

R-13317

SCALE: 12" = 1'-0"

303 South Water Street

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XHEZ.W-L-5029 - Through-penetration Firestop Systems

System No. W-L-5029 XHEZ.W-L-5029

Through-penetration Firestop Systems

Design/System/Construction/Assembly Usage Disclaimer · Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL

Certified products, equipment, system, devices, and materials.

Authorities Having Jurisdiction should be consulted before construction. Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
 When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate Only products which bear UL's Mark are considered Certified.

**XHEZ - Through-penetration Firestop Systems** 

XHEZ7 - Through-penetration Firestop Systems Certified for Canada

System No. W-L-5029

Ju**l**y 17, 2015 ANSI/UL1479 (ASTM E814) CAN/ULC S115 F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4) F Ratings — 1, 2 and 3 Hr (See Items 1, 3 and 4) T Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3) FT Ratings — 0, 1/2, 1 and 1-1/4 Hr (See Item 3) Rating At Ambient - 4 CFM/Sq Ft FH Ratings — 1, 2 and 3 Hr (See Items 1, 2 and 4) Rating At 400 F - Less Than 1 CFM/Sg Ft ETH Ratings - 0, 1/2, 1 and 1-1/4 Hr (See Item 3) L Rating At Ambient - 4 CFM/Sq Ft L Rating At 400 F — Less Than 1 CFM/Sq Ft

 $\label{local-problem} $$ http://database.ul.com/cgj-bin/XYV/template/LISEXT/1FRAME/showpage.html?name=XHEZ.W-L-5029&ccnshortti<math>de=Through-penetration+Firestop+Systems... 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ $$ 1/3 $$ 1$ XHEZ.W-L-5029 - Through-penetration Firestop Systems

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1. Wall Assembly — The 1, 2 or 3 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300, U400, V400 or W400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features: A. Studs — Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 2-1/2 in. (64 mm) wide for 1 and 2 hr F and FH rating and 3-1/2 in. (89 mm) wide for 3 hr F and FH rating and spaced max 24 in. (610 mm) OC. B. Gypsum Board\* — Min 5/8 in. (16 mm) thick with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 18-5/8 in. (473

The hourly F and FH Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through Penetrants — One metallic pipe or tubing to be installed within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used: A. Steel Pipe - Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe. B. Iron Pipe - Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe. C. Copper Tubing — Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper tube shall not exceed 4 in. (102 mm).

D. Copper Pipe — Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe. When the hourly F or FH Rating of the firestop system is 3 hr, the nom diam of copper pipe shall not exceed 4 in. (102 mm).

3. Pipe Covering\* — Nom 1, 1-1/2 or 2 in. (25, 38 or 51 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m<sup>3</sup>) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. For 1 and 2 hr F and FH Ratings, the annular space between insulated penetrant and periphery of opening shall be min 0 in. (point contact) to max 1–7/8 in. (48 mm). For 3 hr F and FH Ratings, the annular space shall be min 0 in. (point contact) to max 1–1/4 in. (32 mm). See Pipe and Equipment Covering — Materials (BRGU) category in the Building Material Directory for the names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used. The hourly T, FT, FTH Ratings of the firestop system are 1/2 hr for 1 hr rated walls and 1 hr for 2 hr rated walls. For 3 hr rated walls, the hourly T, FT and FTH Ratings when steel and iron pipes are used are 1 hr. For 3 hr rated walls, the hourly T, FT and FTH Ratings when copper penetrants are used are 1-1/4 hr for 2 in. (51 mm) thick pipe covering and 0 hr for pipe covering thickness less than 2 in. (51 mm). 3A. Pipe Covering\* — (Not Shown) — As an alternate to Item 3, max 2 in. (51 mm) thick cylindrical calcium silicate

XHEZ.W-L-5029 - Through-penetration Firestop Systems (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 18 AWG stainless steel wire spaced max 12 in. (305 mm) OC. When the alternate pipe covering is used, the T and FT Rating shall be as specified in item 3 above. See Pipe and Equipment Covering — Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used. 4. Fill, Void or Cavity Material\* — Sealant — For 1 and 2 hr F and FH Rating, min 5/8 in. (16 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. For 3 hr F and FH Rating, min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between pipe covering and gypsum board, a min 1/2 in. (13 mm) diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.

\* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification

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SCALE: 12" = 1'-0'

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Job No: 15-061

**UNIVERSITY OF NEVADA, LAS VEGAS** 

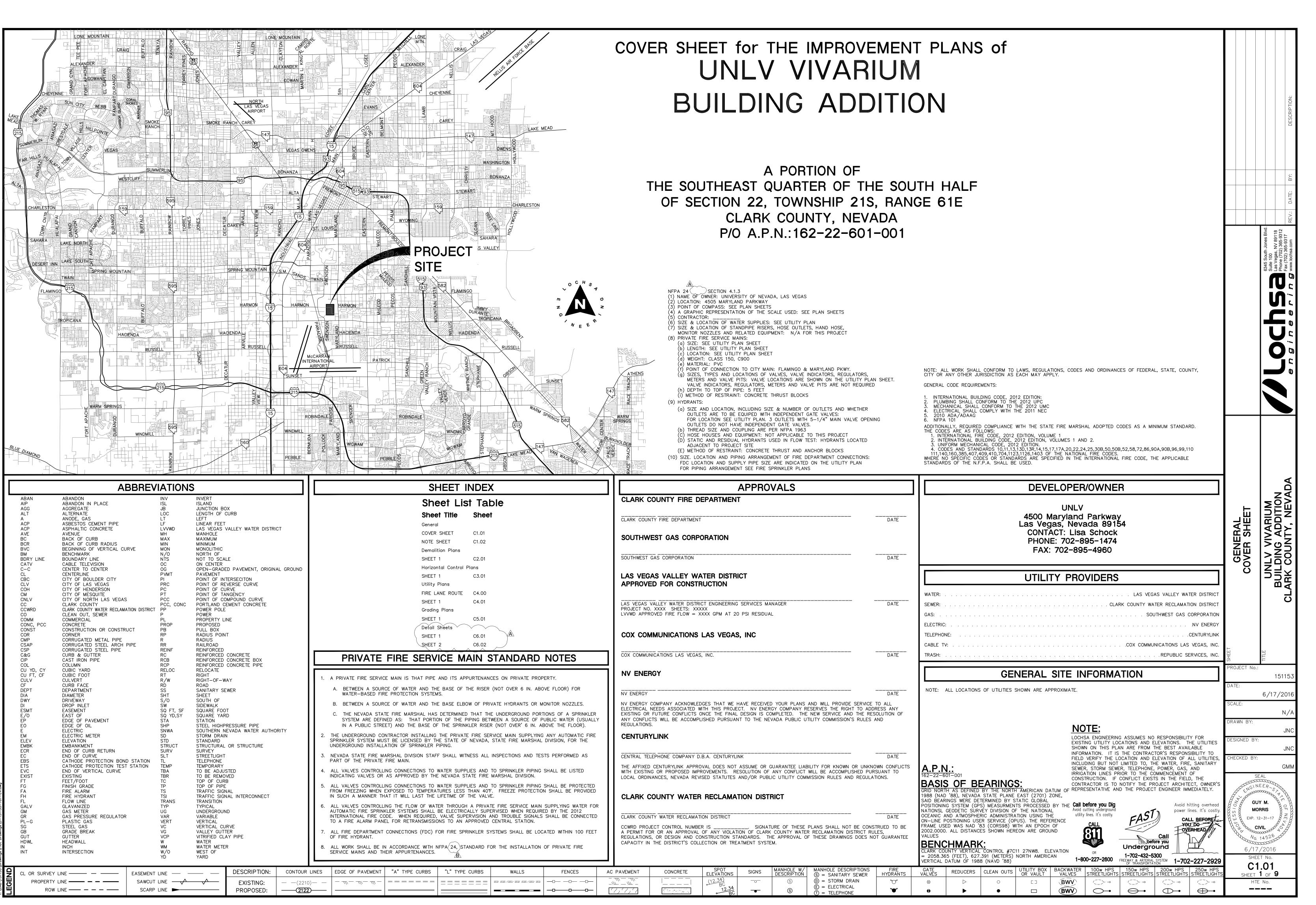
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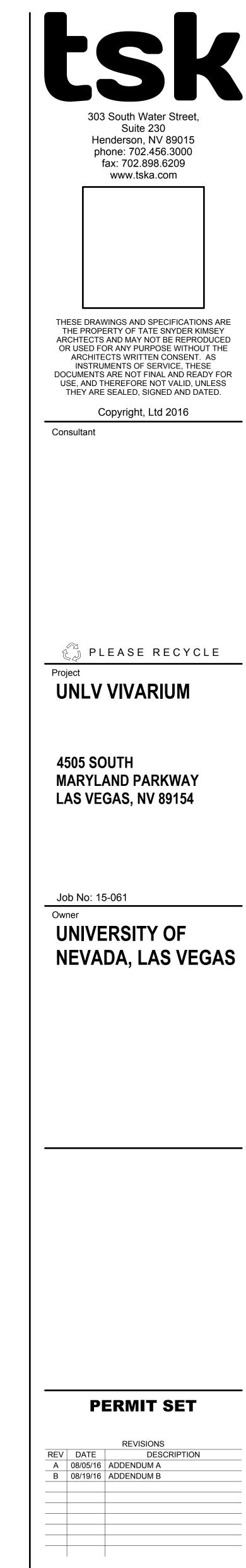
DESCRIPTION A 08/05/16 ADDENDUM A B 08/19/16 ADDENDUM B

Sheet Title **UL DESIGN SYSTEMS** 

Date: 06/17/2016

Sheet No:

