGNETIC, AUTOMATIC TRIPPING, OF THE AMPACITY AND POLES AS SCHEDULED ON THE DRAWINGS. THEY SHALL BE QUICK-MAKE, QUICK-BREAK TYPE. BREAKERS SHALL BE OVER-THE-CENTER TOGGLE OPERATING TYPE, WITH THE HANDLE GOING TO A POSITION BETWEEN "ON" AND "OFF" TO INDICATE AUTOMATIC TRIPPING. ALL MULTI-POLE BREAKERS SHALL HAVE INTERNAL COMMON TRIP, HANDLE TIES WILL NOT BE ACCEPTED.

H. ALL CIRCUIT BREAKERS, INCLUDING ANY CONNECTORS TO THE MAIN BUS SHALL BE BOLT-ON TYPE AND RIGIDLY BRACED. THE SPACES SHALL BE COMPLETE WITH ALL BUS AND REQUIRED BUS CONNECTORS SUCH THAT FUTURE BREAKERS CAN BE INSTALLED WITHOUT ADDING OR CHANGING BUS CONNECTORS ON THE MAIN BUS AND WITHOUT USING A LARGER (FRAME SIZE) OR DIFFERENT TYPE OF BREAKER THAN THE TRIP SIZE AND INTERRUPTING CAPACITY WOULD REQUIRE.

I. CIRCUIT BREAKERS SERVING SECURITY EQUIPMENT, COMMUNICATIONS AND FIRE ALARM SHALL HAVE HANDLE LOCKS.

J. PROVIDE PANELBOARDS THAT ARE CONSTRUCTED TO WITHSTAND SEISMIC FORCES FOR REGION OF INSTALLATION.

K. IDENTIFY PANELBOARDS PER IDENTIFICATION SECTION.

2.11 IDENTIFICATION:

A. PROVIDE ELECTRICAL IDENTIFICATION FOR EACH PANELBOARD, VFD, STARTER, AND DISCONNECT. UTILIZE ENGRAVED ACRYLIC OR MELAMINE NAMEPLATE IN CONTRASTING COLORS AND OF SIZE APPROVED BY ENGINEER. MECHANICALLY CONNECT NAMEPLATE WITH STAINLESS-STEEL SCREWS OR STAINLESS-STEEL MACHINE SCREWS WITH NUTS, FLAT WASHERS, AND LOCK WASHERS.

B. NAMEPLATES
1. NAMEPLATES SHALL BE 4"X1"X1/8" MINIMUM WITH WHITE CORE, BLACK FACE, ACRYLIC OR MELAMINE WITH ENGRAVED 3/8" MINIMUM LETTERS.

C. PROVIDE PANEL DESIGNATION AND CIRCUIT NUMBER FOR ALL ELECTRICAL JUNCTION BOX COVERS. PROVIDE SELF-ADHESIVE VINYL LABELS: PREPRINTED, FLEXIBLE LABEL LAMINATED WITH A CLEAR, WEATHER-AND CHEMICAL-RESISTANT COATING. PERMANENT MARKER IS ACCEPTABLE FOR ALL JUNCTION BOXES LOCATED ABOVE CEILINGS.

PART 3 - EXECUTION

3.1 PREPARATION:

A. COORDINATE:
1. COORDINATE THE INSTALLATION OF ELECTRICAL WITH THE SCHEDULE AND WORK OF OTHER TRADES TO PREVENT UNNECESSARY DELAYS AND OR COSTS IN THE TOTAL WORK.
2. COORDINATE WITH MECHANICAL AND OR CONTROLS CONTRACTOR FOR TEMPERATURE CONTROL AND INTERLOCK WIRING REQUIREMENTS PRIOR TO SUBMITTING BID PROPOSAL.

3.2 INSTALLATION OF RACEWAYS AND FITTINGS:

A. SECURELY AND RIGIDLY SUPPORT CONDUITS TO SUPER STRUCTURE THROUGHOUT THE WORK.

B. INSTALL RACEWAYS PARALLEL AND PERPENDICULAR TO SURFACES OF STRUCTURAL MEMBERS. FOLLOW SURFACE CONTOURS, WHERE POSSIBLE, IN EXPOSED AREAS.

C. COMPLY WITH ALL APPLICABLE NECA STANDARDS FOR INSTALLATION OF HANGERS, SUPPORTS AND RACEWAYS FOR ELECTRICAL EQUIPMENT AND SYSTEMS.

D. PVC COATED SURFACES DAMAGED DURING INSTALLATION AND OR CONSTRUCTION SHALL HAVE THE DAMAGED SURFACE TOUCHED-UP WITH MANUFACTURER APPROVED COMPOUND.

E. USE FLEXIBLE METALLIC CONDUIT ONLY FOR SHORT MOTOR CONNECTIONS, OR WHERE SUBJECT TO VIBRATION.

F. CONDUITS THROUGH PERIMETER BUILDING WALLS SHALL HAVE INTERNAL AND EXTERNAL SEALS.

3.3 INSTALLATION OF CONDUCTORS:

A. NO CONDUCTOR SHALL BE SMALLER THAN #12 AWG, EXCEPT THAT WIRING FOR SIGNAL AND PILOT CONTROL CIRCUITS MAY BE #14 AWG, UNLESS NOTED OTHERWISE.

B. ALL 120V CIRCUITS LONGER THAN 100' SHALL BE #10 AWG MINIMUM.

3.4 CONDUCTOR CONNECTIONS AND DEVICES:

A. ALL ELECTRICAL CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH ARTICLE 110 OF THE NEC.

B. ALL 120 VOLT 20A RECEPTACLES IN THE FOLLOWING LOCATIONS SHALL BE GFCI OR BE PROVIDED WITH GFCI PROTECTION: WITHIN 6 FEET OF A PLUMBING FIXTURE, AND WHERE REQUIRED BY THE NATIONAL ELECTRICAL CODE. ALL OUTDOOR RECEPTACLES SHALL HAVE IN-USE WEATHER-PROOF COVERS.

3.5 IDENTIFICATION AT PANELS:

A. PANEL DIRECTORIES SHALL BE TYPED AND FILLED OUT BY ELECTRICAL CONTRACTOR AFTER TESTING AND CHECKOUT AND BE MOUNTED IN DIRECTORY FRAME INSIDE OF PANEL DOOR. PROVIDE ACCURATE TYPED PANELBOARD SCHEDULES IN ALL NEW AND EXISTING PANELS. MOUNT DIRECTORY BEHIND PLASTIC ON THE INSIDE OF EACH PANEL DOOR. PROVIDE CIRCUIT NUMBER AND COMPLETE DESCRIPTION OF ALL LOADS ON EACH CIRCUIT.

B. PROVIDE NAMEPLATE ON THE PANELBOARD WITH THE PANEL DESIGNATION, VOLTAGE, PHASE, AND POWER SOURCE.

3.6 MATERIAL AND EQUIPMENT:

A. ALL MATERIALS AND EQUIPMENT SHALL BE NEW, OF THE SAME TYPE AND MANUFACTURER, AND SHALL BE FREE FROM DEFECTS. DEFECTIVE AND OR DAMAGED EQUIPMENT SHALL BE REMOVED FROM THE SITE AND REPLACED WITH NEW AT CONTRACTOR'S EXPENSE.

B. MAKE FINAL ELECTRICAL CONNECTIONS TO NEW AND ANY RELOCATED EQUIPMENT.

3.7 GROUNDING:

A. A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED WITH THE CIRCUIT CONDUCTORS, WHETHER INDICATED ON THE DRAWINGS OR NOT. METAL RACEWAY, CABLE ARMOR OR SHEATH SHALL NOT BE USED AS THE PREFERRED EQUIPMENT GROUNDING CONDUCTOR. RACEWAY SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONTINUOUS AND SHALL BE BONDED AT ALL POINTS TO THE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF NEC ARTICLE 250.

B. IN THE LIGHTING SYSTEM, THE EQUIPMENT GROUNDING CONDUCTOR OF EACH CIRCUIT SHALL BE CONNECTED TO THE EQUIPMENT GROUNDING SCREW OF THE LIGHTING FIXTURE.

3.8 LIGHTING:

A. LIGHTING CONTROL DEVICES SHOWN IN ROOMS/AREAS SHALL CONTROL THE FIXTURES IN THAT ROOM/AREA, UNLESS NOTED OTHERWISE.

B. SUPPORT LIGHT FIXTURE FROM THE STRUCTURE. FIXTURES SHALL NOT SOLELY BE SUPPORTED FROM THE CEILING.

BEFORE YOU DIG
1-800-552-6543
811
CALL OKIE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER
Christopher A. Harwell
21109
OKLAHOMA
9-13-16

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

ELECTRICAL SPECIFICATIONS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE:	DRAWN	JWE	08/2016	APPROVED:
AS INDICATED	DESIGNED	JWE	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZCM	9/16	
	FIELD MGR.	RBV	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: E-001.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 32 OF 40 SHEETS
SHEET NAME: ELECTRICAL SPECIFICATIONS				SHEET NO. E-001

Printed: 9/7/2016 2:24:23 PM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\E-001.dwg

3.9 SAFETY SWITCHES:

A. CONTRACTOR SHALL PROVIDE A HEAVY DUTY DISCONNECT FOR ALL MOTORS WHICH ARE NOT PROVIDED BY THE MANUFACTURER WITH A UL LISTED DISCONNECT. WHERE NO INTERNAL OVERLOAD PROTECTION IS PROVIDED, PROVIDE A STARTER (IF REMOTELY CONTROLLED) OR MOTOR STARTING SWITCH AS REQUIRED. PROVIDE MELTING ALLOY OR ELECTRONIC TRIP MOTOR OVERLOAD PROTECTION SIZED PER MANUFACTURER'S RECOMMENDATIONS.

3.10 CUTTING AND PATCHING:

A. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING AND PENETRATING ALL FLOORS, WALLS, PARTITIONS, CEILINGS OR OTHER CONSTRUCTION REQUIRED FOR PROPER INSTALLATION OF THEIR WORK. CUTTING AND PENETRATING SHALL COMPLY WITH BUILDING CODE REQUIREMENTS. NO CUTTING OR PENETRATIONS SHALL BE DONE WITHOUT PRIOR APPROVAL OF THE ARCHITECT AND OR STRUCTURAL ENGINEER. ALL CUTTING AND PENETRATIONS SHALL BE PERFORMED AS DIRECTED BY THE ARCHITECT AND OR STRUCTURAL ENGINEER.

B. PROVIDE FIRESTOPPING FOR ALL FIRE RATED WALL, FLOOR AND CEILING PENETRATIONS. FIRESTOPPING SHALL BE PRODUCED AND INSTALLED TO RESIST SPREAD OF FIRE ACCORDING TO ASTME OR UL REQUIREMENTS, RESIST PASSAGE OF SMOKE AND OTHER GASES, AND MAINTAIN ORIGINAL FIRE-RESISTANCE RATING OF CONSTRUCTION PENETRATED.

C. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING, PAINTING AND REPAIRING ALL WALLS, FLOORS AND CEILINGS DAMAGED DURING CONSTRUCTION TO MATCH EXISTING CONDITIONS.

3.11 MISCELLANEOUS ITEMS:

A. THE CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS ITEMS REQUIRED FOR PROPER INSTALLATION OF ALL ELECTRICAL SYSTEMS.

B. PROVIDE ALL DISCONNECTS AND SAFETY SWITCHES FOR MECHANICAL EQUIPMENT. OVERCURRENT DEVICES FOR HEATING, REFRIGERATION OR AIR CONDITIONING EQUIPMENT SHALL BE FUSES OR "HACR" RATED CIRCUIT BREAKERS.

C. COMPLY WITH NECA INSTALLATION RECOMMENDATIONS FOR ALL ELECTRICAL EQUIPMENT INSTALLATIONS.

3.12 TESTS:

A. PERFORM CIRCUIT CONTINUITY TESTS FOR CIRCUITS AND FEEDERS.

B. PERFORM INSULATION RESISTANCE TESTS FOR ALL FEEDERS.

C. TEST MOTORS FOR CORRECT ROTATION.

D. ANY FAILURE OR UNSATISFACTORY RESULT OF TESTS SHALL BE CORRECTED AND RETESTED, AT CONTRACTOR'S EXPENSE REPAIR AND RETEST UNTIL A SATISFACTORY RESULT IS ACHIEVED.

E. ALL TEST RESULTS SHALL BE TYPE-WRITTEN AND INCLUDED WITH THE PROJECT CLOSE OUT DOCUMENTS.

3.13 PROJECT COMPLETION:

A. UPON COMPLETION OF THE WORK OF THIS SECTION, THOROUGHLY CLEAN ALL EXPOSED PORTIONS OF THE ELECTRICAL INSTALLATION, REMOVING ALL TRACES OF SOIL, LABELS, FINGERPRINTS, GREASE, PAINT, DRYWALL COMPOUND, OIL, AND OTHER FOREIGN MATERIAL, AND USING ONLY THE TYPE CLEANER RECOMMENDED BY THE MANUFACTURER OF THE ITEM BEING CLEANED. CLEAN INTERIORS OF ALL PANELBOARDS, DISCONNECTS AND OTHER ENCLOSURES. CLEAN ALL LIGHT FIXTURE APERTURES, REFLECTORS, LENSES, AND ANY OTHER SOILED PORTIONS OF THE LIGHT FIXTURES.

B. THOROUGHLY INDOCTRINATE THE OWNER'S OPERATION AND MAINTENANCE PERSONNEL IN THE CONTENTS OF THE OPERATIONS AND MAINTENANCE MANUAL REQUIRED TO BE SUBMITTED BY THESE DOCUMENTS.

C. PROVIDE A COMPLETE, NEATLY BOUND SET OF AS-BUILT DRAWINGS AND OPERATIONS AND MAINTENANCE MANUALS TO THE OWNER AND ENGINEER. SUBMIT DOCUMENTS IN ACCORDANCE WITH THE GENERAL CONDITIONS AND THE FOLLOWING. AS-BUILT DRAWINGS SHALL INDICATE INSTALLED EQUIPMENT LOCATIONS (DISTRIBUTION EQUIPMENT, LIGHT FIXTURES, OUTLETS, SWITCHES, ETC.), INSTALLED WIRING CONNECTIONS (FEEDERS, REVISED CIRCUIT NUMBERS, ETC.), UPDATED PANEL SCHEDULES, ETC.. AS-BUILTS SHALL BE CREATED BY QUALIFIED DRAFTING PERSONNEL.

3.14 COORDINATION STUDY

A. CONTRACTOR SHALL HAVE A COORDINATION STUDY PERFORMED USING APPROVED COMPUTER SOFTWARE PROGRAM. PREPARE A WRITTEN REPORT. COMPLY WITH IEEE 399.
   1. PROFESSIONAL ENGINEER, LICENSED IN THE STATE WHERE PROJECT IS LOCATED, SHALL BE RESPONSIBLE FOR THE STUDY. ALL ELEMENTS OF THE STUDY SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION AND CONTROL OF ENGINEER.
   2. CALCULATE THE MAXIMUM AND MINIMUM 1/2-CYCLE SHORT-CIRCUIT CURRENTS.
   3. CALCULATE THE MAXIMUM AND MINIMUM INTERRUPTING DUTY (5 CYCLES TO 2 SECONDS) SHORT-CIRCUIT CURRENTS.
   4. CALCULATE THE MAXIMUM AND MINIMUM GROUND-FAULT CURRENTS.

B. COMPLY WITH IEEE RECOMMENDATIONS FOR FAULT CURRENTS AND TIME INTERVALS.

C. CONDUCTOR PROTECTION: PROTECT CONDUCTORS AGAINST DAMAGE FROM FAULT CURRENTS ACCORDING TO ICEA P-32-382, ICEA P-45-482, AND CONDUCTOR MELTING CURVES IN IEEE 242. DEMONSTRATE THAT EQUIPMENT WITHSTANDS THE MAXIMUM SHORT-CIRCUIT CURRENT FOR A TIME EQUIVALENT TO THE TRIPPING TIME OF THE PRIMARY RELAY PROTECTION OR TOTAL CLEARING TIME OF THE FUSE. TO DETERMINE TEMPERATURES THAT DAMAGE INSULATION, USE CURVES FROM CONDUCTOR MANUFACTURERS OR FROM LISTED STANDARDS INDICATING CONDUCTOR SIZE AND SHORT-CIRCUIT CURRENT.

D. COORDINATION-STUDY REPORT: PREPARE A WRITTEN REPORT INDICATING THE FOLLOWING RESULTS OF COORDINATION STUDY:
   1. TABULAR FORMAT OF SETTINGS SELECTED FOR OVERCURRENT PROTECTIVE DEVICES SHALL REPRESENT: a) DEVICE TAG b) RELAY-CURRENT TRANSFORMER RATIOS; AND TAP, TIME-DIAL, AND INSTANTANEOUS-PICKUP VALUES c) CIRCUIT-BREAKER SENSOR RATING; AND LONG-TIME, SHORT-TIME, AND INSTANTANEOUS SETTINGS d) FUSE-CURRENT RATING AND TYPE e) GROUND-FAULT RELAY-PICKUP AND TIME-DELAY SETTINGS.
   2. COORDINATION CURVES: PREPARED TO DETERMINE SETTINGS OF OVERCURRENT PROTECTIVE DEVICES TO ACHIEVE SELECTIVE COORDINATION. GRAPHICALLY ILLUSTRATE THAT ADEQUATE TIME SEPARATION EXISTS BETWEEN DEVICES INSTALLED IN SERIES, INCLUDING POWER UTILITY COMPANY'S UPSTREAM DEVICES. PREPARE SEPARATE SETS OF CURVES FOR THE SWITCHING SCHEMES AND FOR EMERGENCY PERIODS WHERE THE POWER SOURCE IS LOCAL GENERATION.

