

# HOUSTON COMMUNITY COLLEGE

HVAC REPLACEMENT AT FANNIN BUILDING

3601 FANNIN ST HOUSTON, TEXAS FEBRUARY 21, 2020

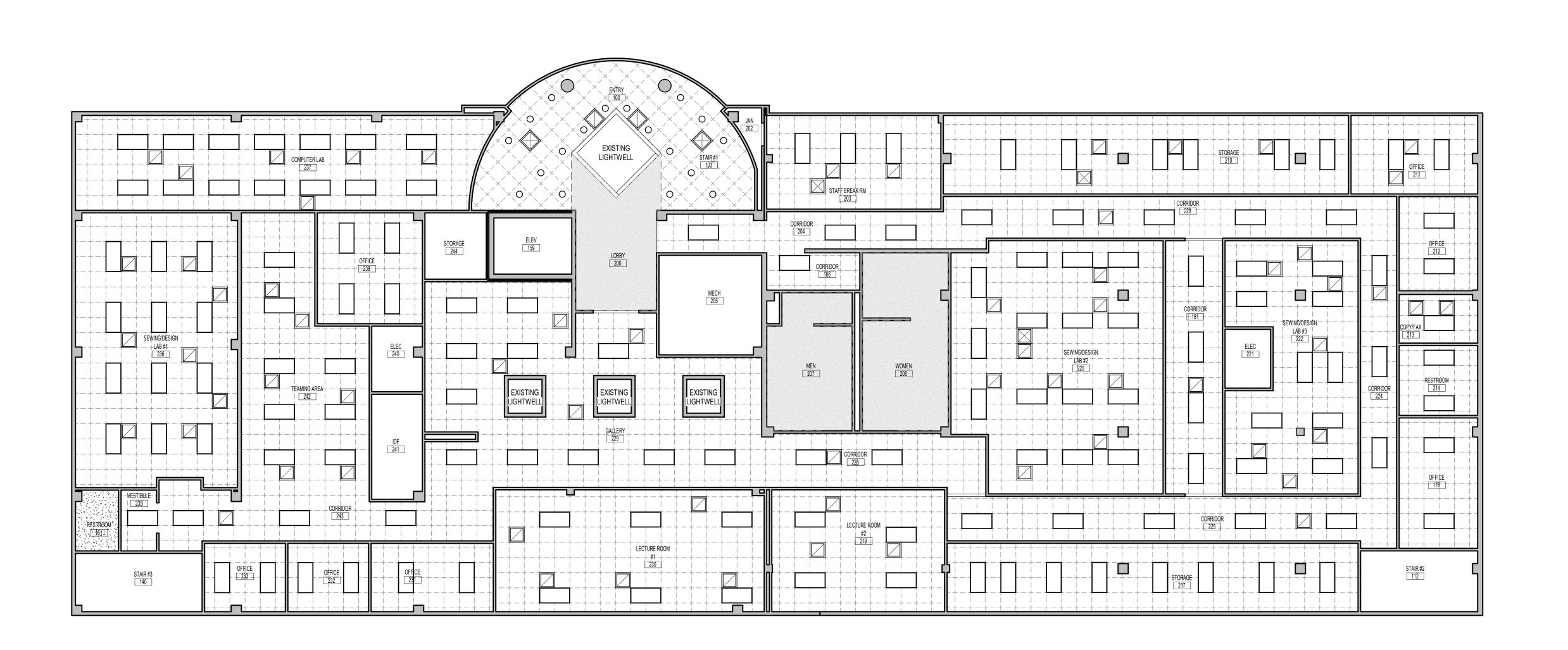
Prime Consultant / Engineer:

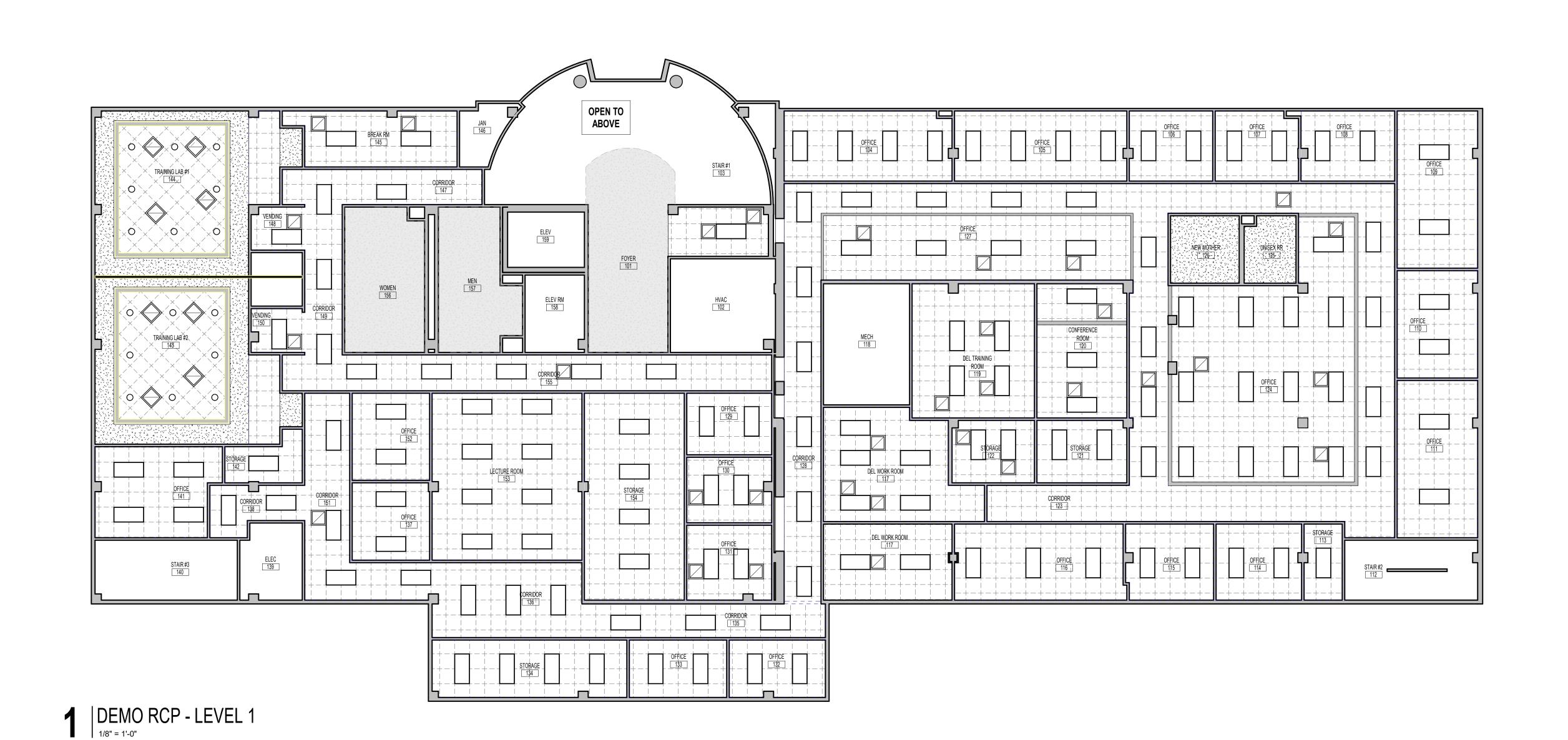
DBR

9990 Richmond Avenue South Building, Suite 300 Houston, TX 77042 P. 713.914.0888 F. 713.914.0886 TBPE Firm Registration No. 2234 Architectural:

**ERO Architects** 

5444 WESTHEIMER SUITE 1000, OFFICE 1054 HOUSTON, TX 77056





RCP DEMO GENERAL NOTES

1. ALL LIGHTS IN GYP CEILINGS TO REMAIN. 2. ALL GYP. CEILINGS TO REMAIN.

3. CEILING TILE SHOULD BE REMOVED CAREFULLY AND STORED FOR RE-USE & RE-INSTALLATION. 4. ALL EXISTING LIGHTS, SUPPLIES, RETURNS, SPEAKERS, ETC. (CEILING DEVICES) TO REMAIN & RE-INSTALLED IN NEW CEILINGS, UNLESS NOTED

RCP LEGEND REMOVE EXISTING CEILING TILES & CEILING GRIDS, ASSOCIATED ACCESSORIES AND SUPPORTS. STORE TILES FOR RE-USE. LAYIN CEILING ANGLE TO REMAIN, REPLACE IF DAMAGED. EXIST GYP. BRD. CEILING ASSEMBLY, PTD. TO BE REMOVED & REPLACED EXIST GYP. BRD. CEILING ASSEMBLY, PTD. TO REMAIN OPEN TO STRUCTURE Houston, TX 77056 REVISION: ALL ELECTRICAL, MECHANICAL AND RISER ROOMS ARE OPEN TO STRUCTURE ABOVE, W/STRUCTURE PAINTED. U.N.O.

**LEGEND** LIGHT FIXTURE RETURN SUPPLY

ALL ELECTRICAL, MECHANICAL AND RISER ROOMS ARE OPEN TO STRUCTURE ABOVE, W/STRUCTURE PAINTED. U.N.O.

5444 Westheimer Suite 1000, Office 1054

No. / DATE / DISCRIPTION

SEAL:

02/21/2020

CHECKED BY:

PROJECT NUMBER 20004

SHEET TITLE

ARCHITECTURAL DEMO PLANS



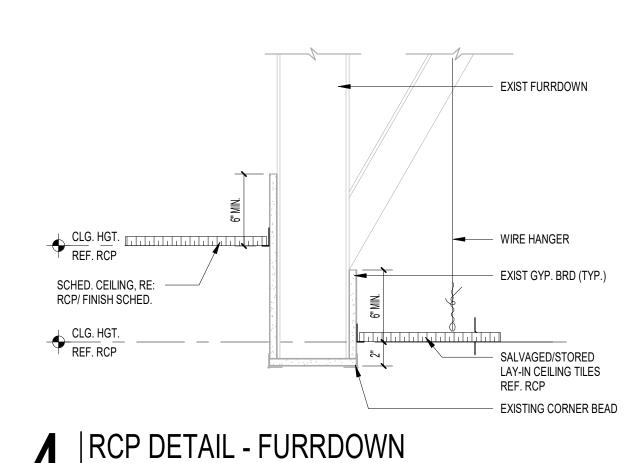
EM MECH ELEC PLBG TECH

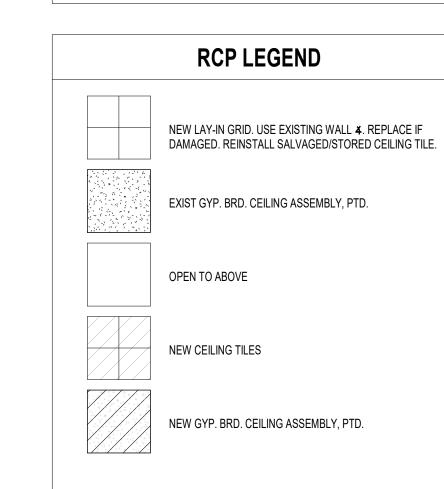
SHEET NUMBER

**AD101** 

HIGH TENSION WIRE HANGER CLG. HGT.
REF. RCP SALVAGED/STORED LAY-IN CEILING TILES REF. RCP - EXISTING CEILING WALL ANGLE TO REMAIN - EXISTING WALL

3 | RCP DETAIL 1/2" = 1'-0"





**RCP GENERAL NOTES** 

1. ALL CEILING HEIGHTS INDICATED ARE FROM FINISH FLOOR LEVEL, COORDINATE ANY MEP DISCREPANCIES W/CEILING HEIGHT PROVIDED ON

2. COORDINATE ALL LIGHTING FIXTURES, DIFFUSERS, ETC. SEE MEP DRAWINGS FOR ADDITIONAL INFORMATION, INSTRUCTIONS. NOTIFY

4. SEE MEP DRAWINGS FOR SPECIFIC MECHANICAL DIFFUSERS.

ARCHITECTURAL DRAWINGS FOR LOCATIONS AND SIZES.

8. CEILING GRIDS TO BE CENTERED IN ROOMS U.N.O.

AND MEP EQUIPMENT.

STRUCTURAL ELEMENTS

3. SEE MEP DRAWINGS FOR SPECIFIC LIGHT FIXTURES, EXIT SIGNS, VISUAL

5. LIGHT FIXTURES THAT ARE NOT THE FULL SIZE OF A CEILING PANEL SHALL

BE LOCATED IN THE CENTER OF THE CEILING PANEL. COORDINATE WITH

6. PAINT ALL EXPOSED TO VIEW AREAS, INCLUDING STRUCTURAL MEMBERS

7. COORDINATE ALL CEILING MOUNTED EQUIPMENT LOCATIONS WITH OTHER TRADES.

9. CENTER ALL DEVICES IN CEILING PANELS. (I.E. DOWNLIGHTS, SPRINKLER HEADS, ETC) U.N.O.

10. COORDINATE ALL MECHANICAL DUCT WORK, PIPING, SPRINKLER LINES AND CABLE TRAYS TO AVOID CONFLICTS WITH LIGHT FIXTURES AND

11. PAINT ALL EXPOSED CONDUITS, JUNCTION BOXES, ELECTRICAL ITEMS (NOT

FACTORY FINISHED), SPRINKLER LINES, MECHANICAL DUCTWORK, PIPING

12. SPRINKLER HEADS TO BE CENTERED IN TILES U.N.O., TYP.

ENGINEER IF THERE ARE ANY DISCREPANCIES.

NOTE: ALL ELECTRICAL, MECHANICAL AND RISER ROOMS ARE OPEN TO STRUCTURE ABOVE, W/STRUCTURE PAINTED. U.N.O.

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No. / DATE / DISCRIPTION

**REVISION:** 

SEAL:

02/21/2020 DRAWN BY:

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PROJECT NUMBER

20004 SHEET TITLE

REFLECTED CEILING PLANS

**₩DBR** Houston, Texas 77042 713.914.0888 p 713.914.0886 f

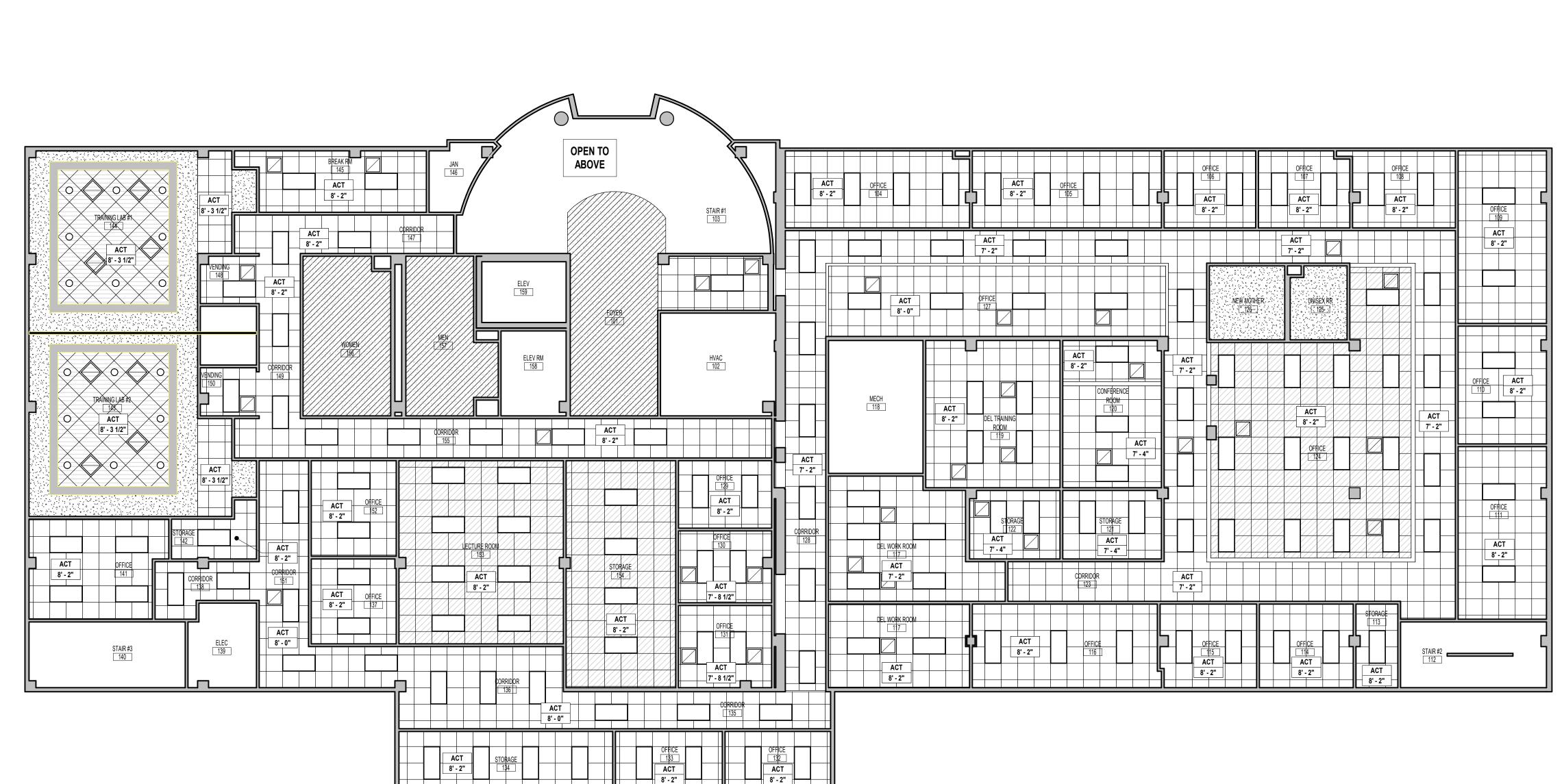
TBPE Firm Registration No. 2234

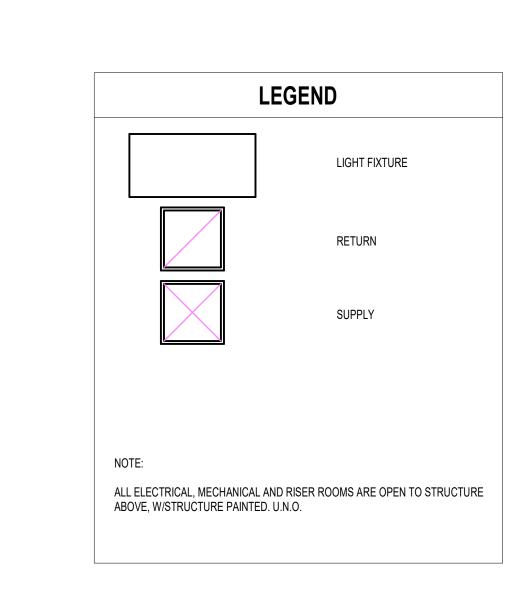
EM | MECH | ELEC | PLBG | TECH

BR Project Number

SHEET NUMBER

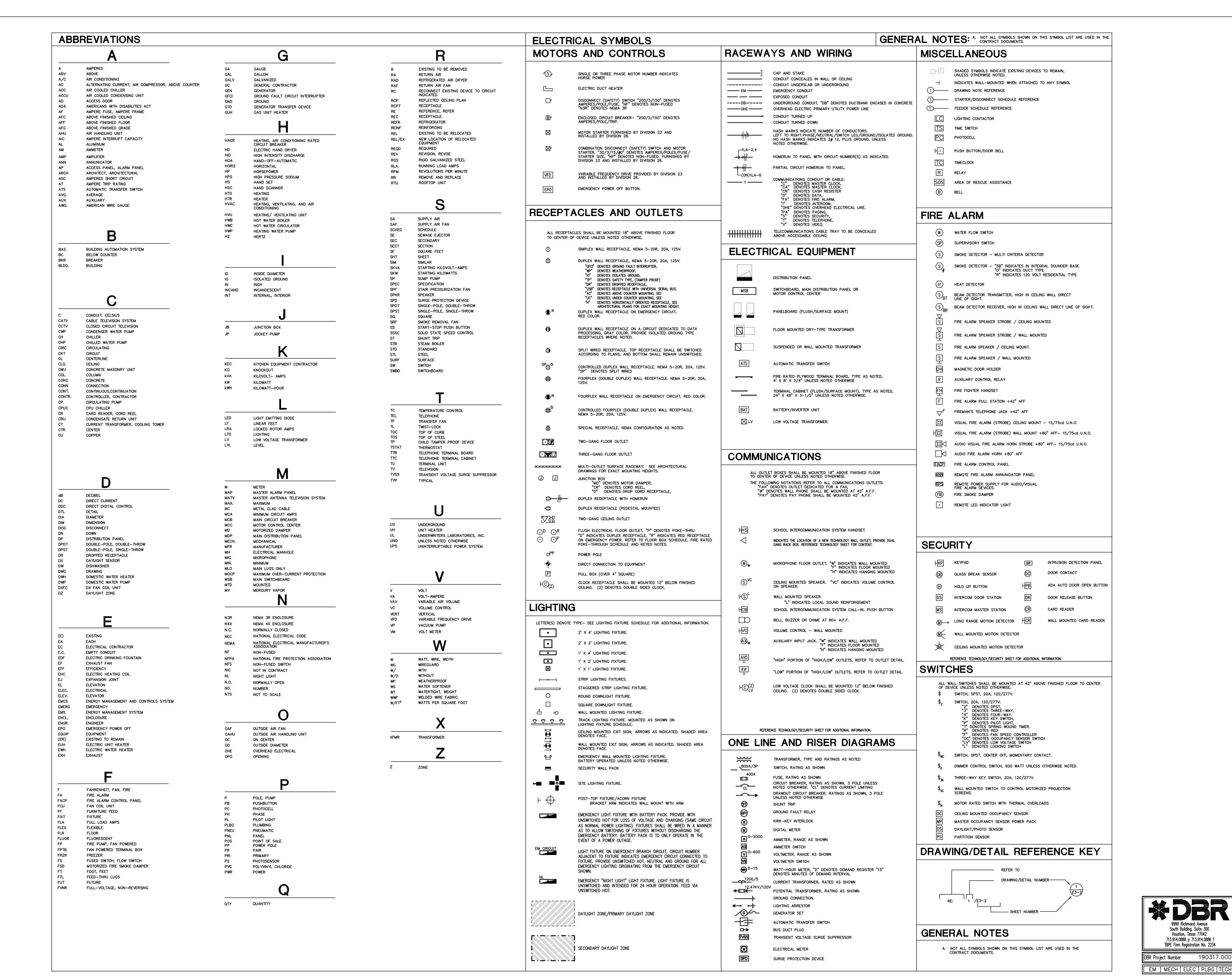
**AE101** 





1 | RCP - LEVEL 1

2 | RCP - LEVEL 2



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DATE / DESCRIPTION 02/21/2020 | 100% CD SEAL:



02/06/2020 DRAWN BY: DBR

CHECKED BY:

PROJECT NUMBER:

190317.000 SHEET TITLE:

ELECTRICAL

SYMBOLS AND **ABBREVIATIONS** 

SHEET NUMBER:

190317.000

**E001** 

- A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE VERIFIED EXISTING JOB—SITE CONDITIONS DURING THE BIDDING PERIOD TO OBTAIN THE SCOPE OF ELECTRICAL WORK INVOLVED AS A RESULT OF ARCHITECTURAL MODIFICATIONS TO THE EXISTING STRUCTURE. THE SCOPE OF WORK SHALL INCLUDE MATERIALS AND OUTLETS, CONSISTING OF FIXTURES, DEVICES, EQUIPMENT OR APPARATUS, WHICH MUST BE REROUTED, RELOCATED OR REMOVED EITHER TEMPORARILY OR PERMANENTLY, OR WHICH MUST BE PROVIDED, SO THAT THE INDICATED REMODELING MAY BE ACCOMPLISHED. NOT ALL EXISTING OUTLETS ARE NECESSARILY INDICATED ON THE DRAWINGS.
- B. WHEN OUTLETS ARE ABANDONED, WIRE MUST BE PULLED OUT OF THE CONDUIT BACK TO THE NEAREST REMAINING BOX OR CABINET. EXPOSED CONDUIT THAT HAS BEEN ABANDONED MUST BE REMOVED.
- C. RE-ESTABLISH SERVICE TO ALL OUTLETS THAT MAY BE INTERRUPTED DUE TO REMODELING
- D. PROVIDE ALL APPURTENANCES REQUIRED TO REROUTE, RELOCATE, REMOVE OR REINSTALL ALL ITEMS DESCRIBED IN THESE NOTES.
- E. VERIFY THE LOADING OF EACH CIRCUIT AFFECTED BY REMODELING WORK. THE MAXIMUM LOAD OF ANY BRANCH CIRCUIT MUST NOT EXCEED 80% OF ITS BREAKER RATING.
- F. REMOVE ALL OUTLETS AND WRING ASSOCIATED WITH ALL EQUIPMENT BEING REMOVED, INCLUDING MECHANICAL AND PLUMBING EQUIPMENT.
- G. ALL EXISTING LIGHT FIXTURES TO BE RELOCATED MUST BE CLEANED, RELAMPED AS REQUIRED AND TOUCHED UP WITH PAINT. ALL DAMAGED PARTS MUST BE REPLACED. THE FIXTURES SHALL THEN BE REINSTALLED AS REQUIRED. PROVIDE NEW BALLAST AS REQUIRED.
- H. ALL ELECTRICAL OUTLET COVER PLATES SHALL BE LABELED WITH PANEL AND CIRCUIT
- K. CIRCUIT NUMBERS ARE FOR PLAN REFERENCE ONLY, CONTRACTOR SHALL FIELD VERIFY ACTUAL NUMBERS AND UPDATE PANEL DIRECTORIES.
- L. TYPICAL VOICE/DATA OUTLET. ELECTRICAL CONTRACTOR TO PROVIDE SINGLE GANG WALL BOX WITH 1" EMPTY CONDUIT WITH PULLSTRING FROM WALL BOX TO ABOVE CEILING. VOICE/DATA CABLING, FACEPLATE AND INSERTS PROVIDED AND INSTALLED BY OTHERS. TYPICAL UNLESS NOTED OTHERWISE.
- M. EXISTING CIRCUIT BREAKERS VACATED DUE TO REMODELING WORK SHALL REMAIN AS SPARE BREAKERS.
- N. EXISTING CONDUITS ROUTED IN CORRIDORS SHALL BE REMOVED AND RELOCATED TO FACILITATE THE INSTALLATION OF NEW DUCTWORK INCLUDING BUT NOT LIMITED TO 600V CIRCUITS, FIRE ALARM, DATA, ETC.
- O. CONTRACTOR SHALL TEST EXISTING CONDUIT FOR CONTINUITY OF THE GROUNDING SYSTEM.

  NOTE CONDUIT IS USED AS THE GROUNDING PATH. TEST SHALL BE LESS THAN 5 OHMS. IF
  ANY TEST IS HIGHER PROVIDE IN WRITING TO ENGINEER OF RECORD.

# ELECTRICAL KEYED NOTES: #

- 1. EXISTING MAIN DISTRIBUTION PANEL SHALL REMAIN.
- 2. EXISTING PANELBOARD SHALL REMAIN.
- 3. EXISTING TRANSFORMER SHALL REMAIN.
- 4. ELECTRICAL CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING LIGHTING FIXTURES AND CEILING MOUNTED ELECTRICAL AND FIRE ALARM DEVICES, PA AND SECURITY DEVICES WITHIN THIS AREA DUE TO HVAC SYSTEM IMPROVEMENT.
- 5. EXISTING AIR HANDLING UNIT SHALL BE DEMOLISHED. ELECTRICAL CONTRACTOR SHALL DISCONNECT CIRCUIT, REMOVE DISCONNECT AND PULL WRING AND CONDUIT BACK TO ASSOCIATED PANELBOARD. CIRCUITS MADE AVAILABLE DUE TO HVAC EQUIPMENT REMOVAL SHALL REMAIN AS SPARE, UNLESS NOTED OTHERWISE.
- 6. EXISTING CONDENSING UNIT SHALL BE DEMOLISHED. ELECTRICAL CONTRACTOR SHALL DISCONNECT CIRCUIT, REMOVE DISCONNECT AND PULL WRING AND CONDUIT BACK TO ASSOCIATED PANELBOARD. CIRCUITS MADE AVAILABLE DUE TO HVAC EQUIPMENT REMOVAL SHALL REMAIN AS SPARE, UNLESS NOTED OTHERWISE.
- 7. ELECTRICAL WATER HEATER SHALL BE DEMOLISHED AND REPLACED WITH NEW. ELECTRICAL CONTRACTOR SHALL DISCONNECT WATER HEATER AND PULL WRING AND CONDUIT BACK TO ASSOCIATED DISCONNECT SWITCH. FEEDER SHALL BE REUSED.



SERVICE | QUALITY | INTEGRITY
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300 Houston, Texas
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SEAL:



Houston Community College System

HVAC Replacement at Fannin

Central Campus

**DATE**: 02/06/2020 **DRAWN BY**:

DBR
CHECKED BY:

PROJECT NUMBER: 190317.000

SHEET TITLE:

LEVEL 1 ELECTRICAL DEMO PLAN

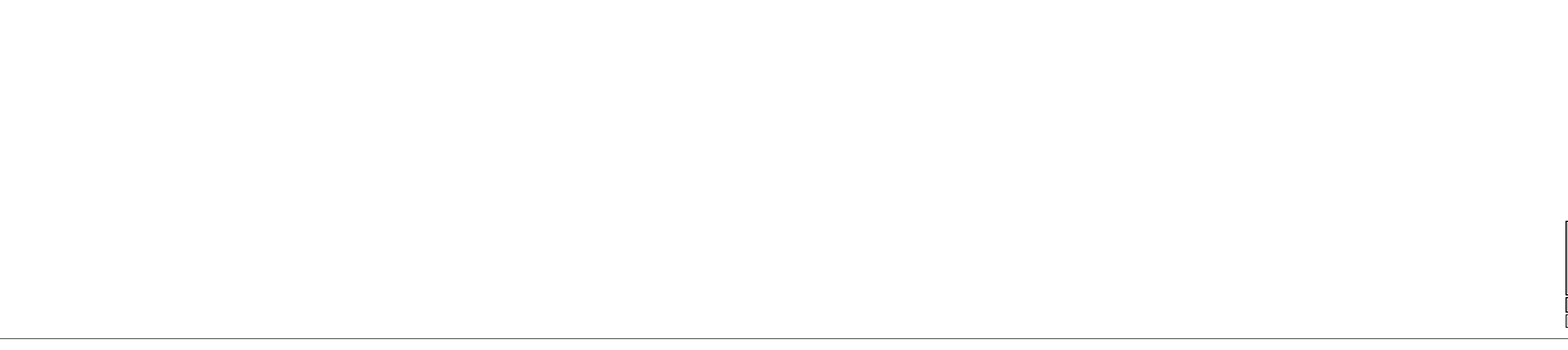
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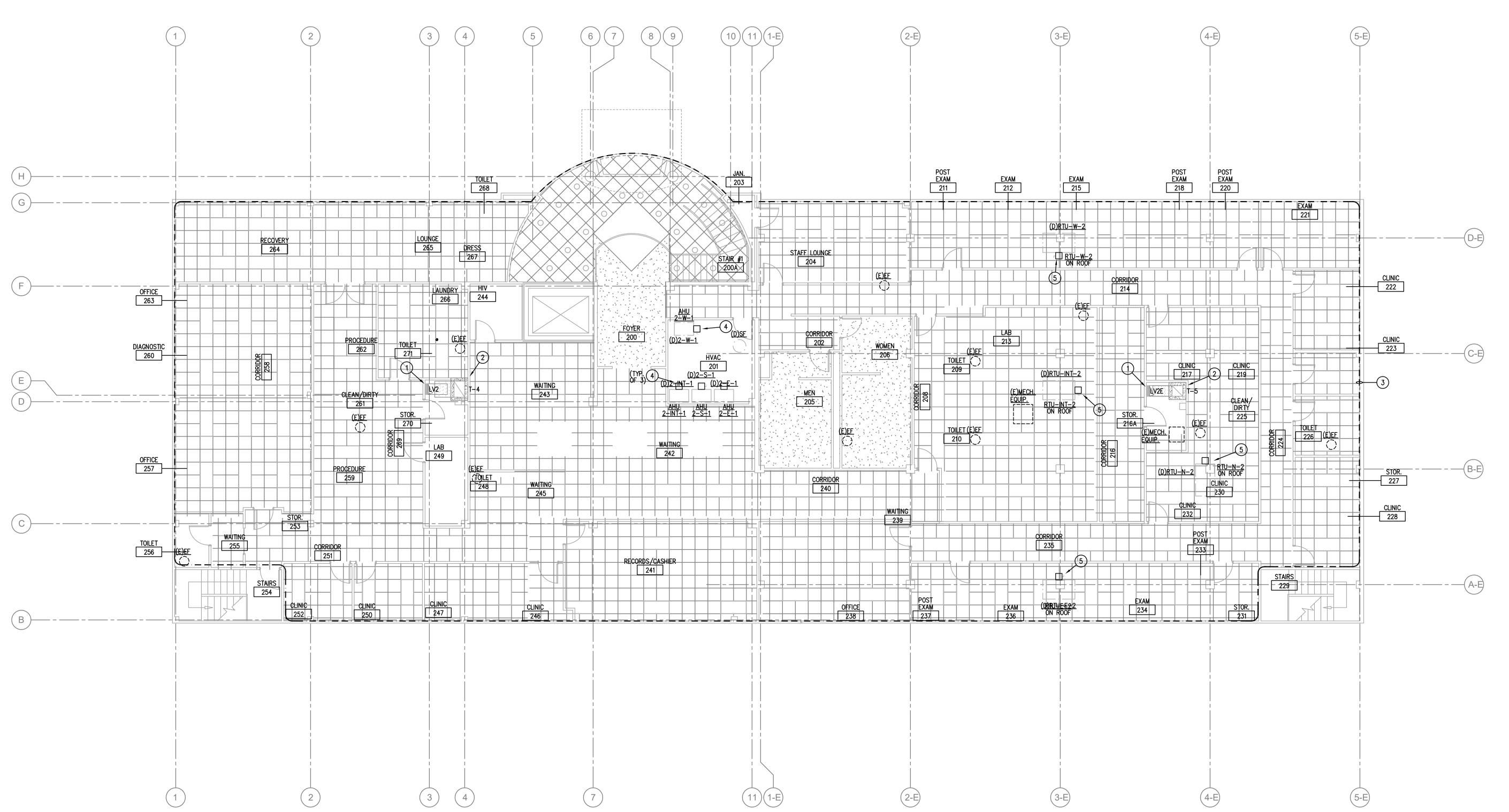
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TBPE Firm Registration No. 2234

DBR Project Number 190317.000

EM MECH ELEC PLBG TECH





- A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE VERIFIED EXISTING JOB-SITE CONDITIONS DURING THE BIDDING PERIOD TO OBTAIN THE SCOPE OF ELECTRICAL WORK INVOLVED AS A RESULT OF ARCHITECTURAL MODIFICATIONS TO THE EXISTING STRUCTURE. THE SCOPE OF WORK SHALL INCLUDE MATERIALS AND OUTLETS, CONSISTING OF FIXTURES, DEVICES, EQUIPMENT OR APPARATUS, WHICH MUST BE REROUTED, RELOCATED OR REMOVED EITHER TEMPORARILY OR PERMANENTLY, OR WHICH MUST BE PROVIDED, SO THAT THE INDICATED REMODELING MAY BE ACCOMPLISHED. NOT ALL EXISTING OUTLETS ARE NECESSARILY INDICATED ON THE DRAWINGS.
- B. WHEN OUTLETS ARE ABANDONED, WIRE MUST BE PULLED OUT OF THE CONDUIT BACK TO THE NEAREST REMAINING BOX OR CABINET. EXPOSED CONDUIT THAT HAS BEEN ABANDONED
- MUST BE REMOVED. C. RE-ESTABLISH SERVICE TO ALL OUTLETS THAT MAY BE INTERRUPTED DUE TO REMODELING
- D. PROVIDE ALL APPURTENANCES REQUIRED TO REROUTE, RELOCATE, REMOVE OR REINSTALL ALL ITEMS DESCRIBED IN THESE NOTES.
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- F. REMOVE ALL OUTLETS AND WRING ASSOCIATED WITH ALL EQUIPMENT BEING REMOVED, INCLUDING MECHANICAL AND PLUMBING EQUIPMENT.
- G. ALL EXISTING LIGHT FIXTURES TO BE RELOCATED MUST BE CLEANED, RELAMPED AS REQUIRED
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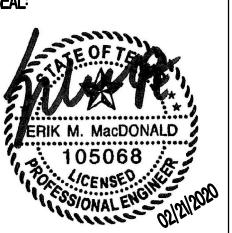
# ELECTRICAL KEYED NOTES: #

- 1. EXISTING PANELBOARD SHALL REMAIN.
- 2. EXISTING TRANSFORMER SHALL REMAIN.
- 3. ELECTRICAL CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING LIGHTING FIXTURES AND CEILING MOUNTED ELECTRICAL AND FIRE ALARM DEVICES, PA AND SECURITY DEVICES WITHIN THIS AREA DUE TO HVAC SYSTEM IMPROVEMENT.
- 4. EXISTING AIR HANDLING UNIT SHALL BE DEMOLISHED. ELECTRICAL CONTRACTOR SHALL DISCONNECT CIRCUIT, REMOVE DISCONNECT AND PULL WIRING AND CONDUIT BACK TO ASSOCIATED PANELBOARD. CIRCUITS MADE AVAILABLE DUE TO HVAC EQUIPMENT REMOVAL SHALL REMAIN AS SPARE, UNLESS NOTED OTHERWISE.
- 5. EXISTING ROOF TOP UNIT SHALL BE DEMOLISHED. ELECTRICAL CONTRACTOR SHALL DISCONNECT CIRCUIT, REMOVE DISCONNECT AND PULL WIRING AND CONDUIT BACK TO ASSOCIATED PANELBOARD. CIRCUITS MADE AVAILABLE DUE TO HVAC EQUIPMENT REMOVAL SHALL REMAIN AS SPARE, UNLESS NOTED OTHERWISE.