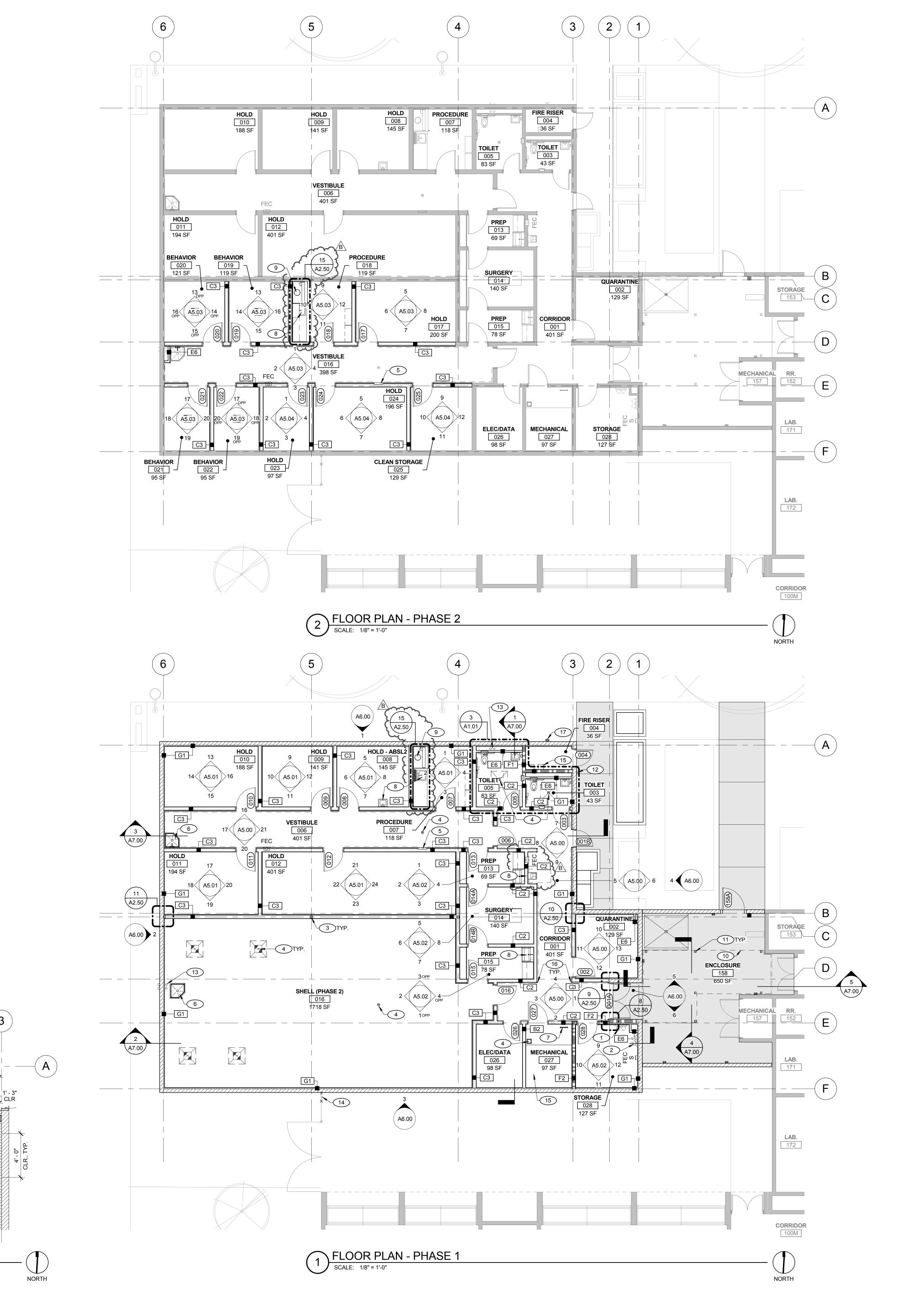




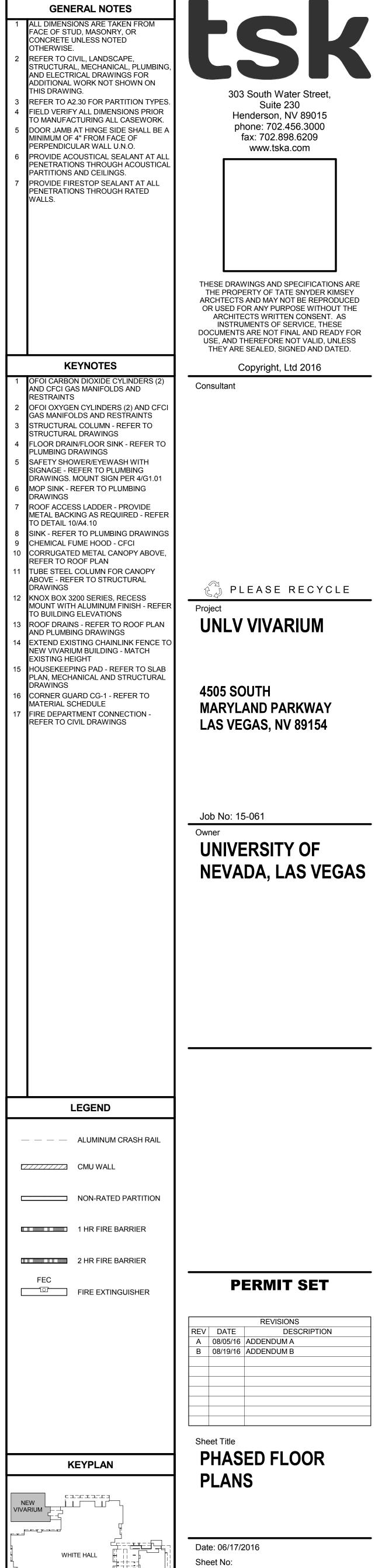
GENERAL COVER SHEET

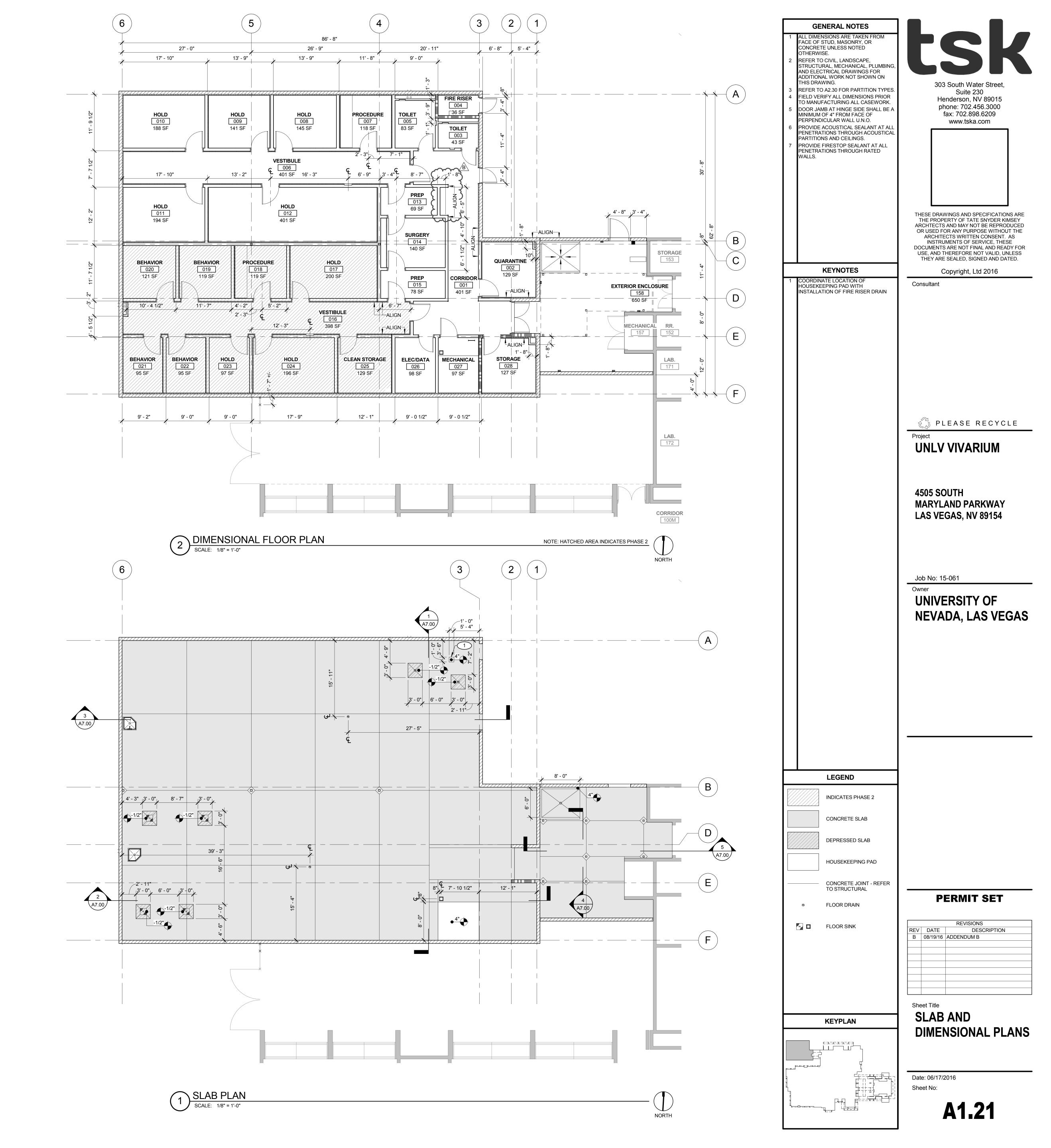
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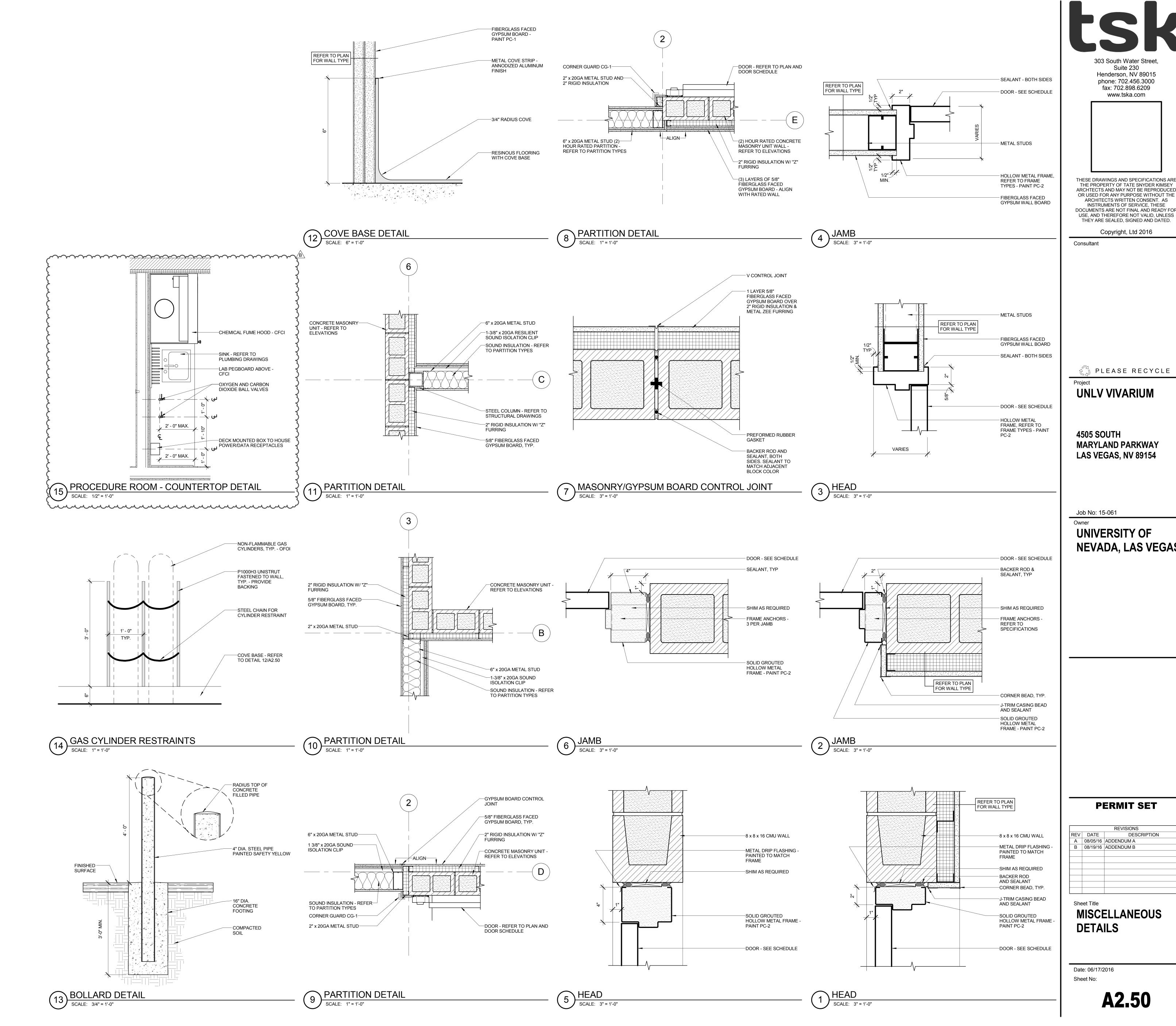
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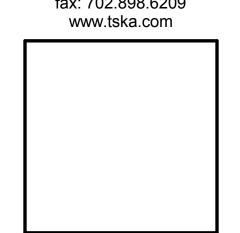