E. PREPARE DATA SHEETS FOR OVERCURRENT PROTECTIVE DEVICE SETTINGS.

F. CONTRACTOR SHALL SET PROTECTIVE DEVICES BASED ON RESULTS OF THE PROTECTIVE DEVICE COORDINATION STUDY.

SECTION 262923 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS APPLY TO THIS SECTION.

1.2 SUMMARY
A. SECTION INCLUDES SEPARATELY ENCLOSED, PRE-ASSEMBLED, COMBINATION VARIABLE-FREQUENCY MOTOR CONTROLLER (VFMC), RATED 600 V AND LESS, FOR SPEED CONTROL OF THREE-PHASE, SQUIRREL-CAGE OR INDUCTION MOTORS.

1.3 DEFINITIONS

A. BAS: BUILDING AUTOMATION SYSTEM.
B. CE: CONFORMITE EUROPEENE (EUROPEAN COMPLIANCE).
C. CPT: CONTROL POWER TRANSFORMER.
D. EMI: ELECTROMAGNETIC INTERFERENCE.
E. IGBT: INSULATED-GATE BIPOLAR TRANSISTOR.
F. LAN: LOCAL AREA NETWORK.
G. LED: LIGHT-EMITTING DIODE.
H. MCP: MOTOR-CIRCUIT PROTECTOR.
I. NC: NORMALLY CLOSED.
J. NO: NORMALLY OPEN.
K. NRTL: NATIONALLY RECOGNIZED TESTING LABORATORY
L. OCPD:OVERCURRENT PROTECTIVE DEVICE.
M. PCC: POINT OF COMMON COUPLING.
N. PID: CONTROL ACTION, PROPORTIONAL PLUS INTEGRAL PLUS DERIVATIVE.
O. PWM: PULSE-WIDTH MODULATED.
P. RFI: RADIO-FREQUENCY INTERFERENCE.
Q. TDD: TOTAL DEMAND (HARMONIC CURRENT) DISTORTION.
R. THD(V): TOTAL HARMONIC VOLTAGE DEMAND.
S. VFMC: VARIABLE-FREQUENCY MOTOR CONTROLLER (ALSO KNOWN AS VFD: VARIABLE-FREQUENCY DRIVE).

1.4 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE AND RATING OF VFMC INDICATED. INCLUDE FEATURES, PERFORMANCE, ELECTRICAL RATINGS, OPERATING CHARACTERISTICS, AND FURNISHED SPECIALTIES AND ACCESSORIES.
B. COORDINATION DRAWINGS: PROVIDE FLOOR PLANS IF PROPOSED VFMC LOCATION IS DIFFERENT THAN SHOWN ON PLANS OR IF EXTERNAL HARMONIC ABATEMENT IS REQUIRED . SHOW REQUIRED WORKING CLEARANCES, AND REQUIRED AREA ABOVE AND AROUND VFMC'S. SHOW VFMC LAYOUT AND RELATIONSHIPS BETWEEN ELECTRICAL COMPONENTS AND ADJACENT STRUCTURAL AND MECHANICAL ELEMENTS. SHOW SUPPORT TYPE AND LOCATIONS OF SUPPORT.
C. HARMONIC ABATEMENT: PROVIDE MANUFACTURER DOCUMENTATION SHOWING COMPLIANCE WITH SPECIFICATION. EQUIPMENT REQUIRED BY PART 2- PRODUCTS OF THIS SPECIFICATION.
D. OPERATION AND MAINTENANCE DATA: FOR VFMC'S TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN OTHER SECTIONS INCLUDE THE FOLLOWING:
   1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING THERMAL-MAGNETIC CIRCUIT BREAKER AND MCP TRIP SETTINGS.
   2. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR SETTING FIELD-ADJUSTABLE OVERLOAD RELAYS.
   3. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING, ADJUSTING, AND REPROGRAMMING MICROPROCESSOR CONTROL MODULES.
   4. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR SETTING FIELD-ADJUSTABLE TIMERS, CONTROLS, AND STATUS AND ALARM POINTS.

1.5 QUALITY ASSURANCE
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
B. COMPLY WITH NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING
A. IF STORED IN SPACE THAT IS NOT PERMANENTLY ENCLOSED AND AIR CONDITIONED, REMOVE LOOSE PACKING AND FLAMMABLE MATERIALS FROM INSIDE CONTROLLERS AND INSTALL TEMPORARY ELECTRIC HEATING, WITH AT LEAST 250 W PER CONTROLLER.

1.7 PROJECT CONDITIONS
A. ENVIRONMENTAL LIMITATIONS: RATE EQUIPMENT FOR CONTINUOUS OPERATION, CAPABLE OF DRIVING FULL LOAD WITHOUT DERATING, UNDER THE FOLLOWING CONDITIONS UNLESS OTHERWISE INDICATED:
   1. AMBIENT TEMPERATURE: NOT LESS THAN 14 DEG F AND NOT EXCEEDING 104 DEG F.
   2. HUMIDITY: 20-93% (NON-CONDENSING AND VAPOR FREE).
   3. ALTITUDE: NOT EXCEEDING 1500 FEET.

1.8 COORDINATION
C. COORDINATE FEATURES OF MOTORS, LOAD CHARACTERISTICS, INSTALLED UNITS, AND ACCESSORY DEVICES TO BE COMPATIBLE WITH THE FOLLOWING:
   1. TORQUE, SPEED, AND HORSEPOWER REQUIREMENTS OF THE LOAD.
   2. RATINGS AND CHARACTERISTICS OF SUPPLY CIRCUIT AND REQUIRED CONTROL SEQUENCE.
   3. AMBIENT AND ENVIRONMENTAL CONDITIONS OF INSTALLATION LOCATION.

1.9 WARRANTY
A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE VFMC'S THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.
   1. WARRANTY PERIOD: FIVE YEARS FROM DATE OF SUBSTANTIAL COMPLETION.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS
A. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING MANUFACTURERS WITH BACNET COMMUNICATION INTERFACE, WITHOUT BYPASS OR EQUAL IN EVERY RESPECT.
   1. ABB
   2. TOSHIBA
   3. DANFOSS
   4. YASKAWA
   5. EATON ELECTRICAL
   6. EMERSON ELECTRIC
B. GENERAL REQUIREMENTS FOR VFMC'S: COMPLY WITH NEMA ICS 7, NEMA ICS 61800-2, AND UL 508C
C. APPLICATION: VARIABLE TORQUE AND WITH PROGRAMMABLE FEATURES OPTIMIZED FOR USE WITH HVAC EQUIPMENT.
D. VFMC DESCRIPTION: VARIABLE-FREQUENCY POWER CONVERTER (RECTIFIER, DC BUS, AND IGBT, PWM INVERTER) FACTORY PACKAGED IN AN ENCLOSURE, WITH INTEGRAL DISCONNECTING MEANS AND OVERCURRENT AND OVERLOAD PROTECTION; LISTED AND LABELED BY AN NRTL AS A COMPLETE UNIT; ARRANGED TO PROVIDE SELF-PROTECTION, PROTECTION, AND VARIABLE-SPEED CONTROL OF ONE OR MORE THREE-PHASE INDUCTION MOTORS BY ADJUSTING OUTPUT VOLTAGE AND FREQUENCY.
   1. UNITS SUITABLE FOR OPERATION OF NEMA MG 1, DESIGN A AND DESIGN B MOTORS AS DEFINED BY NEMA MG 1, SECTION IV, PART 30, "APPLICATION CONSIDERATIONS FOR CONSTANT SPEED MOTORS USED ON A SINUSOIDAL BUS WITH HARMONIC CONTENT AND GENERAL PURPOSE MOTORS USED WITH ADJUSTABLE-VOLTAGE OR ADJUSTABLE-FREQUENCY CONTROLS OR BOTH."
   2. UNITS SUITABLE FOR OPERATION OF INVERTER-DUTY MOTORS AS DEFINED BY NEMA MG 1, SECTION IV, PART 31, "DEFINITE-PURPOSE INVERTER-FED POLYPHASE MOTORS."
   3. LISTED AND LABELED FOR INTEGRATED SHORT-CIRCUIT CURRENT (WITHSTAND) RATING BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
E. DESIGN AND RATING: MATCH LOAD TYPE, SUCH AS FANS, BLOWERS, AND PUMPS; AND TYPE OF CONNECTION USED BETWEEN MOTOR AND LOAD SUCH AS DIRECT OR THROUGH A POWER-TRANSMISSION CONNECTION.
F. OUTPUT RATING: THREE-PHASE; 10 TO 60 HZ, WITH VOLTAGE PROPORTIONAL TO FREQUENCY THROUGHOUT VOLTAGE RANGE, MAXIMUM VOLTAGE EQUALS INPUT VOLTAGE.
G. UNIT OPERATING REQUIREMENTS:
   1. INPUT AC VOLTAGE TOLERANCE: PLUS 10 AND MINUS 10 PERCENT OF VFMC INPUT VOLTAGE RATING.
   2. INPUT AC VOLTAGE UNBALANCE: NOT EXCEEDING 5 PERCENT.
   3. INPUT FREQUENCY TOLERANCE: PLUS OR MINUS 3 PERCENT OF VFMC FREQUENCY RATING.
   4. MINIMUM EFFICIENCY: 96 PERCENT AT 60 HZ, FULL LOAD.
   5. MINIMUM DISPLACEMENT PRIMARY-SIDE POWER FACTOR: 96 PERCENT UNDER ANY LOAD OR SPEED CONDITION.
   6. MINIMUM SHORT-CIRCUIT CURRENT (WITHSTAND) RATING: GREATER THAN OR EQUAL TO RATING OF PANEL SERVING VFD.
   7. AMBIENT TEMPERATURE RATING: NOT LESS THAN 14 DEG F AND NOT EXCEEDING 104 DEG F.
   8. HUMIDITY RATING: 20-93% (NON-CONDENSING AND VAPOR FREE).
   9. ALTITUDE RATING: NOT EXCEEDING 1500 FEET.
   10. VIBRATION WITHSTAND: COMPLY WITH IEC 60068-2-6.
   11. OVERLOAD CAPABILITY: 1.1 TIMES THE BASE LOAD CURRENT FOR 60 SECONDS; MINIMUM OF 1.8 TIMES THE BASE LOAD CURRENT FOR THREE SECONDS.
   12. STARTING TORQUE: MINIMUM 100 PERCENT OF RATED TORQUE FROM 3 TO 60 HZ.
   13. SPEED REGULATION: PLUS OR MINUS 5 PERCENT.
   14. OUTPUT CARRIER FREQUENCY: SELECTABLE; 0.5 TO 15 KHZ.
   15. STOP MODES: PROGRAMMABLE; INCLUDES FAST, FREE-WHEEL, AND DC INJECTION BRAKING.
H. INVERTER LOGIC: MICROPROCESSOR BASED, 32 BIT, ISOLATED FROM ALL POWER CIRCUITS.
I. ISOLATED CONTROL INTERFACE: ALLOWS VFMC'S TO FOLLOW REMOTE-CONTROL SIGNAL OVER A MINIMUM 40:1 SPEED RANGE.
   1. SIGNAL: ELECTRICAL.
J. INTERNAL ADJUSTABILITY CAPABILITIES:
   1. MINIMUM SPEED: 5 TO 25 PERCENT OF MAXIMUM RPM.
   2. MAXIMUM SPEED: 80 TO 100 PERCENT OF MAXIMUM RPM.
   3. ACCELERATION: 0.1 TO 999.9 SECONDS.
   4. DECELERATION: 0.1 TO 999.9 SECONDS.
   5. CURRENT LIMIT: 30 TO MINIMUM OF 150 PERCENT OF MAXIMUM RATING.
K. SELF-PROTECTION AND RELIABILITY FEATURES:
   1. INPUT TRANSIENT PROTECTION BY MEANS OF SURGE SUPPRESSORS TO PROVIDE THREE-PHASE PROTECTION AGAINST DAMAGE FROM SUPPLY VOLTAGE SURGES 10 PERCENT OR MORE ABOVE NOMINAL LINE VOLTAGE.
   2. LOSS OF INPUT SIGNAL PROTECTION: SELECTABLE RESPONSE STRATEGY, INCLUDING SPEED DEFAULT TO A PERCENT OF THE MOST RECENT SPEED, A PRESET SPEED, OR STOP; WITH ALARM.
   3. UNDER AND OVERVOLTAGE TRIPS.
   4. INVERTER OVERCURRENT TRIPS.
   5. VFMC AND MOTOR OVERLOAD/OVERTEMPERATURE PROTECTION: MICROPROCESSOR-BASED THERMAL PROTECTION SYSTEM FOR MONITORING VFMC'S AND MOTOR THERMAL CHARACTERISTICS, AND FOR PROVIDING VFMC OVERTEMPERATURE AND MOTOR OVERLOAD ALARM AND TRIP; SETTINGS SELECTABLE VIA THE KEYPAD; NRTL APPROVED.
   6. CRITICAL FREQUENCY REJECTION, WITH THREE SELECTABLE, ADJUSTABLE DEADBANDS.
   7. INSTANTANEOUS LINE-TO-LINE AND LINE-TO-GROUND OVERCURRENT TRIPS.
   8. LOSS-OF-PHASE PROTECTION.
   9. REVERSE-PHASE PROTECTION.
   10. SHORT-CIRCUIT PROTECTION.
   11. MOTOR OVERTEMPERATURE FAULT.
L. AUTOMATIC RESET/RESTART: ATTEMPT TEN RESTARTS AFTER DRIVE FAULT OR ON RETURN OF POWER AFTER AN INTERRUPTION AND BEFORE SHUTTING DOWN FOR MANUAL RESET OR FAULT CORRECTION; ADJUSTABLE DELAY TIME BETWEEN RESTART ATTEMPTS.
M. POWER-INTERRUPTION PROTECTION: TO PREVENT MOTOR FROM RE-ENERGIZING AFTER A POWER INTERRUPTION UNTIL MOTOR HAS STOPPED, UNLESS "BIDIRECTIONAL AUTOSPEED SEARCH" FEATURE IS AVAILABLE AND ENGAGED.
N. BIDIRECTIONAL AUTOSPEED SEARCH: CAPABLE OF STARTING VFMC INTO ROTATING LOADS SPINNING IN EITHER DIRECTION AND RETURNING MOTOR TO SET SPEED IN PROPER DIRECTION, WITHOUT CAUSING DAMAGE TO DRIVE, MOTOR, OR LOAD.
O. TORQUE BOOST: AUTOMATICALLY VARIES STARTING AND CONTINUOUS TORQUE TO AT LEAST 1.5 TIMES THE MINIMUM TORQUE TO ENSURE HIGH-STARTING TORQUE AND INCREASED TORQUE AT SLOW SPEEDS.
P. MOTOR TEMPERATURE COMPENSATION AT SLOW SPEEDS: ADJUSTABLE CURRENT FALL-BACK BASED ON OUTPUT FREQUENCY FOR TEMPERATURE PROTECTION OF SELF-COOLED, FAN-VENTILATED MOTORS AT SLOW SPEEDS.

2.2 CONTROLS AND INDICATION
A. PANEL-MOUNTED OPERATOR STATION: MANUFACTURER'S STANDARD FRONT-ACCESSIBLE, SEALED KEYPAD AND PLAIN-ENGLISH LANGUAGE DIGITAL DISPLAY; ALLOWS COMPLETE PROGRAMMING, PROGRAM COPYING, OPERATING, MONITORING, AND DIAGNOSTIC CAPABILITY.
   1. KEYPAD: IN ADDITION TO REQUIRED PROGRAMMING AND CONTROL KEYS, INCLUDE KEYS FOR HAND, OFF, AND AUTO MODES.
B. HISTORICAL LOGGING INFORMATION AND DISPLAYS:
   1. REAL-TIME CLOCK WITH CURRENT TIME AND DATE.
   2. RUNNING LOG OF TOTAL POWER VERSUS TIME.
   3. TOTAL RUN TIME.
   4. FAULT LOG, MAINTAINING LAST FOUR FAULTS WITH TIME AND DATE STAMP FOR EACH.
C. INDICATING DEVICES: DIGITAL DISPLAY MOUNTED FLUSH IN VFMC DOOR AND CONNECTED TO DISPLAY VFMC PARAMETERS INCLUDING, BUT NOT LIMITED TO:
   1. OUTPUT FREQUENCY (HZ).
   2. MOTOR SPEED (RPM).
   3. MOTOR STATUS (RUNNING, STOP, FAULT).
   4. MOTOR CURRENT (AMPERES).
   5. MOTOR TORQUE (PERCENT).
   6. FAULT OR ALARMING STATUS (CODE).
   7. PID FEEDBACK SIGNAL (PERCENT).
   8. DC-LINK VOLTAGE (V DC).
   9. SET POINT FREQUENCY (HZ).
   10. MOTOR OUTPUT VOLTAGE (V AC).
D. CONTROL SIGNAL INTERFACES:
   1. ELECTRIC INPUT SIGNAL INTERFACE:
      a. A MINIMUM OF TWO PROGRAMMABLE ANALOG INPUTS: 0- TO 10-V DC 4- TO 20-MA DC
      b. A MINIMUM OF SIX MULTIFUNCTION PROGRAMMABLE DIGITAL INPUTS.
   2. REMOTE SIGNAL INPUTS: CAPABILITY TO ACCEPT ANY OF THE FOLLOWING SPEED-SETTING INPUT SIGNALS FROM THE BAS OR OTHER CONTROL SYSTEMS:
      a. 0- TO 10-V DC.
      b. 4- TO 20-MA DC.
   3. OUTPUT SIGNAL INTERFACE: A MINIMUM OF TWO PROGRAMMABLE ANALOG OUTPUT SIGNAL(S) (0- TO 10-V DC 4- TO 20-MA DC, WHICH CAN BE CONFIGURED FOR ANY OF THE FOLLOWING:
      a. OUTPUT FREQUENCY (HZ).
      b. OUTPUT CURRENT (LOAD).
      c. DC-LINK VOLTAGE (V DC).
      d. MOTOR TORQUE (PERCENT).
      e. MOTOR SPEED (RPM).
      f. SET POINT FREQUENCY (HZ).
   4. PROVISIONS FOR REMOTE INDICATION INTERFACE: A MINIMUM OF TWO PROGRAMMABLE DRY-CIRCUIT RELAY OUTPUTS FOR REMOTE INDICATION OF THE FOLLOWING:
      a. MOTOR RUNNING.
      b. SET POINT SPEED REACHED.
      c. FAULT AND WARNING INDICATION (OVERTEMPERATURE OR OVERCURRENT).
      d. PID HIGH-OR LOW-SPEED LIMITS REACHED.
E. BAS INTERFACE: FACTORY-INSTALLED HARDWARE AND SOFTWARE TO ENABLE THE BAS TO MONITOR, CONTROL, AND DISPLAY VFMC STATUS AND ALARMS AND ENERGY USAGE. ALLOWS VFMC TO BE USED WITH AN EXTERNAL SYSTEM WITHIN A MULTIDROP LAN CONFIGURATION; SETTINGS RETAINED WITHIN VFMC'S NONVOLATILE MEMORY.
   1. NETWORK COMMUNICATIONS PORTS: ETHERNET AND RS-422/485.
   2. EMBEDDED BAS PROTOCOLS FOR NETWORK COMMUNICATIONS: BACNET; PROTOCOLS ACCESSIBLE VIA THE COMMUNICATIONS PORTS.