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**DATE:** 02/06/2020

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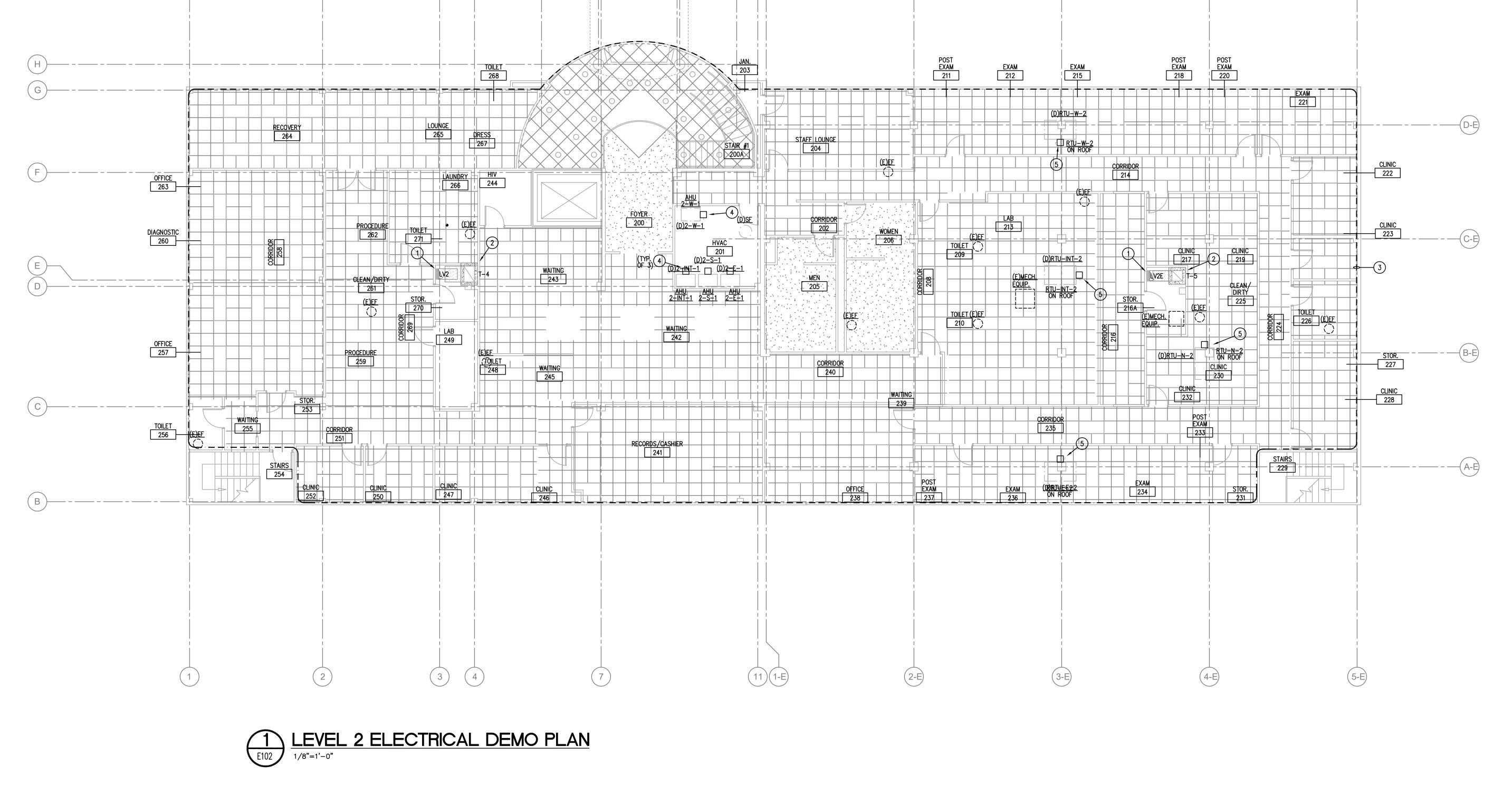
190317.000

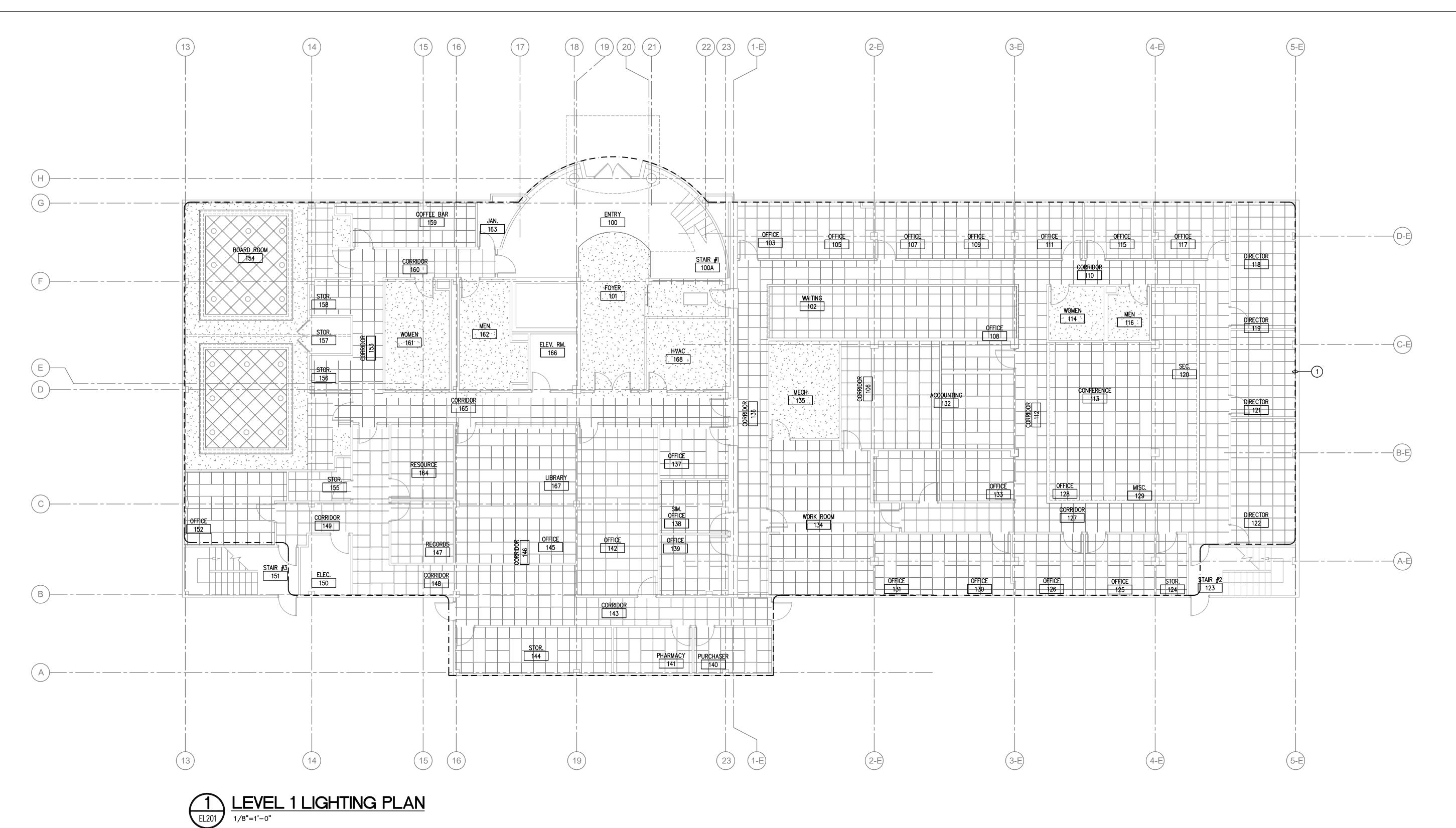
SHEET TITLE:

LEVEL 2 ELECTRICAL DEMO PLAN

SHEET NUMBER:

E102





- A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE VERIFIED EXISTING JOB—SITE CONDITIONS DURING THE BIDDING PERIOD TO OBTAIN THE SCOPE OF ELECTRICAL WORK INVOLVED AS A RESULT OF ARCHITECTURAL MODIFICATIONS TO THE EXISTING STRUCTURE. THE SCOPE OF WORK SHALL INCLUDE MATERIALS AND OUTLETS, CONSISTING OF FIXTURES, DEVICES, EQUIPMENT OR APPARATUS, WHICH MUST BE REROUTED, RELOCATED OR REMOVED EITHER TEMPORARILY OR PERMANENTLY, OR WHICH MUST BE PROVIDED, SO THAT THE INDICATED REMODELING MAY BE ACCOMPLISHED. NOT ALL EXISTING OUTLETS ARE NECESSARILY INDICATED ON THE DRAWINGS.
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- G. ALL EXISTING LIGHT FIXTURES TO BE RELOCATED MUST BE CLEANED, RELAMPED AS REQUIRED AND TOUCHED UP WITH PAINT. ALL DAMAGED PARTS MUST BE REPLACED. THE FIXTURES SHALL THEN BE REINSTALLED AS REQUIRED. PROVIDE NEW BALLAST AS REQUIRED.
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# ELECTRICAL KEYED NOTES:

 ELECTRICAL CONTRACTOR SHALL REINSTALL ALL EXISTING LIGHTING FIXTURES AND CEILING MOUNTED ELECTRICAL AND FIRE ALARM DEVICES, PA AND SECURITY DEVICES WITHIN THIS AREA DUE TO HVAC SYSTEM IMPROVEMENT.

713.914.0888 v 713.914.0888 f 90 Richmond Ave. South Bldg. Si

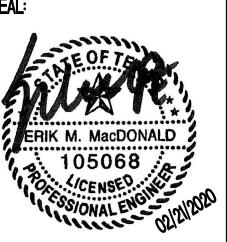
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| 02/21/2020 | 100% CD

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Houston Community College System
HVAC Replacement at Fannin
Central Campus

DATE: 02/06/2020 DRAWN BY:

DBR
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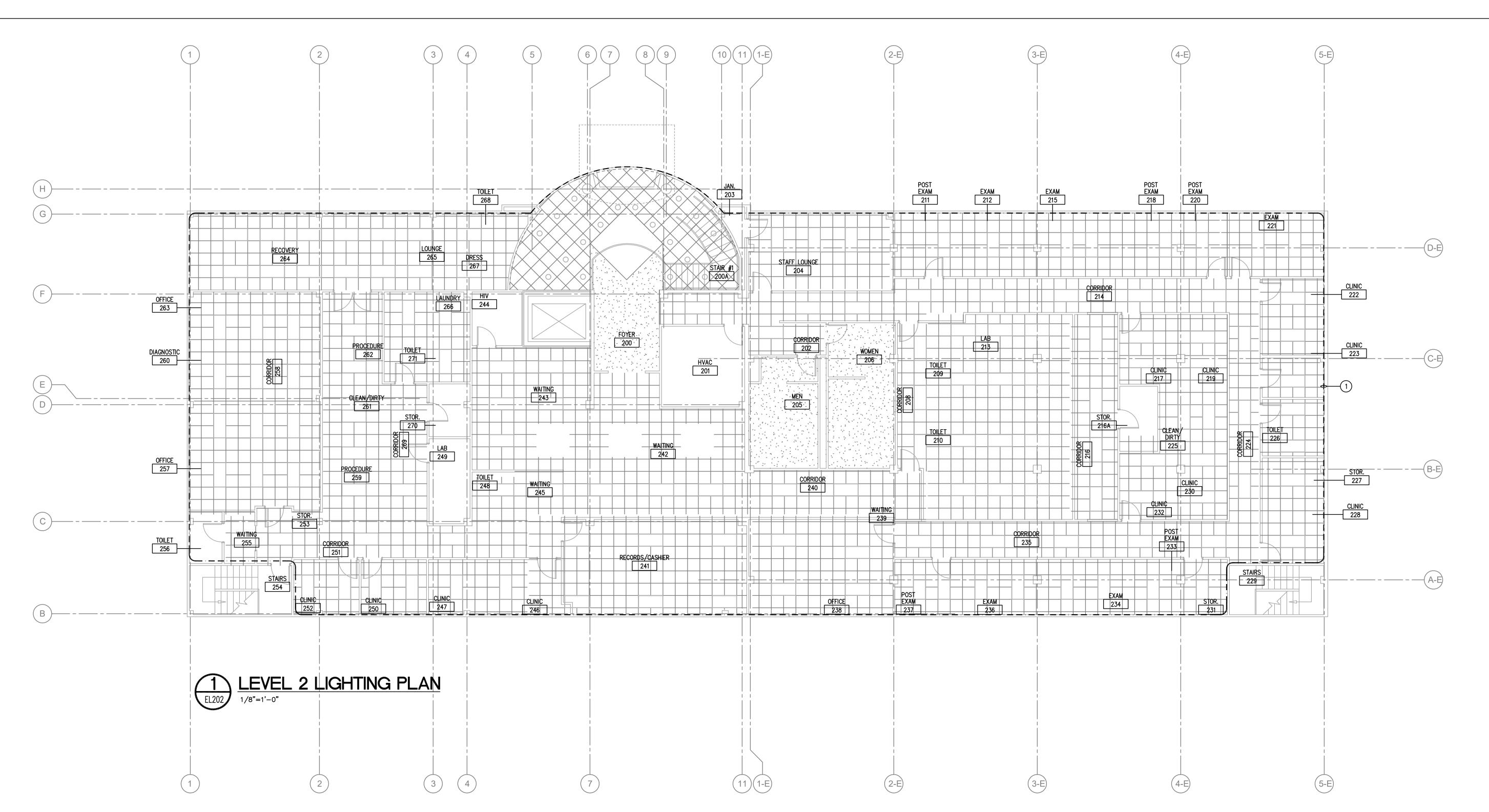
PROJECT NUMBER:
190317.000
SHEET TITLE:

ELECTRICAL LIGHTING PLAN



SHEET NUMBER:

**EL201** 



- A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE VERIFIED EXISTING JOB-SITE CONDITIONS DURING THE BIDDING PERIOD TO OBTAIN THE SCOPE OF ELECTRICAL WORK INVOLVED AS A RESULT OF ARCHITECTURAL MODIFICATIONS TO THE EXISTING STRUCTURE. THE SCOPE OF WORK SHALL INCLUDE MATERIALS AND OUTLETS, CONSISTING OF FIXTURES, DEVICES, EQUIPMENT OR APPARATUS, WHICH MUST BE REROUTED, RELOCATED OR REMOVED EITHER TEMPORARILY OR PERMANENTLY, OR WHICH MUST BE PROVIDED, SO THAT THE INDICATED REMODELING MAY BE ACCOMPLISHED. NOT ALL EXISTING OUTLETS ARE NECESSARILY INDICATED ON THE DRAWINGS.
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# ELECTRICAL KEYED NOTES: #

1. ELECTRICAL CONTRACTOR SHALL REINSTALL ALL EXISTING LIGHTING FIXTURES AND CEILING MOUNTED ELECTRICAL AND FIRE ALARM DEVICES, PA AND SECURITY DEVICES WITHIN THIS AREA DUE TO HVAC SYSTEM IMPROVEMENT.



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No. / DATE / DESCRIPTION 02/21/2020 100% CD



**DATE**: 02/06/2020

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PROJECT NUMBER: 190317.000

SHEET TITLE: ELECTRICAL

LIGHTING PLAN

South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234 190317.000 DBR Project Number

EM | MECH | ELEC | PLBG | TECH

SHEET NUMBER:

**EL202** 

5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

No. / DATE / DESCRIPTION 02/21/2020 100% CD 03/04/2020 ADDENDUM 01

SEAL:



02/06/2020 DRAWN BY: CHECKED BY: PROJECT NUMBER: 190317.000

SHEET TITLE:

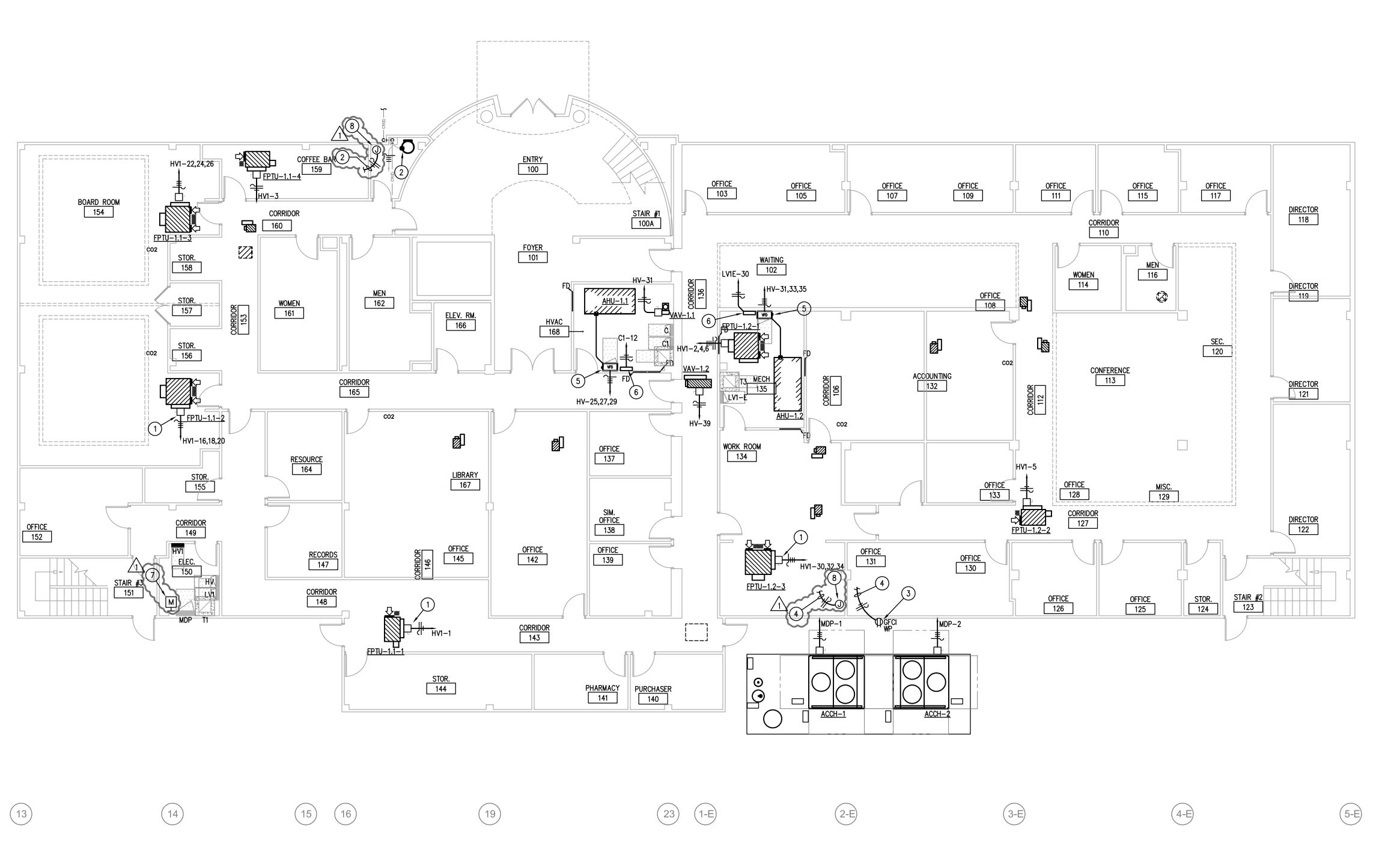
ELECTRICAL POWER PLAN

9990 Richmond Avenue South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234 DBR Project Number 190317.000

EM | MECH | ELEC | PLBG | TECH

SHEET NUMBER:

**EP201** 



15 16 18 19 20 21 22 23 1-E

LEVEL 1 POWER PLAN

1/8"=1'-0"

13

GENERAL ELECTRICAL REMODELING NOTES:

(4-E)

A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE VERIFIED EXISTING JOB-SITE CONDITIONS DURING THE BIDDING PERIOD TO OBTAIN THE SCOPE OF ELECTRICAL WORK INVOLVED AS A RESULT OF ARCHITECTURAL MODIFICATIONS TO THE EXISTING STRUCTURE. THE SCOPE OF WORK SHALL INCLUDE MATERIALS AND OUTLETS, CONSISTING OF FIXTURES, DEVICES, EQUIPMENT OR APPARATUS, WHICH MUST BE REROUTED, RELOCATED OR REMOVED EITHER TEMPORARILY OR PERMANENTLY, OR WHICH MUST BE PROVIDED, SO THAT THE INDICATED REMODELING MAY BE ACCOMPLISHED. NOT ALL EXISTING OUTLETS ARE NECESSARILY INDICATED ON THE

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D. PROVIDE ALL APPURTENANCES REQUIRED TO REROUTE, RELOCATE, REMOVE OR REINSTALL ALL ITEMS DESCRIBED IN THESE NOTES.

E. VERIFY THE LOADING OF EACH CIRCUIT AFFECTED BY REMODELING WORK. THE MAXIMUM LOAD OF ANY BRANCH CIRCUIT MUST NOT EXCEED 80% OF ITS BREAKER

F. REMOVE ALL OUTLETS AND WRING ASSOCIATED WITH ALL EQUIPMENT BEING REMOVED, INCLUDING MECHANICAL AND PLUMBING EQUIPMENT.

G. ALL ELECTRICAL OUTLET COVER PLATES SHALL BE LABELED WITH PANEL AND CIRCUIT

H. CIRCUIT NUMBERS ARE FOR PLAN REFERENCE ONLY, CONTRACTOR SHALL FIELD VERIFY

ACTUAL NUMBERS AND UPDATE PANEL DIRECTORIES. I. EXISTING CIRCUIT BREAKERS VACATED DUE TO REMODELING WORK SHALL REMAIN AS SPARE BREAKERS.

ELECTRICAL KEYED NOTES:

1. DISCONNECT PROVIDED BY MECHANICAL CONTRACTOR. WIRED AND INSTALLED BY ELECTRICAL CONTRACTOR. TYPICAL UNLESS NOTED OTHERWISE.

2. NEW ELECTRICAL WATER HEATER. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR TO EXTEND EXISTING FEEDER PREVIOUSLY SERVING DEMOLISHED WATER HEATER AND CONNECT TO NEW WATER HEATER. FIELD COORDINATE EXACT LOCATION AND ADDITIONAL REQUIREMENTS WITH PLUMBING CONTRACTOR PRIOR

3. PROVIDE 20A @ 120V GFCI TYPE RECEPTACLE FOR HVAC EQUIPMENT SERVICE. FIELD COORDINATE LOCATION WITH MECHANICAL CONTRACTOR. INSTALL AT NO MORE THAN 25' FROM HVAC EQUIPMENT.

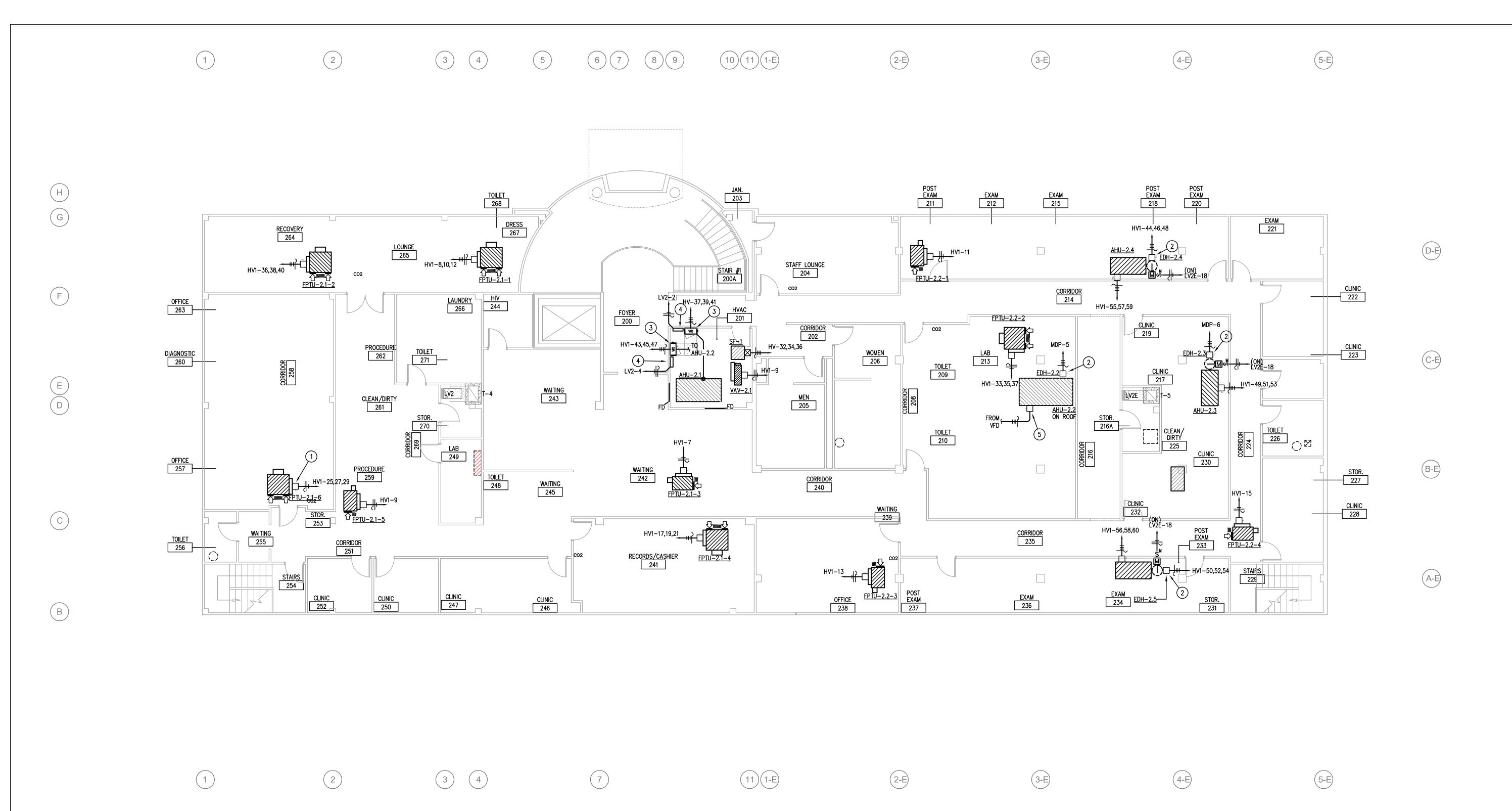
4. CONNECT TO EXISTING 20A @ 120V RECEPTACLE CIRCUIT SERVING THIS AREA.

5. VARIABLE FREQUENCY DRIVE PROVIDED BY MECHANICAL CONTRACTOR. INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. TYPICAL UNLESS NOTED OTHERWISE.

6. PROVIDE 120V POWER FOR DDC PANEL. FIELD COORDINATE EXACT LOCATION AND ADDITIONAL REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR PLACEMENT. PROVIDE NEW METER FOR MAIN DISTRIBUTION PANEL. FIELD COORDINATE EXACT LOCATION WITH ACTUAL ELECTRICAL ROOM CONDITIONS AND OTHER TRADES. REFER TO

3. 120V JUNCTION BOX CONNECTION FOR WATER METER POWER SUPPLY. FIELD COORDINATE EXACT LOCATION AND ADDITIONAL REQUIREMENTS WITH PLUMBING CONTRACTOR PRIOR TO ROUGH IN.

ONE LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS.



A. IT IS THE CONTRACTOR'S RESPONSIBILITY TO HAVE VERIFIED EXISTING JOB-SITE CONDITIONS DURING THE BIDDING PERIOD TO OBTAIN THE SCOPE OF ELECTRICAL WORK INVOLVED AS A RESULT OF ARCHITECTURAL MODIFICATIONS TO THE EXISTING STRUCTURE. THE SCOPE OF WORK SHALL INCLUDE MATERIALS AND OUTLETS, CONSISTING OF FIXTURES, DEVICES, EQUIPMENT OR APPARATUS, WHICH MUST BE REROUTED, RELOCATED OR REMOVED EITHER TEMPORARILY OR PERMANENTLY, OR WHICH MUST BE PROVIDED, SO THAT THE INDICATED REMODELING MAY BE ACCOMPLISHED. NOT ALL EXISTING OUTLETS ARE NECESSARILY INDICATED ON THE

B. WHEN OUTLETS ARE ABANDONED, WIRE MUST BE PULLED OUT OF THE CONDUIT BACK TO THE NEAREST REMAINING BOX OR CABINET. EXPOSED CONDUIT THAT HAS BEEN ABANDONED MUST BE REMOVED.

C. RE-ESTABLISH SERVICE TO ALL OUTLETS THAT MAY BE INTERRUPTED DUE TO REMODELING WORK.

D. PROVIDE ALL APPURTENANCES REQUIRED TO REROUTE, RELOCATE, REMOVE OR REINSTALL ALL ITEMS DESCRIBED IN THESE NOTES.

E. VERIFY THE LOADING OF EACH CIRCUIT AFFECTED BY REMODELING WORK. THE MAXIMUM LOAD OF ANY BRANCH CIRCUIT MUST NOT EXCEED 80% OF ITS BREAKER

F. REMOVE ALL OUTLETS AND WRING ASSOCIATED WITH ALL EQUIPMENT BEING REMOVED, INCLUDING MECHANICAL AND PLUMBING EQUIPMENT.

G. ALL ELECTRICAL OUTLET COVER PLATES SHALL BE LABELED WITH PANEL AND CIRCUIT

H. CIRCUIT NUMBERS ARE FOR PLAN REFERENCE ONLY, CONTRACTOR SHALL FIELD VERIFY ACTUAL NUMBERS AND UPDATE PANEL DIRECTORIES.

I. EXISTING CIRCUIT BREAKERS VACATED DUE TO REMODELING WORK SHALL REMAIN AS

# ELECTRICAL KEYED NOTES: #

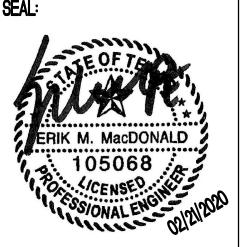
SPARE BREAKERS.