3 ENLARGED RESTROOM PLAN
SCALE: 1/4" = 1'-0"





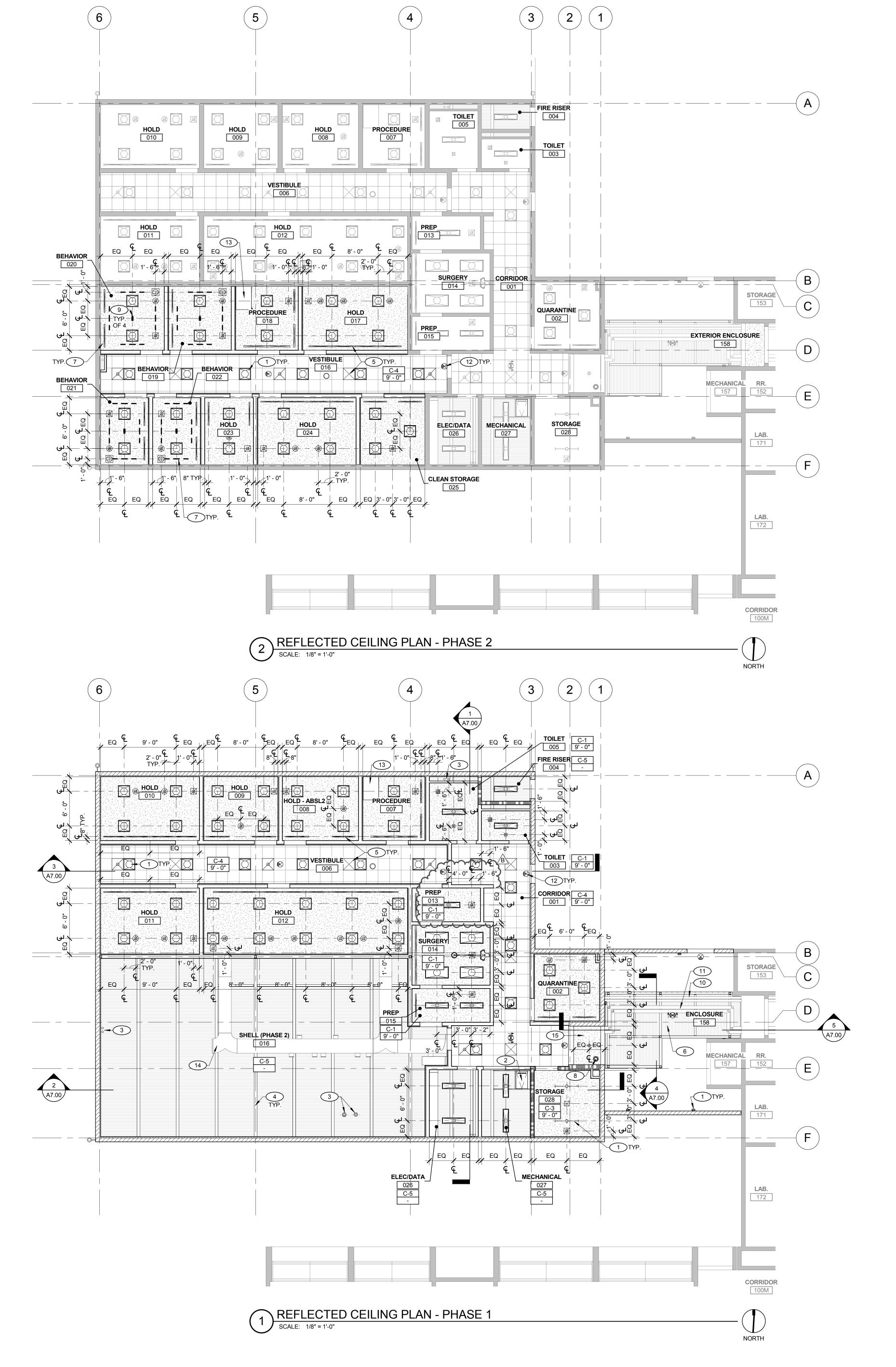




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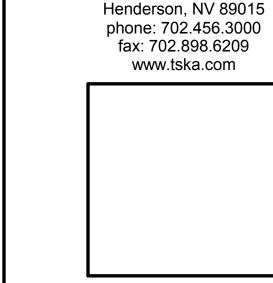
**NEVADA, LAS VEGAS** 

		REVISIONS
REV	DATE	DESCRIPTION
Α	08/05/16	ADDENDUM A
В	08/19/16	ADDENDUM B



#### **GENERAL NOTES**

- REFER TO MATERIAL SCHEDULE FOR CEILING COLOR AND FINISH. CEILING HEIGHTS ARE BASED ON FINISI FLOOR ELEVATIONS.
- MAINTAIN MINIMUM 6" CLEAR BETWEEN LIGHT FIXTURES, DIFFUSERS, ETC.
- CEILINGS ARE TYPE C-2, WITH A HEIGHT OF 9'-0", U.N.O.
- PROVIDE ACOUSTICAL SEALANT AT ALL PENETRATIONS THROUGH ACOUSTICAL PARTITIONS AND CEILINGS. PROVIDE FIRESTOP SEALANT AT ALL
- PENETRATIONS THROUGH RATED WALLS AND CEILINGS. ALL CEILING EQUIPMENT/DIFFUSERS TO BE AT LEAST 6" FROM WALLS.



303 South Water Street,

Suite 230

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ROOF HATCH - REFER TO ROOF PLAN ROOF DRAIN - REFER TO ROOF PLAN AND PLUMBING DRAWINGS STRUCTURE - REFER TO STRUCTURAL SUPPLY/EXHAUST REGISTER - REFER

**KEYNOTES** 

1 LIGHT FIXTURE - REFER TO ELECTRICAL

SHADE CANOPY - REFER TO STRUCTURAL DRAWINGS AND

TO MECHANICAL DRAWINGS

- 4'-0" UNISTRUT REFER TO DETAIL CEILING MOUNTED SECURITY CAMERA COLOR TO MATCH ADJACENT FINISH -REFER TO ELECTRICAL DRAWINGS
- OFOI CAMERA REFER TO DETAIL 10/A3.10 - PROVIDE BLOCKING CONDUIT - RUN TIGHT TO BOTTOM OF BEAMS, SUPPORT HANGERS FROM BEAMS AT CANOPY - REFER TO
- ELECTRICAL DRAWINGS HYDRONIC PIPING - RUN TIGHT TO BOTTOM OF BEAMS, SUPPORT HANGERS FROM BEAMS AT CANOPY -REFER TO MECHANICAL DRAWINGS EXIT SIGN - REFER TO ELECTRICAL
- DRAWINGS FUME HOOD, CFCI DUCTWORK - REFER TO MECHANICAL DRAWINGS
- **UNLV VIVARIUM** PLASTER SOFFIT, PAINT PC-3 - REFER TO DETAIL 11/A3.10
  - **4505 SOUTH MARYLAND PARKWAY** LAS VEGAS, NV 89154

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## **LEGEND**

GYPSUM BOARD CEILING **CEILING TILE** (C-4), REFER TO 6/A3.10 1' x 4' SURFACE MOUNTED LIGHT W/ LENS 1' x 4' TROFFER LIGHT 2' x 2' TROFFER LIGHT