2.3 ENCLOSURES
A. VFMC ENCLOSURES: NEMA 250, TO COMPLY WITH ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
   1. DRY AND CLEAN INDOOR LOCATIONS: TYPE 1
   2. OUTDOOR LOCATIONS: TYPE 3R

2.4 ACCESSORIES
A. CONTROL RELAYS: AUXILIARY AND ADJUSTABLE SOLID-STATE TIME-DELAY RELAYS.
B. PHASE-FAILURE, PHASE-REVERSAL, AND UNDERVOLTAGE AND OVERVOLTAGE RELAYS: SOLID-STATE SENSING CIRCUIT WITH ISOLATED OUTPUT CONTACTS FOR HARD-WIRED CONNECTIONS. PROVIDE ADJUSTABLE UNDERVOLTAGE, OVERVOLTAGE, AND TIME-DELAY SETTINGS.
   1. CURRENT TRANSFORMERS: CONTINUOUS CURRENT RATING, BASIC IMPULSE INSULATING LEVEL (BIL) RATING, BURDEN, AND ACCURACY CLASS SUITABLE FOR CONNECTED CIRCUITRY. COMPLY WITH IEEE C57.13.
D. SPARE CONTROL-WIRING TERMINAL BLOCKS; UNWIRED.
E. HARMONIC ABATEMENT: PROVIDE FIVE PERCENT HARMONIC REACTOR OR EQUIVALENT. COORDINATE EQUIPMENT INSTALLATION WITH MANUFACTURER RECOMMENDATIONS, IF NOT FACTORY INSTALLED.
F. MOTOR PREHEAT FUNCTION FOR CONDENSATION CONTROL IN MOTOR WINDINGS.

2.5 SOURCE QUALITY CONTROL
A. TESTING: TEST AND INSPECT VFMC'S ACCORDING TO REQUIREMENTS IN NEMA ICS 61800-2
   1. TEST EACH VFMC WHILE CONNECTED TO ITS SPECIFIED MOTOR.
   2. VERIFICATION OF PERFORMANCE: RATE VFMC'S ACCORDING TO OPERATION OF FUNCTIONS AND FEATURES SPECIFIED.
B. VFMC'S WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
C. PREPARE TEST AND INSPECTION REPORTS.

PART 3 - EXECUTION

3.1 EXAMINATION
A. EXAMINE AREAS, SURFACES, AND SUBSTRATES TO RECEIVE VFMC'S, WITH INSTALLER PRESENT, FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES, AND OTHER CONDITIONS AFFECTING PERFORMANCE.
B. EXAMINE VFMC BEFORE INSTALLATION. REJECT VFMC'S THAT HAVE BEEN SUBJECTED TO MOISTURE.
C. EXAMINE ROUGHING-IN FOR CONDUIT SYSTEMS TO VERIFY ACTUAL LOCATIONS OF CONDUIT CONNECTIONS BEFORE VFMC INSTALLATION
D. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION
A. COORDINATE LAYOUT AND INSTALLATION OF VFMC'S WITH OTHER CONSTRUCTION INCLUDING CONDUIT, PIPING, EQUIPMENT, AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.
B. WALL-MOUNTING CONTROLLERS: INSTALL VFMC'S ON WALLS WITH TOPS AT UNIFORM HEIGHT AND WITH DISCONNECT OPERATING HANDLES NOT HIGHER THAN 79 INCHES ABOVE FINISHED FLOOR UNLESS OTHERWISE INDICATED, AND BY BOLTING UNITS TO WALL OR MOUNTING ON LIGHTWEIGHT STRUCTURAL-STEEL CHANNELS BOLTED TO WALL. PROVIDE BACKING IN/ON WALL AS REQUIRED.
C. TEMPORARY LIFTING PROVISIONS: REMOVE TEMPORARY LIFTING EYES, CHANNELS, AND BRACKETS AND TEMPORARY BLOCKING OF MOVING PARTS FROM ENCLOSURES AND COMPONENTS.
D. INSTALL FUSES IF NOT FACTORY INSTALLED. COMPLY WITH NEMA FU 1, NONRENEWABLE CARTRIDGE FUSES WITH VOLTAGE RATINGS CONSISTENT WITH CIRCUIT VOLTAGES.
E. INSTALL HEATERS IN THERMAL-OVERLOAD RELAYS. SELECT HEATERS BASED ON ACTUAL NAMEPLATE FULL-LOAD AMPERES AFTER MOTORS HAVE BEEN INSTALLED.
F. INSTALL, CONNECT, AND FUSE THERMAL-PROTECTOR MONITORING RELAYS FURNISHED WITH MOTOR-DRIVEN EQUIPMENT.
G. COMPLY WITH NECA 1.

3.3 IDENTIFICATION
A. IDENTIFY VFMC'S, COMPONENTS, AND CONTROL WIRING.
   1. IDENTIFY FIELD-INSTALLED CONDUCTORS, INTERCONNECTING WIRING, AND COMPONENTS; PROVIDE WARNING SIGNS.
   2. LABEL EACH VFMC WITH ENGRAVED NAMEPLATE.
   3. LABEL EACH ENCLOSURE-MOUNTED CONTROL AND PILOT DEVICE.
B. OPERATING INSTRUCTIONS: FRAME PRINTED OPERATING INSTRUCTIONS FOR VFMC'S, INCLUDING CONTROL SEQUENCES AND EMERGENCY PROCEDURES. FABRICATE FRAME OF FINISHED METAL, AND COVER INSTRUCTIONS WITH CLEAR ACRYLIC PLASTIC. MOUNT ON FRONT OF VFMC UNITS.

BEFORE YOU DIG 1-800-552-6543 811 CALL OKIE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER Christopher A. Harwell 21109 OKLAHOMA
9-13-16

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

ELECTRICAL SPECIFICATIONS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	JWE	08/2016	APPROVED:
	DESIGNED	JWE	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	CEW	9/16	
	FIELD MGR.	RBK	9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HR	9/16	CITY ENGINEER

FILE: E-002.dwg DRAWING: DATE: 9/8/2016
ATLAS PAGE NO: 00016 SHEET 33 OF 40 SHEETS
SHEET NAME: ELECTRICAL SPECIFICATIONS SHEET NO. E-002

Printed: 9/7/2016 2:24:27 PM
V:\Tulsa Public Works\Maintenance Shc & Mech 065100-38\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\E-002.dwg

3.4 CONTROL WIRING INSTALLATION
A. BUNDLE, TRAIN, AND SUPPORT WIRING IN ENCLOSURES.

3.5 FIELD QUALITY CONTROL
A. TESTING AGENCY: ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM TESTS AND INSPECTIONS.
B. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT, TEST, AND ADJUST COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS.
C. ACCEPTANCE TESTING PREPARATION:
   1. TEST INSULATION RESISTANCE FOR EACH VFMC ELEMENT, BUS, COMPONENT, CONNECTING SUPPLY, FEEDER, AND CONTROL CIRCUIT.
   2. TEST CONTINUITY OF EACH CIRCUIT.
D. TESTS AND INSPECTIONS:
   1. INSPECT VFMC, WIRING, COMPONENTS, CONNECTIONS, AND EQUIPMENT INSTALLATION. TEST AND ADJUST CONTROLLERS, COMPONENTS, AND EQUIPMENT.
   2. TEST INSULATION RESISTANCE FOR EACH VFMC ELEMENT, COMPONENT, CONNECTING MOTOR SUPPLY, FEEDER, AND CONTROL CIRCUITS.
   3. TEST CONTINUITY OF EACH CIRCUIT.
   4. VERIFY THAT VOLTAGES AT VFMC LOCATIONS ARE WITHIN 10 PERCENT OF MOTOR NAMEPLATE RATED VOLTAGES. IF OUTSIDE THIS RANGE FOR ANY MOTOR, NOTIFY OWNER BEFORE STARTING THE MOTOR(S).
   5. TEST EACH MOTOR FOR PROPER PHASE ROTATION.
   6. PERFORM EACH ELECTRICAL TEST AND VISUAL AND MECHANICAL INSPECTION STATED IN NETA ACCEPTANCE TESTING SPECIFICATION. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
   7. CORRECT MALFUNCTIONING UNITS ON-SITE, WHERE POSSIBLE, AND RETEST TO DEMONSTRATE COMPLIANCE; OTHERWISE, REPLACE WITH NEW UNITS AND RETEST.
   8. TEST AND ADJUST CONTROLS, REMOTE MONITORING, AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.
E. VFMC'S WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.

3.6 STARTUP SERVICE
A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PROGRAM AND PERFORM STARTUP SERVICE.
   1. COMPLETE INSTALLATION AND STARTUP CHECKS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

3.7 ADJUSTING
A. PROGRAM MICROPROCESSORS FOR REQUIRED OPERATIONAL SEQUENCES, STATUS INDICATIONS, ALARMS, EVENT RECORDING, AND DISPLAY FEATURES. CLEAR EVENTS MEMORY AFTER FINAL ACCEPTANCE TESTING AND PRIOR TO SUBSTANTIAL COMPLETION.
B. SET FIELD-ADJUSTABLE SWITCHES, AUXILIARY RELAYS, TIME-DELAY RELAYS, TIMERS, AND OVERLOAD-RELAY PICKUP AND TRIP RANGES.
C. ADJUST THE TRIP SETTINGS OF MCPS AND THERMAL-MAGNETIC CIRCUIT BREAKERS WITH ADJUSTABLE, INSTANTANEOUS TRIP ELEMENTS. INITIALLY ADJUST TO SIX TIMES THE MOTOR NAMEPLATE FULL-LOAD AMPERES AND ATTEMPT TO START MOTORS SEVERAL TIMES, ALLOWING FOR MOTOR COOL-DOWN BETWEEN STARTS. IF TRIPPING OCCURS ON MOTOR INRUSH, ADJUST SETTINGS IN INCREMENTS UNTIL MOTORS START WITHOUT TRIPPING. DO NOT EXCEED EIGHT TIMES THE MOTOR FULL-LOAD AMPERES (OR 11 TIMES FOR NEMA PREMIUM EFFICIENT MOTORS IF REQUIRED). WHERE THESE MAXIMUM SETTINGS DO NOT ALLOW STARTING OF A MOTOR, CONSULT WITH OWNER BEFORE INCREASING SETTINGS.
D. SET THE TAPS ON REDUCED-VOLTAGE AUTOTRANSFORMER CONTROLLERS.
E. SET FIELD-ADJUSTABLE PRESSURE SWITCHES.

3.8 PROTECTION
A. TEMPORARY HEATING: APPLY TEMPORARY HEAT TO MAINTAIN TEMPERATURE ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS UNTIL CONTROLLERS ARE READY TO BE ENERGIZED AND PLACED INTO SERVICE.
B. REPLACE VFMC'S WHOSE INTERIORS HAVE BEEN EXPOSED TO WATER OR OTHER LIQUIDS PRIOR TO SUBSTANTIAL COMPLETION.

3.9 DEMONSTRATION
A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, REPROGRAM, AND MAINTAIN VFMC'S.

END OF SECTION 262923

END OF SPECIFICATIONS

GENERAL NOTES

1. ALL MATERIAL SHALL FIT THE SPACE AVAILABLE. VERIFY DIMENSIONS AND CLEARANCES AT BUILDING PRIOR TO ORDERING. ALL WORKING CLEARANCES AT ELECTRICAL EQUIPMENT SHALL BE MAINTAINED IN ACCORDANCE WITH THE NEC. COORDINATE WITH OTHER TRADES AS REQUIRED.
2. REFER TO MECHANICAL DRAWINGS FOR MECHANICAL EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS. NOTIFY ENGINEER, IN WRITING, TEN DAYS PRIOR TO BID IF MECHANICAL DOCUMENTS REQUIRE ELECTRICAL CONNECTIONS THAT ARE NOT INDICATED ON ELECTRICAL DOCUMENTS.
3. ELECTRICAL DISCONNECTS, STARTERS, DEVICES, OR RACEWAYS MOUNTED ON OR ADJACENT TO EQUIPMENT SHALL NOT IMPEDE ACCESS TO THAT EQUIPMENT. DISCONNECTS AND STARTERS SHALL BE INSTALLED IN A LOCATION TO MEET THE NEC WORKING SPACE REQUIREMENTS.
4. LABEL ALL DISCONNECTS, STARTERS, AND VARIABLE FREQUENCY DRIVES WITH EQUIPMENT DESIGNATION, SERVING PANELBOARD DESIGNATION AND CIRCUIT NUMBER. INTERIOR EQUIPMENT MAY BE LABELED WITH SELF-ADHESIVE VINYL LABELS THAT ARE PREPRINTED, FLEXIBLE, LAMINATED WITH A CLEAR, WEATHER-AND CHEMICAL-RESISTANT COATING. EXTERIOR EQUIPMENT SHALL BE LABELED WITH SCREW RETAINED, UV STABILIZED PHENOLIC LABELS.
5. COORDINATE WITH MECHANICAL FOR ELECTRICAL CONTROLS WORK NOT PART OF CONTROLS CONTRACTOR SCOPE OF WORK.
6. CONTRACTOR SHALL MAINTAIN EXISTING ELECTRICAL SERVICE FOR ALL AREAS OUTSIDE OF THE SCOPE OF WORK AREA THROUGHOUT THE PROJECT, UNLESS SCHEDULED AND AGREED TO IN WRITING WITH THE OWNER/CLIENT. CONTRACTOR SHALL PROVIDE A MINIMUM OF TWO WEEKS NOTICE TO OWNER/CLIENT FOR ALL SHUTDOWNS.
7. ALL BRANCH CIRCUITS LARGER THAN 20A SHALL BE INSTALLED IN DEDICATED CONDUITS.
8. SLEEVE ALL WALL, FLOOR AND CEILING PENETRATIONS FOR CABLE INSTALLATIONS. SUPPORT SLEEVES ACCORDINGLY. FIRESTOP AROUND AND IN SLEEVES AS REQUIRED. FIRESTOP MATERIAL IN SLEEVE SHALL BE REMOVABLE FOR FUTURE INSTALLATION OF CABLES.
9. CONTRACTOR SHALL REVIEW CONTRACT DOCUMENTS INCLUDING, BUT NOT LIMITED TO, ARCHITECTURAL DRAWINGS, MECHANICAL DRAWINGS, CEILING PLANS, ELEVATIONS AND DETAILS FOR LOCATION OF ALL CEILING ELEMENTS (LIGHTS, SPRINKLERS, DIFFUSERS, ETC.). ALL CEILING MOUNTED ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE ARCHITECTURAL REFLECTED CEILING PLANS. IF LOCATION FOR AN ITEM IS NOT SHOWN ON THE ARCHITECTURAL PLANS, ELEVATIONS, OR DETAILS, VERIFY THE EXACT LOCATION OF THE ITEM WITH THE ARCHITECT PRIOR TO INSTALLATION. THESE REQUIREMENTS APPLY TO ALL CEILING TYPES IN ALL AREAS. DO NOT SCALE OR DIMENSION LOCATIONS FROM THESE DRAWINGS.
10. COORDINATE MOUNTING HEIGHTS/LOCATIONS OF ALL WALL MOUNTED DEVICES WITH ARCHITECTURAL DOCUMENTS.
11. COORDINATE MOUNTING HEIGHTS OF WALL MOUNTED DEVICES WITH MASONRY AND ARCHITECTURAL WALL FINISHES (I.E. TILE). NOTIFY ENGINEER AND OR ARCHITECT IF MOUNTING HEIGHTS SHOULD BE ADJUSTED.
12. THE WORD "PROVIDE" AS USED IN THE CONTRACT DOCUMENTS SHALL MEAN TO FURNISH AND INSTALL, UNLESS OTHERWISE NOTED.
13. PROVIDE PULL STRING IN ALL EMPTY CONDUITS.
14. CONTRACTOR SHALL UPDATE ALL PANELBOARD DIRECTORIES WITH ALL NEW AND REMOVED CIRCUITS. DIRECTORIES SHALL BE TYPED. ALL SPARE CIRCUIT BREAKERS SHALL BE LABELED AS "SPARE" AND TURNED OFF.
15. PROVIDE ALL LIGHTING CONTROL DEVICES, AT ONE LOCATION, UNDER A COMMON COVER PLATE, UNLESS NOTED OTHERWISE. PROVIDE BARRIER IN BOX WHERE DEVICES ARE SHOWN SIDE BY SIDE CONTROLLING DIFFERENT VOLTAGES.
16. DIMMERS SHALL BE OF TYPE AS COORDINATED WITH CITY OF TULSA. DIMMERS SHALL NOT BE LOADED MORE THAN 80% OF THE RATED (OR DE-RATED) CAPACITY. DE-RATE DIMMERS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR SHALL COORDINATE EXACT DIMMER TYPE IN ACCORDANCE WITH THE TYPE OF LOAD SERVED. PROVIDE DEDICATED NEUTRAL FOR ALL DIMMING PHASE CONDUCTORS. DIMMERS AND OR SWITCHES AT ONE LOCATION SHALL BE UNDER ONE COMMON COVER PLATE, UNLESS NOTED OTHERWISE. LIMIT DIMMERS TO NO MORE THAN THREE IN ONE BOX. DEVICE AND COVER PLATE FINISH SHALL MATCH THE SPECIFIED LIGHT SWITCH AND COVER PLATE FINISH, OR AS DIRECTED BY THE ARCHITECT.
17. ALL EQUIPMENT/DEVICES (INCLUDING LIGHTING ASSEMBLIES) SHALL BE UNDERWRITER LABORATORY (OR OTHER APPROVED NATIONALLY RECOGNIZED TESTING LABORATORY) LISTED AND LABELED FOR INSTALLATION AND INTENDED USE.
18. OUTLETS SHALL NOT BE MOUNTED BACK TO BACK. A MINIMUM OF 2" SHALL BE PROVIDED BETWEEN OUTLETS.
19. SURFACE MOUNTED RACEWAYS AND DEVICES WILL BE ALLOWED IN MECHANICAL AREAS AND ELECTRICAL ROOMS ONLY, UNLESS NOTED OTHERWISE.
20. PROVIDE DEDICATED NEUTRALS FOR GFCI CIRCUITS. GFCI OUTLETS ARE SHOWN FOR ALL OUTLETS REQUIRED TO BE PROTECTED, HOWEVER, ONLY ONE GFCI MAY BE INSTALLED TO PROTECT THE GFCI OUTLETS SHOWN. LOCATE GFCI DEVICE IN CIRCUIT TO PROTECT ALL GFCI OUTLETS SHOWN.
21. PROVIDE LISTED HANDLE-TIE OR MULTI-POLE CIRCUIT BREAKER FOR CIRCUITS SHARING A COMMON NEUTRAL. HANDLE-TIED OR MULTI-POLE CIRCUIT BREAKERS SHALL SIMULTANEOUSLY DISCONNECT ALL UNGROUNDED CONDUCTORS, THAT SHARE THE COMMON NEUTRAL.
22. CIRCUIT BREAKERS SERVING FIRE ALARM SYSTEM COMPONENTS SHALL HAVE RED IDENTIFICATION ON THE CIRCUIT BREAKER HANDLE.
23. REFER TO THE BRANCH CIRCUIT SCHEDULE FOR BRANCH CIRCUIT SIZES, UNLESS OTHERWISE NOTED.
24. EXISTING FLUORESCENT BALLAST AND LAMPS SHALL BE HANDLED AND DISPOSED OF IN ACCORDANCE WITH THE ENVIRONMENTAL PROTECTION AGENCIES (EPA) REQUIREMENTS.