- DISCONNECT PROVIDED BY MECHANICAL CONTRACTOR. WIRED AND INSTALLED BY ELECTRICAL CONTRACTOR. TYPICAL UNLESS NOTED OTHERWISE.
- 2. PROVIDE 30A/3P/NF/N1 SAFETY DISCONNECT FOR ELECTRICAL DUCT HEATER. FIELD COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR PRIOR PLACEMENT.
- 3. VARIABLE FREQUENCY DRIVE PROVIDED BY MECHANICAL CONTRACTOR. INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. TYPICAL UNLESS NOTED OTHERWISE.
- 4. PROVIDE 120V POWER FOR DDC PANEL. FIELD COORDINATE EXACT LOCATION AND ADDITIONAL REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR PLACEMENT.
- 5. PROVIDE 30A/3P/NF/N4X DISCONNECT SWITCH WITH EARLY BREAK AUXILIARY CONTACTS. FIELD COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR PRIOR PLACEMENT. ROUTE AND ADDITIONAL 3/4" CONDUIT WITH CONTROL WIRING TO ASSOCIATED VARIABLE FREQUENCY DRIVE, COORDINATE CONTROL WIRING WITH MECHANICAL CONTRACTOR.



ER0 5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

No. / DATE / DESCRIPTION 02/21/2020 100% CD



at Houston Community Cant a HVAC Replacement a Central Campus

**DATE:** 02/06/2020

CHECKED BY:

PROJECT NUMBER: 190317.000

SHEET TITLE:

ELECTRICAL POWER PLAN

South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234

SHEET NUMBER:

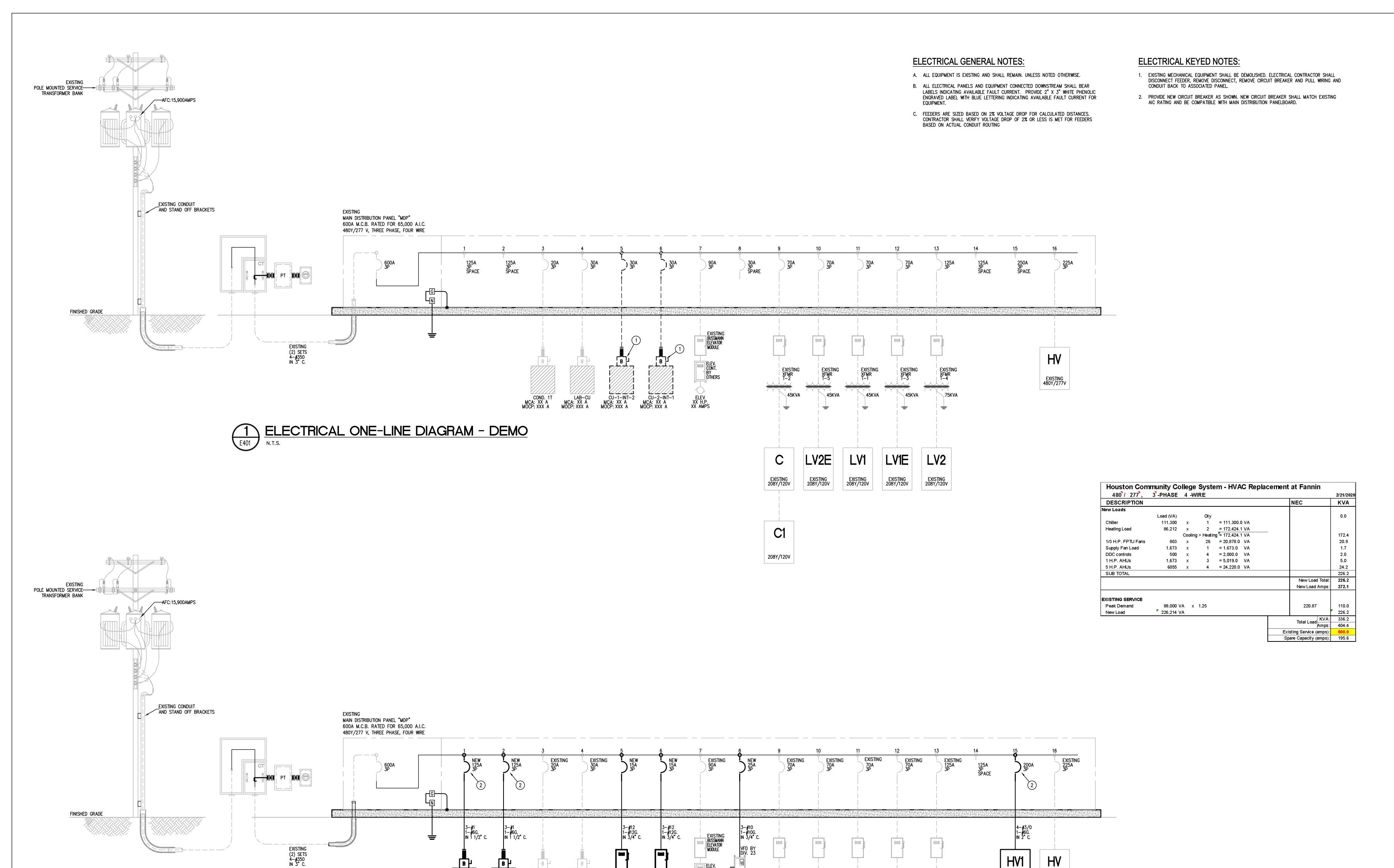
**EP202** EM | MECH | ELEC | PLBG | TECH

190317.000

DBR Project Number



EP202 LEVEL 2 POWER PLAN
1/8"=1'-0"



ELEV XX H.P. XX AMPS

EDH-2.3 3.4 KW

COND. 1T MCA: XX A MOCP: XXX A

ELECTRICAL ONE-LINE DIAGRAM - NEW N.T.S.

02/06/2020 DRAWN BY: CHECKED BY:

ER0 5444 Westheimer Suite 1000, Office 1054

Houston, TX 77056

No. / DATE / DESCRIPTION

02/21/2020 100% CD

annin

at

PROJECT NUMBER:

190317.000 SHEET TITLE:

> ELECTRICAL ONE-LINE DIAGRAMS

SHEET NUMBER:

E401

9990 Richmond Avenue
South Building, Suite 300
Houston, Texas 77042
713.914.0888 p 713.914.0886 f
TBPE Firm Registration No. 2234 DBR Project Number EM | MECH | ELEC | PLBG | TECH |

NEW 480Y/277V

LV1E

LV2E LV1

208Y/120V

190317.000

													1	0,000	AIC Rating	7		
			F	and	elbo	ard	C	1						Х	Existing			
			-	<b>U</b>		<b></b>		•							New			
	120/208	V.3-Phase,4-Wir	re		MCB		AMF	Р МС	В			Х	Singl	<u>=====</u>			Mounting	<del></del>
	1	Section		Х	MLO	100	AMF	BU:	S (Co	pper	)		Doub				X Surface	
	1	-Nema Rating					ISO.	GRI	ND. E	BUS			Feed	- Thru	I		Flush	
Notes	Load (VA)	Description		Туре	Wire	СВ	CKT #	РН	CKT #	СВ	3	Wire	Туре		Description		Load (VA)	Notes
1	900	RC - COMPUTE	R	R	12	20/1	1	Α	2	20/	1	12	R	RC - S	SERVER L	JPS	750	1
1	720	RC - PRINTER		R	12	20/1	3	В	4	20/	1	12	R	RC - S	SERVER L	JPS	750	1
1	540	RC - PRINTER		R	12	20/1	5	С	6	20/	1	12	R	RC - S	SERVER L	JPS	750	1
1	720	RC - PHNE RM	TL	R	12	20/1	7	Α	8	20/	1	12	R	EQ -	COM AIR I	HAND.	750	1
1	540	RC - PHNE RM	TL	R	12	20/1	9	В	10	20/	1	12	R	EQ -	COM AIR I	HAND.	750	1
1	900	RC - LIB. WIREM	OLD	R	12	20/1	11	С	12	20/	1	12	М	EQ -	DDC CON	TROL	500	4
1	540	RC - LIB. WIREM	OLD	R	12	20/1	13	Α	14					SPAC	E			
1	900	RC - LIB. WIREM	OLD	R	12	20/1	15	В	16					SPAC	E			
		SPACE					17	С	18				l I	SPAC				
		SPACE					19	Α	20					SPAC				
		SPACE					21	В	22					SPAC	Œ			
		SPACE					23	С	24					SPAC	E			
1	8646	EQ - SHREDDE	R	М	8	40/3	25	Α	26					SPAC				
-	-	-		-	8	-	27	В	28					SPAC				
-	-	-		-	8	-	29	С	30					SPAC	E			
	14,406	Subtotal													Subtotal		4,250	
N	I.E.C.	Load Type	Co	nn.	Fct.	Divers	sity	N	I.E.C						Conn.	Fct.	Diversity	·
2	20.44	(R) Recept.	9,5	510		9,51	10	21	0.20(	(a)	(L) L	ighting			0	125%	6 0	
2	20.56	(K) Kitchen		0	100%	0					(EL)	Ext. L	tg.		0	125%	6  0	
2	20.60	(C) Cooling		0	0%	0		6	20.14	4	(E) I	Elevato	rs		0	100%	6  0	
2	20.60	(H) Heating		0	0%	0					(WH	l) Wate	r Ht.		0	100%	6  0	
2	20.60	(F) Fans		0	100%	0		2	220.5	;   <sub> </sub>	(MT)	Lrg. N	lot.		0	125%	6  0	
		(M) Misc.	9,1	146	100%	9,14	16				(SP)	) Sub F	anel		0	100%	6  0	
63	0.11(B)	(W) Welders		0	100%	0		2	20.87	7	(EX)	Existi	g Load		0	125%	6  0	
		Total Connected Total Load (Dive			18,656 18,656				AMF			Locatio	n of P	anel:			·	

			F	an	elbo	ard	H	V1				6		AIC Rating Existing	l		
	277/480	V.3-Phase,4-Wi	re		MCB	•	AMF	P MC	B			Singl		New		Mounting	
		l Section		Х		<b>2</b> 50				opper)		Doub			;	X Surface	,
	1	I -Nema Rating							ND. E		Х	Feed	- Thru	J		Flush	
lotes	Load (VA)	Description		Туре	Wire	СВ	CKT #	PH	CKT #	СВ	Wire	Туре		Description		Load (VA)	Notes
	4803	FPTU-1.1-1		Н	10	25/1	1	Α	2	20/3	12	F	FPTL	J-1.2-1		1607	1
	3803	FPTU-1.1-4		Н	12	20/1	3	В	4	-	12	Н	-			7000	
	4803	FPTU-1.2-2		Н	10	25/1	5	С	6	-	12	-	-			-	
	5303	FPTU-2.1-3		Н	10	25/1	7	Α	8	25/3	10	F	FPTL	J-2.1-1		1607	
	3303	FPTU-2.1-5		Н	12	15/1	9	В	10	-	10	Н	-			10000	
	4303	FPTU-2.2-1		Н	12	20/1	11	С	12	-	10	-	-			-	
	5303	FPTU-2.2-3		Н	10	25/1	13	Α	14			II I	SPA				
	5303	FPTU-2.1-4		F	10	25/1	15	В	16	20/3	12	F	FPTL	J-1.1-2		1607	
	1607	FPTU-2.1-4		F	12	20/3	17	С	18	-	12	Н	-			5500	
	6000	-		Н	12	-	19	Α	20	-	12	-	-			-	
	-	-		-	12	-	21	В	22	20/3	12	F	FPTL	J-1.1-3		1607	
		SPACE					23	С	24	-	12	Н	-			5500	
	1607	FPTU-2.1-6		F	12	20/3	25	Α	26	-	12	-	-			-	
	6000	-		Н	12	-	27	В	28				SPA				
	-	-		-	12	-	29	С	30	20/3	12	F	FPTL	J-1.2-3		1607	
	1600	VAV-1.1		Ι	12	15/1	31	Α	32	-	12	Η	-			5500	
	1607	FPTU-2.2-2		F	12	20/3	33	В	34	-	12	-	-			-	
	6000	-		Η	12	-	35	С	36	20/3	12	F	FPTL	J-2.1-2		1607	
	-	-		-	12	-	37	Α	38	-	12	Н	-			5500	
	4900	VAV-1.2		Н	10	25/1	39	В	40	-	12	-	-			-	
		SPACE					41	С	42	15/1	12		VAV-			3200	
	6055	AHU-2.2		MT	12	15/3	43	Α	44	15/3	12	Н	EDH-	2.4		3400	
	-	5 H.P.		-	12	-	45	В	46	-	12	-	-			-	
	-	-		-	12	-	47	С	48	-	12	-	-			-	
	1673	AHU-2.3		F	12	15/3	49	Α	50	15/3		Н	EDH-	2.5		2100	
	-	1 H.P.		-	12	-	51	В	52	-	12	-	-			-	
	-	-		-	12	-	53	С	54	-	12	-				-	
	1673	AHU-2.4		F	12	15/3	55	Α	56	15/3		F	AHU-	2.5		1673	
	-	1 H.P.		-	12	-	57	В	58	-	12	-	-			-	
	-	-		-	12	-	59	С	60	-	12	-	-			-	
	75,645	Subtotal												Subtotal		59,013	
N	.E.C.	Load Type	Co	nn.	Fct.	Divers	sity	١	I.E.C					Conn.	Fct.	Diversity	r
2	20.44	(R) Recept.		0		0		21	0.20	(a) (L	_) Lighting	<del>g</del>		0	125%	II .	
		(K) Kitchen		0	100%	0				11.	EL) Ext. l	_		0	125%	II .	
	ll ll	(C) Cooling	II	0	0%	0		6	20.1	, III	E) Elevato			0	100%	II .	
	ll ll	(H) Heating	II	,821	100%	103,8				111,	VH) Wat			0	100%	II .	
2		(F) Fans	24,	781	100%	24,7	81	;	220.5	111 '	ИТ) Lrg. I			6,055	125%		39
		(M) Misc.		0	100%	0				111 -	SP) Sub I			0	100%	II .	
63	D.11(B)	(W) Welders		0	100%	0		2	20.8	7(E	EX) Exist	ig Load	<u> </u>	0	125%	0	
		Total Connected Total Load (Dive			134,657 136,171				AMF AMF	- 11	Locati	on of P	anel:			•	

			Par	elbo	ard	С				,	1		AIC Rating Existing New	l		
	120/208	V.3-Phase,4-Wire	, X	MCB	150		P MC				Sing	е			Mounting	<del></del>
	1	Section		MLO	225	AMF	P BU	S (Co	opper)		Doub	ole			X Surface	
	1	-Nema Rating					GRI			X	Feed	l - Thr	u		Flush	
lotes	Load (VA)	Description	Туре	Wire	СВ	CKT #	PH	CKT #	СВ	Wire	Туре		Description		Load (VA)	Notes
1	900	RC - 129, 1ST FL	RR	12	20/1	1	Α	2	100/:	3 3	SP	PAN	EL C1		18156	1
1	720	RC - 131, 1ST FL	RR	12	20/1	3	В	4	-	3		<b> -</b>			-	1 -
1	540	RC - 131,133, 1ST	FL R	12	20/1	5	С	6	-	3		-			-	-
1	720	EXISTING LOAD	R	12	20/1	7	Α	8	20/1	12	R	EXIS	TING LOAD	)	720	1
1	540	EXISTING LOAD	R	12	20/1	9	В	10	20/1	12	R	II	TING LOAD		540	1
1	900	EXISTING LOAD	R	10	30/2	11	С	12	20/1	12	R	11	154 1ST FL		900	1
1	540	EXISTING LOAD	R	10	-	13	Α	14	20/1	12	R	11	153 1ST FL		540	1
1	900	EXISTING LOAD	R	12	20/1	15	В	16	30/2	10	R	II	TING LOAD		900	1
1	720	RC - 127, 1ST FL	RR	12	20/1	17	С	18	-	10	R	EXIS	TING LOAD	)	720	1
1	900	RC - 119, 1ST FL	ll ll	12	20/1	19	Α	20	20/1	12	R	RC -	141 1ST FL	.R	900	1
1	720	RC - 120, 1ST FL	RR	12	20/1	21	В	22	20/1	12	R	RC -	144 1ST FL	.R	540	1
1	540	RC - 117,122,121,	1ST R	12	20/1	23	С	24	20/1	12	R	RC -	143 1ST FL	.R	720	1
1	720	EXISTING LOAD	R	12	20/1	25	Α	26	20/1	12	R	II	TING LOAD		720	1
1	540	EXISTING LOAD	R	12	20/1	27	В	28	20/1	12	R	II	TING LOAD		540	1
1	900	EXISTING LOAD	R	12	20/1	29	С	30	20/1	12	R	11	TING LOAD		900	1
1	540	EXISTING LOAD	R	12	20/1	31	Α	32	20/1		R	11	TING LOAD		540	1
1	900	EXISTING LOAD	R	12	20/1	33	В	34	20/1		R	11	137,152 1S		1	1
1	720	EXISTING LOAD	R	12	20/1	35	С	36	20/1	12	R	11	153 1ST FL		720	1
1	900	EXISTING LOAD	R	12	20/1	37	Α	38	20/1		R	II	TING LOAD		900	1
1	720	EXISTING LOAD	R	12	20/1	39	В	40	20/1	12	R	11	TING LOAD		540	1
1	540	EXISTING LOAD	R	12	20/1	41	O	42	20/1	12	R	EXIS	TING LOAD	)	720	1
	15,120	Subtotal											Subtotal		31,116	
Ν	I.E.C.	Load Type	Conn.	Fct.	Diver	sity	N	I.E.C	;.				Conn.	Fct.	Diversity	
2	20.44	(R) Recept.	28,080		19,0	40	21	0.20	(a) (l	L) Lightin	ıg		0	125%	6 0	
2	ll ll	(K) Kitchen	0	100%	0				(1	EL) Ext.	Ltg.		0	125%	6 O	
2	20.60	(C) Cooling	0	0%	0		6	20.1	4 (1	E) Elevat	ors		0	100%	6 <b>r</b> 0	
2	20.60	(H) Heating	0	0%	0					WH) Wat			0	100%	6 O	
2	20.60	(F) Fans	0	100%	0		] :	220.5		MT) Lrg.			0	125%	6 O	
	-	(M) Misc.	0	100%	0				(	SP) Sub	Panel		18,156	100%	6 18,1	56
63	0.11(B)	(W) Welders	0	100%	0		2	20.8	7 (1	EX) Exist	tig Load	i	O	125%	6 O	
	<u>"</u>	Total Connected I		46,236 37,196				AMF		Locat	ion of F	anel:		•	1	

			F	an	elbo	ard	L	<b>V</b> 2	E				1		AIC Rating Existing New	l		
	120/208 1	V.3-Phase,4-Wi Section -Nema Rating	re	Х	MCB MLO	150 225	AMF			opper) BUS	)	Х	Singl Doub Feed		ı		Mounting X Surface Flush	g
lotes	Load (VA)	Description		Туре	Wire	СВ	CKT #	PH	CKT #	СВ	3	Wire	Туре		Description		Load (VA)	Notes
1	720	RC - 204		R	12	20/1	1	Α	2	20/	1	12	R	RC -	225		900	1 1
1	560	RC - 204		R	12	20/1	3	В	4	20/	1	12	R	EXIS	TING LOAD	)	560	1
1	900	RC - 204		R	12	20/1	5	С	6	20/	1	12	R	EXIS	TING LOAD	)	720	1
1	560	RC - 204		R	12	20/1	7	Α	8	20/	1	12	R	EXIS	TING LOAD	)	560	1
1	900	RC - 204		R	12	20/1	9	В	10	20/	1	12	R	RC -	213		720	1
1	720	RC - 204,211		R	12	20/1	11	С	12	20/	1	12	R	RC -	213		900	1
1	900	RC - 212		R	10	30/2	13	Α	14	20/	1	12	R	RC -	213		720	1
1	720	RC - 215		R	10	-	15	В	16	20/	1	12	R	RC -	213		900	1
1	560	EXISTING LOAD	)	R	12	20/1	17	С	18	20/	1	12	М	EQ -	DAMPERS		500	3
1	720	RC -214,217,218	3,219	R	12	20/1	19	Α	20					SPA	Œ			3
1	560	RC - 223,226,227	7,228	R	12	20/1	21	В	22	20/	1	12	R	EXIS.	TING LOAD	)	560	1
1	900	RC - 236		R	12	20/1	23	С	24	20/	1	12	R	RC -	213,230,		720	1
1	560	RC - 234		R	12	20/1	25	Α	26	20/	1	12	R	RC -			560	1
1	900	RC - 237,238		R	12	20/1	27	В	28	20/	1	12	R	RC -	213		720	1
1	720	RC - 225		R	12	20/1	29	С	30	20/	1	12	R	RC -	231,233,23	5,239	900	1
2		SPARE				40/2	31	Α	32	20/	1	12	R	EXIS <sup>-</sup>	TING LOAD	)	720	1
-		-				-	33	В	34	20/	ll ll	12	R		TING LOAD		900	1
2		SPARE					35	С	36	20/	ll ll	12	R		TING LOAD		560	1
-		-					37	Α	38	20/	1	12	R		TING LOAD		900	1
1	560	RC - 202,206		R	12	20/1	39	В	40	20/	ll ll	12	R		TING LOAD		560	1
1	900	EXISTING LOAD	)	R	12	20/1	41	С	42	20/	1	12	R	EXIS	TING LOAD	)	720	1
	12,360	Subtotal													Subtotal		14,300	
N	l.E.C.	Load Type	Co	nn.	Fct.	Divers	sity	N	I.E.C						Conn.	Fct.	Diversity	
2	20.44	(R) Recept.	26,	160		18,0	80	21	0.20(	(a)	(L)	Lighting	1		0	125%	6 0	
2	20.56	(K) Kitchen		0	100%	0					(EL	) Ext. L	tg.		0	125%	6 O	
2	20.60	(C) Cooling		0	0%	0		6	20.14	4	(E)	Elevato	rs		0	100%	6 <b>r</b> 0	
2	20.60	(H) Heating		0	0%	0					(WI	⊣) Wate	er Ht.		0	100%	6 O	
2	20.60	(F) Fans		0	100%	0		:	220.5	; ∥₁	(MT	) Lrg. N	/lot.		0	125%	6 O	
		(M) Misc.	5	00	100%	500	o				(SP	) Sub F	Panel		0	100%	6 O	
63	0.11(B)	(W) Welders		0	100%	0		2	20.87	7	(EX	) Existi	g Load		0	125%	6 0	
		Total Connected Total Load (Dive			26,660 18,580		74 51		AMF	ll.		Location	on of P	anel:				

Markar Marka		
РА	NEL SCHEDULES GENERAL NOTES:	1
A.	ALL PANEL SCHEDULES SHALL BE UPDATED AT THE END OF CONSTRUCTION.	

			Pan	elbo	ard	L'	V1					1		AIC Rating Existing New	ļ		
	120/208	V.3-Phase,4-Wire	X	MCB	150	AMI	<sup>2</sup> MC	В				Singl	е			Mountin	<del></del> g
	1	Section		MLO	225			S (Co		r)		Doub				X Surface	
	1	-Nema Rating				ISO	. GRI	ND. E	BUS		Х	Feed	l - Thru	ı		Flush	
Notes	Load (VA)	Description	Туре	Wire	СВ	CKT #	PH	CKT #	CE	3	Wire	Туре		Description		Load (VA)	Notes
1	1080	RC - 143,144 FLOO	₹ R	12	20/1	1	Α	2	20/	1	12	R	RC -	153 1ST FL	.00R	720	1
1	900	RC - 143,144 FLOO	₹ R	12	20/1	3	В	4	20/	/1	12	R	RC -	134 1ST FL	.00R	900	1
1	720	RC - 143,144 FLOO	₹ R	12	20/1	5	С	6	20/	1	12	R	RC -	132 1ST FL	.00R	1080	1
1	900	RC - PBX TEL	R	12	20/1	7	Α	8	20/	1	12	R	RC -	TWISTLOC	K	900	1
1	720	EXISTING LOAD	R	12	20/1	9	В	10	20/	1	12	R	RC -	TWISTLOC	K	1080	1
1	1080	EXISTING LOAD	R	12	20/1	11	С	12	20/	1	12		ll .	TING LOAD		720	1
1	720	RC - 145 WC FLOO	RR	12	20/1	13	Α	14	20/	1	12	R	LT - E	LEVATOR	PIT	1080	1
1	1080	RC - 145 FLOOR	R	12	20/1	15	В	16	20/	′1	12	R	RC -	ELEVATOR	RPIT	720	1
1	900	RC - 145 FLOOR	R	12	20/1	17	С	18	20/	/1	12		EXIS	TING LOAD	)	900	1
1	1080	EXISTING LOAD	R	12	20/1	19	Α	20	90/	/2		F	SPAF	RE			2
1	900	EXISTING LOAD	R	12	20/1	21	В	22	-			-	-				-
1	720	RC - 146 1ST FLR	R	12	20/1	23	С	24	40/	′2		F	SPAF	RE			2
2		SPARE			20/2	25	Α	26	-			-	-				-
-		-			-	27	В	28	40/	′2		F	SPAF	RE			2
1	1080	RC - 143,144 PROJ.	R	12	20/1	29	С	30	-			-	-				<b> </b> -
1	720	RC - 143 1ST FLR	R	12	20/1	31	Α	32	20/	1	12	L	LT - C	CANOPY		500	1
1	1080	RC - 144 1ST FLR	R	12	20/1	33	В	34	40/	′3			SPAF	₹E			2
1	900	RC - GFCI QUAD	R	12	20/1	35	С	36	-				-				-
1	1080	EXISTING LOAD	М	8	40/2	37	Α	38	-				-				-
-	900	-	-	8	-	39	В	40	20/	1	12	М	II .	SUMP PU		900	1
1	720	EXISTING LOAD	М	12	20/1	41	С	42	20/	/1	12		EXIS	TING LOAD	)	1080	1
	17,280	Subtotal												Subtotal		10,580	
	I.E.C.	Load Type (	Conn.	Fct.	Divers	sity	١	N.E.C	;.					Conn.	Fct.	Diversity	
2	20.44	(R) Recept. 2	1,060		15,5	30	21	0.20	(a)	(L) L	_ighting	]		500	125%	6 62	5
2	ll l	(K) Kitchen	0	100%	o						Ext. L			0	125%	6 O	
	II.	(C) Cooling	0	0%	0		6	320.1	4		Elevato	-		Ō	100%	ll l	
2	ll.	(H) Heating	0	0%	0					' '	H) Wate			0	100%	6 O	
	ll.	(F) Fans	0	100%	0			220.5	ll ll	,	Ĺrg. N			0	125%	II .	
	ll l	` '	2,700	100%	2,70	00					) Sub F			Ö	100%	ll l	
63	ll l	(W) Welders	0	100%	o		2	220.8	7		) Existi			Ö	125%	ll l	
	<u> </u>	Total Connected Loa Total Load (Diversifie	ıd	24,260 18,855	VA =		7.4 2.4	AMF	PS		Location				II.	JI	

			Р	an	elbo	ard	L	<b>V</b> 2			•		10,0	00 AIC Ratin X Existing New	g		
	120/208	V.3-Phase,4-Wi	re	Х	MCB	225	AMF	Р МС	В			S	ingle			Mounting	<del></del> g
	1	Section			MLO	225	AMF	BU.	S (Co	opper)	)	D	ouble			X Surface	
	1	-Nema Rating					ISO.	GRI	ND. E	BUS	>	( F	eed - T	⁻hru		Flush	
Notes	Load (VA)	Description		Туре	Wire	СВ	CKT #	PH	CKT #	СВ	3 Wi	re Ty	/ре	Description	1	Load (VA)	Note
1	720	RC - 241,246,24	7	R	12	20/1	1	Α	2	20/	1 1:	2	м ЕС	Q - DDC CON	ITROL	500	3
1	360	RC - 241,242		R	12	20/1	3	В	4	20/	1 1:	2	м ЕС	Q - DDC CON	ITROL	500	3
1	900	RC - 243		R	12	20/1	5	С	6	60/	2		SF	PARE			2
1	360	RC - DISP.CARD	TST	R	12	20/1	7	Α	8	-			-				1 -
1	900	RC - TRIAC CEN		R	12	20/1	9	В	10	30/	2		SF	PARE			2
1	720	RC - 201, SEC F	RM	R	12	20/1	11	С	12	-			-				1 -
1	900	RC - 271,269,26	1	R	12	20/1	13	Α	14	30/	2		SF	PARE			2
1	720	RC - DISP 261		R	12	20/1	15	В	16	-			-				1 -
1	360	RC - 261 FREE	ZER	R	12	20/1	17	С	18	20/	1 1:	2	RC	C - 262		720	1
1	720	RC - AUTOCLAY		R	12	20/1	19	Α	20	20/	1 1:	2	RC	C - MDF L6-30	0R	360	1
1	360	RC - MAGNA CI		R	12	20/1	21	В	22	20/	1 1:	2	- 11	ISTING LOAI		900	1
1	900	RC - MAGNA CI	LAVE	R	12	20/1	23	С	24	20/	1 1:	2	RC	- WASHER		1500	1
1	360	RC - MAGNA CI	LAVE	R	12	20/1	25	Α	26	20/	1 1:	2	RC	<del>- 268,265,2</del> 6	64	900	1
1	900	RC - 259		R	12	20/1	27	В	28	20/	1 1:	2	RC	C - 265		720	1
1	720	RC - 264		R	12	20/1	29	С	30	30/	2		SF	PARE			2
1	900	RC - 260,262,26	4	R	12	20/1	31	Α	32	-			-				1 -
2	720	SPARE				30/2	33	В	34	40/	2		SF	PARE			2
-	360	-				-	35	С	36	-			-				1 -
1	720	WALLPACKS		EL	10	30/2	37	Α	38	30/	2		SF	PARE			2
-	-	-		-	10	-	39	В	40	-			-				1 -
1	900	EXISTING LOAD	)		12	20/1	41	С	42	20/	1 1:	2	EX	(ISTING LOAI	D	360	1
N	I.E.C.	Load Type	Co	nn.	Fct.	Diver	sity	N	I.E.C					Conn.	Fct.	Diversity	,
2	20.44	(R) Recept.	10,	800		10,4	00	21	0.20	(a)	(L) Ligh	ting		0	125%	6 0	
2	20.56	(K) Kitchen	(	0	100%	0					(EL) Ex	t. Ltg.		720	125%	% <b> </b> 900	C
2	20.60	(C) Cooling	(	0	0%	0		6	20.1	4 ∥₁	(E) Elev	<i>a</i> tors		0	100%	6 <b>r</b> 0	
2	20.60	(H) Heating	(	0	0%	0					(WH) W	/ater F	lt.	0	100%	6 <b>0</b>	
2	20.60	(F) Fans	(	0	100%	0		:	220.5	j ∥	(MT) Lr	g. Mot		0	125%	6 <b>0</b>	
		(M) Misc.	1,0	000	100%	1,00	00				(SP) St	ıb Pan	el	0	100%	6 <b>0</b>	
63	0.11(B)	(W) Welders	(	0	100%	0		2	20.8	7	(EX) Ex	istig L	oad	0	125%	6 O	
		Total Connected Total Load (Dive			12,520 12,300				AMF AMF	ll l	Loc	ation	of Pane	el:	-11		

PANEL SCHEDULES KEYED NOTES:

2. EXISTING BRANCH CIRCUIT SHALL BE REMOVED. EXISTING CIRCUIT BREAKER SHALL REMAIN AS SPARE.

3. EXISTING BRANCH CIRCUIT SHALL BE REMOVED. PROVIDE NEW CIRCUIT/SPACE AS SHOWN.

1. EXISTING BRANCH CIRCUIT SHALL REMAIN.

4. PROVIDE NEW CIRCUIT AS SHOWN.

22	20.60	(H) Heating (F) Fans (M) Misc. (W) Welders	13,	0 ,783 0 0	100% 100% 100%	13,7 0 0	83		220.5 220.8	5	(М <sup>-</sup> (SF	H) vvate Γ) Lrg. N Ρ) Sub F () Existi	1ot. Panel		5,000 0 0 0	100% 125% 100% 125%	0 0	
		Total Connected Total Load (Diver			85,183 101,783			2.5 2.5	AMF	ll ll		Location	on of P	anel:				
			F	Pan	elbo	ard	L'	V1	E			<b>,</b>	1		AIC Rating Existing New	J		
	120/208	V.3-Phase,4-Wir	e	Х	МСВ	150	AMF	<sup>2</sup> МС	В				Single	<u>е</u>			Mountin	 g
	•	1 Section			MLO	225	AMF	P BU	IS (Co	opper	)		Doub	le			X Surface	
		1 -Nema Rating					ISO.	. GR	ND. E	BUS		Х	Feed	- Thru	ı		Flush	
Notes	Load (VA)	,		Туре	Wire	СВ	CKT #	PH	CKT #	CE		Wire	Туре		Description		Load (VA)	Note
1	540	EXISTING LOAD		R	12	20/1	1	Α	2	20/		12			TING LOAD	- 11	900	1
1	1080	EXISTING LOAD		R	12	20/1	3	В	4	20/		12			TING LOAD	- 11	540	1
1	900	EXISTING LOAD		R	12	20/1	5	С	6	20/	- 1	12			TING LOAD	- 11	1080	1
1	1080	EXISTING LOAD		R	12	20/1	7	Α	8	20/		12			TING LOAD	- 1	540	1
1	900	EXISTING LOAD		R	12	20/1	9	В	10	20/		12			TING LOAD	- 11	1080	1
1	540	EXISTING LOAD	)	R	12	20/1	11	С	12	20/	- 1	12			TING LOAD	- 11	900	1
2		SPARE				40/2	13	Α	14	20/	- 1	12			TING LOAD	- 11	1080	1
-						-	15	В	16	20/	- 1	12	I I		TING LOAD	- 11	900	1
2		SPARE				50/2	17	С	18	20/	- 1	12	I I		TING LOAD	- 11	540	1
-		-				-	19	Α	20	20/	- 1	12	I I		TING LOAD	- 11	900	1
2		SPARE				30/2	21	В	22	20/		12	I I		TING LOAD	- 11	540	1
-		-				-	23	С	24	20/	- 1	12	I I		TING LOAD	- 11	1080	1
2		SPARE				20/2	25	Α	26	20/		12			TING LOAD	- 11	540	1
-	5.40	-				-	27	В	28	20/	- 1	12	I I		TING LOAD	- 11	1080	1
1	540	EXISTING LOAD		R	12	20/1	29	С	30	20/	1	12			DDC CONT	IKUL	500	3
1	900	EXISTING LOAD		R	12	20/1	31	A	32	407			I I	SPAC				3
1	540 1080	EXISTING LOAD EXISTING LOAD		R	12	20/1	33	В	34	40/	_			SPAF	<b>\</b> C			2
1	540	EXISTING LOAD		R	12 12	20/1	35 37	C	36 38	- 20/	<u>,</u>	12	R	EVIC:	TING LOAD	,	900	<u>-</u>
		<del></del>			_	20/1		A	lacksquare			_		L				1 1
1	1080 900	EXISTING LOAD EXISTING LOAD		R R	12 12	20/1 20/1	39 41	B C	40	20/ 20/		12 12			TING LOAD TING LOAD	- 11	540 1080	<u> </u>
	I.E.C.	Load Type		nn.	Fct.	Divers			N.E.C		'	14		<u>  _ / 10  </u>	Conn.	Fct.	Diversity	<u> </u>
		(R) Recept.		840	1 61.	17,4		<u> </u>	10.20		/I \	Lighting	1			125%		
		(K) Kecept. (K) Kitchen	l .	,040 0	100%	17,4.	20	2	10.20	` ' 11		Lighting .) Ext. L			0	125%	II .	
	20.56 20.60	(C) Cooling		0	0%	0			320.1	ll ll	-	.) ⊏xı. ∟ Elevato	-		0	100%	II .	
	20.60	(H) Heating		0	0% 0%	0		'	JZU. 14		. ,	⊟evato H) Wate			0	100%	II .	
	20.60	(F) Fans		0	100%	0			220.5	- 11		π) vvate Γ) Lrg. N			0	125%	II .	
2.		(M) Misc.	l	00	100%	500			ZZU.	- 11		P) Sub F			0	100%	II .	
		KINI) INIISC.	၂ ၁	UU	100%	ال ع	,				(SF	) Sub F	anen		l u	100%	.   U	