2' x 4' TROFFER LIGHT SAFETY SHOWER HEAD

MECHANICAL SUPPLY MECHANICAL EXHAUST MECHANICAL THIMBLE EXHAUST CONNECTION SURGERY LIGHT

#### **KEYPLAN**

**- - -** 4'-0" UNISTRUT



**PERMIT SET** 

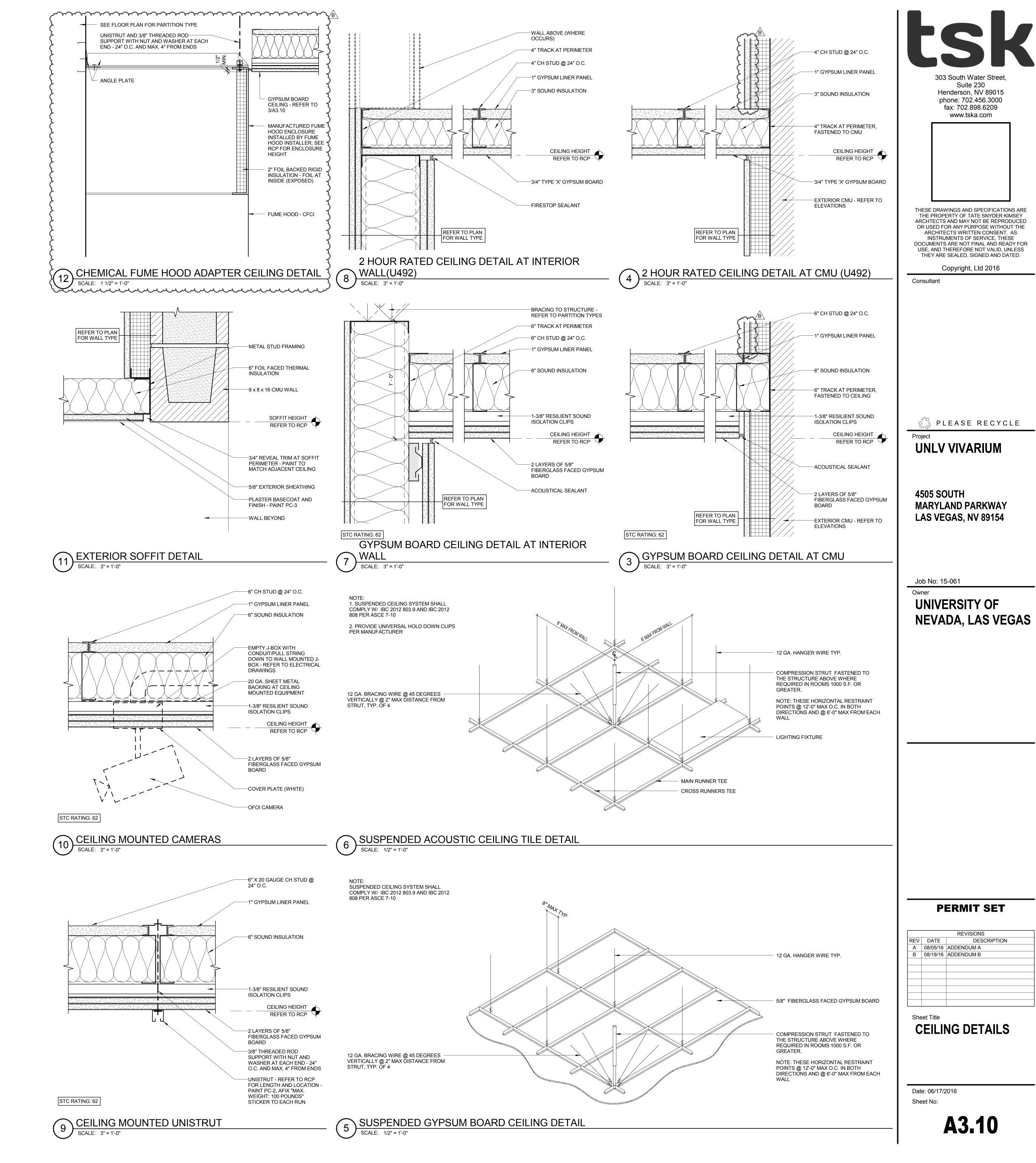
A 08/05/16 ADDENDUM A

B 08/19/16 ADDENDUM B

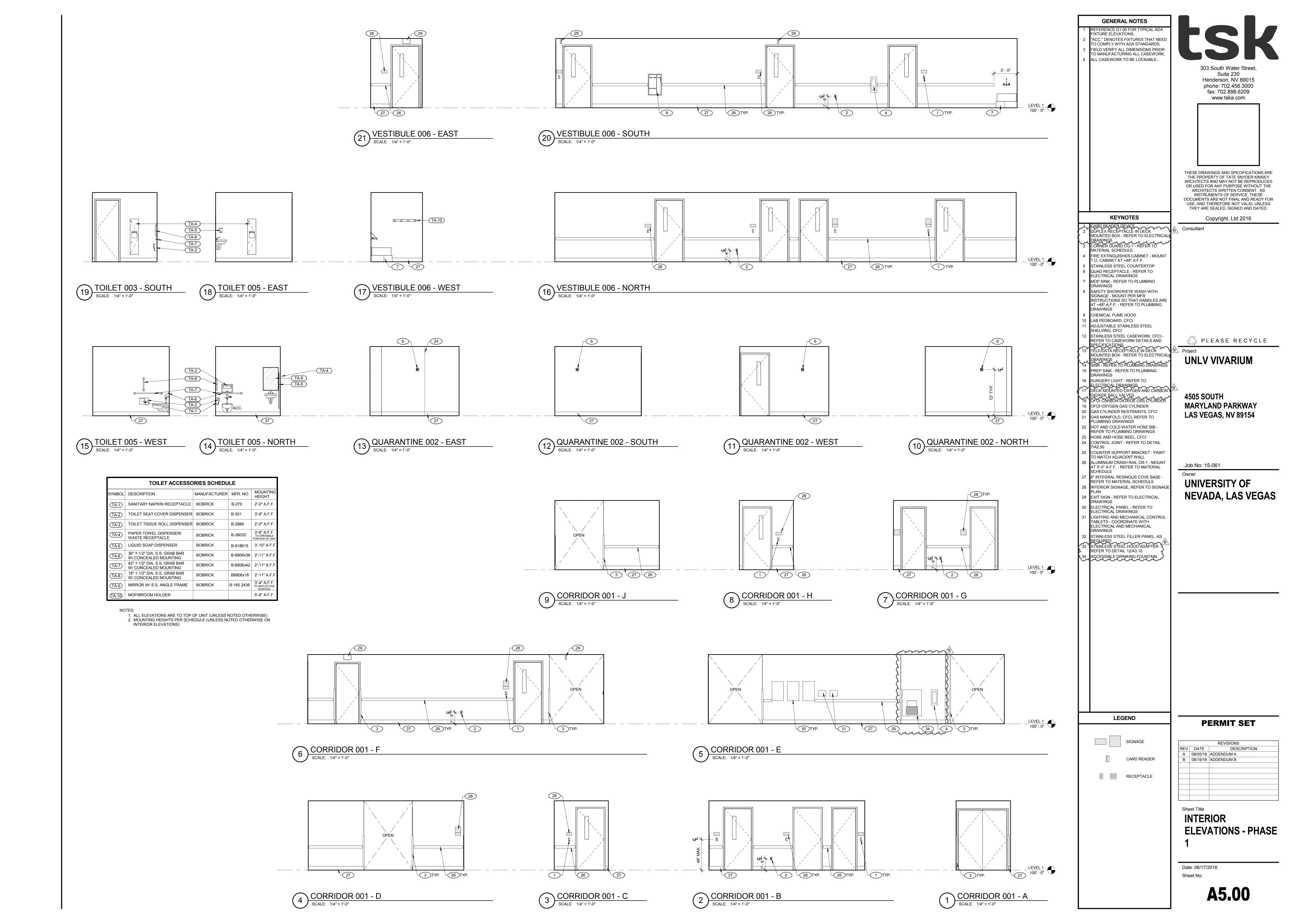
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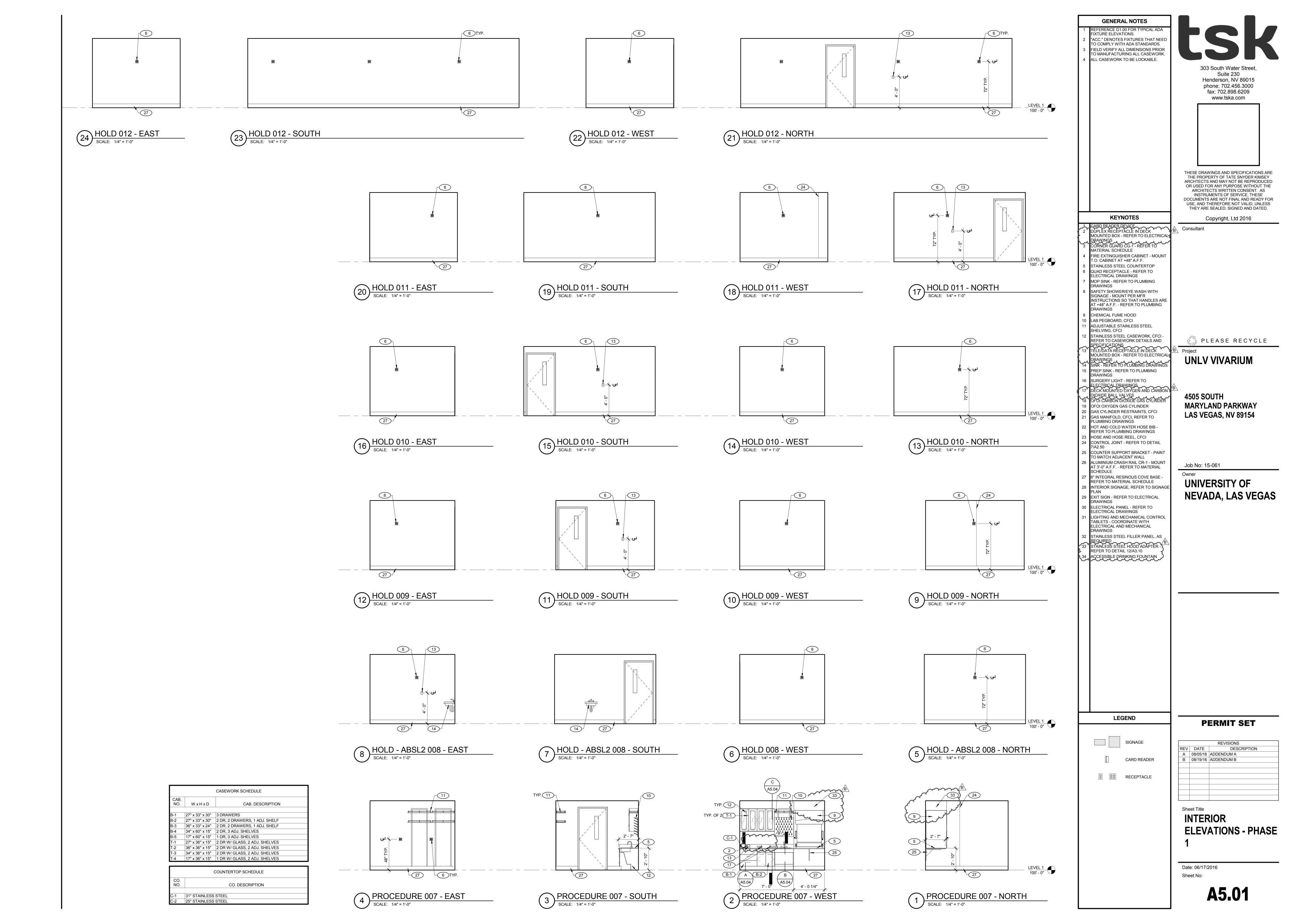
PHASED REFLECTED **CEILING PLANS** 

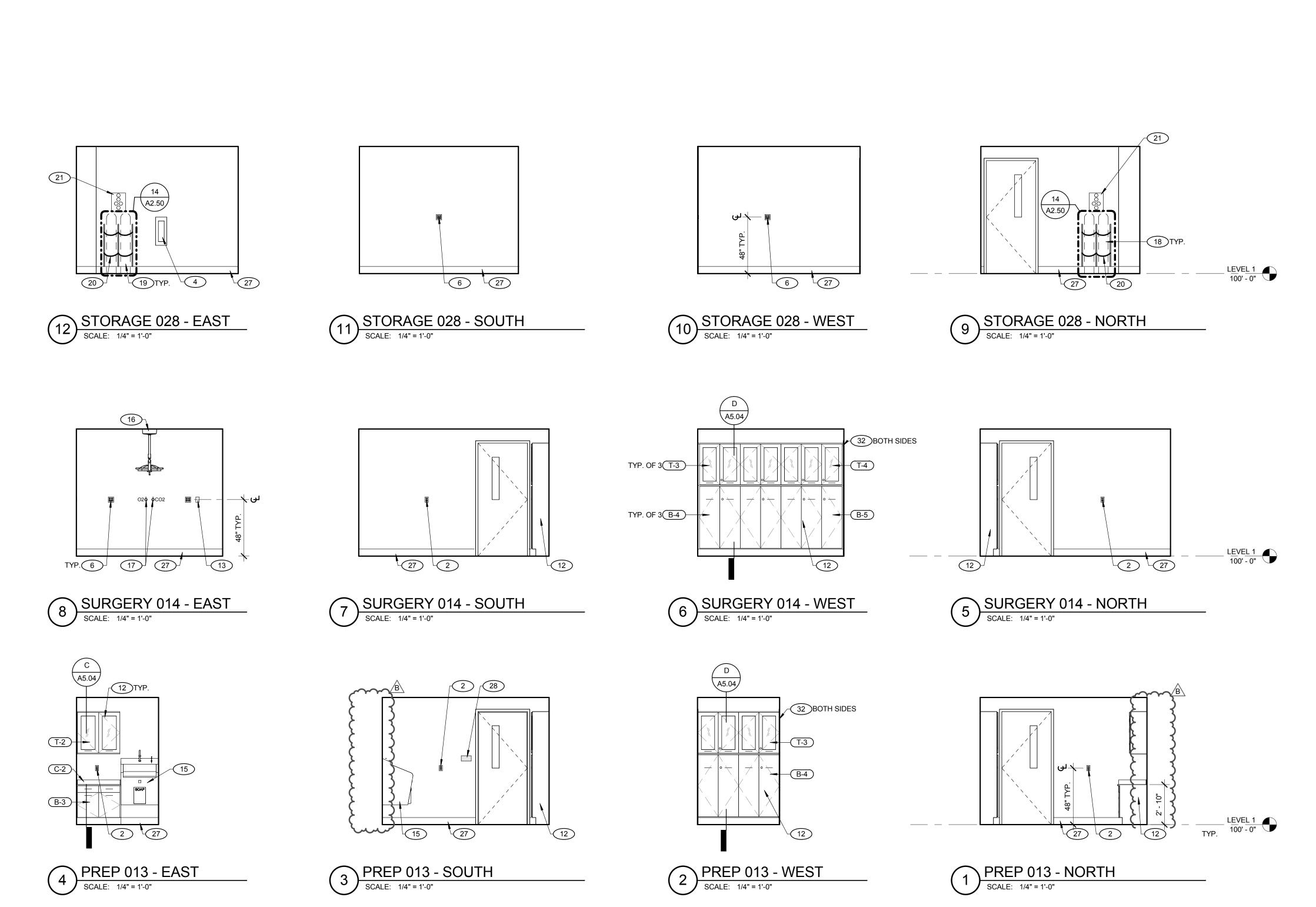
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CASEWORK SCHEDULE

27" x 33" x 30" 2 DR, 2 DRAWERS, 1 ADJ. SHELF

34" x 60" x 15" 2 DR, 3 ADJ. SHELVES 17" x 60" x 15" 1 DR, 3 ADJ. SHELVES

36" x 33" x 24" 2 DR, 2 DRAWERS, 1 ADJ. SHELF

27" x 36" x 15" 2 DR W/ GLASS, 2 ADJ. SHELVES

36" x 36" x 15" 2 DR W/ GLASS, 2 ADJ. SHELVES 34" x 36" x 15" 2 DR W/ GLASS, 2 ADJ. SHELVES 17" x 36" x 15" 1 DR W/ GLASS, 2 ADJ. SHELVES