DEMOLITION NOTES

A. CONTRACTOR SHALL VISIT THE SITE, PRIOR TO BID, TO EVALUATE SCOPE OF DEMOLITION AND EXISTING CONDITIONS.
B. CONTRACTOR SHALL MAINTAIN EXISTING ELECTRICAL SERVICE FOR ALL AREAS OUTSIDE OF THE SCOPE OF WORK AREA THROUGHOUT THE PROJECT, UNLESS SCHEDULED AND AGREED TO IN WRITING WITH THE OWNER/CLIENT. CONTRACTOR SHALL PROVIDE A MINIMUM OF TWO WEEKS NOTICE TO OWNER/CLIENT FOR ALL SHUTDOWNS.
C. REFER TO ARCHITECTURAL AND MECHANICAL DOCUMENTS FOR ADDITIONAL INFORMATION ABOUT ITEMS TO BE DEMOLISHED.
D. CONDUCTORS AND RACEWAYS ASSOCIATED WITH EQUIPMENT/DEVICES TO BE REMOVED SHALL BE REMOVED, UNLESS OTHERWISE DIRECTED. EXISTING RACEWAYS MAY BE REUSED IF THEY MEET THE REQUIREMENTS OF THE SCOPE OF WORK. RACEWAYS SHALL BE REMOVED TO THE NEXT DEVICE, JUNCTION BOX, OR OVERCURRENT DEVICE. ALL RACEWAYS IN INACCESSIBLE CONCEALED AREAS MAY REMAIN. ALL CONDUCTORS SHALL BE REMOVED TO THE OVERCURRENT DEVICE, UNLESS USED FOR NEW OR EXISTING TO REMAIN EQUIPMENT/DEVICES.
E. CONTRACTOR SHALL CONFIRM IF THERE ARE ANY DEVICES TO REMAIN ON THE CIRCUITS THAT ARE SCHEDULED TO HAVE EQUIPMENT/DEVICES DEMOLISHED. CONTRACTOR SHALL UPDATE PANEL SCHEDULES ACCORDINGLY. IF ALL EQUIPMENT/DEVICES HAVE BEEN REMOVED FROM A CIRCUIT THEN THE OVERCURRENT DEVICE SHALL BE TURNED OFF AND LABELED AS "SPARE".
F. PROTECT SYSTEMS DURING DEMOLITION AND CONSTRUCTION, PROVIDE NEW IF DAMAGED OR REMOVED.

ELECTRICAL ABBREVIATIONS

A
AFF — ABOVE FINISHED FLOOR
AHJ — AUTHORITY HAVING JURISDICTION
AIC — AMPERE INTERRUPTING CAPACITY
AMP — AMPERE

C
C — CONDUIT
CCTV — CLOSED CIRCUIT TELEVISION

E
(E) — EXISTING TO REMAIN
(ER) — EXISTING TO BE RELOCATED/REWORKED
EF — EXHAUST FAN
EG — EQUIPMENT GROUND
EMT — ELECTRICAL METALLIC TUBING

F
FLA — FULL LOAD AMPS
FT — FEET

G
G/GD/GND — GROUND

H
HACR — HEATING, AIR-CONDITIONING, REFRIGERATION
HP — HORSEPOWER

I
IG — ISOLATED GROUND
IN — INCHES

K
K — KELVIN
KVA — KILOVOLT AMPS

M
MAX — MAXIMUM
MCB — MAIN CIRCUIT BREAKER
MDP — MAIN DISTRIBUTION PANELBOARD
MIN — MINIMUM
MLO — MAIN LUGS ONLY

N
N — NEUTRAL
NEC — NATIONAL ELECTRICAL CODE
NFPA — NATIONAL FIRE PROTECTION ASSOCIATION

O
OSHA — OCCUPATIONAL SAFETY AND HEALTH ACT

P
PH — PHASE

R
(R) — EXISTING TO BE REMOVED
RECEPTS — RECEPTACLE(S)
RMS — ROOT MEAN SQUARE

S
SPD — SURGE PROTECTION DEVICE

T
TYP — TYPICAL

U
UL — UNDERWRITERS LABORATORIES
UON — UNLESS OTHERWISE NOTED

V
V — VOLT
VA — VOLT AMPS

W
W — WIRE
WP — WEATHERPROOF WHILE IN USE

ELECTRICAL SYMBOLS

LIGHTING SYMBOLS

A a 42	LED FIXTURE, UPPERCASE LETTER DENOTES FIXTURE TYPE, LOWER CASE LETTER DENOTES SWITCH DESIGNATION, NUMBER DENOTES CIRCUIT. (TYPICAL)
	LED STRIP LIGHT
	LED DOWN LIGHT

RECEPTACLE SYMBOLS

41	DUPLEX RECEPTACLE 18" AFF TO CENTER, UON. NUMBER DENOTES CIRCUIT (TYPICAL)
	DOUBLE DUPLEX RECEPTACLE 18" AFF TO CENTER, UON
	DUPLEX GROUND-FAULT CIRCUIT-INTERRUPTER RECEPTACLE 18" AFF TO CENTER, UON
	DOUBLE DUPLEX GROUND-FAULT CIRCUIT-INTERRUPTER RECEPTACLE 18" AFF TO CENTER, UON
	SPECIAL RECEPTACLE 18" AFF TO CENTER, UON

SWITCH SYMBOLS

$a	SINGLE POLE SWITCH 46" AFF TO CENTER, UON LOWER CASE LETTER DENOTES SWITCH DESIGNATION
$3	3-WAY SWITCH 46" AFF TO CENTER, UON
$D	DIMMER 46" AFF TO CENTER, UON

LOW VOLTAGE SYMBOLS

B	PROVIDE 4" SQUARE DEEP BOX WITH SINGLE GANG MUD RING AND BLANK FACEPLATE AT 18" AFF TO CENTER (UON) AND 3/4" CONDUIT WITH BUSHINGS AND PULL STRING TO ACCESSIBLE CEILING SPACE.

DISTRIBUTION SYMBOLS

J	JUNCTION BOX
$M	MOTOR RATED SWITCH WITH THERMAL OVERLOADS, EXCLUDE OVERLOADS IF PROVIDED WITH MOTOR
	NON-FUSED DISCONNECT
	FUSED DISCONNECT
	PANEL, SURFACE MOUNTED

OCCUPANCY SENSOR SCHEDULE

SYMBOLS	DESCRIPTION	MODEL NUMBER
OS a	CEILING MOUNTED, 360 DEGREE, DUAL TECHNOLOGY OCCUPANCY/VACANCY SENSOR. LETTER DENOTES SWITCH DESIGNATION, EXAMPLE "a".	GREENGATE: OAC-DT-1000 SERIES (OR EQUAL BY LUTRON, LEVITON, SENSOR SWITCH, OR LC&D)

COMMENTS

TIME DELAY SHALL BE SET AT 20 MINUTES. SENSITIVITY SHALL BE AT MAXIMUM SETTINGS. CONNECT TO LIGHT FIXTURES INSIDE ROOM/AREA AS INDICATED BY SWITCH DESIGNATION SHOWN AT OCCUPANCY SENSOR AND/OR WHERE SENSOR IS PLACED. MULTIPLE OCCUPANCY SENSORS MAY CONTROL ROOM/AREA. CONNECT PER MANUFACTURERS WIRING INSTRUCTIONS.

LOCATIONS OF DEVICES SHOWN ON DRAWINGS ARE BASED ON COVERAGE AREAS OF MANUFACTURER AND MODEL NUMBER SHOWN IN OCCUPANCY SENSOR SCHEDULE. IF OTHER APPROVED MANUFACTURER'S DEVICES ARE USED, THE CONTRACTOR AND MANUFACTURER SHALL CONFIRM THAT THE COVERAGE AREA IS EQUAL TO OR LARGER THAN THE SPECIFIED. CONTRACTOR OR MANUFACTURER SHALL COMMISSION (AIM, ADJUST, ETC.) THE OCCUPANCY SENSORS IN THE PRESENCE OF THE OWNER, AFTER INSTALLATION FOR MAXIMUM PERFORMANCE.

DO NOT EXCEED LOAD LIMITATIONS OF LIGHTING CONTROL DEVICES. IF DEVICE LOAD LIMITATIONS ARE EXCEEDED, THEN PROVIDE A POWER SUPPLY, RELAY, AND OR CONTACTOR SYSTEM (NOT SHOWN) CONTROLLED BY THE LIGHTING CONTROL DEVICE.

BEFORE YOU DIG
811
1-800-552-6543
CALL OKIE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER
Christopher A. Harwell
21109
OKLAHOMA
9-13-16