			P	an	elbo	ard	H	V			•	6		AIC Rating Existing New	]		
	1	V.3-Phase,4-Wire Section	е	х	MCB MLO	225	AMF		S (Co	opper)		Singl	le			Mounting X Surface	g 9
	1	-Nema Rating						. GRI	ND. E	BUS	X	Feed	l - Thru	ı		Flush	
Notes	Load (VA)	Description		Туре	Wire	СВ	CKT #	PH	CKT #	СВ	Wire	Туре		Description		Load (VA)	Notes
1	2500	LT - 1ST FLOOF	₹	L	12	20/1	1	Α	2	20/1	12	L	EXIS	TING LOAD	)	2800	1
1	2500	LT - 1ST FLOOF	₹	L	12	20/1	3	В	4	20/1	12	L	LT - E	XIT 2ND		2800	1
1	2500	LT - 1ST FLOOF	₹	L	12	20/1	5	С	6	20/1	12	L	LT - E	XTERIOR		2800	1
1	2500	LT - EXIT LTS 1ST		L	12	20/1	7	Α	8	20/1	12	L	ll .	ST FLOOF	l l	2800	1
1	2500	EXISTING LOAD		L	12	20/1	9	В	10	20/1	12	L	ll .	ST FLOOF		2800	1
1	2500	LT - LOBBY		L	12	20/1	11	С	12	20/1	12	L	LT - 1	ST FLOOF	₹	2800	1
1	2500	EXISTING LOAD		L	12	20/1	13	Α	14	20/1	12		EXIS	TING LOAD	)	2800	1
1	2500	LT - 2ND FLOOF		L	12	20/1	15	В	16	20/1	12		EXIS	TING LOAD	)	2800	1
1	2500	LT - 2ND FLOOF	7	L	12	20/1	17	С	18	20/1	12	L	LT - 2	ND FLOO	R	2800	1
1	2500	LT - 2ND FLOOF	7	L	12	20/1	19	Α	20	20/1	12	L	LT - 2	ND FLOO	R	2800	1
1	2500	LT - LOBBY		L	12	20/1	21	В	22	20/1	12	L	ll .	ND FLOO	l l	2800	1
1	2500	LT - 2ND FLOOF	7	L	12	20/1	23	С	24	20/1	12	L	ll .	ND FLOO	l l	2800	1
3	6055	AHU-1.1		F	12	15/3	25	Α	26	20/1	12	L	LT - 2	ND FLOO	R	2800	1
-	-	5 H.P.		-	12	-	27	В	28	20/1	12	L	LT - 2	ND FLOO	R	2800	1
-	-	-		-	12	-	29	С	30	20/1	12	L	ll .	ND FLOO	R	2800	1
3	6055	AHU-1.2		F	12	15/3	31	Α	32	15/3	12	F	SF-1			1673	3
-	-	5 H.P.		-	12	-	33	В	34	-	12	-	1 H.P				-
-	-	-		-	12	-	35	С	36	-	12	-					-
3	6055	AHU-2.1			12	15/3	37	Α	38	20/3	12	WH	EWH	-1		5000	1
-	-	5 H.P.			12	-	39	В	40	-	12	-	-			-	-
-	-	-			12	-	41	С	42	-	12	-	-			-	-
N	I.E.C.	Load Type	Co	nn.	Fct.	Divers	sity	١	I.E.C	; <u>.                                    </u>				Conn.	Fct.	Diversity	
2	20.44	(R) Recept.	(	0		0		21	0.20	(a) (L	) Lighting	)		66,400	125%	6 83,0	00
2	20.56	(K) Kitchen	(	o	100%	0				(E	L) Ext. L	tg.		0	125%	6 0	
2	20.60	(C) Cooling	(	o	0%	0		6	20.1	4 ∥(E	) Elevato	ors		0	100%	6 <b>r</b> 0	
2	20.60	(H) Heating	(	o	0%	0				(V	VH) Wate	er Ht.		5,000	100%	6 5,00	00
2	20.60	(F) Fans	13,	783	100%	13,78	83	:	220.5	5 ∥(N	1T) Lrg. N	∕lot.		0	125%	6 0	
		(M) Misc.	(	o	100%	0				(S	P) Sub F	Panel		0	100%	6 0	
63	0.11(B)	(W) Welders	(	0	100%	0		2	20.8	7(E	X) Existi	g Load	<u> </u>	0	125%	6 0	
		Total Connected	Load		85,183	VA =	10	2.5	AMF	rs T	Location	on of F	anel:				

													1	0,000	AIC Rating			
			P	an	elbo	ard	1	<b>V1</b>	F					Х	Existing			
			•	<b>-</b>		<b> </b>		•							New			
	120/208	V.3-Phase,4-Wire	e	Х	MCB	150	AMF	P MC	В				Single	<u></u>			Mounting	<b>1</b>
		1 Section			MLO	225				opper	.)		Doub				X Surface	,
		1 -Nema Rating						GRI	•			Х	Feed	- Thru	J		Flush	
	1 1 () (0)	Barani (ian		_	105	0.0	CKT		CKT		$\Box$	105			D		1 1 () (0.)	N
otes	Load (VA)	Description		Туре	Wire	CB	#	PH	#	CE	3	Wire	Туре		Description		Load (VA)	Notes
1	540	EXISTING LOAD		R	12	20/1	1	Α	2	20/	1	12	R	EXIS	TING LOAD		900	1
1	1080	EXISTING LOAD		R	12	20/1	3	В	4	20/	1	12	R	EXIS	TING LOAD		540	1
1	900	EXISTING LOAD		R	12	20/1	5	С	6	20/	ll ll	12	R	EXIS	TING LOAD		1080	1
1	1080	EXISTING LOAD		R	12	20/1	7	Α	8	20/	ll ll	12	R		TING LOAD	ll l	540	1
1	900	EXISTING LOAD		R	12	20/1	9	В	10	20/	ll ll	12	R		TING LOAD	ll l	1080	1
1	540	EXISTING LOAD		R	12	20/1	11	С	12	20/	ll ll	12	I I		TING LOAD		900	1
2		SPARE				40/2	13	Α	14	20/	ll ll	12			TING LOAD		1080	1
-		-				-	15	В	16	20/	ll ll	12	R		TING LOAD		900	1
2		SPARE				50/2	17	С	18	20/	ll ll	12	R		TING LOAD		540	1
-		-				-	19	Α	20	20/	ll ll	12	R		TING LOAD		900	1
2		SPARE				30/2	21	В	22	20/	ll ll	12			TING LOAD	- 11	540	1
-		-				-	23	С	24	20/	ll ll	12	I I		TING LOAD	ll l	1080	1
2		SPARE				20/2	25	Α	26	20/	ll ll	12			TING LOAD		540	1
-		-				-	27	В	28	20/	ll ll	12	I I		TING LOAD	ll l	1080	1
1	540	EXISTING LOAD		R	12	20/1	29	С	30	20/	1	12	M		DDC CONT	ROL	500	3
1	900	EXISTING LOAD		R	12	20/1	31	Α	32					SPAC				3
1	540	EXISTING LOAD		R	12	20/1	33	В	34	40/	2			SPAF	RE			2
1	1080	EXISTING LOAD		R	12	20/1	35	С	36	-				-				ļ-
1	540	EXISTING LOAD		R	12	20/1	37	Α	38	20/	ll ll	12	R		TING LOAD		900	1
1	1080	EXISTING LOAD		R	12	20/1	39	В	40	20/	ll ll	12	I I		TING LOAD	ll l	540	1
1	900	EXISTING LOAD		R	12	20/1	41	С	42	20/	1	12	R	EXI2	TING LOAD		1080	1
	I.E.C.	Load Type	Con		Fct.	Divers	•		I.E.C						Conn.	Fct.	Diversity	
	20.44	(R) Recept.	24,8			17,42	20	21	0.20	` ′ 11	` '	Lighting			0	125%	II .	
		(K) Kitchen	0		100%	0		_			•	) Ext. L	_		0	125%	II .	
	20.60	(C) Cooling	0		0%	0		6	20.14		` '	Elevato			0	100%	II .	
		(H) Heating	0		0%	0		] .	200 -			H) Wate			0	100%	II .	
2		(F) Fans	0		100%	0		3	220.5		•	) Lrg. M			0	125%	ll .	
		(M) Misc.	50		100%	500	ן נ	_		ll l	`	) Sub F			0	100%	II .	
63	0.11(B)	(W) Welders	0		100%	0		2	20.8	7	(EX	) Existi	g Load		0	125%	0	
		Total Connected Total Load (Diver			25,340 17,920				AMF AMF			Locatio	on of P	anel:				

ERO 5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

REVIS	ION:	
No.	/ DATE	/ DESCRIPTION
	02/21/2020	100% CD
01	03/04/2020	ADDENDUM 01



**DATE:** 02/06/2020

CHECKED BY: DBR

**PROJECT NUMBER:** 190317.000

SHEET TITLE:

SHEET NUMBER:

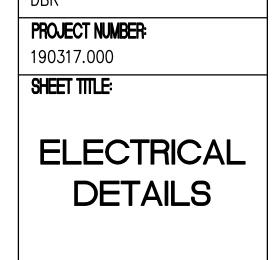
ELECTRICAL SCHEDULES



9990 Richmond Avenue
South Building, Suite 300
Houston, Texas 77042
713.914.0888 p 713.914.0886 f
TBPE Firm Registration No. 2234 EM | MECH | ELEC | PLBG | TECH |

E501





ER0

5444 Westheimer

02/21/2020 100% CD

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ment Camping

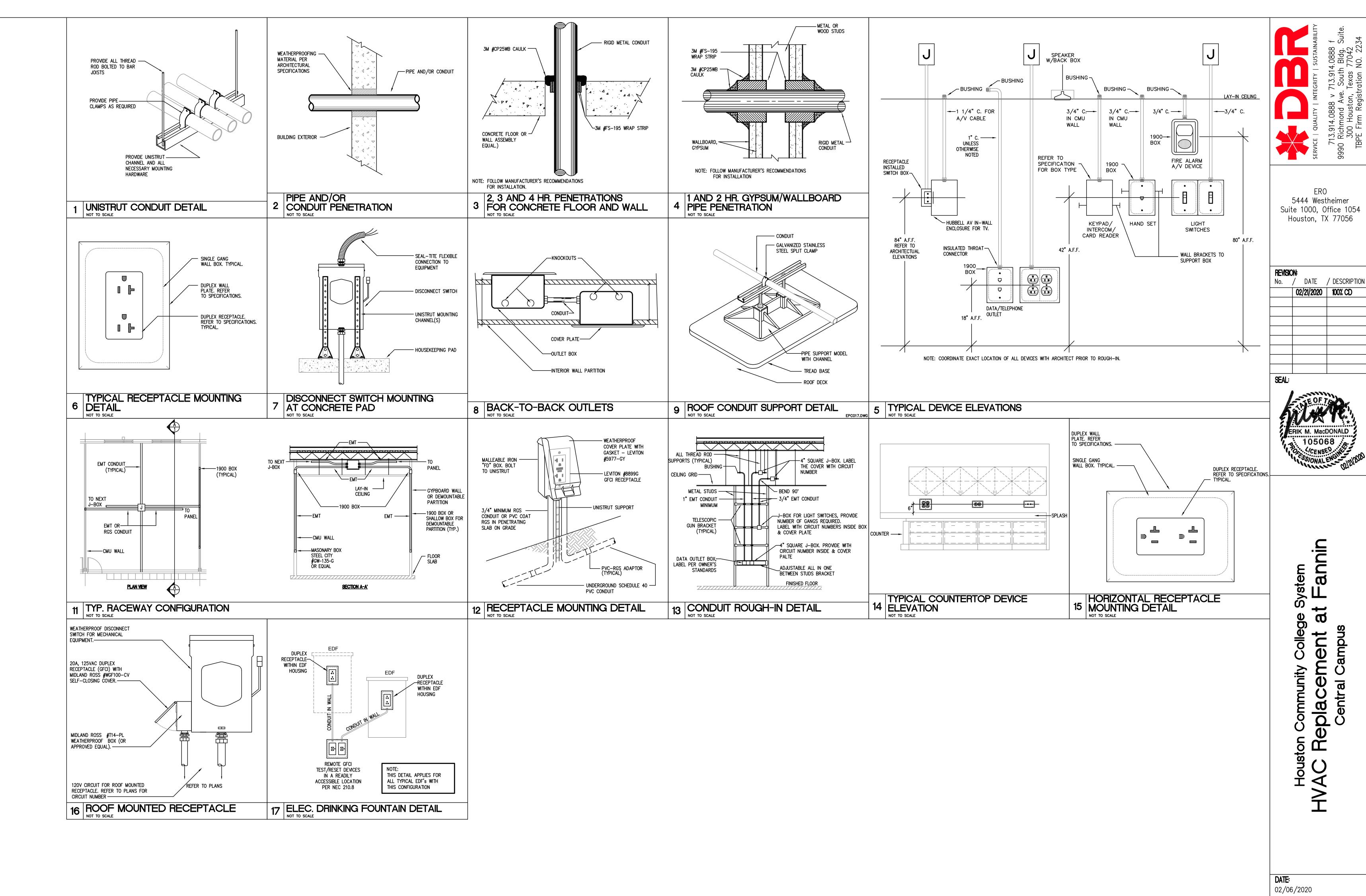
pla Cen

SHEET NUMBER:

DRAWN BY:

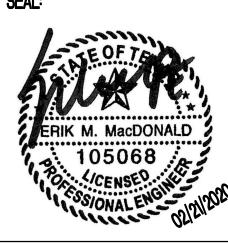
CHECKED BY:

E601



ER0 5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

No. / DATE / DESCRIPTION 02/21/2020 100% CD



System t Fannin at ement al Campus Houston Communication HVAC Replace

02/06/2020 DRAWN BY:

— CHECK VALVE (TYPICAL)

RE: EXISTING

RE: EXISTING EXPANSION TANK

ELECTRIC WATER HEATER

TO FLOOR DRAIN

ELECTRIC WATER HEATER DETAIL
NOT TO SCALE

- ASME RATED TEMPERATURE AND PRESSURE RELIEF VALVE. ROUTE DRAIN LINE FULL SIZE

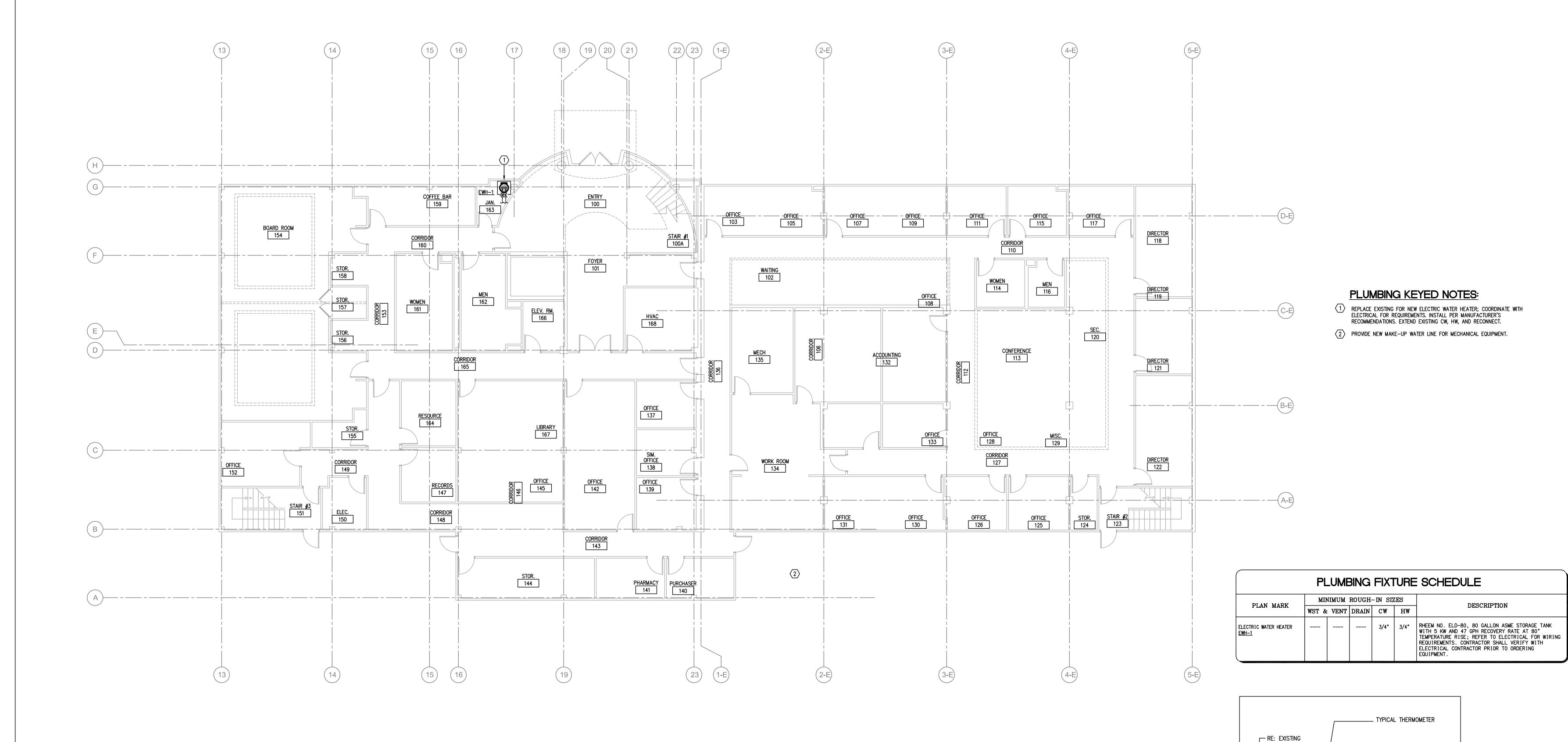
CHECKED BY:

PROJECT NUMBER: 190317.000 SHEET TITLE:

> **PLUMBING** PLAN

SHEET NUMBER:

P201



P201 LEVEL 1 PLUMBING PLAN
1/8"=1'-0"

9990 Richmond Avenue South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234 190317.000 DBR Project Number EM | MECH | ELEC | PLBG | TECH | ABBREVIATIONS (NOT ALL IT

GPM

GTH

GROUND

GALLONS PER DAY

GALLONS PER HOUR

GRAND TOTAL HEAT

GATE VALVE

GALLONS PER MINUTE

GRAND SENSIBLE HEAT

A	AIR (COMPRESSED)	
ABV	ABOVE	
A/C	AIR CONDITIONING	
AC	ALTERNATING CURRENT AIR COMPRESSOR	
ACCH	AIR COOLED CHILLER	
ACCU	AIR COOLED CONDENSING UNIT	
AD	ACCESS DOOR, AREA DRAIN	
ADJ	ADJUSTABLE	
AFC.	AR FILTER	
AFC AFF	ABOVE FINISHED CEILING  ABOVE FINISHED FLOOR	
AFG	ABOVE FINISHED FLOOR  ABOVE FINISHED GRADE	
AHU	AIR HANDLING UNIT	
AL	ALUMINUM	
AMB	AMBIENT	
AP	ACCESS PANEL	
APD	AIR PRESSURE DROP	
ARI	AMERICAN REFRIGERANT INSTITUTE	
ARCH	ARCHITECT, ARCHITECTURAL	
AS	AIR SEPARATOR	
ASHRAE	AMERICAN SOCIETY OF HEATING AND REFRIGERATION ENGINEERS	
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS	
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS	
AV	ACID VENT, AIR VENT	
AVG	AVERAGE	
AWS	AMERICAN WELDING SOCIETY	
AUX	AUXILIARY	
	В	
В	BOILER	
BC D /O	BELOW COUNTER	
B/C BEV	BACK OF CURB	
BFV BH	BUTTERFLY VALVE BOX HYDRANT	
BLDG	BUILDING	
BM	BENCHMARK	
BOF	BOTTOM OF FOOTING	
BOS	BOTTOM OF STRUCTURE	
BT	BATH TUB, BREAK TANK	
BTU	BRITISH THERMAL UNIT	
BV	BALL VALVE	
BWV	BACK WATER VALVE	
	C	
	VEI CILIC	
CAB	CELSIUS	
CB	CATCH BASIN	
CD	CONDENSATE DRAIN LINE	
CFM	CUBIC FEET PER MINUTE	
CFS	CUBIC FEET PER SECOND	
СН	CHILLER	
CHW	CHILLED WATER	
CHWP	CHILLED WATER PUMP	
CHWR	CHILLED WATER RETURN	
CHWS	CHILLED WATER SUPPLY	
CI	CAST IRON	
CIRC	CIRCULATING	
CL	CENTERLINE	
CLG	CEILING	
CLR	CLEAR	
CMP	CONCRETE MASONRY UNIT	
CMU CPI	CONCRETE MASONRY UNIT  CAST IRON PIPE INSTITUTE	
CPVC	CHLORINATED POLYVINYL CHLORIDE	
CO	CLEAN OUT	
COL	COLUMN	
СОМВ	COMBINATION	
COMP	COMPRESSOR	
CON	CONVERTER	 
CONC	CONCRETE, CONCENTRIC	
COND	CONDENSER, CONDENSATE	
CONN	CONNECTION	
CONT	CONTINOUS, CONTINUATION	
CONTR	CONTROLLER, CONTRACTOR	
CRAC	COMPUTER ROOM A/C UNIT	
CRT	CATHODE RAY TUBE	
CT	COOLING TOWER	
CTR	CENTER	
CU	COPPER	
CWD	COLD WATER	
CWP	CONDENSER WATER PUMP	
CWR	CONDENSER WATER RETURN	

	D		Н
	DEDTH DRAIN DRAFD	HB	
)	DEPTH, DRAIN, DRYER	HD HR	HOSE BIBB
3	DRY BULB	ł <del>                                    </del>	HEAD, HUB DRAIN
;	DOUBLE DUCT CONSTANT VOLUME, DIRECT CURRENT	HE	HEAT EXCHANGER
OC .	DIRECT DIGITAL CONTROL	HF	HUMIDIFIER
ESIG	DESIGNATION	HORIZ	HORIZONTAL
TL	DETAIL	HP	HORSEPOWER, HALON PANEL
F	DRINKING FOUNTAIN	HPU	HEAT PUMP UNIT
IA	DIAMETER	НКР	HOUSEKEEPING PAD
IFF	DIFFUSER	HSC	HORIZONTAL SPLIT CASE
IM	DIMENSION	HSTAT	HUMIDISTAT
ISC	DISCONNECT	нт	HEIGHT
N	DOWN	HTG	HEATING
		HTR	HEATER
PR	DAMPER	HW	HOT WATER
S	DOWNSPOUT, DOUBLE SUCTION	HWC	HOT WATER CIRCULATOR
V	DOUBLE DUCT VAV	HWP	HEATING WATER PUMP
W	DISHWASHER	HWR	
WG	DRAWING	l —	HOT WATER RETURN
WH	DOMESTIC WATER HEATER	HWS	HOT WATER SUPPLY
WP	DOMESTIC WATER PUMP	HZ	HERTZ
Х	DIRECT EXPANSION		
	С	<u>                                   </u>	<u> </u>
	<b></b>	ID	INSIDE DIAMETER
A	EACH	IE	INVERT ELEVATION
AT	ENTERING AIR TEMPERATURE	IH	INFRARED HEATER
		IN	INCH
C	ELECTRICAL CONTRACTOR	INSUL	INSULATION
:CC	ECCENTRIC  ENTERING DRY BUILD	INT	INTERNAL, INTERIOR
DB	ENTERING DRY BULB	IW	INDIRECT WASTE
DF	ELECTRIC DRINKING FOUNTAIN		ı
DH	ELECTRIC DUCT HEATER		J
F	EXHAUST FAN	JB	JUNCTION BOX
FF	EFFICIENCY	JP	JOCKEY PUMP
IJ	EXPANSION JOINT		
L	ELEVATION		K
LEC	ELECTRICAL	KEC	KITCHEN EQUIPMENT CONTRACTOR
LEV	ELEVATOR EMERGENCY ENCLOSURE	ко	KNOCKOUT
MERG	EMERGENCY	KVA	KILOVOLT- AMPS
NCL	ENCLOSURE	KW	KILOWATT
		NW NW	NILOWATT -
NGR	ENGINEER		<u>_</u>
<u>Q</u>	EQUAL	L	LENGTH, LAVATORY
QUIP	EQUIPMENT	LAT	
:S	END SUCTION, EMERGENCY SHOWER	l —	LEAVING AIR TEMPERATURE
:SP	EXTERNAL STATIC PRESSURE EXPANSION TANK	LAV	LAVATORY
T	EXPANSION TANK	LF	LINEAR FEET
TR	EXISTING TO REMAIN	LP	LOW PRESSURE
VAP	EVAPORATOR	LRA	LOCKED ROTOR AMPS
:WB	ENTERING WET BULB	LVL	LEVEL
WT	ENTERING WATER TEMPERATURE	LWB	LEAVING WET BULB
X	EXPLOSION-PROOF	LWCO	LOW WATER CUT OFF
XT	EXTERNAL	LWT	LEAVING WATER TEMPERATURE
XTG	EXISTING		M
	EXISTING		M
	F	MAT	MIXED AIR TEMPERATURE
	FAHRENHEIT, FIRE	MAX	MAXIMUM
B0	FURNISHED BY OTHERS	мвтин	THOUSAND OF BTU'S
		МС	MECHANICAL CONTRACTOR
CO	FLOOR CLEAN OUT	MECH	MECHANICAL
CS	FLOOR CONTROL STATION	MFR	MANUFACTURER
CU	FAN COIL UNIT	MH	MANHOLE
D	FLOOR DRAIN, FIRE DAMPER	MI MI	
DS	FIRE DEPARTMENT SIAMESE	l —	MALLEABLE IRON
DV	FIRE DEPARTMENT VALVE	MIN	MINIMUM
<del></del>	FIRE HYDRANT	MP	MEDIUM PRESSURE
HC	FIRE HOSE CABINET	MS	MOP SINK
. 10	TINE HOSE ORDINE!	MTD	MOUNTED
up	EIDE MUCE DYCK		MAKE-UP
	FIRE HOSE RACK	MU	
IXT	FIXTURE	MU MVD	MANUAL VOLUME DAMPER
IXT LA	FIXTURE FULL LOAD AMPS	l —	
IXT LA	FIXTURE	l —	MANUAL VOLUME DAMPER
LA LEX	FIXTURE FULL LOAD AMPS	l —	
XT LA LEX	FIXTURE  FULL LOAD AMPS  FLEXIBLE	MVD N.C.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION
XT LA LEX L	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES	N.C.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION
XT _A _EX _R	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR	N.C. NFPA NIC	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT
LA LEX L LR P	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL	N.C.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION
LA LEX L LR P PT RZR	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER	N.C. NFPA NIC	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT
IXT LA LEX L LR P PT RZR	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER	N.C. NFPA NIC N.O.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN
LEX L LR P T RZR S SK	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK	N.C. NFPA NIC N.O.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER
LEX L LR P T RZR S SK	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET	N.C. NFPA NIC N.O.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER
LA LEX L LR P PT RZR S SK	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK	N.C. NFPA NIC N.O.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER
LEX LEX P PT RZR S S SK	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE	N.C. NFPA NIC N.O. NO.	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE
XT A EX - R PT RZR S SK	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET	N.C. NFPA NIC N.O. NO. NO. OA	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  OUTSIDE AIR OUTSIDE AIR FAN
XT A EX R PT RZR S SK	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE	N.C. NFPA NIC N.O. NO. OA OAF OAHU	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  O  OUTSIDE AIR OUTSIDE AIR FAN  OUTSIDE AIR HANDLING UNIT
XT _A _EXR _PT _RZR S SK _T _JT	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE	N.C. NFPA NIC N.O. NO. NO. OA OAF OAHU OBD	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  O  OUTSIDE AIR OUTSIDE AIR FAN  OUTSIDE AIR HANDLING UNIT  OPPOSED BLADE DAMPER
EX - R - R - R - R - R - R - R - R - R -	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE  G  GAS	N.C. NFPA NIC N.O. NO. NO. OA OAF OAHU OBD OC	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  OUTSIDE AIR  OUTSIDE AIR FAN  OUTSIDE AIR HANDLING UNIT  OPPOSED BLADE DAMPER  ON CENTER
LA LEX L LR P PT RZR SSK T UT	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE  G  GAS  GAS  GAUGE	N.C. NFPA NIC N.O. NO. NO. OA OAF OAHU OBD OC OD	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  OUTSIDE AIR  OUTSIDE AIR FAN  OUTSIDE AIR HANDLING UNIT  OPPOSED BLADE DAMPER  ON CENTER  OUTSIDE DIAMETER, OVERFLOW DRAIN
FHR FIXT FLA FLEX FLF FPT FRZR FS FSK FT FUT  GG GAL GALV GC	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE   GAS  GAUGE  GALLON	N.C. NFPA NIC N.O. NO. NTS  OA OAF OAHU OBD OC OD	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  O  OUTSIDE AIR OUTSIDE AIR FAN  OUTSIDE AIR HANDLING UNIT  OPPOSED BLADE DAMPER  ON CENTER  OUTSIDE AIR FAN COIL UNIT
XT _A _EXR _PT _RZR _S _S _SK _T _JT _A _AL _ALV	FIXTURE  FULL LOAD AMPS  FLEXIBLE  FLOW LINES  FLOOR  FIRE PUMP  FAN POWERED TERMINAL  FREEZER  FLOW SWITCH, FIRE SPRINKLER  FLOOR SINK  FOOT, FEET  FUTURE  G  GAS  GAUGE  GALUON  GALVANIZED	N.C. NFPA NIC N.O. NO. NO. OA OAF OAHU OBD OC OD	NORMALLY CLOSED  NATIONAL FIRE PROTECTION ASSOCIATION  NOT IN CONTRACT  NORMALLY OPEN  NUMBER  NOT TO SCALE  OUTSIDE AIR  OUTSIDE AIR FAN  OUTSIDE AIR HANDLING UNIT  OPPOSED BLADE DAMPER  ON CENTER  OUTSIDE DIAMETER, OVERFLOW DRAIN