COUNTERTOP SCHEDULE

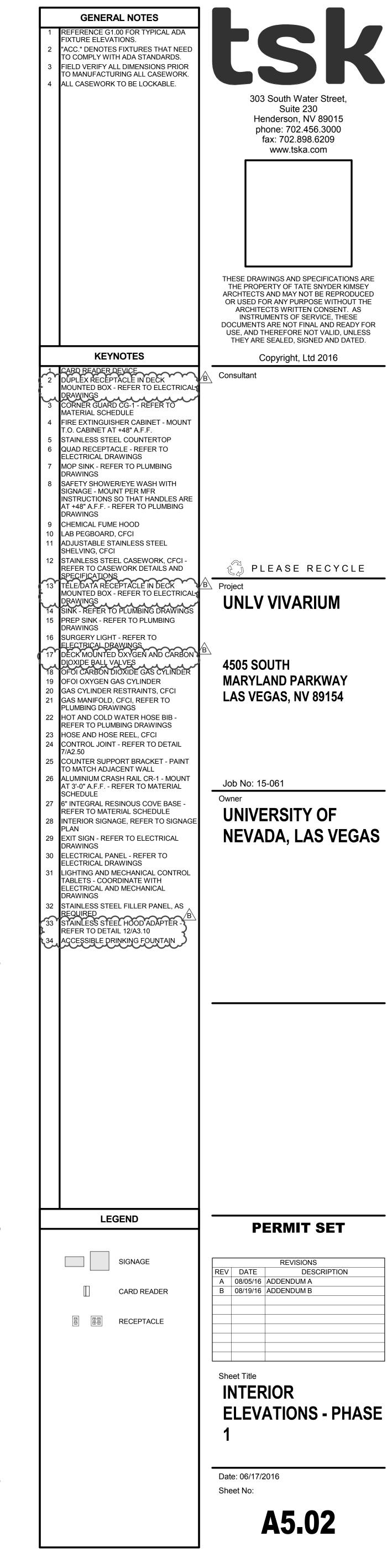
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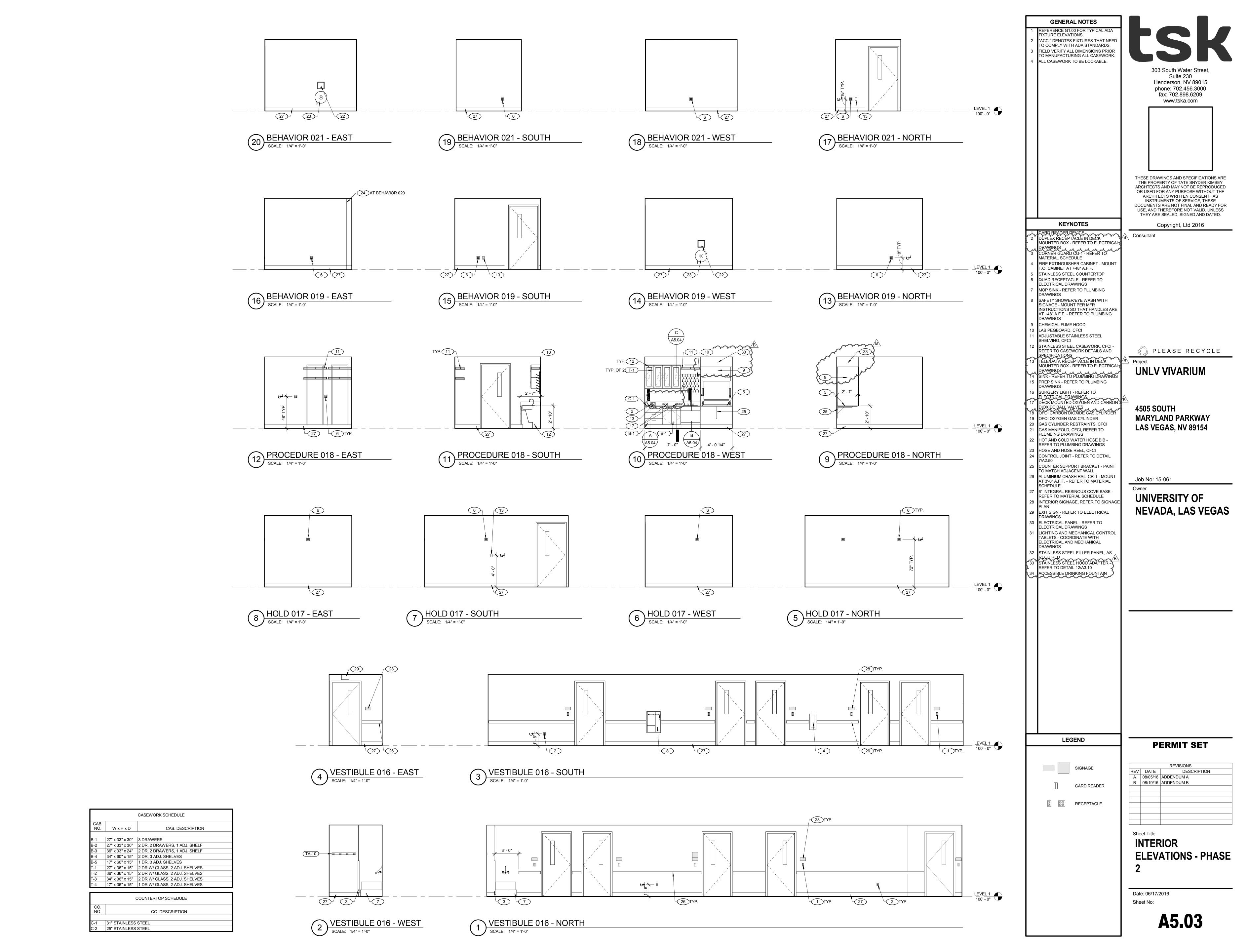
CAB. DESCRIPTION

CAB. NO. W x H x D

3-1 27" x 33" x 30" 3 DRAWERS

31" STAINLESS STEEL 25" STAINLESS STEEL





#### MECHANICAL SCHEDULES

#### ROOFTOP HEAT RECOVERY UNIT SCHEDULE (VRV HEAT PUMP/ HHW UNIT @ 2,200 FEET ELEVATION)

					H	IEAT EXCHANGE	ER/COOLING	SEASON	cod	OLING COIL	CAPACITY-I	DX, VARIABI	E VOLUME		S	UPPLY AIR					EXHAUS	T AIR		-	HEAT EXCHANG	GER/HEATI	NG SEASON		HEA	ATING COIL CA	PACITY-HEA	ATING HOT WATER	2 0	OUTDOOR-CONDENSING SECTION "DAIKIN VRV-IV UNIT"	ı	
	MANUFACTURER	0550 #110	AIR	011	INTAK	E AIR (OSA)	EXHA	JST AIR (ROO	M)			AIR SI	DE											INTA	KE AIR (OSA)	E	XHAUST AIR (	(ROOM)		AIR SIDE		WATER SIE	DE	INDOOR COMPRESSORS	OPER.	044504
SYMBOL	& MODEL NO.	SERVING	SYSTEM T	ON LOCATION PE	CFM (MAX)	PD ENT.AIR ( LVG.AIR (	CFM (MAX.)	PD ENT.A LVG.AI	IR(°F) IR (°F) WB MBI	AL SENS.	REF. CFN	AIR PD	ENT.AIR LVG.AIR(*F)	TOTAL CFM MAX MIN	EXT. SP IN.WG		CLY FAN WA OTOR HP # TOT	V/ø/HZ	TOTAL C	FM EXT. SP IN.WG	SP N N IN.WG EA.	T FAN SEC TOTOR HP # TOT	V/ø/HZ	CFM (MAX)	PD ENT.AIR	CFI (MA	M PD LV	NT.AIR VG.AIR(*F)	OTAL CFM	AIR PD LVG.	AIR(*F) AIR OB	LOW PD EWT	LWT VEL.	MCA MOP RLA V/ø/HZ	WT. REMARKS LB.	SYMBOL
AC V1	ALLIANCE 	VIVARIUM WHI	VARIABL VOLUME	ON ROOF	10,510	0.41 115 7	73 62 10,235	0.44 78 98.8	55.5 63.5	8 436.8 F	-410A 10,51	0 0.45 _	92.8 62 50.5 45.5	10,510 7,730	4.0	6.64 7.5	3 22	5 208/3/60	10,235 7,	455 3.0	3.1 15	2 30	208/3/60	10,510	0.48 27 57.9	10% 3%	35 0.43 7	75 –	495 10,510	0.05 5	7.9 05	4.75 1.5 180	140 490	2X36.3 4X72.6 2X45 4X90 2X26.2 4X52.4 208/3/60 208/3/60	26,000 SEE NOTES BELOW	AC V1

- 1. PROVIDE QUANTITY OF FANS SCHEDULED. CONNECTED HP SHALL NOT EXCEED THE SCHEDULE AMOUNT. 2. ALL MOTORS SHALL BE STANDARD FOOT MOUNTED TYPE TEAO SELECTED AT THE SPECIFIED OPERATING VOLTAGE, RPM, AND EFFICIENCY AS SPECIFIED IN SPECIFICATIONS. MOTORS SHALL MEET THE REQUIREMENTS OF NEMA MG-1
- 3. MOTORS SHALL BE AS MANUFACTURED BY TECO-WESTIGHOUSE, BALDOR, SIEMENS, OR TOSHIBA FOR USE IN
- MULTIPLE FAN ARRAYS THAT OPERATE AT VARYING SYNCHRONOUS SPEEDS AS DRIVEN BY AN APPROVED VFD, SEE
- 4. STEEL CASED MOTORS AND/OR ODP MOTORS ARE NOT ACCEPTABLE. 5. ALL MOTORS SHALL INCLUDE PERMANENTLY SEALED (L10-400,000 HR) BEARINGS AND AEGIS™ SHAFT GROUNDING

OVERLOAD PROTECTION.

DESIGN BASE

MAV-A-108-M

MAV-A-108-M

MAV-A-108-M

MAV-A-108-M

MAV-A-108-M

MAV-A-108-M

MAV - A - 108 - M

MAV-A-108-M

MAV-A-108-M

- TO PROTECT THE MOTOR BEARINGS FROM ELECTRICAL DISCHARGE MACHINING DUE TO STRAY SHAFT CURRENTS. 6. THE MULTIPLE FAN ARRAY AH UNIT SHALL PROVIDE, AS A MINIMUM THE SPECIFIED (BASE) UNIT'S ACOUSTICAL
- PERFORMANCE, FOR THE UNIT SUPPLY DISCHARGE OPENING(S), AND EXHAUST AIR OPENING(S). 7. EACH INDIVIDUAL CUBE OR CELL IN THE MULTIPLE FAN ARRAYS SHALL BE PROVIDED WITH AN INTEGRAL BACK FLOW PREVENTION DEVICE THAT PROHIBITS RECIRCULATION OF AIR IN THE EVENT A FAN OR MULTIPLE FANS
- BECOME DISABLED. 8. EACH FAN MOTOR SHALL BE INDIVIDUALLY WIRED TO A CONTROL PANEL CONTAINING MULTIPLE VFD'S. 9. EACH FAN & MOTOR ASSEMBLY SHALL BE REMOVABLE THROUGH A 24" WIDE, FREE AREA, ACCESS DOOR LOCATED
- ON THE DISCHARGE SIDE OF THE FAN WALL ARRAY WITHOUT REMOVING THE FAN WHEEL FROM THE MOTOR. 10. ALL MOTORS IN THE FANWALL ARRAY SHALL BE PROVIDED WITH INDIVIDUAL MOTOR PROTECTION FOR THERMAL
- 11. PROVIDE REMOTE INDICATION BY MEANS OF AUX CONTACTS WIRED IN SERIES. 12. PROVIDE MULTIPLE DANFOSS VARIABLE FREQUENCY DRIVE TO START AND RUN EACH ROW OF FAN MOTORS IN THE FANWALL ARRAY.
- 13. GRATE FLOORS SHALL BE PROVIDED AT SUPPLY AND RETURN AIR SECTIONS. 14. PROVIDE ACCESSIBLE SERVICE/SAFETY PLATFORM AT UPPER SECTION (EXHAUST FAN SECTION). SHOP DRAWINGS
- SHALL BE SUBMITTED AND THE FIELD MOUNTED ASSEMBLY/ARRANGEMENT SHALL BE APPROVED BY ARCHITECT AND UNLV PRIOR TO ORDERING OF THE UNIT. 15. ALL EXHAUST/RELEIF, OUTSIDE AIR AND RETURN AIR (MIXED AIR) SECTIONS OPENINGS SHALL BE EQUIPPED WITH
- DAMPERS TO BE CONTROLLED BY ELECTRIC MOTOR VIA BAS. 16. INSTALL CONTROL VALVES AND PIPING INSIDE UNIT ENCLOSURE (OR PROVIDE DOGHOUSE) WITH PROPER SIZE
- 17. PROVIDE WITH BACKDRAFT DAMPER ON OSA INTAKE AND EXHAUST AIR OPENINGS. 18. PROVIDE WITH FACTORY INSTALLED AIRFLOW MEASUREMENTS STATIONS ON RETURN/EXHAUST AND OUTSIDE/SUPPLY
- AIR SIDES. SEE SPECIFICATIONS FOR MORE DETAILS. 19. PROVIDE FACE AND BY-PASS DAMPER SECTION ON SUPPLY AIR SIDE.

ACCESS DOOR.

- 21. PROVIDE FILTERS AS FOLLOWS: \* 2"MERV-8 30% EFFICIENCY PRE-FILTERS FOR BOTH RETURN AND OUTSIDE AIR SECTIONS.
- 4"MERV-13, FINAL INLET FILTERS (UPSTREAM OF COILS, AT FAN SUCTION). 12"MERV-16, 95% EFFICIENCY FINAL FILTERS AT SUPPLY SIDE OF THE UNIT (DISCHARGE SIDE OF FAN). 22. PROMIDE WITH SINGLE POINT OF CONNECTION FOR HHWS&HHWR PIPING INSIDE UNIT PIPING CABINET (DOGHOUSE).

25. ALL INTERNAL REFRIG. PIPING TO EACH SET OF COOLING COILS SHALL BE FACTORY INSTALLED.

- 23. PROVIDE WITH HUMIDIFIER "H-V1", AND DRAIN PANS. RO WATER SHALL BE ROUTED INTO THE PIPING CABINET FOR CONNECTION TO PUMP PACKAGE BELOW. SEE SPECIFICATIONS FOR MORE DETAILS. PROVIDE HUMIDIFICATION
- SYSTEM EQUIPMENT AS SCHEDULED IN THIS SHEET. 24. PROVIDE WITH DUAL, TOTALLY INDEPENDENT REFRIGERANT CIRCUITS.