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

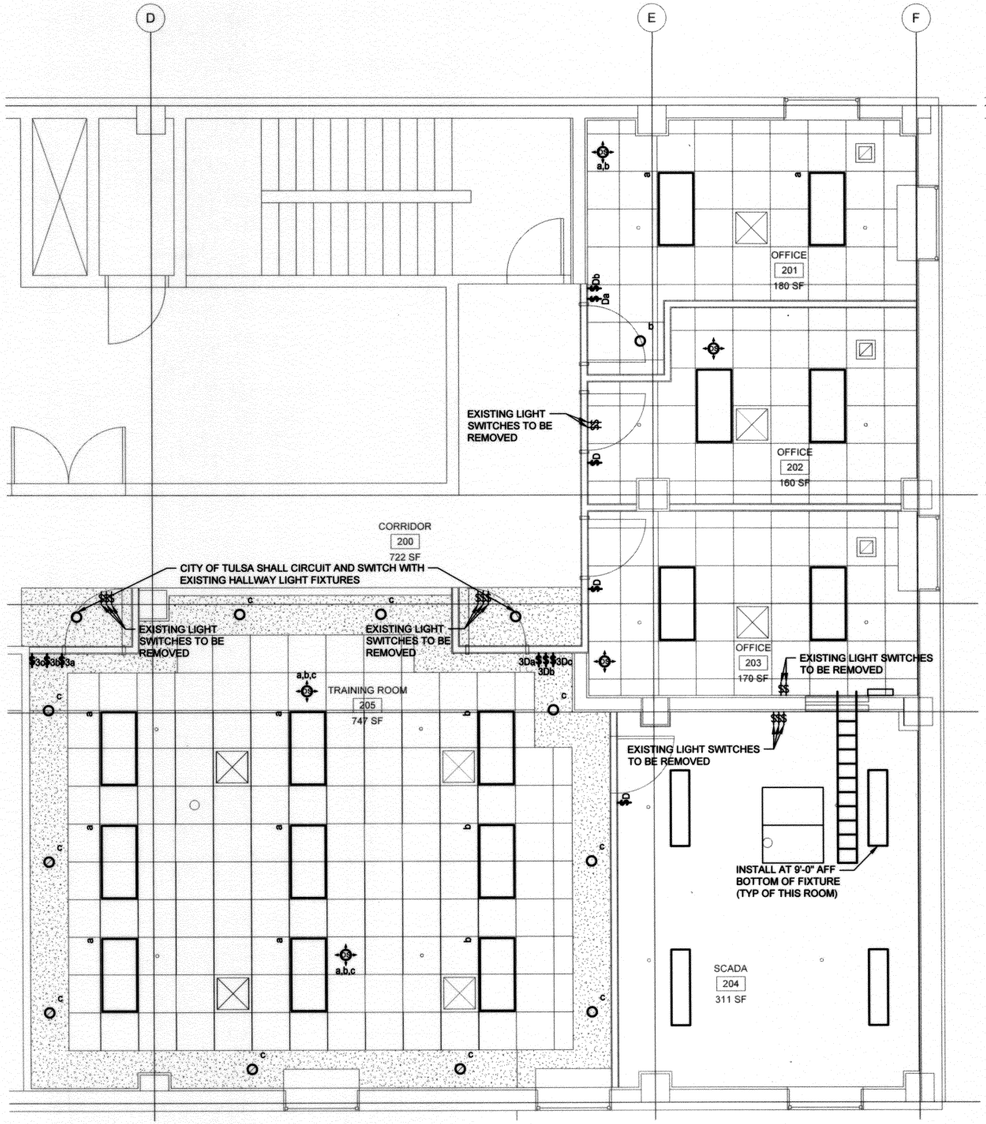
ELECTRICAL SPECIFICATIONS, SYMBOLS, NOTES, ABBREVIATIONS, & SCHEDULES

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

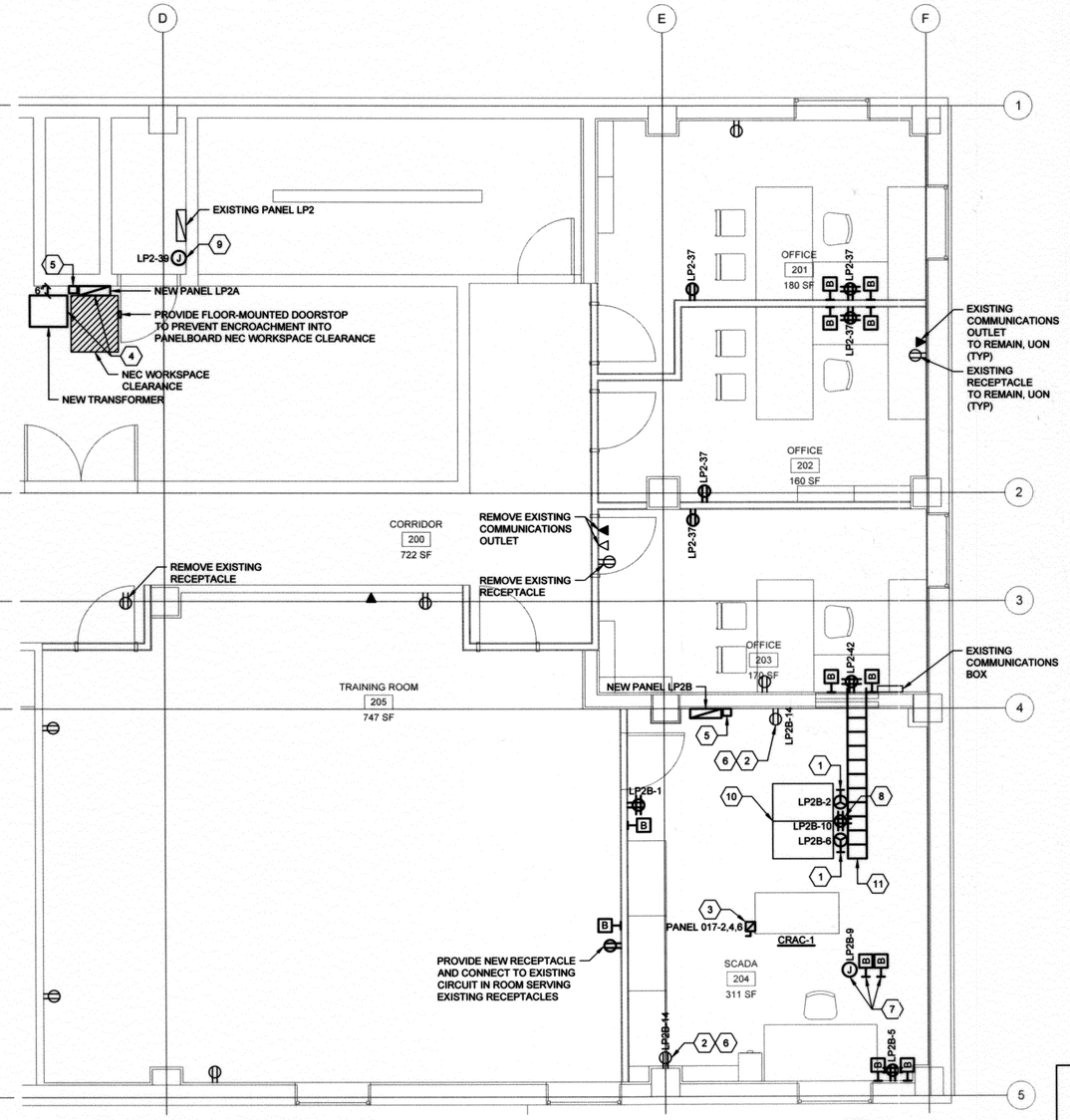
PLAN SCALE: AS INDICATED	DRAWN	JWE	08/2016	APPROVED:
	DESIGNED	JWE	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	ZZM	9/16	
	FIELD MGR.	RBW	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: E-003.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 34 OF 40 SHEETS
SHEET NAME: ELECTRICAL SPECIFICATIONS, SYMBOLS, NOTES, ABBREVIATIONS, & SCHEDULES				SHEET NO. E-003

Printed: 9/7/2016 2:24:30 PM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\E-003.dwg



1 SECOND FLOOR LIGHTING PLAN

1/4" = 1'-0"



2 SECOND FLOOR POWER PLAN

1/4" = 1'-0"

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

KEYNOTES

1. PROVIDE NEMA L5-20R RECEPTACLE. MOUNT TO DECK/BEAM TO ALLOW FOR RACK POWER STRIP'S 6' POWER CORD LENGTH. PROVIDE STRUT MOUNTING AS REQUIRED.
2. REPLACE EXISTING DEVICE AND FACEPLATE WITH NEW IN ACCORDANCE WITH SPECIFICATIONS.
3. MAKE FINAL CONNECTION TO CONTRACTOR PROVIDED FUSED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. PROVIDE 30A, 3-POLE CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING. BRANCH CIRCUIT CONDUCTORS SHALL BE #10. FUSE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PROVIDE LEVITON 55480-ASA SURGE ARRESTOR. INSTALL SURGE ARRESTOR AS CLOSE AS POSSIBLE TO UNIT AHEAD OF FUSED DISCONNECT.
4. REMOVE EXISTING PANEL AT THIS LOCATION. REMOVE CONDUIT TO WALL. SEAL CONDUIT AT WALL. SERVE NEW PANEL FROM EXISTING PANEL LP2, CIRCUITS 22,24,26. REFER TO PANEL SCHEDULE FOR FEEDER SIZE. PROVIDE NEW 125A, 3-POLE CIRCUIT BREAKER. AIC RATING SHALL MATCH EXISTING. REFER TO PANEL SCHEDULE FOR ADDITIONAL INFORMATION. ADD. ALT. NO. 2: CONTRACTOR HAS THE OPTION TO RE-USE THE ABANDONED CONDUIT AT THIS LOCATION IF IT MEETS THE INTENT OF THE CONTRACT DOCUMENTS, FOR THE FEEDER TO THE NEW TRANSFORMER. REMOVE EXISTING SPARE CIRCUIT BREAKER IN EXISTING FIRST FLOOR MDP. PROVIDE NEW CIRCUIT BREAKER IN ITS PLACE FOR NEW TRANSFORMER. AIC RATING AND MANUFACTURER SHALL MATCH EXISTING. PROVIDE WITH NEW PHENOLIC LABEL ON EXISTING FIRST FLOOR MDP TO MATCH EXISTING PHENOLIC LABELING. REFER TO ADD. ALT. NO. 2 ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
5. SURGE PROTECTION DEVICE (SPD) FOR 208V, 3PH, 4W BRANCH CIRCUIT PANELBOARD SHALL BE LEVITON 42120-DY3. INSTALL SPD AS CLOSE AS POSSIBLE TO THE PANELBOARD FEEDER ENTRY (MAXIMUM 3'-0" CONDUCTOR LENGTH). FURNISH AND INSTALL #10 CONDUCTORS TWISTED TOGETHER FROM PANELBOARD TO SPD. SPD SHALL BE PROVIDED WITH DRY CONTACTS FOR REMOTE MONITORING. SEAL INSIDE OF CONDUIT ENTERING PANELBOARD.
6. RE-CIRCUIT EXISTING RECEPTACLE AS SHOWN.
7. ADD. ALT. NO. 1: JUNCTION BOX AND COMMUNICATIONS BOXES FOR SCADA ROOM CLEAN AGENT CONTROL PANEL. COORDINATE EXACT LOCATION AND ADDITIONAL REQUIREMENTS WITH FIRE PROTECTION CONTRACTOR.
8. MOUNT OUTLET VERTICALLY. PROVIDE STRUT MOUNTING AS REQUIRED.
9. JUNCTION BOX FOR NEW MECHANICAL CONTROL PANEL. PROVIDE NEW 20A, 1-POLE CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
10. INSTALL THE FOLLOWING CITY OF TULSA FURNISHED SERVER RACKS (OR CITY OF TULSA APPROVED EQUAL) FOR THIS PROJECT: (2) MARTIN 732036-2L, (1) MARTIN SP7336, (4) MARTIN SPD7320 WITH 2 LEFT HAND AND 2 RIGHT HAND HINGED DOORS, (2) MARTIN FT2036, (1) MARTIN JK1000EX-4, (2) MARTIN PSM7020-6-20-TL. SERVER RACKS SHALL BE INSTALLED 1' ABOVE FLOOR. COORDINATE STAND FOR RACK WITH CITY OF TULSA.
11. PROVIDE CABLOFIL CF54 12"X2" ZINC-PLATED WIRE TRAY (OR CITY OF TULSA APPROVED EQUAL). BOTTOM OF TRAY SHALL BE INSTALLED AT 10'-0" AFF. TRAY SHALL BE HORIZONTALLY INSTALLED EXACTLY STRAIGHT, LEVEL, AND PARALLEL TO BUILDING LINES. SUPPORT TRAY AT LOCATIONS AND DISTANCES AS RECOMMENDED BY MANUFACTURER, WITH CENTER HANGERS AND WIRE CABLE TRAY SPLICE WASHERS AS REQUIRED. DO NOT SUPPORT TRAY AT JOINTS OR SPLICE LOCATIONS. PROVIDE UL LISTED FITTINGS TO GROUND EACH SECTION OF TRAY AND BOND TO CONDUIT DROPS. COORDINATE WITH CITY OF TULSA FOR WIRE CABLE TRAY EXIT SNAP IN MOUNTING TABS. PROVIDE GROUND FOR TRAY PER NEC.

PLAN NOTES

1. TROFFERS, DOWNLIGHTS, STRIP LIGHTS, AND DIMMER SWITCHES INDICATED ON PLANS SHALL BE CITY OF TULSA FURNISHED AND INSTALLED. NON-DIMMING 3-WAY SWITCHES IN TRAINING ROOM 205 SHALL BE CONTRACTOR FURNISHED AND INSTALLED.

LICENSED PROFESSIONAL ENGINEER
Christopher A. Harwell
21109
OKLAHOMA
9-13-16

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

SECOND FLOOR ELECTRICAL PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

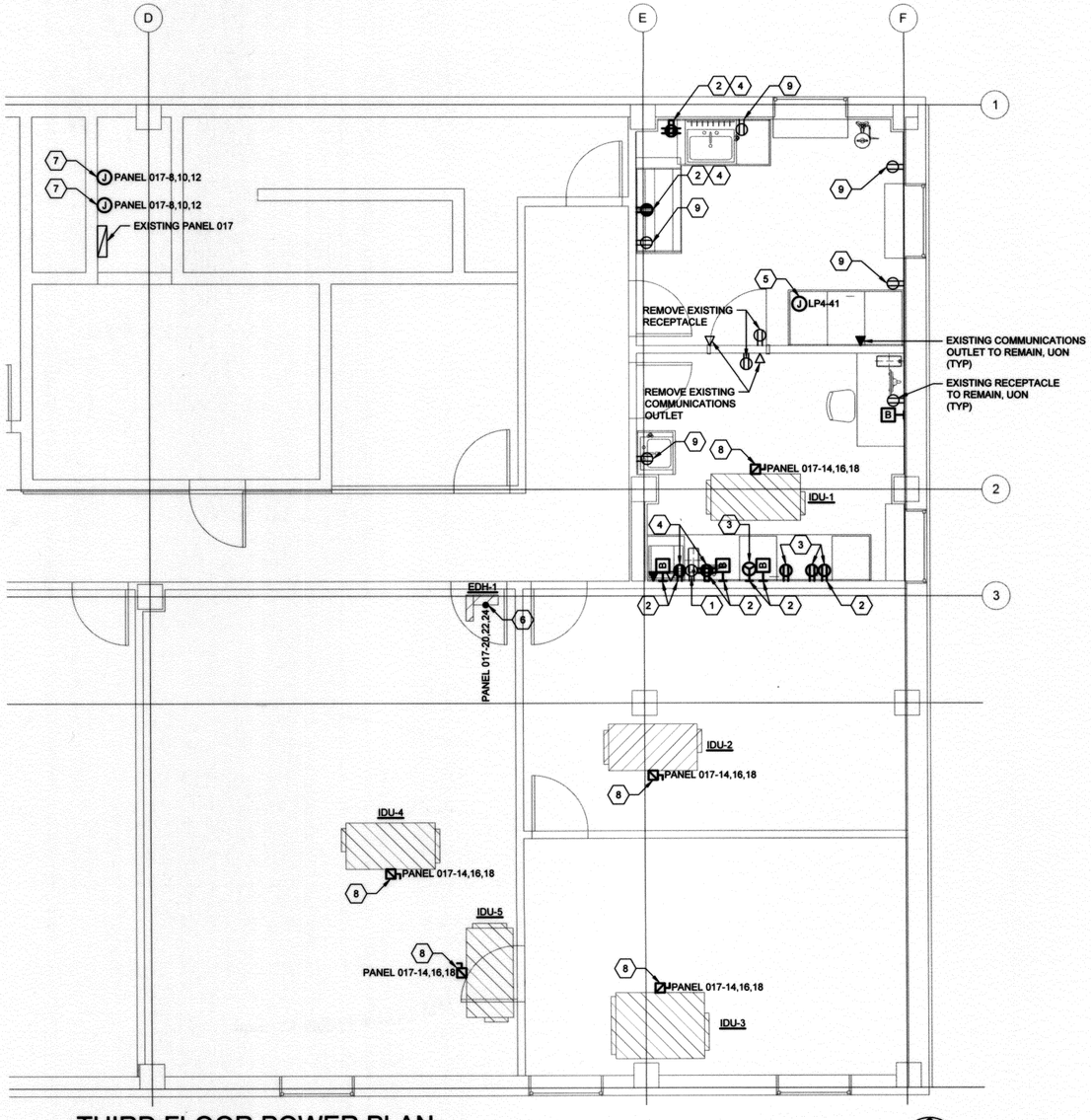
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	JWE	08/2016
	DESIGNED	JWE	08/2016
	SURVEY		
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16
HORIZONTAL: N/A	LEAD ENGR.	ZDM	9/16
	FIELD MGR.	RBW	9/16
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HBS	9/16

APPROVED: CITY ENGINEER

FILE: E-101.dwg DRAWING:
DATE: 9/8/2016
ATLAS PAGE NO: 00016
SHEET 35 OF 40 SHEETS
SHEET NAME: SECOND FLOOR ELECTRICAL PLAN
SHEET NO. E-101

Printed: 9/7/2016 2:24:34 PM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-28\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\E-101.dwg



1 THIRD FLOOR POWER PLAN

1/4" = 1'-0"

N

KEYNOTES

1. PROVIDE NEW GFCI RECEPTACLE AND NEW FACEPLATE IN ACCORDANCE WITH SPECIFICATIONS.
2. OUTLET SHALL BE LOCATED 2" ABOVE COUNTERTOP OR BACKSPLASH WHERE APPLICABLE, REFER TO ARCHITECTURAL ELEVATIONS FOR COUNTERTOP/BACKSPLASH ELEVATION AND ADDITIONAL INFORMATION.
3. RELOCATE RECEPTACLE FROM LAB 306 AND INSTALL IN SHOWN LOCATION. EXTEND CIRCUIT TO NEW LOCATION AND RECONNECT.
4. PROVIDE NEW RECEPTACLE AND CONNECT TO EXISTING CIRCUIT IN ROOM SERVING EXISTING RECEPTACLES.
5. PROVIDE CONNECTION TO FACTORY-PROVIDED HOOD INTERNAL JUNCTION BOX. PROVIDE CIRCUIT INDICATED WITH 20A, 1-POLE CIRCUIT BREAKER WITH LOCK-OUT ACCESSORY. AIC RATING SHALL MATCH EXISTING.
6. MAKE FINAL CONNECTION TO FACTORY PROVIDED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. PROVIDE 15A, 3-POLE CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING.
7. JUNCTION BOX FOR LOCATION OF MECHANICAL CONTRACTOR PROVIDED VFD FOR ROOF-MOUNTED LAB EXHAUST FAN. PROVIDE 25A, 3-POLE, LOCK-OUT, TAG-OUT CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING. PROVIDE POWER TO VFD. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. PROVIDE POWER FROM VFD AND MAKE FINAL CONNECTION TO LAB EXHAUST FAN FACTORY PROVIDED DISCONNECT ON ROOF. PROVIDE LABEL ON LAB EXHAUST FAN DISCONNECT STATING "TURN OFF POWER AT VFD PRIOR TO OPERATING DISCONNECT". CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. REUSE EXISTING RACEWAY TO ROOFTOP AS APPLICABLE AND EXTEND CONDUIT TO NEW LAB EXHAUST FAN. BRANCH CIRCUIT CONDUCTORS SHALL BE #10. PROVIDE 20A, 1-POLE CIRCUIT BREAKER IN EXISTING THIRD FLOOR LOAD CENTER ADJACENT TO EXISTING PANEL LP4 FOR LAB EXHAUST FAN ISOLATION DAMPERS. AIC RATING SHALL MATCH EXISTING. MAKE FINAL CONNECTION TO ISOLATION DAMPERS. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. COORDINATE REQUIREMENTS WITH MECHANICAL DRAWINGS, MECHANICAL CONTRACTOR, AND MANUFACTURER'S RECOMMENDATIONS.
8. MAKE FINAL CONNECTION TO CONTRACTOR PROVIDED FUSED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. PROVIDE 80A, 3-POLE CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING. FUSE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
9. REMOVE EXISTING RECEPTACLE AND CONDUCTORS. PROVIDE NEW BLANK FACEPLATE.