OS&Y OPEN STEM AND YOLK

	<u> </u>	
Р	PUMP, PLUMBING EQUIPMENT	
PC	PLUMBING CONTRACTOR	
PCR	PUMPED CONDENSATE RETURN	
PD	PRESSURE DROP, PLANTER DRAIN	
PH	PHASE, POST HYDRANT	
PIV	POST INDICATOR VALVE	
PLBG	PLUMBING	
PNEU	PNEUMATIC	
PNL	PANEL	
PNTH	PENTHOUSE	
PP	POLYPROPYLENE	
PPM	PART PER MILLION	
PRI	PRIMARY	
PRS	PRESSURE REDUCING STATION	
PRV	PRESSURE REDUCING VALVE	
PSF	POUNDS PER SQUARE FOOT	
PSI	POUNDS PER SQUARE INCH	
PSIG	POUNDS PER SQUARE INCH GAUGE	
PT	PLUMBING TRIM	
PV	PLUG VALVE	
PVC	POLYVINYL CHLORIDE	
	$\sim$	
	<u>Q</u>	
QTY	QUANTITY	
	R	
	11	
RA	RETURN AIR	
RAD	REFRIGERATED AIR DRYER	
RAF	RETURN AIR FAN	
RAG	RETURN AIR GRILL	
RAT	RETURN AIR TEMPERATURE	
RCP	REFLECTED CEILING PLAN, REINFORCED CONCRETE PIPE	
RD	ROOF DRAIN	
RE	REFERENCE, REFER	
RECIRC	RECIRCULATE	
RED	REDUCER	
REFR	REFRIGERATOR	
REG	REGISTER	
REINF	REINFORCING	
REQD	REQUIRED	
REV	REVISION, REVISE	
RH	RELATIVE HUMIDITY	
RHG	REFRIGERANT HOT GAS	
RKVA	RUNNING KILOVOLT-AMPS	
RKW	RUNNING KILOWATTS	
RL	REFRIGERANT LIQUID	
RLA	RUNNING LOAD AMPS	
RM	ROOM, REFRIGERATION MACHINE	
RPM	REVOLUTIONS PER MINUTE	
RS	REFRIGERANT SUCTION	
RTU	ROOFTOP UNIT	
RV	RELIEF VALVE	
	0	
	<b>5</b>	
	_	
S	STEAM	
S SA	STEAM SUPPLY AIR	
SA		
SA SAF	SUPPLY AIR	
	SUPPLY AIR SUPPLY AIR FAN	
SA SAF SAG	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE	
SA SAF SAG SAN	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER	
SA SAF SAG SAN SAR	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER	
SA SAF SAG SAN SAR SC	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE	
SAF SAG SAN SAR SC SCHED	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED	
SA SAF SAG SAN SAR SC SCHED SCR	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER	
SA SAF SAG SAN SAR SC SCHED SCR SD	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN	
SA SAF SAG SAN SAR SC SCHED SCR SD SE	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT SIM	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT SIM SK	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT SIM	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT SIM SK	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SECT SENS SF SFCS SH SHT SIM SK SKVA	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK STARTING KILOVOLT—AMPS	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT SIM SK SKVA SKW	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK STARTING KILOVOLT-AMPS STARTING KILOVOLTT-	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SECT SENS SF SFCS SH SHT SIM SK SKVA SKW SM	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK STARTING KILOVOLT—AMPS STARTING KILOVOLT—AMPS STARTING KILOWATTS	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SEC SECT SENS SF SFCS SH SHT SIM SK SKVA SKW SM SP	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK STARTING KILOVOLT—AMPS STARTING KILOWATTS SHEETMETAL SUMP PUMP, STATIC PRESSURE	
SA SAF SAG SAN SAR SC SCHED SCR SD SE SECT SENS SF SFCS SH SHT SIM SK SKVA SKW SM SP SPEC	SUPPLY AIR SUPPLY AIR FAN SUPPLY AIR GRILLE SANITARY SEWER SUPPLY AIR REGISTER STEAM CONDENSATE SCHEDULED SILICON CONTROLLED RECTIFIER STORM DRAIN SEWAGE EJECTOR SECONDARY SECTION SENSIBLE SQUARE FEET SPRINKLER FLOOR CONTROL STATION SHOWER SHEET SIMILAR SINK STARTING KILOVOLT—AMPS STARTING KILOVOLT—AMPS STARTING KILOWATTS SHEETMETAL SUMP PUMP, STATIC PRESSURE SPECIFICATION	

SERVICE SINK SUBSURFACE DRAIN

STANDARD

STEEL

STRAINER

SURFACE

SUSPEND

SANITARY VENT

SSSC

STD

STR

SUSP

SANITARY SEWER FIXTURE UNITS

SOLID STATE SPEED CONTROL

<b>MECHANIC</b>	AL PIPING SYMBOLS		
—cws—	CONDENSER WATER SUPPLY	<del></del>	STRAINER WITH BLOW DOWN VALVE
— CWR —	CONDENSER WATER RETURN	X <sub>4</sub>	STRAINER WITH BLOW DOWN VALVE
—— CHS ——	CHILLED WATER SUPPLY	<b>──</b> ቚ──	GATE VALVE, HVAC BALANCING/STOP VALVE
——CHR ——	CHILLED WATER RETURN	$\longrightarrow$	GLOBE VALVE
——CD——	CONDENSATE DRAIN LINE	<b>──</b> ⋈──	BALL VALVE
<del></del> 3	CAP ON END OF PIPE	<del></del>	BALANCING VALVE WITH DIFFERENTIAL PRESSURE TAPS
——•	ELBOW UP	<b>—</b> ♠—	OS&Y VALVE
—— <del></del>	ELBOW DOWN		CHECK VALVE
<del></del>	VALVE IN DROP		BUTTERFLY VALVE
——•≪₁	VALVE IN RISE	<b>────</b>	TWO-WAY MODULATING CONTROL VALVE
<del></del>	DIRECTION OF FLOW	 <b>────</b>	THREE-WAY MODULATING CONTROL VALVE
	DIRECTION OF SLOPE DOWN		SOLENOID VALVE
$\longrightarrow\!$	CONCENTRIC REDUCER		
<del></del>	ECCENTRIC REDUCER		PRESSURE REDUCING VALVE
<del></del>	TEE OUTLET UP	<u> </u>	GAS REGULATOR
<del></del>	TEE OUTLET DOWN	——· <b>₹</b> ⊢——	GAS COCK
<b>──</b>	UNION	— FCS —	SPRINKLER FLOOR CONTROL STATION
<del></del>	FLANGE	<u>+¬</u>	MANUAL AIR VENT
—×	PIPE ANCHOR	<u> </u>	AUTOMATIC AIR VENT
<b>─</b> /\\\	EXPANSION JOINT	<b>₩</b>	T&P RELIEF VALVE
	PRESSURE AND TEMPERATURE TAP	Ø	PRESSURE GAUGE WITH GAUGE COCK
<del></del>	FLOW VENTURI	8	STEAM TRAP
7	VACUUM BREAKER		
<u> </u>	VACUUM RELIEF VALVE		WATER METER
-XZZX-	BACKFLOW PREVENTOR		FLEXIBLE CONNECTION
	THERMOMETER		
_ <del></del>	CIRCULATING PUMP		

<u>—</u> C	CIRCULATING PUMP		
	T	DUCTWORK SYM	MBOLS
TC	TEMPERATURE CONTROL		SUPPLY OR OUTSIDE AIR UP
rcc TD	TEMPERATURE CONTROL COMPRESSOR		SUPPLY OR OUTSIDE AIR OP
D -	TRENCH DRAIN TRANSFER FAN	<u> </u>	OPPOSED BLADE VOLUME DAMPER
T TDH	TOTAL DYNAMIC HEAD		FIRE DAMPER
H BLK	THRUST BLOCK	$\rightarrow$	TINE DAWN EN
TP	TRAP PRIMER		SMOKE DAMPER
PD	TRAP PRIMER DEVICE	$\dashv$ $\mid$ $\mid$ $\mid$	
rsp	TOTAL STATIC PRESSURE		FIRE/SMOKE DAMPER
STAT	THERMOSTAT	_     _	
ΥP	TYPICAL		MOTORIZED DAMPER
	U	<b>-</b>       <b>-</b>   -	RETURN, RELIEF OR EXHAUST AIR UP
J	URINAL		INCLINED RISE IN DUCT
JCD	UNDER CUT DOOR	$\neg$     $\sqcup$	
JG	UNDERGROUND		INCLINED DROP IN DUCT
IH	UNIT HEATER		
JL	UNDERWRITERS LABORATORIES, INC.		RETURN OR EXHAUST DIFFUSER
JNO	UNLESS NOTED OTHERWISE	(100) -	INCLINED DROP IN DUCT
J/F	UNDERFLOOR	🗓	RETURN, RELIEF OR EXHAUST AIR DOWN
ı/s	UNDERSLAB	_	HUMIDISTAT
	V		
,	VALT VENT	-   $ $ $ $ $ $ $ $ $ $ $ $	THERMOSTAT
<u>/</u> /A	VOLT, VENT  VOLT- AMPERE		CARBON DIOXIDE
AC	VACUUM		CARBON MONOXIDE SENSOR
AC AV	VARIABLE AIR VOLUME	<del> </del>	EXISTING DIFFUSER
/B	VALVE BOX, VACUUM BREAKER	<del>- </del>	EXISTING FLEX DUCT  EXISTING DUCTWORK
/CP	VITRIFIED CLAY PIPE		EXISTING DUCTWORK
/D	VOLUME DAMPER	—   <u>                                   </u>	L-/ <i>j</i> }
 /EL	VELOCITY	16/	14 7 EXISTING DUCT DIMENSIONS
/ERT	VERTICAL		CONNECTION TO EXISTING
/FD	VARIABLE FREQUENCY DRIVE	$\dashv$ $\mid$ $\mid$ $\mid$ $\mid$	RECTANGULAR BRANCH DUCT TAP
/IB	VALVE IN BOX	10"	ø NECK SIZE
/OV	VALVE ON VERTICAL	/ / / / / / / / / / / / / / / /	5 CFM —— CFM
/P	VACUUM PUMP		DIFFUSER TYPE; REFER TO SCHEDULE
/R	VARIABLE AIR VOLUME REHEAT		SUPPLY DIFFUSER
/TR	VENT THRU ROOF		
	W	$\neg$	FLEXIBLE DUCT CONNECTION
		_	NEW DUCTWORK
<u>v /                                     </u>	WATT, WASTE, WIDTH, WASHER	$\dashv$ $\mid$ $\mid$ $\mid$ $\vdash$	TRANSITION
<u>//</u>	WITH	$\dashv$ $\mid$ $\mid$ $\mid$	
//0 /P	WITHOUT WET BULB	$\dashv$ $\sqcap$	NEW DUOT DIMENSIONS (MIDTIL LIEIGUE
VB VC	WATER CLOSET		NEW DUCT DIMENSIONS (WIDTH x HEIGH
VCO	WALL CLEAN OUT	20/16	SUPPLY OR OUTSIDE AIR DOWN
<u>voc</u> vh	WALL HYDRANT	- $ '  '$	TURNING VANES
<u>''''</u> VM	WATER METER		
//P	WEATHERPROOF	RE#1/M2.0	SECT DITTOSEN MY TELNOM CONNECTIO
<u>"</u> /PD	WATER PRESSURE DROP		
WF	WELDED WIRE FABRIC	$\neg$   $\sim$	REFER TO DRAWING #1, SHEET M2.0
<del>''''</del> VТ	WATERTIGHT, WEIGHT	<del>-</del>	2
	Υ		
,	YARD HYDRANT	─ <b>├</b> ─ <b>├</b> ── <b>├</b> ── <b>├</b>	POINT OF NEW CONNECTION TO EXISTING DUCTWOR
	7	<del></del>	Same Same Same To Englind Doorwood
,	7045	<b>─</b>	
Z	ZONE	<b>_</b>	DEMOLISH DUCTWORK UP TO LOCATION SHOWN



- DUCTWORK AND PROVIDE ALL CLEARANCES AS REQUIRED.
- CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR
- EQUIPMENT SIZES, DIMENSIONS, AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE MANUFACTURER DRAWINGS AND POURING OF CONCRETE HOUSEKEEPING PADS.
- AVOID CONFLICTS AND ALLOW ADEQUATE CLEARANCES. INSTALL FAN POWERED TERMINAL UNITS AND SINGLE INLET VAV BOXES TO ENSURE ACCESS PANELS ARE NOT BLOCKED. ACCESS
- 8. DUCT SIZES SHOWN ON PLANS ARE CLEAR INSIDE DIMENSIONS.
- 9. ALL MEDIUM AND LOW PRESSURE DUCTWORK AND ASSOCIATED ACCESSORIES SHALL BE CONSTRUCTED TO MEET THE LATEST
- 10. PROVIDE INSULATION FOR ALL DUCTWORK AND PIPING THAT MEETS 2015 IECC AS SPECIFIED IN SECTION 230713 AND 230700.
- 603.9. DUCT SEALANT SHALL BE INSPECTED PRIOR TO DUCTWORK BEING INSULATED.
- ELECTRICAL CONTRACTOR PRIOR TO ACTUAL INSTALLATION OF TEMPERATURE SENSORS AND HUMIDITY SENSORS.
- 13. PROVIDE YOUNG'S REGULATOR OPERATOR FOR SPIN-IN CONNECTIONS AND VOLUME DAMPERS LOCATED OVER GYPSUM CEILINGS. TYPICAL. RE: DETAIL 9/M501.
- 14. PROVIDE RECTANGULAR BRANCH DUCT TAP FOR ALL RECTANGULAR DUCT CONNECTIONS TO RECTANGULAR DUCT
- 15. PROVIDE TURNING VANES IN ALL 90 DEGREE ELBOWS
- 16. UPON SUBSTANTIAL COMPLETION, CONTRACTOR SHALL PROVIDE TO OWNER A COMPLETE SET OF SPARE BELTS AND A COMPLETE CHANGE OF FILTERS IN THE CARTONS FOR ALL NEW AIR
- WITH ARCHITECT.
- 18. ALL CEILING MOUNTED AND WALL MOUNTED AIR DEVICE FINISHES SHALL MATCH ADJACENT ARCHITECTURAL SURFACE. CONTRACTOR SHALL COORDINATE COLOR WITH ARCHITECT.
- 19. NO PIPE HANGERS SHALL BE SPACED MORE THAN 10'-0" O.C. COMPLY WITH PIPE SPACING AS SPECIFIED IN THE PIPING
- 21. CONTRACTOR SHALL PROVIDE ALL NECESSARY TESTING AND
- MAINTAIN THE SETPOINT TEMPERATURE.



- PIPING AND DUCTWORK SHOWN ON PLANS ARE SCHEMATIC ONLY. COORDINATE WITH OTHER TRADES FOR PIPING AND DUCTWORK ROUTING. OFFSET AND RUN PIPING DUCTWORK INSIDE THE STRUCTURE IF REQUIRED. PROVIDE ALL NECESSARY PIPING, DUCTWORK, FITTING, INSULATION, AND OTHER ACCESSORIES IN ORDER TO COMPLETE THE INSTALLATIONS.
- CONTRACTOR SHALL COORDINATE WITH STRUCTURAL CONDITIONS AT THE SITE PRIOR TO INSTALLATION OF EQUIPMENT, PIPING OR
- FOR ALL ELECTRICAL POWER REQUIREMENTS. CUT-SHEETS BEFORE FABRICATING OF DUCTWORK, PIPING, OR
- MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF ALL OUTSIDE AIR INTAKES TO MAINTAIN 10 FEET DISTANCE BETWEEN OUTSIDE AIR INTAKES AND ANY EXHAUST AIR OUTLET, FLUES OR PLUMBING VENTS. COORDINATE WITH PLUMBING CONTRACTOR AND OTHER TRADES.
- 6. EXACT LOCATIONS OF MECHANICAL EQUIPMENT, GRILLES, AND DAMPERS SHALL BE FIELD COORDINATED WITH OTHER TRADES TO
- FOR SERVICE MUST BE PROVIDED PRIOR TO INSALLATION.
- SMACNA STANDARDS FOR MEDIUM AND LOW PRESSURE
- . FASTEN AND SEAL ALL DUCTWORK JOINTS, LONGITUDINAL AND TRAVERSE SEAMS AND CONNECTIONS PER 2012 IMC SECTION
- 12. DIVISION 23 MECHANICAL CONTRACTOR SHALL COORDINATE WITH
- TRUNKS. TYPICAL. RE: DETAIL 29/M501.
- CONSTRUCTED TO MEET THE LATEST SMACNA STANDARDS.
- 17. COORDINATE LOCATIONS OF FLOOR, ROOF, AND WALL OPENINGS
- SUPPORT SPECIFICATIONS.
- 20. ALL CHILLED WATER PIPING LOCATED OUTSIDE OF BUILDING TO BE INSULATED AND JACKETED TO RESIST UV-EXPOSURE AND
- BALANCING FOR THIS PROJECT REFER TO SECTION 230593 FOR SPECIFICATIONS. AIR BALANCE SHALL BE REQUIRED FOR ALL AREAS WITHIN SCOPE OF WORK TO MEET DESIGN CFM AND
- 22. CONTRACTOR SHALL PROVIDE AND COORDINATE CHEMICAL TREATMENT SCHEDULES WITH OWNER.

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02/06/2020 DRAWN BY: CHECKED BY: PROJECT NUMBER:

SHEET TITLE: MECHANICAL SYMBOLS AND

ABBREVIATIONS

SHEET NUMBER:

190317.000



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**DATE:** 02/06/2020

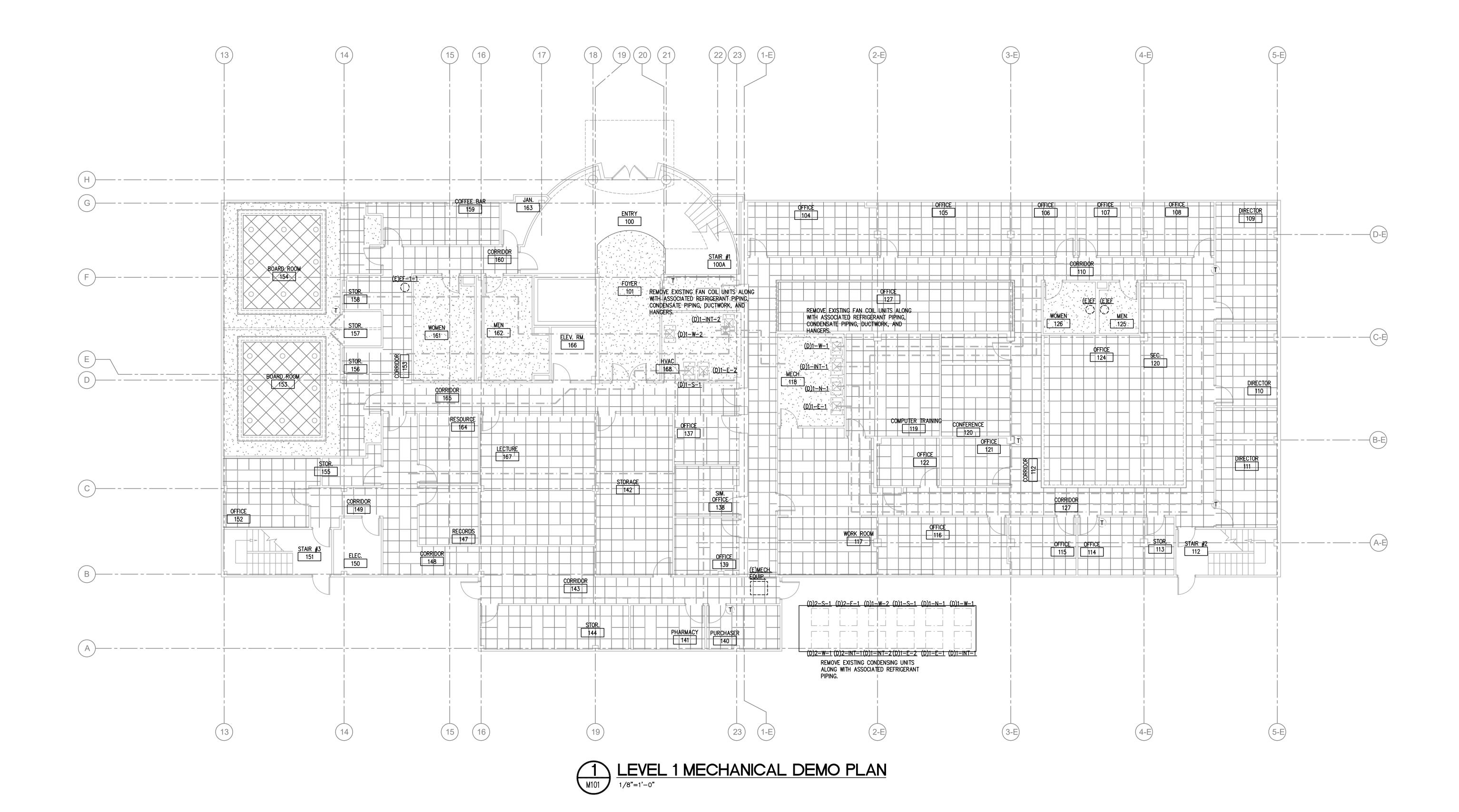
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PROJECT NUMBER: 190317.000 SHEET TITLE:

> LEVEL 1 MECHANICAL DEMO PLAN

SHEET NUMBER:

M101



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No. / DATE / DESCRIPTION 02/21/2020 100% CD



**DATE:** 02/06/2020

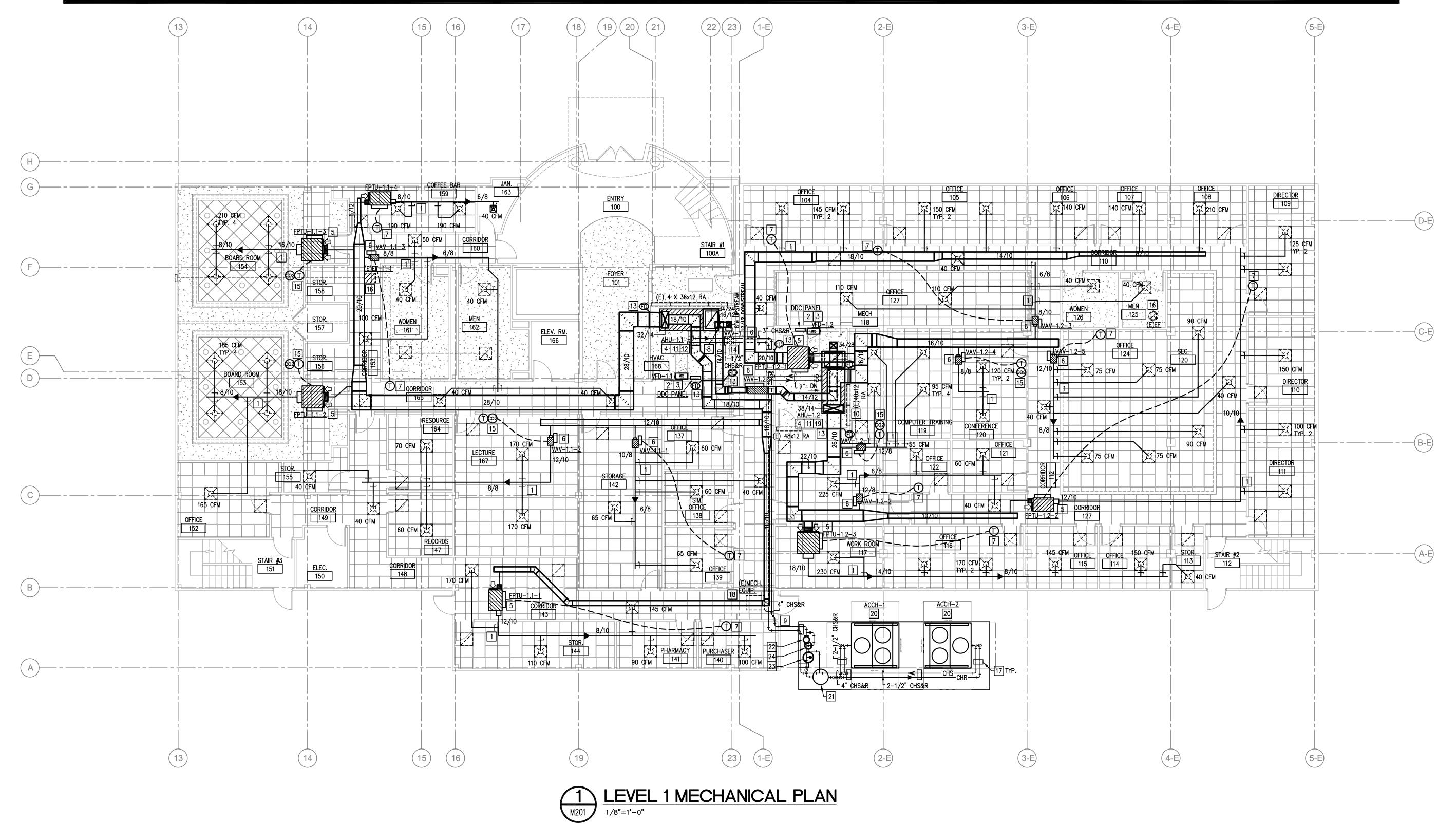
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PROJECT NUMBER: 190317.000 SHEET TITLE:

> LEVEL 2 MECHANICAL DEMO PLAN

SHEET NUMBER:

RELOCATE EXISTING CONDUIT, PIPING, WIRING, CABLE TRAYS, AND ASSOCIATED HANGERS AND SUPPORTS TO ACCOMODATE NEW MECHANICAL DUCTWORK, PIPING, AND EQUIPMENT.



MECHANICAL GENERAL NOTES:

- 2. ROUND DUCTS FROM LOW PRESSURE SUPPLY MAINS TO DIFFUSERS SHALL BE SIZED PER TABLE ON SHEET. SWITCH OUT EXISTING DIFFUSERS TO GET MINIMUM NECK SIZE.
- MECHANICAL KEYED NOTES:
- PROVIDE NEW DDC PANEL IN MECHANICAL ROOM. CONTRACTOR TO FIELD VERIFY FINAL LOCATION OF DDC PANEL.
- 4 PROVIDE 1" CONDENSATE DRAIN LINE FROM AHU TO NEAREST FLOOR DRAIN. RE:
- PROVIDE AND INSTALL FAN POWERED TERMINAL UNIT AND DUCTWORK AT APPROXIMATE LOCATION SHOWN. SUPPORT UNIT FROM STRUCTURE ABOVE. RE: DETAIL
- PROVIDE AND INSTALL VARIABLE AIR VOLUME BOX AND DUCTWORK AT APPROXIMATE LOCATION SHOWN. SUPPORT UNIT FROM STRUCTURE ABOVE. RE: DETAIL 5/M501.
- 8 ROUTE OUTSIDE AIR DUCT UP THROUGH FLOOR TO LEVEL ABOVE. SEE PLAN FOR SIZE.
- 9 ROUTE CHILLED WATER SUPPLY AND RETURN THROUGH EXTERIOR WALL AT APPROXIMATE LOCATION SHOWN. RE: DETAIL 24/M501.
- RELOCATE EXISTING TWO 40X12 RETURN AIR OPENINGS WITH FIRE DAMPER TO LOCATION SHOWN.
- PROVIDE NEW AIR HANDLING UNIT AS SHOWN AND SCHEDULED. RE: M401 FOR SCHEDULE. INSTALL NEW UNIT WITH CLEARANCE FOR UNIT SERVICE AS RECOMMENDED BY AHU MANUFACTURER. ROUTE NEW 1" CONDENSATE DRAIN PIPE TO FLOOR DRAIN AS SHOWN. PROVIDE NEW 4" THICK HOUSEKEEPING PAD AS REQUIRED FOR NEW AHU
- PROVIDE 36" X 24" RETURN AIR DUCT ON TOP OF MIXING BOX PLENUM. PROVIDE MINIMUM RETURN AIR DUCTWORK REQUIRED TO INSTALL MOTORIZED DAMPER AND
- 13 PROVIDE FIRE DAMPER IN DUCT AT WALL PENETRATION. RE: DETAIL 28/M501.
- 14 ROUTE CHS&R PIPING UP THROUGH FLOOR TO LEVEL ABOVE.
- WITH ARCHITECT FOR FINAL LOCATION AND MOUNTING HEIGHTS.
- EXISTING EXHAUST FAN TO REMAIN. EXHAUST FAN SHALL BE INTEGRATED INTO NEW ENERGY MANAGEMENT AND CONTROL SYSTEM.
- [18] EXISTING CONDENSING UNIT SHALL REMAIN.
- PROVIDE AIR COOLED CHILLER AS SCHEDULED. ROUTE REFRIGERANT RELIEF 20 FT FROM DOOR OPENINGS. RE: DETAIL 19/M501.

- PROVIDE FULL ACCEPTANCE CAPTIVE AIR PRE—CHARGED BLADDER TYPE EXPANSION TANK FOR CHILLED WATER SYSTEM AT LOCATION SHOWN. MINIMUM 23 GAL. VOLUME. TACO CA90 OR EQUAL. RE: DETAIL 21/M501.
- PROVIDE NEW CHEMICAL TREATMENT FEEDER FOR CHILLED WATER SYSTEM AT LOCATION SHOWN. RE: DETAIL 22/M501.

MIN. DUCT SIZE 6"ø	<u>CFM</u> 0-120
8"ø	125–220
10"α	225-340

1. REFER TO MO01 FOR MECHANICAL GENERAL NOTES.

- PROVIDE NEW DIFFUSERS TO MATCH EXISTING TYPE IF NOT AVAILABLE.
- PROVIDE SPIN-IN FITTING WITH LOCKING QUADRANT BUTTERFLY DAMPER FOR ALL ROUND DUCT CONNECTIONS TO RECTANGULAR DUCT. RE: DETAIL 3/M501.
- PROVIDE NEW VARIABLE FREQUENCY DRIVE FOR ASSOCIATED MECHANICAL EQUIPMENT AS SHOWN. CONTRACTOR TO FIELD VERIFY FINAL LOCATION AND INSTALL VFD.

- PROVIDE WALL MOUNTED TEMPERATURE SENSOR FOR ASSOCIATED MECHANICAL EQUIPMENT AT LOCATION SHOWN. TYPICAL. COORDINATE WITH ARCHITECT FOR FINAL LOCATION AND MOUNTING HEIGHTS.

- PROVIDE NEW MIXING BOX PLENUM FULL SIZE OF UNIT AND 30" DEEP. PROVIDE NEW OUTSIDE AIR DUCTWORK AS SHOWN. ROUTE 12" X 12" OUTSIDE AIR DUCT FROM VAV BOX AND TAP INTO BACK OF MIXING BOX PLENUM. TRANSITION AS REQUIRED.
- VOLUME DAMPER.

- PROVIDE WALL MOUNTED TEMPERATURE AND CARBON DIOXIDE SENSOR FOR ASSOCIATED MECHANICAL EQUIPMENT AT LOCATION SHOWN. TYPICAL. COORDINATE
- 17 PROVIDE PIPE SUPPORT AT APPROXIMATE LOCATION SHOWN. TYPICAL. RE: DETAIL
- 19 PROVIDE NEW MIXING BOX PLENUM FULL SIZE OF UNIT AND 32" DEEP. PROVIDE NEW OUTSIDE AIR DUCTWORK AS SHOWN. ROUTE 14" X 12" OUTSIDE AIR DUCT FROM VAV BOX AND TAP INTO BACK OF MIXING BOX PLENUM. TRANSITION AS REQUIRED. PROVIDE 34" X 28" RETURN AIR DUCT ON TOP OF MIXING BOX PLENUM. PROVIDE MINIMUM RETURN AIR DUCTWORK REQUIRED TO INSTALL MOTORIZED DAMPER AND VOLUME DAMPER.
- PROVIDE 180 GALLON MINIMUM VOLUME TANK FOR CHILLED WATER SYSTEM. TACO BTL0180 OR EQUAL. RE: DETAIL 20/M501.
- PROVIDE TACO 4900ADR AIR/DIRT SEPARATOR WITH REMOVABLE COVER OR APPROVED EQUAL FOR CHILLED WATER SYSTEM AT LOCATION SHOWN. RE: DETAIL 21/M501.

MIN. DUCT SIZE	<u>CFM</u>
6 <b>"</b> ø	0-120
8"ø	125-220
10 <b>"</b> ø	225-340
	745 500

02/06/2020

CHECKED BY:

SHEET TITLE:

PROJECT NUMBER:

LEVEL 1

PLAN

M201

DRAWN BY:

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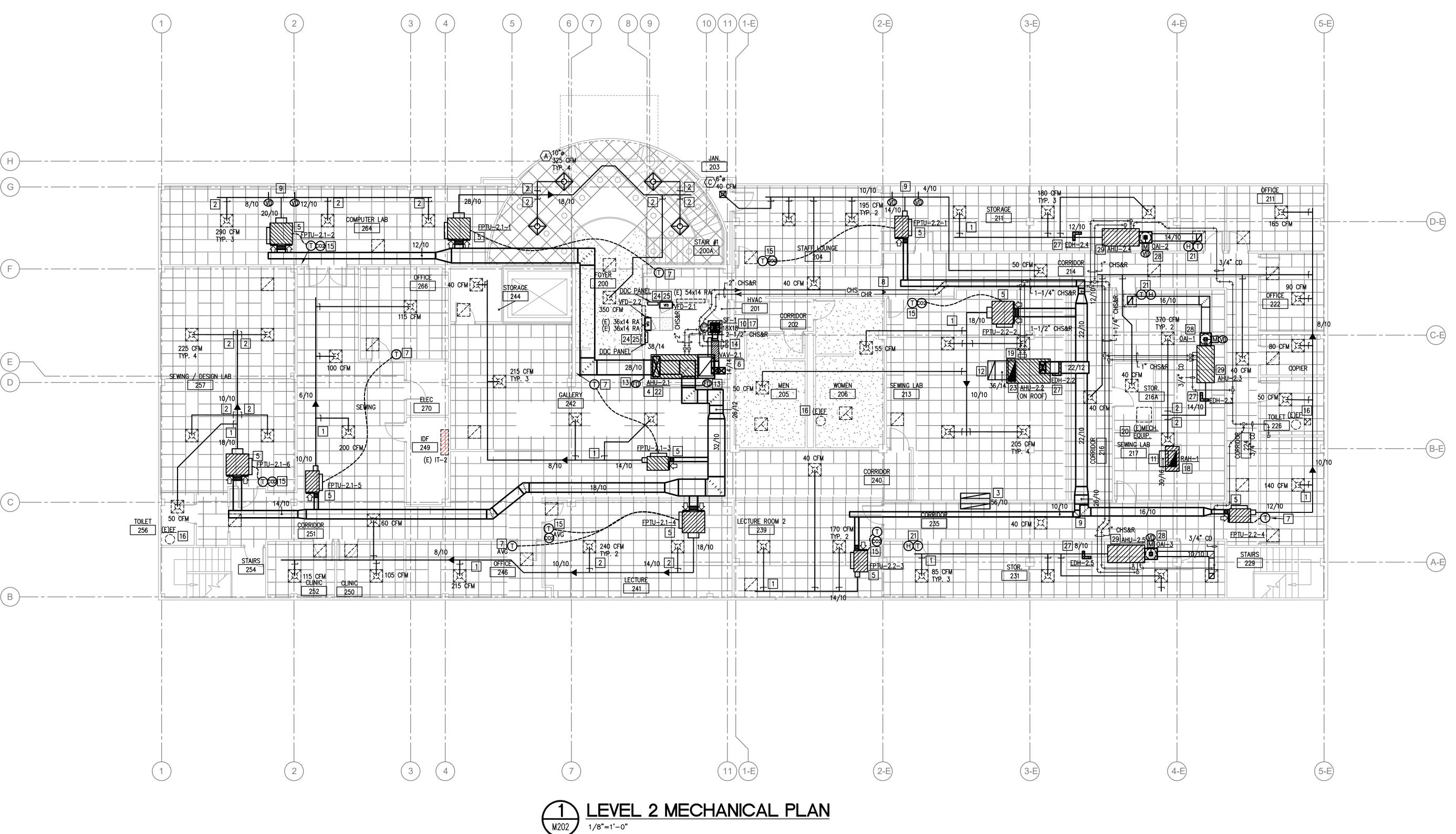
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MECHANICAL SHEET NUMBER:

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190317.000 EM | MECH | ELEC | PLBG | TECH RELOCATE EXISTING CONDUIT, PIPING, WIRING, CABLE TRAYS, AND ASSOCIATED HANGERS AND SUPPORTS TO ACCOMODATE NEW MECHANICAL DUCTWORK, PIPING, AND EQUIPMENT.