- 26. PROVIDE WITH INTELLIGENT SMOKE DETECTOR ON SUPPLY AIR SECTION. 27. SMOKE DETECTOR SHALL BE PROVIDED BY DIV. 16 AND INSTALLED BY UNIT MANUFACTURER.
- 28. PROVIDE WITH SINGLE POINT OF ELECTRICAL CONNECTION AND FACTORY INSTALLED DISCONNECT. 29. PROVIDE SEPARATE/DEDICATED POWER FOR BAS CONTROLS. SEE SPEC. FOR ADDITIONAL REQUIREMENTS. 30. PROVIDE WITH 120V, 20A GFIC SERVICE RECEPTACLE. SEE ELECTRICAL DRAWINGS.
- 31. PROVIDE TERMINAL BUSS (FOR BAS CONNECTION), UNIT BACNET CONTROL MODULE AND SENSORS WITH TEMPERATURE AND HUMIDITY CONTROL, SEE SPECS FOR CONTROLS AND "SEQUENCE OF OPERATION". 32. PROVIDE ADEQUATELY SIZED, VENTILATED CONTROL PANELS FOR HOUSING BAS DDC CONTROLLERS AND
- INSTRUMENTATIONS, TERMINAL BOARDS AND VFD'S. 33. PROVIDE PROPER AND ADEQUATE "LED" SERVICE LIGHTS IN DIFFERENT SECTIONS OF THE AC UNIT.
- 34. PROVIDE VIBRATION ISOLATORS AND SEISMIC SNUBBERS FOR MOVING PARTS, FANS, AND COMPRESSORS. 35. PROVIDE WITH MANUFACTURER ROOF CURB.
- 36. PROVIDE WITH BOTTOM DISCHARGE SUPPLY AND RETURN/EXHAUST DUCTWORK. 37. PROVIDE WITH HIGH PRESSURE, AND LOSS OF CHARGE/LOW PRESSURE SWITCH, AND CRANKCASE HEATER.

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					CAPACIT	Υ							
SYMBOL	MANUFACTURER & MODEL NO.	SERVING	CFM	GROSS (#/HR)	EVAP EFF. (%)	NET (#/HR)	EAT DB/WB (DEG F)	LAT (DEG F)	PUMP	NO OF NOZZLES	no of Zone Valves	NO OF MANIFOLDS	NOTES
H V1	MeeFOG	VIVARIUM WHI	10,510	240	99%	238	105/58	85	SEE "FPS-V1"	15	4	5	SEE BELOW.
1. ALL W	ETTED COMPONENTS	S TO BE STAIN	NLESS ST	EEL.		•	•	_					_

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50.5

50.5

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LABORATORY SUPPLY AIR VALVE SCHEDU	PLY AIR VALVE SCHED	)ULF
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LABUKAT	UK Y	SUPPLY	AIK V	ALVE	OCHEDOL

	MANUFACTURER: "PHOENIX CONTROLS CORP."				CI	FM (		<b>\\\\\\\</b>		REHEAT	COIL (@100% F	FLOW)		_		
SYMBOL	TYPE: "ACCEL-II VALVE"	VALVE SIZE	QTY OF VALVES	SERVICE	MAX	MIN >	мвн	GPM	EWT (°F)	LWT (°F)	RUN OUT SIZE	MAX. WATER PRESS. DROP	EAT ('F)	) LAT (°F)	MAX. AIR PRESS. DROP	REMARKS
	MODEL NO.:		OI VALVES			>			}		(INCH)	(FT. WG.)		}	(IN. WG.)	
SAV 001	MAV-A-112-M	12"	1	CORRIDOR 001	900	860	27	1.4	180	140	3/4"	5.0	50.5	80	0.10	1. PROVIDE WITH 24VAC POWER, CONTROL ENCLOSURE & REHEAT COIL CONNECTIONS ON SAME SIDE OF UNIT.
SAV 002 SAV 003	MAV-A-108-M	8"	1	QUARANTINE 002	300	210	9.5	.5	180	140	3/4"	5.0	50.5	80	0.10	<ul> <li>2. FURNISHED VALVE FOR MEDIUM PRESSURE SYSTEM.</li> <li>3. PROVIDE CIRCULAR FLANGES FOR SINGLE VALVES.</li> <li>4. PROVIDE EMERGENCY POWER FOR AIR CONTROL SYSTEM.</li> </ul>
SAV 003	MAV-A-108-M	8"	1	JANITOR 003	125	125	2.4	.1	180	140	3/4"	5.0	50.5	80	0.10	5. PROVIDE ALL VALVES WITH "TRACCEL" CONTROLS EXCEPT AS NOTED BELOW. 6. PROVIDE WITH "CELERIS" CONTROLS FOR "SAV-007" AND "SAV-018".

The state of the s

PROVIDE HEATING COIL WITH BELIMO "PICCY" VALVE. SEE DETAILS FOR PIPING. 3.5 3/4" 50.5 100 100 > 5.0 MAV-A-108-M INSTALL SPACE TEMPERATURE AND HUMIDITY SENSORS IN GENERAL EXHAUST DUCT, IMMEDIATELY DOWNSTREAM OF THE EXHAUST GRILL. 10" . AIR VALVES SHALL BE MANUFACTURED BY PHOENIX CONTROLS CORPORATION, 3/4" 425 22.4 5.0 MAV - A - 110 - MOR APPROVED EQUAL. 3/4" 430 430 5.0 0.10 MAV - A - 108 - M

3/4"

350 3/4" 275 5.0 50.5 0.10 MAV-A-108-M 350 310 5.0 50.5 0.10 MAV-A-108-M 450 310 3/4" 5.0 50.5 0.10 MAV-A-108-M 3/4" 450 5.0 0.10 MAV - A - 108 - M310 12" 3/4" MAV - A - 112 - M1,000 710 ( 1.5 180 5.0 50.5 0.10

175 125 3/4" 5.0 50.5 0.10 MAV-A-108-M 500 300 3/4" 5.0 50.5 0.10 MAV - A - 108 - M3/4" 175 125 MAV-A-108-M 5.0 50.5 0.10 10" 750 575 22.4 5.0 50.5 0.10 MAV - A - 110 - M500 410 15.3 3/4" 5.0 50.5 0.10 MAV-A-108-M PROCEDURE 430 3/4" 430 5.0 MAV-A-108-M 0.10 3/4" 275 175 8.2 5.0 MAV-A-108-M 180 50.5 0.10 3/4" 275 175 5.0

225

150

3/4" 225 150 5.0 225 210 5.0 3/4" 450 310 13 5.0 CLEAN STORAGE 3/4"

> 400 100 — NONE – 150 3/4" 100 5.0 250 150

FUME HOOD SCHEDULE (FOR REFERENCE ONLY. SEE ARCH. DWGS AND SPEC FOR EXACT INFORMATION)

DESIGN EXHAUST VOLUME OF 470 CFM WITH 18"SASH OPENING, AT 100FPM DESIGN VELOCITY IS SPECIFIED FOR FUME HOOD.

CONTROLS AND SENSORS BY BAS.

**EQUIPMENT SCHEDULE** MANUFACTURER SYMBOL DESCRIPTION SERVICE LOCATION REMARKS MODEL MEC. 027 Mee INDUSTRIES, 0.75 CU.FT. BRINE TANK SIZE, 15,000 GRAINS, HARDNESS (RO SYSTEM) REMOVAL PER REGENERATION. PROVIDE WITH 120V-1PH ELECTRICAL OUTLET. COMBINED RO SYSTEM AND PUMP PACKAGED W/PRE-PRESSURE ROS RO WATER MEC. 027 Mee INDUSTRIES, PUMP. ALL COMPONENTS SHALL BE MOUNTED ON A 304 (RO TANK) V1 / TREATMENT STAINLESS STEEL FRAME (SKID) INCLUDED WITH PIPING, VALVES & SYSTEM GAUGES FOR CONVENIENT INSTALLATION AND FIELD PIPING "MEERO-01-10 INTERFACE. UNIT SHALL BE PROVIDED WITH SINGLE MOTOR CONTROL PANEL AND SINGLE POINT OF ELECTRICAL CONNECTION, -3-RP" RPP PRESSURE MEC. 027 208V-60HZ-3PH., WITH FULL LOAD AMP OF 5.9. V1 / PUMP PACKAGE. (FOG PUMP SYSTEM) WITH CARBON FILTER. TIME CLOCK, TWIN ALTERNATING WATER SOFTENER, WATER HARDNESS TEST KIT, SOLENOID VALVE, REVERSE OSMOSIS MEMBRANE SYSTEM MODEL: MEEROC-011002. RO HIGH PRESSURE PUMP, ROTARY VANE PUMP, 304 SS, 3/4 HP, 1 GPM @ 210 PSI. PROVIDE WITH PUMP INLET LOW PRESSURE CUT-OFF SWITCH, AND RO INLET PLEATED CARTRIDGE FILTER. PROVIDE WITH RE-PRESSURE/RE-CIRCULATION SYSTEM, UV STERILIZER, 20GAL. FRP SHELL BLADDER TANK, AND RE-PRESSURIZATION PUMP CENTRIFUGAL PUMP 316 SS .33 HP, 2 GPM @ 42 PSI. UNIT OPERATING WEIGHT SHALL NOT EXCEED 800LBS. 55 GALLON RO WATER STORAGE TANK, POLYPROPYLENE CLEAR MEC. 027 "Mee INDUSTRIES, TANK, WITH REMOVABLE LID. WITH HIGH AND LOW LEVEL CONTROL ROT RO SYSTEM (RE-PRESSURE FLOATS. 26.5"DIA.X51" HEIGHT (INCLUDING SUPPORT LEGS/RACK), STORAGE TANK PROVIDE WITH 120VOLTS OUTLET. "PN20999b" UNIT OPERATING WEIGHT SHALL NOT EXCEED 500LBS. HIGH PRESSURE WATER ATOMIZATION TYPE PUMP UNIT, PUMP FOG PUMP SYSTEM MEC. 027 Mee INDUSTRIES, HUMIDIFIER MODEL: "CAT231", 1.6GPM (800LBS/HR), 2HP MOTOR, WITH ABB (@ <u>AC-V1</u>) ELECTRICAL REQUIREMENT: 230V-60HZ-3PH. PROVIDE WITH "MFP-800" 120V-1PH. ELECTRICAL OUTLET FOR SOLENOID VALVE PANEL.

UNIT OPERATING WEIGHT SHALL NOT EXCEED 600LBS.

			AIR DE\	ICE SCH	IEDULE				
TAG	SERVICE/ LOCATION	MANUFACTURER &	TYPE - FACE	TYPE OF	SIZE	MAX.	MAX.	MAX. PRESS.	REMARKS
IAG	SERVICE/ LOCATION	MODEL NUMBER	SIZE	CEILING	(IN)	CFM	N.C.	LOSS ("WC)	REMARKS
S1	SUPPLY AIR DIFFUSER SEE PLANS	"TITUS" MODEL FTI-20	LINEAR SINGLE SLOT 2"SLOT WIDTH 4FT. LONG	GYPSUM	8"ø INLET	175	10	0.08	W/ PLENUM
S2	SUPPLY AIR DIFFUSER SEE PLANS	"TITUS" MODEL FTI-30	LINEAR SINGLE SLOT 3"SLOT WIDTH 4FT. LONG	GYPSUM	10"ø INLET	110	10<	0.03	W/ PLENUM
S3	SUPPLY AIR DIFFUSER SEE PLANS	"TITUS" MODEL FTI-30	LINEAR SINGLE SLOT 3"SLOT WIDTH 5FT. LONG	GYPSUM	10"ø INLET	375	15	0.08	W/ PLENUM
S4	SUPPLY AIR DIFFUSER GENERAL, SEE PLAN	"TITUS" "TDC-AA"	SQUARE NECK	GYPSUM/ T-BAR	6X6- 6"Ø 8X8- 8"Ø 10X10-10"Ø 12X12-12"Ø 14"Ø 16"Ø	100 200 300 400 550 750	10	0.1	FOUR WAY ADJUSTABLE PATTERN, SQUARE TO RO ADAPTER ALUMINUM. USE 24X24 SIZE FOR T-BAR AREAS.
<b>S</b> 5	SUPPLY AIR REGISTER GENERAL, SEE PLAN	"TITUS" "272-FS"	WALL, SOFFIT, SIDEWALL	EXPOSED/ SOFFIT	8X6 12X6 16X6 18X8	150 210 300 450	15	0.1	DOUBLE DEFLECTION, ALUMINUM
E1	EXHAUST AIR GRILLE SEE PLAN	"TITUS" "350RL"	SQUARE NECK	GYPSUM	6X6 8X8 10X10 12X12 14X14	90 200 300 450 600	10	0.12	3/4" SPACING, 35° DEFLECTION W/ MATCHING SQUARE T ROUND ADAPTER.
E2	EXHAUST AIR GRILLE SEE PLAN	"TITUS" "350FL"	WALL	GYPSUM	6X6 8X8 10X10 12X12 24X12	90 200 300 450 750	25	0.12	34" SPACING-35 DEGREE DEFLECTION. PAINT PER ARCH. FINISH SCHEDULE.
E3	EXHAUST AIR GRILLE SEE PLAN	"TITUS" "350RL"	SQUARE NECK	T-BAR	24X24	800	10	0.12	3/4" SPACING, 35° DEFLECTION W/ MATCHING SQUARE TO ROUND ADAPTER.