BEFORE YOU DIG CALL OKLA 811 1-800-552-6543

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER Christopher A. Harwell 21109 OKLAHOMA

9-13-16

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

THIRD FLOOR POWER PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	JWE	08/2016	APPROVED:
	DESIGNED	JWE	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CGW	9/17/16	
HORIZONTAL: N/A	LEAD ENGR.	CAH	9/16	
	FIELD MGR.	RBH	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	HAS	9/16	CITY ENGINEER
FILE: E-102.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 36 OF 40 SHEETS
SHEET NAME: THIRD FLOOR POWER PLAN				SHEET NO. E-102

Printed: 9/7/2016 2:24:56 PM
V:\Tulsa Public Works\Miscellaneous Elec & Mech 065100-29\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\E-102.dwg

PANEL LP2A
(NEW)
PANELBOARD SCHEDULE

CKT	DESCRIPTION	LOAD KVA	C.B.	PHASE A KVA	PHASE B KVA	PHASE C KVA	C.B.	LOAD KVA	DESCRIPTION	CKT
1	PANEL LP2B	2.64	100/3	4.28			20/1	1.64	GH-1	2
3		0.54			0.54		20/1		SPARE	4
5		2.28				2.28	20/1		SPARE	6
7	SPARE		20/1	0.00			20/1		SPARE	8
9	SPARE		20/1		0.00		20/1		SPARE	10
11	SPARE		20/1			0.00	20/1		SPARE	12
13	SPARE		20/1	0.00			20/1		SPARE	14
15	SPARE		20/1		0.00		20/1		SPARE	16
17	SPARE		20/1			0.00	20/1		SPARE	18
19	SPACE			0.00					SPACE	20
21	SPACE				0.00				SPACE	22
23	SPACE					0.00			SPACE	24
25	SPACE			0.00					SPACE	26
27	SPACE				0.00				SPACE	28
29	SPACE					0.00			SPACE	30
31	SPACE			0.00					SPACE	32
33	SPACE				0.00				SPACE	34
35	SPACE					0.00			SPACE	36
37	SPACE			0.00			30/3		SPD	38
39	SPACE				0.00					40
41	SPACE					0.00				42
	CONNECTED kVA LOAD PER PHASE:			4.28	0.54	2.28				
	CONNECTED AMPERE LOAD PER PHASE:			35.7	4.5	19.0				

TOTAL CONNECTED kVA: 7.1
TOTAL CONNECTED AMPERES: 19.7
TOTAL DEMAND kVA LOAD: 8.1
TOTAL DEMAND AMPERES: 22.4

VOLTAGE: 120/208, 3 PH, 4 W
AMPERE: 125 AMP MCB
AIC: *
MOUNTING: SURFACE
FEEDER: 4#1, 1#6G, 1-1/2"C

NOTES:

* BASE BID: PROVIDE WITH AIC RATING EQUAL TO OR GREATER THAN AIC RATING OF EXISTING PANEL LP2. ADD ALT. NO. 2: PROVIDE 10K AIC RATING.

PANEL LP2B
(NEW)
PANELBOARD SCHEDULE

CKT	DESCRIPTION	LOAD KVA	C.B.	PHASE A KVA	PHASE B KVA	PHASE C KVA	C.B.	LOAD KVA	DESCRIPTION	CKT
1	SCADA ROOM RECEPTACLE	0.36	***20/1	2.28			20/1***	1.92	SERVER RACK POWER STRIP	2
3	SPACE				0.00				SPACE	4
5	SCADA ROOM RECEPTACLE	0.36	***20/1			2.28	20/1***	1.92	SERVER RACK POWER STRIP	6
7	SPACE			0.00					SPACE	8
9	CLEAN AGENT CONTROL PANEL	0.18	**15/1		0.54		20/1***	0.36	SERVER RACK POWER	10
11	SPACE					0.00			SPACE	12
13	SPARE		***20/1	0.36			20/1***	0.36	SCADA ROOM RECEPTACLE	14
15	SPACE				0.00				SPACE	16
17	SPARE		20/1			0.00			SPACE	18
19	SPACE			0.00					SPACE	20
21	SPACE				0.00				SPACE	22
23	SPACE					0.00			SPACE	24
25	SPACE			0.00			30/3		SPD	26
27	SPACE				0.00					28
29	SPACE					0.00				30
	CONNECTED kVA LOAD PER PHASE:			2.84	0.54	2.28				
	CONNECTED AMPERE LOAD PER PHASE:			22.0	4.5	19.0				

TOTAL CONNECTED kVA: 5.5
TOTAL CONNECTED AMPERES: 15.2
TOTAL DEMAND kVA LOAD: 6.4
TOTAL DEMAND AMPERES: 17.8

VOLTAGE: 120/208, 3 PH, 4 W
AMPERE: 100 AMP MLO
AIC: *
MOUNTING: SURFACE
FEEDER: 4#3, 1#8G, 1-1/4"C

NOTES:
* PROVIDE WITH AIC RATING EQUAL TO OR GREATER THAN AIC RATING OF NEW PANEL LP2A.
** PROVIDE WITH LOCK-OUT ACCESSORY.
*** ADD. ALT. NO. 1: PROVIDE SHUNT TRIP BREAKER. COORDINATE WITH FIRE ALARM CONTRACTOR.

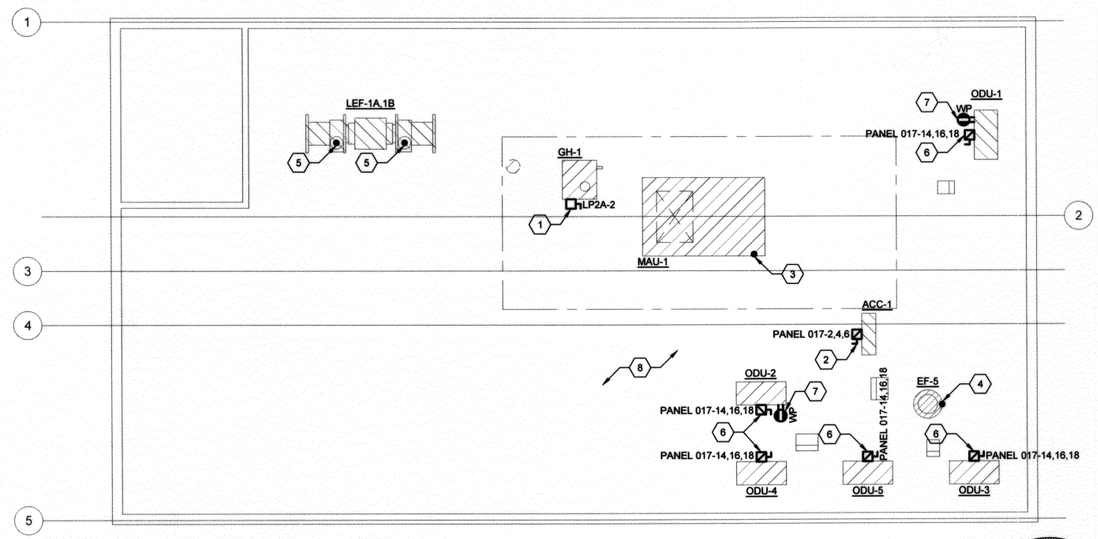
BRANCH CIRCUIT SCHEDULE

CIRCUIT BREAKER	1 POLE/1 PHASE	1 POLE/1 PHASE WITH IG	2 POLE/1 PHASE	3 POLE/3 PHASE OR 2 POLE/1 PHASE WITH NEUTRAL	SEE NOTE C 3 POLE/3 PHASE WITH NEUTRAL
15 OR 20 AMP	2#12, 1#12G, 1/2"C	2#12, 1#12G, 1#12IG, 1/2"C	2#12, 1#12G, 1/2"C	3#12, 1#12G, 1/2"C	4#12, 1#12G, 1/2"C
25 AMP	2#10, 1#10G, 1/2"C	2#10, 1#10G, 1#10IG, 1/2"C	2#10, 1#10G, 1/2"C	3#10, 1#10G, 1/2"C	4#10, 1#10G, 1/2"C
30 AMP	2#10, 1#10G, 1/2"C	2#10, 1#10G, 1#10IG, 1/2"C	2#10, 1#10G, 1/2"C	3#10, 1#10G, 1/2"C	4#10, 1#10G, 1/2"C
40 AMP	2#8, 1#10G, 1/2"C	2#8, 1#10G, 1#10IG, 1/2"C	2#8, 1#10G, 1/2"C	3#8, 1#10G, 3/4"C	4#8, 1#10G, 3/4"C
45 AMP	2#8, 1#10G, 1/2"C	2#8, 1#10G, 1#10IG, 1/2"C	2#8, 1#10G, 1/2"C	3#8, 1#10G, 3/4"C	4#8, 1#10G, 3/4"C
50 AMP	2#8, 1#10G, 1/2"C	2#8, 1#10G, 1#10IG, 1/2"C	2#8, 1#10G, 1/2"C	3#8, 1#10G, 3/4"C	4#8, 1#10G, 3/4"C
60 AMP	2#6, 1#10G, 3/4"C	2#6, 1#10G, 1#10IG, 3/4"C	2#6, 1#10G, 3/4"C	3#6, 1#10G, 3/4"C	4#6, 1#10G, 1"C
70 AMP	2#4, 1#8G, 3/4"C	2#4, 1#8G, 1#8IG, 1"C	2#4, 1#8G, 3/4"C	3#4, 1#8G, 1"C	4#4, 1#8G, 1 1/4"C
80 AMP	2#4, 1#8G, 3/4"C	2#4, 1#8G, 1#8IG, 1"C	2#4, 1#8G, 3/4"C	3#4, 1#8G, 1"C	4#4, 1#8G, 1 1/4"C
90 AMP	2#3, 1#8G, 1"C	2#3, 1#8G, 1#8IG, 1"C	2#3, 1#8G, 1"C	3#3, 1#8G, 1"C	4#3, 1#8G, 1 1/4"C
100 AMP	2#3, 1#8G, 1"C	2#3, 1#8G, 1#8IG, 1"C	2#3, 1#8G, 1"C	3#3, 1#8G, 1"C	4#3, 1#8G, 1 1/4"C

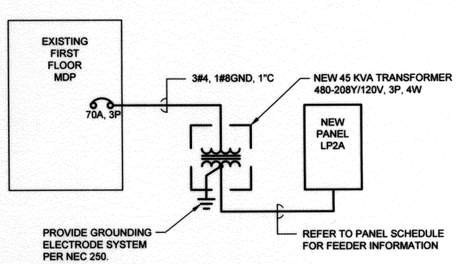
NOTES:
A. CONDUIT SIZES ARE BASED ON 75°C, COPPER CONDUCTORS, AND EMT CONTRACTOR SHALL PROVIDE LARGER CONDUITS AS REQUIRED.
B. CONDUCTORS AND CONDUITS LISTED ARE THE MINIMUM CONDUCTOR AND CONDUIT SIZES FOR THE ASSOCIATED CIRCUIT BREAKER SHOWN CONTRACTOR MAY UPSIZE CONDUCTORS OR CONDUIT.
C. ADJUST CONDUCTOR AND CONDUIT SIZES AS REQUIRED BY 2011 NEC 310.15(B)(5).

KEYNOTES

1. MAKE FINAL CONNECTION TO CONTRACTOR PROVIDED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER.
2. MAKE FINAL CONNECTION TO CONTRACTOR PROVIDED FUSED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. PROVIDE 30A, 3-POLE CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING. BRANCH CIRCUIT CONDUCTORS SHALL BE #10. FUSE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PROVIDE LEVITON 55480-ASA SURGE ARRESTOR. INSTALL SURGE ARRESTOR AS CLOSE AS POSSIBLE TO UNIT AHEAD OF FUSED DISCONNECT.
3. MAKE FINAL CONNECTION TO UNIT FACTORY PROVIDED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. DEMOLISH EXISTING 200A CIRCUIT BREAKER AT FIRST FLOOR SWITCHBOARD SERVING DEMOLISHED MAKE-UP AIR UNIT AND PROVIDE NEW 150A CIRCUIT BREAKER IN ITS PLACE. REUSE EXISTING RACEWAY TO ROOFTOP AS APPLICABLE AND EXTEND CONDUIT TO NEW UNIT. CONDUIT SHALL BE 1-1/2" MINIMUM. PROVIDE NEW CONDUCTORS (3#1/0, 1#6G) TO NEW UNIT. CONNECT FACTORY-PROVIDED MAINTENANCE RECEPTACLE TO AN EXISTING 20A, 1-POLE CIRCUIT BREAKER IN EXISTING THIRD FLOOR PANEL LP3 WITH AVAILABLE CAPACITY AND DESIGNATED FOR GENERAL USE, HOUSEKEEPING, OR MAINTENANCE.
4. MAKE FINAL CONNECTION TO UNIT FACTORY PROVIDED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. UTILIZE EXISTING CIRCUIT BREAKER LP2-33 SERVING DEMOLISHED EXHAUST FAN. REUSE EXISTING RACEWAY TO ROOFTOP AS APPLICABLE AND EXTEND CONDUIT AND CONDUCTORS TO NEW UNIT.
5. REFER TO THIRD FLOOR POWER PLAN FOR REQUIREMENTS, LOCATION OF VFD, AND ADDITIONAL INFORMATION. VERIFY LAB EXHAUST FAN VOLTAGE CONFIGURATION/ NEUTRAL REQUIREMENTS WITH MANUFACTURER.
6. MAKE FINAL CONNECTION TO CONTRACTOR PROVIDED FUSED DISCONNECT. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTION WITH MANUFACTURER. PROVIDE 80A, 3-POLE CIRCUIT BREAKER AT CIRCUIT INDICATED. AIC RATING SHALL MATCH EXISTING. BRANCH CIRCUIT CONDUCTORS SHALL BE #4. FUSE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
7. PROVIDE NEW ROOFTOP MAINTENANCE RECEPTACLE. CONNECT TO AN EXISTING 20A, 1-POLE CIRCUIT BREAKER IN EXISTING THIRD FLOOR PANEL LP3 WITH AVAILABLE CAPACITY AND DESIGNATED FOR GENERAL USE, HOUSEKEEPING, OR MAINTENANCE.
8. PROVIDE 20A, 1-POLE 30mA GROUND FAULT CIRCUIT BREAKER IN EXISTING THIRD FLOOR LOAD CENTER ADJACENT TO EXISTING PANEL LP4 FOR ROOFTOP HEAT TRACE. AIC RATING SHALL MATCH EXISTING. MAKE FINAL CONNECTIONS TO HEAT TRACE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONFIRM EXACT LOCATION OF ELECTRICAL CONNECTIONS WITH MANUFACTURER. COORDINATE REQUIREMENTS WITH MECHANICAL CONTRACTOR.



2 ROOF POWER PLAN
1/4" = 1'-0"



1 ADD. ALT. NO. 2 ONE-LINE DIAGRAM
NOT TO SCALE

OKLAHOMA ONE-CALL SYSTEM, INC.
1-800-552-6543
OR DIAL 811

LICENSED PROFESSIONAL ENGINEER
Christopher A. Harwell
21109
OKLAHOMA
9-13-16

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

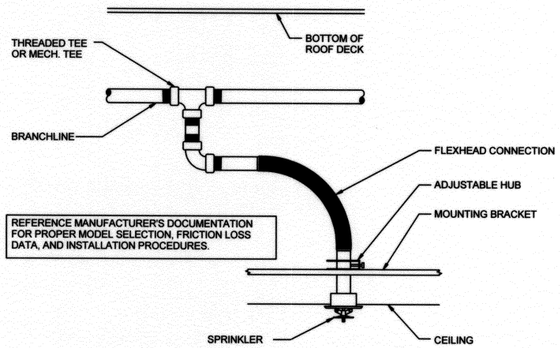
ROOF POWER PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	JWE	08/2016	APPROVED:
	DESIGNED	JWE	08/2016	
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/13/16	
HORIZONTAL: N/A	LEAD ENGR.	ZPM	9/16	
	FIELD MGR.	PAV	9/16	
VERTICAL N/A	RECOMMENDED: DESIGN MANAGER	KAS	9/16	CITY ENGINEER
FILE: E-103.dwg	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO: 00016				SHEET 37 OF 40 SHEETS
SHEET NAME: ROOF POWER PLAN				SHEET NO. E-103

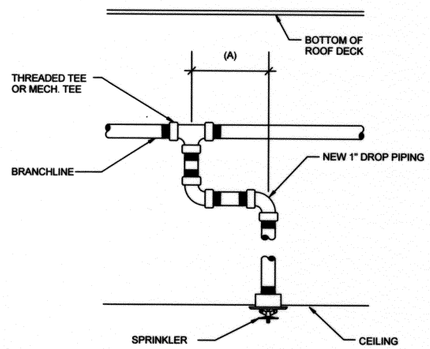
Printed: 9/7/2016 2:24:37 PM
V:\Tulsa Public Works\Maintenance Elec & Mech 065100-29\AB Jewell WTP Lab-Office Remodel\Drawings\Sheet\E-103.dwg



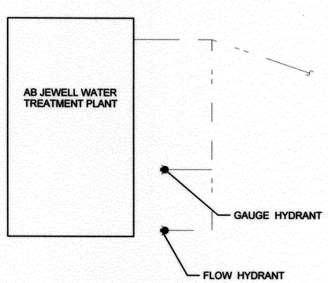
1 FLEXIBLE LOW CEILING SPRINKLER
SCALE: NTS

PRESSURE IN EXCESS OF 100 PSI @ SPRINKLER, DIMENSION (A) SHALL NOT EXCEED 12 INCHES WITHOUT BEING SUPPORTED BY HANGER THAT PREVENTS UPWARD MOVEMENT.

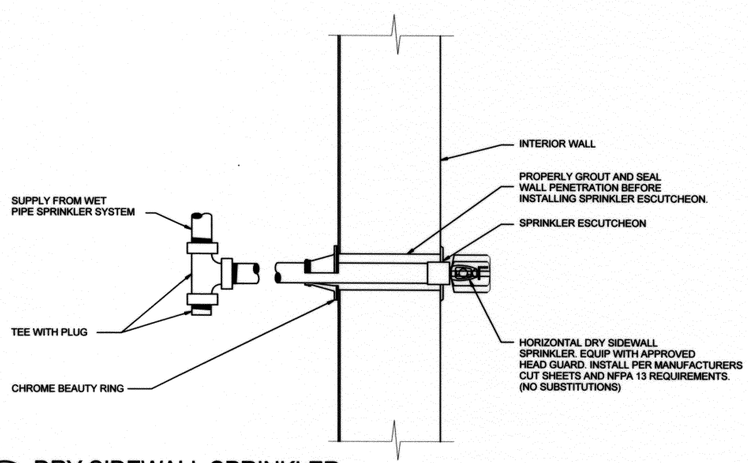
PRESSURE LESS THAN 100 PSI @ SPRINKLER, DIMENSION (A) SHALL NOT EXCEED 24 INCHES WITHOUT BEING SUPPORTED BY HANGER.