- MECHANICAL GENERAL NOTES: 1. REFER TO MOO1 FOR MECHANICAL GENERAL NOTES.
- 2. ROUND DUCTS FROM LOW PRESSURE SUPPLY MAINS TO DIFFUSERS SHALL BE SIZED PER TABLE ON SHEET. SWITCH OUT EXISTING DIFFUSERS TO GET MINIMUM NECK SIZE. PROVIDE NEW DIFFUSERS TO MATCH EXISTING TYPE IF NOT AVAILABLE.
- MECHANICAL KEYED NOTES: PROVIDE SPIN-IN FITTING WITH LOCKING QUADRANT BUTTERFLY DAMPER FOR ALL ROUND DUCT CONNECTIONS TO RECTANGULAR DUCT. RE: DETAIL 3/M501.
- PROVIDE RECTANGULAR TAP TO ROUND TRANSITION FOR ROUND DUCT CONNECTIONS TO RECTANGULAR DUCT OF SAME HEIGHT OR SHORTER. TYPICAL. RE: DETAIL 7/M501.
- 3 PROVIDE RETURN AIR BOOT; SIZE AS SHOWN. RE: DETAIL 1/M401.
- 4 PROVIDE 1" CONDENSATE DRAIN LINE FROM AHU TO NEAREST FLOOR DRAIN. RE:
- PROVIDE AND INSTALL FAN POWERED TERMINAL UNIT AND DUCTWORK AT APPROXIMATE LOCATION SHOWN. SUPPORT UNIT FROM STRUCTURE ABOVE. RE: DETAIL
- PROVIDE AND INSTALL VARIABLE AIR VOLUME BOX AND DUCTWORK AT APPROXIMATE LOCATION SHOWN. SUPPORT UNIT FROM STRUCTURE ABOVE. RE: DETAIL 5/M501.
- PROVIDE WALL MOUNTED TEMPERATURE SENSOR FOR ASSOCIATED MECHANICAL EQUIPMENT AT LOCATION SHOWN. TYPICAL. COORDINATE WITH ARCHITECT FOR FINAL LOCATION AND MOUNTING HEIGHTS.
- 8 PROVIDE 2" CHILLED WATER BYPASS WITH 2-WAY MODULATING CONTROL VALVE AS SHOWN. VALVE SHALL BE SIZED FOR MINIMUM CHILLER FLOW RATE.
- 9 INSTALL DUCTWORK TEE AS SHOWN. RE: DETAIL 6/M501.
- PROVIDE FIRE DAMPER IN DUCT AT FLOOR PENETRATION. RE: DETAIL 29 & 30/M501.
- PROVIDE ELBOW AT RELIEF AIR DUCT. COVER OPENING WITH 1/2" HARDWARE CLOTH. ROUTE RELIEF AIR DUCT UP THROUGH ROOF TO RELIEF HOOD. PROVIDE BAROMETRIC DAMPER IN VERTICAL SECTION OF RELIEF AIR DUCT. REFER TO PLAN FOR DUCT SIZE.
- PROVIDE ELBOW AT RETURN AIR DUCT. COVER OPENING WITH 1/2" GALVANIZED HARDWARE CLOTH. REFER TO PLAN FOR SIZE.
- 13 PROVIDE FIRE DAMPER IN DUCT AT WALL PENETRATION. RE: DETAIL 28 & 30/M501. 14 CHS&R PIPING FROM FLOOR BELOW.
- PROVIDE WALL MOUNTED TEMPERATURE AND CARBON DIOXIDE SENSOR FOR ASSOCIATED MECHANICAL EQUIPMENT AT LOCATION SHOWN. TYPICAL. COORDINATE
- WITH ARCHITECT FOR FINAL LOCATION AND MOUNTING HEIGHTS. 16 EXISTING EXHAUST FAN TO REMAIN. EXHAUST FAN SHALL BE INTEGRATED INTO NEW
- ENERGY MANAGEMENT AND CONTROL SYSTEM. PROVIDE ROOF-MOUNTED OUTSIDE AIR SUPPLY FAN AS SCHEDULED. MOUNT FAN ON
- PRE-FABRICATED ROOF CURB. CONNECT OUTSIDE AIR DUCT TO FAN OUTLET AND ROUTE DOWN THROUGH ROOF TO ASSOCIATED AHU'S AS SHOWN. REFER TO PLAN FOR SIZE. PROVIDE TRANSITIONS AS REQUIRED. RE: DETAIL 12/M501.
- PROVIDE ROOF-MOUNTED RELIEF AIR HOOD AS SCHEDULED. MOUNT HOOD ON PRE-FABRICATED ROOF CURB. CONNECT RELIEF AIR DUCT TO HOOD INLET AND ROUTE DOWN THROUGH ROOF. REFER TO PLAN FOR SIZE. PROVIDE TRANSITIONS AS REQUIRED. RE: DETAIL 11/M501.
- PROVIDE PIPE SUPPORT AT LOCATION SHOWN. TYPICAL. RE: DETAIL 18/M501. 20 EXISTING CONDENSING UNIT SHALL REMAIN.
- 21 PROVIDE WALL MOUNTED TEMPERATURE AND HUMIDITY SENSOR FOR ASSOCIATED MECHANICAL EQUIPMENT AT LOCATION SHOWN. TYPICAL. COORDINATE WITH ARCHITECT FOR FINAL LOCATION AND MOUNTING HEIGHTS.
- PROVIDE NEW AIR HANDLING UNIT AS SHOWN AND SCHEDULED. RE: M401 FOR SCHEDULE. INSTALL NEW UNIT WITH CLEARANCE FOR UNIT SERVICE AS RECOMMENDED BY AHU MANUFACTURER. ROUTE NEW 1" CONDENSATE DRAIN PIPE TO FLOOR DRAIN AS SHOWN. PROVIDE NEW 4" THICK HOUSEKEEPING PAD AS REQUIRED FOR NEW AHU
- PROVIDE ROOFTOP AIR HANDLING UNIT AS SHOWN AND SCHEDULED. RE: M401 FOR SCHEDULE. MOUNT ROOFTOP UNIT ON CURB ADAPTER. ROUTE NEW 1" CONDENSATE DRAIN PIPE TO NEAREST ROOF DRAIN. RE: DETAIL 14/M501.
- PROVIDE NEW VARIABLE FREQUENCY DRIVE FOR ASSOCIATED MECHANICAL EQUIPMENT AS SHOWN. CONTRACTOR TO FIELD VERIFY FINAL LOCATION AND INSTALL VFD. PROVIDE NEW DDC PANEL IN MECHANICAL ROOM. CONTRACTOR TO FIELD VERIFY FINAL
- LOCATION OF DDC PANEL. 26 PROVIDE NEW MIXING BOX PLENUM FULL SIZE OF UNIT AND 32" DEEP. PROVIDE NEW OUTSIDE AIR DUCTWORK AS SHOWN. ROUTE 14" X 14" OUTSIDE AIR DUCT FROM VAV BOX AND TAP INTO BACK OF MIXING BOX PLENUM. TRANSITION AS REQUIRED. PROVIDE 36" X 28" RETURN AIR DUCT ON TOP OF MIXING BOX PLENUM. PROVIDE MINIMUM RETURN AIR DUCTWORK REQUIRED TO INSTALL MOTORIZED DAMPER AND
- PROVIDE INLINE ELECTRIC DUCT HEATER AT LOCATION SHOWN. REFER TO M401 FOR SCHEDULE. RE: 13/M501.
- PROVIDE ROOF MOUNTED OUTSIDE AIR INTAKE AT LOCATION SHOWN. MOUNT ON PREFABRICATED ROOF CURB. ROUTE DUCTWORK DOWN TO ASSOCIATED AHU AS SHOWN. REFER TO M401 FOR SCHEDULE. RE: 10/M501.

SLOPED NOT LESS THAN 1/8" PER FOOT.

VOLUME DAMPER.

PROVIDE NEW AIR HANDLING UNIT SUSPENDED FROM STRUCTURE AS SHOWN AND SCHEDULED. RE: M401 FOR SCHEDULE. INSTALL NEW UNIT WITH CLEARANCE FOR UNIT SERVICE AS RECOMMENDED BY AHU MANUFACTURER. SUPPLY AND RETURN DUCTWORK INCLUDING FLEX DUCT SHALL BE R-8. ROUTE NEW 3/4" CONDENSATE DRAIN PIPE TO NEAREST LAVATORY AS SHOWN. MAIN CONDENSATE DRAIN LINE SHALL BE

MIN. DUCT SIZE	<u>CFM</u>
6 <b>"</b> ø	<u>огм</u> 0–120
8 <b>"</b> ø	125-220
10 <b>"</b> ø	225-340
12 <b>"</b> ø	345-500

South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234

190317.000 DBR Project Number EM | MECH | ELEC | PLBG | TECH

ER0 5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

No. / DATE / DESCRIPTION

02/21/2020 100% CD

02/06/2020 DRAWN BY:

CHECKED BY:

PROJECT NUMBER: 190317.000 SHEET TITLE:

LEVEL 2 MECHANICAL **PLAN** 

SHEET NUMBER:

MARK		AIR HANDLING UNIT SCHEDULE	
UNIT CONFIGURATION   VERTICAL			AHU-5
DISCHARGE		TYPE	CV
DESIGN SUPPLY AIR (CFM)		UNIT CONFIGURATION	VERTICAL
DESIGN OUTDOOR AIR (CFM)   270		DISCHARGE	TOP
EXTERNAL. S.P. (IN. W.G.)		DESIGN SUPPLY AIR (CFM)	1,200
TOTAL S.P. (IN. W.G.)   2.510	z	DESIGN OUTDOOR AIR (CFM)	270
FAN MOTOR BRAKE HORSEPOWER (HP)   1.0	Ā	EXTERNAL. S.P. (IN. W.G.)	0.750
FAN MOTOR HORSEPOWER (HP)   1.5		TOTAL. S.P. (IN. W.G.)	2.510
VOLTS/PHASE/HERTZ		FAN MOTOR BRAKE HORSEPOWER (HP)	1.0
MAX FAN RPM   1,757.0		FAN MOTOR HORSEPOWER (HP)	1.5
MCA / MOCP   2.8 / 3		VOLTS/PHASE/HERTZ	480/3/60
MAX COIL FACE VELOCITY (FPM)   500		MAX FAN RPM	1,757.0
MIN. COIL ROWS  MAX FINS PER INCH  COIL CFM  1,200  EAT DB/WB (°F)  LAT DB/WB (°F)  DESIGN TOTAL COOLING CAPACITY (MBH)  TOTAL COOLING CAPACITY PROVIDED BY UNIT (MBH)  SENSIBLE COOLING CAPACITY (MBH)  SENSIBLE COOLING CAPACITY (MBH)  ANAX WATER FLOW (GPM)  MAX WATER P.D. (FT. HD.)  MAX COIL FACE VELOCITY (FPM)  POSITION  MAX FINS PER INCH  COIL CFM  EAT DB/WB (°F)  LAT DB/WB (°F)  LAT DB/WB (°F)  DESIGN HEATING CAPACITY (MBH)  HEATING CAPACITY PROVIDED BY UNIT (MBH)  EWT/LWT (°F)  COIL WATER FLOW (GPM)  MAX WATER P.D. (FT. HD.)  MANUFACTURER  MODEL NUMBER  OPERATING WEIGHT (LBS.)  1091		MCA / MOCP	2.8 / 3
MAX FINS PER INCH		MAX COIL FACE VELOCITY (FPM)	500
COIL CFM		MIN. COIL ROWS	6
EAT DB/WB (°F)   S3.0 / 52.9		MAX FINS PER INCH	11
LAT DB/WB (°F)   53.0 / 52.9		COIL CFM	1,200
DESIGN SENSIBLE COOLING CAPACITY (MBH)   37.1	_	EAT DB/WB (°F)	81.5 / 66.7
DESIGN SENSIBLE COOLING CAPACITY (MBH)   37.1	8	LAT DB/WB (°F)	53.0 / 52.9
DESIGN SENSIBLE COOLING CAPACITY (MBH)   37.1	NG	DESIGN TOTAL COOLING CAPACITY (MBH)	50.4
DESIGN SENSIBLE COOLING CAPACITY (MBH)   37.1	Ж	TOTAL COOLING CAPACITY PROVIDED BY UNIT (MBH)	49.7
EWT/LWT (°F)	ŏ	DESIGN SENSIBLE COOLING CAPACITY (MBH)	37.1
COIL WATER FLOW (GPM)   8.2		SENSIBLE COOLING CAPACITY PROVIDED BY UNIT (MBH)	36.5
MAX WATER P.D. (FT. HD.)  MAX COIL FACE VELOCITY (FPM)  POSITION  REHEAT  MIN. COIL ROWS  1  COIL CFM  EAT DB/WB (°F)  DESIGN HEATING CAPACITY (MBH)  HEATING CAPACITY PROVIDED BY UNIT (MBH)  EWT/LWT (°F)  COIL WATER FLOW (GPM)  MAX WATER P.D. (FT. HD.)  MANUFACTURER  MODEL NUMBER  10.0  10.0  MANUFACTURER  MODEL NUMBER  10.0		EWT/LWT (°F)	42 / 54
MAX COIL FACE VELOCITY (FPM)   500		COIL WATER FLOW (GPM)	8.2
POSITION   REHEAT		MAX WATER P.D. (FT. HD.)	10.0
MIN. COIL ROWS   1		MAX COIL FACE VELOCITY (FPM)	500
MAX FINS PER INCH  COIL CFM  EAT DB/WB (°F)  DESIGN HEATING CAPACITY (MBH)  HEATING CAPACITY PROVIDED BY UNIT (MBH)  SWT/LWT (°F)  COIL WATER FLOW (GPM)  MAX WATER P.D. (FT. HD.)  MANUFACTURER  MODEL NUMBER  11  1200  1300  1400  1400  CARRIER  MODEL NUMBER  39MN03  OPERATING WEIGHT (LBS.)		POSITION	REHEAT
COIL CFM 1,200  EAT DB/WB (°F) 59.3  LAT DB/WB (°F) 90.0  DESIGN HEATING CAPACITY (MBH) 40.0  HEATING CAPACITY PROVIDED BY UNIT (MBH) 39.8  EWT/LWT (°F) 180 / 160  COIL WATER FLOW (GPM) 4.1  MAX WATER P.D. (FT. HD.) 10.0  MANUFACTURER CARRIER  MODEL NUMBER 39MN03  OPERATING WEIGHT (LBS.) 1091		MIN. COIL ROWS	1
HEATING CAPACITY PROVIDED BY UNIT (MBH)   39.8		MAX FINS PER INCH	11
HEATING CAPACITY PROVIDED BY UNIT (MBH)   39.8	O	COIL CFM	1,200
HEATING CAPACITY PROVIDED BY UNIT (MBH)   39.8	၁၅	EAT DB/WB (°F)	59.3
HEATING CAPACITY PROVIDED BY UNIT (MBH)   39.8	N	LAT DB/WB (°F)	90.0
EWT/LWT (°F)       180 / 160         COIL WATER FLOW (GPM)       4.1         MAX WATER P.D. (FT. HD.)       10.0         MANUFACTURER       CARRIER         MODEL NUMBER       39MN03         OPERATING WEIGHT (LBS.)       1091	HEA	DESIGN HEATING CAPACITY (MBH)	40.0
COIL WATER FLOW (GPM)  MAX WATER P.D. (FT. HD.)  MANUFACTURER  MODEL NUMBER  OPERATING WEIGHT (LBS.)  4.1  CARRIER  39MN03		HEATING CAPACITY PROVIDED BY UNIT (MBH)	39.8
MAX WATER P.D. (FT. HD.)  MANUFACTURER  MODEL NUMBER  OPERATING WEIGHT (LBS.)  10.0  CARRIER  39MN03  1091		EWT/LWT (°F)	180 / 160
MANUFACTURER CARRIER  MODEL NUMBER 39MN03  OPERATING WEIGHT (LBS.) 1091		COIL WATER FLOW (GPM)	4.1
MODEL NUMBER 39MN03  OPERATING WEIGHT (LBS.) 1091		MAX WATER P.D. (FT. HD.)	10.0
OPERATING WEIGHT (LBS.) 1091	MAN	IUFACTURER	CARRIER
` '	MOE	DEL NUMBER	39MN03
NOTES	OPE	RATING WEIGHT (LBS.)	1091
NOTES 1, 2, 3, 4	NOT	ES	1, 2, 3, 4

1. EXTERNAL STATIC PRESSURE DOES NOT INCLUDE LOSSES DUE TO COILS, FILTERS, AND CASING.

2. PROVIDE UNIT WITH STACKED DRAW THRU BELT DRIVE CENTRIFUGAL FAN SECTION, HOT WATER COIL SECTION, CHILLED WATER COIL SECTION, AND 2" MERV 8 FLAT FILTER RACK MOUNTED TO AHU.

WIDE DOORWAY. CONTRACTOR TO ASSEMBLE THE UNIT INTO POSITION.

3. UNIT SHALL NOT EXCEED 47" WIDTH X 42" LENGTH. 4. UNIT MANUFACTURER TO PROVIDE SHIPPING SPLITS TO ENSURE FIT THROUGH A 3'-0"

FAN SCHEDULE	
MARK	SF-1
SERVES	AHU-1.1, 1.2, 2.1
TYPE/DRIVE	ROOF / BELT
CFM	2,565
EXT. S.P. (IN. W.G.)	0.750
HORSEPOWER	1
MOTOR CONTROL	SEE NOTE 3
FAN RPM	726
SONES	
VOLTS/PHASE/HERTZ	480 / 3 / 60
WEIGHT WITH ACCESSORIES - LBS	
MANUFACTURER	GREENHECK
MODEL NUMBER	SAF-115-10
NOTES	1, 2, 3, 4

NOTES:

1. EXTERNAL STATIC PRESSURE DOES NOT ACCOUNT FOR LOSSES DUE TO FILTERS, HOUSING, NOR ACCESSORIES.

2. PROVIDE FAN WITH MOTOR RATED TOGGLE SWITCH AND 1" WASHABLE ALUMINUM FILTERS.

3. PROVIDE FAN WITH VFD, PREMIUM EFFICIENCY MOTOR AND SHAFT GROUNDING RINGS FOR DEMAND CONTROL

VENTILATION SEQUENCE. 4. PROVIDE FAN WITH ROOF CURB ADAPTER. FIELD VERIFY EXISTING ROOF CURB DIMENSIONS PRIOR TO ORDERING.

AIR HANDLING UNIT SCHEDULE							
MARK	AHU-1.1	AHU-1.2	AHU-2.1	AHU-2.2	AHU-2.3	AHU-2.4	AHU-2.5
TYPE	VAV	VAV	VAV	VAV	CV	CV	cv
UNIT CONFIGURATION	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL	HORIZONTAL
DISCHARGE	TOP	TOP	TOP	воттом	FRONT	FRONT	FRONT
DESIGN SUPPLY AIR (CFM)	4,005	4,755	4,960	2,265	740	540	255
MINIMUM SUPPLY AIR (CFM)	1,180	1,320	1,670	990	225	165	255
Z DESIGN OUTDOOR AIR (CFM)	640	950	975	760	70	60	65
MINIMUM OUTSIDE AIR (CFM)	340	410	465	345	70	60	65
EXTERNAL. S.P. (IN. W.G.)	1.325	1.250	1.125	1.250	0.500	0.500	0.500
TOTAL. S.P. (IN. W.G.)	3.080	2.910	2.840	3.020	3.090	2.780	2.530
FAN MOTOR BRAKE HORSEPOWER (HP)	3.0	3.3	3.4	1.9	0.8	0.6	0.3
FAN MOTOR HORSEPOWER (HP)	5	5	5	3	1	1	1
VOLTS/PHASE/HERTZ	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60	480/3/60
MAX FAN RPM	1,932.0	1,717.0	1,735.0	1,650.0	4,262.0	3,785.0	3,371.0
MCA / MOCP	8.3 / 10	8.3 / 10	8.3 / 10	5.1 / 6			
MAX COIL FACE VELOCITY (FPM)	500	500	500	500	500	500	500
MIN. COIL ROWS	6	6	6	6	6	6	6
MAX FINS PER INCH	11	11	11	11	11	11	11
COIL CFM	4,005	4,755	4,960	2,265	740	540	255
EAT DB/WB (°F)	77.5 / 65.0	78.2 / 66.2	80.4 / 66.3	83.3 / 69.4	62.8 / 54.7	63.3 / 55.2	68.5 / 60.1
LAT DB/WB (°F)	50.6 / 50.6	50.0 / 50.0	50.0 / 50.0	51.00 / 50.8	46.2 / 44.8	46.2 / 45.0	46.2 / 44.6
DESIGN TOTAL COOLING CAPACITY (MBH)	156.4	210.9	215.9	130.3	18.1	13.7	10.1
DESIGN TOTAL COOLING CAPACITY (MBH)  TOTAL COOLING CAPACITY PROVIDED BY UNIT (MBH)	156.2	209.9	219.6	131.3	17.7	14.1	11.8
DESIGN SENSIBLE COOLING CAPACITY (MBH)	109.3	138.7	151.7	81.5	13.7	9.9	6.1
SENSIBLE COOLING CAPACITY PROVIDED BY UNIT (MBH)	111.5	138.8	155.3	81.3	12.4	9.9	7.7
EWT/LWT (°F)	42 / 56	42 / 56	42 / 56	42 / 56	42 / 56	42 / 56	42 / 56
COIL WATER FLOW (GPM)	22.2	29.9	31.3	18.7	5.9	4.7	3.9
MAX WATER P.D. (FT. HD.)	10.0	10.0	10.0	10.0	11.0	11.0	11.0
MANUFACTURER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER	CARRIER
MODEL NUMBER	39MN09	39MN11	39MN11	39MW06	39S00	39800	39800
OPERATING WEIGHT (LBS.)	1427	1666	1666	1695	592.0	592.0	592.0
NOTES	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 2, 3, 4, 5	1, 3, 4, 6, 8, 10	1, 4, 5, 7, 9	1, 4, 5, 7, 9	1, 4, 5, 7, 9
NOTES:	ı	1	1	1	1	1	ı

1. EXTERNAL STATIC PRESSURE DOES NOT INCLUDE LOSSES DUE TO COILS, FILTERS, AND CASING.

2. PROVIDE UNIT WITH DRAW THRU DIRECT DRIVE PLENUM FAN SECTION, ACCESS SECTION, CHILLED WATER COIL SECTION, AND 2" MERV 11 FLAT FILTER SECTION.

3. PROVIDE UNIT WITH REMOTE MOUNTED VARIABLE FREQUENCY DRIVE AND PREMIUM EFFICIENCY MOTORS WITH SHAFT GROUND RINGS. 4. PROVIDE CHILLED WATER COIL WITH 2-WAY AUTOMATIC CONTROL VALVE.

5. UNIT MANUFACTURER TO PROVIDE SHIPPING SPLITS TO ENSURE FIT THROUGH A 3'-0" WIDE DOORWAY. CONTRACTOR TO ASSEMBLE THE UNIT INTO POSITION.

TITUS DESV-8

6. UNIT SHALL BE OUTDOOR RATED CONSTRUCTION WITH BOTTOM DISCHARGE, ROOFCURB ADAPTER, AND OUTSIDE AIR INTAKE HOOD WITH DAMPER.

7. PROVIDE UNIT WITH DRAW THRU DIRECT DRIVE PLENUM FAN SECTION, ACCESS SECTION, CHILLED WATER COIL SECTION, AND COMBINATION 2" MERV 8/4" MERV 13 FLAT FILTER SECTION. 8. PROVIDE UNIT WITH DRAW THRU BELT DRIVE CENTRIFUGAL FAN SECTION, ACCESS SECTION, CHILLED WATER COIL SECTION, AND 2" MERV 11 FLAT FILTER SECTION.

9. PROVIDE UNIT WITH COMBINATION STARTER/DISCONNECT SWITCH.

10. PROVIDE UNIT WITH WEATHERPROOF DISCONNECT SWITCH.

SINGLE INLET VAV BOX SCHEDULE							
MARK	COOLIN	IG CFM	INLET SIZE	VOLTS/PHASE/HZ	MANUEACTURER	MODEL	
IVIZIVI	MAX	MIN.	INCL I SIZE	VOLIS/FIIAGE/IIZ	WANOI ACTORER	MODEL	
VAV-1.1-1	290	90	6"Ø	24/1/60	TITUS	DESV-6	
VAV-1.1-2	550	170	8"Ø	24/1/60	TITUS	DESV-8	
VAV-1.1-3	310	90	6"Ø	24/1/60	TITUS	DESV-6	
VAV-1.2-1	380	110	6"Ø	24/1/60	TITUS	DESV-6	
VAV-1.2-2	380	110	6"Ø	24/1/60	TITUS	DESV-6	
VAV-1.2-3	340	70	6"Ø	24/1/60	TITUS	DESV-6	
VAV-1.2-4	240	70	6''Ø	24/1/60	TITUS	DESV-6	

1. PROVIDE TERMINAL UNIT CASING WITH 1" INTERNALLY LINED FIBERGLASS FREE INSULATION.

VAV-1.2-5 560 170 8"Ø 24/1/60

2. 24 VOLTS AC SHALL BE PROVIDED BY CONTROLS CONTRACTOR.

SINGLE INLET VAV BOX WITH REHEAT SCHEDULE							
MARK	HEATING CFM		CFM REHEAT		VOLTS/	MFR	MODEL NO.
WAN	MAX	MIN.	кw	SIZE	PHASE/ HZ	IVII IX	WODEL NO.
VAV-1.1	640	340	1.6	8"Ø	277/1/60	TITUS	DESV-8
VAV-1.2	950	410	4.9	10"Ø	277/1/60	TITUS	DESV-10
VAV-2.1	975	465	3.2	10"Ø	277/1/60	TITUS	DESV-10

NOTES:

1. PROVIDE TERMINAL UNIT WITH INTEGRAL DISCONNECT SWITCH. 2. PROVIDE DISCONNECT WITH BOXES.

3. PROVIDE ELECTRIC REHEAT COIL WITH 0-10V SCR MODULATING CAPACITY CONTROL.

4. PROVIDE TERMINAL UNIT CASING WITH 1" INTERNALLY LINED FIBERGLASS FREE INSULATION. 5. PROVIDE AEROCROSS MULTI-POINT CENTER AVERAGING VELOCITY SENSOR IN PRIMARY AIR

FAN POWERED TERMINAL UNIT SCHEDULE								
MARK	PRIMARY	AIR CFM	REHEAT	INLET		ECM HP MFR	MODEL	
WATER	MAX	MIN.	KW	SIZE	PHASE/ HZ	CONTI	IVII IX	NO.
FPTU-1.1-1	615	180	4.0	8"Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-1.1-2	905	270	5.5	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-1.1-3	840	250	5.5	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-1.1-4	420	130	3.0	8"Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-1.2-1	1,120	340	7.0	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-1.2-2	600	180	4.0	8"Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-1.2-3	905	270	5.5	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-2.1-1	1,650	500	10.0	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-2.1-2	870	260	5.5	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-2.1-3	685	210	4.5	8"Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-2.1-4	975	290	6.0	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-2.1-5	415	120	2.5	8"Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-2.1-6	950	290	6.0	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-2.2-1	520	190	3.5	8''Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-2.2-2	925	340	6.0	8"X16"	480/3/60	(2) 1/3	TITUS	DFLS-4
FPTU-2.2-3	630	230	4.5	8"Ø	277/1/60	1/3	TITUS	DFLS-3
FPTU-2.2-4	635	230	4.5	8"Ø	277/1/60	1/3	TITUS	DFLS-3

NOTES: 1. PROVIDE AEROCROSS MULTI-POINT CENTER AVERAGING VELOCITY SENSOR IN PRIMARY AIR INLET.

2. PROVIDE TERMINAL UNIT CASING WITH 1" INTERNALLY LINED FIBERGLASS FREE INSULATION. 3. PROVIDE TERMINAL UNIT WITH INTEGRAL DISCONNECT SWITCH.

4. PROVIDE ELECTRIC REHEAT COIL WITH 0-10V SCR MODULATING CAPACITY CONTROL.

5. PROVIDE LOW PROFILE TERMINAL UNIT.

ELECTRIC DUCT HEATER SCHEDULE						
MARK	EDH-2.2	EDH-2.3	EDH-2.4	EDH-2.5		
SERVES	AHU-2.2	AHU-2.3	AHU-2.4	AHU-2.5		
FUNCTION	RE-HEAT	RE-HEAT	RE-HEAT	RE-HEAT		
HEATER TYPE	INLINE	INLINE	INLINE	INLINE		
DESIGN CFM	3,180	740	540	255		
MINIMUM CFM	990	740	540	255		
EAT (°F)	38.5	66.1	65.4	59.5		
LAT (°F)	52.0	85.0	85.0	85.0		
CAPACITY (KW)	4.2	4.4	3.4	2.1		
DUCT DIMENSION WxH (INSIDE)	22 x 12	14 x 10	12 x 10	8 x 10		
VOLTS/PHASE/HERTZ	480/3/60	480/3/60	480/3/60	480/3/60		
CONTROL TYPE	SCR	SCR	SCR	SCR		
MANUFACTURER	INDEECO	INDEECO	INDEECO	INDEECO		
MODEL	QUA	QUA	QUA	QUA		
NOTES	1	1	1	1		
NOTES:			•			

1. PROVIDE REQUIRED WORKING CLEARANCES PER ELECTRICAL CODE, PRIOR TO INSTALLATION.

GRAVITY VENTILATOR SCHEDULE						
MARK	OAI-1	OAI-2	OAI-3	RAH-1		
SERVICE	AHU-2.3	AHU-2.4	AHU-2.5	BUILDING RELIEF		
INTAKE / RELIEF	INTAKE	INTAKE	INTAKE	RELIEF		
CFM	70	60	65	1,545		
THROAT SIZE (LENGTH x WIDTH)	8"Ø	8''Ø	8"Ø	30 x 16		
MAX. P.D. (IN. W.G.)	0.05	0.05	0.05	0.05		
MANUFACTURER	GREENHECK	GREENHECK	GREENHECK	GREENHECK		
MODEL NO.	GRSI	GRSI	GRSI	FGR		
NOTES	2, 4, 5	2, 4, 5	2, 4, 5	1, 2, 3		

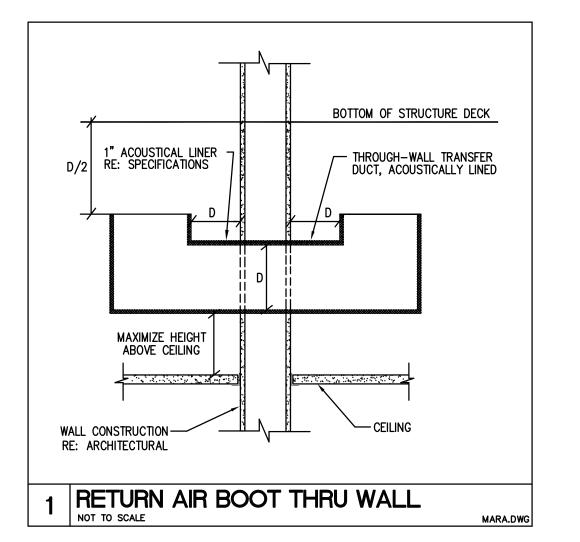
1. PROVIDE HIGH WIND RATED PRE-FABRICATED ROOF CURB.