1. INSIDE PORTION OF THE DIFFUSERS AND REGISTERS/GRILLES THAT ARE VISIBLE SHALL BE PAINTED FLAT BLACK. 2. PAINT DIFFUSER AS REQUIRED BY ARCHITECTURAL DRAWINGS. REFER TO ARCHITECT FOR CLARIFICATION.



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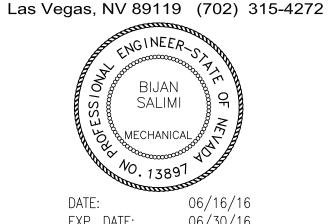
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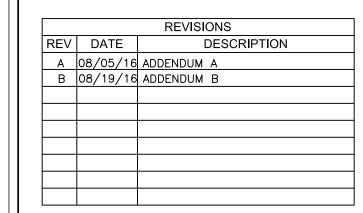
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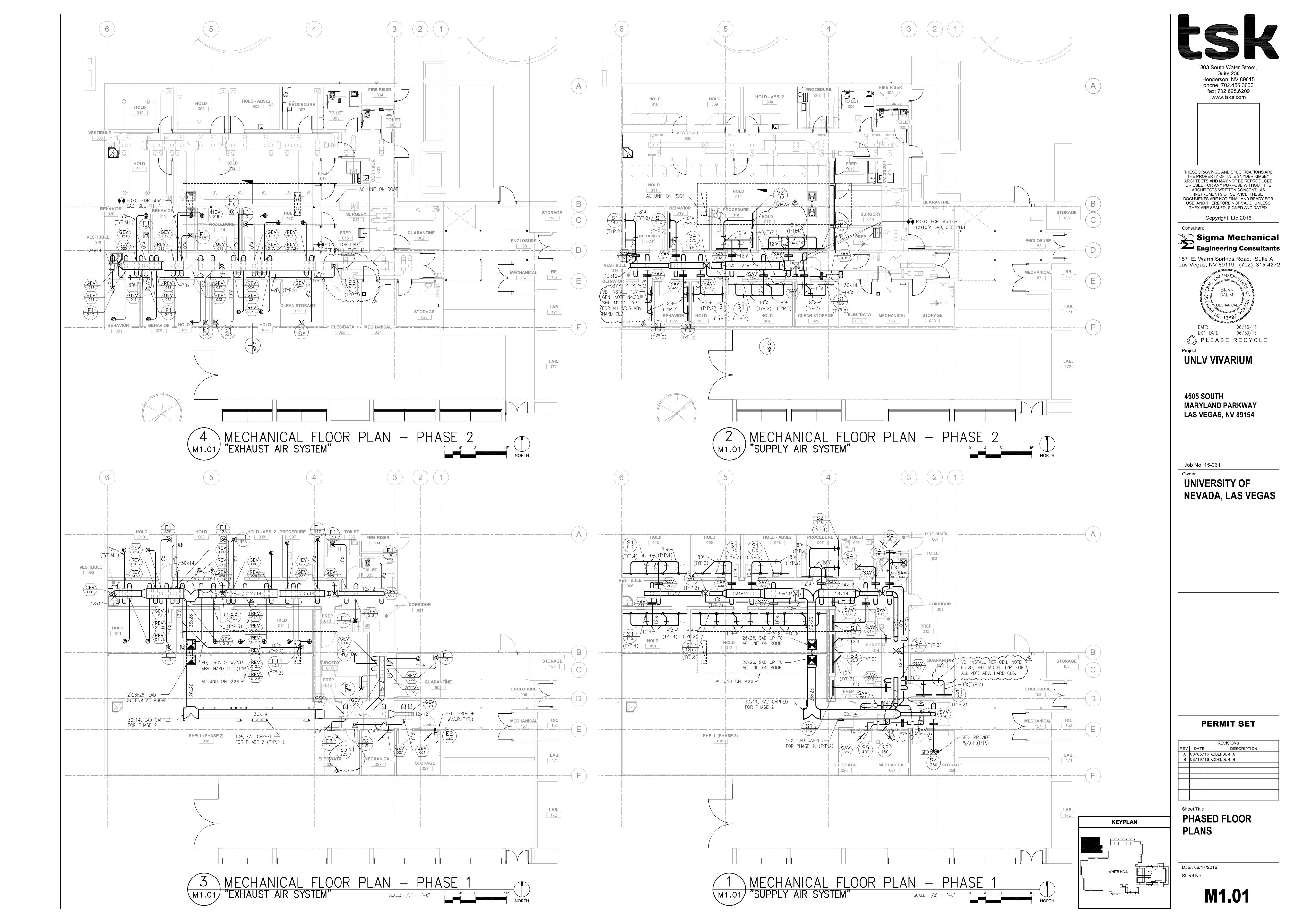
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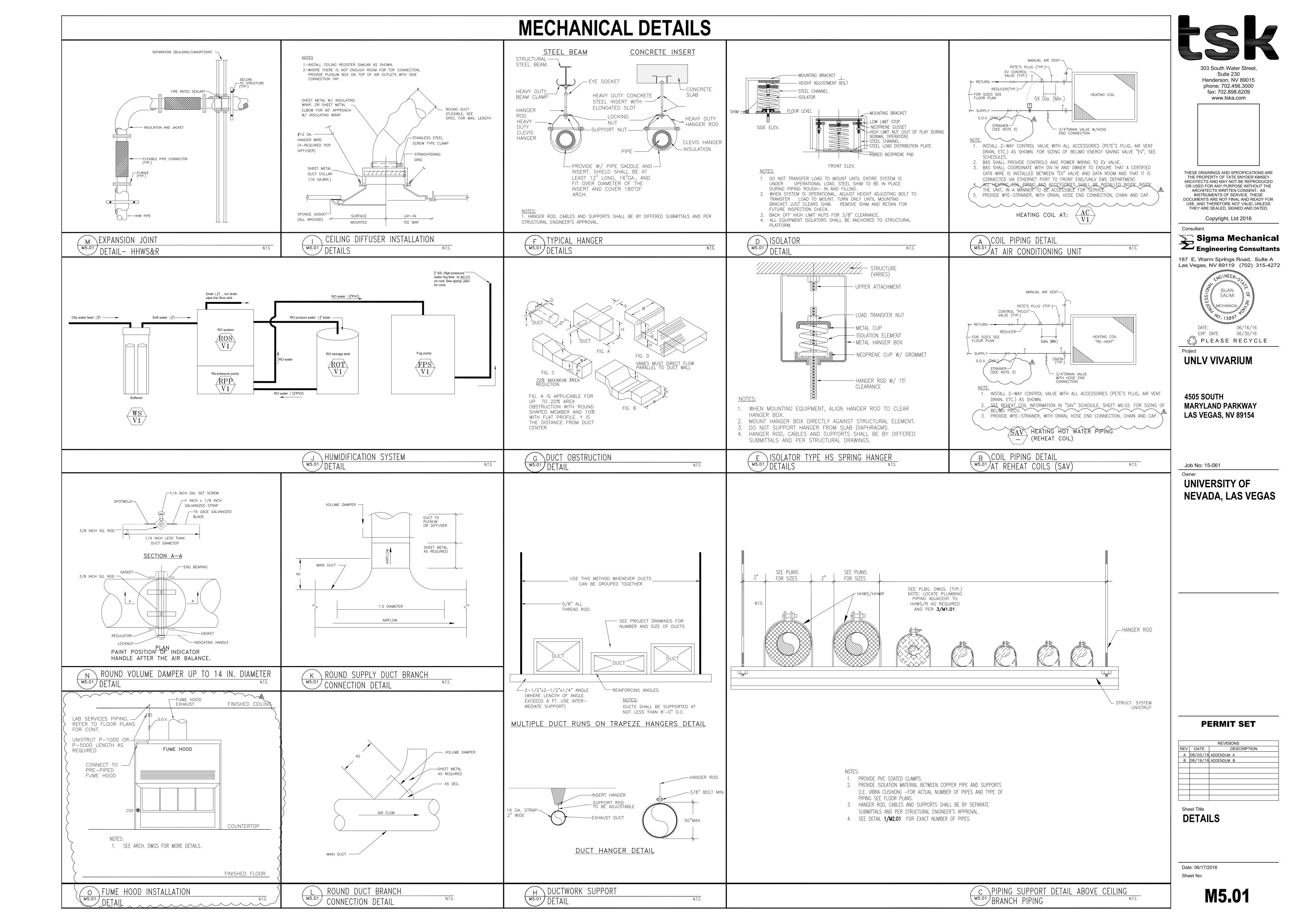
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Sheet Title **SCHEDULES** 

Date: 06/17/2016 Sheet No:





### PLUMBING SCHEDULES

							Pl	LUM	BIN	G FIX	TURE SCHED	DULE
			.U.			BRAN		1			TRAP	
MARK WC-1	DESCRIPTION	W	CW	W	V	CW	HW _	TW _	CC	02 02	, ,	REMARKS
	WATER CLOSET	6	8	4	2	1½		_			INTEGRAL	WALL HUNG, FLUSH VALVE, 1.3 GPF. PROVIDE WITH CARRIER., ADA COMPLIANT.
L-1	LAVATORY	1	1	2	1½	<u>3</u> 4	<u>3</u> 4	_			1½ × 1½	WALL HUNG,. WITH ELECTRONIC FAUCET AND MIXING VALVE. ADA COMPLIANT.
S-1	SINK W/FAUCETS — HOLD "ABSL2"	2	2	1 <u>1</u> "	1 <u>1</u> "	<u>3</u> "	<u>3</u> "	_			1½" X 1½"	PROVIDE WITH ACID WASTE AND VENT PIPING.
S-2	SINK W/FAUCETS — PROCEDURE	2	1	1 <u>1</u> "	1 <u>1</u> "	<u>3</u> "	<u>3</u> "	_			$1\frac{1}{2}$ " $\times$ $1\frac{1}{2}$ "	PROVIDE WITH ACID WASTE AND VENT PIPING.
S-3	SINK W/FAUCETS — PREP	2	1	1 <u>1</u> "	1 <u>1</u> "	<u>3</u> " 4	<u>3</u> "	_			1½" X 1½"	PROVIDE WITH ACID WASTE AND VENT PIPING.
SS-1	SERVICE SINK	3	3	3	2	<u>3</u> 4	<u>3</u> 4	_			3	FLOOR MOUNTED, WITH VACUUM BREAKER.
•	SAFETY SHOWER/EYEWASH	2	12	2"	1 <u>1</u> "	117"	_	_			2" X 2"	PROVIDE W/S.O.V., SEE PLANS FOR PIPING, DIRECT EYEWASH DRAIN AND FLOOR DRAIN FOR SHOWER.
	ELECTRIC WATER COOLER	1	.75	2	11/2	3/4	_	_			1½	WALL HUNG, ADA-COMPLIANT.
FD-1	FLOOR DRAIN	2	_	2	1 ½	_	_	_			2	RESTROOM. PROVIDE WITH TRAP PRIMER CONNECTION.
FD-2	FLOOR DRAIN	4	_	3	2	_	_	_			3	SAFETY SHOWERS. PROVIDE WITH TRAP PRIMER CONNECTION.
FS-1	FLOOR SINK	2	_	2	1 ½	_	_	_			2	MECH. RM. PROVIDE WITH HALF GRATE AND TRAP PRIMER CONNECTION.
FS-2	FLOOR SINK/RECEPTOR	4	_	4	2	_	_	_			4	FLOOR SINK WITH GRATE. PROVIDE WITH TRAP PRIMER CONNECTION.
FS-3	FLOOR SINK/RECEPTOR	3	_	3	2	_	_	_	_		3	FLOOR SINK WITH GRATE. EXTERIOR INSTALLATION.
HB-1	HOSE BIBB	_	5	_	_	3/4	3/4	_		-   -	_	RECESSED VALVE BOX WITH VACUUM BREAKER.
HB-2	HOSE BIBB, FILL FAUCET		12	_	_	1 1 1 "	1\frac{1}{4}"	_	_		_	BEHAVIOR ROOMS. RECESSED VALVE BOX WITH VACUUM BREAKER, LESS COVER. SEE DRAWINGS FOR INSTALLATION DETAILS
T-1	TURRET "CO2" (PROC/PREP)	_	_	_	_	_	_	_	1 2		_	WALL/SIDE MOUNTED (INDEX CO2)
T-2	TURRET "02" (PROC/PREP)	_	_	_	_	_	_	_	-	- 1/2	_	WALL/SIDE MOUNTED (INDEX 02)
										1		
TP-1	TRAP PRIMER	_	_	_	_	_	_	_			_	PPP PRIMERITE (REFER TO DWGS. FOR LOCATIONS.)
WHA-1	WATER HAMMER ARRESTOR	_	_	_	_	_	_	_	_		_	
RD-1	ROOF DRAIN	_	_	_	_	_	_	_	-	-   -	-	SEE PLANS FOR SIZE.
OD-1	OVERFLOW DRAIN	_	_	_	_	_	_	_	-		-	SEE PLANS FOR SIZE. WITH 2" DAM.
DN-1	DOWNSPOUT NOZZLE	_	_	_	_	_	_	_	_		_	SEE PLANS FOR SIZES AND LOCATIONS. INSTALL ON THE BUILDING'S EXTERIOR WALL.