2 LOW CEILING SPRINKLER
SCALE: NTS



3 SITE UTILITY PLAN
SCALE: NTS



4 DRY SIDEWALL SPRINKLER
SCALE: NTS

CONTACT INFORMATION

DOCUMENTS INCLUDE JURISDICTIONAL REQUIREMENTS PROVIDED BY THE FOLLOWING CONTACTS:

FIRE SPRINKLER REVIEWING AUTHORITY:
RAY DRISKELL
TULSA FIRE CHIEF
918-596-9422

WATER SUPPLY INFORMATION

TEST STATIC AT SRC: 112.0 PSI
TEST RESIDUAL AT SRC: 96.0 PSI AT 1538 GPM

INFORMATION DERIVED FROM A WATER REPORT SUPPLIED BY OKLAHOMA FIRE SPRINKLER SERVICES LLC, DURING A FLOW TEST VISIT ON 12/07/2015. THE TEST WAS CONDUCTED AT 11:00 AM.

THE WATER SUPPLY IS MODIFIED BY THE FOLLOWING:

- 5.00 PSI DUE TO LOW CITY PRESSURE
- 4.0 PSI STATIC AND 9.2 PSI RESIDUAL PRESSURE LOSS DUE TO 6" AMES 2000SS CHECK
- 13.41 PSI DUE TO UNDERGROUND PIPE FRICTION LOSS FROM TEST TO FINISH FLOOR STUB-UP FLANGE

ADDITIONAL SAFETY FACTORS ARE NOT INCLUDED.

DESIGN STATIC AT BOR: 103.0 PSI
DESIGN RESIDUAL AT BOR: 68.4 PSI AT 1538 GPM

*AN ADDITIONAL 5-PSI SAFETY FACTOR IS NOT INCLUDED IN THE ABOVE NUMBERS, BUT WILL BE INCLUDED IN THE FIRE SPRINKLER HYDRAULIC CALCULATIONS.

APPLICABLE CODES

NFPA STANDARDS	EDITION
NFPA 13	2013

GENERAL NOTES

1. THE DESIGN SHOWN ON THESE CONTRACT DOCUMENTS IS TO PROVIDE GUIDANCE FOR BIDDING AND TO OBTAIN APPROVAL FROM THE AUTHORITY HAVING JURISDICTION. SPRINKLER CONTRACTOR SHALL SUBMIT COMPLETE FIRE SPRINKLER SHOP DRAWINGS AS REQUIRED BY CONTRACT DOCUMENTS TO THE OWNERS DESIGNATED REVIEWER. BASE DESIGN UPON THESE DRAWINGS AND AS REQUIRED BY THE SPECIFICATIONS. SHOP DRAWINGS SHALL INCLUDE ELEVATIONS, HANGER LOCATIONS, PIPE LENGTHS, DIMENSIONS, FABRICATIONS METHODS, MATERIAL DATA SUBMITTALS, AND ADDITIONAL INFORMATION NECESSARY TO CLARIFY THE INTENT OF INSTALLATION. CONTRACTOR SHALL PROVIDE PIPE SIZE, SPRINKLER SPACING, AND SYSTEM CONFIGURATION AS SHOWN. ALTERNATES MUST BE APPROVED IN WRITING VIA THE RFI PROCESS BY THE FIRE PROTECTION ENGINEER OF RECORD DOCUMENTS PRIOR TO BID.
2. COORDINATE LOCATIONS OF FIRE PROTECTION COMPONENTS, INCLUDING SPRINKLERS, PIPING, HANGER ASSEMBLIES, ALARMS, DRAINS, TEST POINTS, ETC. WITH ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS. OBSTRUCTIONS TO SPRINKLER DISCHARGE MUST BE CONSIDERED DURING SHOP DRAWING PRODUCTION AND INSTALLATION; ADDITIONAL SPRINKLERS OR DIFFERENT PIPE ROUTING MAY BE REQUIRED AT NO ADDITIONAL COST TO OWNER. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
3. THE SPRINKLER CONTRACTOR MUST VISIT THE BUILDING SITE TO DETERMINE THE FULL EXTENT OF THE EXISTING FIRE PROTECTION WORK AND EXISTING CONDITIONS, BECOME TOTALLY FAMILIAR WITH THE DISCONNECTIONS, REMOVALS, RELOCATIONS AND/OR RECONNECTIONS OF EXISTING FIRE PROTECTION EQUIPMENT REQUIRED, AND CONDITIONS IN THE PROPOSAL FOR THIS PROJECT. NO EXTRA COMPENSATION WILL BE PAID FOR LACK OF SUCH DETERMINATION, FAMILIARIZATION, AND/OR ALLOWANCE.
4. SUBMIT A REQUEST FOR INFORMATION FOR ANY QUESTIONS REGARDING THE FIRE PROTECTION DOCUMENTS TO THE ARCHITECT AND ENGINEER OF RECORD.
5. PENETRATIONS OF "RATED ASSEMBLIES" SHALL BE FIRE STOPPED WITH AN APPROVED MATERIAL PER METHODS REQUIRED ALLOWED BY THE FIRE PROTECTION ENGINEER OF RECORD AND THE AUTHORITY HAVING JURISDICTION.
6. THE FIRE PROTECTION ENGINEER OF RECORD SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO CARRY OUT THE CONSTRUCTION WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, NOR SHALL THEY BE REQUIRED TO SUPERVISE THE CONDUCT OF THE WORK, THE CONSTRUCTION PROCEDURES FOLLOWED BY THE CONTRACTOR, SUBCONTRACTORS, THEIR RESPECTIVE EMPLOYEES OR ANY OTHER PERSON AT THE JOB SITE OTHER THAN THAT OF THE ENGINEERING FIRM'S EMPLOYEES.
7. THE SPRINKLER CONTRACTOR MUST REVIEW ALL CONSTRUCTION DOCUMENTS PRIOR TO BID. SHOULD MODIFICATIONS TO THESE PLANS BECOME NECESSARY TO PROPERLY COORDINATE THE SYSTEM WITH ALL OTHER TRADES, IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN APPROVAL OF THE CHANGES FROM BOTH THE AUTHORITY HAVING JURISDICTION AND THE FIRE PROTECTION ENGINEER OF RECORD IN ADDITION TO OBTAINING THE NECESSARY APPROVALS, THE SPRINKLER CONTRACTOR MUST MAKE NOTE OF ANY FIELD OR COORDINATION CHANGES ON THE INSTALLATION DRAWINGS, AND THEN MUST PROVIDE A SET OF "RED-LINED" AS-BUILT DRAWINGS TO THE FIRE PROTECTION ENGINEER OF RECORD ONCE COMPLETE.
9. THE SPRINKLER CONTRACTOR MUST VERIFY ALL DROP DOWN LOCATIONS AT EXTERIOR WALLS WITH THE GENERAL CONTRACTOR PRIOR TO INSTALLATION.
10. ALL PIPING MUST BE COORDINATED AROUND FRAMING MEMBERS AND PROPERLY INSTALLED ABOVE THE BOTTOM CHORD OF THE BAR JOIST.

GENERAL NOTES

11. THE SPRINKLER CONTRACTOR SHALL ROUTE PIPING AROUND ALL OBSTRUCTIONS AND PROVIDE SPRINKLER PROTECTION UNDER OBSTRUCTIONS, AS DETAILED IN THE AHJ APPROVED EDITION OF NFPA 13 AS PART OF THE FIELD COORDINATION AT NO ADDITIONAL COST TO OWNER. REFER TO ALL FIRE PROTECTION DETAILS AND CONSTRUCTION DOCUMENTS FOR ALL INFORMATION.
12. ALL SPRINKLER DEFLECTOR DISTANCE REQUIREMENTS SHALL BE IN ACCORDANCE AS DETAILED IN THE AHJ APPROVED EDITION OF NFPA 13.
13. ALL PIPING PASSING THROUGH WALLS SHALL BE INSTALLED WITH ONE INCH CLEARANCE ON ALL SIDES. (CORE DIAMETER EQUAL TO PIPE +2"). ALL CORES SHALL BE COORDINATED WITH STRUCTURAL REINFORCING. THE SPRINKLER CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL CORING WITH PROPER CLEARANCE AT ALL WALLS. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A TWO INCH CLEARANCE AROUND ALL PIPING PASSING THROUGH CONCRETE SLABS. THE SPRINKLER CONTRACTOR SHALL FILL ALL CLEARANCES WITH APPROVED MASTIC.
14. PROVIDE FLUSHING CONNECTIONS IN ACCORDANCE WITH THE STANDARDS OUTLINED IN NFPA 13.
15. PROVIDE ALL NECESSARY OFFSETS, RISE OR DROPS IN PIPING AND AUXILIARY DRAINS AS REQUIRED BY BUILDING CONDITIONS.
16. EXAMINE THE JOB CONDITIONS AND VERIFY ALL MEASUREMENTS, DISTANCES, ELEVATIONS, CLEARANCES, ETC.
17. ARCHITECTURAL AND ELECTRICAL BACKGROUND INFORMATION IS SHOWN FOR COORDINATION PURPOSES ONLY. REFER TO THE CONTRACT DOCUMENTS FOR LOCATIONS, SIZES AND QUANTITIES OF OTHER TRADE WORK.
18. ALL SPRINKLER SPACING SHALL ADHERE TO THE CONTRACT DOCUMENTS AS WELL AS THE ADOPTED EDITION OF NFPA 13.
19. INTERFACE SPRINKLER SYSTEM WITH FIRE PROTECTION SUPERVISORY SYSTEM.
20. ALL MATERIALS SHALL BE UL LISTED AND FM APPROVED. SPRINKLER PIPE SHALL BE MANUFACTURED TO STANDARDS RECOGNIZED BY NFPA 13., THREADED SCH 40 PIPE SHALL HAVE A CORROSION RESISTANCE RATING OF 1.0 OR GREATER. CRIMP-TYPE COUPLINGS SHALL NOT BE USED.
21. ALL SPRINKLER SYSTEMS TO BE MODIFIED SHALL BE HYDROSTATICALLY TESTED PER NFPA 13 PRIOR TO SPRINKLER SYSTEM MODIFICATION AND SHALL BE RE-HYDROSTATICALLY TESTED AFTER COMPLETION OF WORK.
22. DO NOT HANG OR SUPPORT ANY LOADS OR MAKE ANY ATTACHMENTS TO THE METAL ROOF DECK OR JOIST BRIDGING.
23. PROVIDE RETAINING STRAPS ON HANGERS WHERE REQUIRED.
24. HANG ALL NEW SPRINKLER BRANCH LINE PIPING IN ACCORDANCE WITH THE ADOPTED EDITION OF NFPA 13.
25. ALL SPRINKLER PIPING, FITTINGS, AND HANGER ASSEMBLIES THAT ARE INSTALLED IN VIEW OF THE PUBLIC SHALL BE REQUIRED TO BE PAINTED, EITHER BY THE SPRINKLER CONTRACTOR OR THE GENERAL CONTRACTOR.
26. SPRINKLER SYSTEM FLOW SWITCHES TO HAVE THE DELAY SET TO ALARM BETWEEN 45 AND 60 SECONDS.

REGISTERED PROFESSIONAL ENGINEER
JAMES ROY SPRADLING
18683
OKLAHOMA

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018
JAMES ROY SPRADLING, PE
ENGINEER OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

FIRE SUPPRESSION NOTES AND DETAILS

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	KEM		APPROVED:
	DESIGNED	JRS		
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/19/16	
HORIZONTAL: N/A	LEAD ENGR.	RWM	9/16	
	FIELD MGR.	PBR	9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	MJS	9/16	CITY ENGINEER

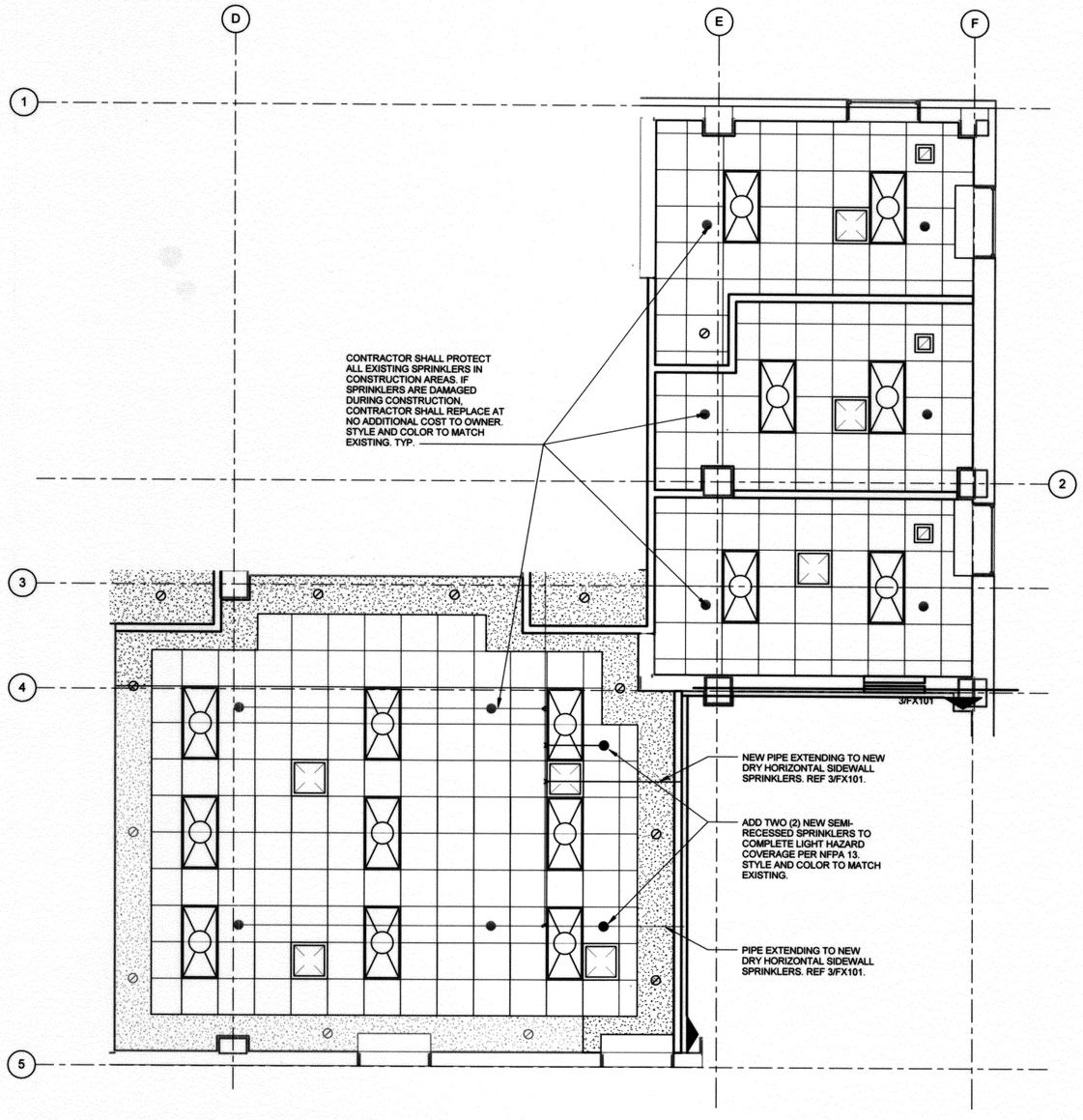
FILE: DRAWING: DATE: 9/8/2016
ATLAS PAGE NO: SHEET 38 OF 40 SHEETS
SHEET NAME: FIRE SUPPRESSION NOTES AND DETAILS
SHEET NO. FX001

Printed: 9/12/2016 9:57:39 AM
C:\Users\Sigwert\Documents\Revit\AB Jewell WTP Lab-Office Remodel_FIRE_R16_Signwert.rvt

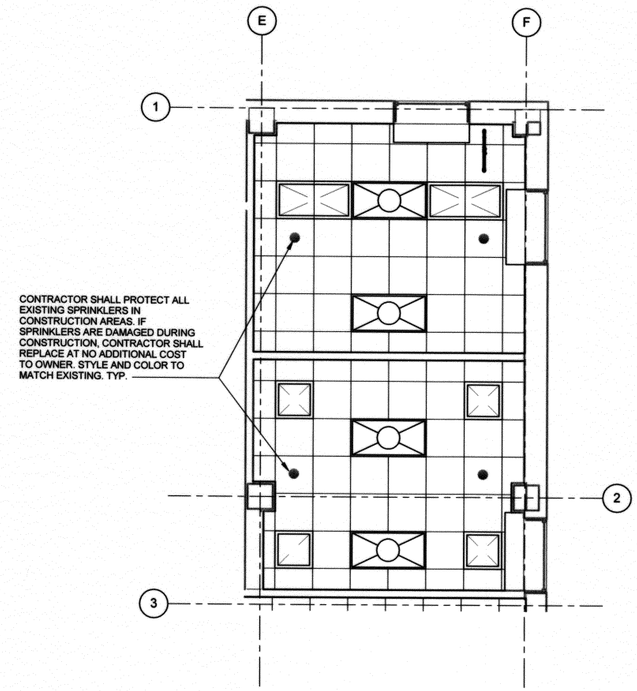
FIRE SPRINKLER SYMBOL LEGEND

SYMBOL	SIZE	MFR	MAKE	S.I.N.	FINISH	STYLE	TEMP	K-FACTOR
●	1/2"	MATCH EXST'G	MATCH EXST'G	MATCH EXST'G	WHITE	RECESSED STYLE 10	155	5.6
◁	1/2"	PER SPEC	EC-DHSW	PER SPEC	WHITE	HSW	200	5.6

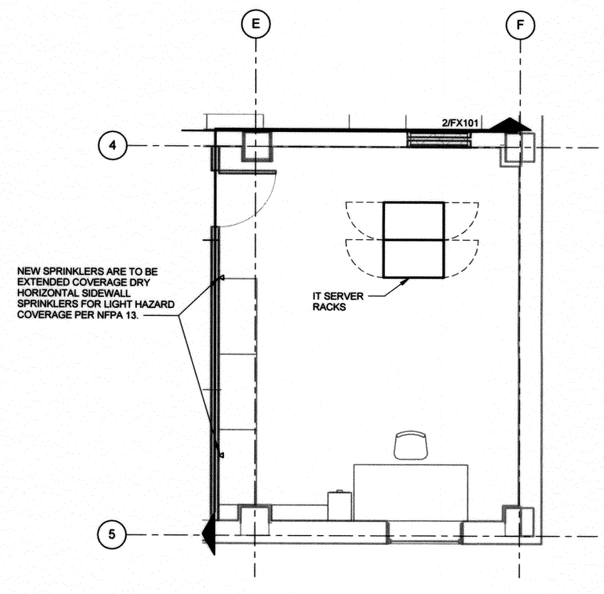
CONTRACTOR MAY SUBSTITUTE SPRINKLERS OF SAME SIZE, K-FACTOR AND TEMPERATURE CLASSIFICATION UNLESS PROHIBITED BY THE CONTRACT DRAWINGS AND SPECIFICATIONS.