2. PROVIDE UNIT WITH BIRD SCREEN.

3. PROVIDE UNIT WITH BAROMETRIC RELIEF DAMPER SET TO BUILDING PRESSURE OF 0.05 IN. W.G.

4. PROVIDE WITH MOTORIZED DAMPER. MOTORIZED DAMPER AND ACTUATOR SHALL BE PROVIDED BY CONTROLS

5. PROVIDE CABLE TIE DOWNS FOR STAINLESS STEEL CABLES. CONTRACTOR TO PROVIDE MIN. 1/8" DIA. CABLES.



PACKAGED AIR-COOLED WATE	R CHILLER WITH CHP SCH	HEDULE
MARK	ACCH-1	ACCH-2
UNIT NOMINAL TONNAGE	45	45
DESIGN COOLING CAPACITY (TONS)	31.5	31.5
ACTUAL COOLING CAPACITY PROVIDED BY UNIT (TONS)	41.0	41.0
MINIMUM CAPACITY - PERCENT	8	8
UNIT TYPE	PREMIUM EFFICIENCY	PREMIUM EFFICIENCY
REFRIGERANT TYPE	R410A	R410A
FULL LOAD EFFICIENCY, DESIGN (EER)	9.106	9.106
IPLV (INTERGRATED PART LOAD VALUE)	16.73	16.73
NPLV (NON-STANDARD PART LOAD VALUE)	16.07	16.07
EVAPORATOR DATA	1	
EVAPORATOR FLOW RATE (GPM)	70.1	70.06
MINIMUM EVAPORATOR FLOW RATE (GPM)	53.0	53
EVAPORATOR ENTERING WATER TEMPERATURE (°F)	56	56
EVAPORATOR LEAVING WATER TEMPERATURE (°F)	42	42
MAX. PRESSURE DROP (FT. HD.)	10	10
· · · · · ·		
ACTUAL PRESSURE DROP (FT. HD.)	3.22	3.22
ACTUAL PRESSURE DROP WITH STRAINER (FT. HD.)	9.29	9.29
FOULING FACTOR - (hr-sqft-F)/BTU	0.0001	0.0001
NUMBER OF PASSES	2	2
CONDENSER DATA	1	
CONDENSER TYPE	HIGH-EFFICIENCY VARIABLE SPEED FANS	HIGH-EFFICIENCY VARIABLE SPEED FANS
AMBIENT TEMPERATURE (°F)	100	100
MINIMUM AMBIENT TEMPERATURE (°F)	-20	-20
NUMBER OF FANS	3	3
TOTAL FAN MOTOR POWER - KW	3.752	3.752
TOTAL CONDENSER FAN AIR FLOW	30,500	30500
COMPRESSOR DATA		
COMPRESSOR TYPE	SCROLL	SCROLL
NUMBER OF COMPRESSORS	4	4
NUMBER OF INDEPENDENT REFRIGERANT CIRCUITS	2	2
CAPACITY STEPS	44	44
TOTAL COMPRESSOR POWER - KW	50.31	50.31
PUMP PACKAGED DATA		
PUMP TYPE	SINGLE PUMP	SINGLE PUMP
DESIGN PUMP HEAD (FT H2O)	80.0	80
AVAILABLE PUMP HEAD (FT H2O)	91.3	91.3
PUMP POWER - KW	3.35	3.35
PUMP HORSEPOWER	5	5
PUMP FLOW CONTROL	VARIABLE SPEED DRIVE	VARIABLE SPEED DRIVE
ELECTRICAL		
VOLTS/PHASE/HERTZ	480/3/60	480/3/60
INCOMING POWER LINE CONNECTION	SINGLE POINT	SINGLE POINT
STARTER TYPE	ACROSS THE LINE	ACROSS THE LINE
TOTAL UNIT POWER WITHOUT PUMPS (KW)	54.07	54.07
TOTAL UNIT POWER WITH PUMPS (KW)	57.42	57.42
SINGLE POINT POWER MCA	103.7	103.7
SINGLE POINT POWER MOCP	125	125
PHYSICAL DATA		120
LENGTH (INCHES)	89.0	89
WIDTH (INCHES)	93.0	93
, ,		
HEIGTH (INCHES)	79.0	79
OPERATING WEIGHT (POUNDS)	2881.0	2881
MANUFACTURER	CARRIER	CARRIER
MODEL NUMBER	30RAP045	30RAP045
NOTES	1 THRU 9	1 THRU 9

1. PROVIDE UNIT WITH UNIT MOUNTED NON-FUSED DISCONNECT.

PROVIDE HAIL GUARDS. 3. PROVIDE COMPRESSOR BLANKETS AND LOW-NOISE FANS.

4. UNIT SHALL NOT EXCEED 68 Dba @ 40 FEET. 5. PROVIDE CHILLER WITH BACnet INTERFACE FOR INTERGRATION INTO BAS.

6. PROVIDE VARIABLE FREQUENCY DRIVE WITH IP-55 ENCLOSURE FOR CHILLED WATER PUMP. CHILLER SHALL BE PROVIDED WITH PUMP AND VFD FOR VARIABLE FLOW. PUMPS SHALL BE INTEGRAL TO THE CHILLER. THE CHILLER AND PUMPS SHALL BE SERVICED BY A SINGLE 460/3/60 POWER CONNECTION. IF MANUFACTURER CANNOT PROVIDE PUMP INTEGRAL THE UNIT, THE

CONTRACTOR SHALL PROVIDE A PUMP AND BEAR ALL COSTS OF PROVIDING ADDITIONAL PIPING AND ELECTRICAL SERVICE TO THE PUMPS. 8. CHILLER SHALL BE PROVIDED WITH AN INTEGRAL HEATER TO SERVE THE EVAPORATOR SO THAT THE CHILLER IS PROTECTED FROM FREEZING

EVEN WHEN THE UNIT IS NOT IN OPERATION.

9. CHILLER MANUFACTURER SHALL PROVIDE A FULLY INTEGRATED PID LOOP WITH AN ELECTRONIC EXPANSION VALVE (EXV) BY VARYING REFRIGERANT FLOW TO THE COMPRESSOR TO PREVENT OVER-SHOOTING SET POINTS WHICH CAN RESULT IN EXCESSIVE COMPRESSOR CYCLING AND EARLY FAILURE.

AIR	AIR DEVICE SCHEDULE						
MARK	MFR. & MODEL	TYPE	REMARKS				
A	TITUS TMSA-AA	LOUVERED FACE SUPPLY AIR DIFFUSER	24"x24" FACE, ALUMINUM CONSTRUCTION WITH FRAME TO MATCH CEILING TYPE. PROVIDE ADJUSTABLE VANES FOR VERTICAL DISCHARGE PATTERN.				
В	TITUS PAS-AA	PERFORATED FACE SUPPLY AIR DIFFUSER	24"x24" FACE, ALUMINUM CONSTRUCTION WITH FRAME TO MATCH CEILING TYPE.				
C	TITUS PAS-AA	PERFORATED FACE SUPPLY AIR DIFFUSER	12"x12" FACE, ALUMINUM CONSTRUCTION WITH FRAME TO MATCH CEILING TYPE.				
D	TITUS PAR-AA	PERFORATED FACE RETURN AIR GRILLE	24"x24" FACE, ALUMINUM CONSTRUCTION WITH FRAME TO MATCH CEILING TYPE. PROVIDE 22"x22" NECK UNLESS OTHERWISE NOTED. PROVIDE O.B.D. FOR DUCTED EXHAUST.				

1. REFER TO ARCHITECTURAL DRAWINGS FOR FINISH.

2. REFER TO MECHANICAL FLOOR PLAN FOR NECK SIZES. 3. CONTRACTOR TO VERIFY EXISTING DIFFUSERS AND PROVIDE NEW MARK B OR MARK C SUPPLY AND MARK D RETURNS AS NECESSARY

TO MATCH DIFFUSER COUNT ON DRAWINGS.

PROJECT NUMBER: 190317.000 SHEET TITLE:

02/06/2020

CHECKED BY:

MECHANICAL SCHEDULES

5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

No. / DATE / DESCRIPTION

02/21/2020 100% CD

SHEET NUMBER:

South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234 190317.000 DBR Project Number EM | MECH | ELEC | PLBG | TECH



ER0 5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

No. / DATE / DESCRIPTION 02/21/2020 100% CD

SEAL: RIK M. MacDONALD 105068

DATE: 02/06/2020 DRAWN BY: DBR

CHECKED BY:

PROJECT NUMBER: 190317.000 SHEET TITLE:

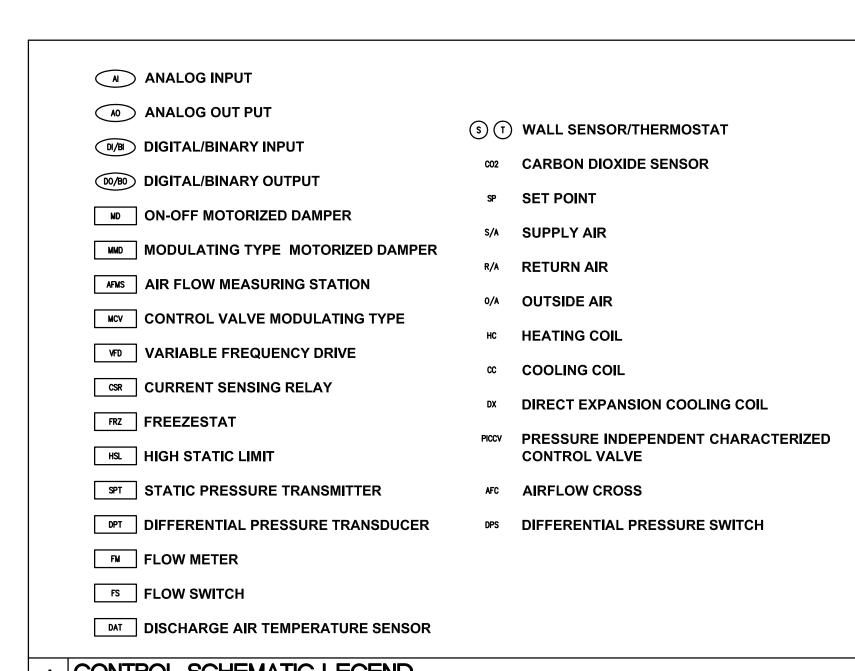
**MECHANICAL DETAILS** 

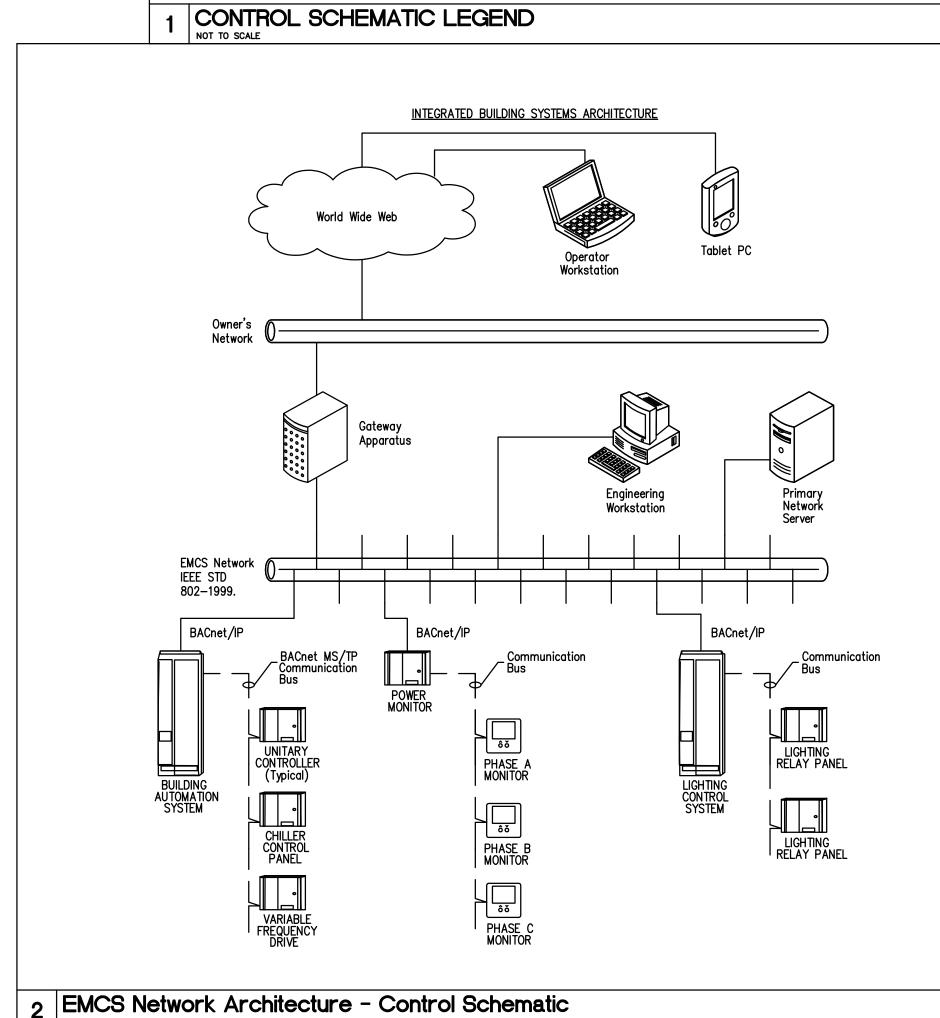
SHEET NUMBER:

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\*DBR 9990 Richmond Avenue South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234

190317.000 IDBR Project Number EM | MECH | ELEC | PLBG | TECH





**Outdoor Air Conditions** 

The sensors shall be mounted in an area on the north side of the building where the representative temperature and humidity can be monitored, both shall have sun shields. Based on the outdoor air temperature and humidity the EMCS shall calculate the outdoor air enthalpy, wet bulb and dew point temperatures. These outdoor air conditions shall be broadcast as global data points for use by other control programs. These shall be displayed on all major air and water systems graphics.

**Electrical Switchgear Power Meter Monitoring** 

The EMCS shall provide BACnet/IP or Modbus TCP communications to the interface modules to monitor the building power usage. The interface modules shall be provided by the switchgear manufacturer per Division 26. The EMCS shall monitor building kW, kWH, kVAR, Power Factor, 3-Phase Amps and Volts, along with all variables available via this interface. The EMCS shall provide a graphic representation to show the current usage, monthly usage, year to date usage, and time and date of the highest peak demand for the month and year. Demand thresholds may be set to adjust setpoints and shed loads in order to reduce peak consumption.

**Electrical Branch Circuit Power Meter Monitoring** 

The EMCS shall provide BACnet/IP or Modbus TCP communications to the power monitor. The power monitor locations shall be shown on the Division 26 drawings. The EMCS shall monitor kW, kWH, kVAR, Power Factor, 3-Phase Amps and Volts, along with all variables available via this interface. The EMCS shall provide a graphic representation to show the current usage, monthly usage, year to date usage, and time and date of the highest peak demand for the month and year. Demand thresholds may be set to adjust setpoints and shed loads in order to reduce peak consumption.

**Sump Pumps and Sump Pits Monitoring** 

The EMCS shall monitor the run status of the pumps and alarm outputs on the water level indicators. The EMCS shall display the values and trend log all Change of State (COS) events. The EMCS shall report alarms to the computers, pagers, and/or text message compatible devices designated by the Owner.

**Building Domestic Water Metering** 

The EMCS shall monitor the building domestic water meter, which is to be furnished by the Division 22 contractor and installed by Division 22 contractor at the service entry to the building. This flow meter shall be provided regardless of any water metering provisions on site. The EMCS shall display and trend log the following: the monthly usage, yearly usage, accumulative total usage, and alarm when excessive flow is measured. The EMCS shall report alarms to the computers, pagers, and/or text message compatible devices designated by the Owner.

IDF and MDF Room Monitoring

The EMCS shall monitor the space temperature and humidity in the IDF and MDF rooms. The primary cooling for IDF and MDF rooms will be supplied by the packaged computer room units. The EMCS shall report high/low temperature/humidity alarms to the computers, pagers, and/or text message compatible devices designated by the Owner. Alarms shall be sent if the space conditions deviate from the following, temperature between 60 °F and 80 °F (adj), humidity between 40% RH and 70% RH (adj), for more than 10 minutes.

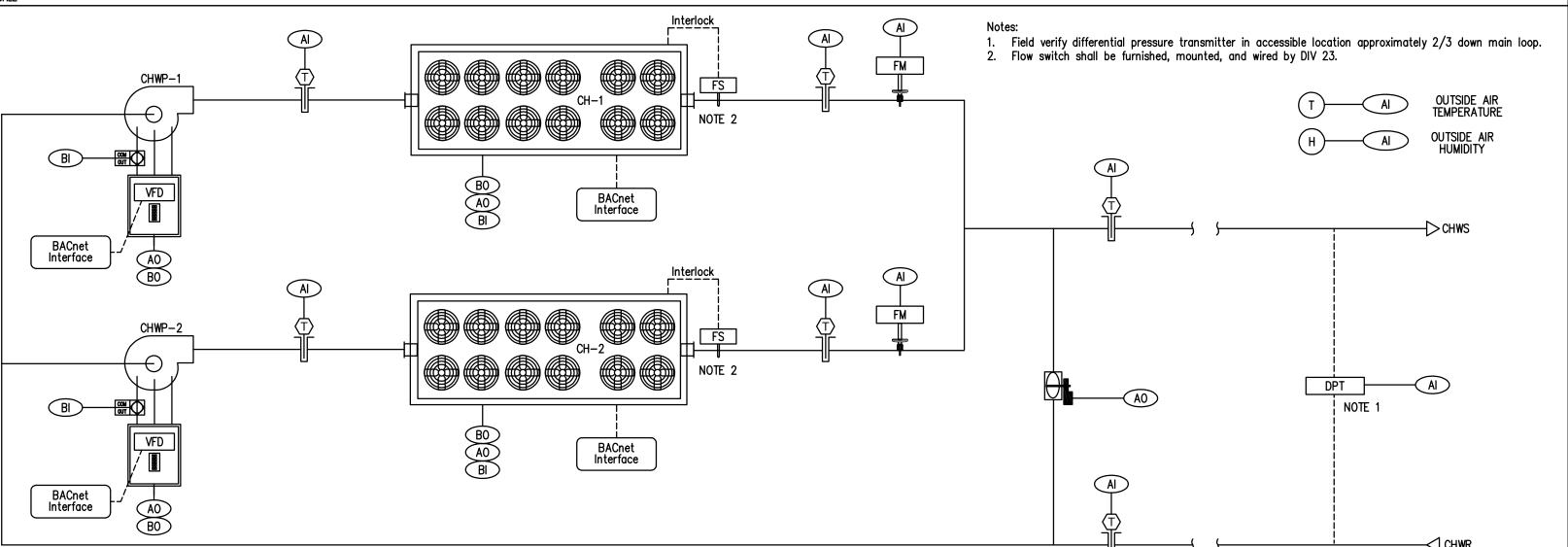
**Elevator Machine Room Monitoring** 

The EMCS shall monitor the space temperature in the machine rooms. The primary cooling for these rooms will be supplied by the packaged AC units. The EMCS shall report high/low temperature alarms to the computers, pagers, and/or text message compatible devices designated by the Owner. Alarms shall be sent if the space conditions deviate from the following, temperature between 60 °F and 80 °F (adj), for more than 10 minutes.

Chilled Water Make-up Water Metering

The EMCS shall monitor the chiller make-up water meter, which is to be furnished by the EMCS contractor and installed by Division 23 contractor at the service entry to the building. This flow meter shall be provided regardless of any water metering provisions on site. The EMCS shall display and trend log the following: the monthly usage, yearly usage, accumulative total usage, and alarm when excessive flow is measured. The EMCS shall report alarms to the computers, pagers, and/or text message compatible devices designated by the Owner.

3 MISCELLANEOUS SYSTEMS



# System Off - When the system is off:

- The chillers shall be off. The pumps shall be off.
- The bypass valve shall be closed. The control loops shall be disabled.

**System Startup - System startup shall be initiated:** 

Manually by an Operator command on the chiller graphic at the EMCS. Automatically by the EMCS, when a call for cooling has been received.

System Operation - When system start-up has been initiated:

The outside air temperature must be above the outside air lockout setpoint, before the chiller can be activated. The number of cooling requests required and the length of time the requests must be received before activating the chiller plant shall be adjustable. The chiller/pump systems shall be lead/lag and rotated weekly at a time and on a day of the week when the chiller plant is not in operation. Rotation shall be based on accumulated runtime of the chillers.

When the chiller plant is activated, the EMCS shall enable the lead chiller pump. A current switch shall prove the pump status at the EMCS, which shall generate an alarm, if the switch is not made within 45 seconds (adjustable). There shall also be a 10 second (adjustable) de-bounce time to prevent nuisance alarms from a bouncing switch. If the pump run status is not proven, the EMCS shall discontinue the enable signal to the pump and rotate chiller systems. The EMCS shall then energize the a lag chiller pump to run in the same manner as described above. That chiller system shall become the lead system.

When the lead pump status is proven, the EMCS shall enable the lead chiller. A flow switch in the chilled water piping shall complete the circuit to the chiller factory installed controller proving that flow has been established. If the chiller alarm input closes (indicating that the chiller has alarm), the EMCS shall generate an alarm, discontinue the start signal to the lead chiller system and energize the lag chiller system to run in the same manner as described above. That chiller system now becomes the lead system. The chiller shall run to maintain the supply water setpoint.

The EMCS shall monitor the "Chiller Output" point from each chiller. If the point is not available, the EMCS shall monitor the kW of the chiller and calculate the Chiller Output by the equation, ((instantaneous kW / full load kW) \* (nominal capacity)). The combined total Chiller Output of all operating chillers shall be the Plant Output. The combined total Nominal Capacity of all operating chillers shall be the Total Capacity. The EMCS shall monitor temperature inputs from sensors mounted in the common supply and return piping and flow meters mounted in the chiller supply piping, and calculate the building load in Tons.

If the value of ((Plant Output / Total Capacity) \* 100) is greater than the stage-up setpoint for 10 minutes (adjustable) or the CHW supply temperature rises greater than 4 °F (adjustable) above setpoint, a lag chiller shall be enabled into operation. If the value of ((Plant Output / Total Capacity) \* 100) is less than the stage-down setpoint for 10 minutes (adjustable), a lag chiller shall be disabled.

A differential pressure sensor monitoring the pressure between the building CHWS and CHWR piping shall be used to modulate the speed of the CHW pumps. A PID control loop shall modulate the speed of the CHW pumps from their minimum speed to their maximum speed as the differential pressure deviates from setpoint. The EMCS shall monitor the position of all of the chilled water valves at the units that the plant serves and the differential pressure setpoint shall be reset based on achieving a target valve position of 90%. There shall be a dead band of 5% to prevent hunting of the reset program. The chilled water flow shall not change by more than 10% per minute. The target valve position, the reset time, the deadband, and the rate of change values shall be

While only one chiller system is in operation, the corresponding flow meter shall be used to maintain the chiller minimum flow rate by modulating the bypass valve open. The chilled water flow shall not change by more than

When a chiller system is to be disabled, the EMCS shall discontinue the command for the chiller to run. The EMCS shall continue to control the speed of its CHW pump until the chiller status has indicated that it is off. When the outdoor air temperature drops below the freeze protection setpoint, the EMCS shall open the chilled water valves to 50% open (adj.) for flow through the AHU coils and the lead chilled water pump shall be activated to run at its minimum referenced speed value until ambient temperature rises above setpoint. The EMCS shall monitor the outside air temperature and humidity. The EMCS shall calculate the outside air enthalpy, wet bulb temperature, and dew point temperature. These values shall be displayed on all air and water

# System Setpoints - The setpoints for the system shall be set as follows:

The outside air temperature lockout setpoint shall be 50 °F (adjustable). The chiller leaving water temperature setpoint shall be 42 °F (adjustable).

The chiller stage-up capacity setpoint shall be 90% (adjustable).

The chiller stage-down capacity setpoint shall be 60% (adjustable). The chiller minimum flow setpoint shall be 53 gpm (adjustable). Verify with chiller manufacturer for minimum

The chilled water system differential pressure shall be 8 psi (adjustable).

The outdoor air temperature freeze protection setpoint shall be 38 °F (adjustable).

4 Chilled Water System - Air Cooled - Variable Primary Flow with Dedicated Pumps - Control Schematic and Sequence of Operations

**ERO** 5444 Westheimer Suite 1000, Office 1054 Houston, TX 77056

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02/06/2020 DRAWN BY: CHECKED BY:

> PROJECT NUMBER: 190317.000 SHEET TITLE:

**MECHANICAL** CONTROLS





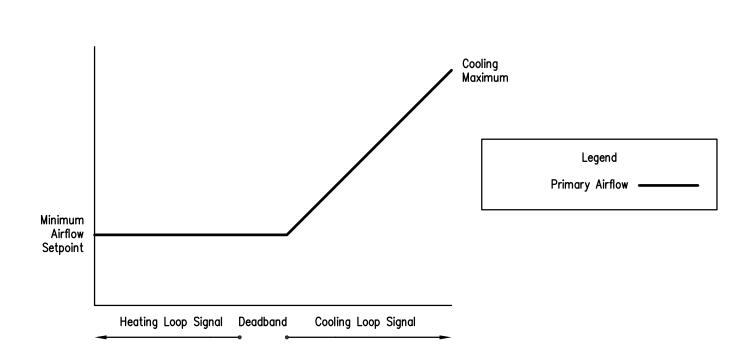
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SHEET NUMBER:

Series Fan-Powered Terminal Unit with Modulating Electric Heat - Control Schematic and Sequence of Operations

NOTES:

1. TERMINAL UNIT CONTROLLER AND DAMPER ACTUATOR SHALL BE SHIPPED TO THE TERMINAL UNIT MANUFACTURER FOR MOUNTING AND WIRING. 2. EMCS CONTRACTOR SHALL PROVIDE 24 VAC POWER TO VAV TERMINAL UNIT CONTROLLERS.



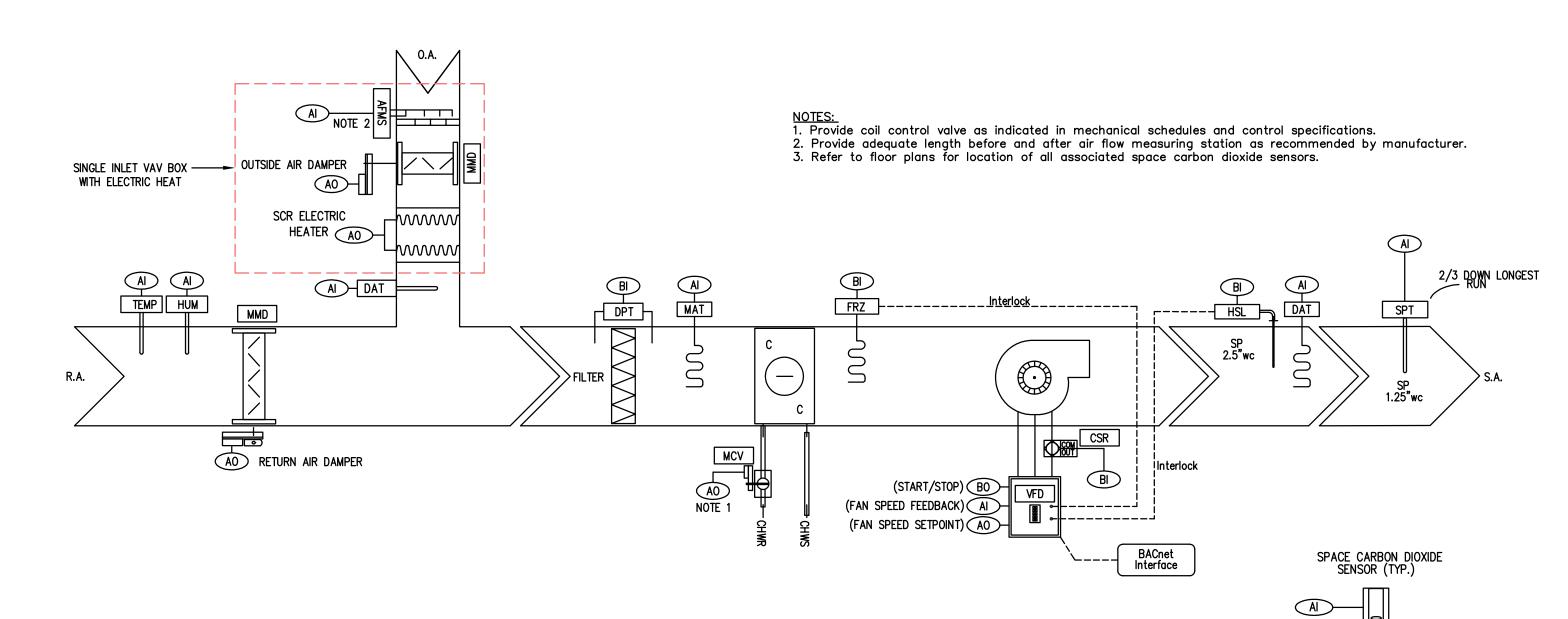
### System Off - When the system is off: The primary air damper shall be closed. The control loops shall be disabled.

System Startup - Startup shall be initiated automatically by the EMCS: In Unoccupied when the corresponding AHU is in UNOCCUPIED MODE. In Occupied when the corresponding AHU is in PRE-START MODE. In Unoccupied when the corresponding AHU is in NIGHT-SETBACK MODE. In Occupied when the corresponding AHU is in OCCUPIED MODE. In Standby when the corresponding AHU is in OCCUPIED MODE and the zone-mounted Occupancy Sensor times out.

System Operation - When system start-up has been initiated, the following sequences The primary air damper shall be modulated between the minimum and maximum flow values to maintain the space temperature within +/- 0.5 °F of the active Cooling Setpoint.

System Setpoints - The setpoints for the system shall be set as follows: The Occupied Cooling Setpoint shall be set initially at 75 °F (adjustable). The Unoccupied Cooling Setpoint shall be set initially at 85 °F (adjustable). The Standby Cooling Setpoint shall be set initially at 77 °F (adjustable). The minimum and maximum primary airflow rates shall be set at the values given in the Mechanical Drawings.

System Alarms - The EMCS shall generate an alarm as follows: If the space temperature during the Occupied Mode is 5 °F above or below the cooling



SYSTEM OFF - WHEN THE SYSTEM IS OFF: The outside air damper shall be closed. The return air damper shall be open. The unit supply fan shall be off.

**SYSTEM START-UP - SYSTEM START-UP SHALL BE INITIATED:** By an operator entered manual command at the EMCS.

# Automatically by the EMCS based on Pre-Start Mode or Night-Setback Mode.

The cooling coil valve shall be closed.

All control loops shall be disabled.

The system shall be enabled by an operator entered manual command at the EMCS or automatically by the EMCS based on the Optimal Start/Stop algorithm. Once enabled, the system shall operate per the **System Operation** section, as detailed below. Operation of the system during Pre-Start Mode shall not include ventilation air.

### NIGHT-SETBACK MODE:

The system shall be enabled automatically by the EMCS based on the cooling demand of 5 (adjustable) or more associated terminal units whose space temperature has exceeded the terminal units Unoccupied Cooling Setpoint. Once enabled, the system shall operate per the **System Operation** section, as detailed below. Operation of the system during Night-Setback Mode shall not include ventilation air.

OCCUPIED MODE: The system shall be enabled automatically by the EMCS based on the actual space occupancy. When the Time of Day schedule (TOD) is active, the system shall operate per the System Operation section, as detailed below, and the following

sequences shall be active. <u>Demand Control Ventilation</u> - During occupied building hours, the EMCS shall allow the outside air damper to modulate from its scheduled maximum flow rate to its scheduled minimum flow rate. If the space CO2 level for any associated zone is at least 100 ppm (adj) less than its active high limit setpoint for a time period of 10 minutes (adj), the EMCS shall index the outside air damper to maintain its minimum scheduled outside air flow rate. If the space CO2 level for any associated zone rises to within

50 ppm (adj) of its active high limit, the EMCS shall index the outside air damper to maintain its scheduled maximum outside Outside Airflow and Damper Control: When the system is commanded to start, the EMCS shall index the outside air damper to the scheduled maximum outside airflow rate as measured by the outside airflow measuring station. Outside Air Damper / Return Air Damper Integration with Supply Fan VFD: The EMCS shall provide dynamic control of the outside air damper and return air damper positions through the full range of the supply fan VFD modulation. The outside air and return air motorized dampers shall modulate in sequence to maintain the active outside air flow rate setpoint. The outside air

damper shall first modulate open. If the outside air damper has reached the 100% open position and still cannot achieve the active outside air flow rate setpoint, then the return air damper shall begin to modulate closed. The return air damper position shall have a low limit of 50% (adj) during normal system operation. Damper positions shall not be adjusted by more than 20% (adj) in any one-minute time period.

# SYSTEM OPERATION - WHEN SYSTEM START-UP HAS BEEN INITIATED:

The variable speed supply fan shall start at its minimum speed. Following a confirmation of fan start status, the supply fan speed shall be modulated to maintain the supply air static pressure at setpoint. The speed of the fan shall not be adjusted by more than 20% in any one-minute period. The static pressure setpoint shall be reset via the control algorithm below to optimize the energy usage.

3 VAV Air Handling Unit - Control Schematic and Sequence of Operations

Supply Air Static Pressure Reset - The static pressure setpoint shall be reset up in defined increments at defined intervals until the primary air damper position to all of the associated terminal units have been below the defined value for more than the defined interval. The static pressure setpoint shall be reset down in defined increments at defined intervals until the primary air damper position to at least one (critical zone) of the associated terminal units has been above the defined value for more than the defined interval. The setpoints are detailed in the **System Setpoint** section below.

Cooling Coil - The chilled water coil control valve shall be modulated to maintain the active supply air temperature setpoint. The supply air temperature setpoint shall be reset via the control algorithm below to optimize the energy usage. Supply Air Temperature Reset - The supply air temperature setpoint shall be reset based on the actual return air temperature, according to the defined reset schedule detailed in the System Setpoint section below. If the Demand Control Ventilation sequence is in maximum outdoor air flow mode or Economizer Mode is active, then the supply air temperature reset shall be disabled and the setpoint shall be set to the initial value.

Pre-heating Coil - The electric pre-heat coil shall be modulated to maintain the unit discharge air temperature at setpoint. The control shall be active when the outside air temperature is below 53°F.

### SYSTEM SETPOINTS - THE SETPOINTS FOR THE SYSTEM SHALL BE DETERMINED AS FOLLOWS: The maximum speed reference value shall be the VFD speed required to obtain the design supply airflow value from the unit

schedule on the Mechanical Drawings. The minimum speed reference value shall be VFD speed required to obtain 50% of the design supply airflow value from the unit schedule on the mechanical drawings but not less than the active outside air flow rate setpoint. The supply air static pressure setpoint shall be set initially at 1.25 inches w.c. (adj) and shall have reset limits of 0.20 to 2.00 inches w.c. (adj)

The time interval for static pressure reset shall be set at 10 minutes (adj). The static pressure reset increment shall be set at 0.05 inches w.c. (adj)

The terminal unit primary damper position setpoint shall be 90% open. (adj) The time interval for terminal unit primary damper position shall be set at 15 minutes. (adj)

The supply air temperature setpoint shall be set initially at 54 °F. (adj) The supply air temperature setpoint shall be reset to 53 °F (adj) when the return air temperature is at 78 °F. (adj) The supply air temperature setpoint shall be reset to 58 °F (adj) when the return air temperature is at 72 °F. (adj)

The pre-heat coil discharge air temperature setpoint shall be set at 52°F. The minimum outside air flowrate setpoint shall be set at the scheduled minimum flowrate from the unit schedule on the

mechanical drawings. The maximum outside air flowrate setpoint shall be set at the scheduled maximum flowrate from the unit schedule on the mechanical drawings.

The space carbon dioxide high-limit setpoint shall be set at 1000 ppm (adj). The supply duct static pressure high-limit setpoint shall be set at 2.0 in. wc. (adj). The air filter pressure differential high-limit setpoint shall be set at 1.0 in. wc. (adj).

### SYSTEM SHUTDOWN - SYSTEM SHUTDOWN SHALL BE INITIATED: By operator entered manual command at the EMCS.

Automatically by the EMCS based on Night-Setback or Time of Day schedule. Automatically by the high-static pressure shut down.

Automatically by the unit freeze-stat shut down. Automatically by a supply fan current sensor status failure.

SYSTEM ALARMS - THE EMCS SHALL GENERATE AN ALARM:

The freeze-stat low-limit trip setpoint shall be set at 37°F(adj).

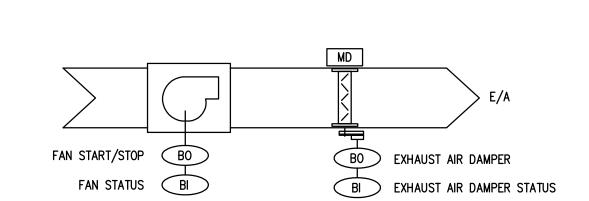
If the supply air temperature is outside the limits, which shall be set at +/- 5 °F around setpoint. If the space carbon dioxide level for any associated zone exceeds its high-limit for more than 20 minutes (adj) or exceeds the

If the supply duct static pressure exceeds the high-limit setpoint. If the unit freeze-stat trips.

If the filter differential pressure exceeds the trip point. If the current sensor relay indicates a supply fan failure status.

All alarms shall be inhibited when the supply fan is not operating. The alarms, except the fan failure alarm, shall remain inhibited following startup of the unit for 2 minutes.

2 VAV Terminal Unit - Cooling Only - Control Schematic and Sequence of Operations

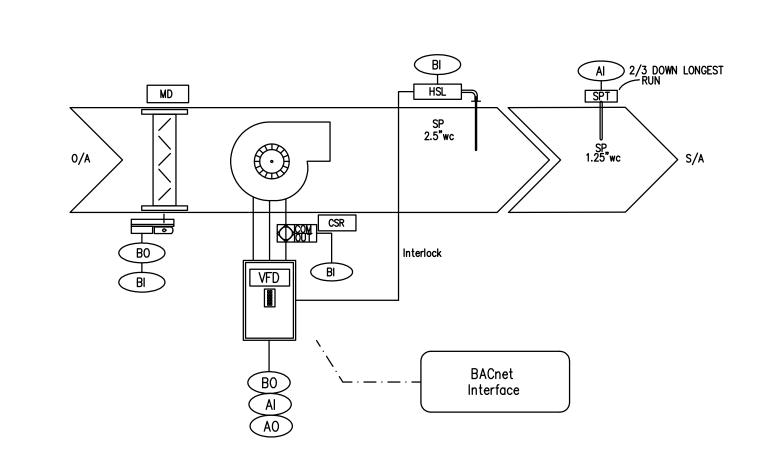


System Operation - When system start-up has been initiated, the following sequences shall be

The ventilation exhaust fan shall be integrated with the EMCS to monitor fan status and to schedule run times. The exhaust air damper shall open anytime the unit runs and shall close anytime the unit stops. The exhaust fan shall start only after the damper status has proven the damper is open. The exhaust air damper shall close 30 sec (adj.) after the fan stops.

System Setpoints - The setpoints for the system shall be set as follows: The design airflow rates shall be set at the values given in the Mechanical Drawings.

- <u>Fan Status</u> The controller shall monitor the fan status.
- Alarms shall be provided as follows: Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on. • Fan Runtime Exceeded: Fan status runtime exceeds a user definable limit (adj.).
- 4 Ventilation Exhaust Fan Control Schematic and Sequence of Operations



5 Outside Air Fan - Control Schematic and Sequence of Operations

System Off - When the system is off:

The outside air dampers shall be closed. The outside air fan shall be off. The control loops shall be disabled.

System Startup - System start-up shall be initiated:

Automatically by the EMCS when any associated AHUs Demand Control Ventilation sequence is active. Outside air motorized damper shall open before fan startup when unit is commanded to run.

System Operation - When system start-up has been initiated: The variable speed outside air fan shall start at its minimum speed. Following a confirmation of fan start status, the fan speed shall be modulated to maintain the outside air duct static pressure setpoint.

System Setpoints - The setpoints for the system shall be determined as follows:

The outside air static pressure setpoint shall be set initially at 1.0 inches w.c. (adj).

System Shutdown - System shutdown shall be initiated: Automatically by the EMCS when no Demand Control Ventilation sequence is active. Automatically by the high-static pressure shutdown.

System Alarms - The EMCS shall generate an alarm if:

If the outside air duct static pressure is outside the established low and high alarm limits, initially set at 0.5 and 2.0 in w.c. (adj)

02/06/2020

CHECKED BY: PROJECT NUMBER:

190317.000 SHEET TITLE:

> **MECHANICAL** CONTROLS

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Houston, TX 77056

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RIK M. MacDONALD

SHEET NUMBER:

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### SYSTEM OFF - WHEN THE SYSTEM IS OFF:

The outside air damper shall be closed. The return air damper shall be open.

The unit supply fan shall be off. The cooling coil valve shall be closed. All control loops shall be disabled.

# SYSTEM START-UP - SYSTEM START-UP SHALL BE INITIATED:

By an operator entered manual command at the EMCS. Automatically by the EMCS based on Pre-Start Mode or Night-Setback Mode.

## PRE-START MODE:

The system shall be enabled by an operator entered manual command at the EMCS or automatically by the EMCS based on the Optimal Start/Stop algorithm. Once enabled, the system shall operate per the **System Operation** section, as detailed below. Operation of the system during Pre-Start Mode shall not include ventilation air.

# **NIGHT-SETBACK MODE:**

The system shall be enabled automatically by the EMCS based on the cooling demand of 5 (adjustable) or more associated terminal units whose space temperature has exceeded the terminal units Unoccupied Cooling Setpoint. Once enabled, the system shall operate per the **System Operation** section, as detailed below. Operation of the system during Night-Setback Mode shall not include ventilation air.

The system shall be enabled automatically by the EMCS based on the actual space occupancy. When the Time of Day schedule (TOD) is active, the system shall operate per the System Operation section, as detailed below, and the following Demand Control Ventilation - During occupied building hours, the EMCS shall allow the outside air damper to modulate from

its scheduled maximum flow rate to its scheduled minimum flow rate. If the space CO2 level for any associated zone is at least 100 ppm (adj) less than its active high limit setpoint for a time period of 10 minutes (adj), the EMCS shall index the outside air damper to maintain its minimum scheduled outside air flow rate. If the space CO2 level for any associated zone rises to within 50 ppm (adj) of its active high limit, the EMCS shall index the outside air damper to maintain its scheduled maximum outside air flow rate. Outside Airflow and Damper Control: When the system is commanded to start, the EMCS shall index the outside air damper to

Outside Air Damper / Return Air Damper Integration with Supply Fan VFD: The EMCS shall provide dynamic control of the outside air damper and return air damper positions through the full range of the supply fan VFD modulation. The outside air and return air motorized dampers shall modulate in sequence to maintain the active outside air flow rate setpoint. The outside air damper shall first modulate open. If the outside air damper has reached the 100% open position and still cannot achieve the active outside air flow rate setpoint, then the return air damper shall begin to modulate closed. The return air damper position shall have a low limit of 50% (adj) during normal system operation. Damper positions shall not be adjusted by more than 20% (adj) in any one-minute time period.

the scheduled maximum outside airflow rate as measured by the outside airflow measuring station.

### SYSTEM OPERATION - WHEN SYSTEM START-UP HAS BEEN INITIATED:

speed shall be modulated to maintain the supply air static pressure at setpoint. The speed of the fan shall not be adjusted by more than 20% in any one-minute period. The static pressure setpoint shall be reset via the control algorithm below to optimize the energy usage.

the primary air damper position to all of the associated terminal units have been below the defined value for more than the the defined interval. The setpoints are detailed in the **System Setpoint** section below.

Cooling Coil - The chilled water coil control valve shall be modulated to maintain the active supply air temperature setpoint. The supply air temperature setpoint shall be reset via the control algorithm below to optimize the energy usage. Supply Air Temperature Reset - The supply air temperature setpoint shall be reset based on the actual return air temperature, according to the defined reset schedule detailed in the System Setpoint section below. If the Demand Control Ventilation sequence is in maximum outdoor air flow mode or Economizer Mode is active, then the supply air temperature reset shall be disabled and the setpoint shall be set to the initial value. Re-heating Coil - The electric re-heat coil shall be modulated to maintain the unit discharge air temperature at setpoint. The

### control shall be active when the outside air temperature is below 53°F. SYSTEM SETPOINTS - THE SETPOINTS FOR THE SYSTEM SHALL BE DETERMINED AS FOLLOWS:

The maximum speed reference value shall be the VFD speed required to obtain the design supply airflow value from the unit schedule on the Mechanical Drawings. The minimum speed reference value shall be VFD speed required to obtain 50% of the design supply airflow value from the unit schedule on the mechanical drawings but not less than the active outside air flow rate setpoint. The supply air static pressure setpoint shall be set initially at 1.25 inches w.c. (adj) and shall have reset limits of 0.20 to 2.00

inches w.c. (adj) The time interval for static pressure reset shall be set at 10 minutes (adj).

The static pressure reset increment shall be set at 0.05 inches w.c. (adj) The terminal unit primary damper position setpoint shall be 90% open. (adj) The time interval for terminal unit primary damper position shall be set at 15 minutes. (adj)

The supply air temperature setpoint shall be set initially at 54 °F. (adj) The supply air temperature setpoint shall be reset to 53 °F (adj) when the return air temperature is at 78 °F. (adj)

The supply air temperature setpoint shall be reset to 58 °F (adj) when the return air temperature is at 72 °F. (adj) The re-heat coil discharge air temperature setpoint shall be set at 52°F.

The minimum outside air flowrate setpoint shall be set at the scheduled minimum flowrate from the unit schedule on the mechanical drawings. The maximum outside air flowrate setpoint shall be set at the scheduled maximum flowrate from the unit schedule on the

mechanical drawings. The space carbon dioxide high-limit setpoint shall be set at 1000 ppm (adj).

The supply duct static pressure high-limit setpoint shall be set at 2.0 in. wc. (adj). The air filter pressure differential high-limit setpoint shall be set at 1.0 in. wc. (adj). The freeze-stat low-limit trip setpoint shall be set at 37°F(adj).

### SYSTEM SHUTDOWN - SYSTEM SHUTDOWN SHALL BE INITIATED:

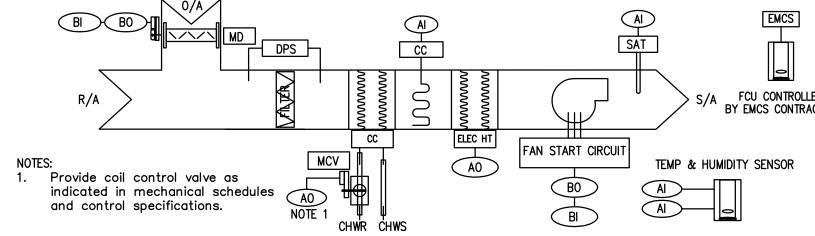
By operator entered manual command at the EMCS. Automatically by the EMCS based on Night-Setback or Time of Day schedule.

Automatically by the high-static pressure shut down. Automatically by the unit freeze-stat shut down.

If the space carbon dioxide level for any associated zone exceeds its high-limit for more than 20 minutes (adj) or exceeds the

All alarms shall be inhibited when the supply fan is not operating. The alarms, except the fan failure alarm, shall remain inhibited following startup of the unit for 2 minutes.

# VAV Air Handling Unit (AHU-2.2) - Control Schematic and Sequence of Operations



System Operation - When system start-up has been initiated, the following sequences shall be implemented: The fan coil unit shall be integrated with the EMCS to monitor fan status, schedule run times, and to adjust space temperature setpoints. Outside air motorized damper of outside air intake shall open before fan startup when unit is commanded to run. <u>COOLING MODE</u>: When the space temperature is above the Cooling Setpoint, the chilled water coil control valve shall be modulated between 0-100%, to maintain the space temperature within +/- 0.5 °F of the Cooling Setpoint. The chilled water coil discharge temperature shall not be allowed to go below the chilled water coil low-limit setpoint. HEATING MODE: When the space temperature is below the Heating Setpoint, the controller shall modulate the electric

heater as required to maintain the space temperature within +/- 0.5 °F of the Heating Setpoint. The fan shall run anytime the unit is commanded to run, unless shutdown on safeties. DE-HUMIDIFICATION MODE: When space humidity rises above its active setpoint and the space temperature is below its active setpoint, the EMCS shall modulate the chilled water control valve to maintain the de-humidication chilled water

coil discharge air temperature setpoint. The EMCS shall modulate the electric heater to maintain the space temperature setpoint as required. The unit shall return to cooling mode when the space humidity setpoint has been satisfied for at least 10 minutes (adj).

### System Setpoints - The setpoints for the system shall be set as follows: The Cooling Setpoint shall be set initially at 68 °F (adjustable).

The Heating Setpoint shall be set initially at 66 °F (adjustable).

The de-humidification chilled water coil discharge air temperature setpoint shall be set at 46°F (adj) with a low-limit alarm

The space humidity setpoint shall be set at 50% RH (adj) with a high-limit alarm of 55% RH (adj).

The design airflow rates shall be set at the values given in the Mechanical Drawings.

# System Alarms - The EMCS shall generate an alarm as follows:

If the space temperature is 2 °F (adj.) above or below the cooling or heating setpoint depending upon active mode for 5 minutes If the space humidity is 5% (adj.) above the space humidity setpoint for 5 minutes (adjustable).

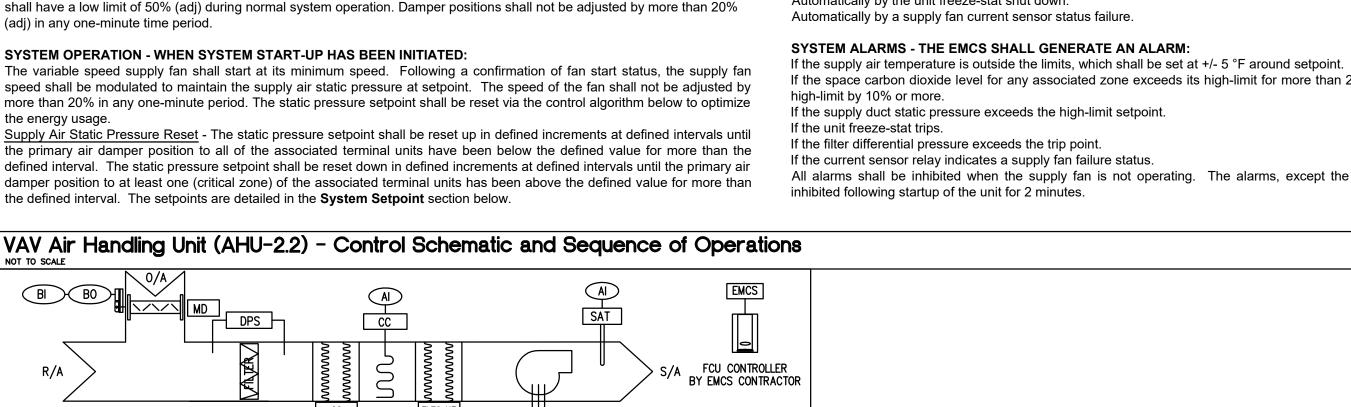
If the supply air temperature drops below the chilled water coil discharge air temperature low-limit for 5 minutes (adj).

If the filter differential pressure exceeds the trip point initially set at 1.0 inch w.c. (adj), message will show "Filter Dirty" otherwise it will show "Filter Clean". All alarms shall be inhibited when the supply fan is not operating except the space temperature alarms. The alarms,

except the fan failure and the space temperature alarms, shall remain inhibited following startup of the unit for 2 minutes.

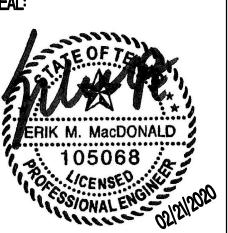
2 | Fan Coil Unit - 2 Pipe - Control Schematic and Sequence of Operations

defined interval. The static pressure setpoint shall be reset down in defined increments at defined intervals until the primary air damper position to at least one (critical zone) of the associated terminal units has been above the defined value for more than



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02/06/2020

CHECKED BY:

PROJECT NUMBER: 190317.000

SHEET TITLE:

**MECHANICAL** CONTROLS



PANEL

**MISCELLANEOUS** DRAIN(TYPE AND SIZE AS NOTED ON PLANS) <del>----</del> ROOF DRAIN OR OVERFLOW DRAIN ROOF DRAIN OR OVERFLOW DRAIN(FROM ABOVE) WALL HYDRANT PLUMBING FIXTURES POINT OF NEW CONNECTION TO EXISTING PIPING PLUMBING DRAWING NOTE REFERENCE DETAIL NUMBER OR PLAN SHEET WHERE DETAIL OR PLAN IS SHOWN FLOW SWITCH TAMPER SWITCH FIRE HOSE CABINET FIRE DEPARTMENT SIAMESE CONNECTION(WALL MOUNTED) FIRE DEPARTMENT SIAMESE CONNECTION(FREE STANDING) PLUMBING RISER DIAGRAM NUMBER SHEET WHERE PLUMBING RISER DIAGRAM IS SHOWN **GENERAL PLUMBING NOTES** 

- 1. SANITARY SEWER PIPING 2 1/2" AND SMALLER TO BE INSTALLED AT A 1/4" PER/FT SLOPE AND SANITARY SEWER PIPING 3" AND LARGER TO BE INSTALLED AT 1/8"
- 2. GREASE WASTE PIPING 2 1/2" AND SMALLER TO BE INSTALLED AT A 1/4" PER/FT SLOPE AND SANITARY SEWER PIPING 3" AND LARGER TO BE INSTALLED AT 1/8"
- PER/FT SLOPE.

  3. ACID WASTE PIPING 2 1/2" AND SMALLER TO BE INSTALLED AT A 1/4" PER/FT
- SLOPE AND SANITARY SEWER PIPING 3" AND LARGER TO BE INSTALLED AT 1/8" PER/FT SLOPE.
- 4. STORM DRAIN PRIMARY AND SECONDARY (OVERFLOW) PIPING TO BE INSTALLED AT 1/8" PER/FT SLOPE, UNLESS OTHERWISE NOTED ON PLAN.
- 5. GAS PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE LOCAL GAS CODE OR NFPA-54 WHERE REQUIREMENTS ARE MORE STRINGENT.
- 6. CONTRACTOR TO COORDINATE THE INSTALLATION OF THE PLUMBING SYSTEMS WITH ALL OTHER TRADES

WATER SUB-METER

\_\_\_\_(M)\_\_\_\_

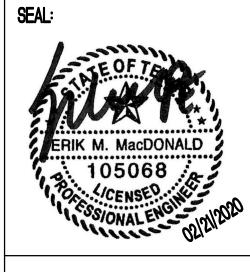
# GENERAL FIRE PROTECTION NOTE

CONTRACTOR SHALL SPRINKLER THE ENTIRE FACILITY AND PROVIDE LIGHT HAZARD COVERAGE EVERYWHERE, EXCEPT FOR ELECTRICAL ROOMS, JANITORS CLOSET, MECHANICAL ROOMS, STORAGE ROOMS AND FOOD SERVICE AREAS SHALL ALL RECEIVE ORDINARY HAZARD GROUP 2 COVERAGE. INSTALLATION SHALL COMPLY WITH THE LATEST REQUIREMENTS OF NFPA 13 AND LOCAL ATHORITIES HAVING JURISDICTION.



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Houston Community College System
HVAC Replacement at Fannin
Central Campus

**DATE:**02/06/2020 **DRAWN BY:**DBR

**CHECKED BY:**DBR

PROJECT NUMBER:
190317.000

SHEET TITLE:

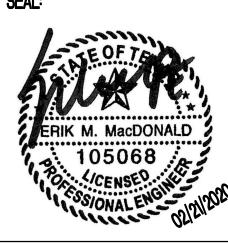
PLUMBING SYMBOLS AND ABBREVIATIONS

SHEET NUMBER:

P001

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System t Fannin at ement al Campus Houston Communication HVAC Replace

02/06/2020 DRAWN BY:

— CHECK VALVE (TYPICAL)

RE: EXISTING

RE: EXISTING EXPANSION TANK

ELECTRIC WATER HEATER

TO FLOOR DRAIN

ELECTRIC WATER HEATER DETAIL
NOT TO SCALE

- ASME RATED TEMPERATURE AND PRESSURE RELIEF VALVE. ROUTE DRAIN LINE FULL SIZE

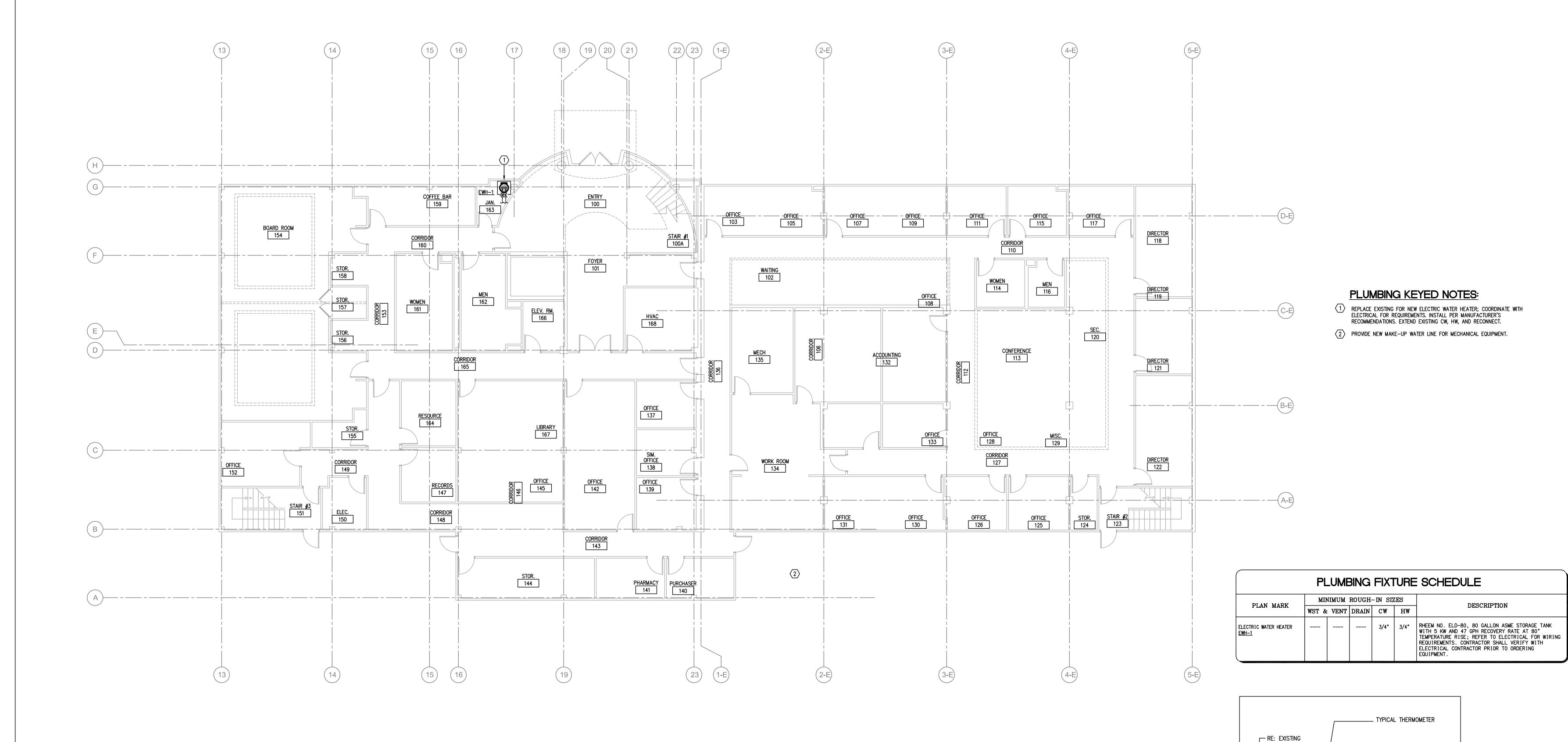
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PROJECT NUMBER: 190317.000 SHEET TITLE:

> **PLUMBING** PLAN

SHEET NUMBER:

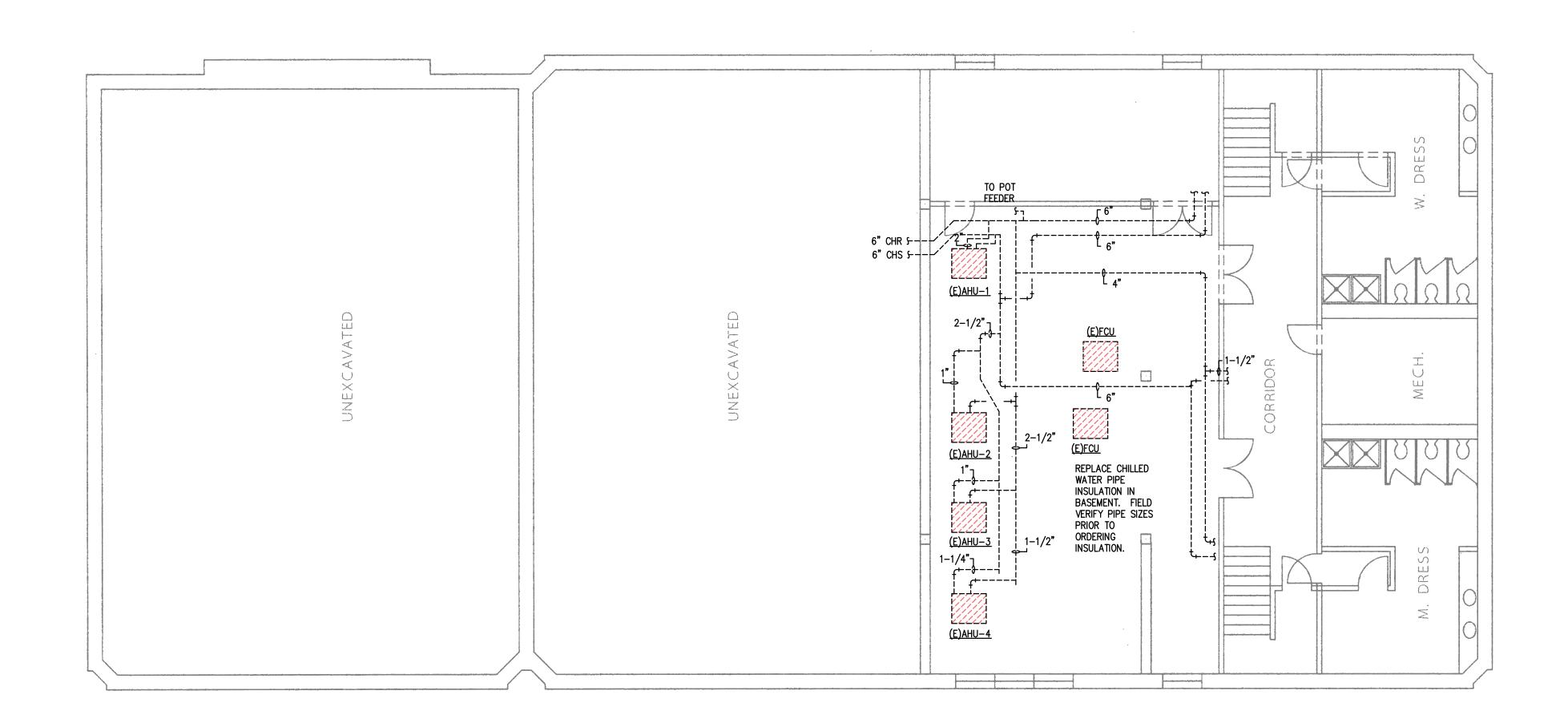
P201



P201 LEVEL 1 PLUMBING PLAN
1/8"=1'-0"

9990 Richmond Avenue South Building, Suite 300 Houston, Texas 77042 713.914.0888 p 713.914.0886 f TBPE Firm Registration No. 2234 190317.000 DBR Project Number EM | MECH | ELEC | PLBG | TECH |

# HOT WATER BASEMENT MECHANICAL PLAN 1/8"=1'-0" APPROX.



CHILLED WATER

BASEMENT MECHANICAL PLAN

1/8"=1'-0" APPROX.

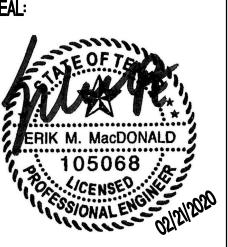


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713.914.0888 p 713.914.0886 f
TBPE Firm Registration No. 2234

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DBR Project Number

190317.000

LEVEL 1
MECHANICAL
PLAN THEATER
SHEET NUMBER:

# ELECTRICAL KEYED NOTES: #

- EXISTING AIR HANDLING UNIT SHALL BE DEMOLISHED. ELECTRICAL CONTRACTOR SHALL DISCONNECT EXISTING FEEDER AND REMOVE EXISTING DISCONNECT. EXISTING FEEDER SHALL REMAIN TO SERVE NEW UNIT.
- 2. ELECTRICAL CONTRACTOR SHALL CONNECT NEW AIR HANDLING UNIT REUSING EXISTING FEEDER PREVIOUSLY SERVING DEMOLISHED AIR HANDLING UNIT. PROVIDE ALL MATERIALS AND LABOR TO EXTEND EXISTING FEEDER TO NEW UNIT'S POINT OF CONNECTION. NEW DISCONNECT PROVIDED BY MECHANICAL CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

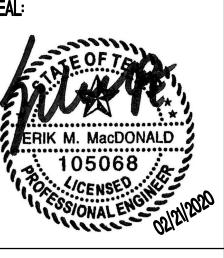
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HVAC Replacement at Fannin
Central Campus

DATE: 02/06/2020 DRAWN BY:

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**PROJECT NUMBER:** 190317.000

SHEET TILE:

LEVEL 1

MECHANICAL AND ELECTRICAL PLAN - THEATER

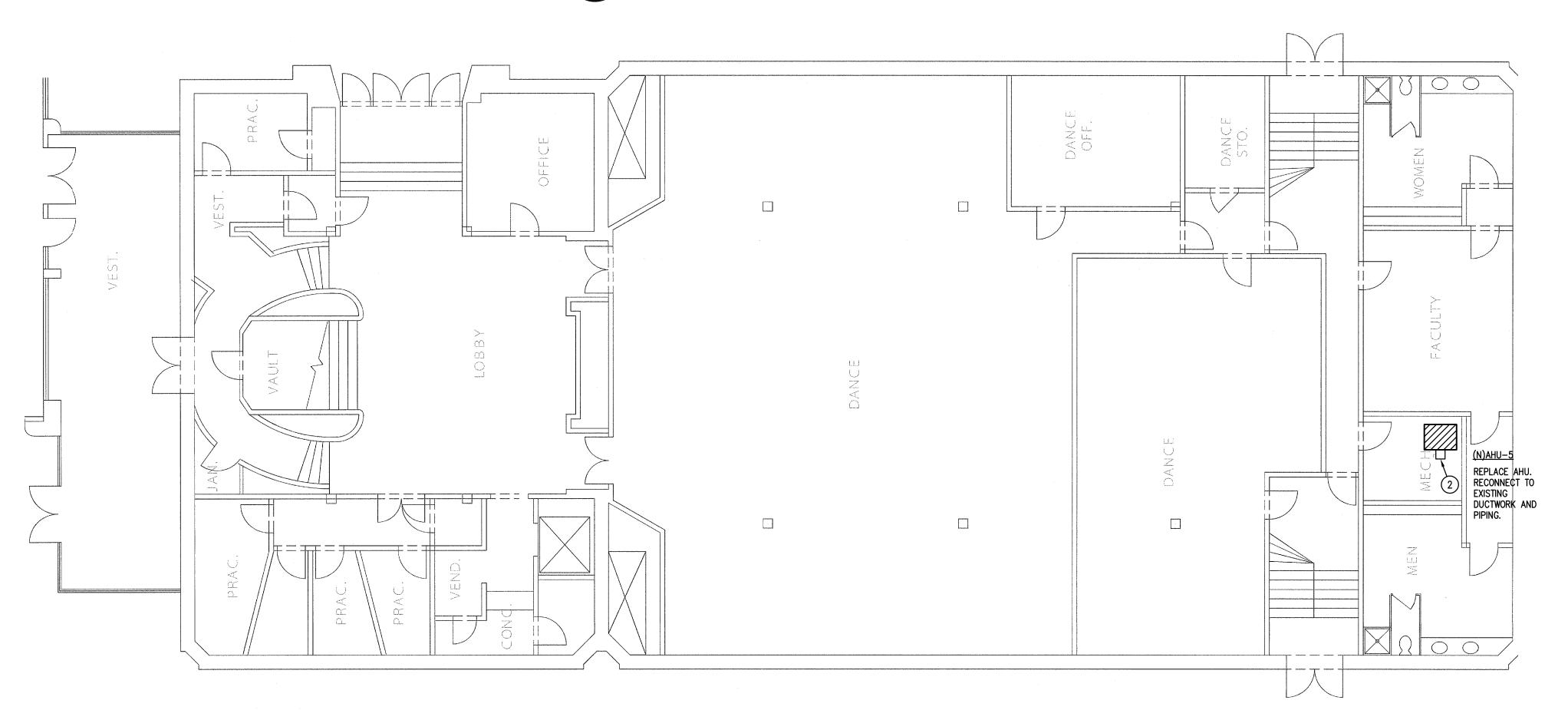
SHEET NUMBER:

**ME204** 

HOT WATER

LEVEL 1 MECHANICAL AND ELECTRICAL PLAN

1/8"=1'-0" APPROX.



CHILLED WATER

LEVEL 1 MECHANICAL AND ELECTRICAL PLAN

1/8"=1'-0" APPROX.

EM | MECH | ELEC | PLBG | TECH |