2 SECOND FLOOR OFFICES AND CONFERENCE ROOM
1/4" = 1'-0"



1 THIRD FLOOR OFFICES
1/4" = 1'-0"



3 DATA ROOM
1/4" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
JAMES ROY SPRADLING
8683
OKLAHOMA

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018
JAMES ROY SPRADLING, PE
ENGINEER OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

FIRE SUPPRESSION PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

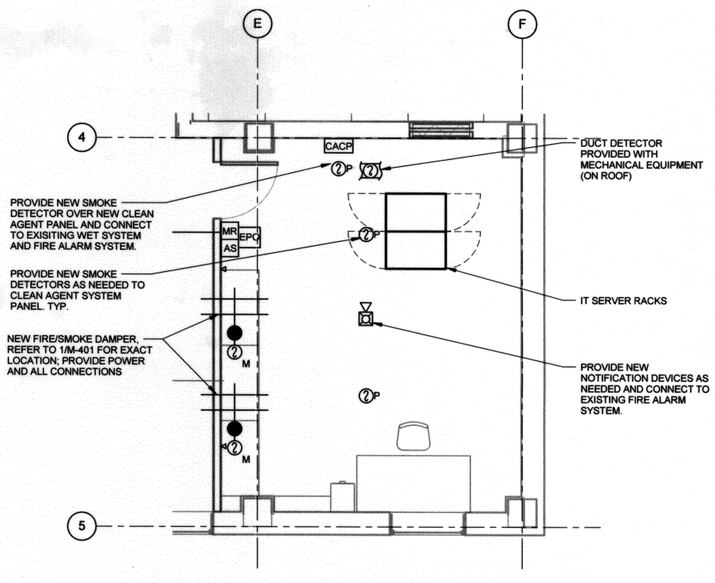
PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	KEM		APPROVED:
	DESIGNED	JRS		
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEW	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	[illegible]	9/16	
	FIELD MGR.	[illegible]	9/16	
VERTICAL: N/A	RECOMMENDED:	HAS	9/16	
	DESIGN MANAGER			CITY ENGINEER
FILE:	DRAWING:			DATE: 9/8/2016
ATLAS PAGE NO:				SHEET 39 OF 40 SHEETS
SHEET NAME: FIRE SUPPRESSION PLAN				SHEET NO. FX101

Printed: 9/12/2016 9:57:39 AM
C:\Users\Sgraves\Documents\Revit\AB Jewell WTP Lab-Office Remodel_FIRE_2016_Sgraves.rvt

FIRE ALARM SYSTEM SEQUENCE OF OPERATIONS

	SYSTEM INPUTS	SYSTEM OUTPUTS – FACP ANNUNCIATION								NOTIFICATION									
		ACTUATE COMMON ALARM SIGNAL INDICATOR	ACTUATE AUDIBLE ALARM SIGNAL	ACTUATE COMMON SUPERVISORY SIGNAL INDICATOR	ACTUATE AUDIBLE SUPERVISORY SIGNAL	ACTUATE COMMON TROUBLE SIGNAL INDICATOR	ACTUATE AUDIBLE TROUBLE SIGNAL	ACTUATE ZONE OR DEVICE ADDRESS ALARM INDICATOR	ACTUATE GENERAL EVACUATION SIGNAL	DISPLAY CHANGE OF STATUS	TRANSMIT FIRE ALARM SIGNAL TO CENTRAL STATION	TRANSMIT SUPERVISORY SIGNAL TO CENTRAL STATION	TRANSMIT TROUBLE SIGNAL TO CENTRAL STATION	RELEASE MAGNETICALLT HELD DOORS	CLOSE ALL SMOKE DAMPERS	UNLOCK EXITS AND CONTROL DOORS	SHUT DOWN RESPECTIVE AIR HANDLING EQUIPMENT		
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P		
1	COMPUTER ROOM CLEAN AGENT SYSTEM ALARM	■	■					■	■	■	■			■	■	■			1
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P		



1 DATA ROOM- ADD ALTERNATE

1/4" = 1'-0"

GENERAL NOTES

1. DETECTION FOR CLEAN AGENT SYSTEM TO BE MORE SENSITIVE THAN THE WET SYSTEM SPRINKLERS.
2. REMOVE ALARM SYSTEM DEVICES IN AREAS THAT ARE UNDER CONSTRUCTION AND STORE AND PROTECT FOR REINSTALLATION. TAKE THE DEVICES OUT OF ALARM SYSTEM PROGRAM SO THAT THE REST OF THE SYSTEM IS OPERATING. REINSTALL DEVICES AFTER EACH AREA IS COMPLETE AS PER CODE AND STATE FIRE MARSHAL. RETURN ALL UNUSED DEVICES TO OWNER.
3. PROVIDE ENCLOSURE INTEGRITY FAN TEST
4. COORDINATE EMERGENCY POWER SHUT OFF SWITCH WITH ELECTRICAL
5. PROVIDE 120VAC INPUT / 24 VAC OUTPUT POWER SUPPLIES, LOW VOLTAGE POWER, NOTIFICATION, AND CONNECTIONS TO SMOKE/FIRE DAMPERS.
6. PROVIDE SHUTDOWN OF LOCAL HVAC EQUIPMENT BY WAY OF MECHANICAL CONTROLS WITH SIGNAL FROM CACP.

FIRE ALARM SYMBOLS

TS	TAMPER SWITCH
PS	PRESSURE SWITCH
FS	FLOW SWITCH
MR	ELECTRIC MANUAL RELEASE SWITCH
AS	CLEAN AGENT ABORT SWITCH
EPO	EMERGENCY POWER SHUT OFF
	HORN, +80" AFF TO BOTTOM, IF WALL MOUNTED
	COMBINATION STROBE/HORN, +80" AFF TO BOTTOM, IF WALL MOUNTED
	STROBE, +80" AFF TO BOTTOM, IF WALL MOUNTED
F	MANUAL FIRE ALARM PULL STATION +46" AFF TO HANDLE
P	SMOKE DETECTOR - PHOTOELECTRIC
F	FIXED HEAT DETECTOR
	PHOTOELECTRIC DUCT DETECTOR
FACP	EXISTING FIRE ALARM CONTROL PANEL
FAAP	FIRE ALARM ANNUNCIATOR PANEL
CACP	CLEAN AGENT CONTROL PANEL
M	MOTORIZED FIRE/SMOKE DAMPER

CLEAN-AGENT FIRE-EXTINGUISHING SYSTEMS

1. MINIMUM NICET LEVEL II SPECIAL HAZARD DESIGNER TO DESIGN CLEAN AGENT SYSTEMS.
2. ALL DEVICES, COMPONENTS, AND EQUIPMENT SHALL BE NEW, STANDARD PRODUCTS OF THE MANUFACTURER'S LATEST DESIGN AND SUITABLE TO PERFORM THE FUNCTIONS INTENDED. THE NAME OF THE MANUFACTURER, PART NUMBER, AND SERIAL NUMBER SHALL APPEAR ON ALL MAJOR COMPONENTS
3. LOCKS FOR ALL CABINETS SHALL BE KEYED ALIKE.
4. CLEAN-AGENT FIRE-EXTINGUISHING SYSTEM SHALL BE AN ENGINEERED SYSTEM FOR TOTAL FLOODING OF THE HAZARD AREA INCLUDING THE ROOM CAVITY ABOVE THE CEILING, BELOW THE CEILING, AND BELOW THE RAISED FLOOR. SYSTEM INCLUDES SEPARATE ZONES ABOVE AND BELOW THE CEILING AND BENEATH THE RAISED FLOOR. IF SMOKE IS DETECTED BELOW THE RAISED FLOOR, EXTINGUISHING AGENT SHALL BE DISCHARGED IN THE UNDER FLOOR ZONE ONLY. IF SMOKE IS DETECTED BELOW THE CEILING, EXTINGUISHING AGENT SHALL BE DISCHARGED IN ZONES ABOVE AND BELOW THE CEILING AND BELOW THE FLOOR. IF SMOKE IS DETECTED ABOVE THE CEILING, EXTINGUISHING AGENT SHALL BE DISCHARGED IN THE ZONE ABOVE THE CEILING ONLY.
5. DESIGN CLEAN-AGENT FIRE-EXTINGUISHING SYSTEM AND OBTAIN APPROVAL FROM AUTHORITIES HAVING JURISDICTION. DESIGN SYSTEM FOR CLASS A, B, AND C FIRES AS APPROPRIATE FOR AREAS BEING PROTECTED, AND INCLUDE SAFETY FACTOR. USE CLEAN AGENT INDICATED AND IN CONCENTRATION SUITABLE FOR NORMALLY OCCUPIED AREAS..
6. FIRE-SUPPRESSION PIPING AND CONTAINERS SHALL WITHSTAND THE EFFECTS OF EARTHQUAKE MOTIONS DETERMINED ACCORDING TO ASCE/SEI 7.
7. PROVIDE VERIFIED DETECTION. WHEN DEVICES LOCATED IN SINGLE ZONE. SOUND ALARM ON ACTIVATING SINGLE-DETECTION DEVICE, AND DISCHARGE EXTINGUISHING AGENT ON ACTUATING SECOND-DETECTION DEVICE.

CLEAN-AGENT OPERATING SEQUENCE

A. VERIFIED DETECTION:
   1. ACTUATING FIRST DETECTOR (ALARM):
      a. VISUAL AND AUDIBLE INDICATION ON CONTROL PANEL.
      b. VISUAL INDICATION ON OPTIONAL ANNUNCIATOR PANEL.
      c. ENERGIZE AUDIBLE AND VISUAL ALARMS INSIDE THE PROTECTED HAZARD AREA (UNIQUE PATTERN).
      d. TRANSFER RELAYS TO SHUT DOWN AIR-CONDITIONING AND VENTILATING SYSTEMS SERVING PROTECTED AREA, CLOSE DOORS IN PROTECTED AREA, AND SEND SIGNAL TO FIRE-ALARM SYSTEM.
   2. ACTUATING SECOND DETECTOR (PRE-DISCHARGE):
      a. VISUAL AND AUDIBLE INDICATION ON CONTROL PANEL.
      b. VISUAL INDICATION ON OPTIONAL ANNUNCIATOR PANEL.
      c. ENERGIZE AUDIBLE AND VISUAL ALARMS INSIDE THE PROTECTED HAZARD AREA (UNIQUE PATTERN).
      d. TRANSFER RELAYS TO SHUT DOWN POWER TO PROTECTED EQUIPMENT ON PANEL LP2B.
      e. START TIME DELAY FOR EXTINGUISHING-AGENT DISCHARGE FOR 30 SECONDS.
      f. INITIATE SYSTEM ABORT SEQUENCE.
   3. EXTINGUISHING-AGENT DISCHARGE (RELEASE): PRE-DISCHARGE TIME DELAY EXPIRES OR MANUAL RELEASE SWITCH IS OPERATED.
      a. VISUAL AND AUDIBLE INDICATION ON CONTROL PANEL.
      b. VISUAL INDICATION ON OPTIONAL ANNUNCIATOR PANEL.
      c. ENERGIZE AUDIBLE AND VISUAL ALARMS INSIDE AND OUTSIDE THE PROTECTED AREA (UNIQUE PATTERN).
      d. RELEASE CLEAN AGENT SUPPRESSION SYSTEM AGENT.

B. SUPERVISORY SIGNAL INITIATION SHALL BE:
   1. CLEAN AGENT CONTAINER LOW PRESSURE SWITCH.

C. TROUBLE SIGNAL INITIATION SHALL BE BY ONE OR MORE OF THE FOLLOWING DEVICES AND ACTIONS:
   1. OPEN CIRCUITS, SHORTS, AND GROUNDS IN DESIGNATED CIRCUITS.
   2. OPENING, TAMPERING WITH, OR REMOVING ALARM-INITIATING AND SUPERVISORY SIGNAL-INITIATING DEVICES.
   3. LOSS OF PRIMARY POWER AT FIRE-ALARM CONTROL UNIT.
   4. GROUND OR A SINGLE BREAK IN FIRE-ALARM CONTROL UNIT INTERNAL CIRCUITS.
   5. ABNORMAL AC VOLTAGE AT FIRE-ALARM CONTROL UNIT.
   6. BREAK IN STANDBY BATTERY CIRCUITRY.
   7. FAILURE OF BATTERY CHARGING.
   8. ABNORMAL POSITION OF ANY SWITCH AT FIRE-ALARM CONTROL UNIT OR ANNUNCIATOR.

D. SYSTEM SUPERVISORY AND TROUBLE SIGNAL ACTIONS:
   1. VISUAL AND AUDIBLE INDICATION ON CONTROL PANEL.
   2. VISUAL INDICATION ON OPTIONAL ANNUNCIATOR PANEL.
   3. TRANSFER RELAYS TO SEND SIGNAL TO FIRE-ALARM SYSTEM.

E. OPERATING MANUAL RELEASE SWITCHES WILL CAUSE THE IMMEDIATE DISCHARGE OF THE EXTINGUISHING AGENT, OVERRIDING THE SYSTEM'S DISCHARGE TIME DELAY AND ABORT FUNCTIONS. PANEL OPERATION SHALL DUPLICATE THE EXTINGUISHING-AGENT DISCHARGE SEQUENCE DESCRIBED IN THE PREVIOUS PARAGRAPHS.
   1. ELECTRIC MANUAL RELEASE SWITCHES SHALL BE LOCATED AT EACH HAZARD EXIT.

F. OPERATING ABORT SWITCHES WILL DELAY EXTINGUISHING-AGENT DISCHARGE WHILE BEING ACTIVATED. RELEASE OF HAND PRESSURE ON THE SWITCH WILL CAUSE AGENT DISCHARGE IF THE DISCHARGE TIME DELAY HAS EXPIRED.

G. LOW-AGENT PRESSURE SWITCH: INITIATE TROUBLE ALARM IF SENSING LESS THAN SET PRESSURE.

REGISTERED PROFESSIONAL ENGINEER
JAMES ROY SPRADLING
18683
OKLAHOMA

CYNTERGY ENGINEERING, PLLC
CA # 3537
EXPIRES 6/30/2018
JAMES ROY SPRADLING, PE
ENGINEER OF RECORD

REVISION	BY	DATE

CITY OF TULSA
AB JEWELL WATER TREATMENT PLANT
LAB / OFFICE RENOVATION

PROJECT NO. TMUA-W 16-04

ADD ALTERNATE FIRE SUPPRESSION CLEAN AGENT PLAN

CITY OF TULSA, OKLAHOMA
ENGINEERING SERVICES DEPARTMENT

PLANS AND ESTIMATES PREPARED BY:
CYNTERGY, L.L.C.

PLAN SCALE: AS INDICATED	DRAWN	KEM		APPROVED:
	DESIGNED	JRS		
	SURVEY			
PROFILE SCALE:	PROJ. MGR.	CEJ	9/14/16	
HORIZONTAL: N/A	LEAD ENGR.	JRS	9/16	
	FIELD MGR.	RDH	9/16	
VERTICAL: N/A	RECOMMENDED: DESIGN MANAGER	HBS	9/16	CITY ENGINEER

FILE: DRAWING:	DATE: 9/8/2016
ATLAS PAGE NO:	SHEET 40 OF 40 SHEETS
SHEET NAME: ADD ALTERNATE FIRE SUPPRESSION CLEAN AGENT PLAN	SHEET NO. FX102

Printed: 9/12/2016 8:57:40 AM
C:\Users\kgreen\Documents\Projects\AB Jewell WTP Lab Office Remodel_FIRE_2016_Signed.rvt