									UTILITY SCH	HEDULE
	LOCATION	FIXTURE UNITS	G.P.M.	MAKE-L HVAC	JP (GPM)	TOTAL (G.P.M.)	MAIN SIZE(IN.)	PRESSURE (P.S.I.G.)	HARDNESS (GR/GAL)	REMARKS
WATER	VIVARIUM BLDG	117	75	-	_	75	2 1/2"	45 PSIG	-	SEE CIVIL DRAWINGS, BEYOND 5FT OF THE BUILDING.
	TOTAL	117	75	_	_	75	2 1/2"			
	LOCATION	FIXTURE UNITS	D	BUILDING RAIN(INCH	)	BUIL <b>SEWER</b>	DING <b>(INCH)</b>	ON-SITE <b>SEWER(INCH)</b>	PUBLIC SEWER(INCH)	REMARKS
SEWER	VIVARIUM BLDG	80		4		SEE	PLANS	SEE PLANS	_	SEE CIVIL DRAWINGS, BEYOND 5FT OF THE BUILDING.
	TOTAL	80		4			_			
	GAS METER LOCATION	SPACE HEATING (BOILER)	HVAC U ROOF	UNITS TOP I	WATER HEATING	KILI	N/ETC.	FOOD SERVICE	SCIENCE ROOMS	TOTAL (CFH) (SEE NOTES)
GAS (CFH) INPUT	NO GAS	-	_		ELEC.		_	_	_	_
CAPACITY	NATURAL GAS IS	ATURAL GAS IS NOT USED IN THIS PROJECT.								
STORM DRAINAGE	STORM DRAINAGE	SYSTEM I	FOR ROOF	F IS DESIG	SNED BASE	ED ON MA	XIMUM RA	INFALL OF 2 INCH	HES PER HOUR.	

					EQUIPMENT SCHEDULE
SYMBOL	DESCRIPTION	SERVICE	LOCATION	MANUFACTURER & MODEL	REMARKS
EWH 1	WATER HEATER ELECTRIC	DOMESTIC	SEE PLANS	A.O.SMITH DURA-POWER MODEL: DSE-80	COMMERCIAL ELECTRIC WATER HEATER, NON SIMULTANEOUS DUAL ELEMENTS, 80 GALLON CAPACITY. 28" DIA. x 52½" HEIGHT. 900 LBS WEIGHT. 24KW, 208 VOLTS, 3 PHASE, 66.6 FLA. PROVIDE WITH TEMPERATURE GAGE. SET AT 125°F HOT WATER SUPPLY TEMPERATURE.
DCP 1	CIRCULATING PUMP	DOMESTIC	SEE PLANS	B&G MODEL: "1AA"	CIRCULATING PUMP, 10GPM, 25FT HEAD, HP MOTOR, 115-230 VOLTS. SUPPORT PUMP INDEPENDENTLY PROVIDE AND INSTALL AQUASTAT.
DET 1	EXPANSION TANK	DOMESTIC WATER HEATER	SEE PLANS	AMTROL MODEL: ST-42V-C	EXPANSION TANK W/ POLYPROPYLENE LINER, BUTYL RUBBER DIAPHRAGM, STAINLESS—STEEL CONNECTION. FOR USE WITH POTABLE WATER SYSTEM W/ MAX. OPERATING TEMPERATURE OF 200°F AND PRESSURE OF 125 PSIG. 17.5 GALLON TANK —¾" CONNECTION, 16"DIA.X24.5" HEIGHT, 200 LBS. WEIGHT.

#### PLUMBING FIXTURE SPECIFICATION (SEE ARCHITECTURAL DRAWINGS FOR MOUNTING ELEVATION OF ALL PLUMBING FIXTURES.)

#### **DESCRIPTION**

WATER CLOSET (MARK WC-1):

ZURN NO. "Z5615-BWL" ECO VANTAGE, WALL HUNG, ELONGATED BOWL, WHITE VITREOUS CHINA TOILET WITH SOLID RING YK SUPPORT BRACKET,  $1\frac{1}{2}$ TOP SPUD BOWL, ZURN ZTR6200EV, 1.28 G.P.F. SENSOR OPERATED FLUSH VALVE AND Z5955SS-EL OPEN FRONT, WHITE SEAT. ADA COMPLIANT.

ZURN NO. "Z5351" 19" X 17", WALL HUNG, WHITE VITREOUS CHINA, WITH WALL SU[PPORT AND HANGER PLATE. ZURN AQUA-FIT BATTERY POWERED FAUCET #Z6950-XL-S. PROVIDE AND INSTALL "ZW3870XLT" AQUA-GARD THERMOSTATIC MIXING VALVE, WITH Z8800  $\frac{1}{2}$ " I.P.S. FLEXIBLE SUPPLIES WITH LOOSE KEY STOPS, ZURN Z8743-PC STRAINER WITH 14"TAILPIECE."ADA COMPLIANT".

SINK (MARK S-1): "BY OTHERS", SEE DIV. 11 SPECIFICATIONS.

SINK (MARK S-2): "BY OTHERS", SEE DIV. 11 SPECIFICATIONS.

SINK (MARK S-3):

"BY OTHERS", SEE DIV. 11 SPECIFICATIONS.

SERVICE SINK (MARK SS-1): UNDERMOUNT GROUP "B-33213", 16GAUGE, CORNER FLOOR MOP SINK, 30"SQUARE TYPE, 8" HEIGHT WITH STAINLESS STEEL STRAINER, 3" I.P.S. DRAIN, CHICAGO "540-LD-897S-WXFCP" FAUCET WITH VACUUM BREAKER SPOUT, 3" HOSE THREAD OUTLET, PAIL HOOK WITH WALL SUPPORT, WXF STRAIGHT SHANK WITH FLANGE, 8" CENTERS, #369 HANDLES.

SAFETY SHOWER/EYEWASH (MARK SSH/EW-1):

"BY OTHERS", SEE DIV. 11 SPECIFICATIONS. 1"WATER CONNECTION AND 2" FOR EYEWASH DRAIN. ELECTRIC WATER COOLER (MARK EWC-1): ELKAY NO. "LZS8L", WALL HUNG, STAINLESS STEEL FINISH, FRONT PUSH BUTTON, SINGLE LEVEL, 8GPG,

115V,370WATTS, ADA COMPLIANT. FLOOR DRAIN (MARK FD-1): ZURN FD2321-NH2 CAST IRON DRAIN, FLASHING COLLAR WITH 5" NICKEL-BRONZE WITH TRAP PRIMER

FLOOR DRAIN (MARK FD-2): ZURN FD2330-PV3-P-Y HEAVY DUTY, ADJUSTABLE, PVC BODY, WITH STEEL THREADED INSERTS AND 8" HEAVY DUTY FULL GRATE, AND SEDIMENT BUCKET. PROVIDE WITH TRAP PRIMER CONNECTIONS.

JR SMITH FIG. NO. 3100Y 2"NH. CAST IRON DRAIN 6"DEEP WITH NICKEL BRONZE RIM WITH HALF GRATE, WITH TRAP PRIMER CONNECTION AND DOME STRAINER.

FLOOR RECEPTOR (MARK FS-2): JOSAM 49420 SERIES, 16"SQUAREX12"DEEP, CAST IRON BODY RECEPTOR, WITH ACID RESISTING INTERIOR, HEAVY DUTY  $\frac{1}{4}$ " SQUARE GRATE, AND INTERIOR BOTTOM DOME STRAINER. PROVIDE WITH TRAP PRIMER CONNECTIONS. 4"PIPE SIZE (49424).

FLOOR RECEPTOR (MARK FS-3): JOSAM 49420 SERIES, 16"SQUAREX12"DEEP, CAST IRON BODY RECEPTOR, WITH ACID RESISTING INTERIOR, HEAVY DUTY  $\frac{1}{4}$ " SQUARE GRATE FOR EXTERIOR INSTALLATION. PROVIDE WITH INTERIOR BOTTOM DOME STRAINER. 3"PIPE SIZE (49423).

HOSE BIBB (MARK HB-1):

CONNECTIONS.

ACORN SS RECESSED DUAL TEMP. (COLD AND HOT) VALVE BOX, NO. "8156", 3"HOSE CONNECTIONS, WITH VACUUM BREAKERS, AND WHEEL HANDLES.

HOSE BIBB (MARK HB-2):

ACORN SS RECESSED HOT AND COLD VALVE BOX, NO. "8156", LESS COVER, 3/4"HOSE CONNECTION, WITH VACUUM BREAKER, AND WHEEL HANDLE. TURRET "CO2" (MARK T-1):

"BY OTHERS", SEE DIV. 11 SPECIFICATIONS. TURRET "02" (MARK T-2):

"BY OTHERS", SEE DIV. 11 SPECIFICATIONS.

TRAP PRIMER (MARK TP-1): PPP PRIMERITE TRAP PRIMER, "PR-500". REFER TO DRAWINGS FOR LOCATIONS.

WATER HAMMER ARRESTOR (MARK WHA-1):

DECK CLAMP. FOR WOOD DECKS USE SUMP RECEIVER.

JAY R. SMITH #5005- $\frac{3}{4}$ ", "A" FOR 1-11 FIXTURE UNITS/ JAY R. SMITH #5010-1", "B" FOR 12-32 FIXTURE UNITS JAY R. SMITH #5020-1", "C" FOR 33-60 FIXTURE UNITS. ROOF DRAIN (MARK RD-1):

DECK CLAMP. OVERFLOW DRAIN (MARK OD-1): J.R. SMITH NO. 1080-Y-C DRAIN WITH DUCO CAST IRON BODY, CAST ALUMINUM DOME AND UNDER

J.R. SMITH NO. 1010-Y-C DRAIN WITH DUCO CAST IRON BODY, CAST ALUMINUM DOME AND UNDER

DOWNSPOUT NOZZLE (MARK DN-1): ZURN NO. Z199, ALL NICKEL BRONZE BODY, WITH WALL FLANGE AND OUTLET NOZZLE.

#### POTABLE WATER PIPE SIZING CALCULATIONS

#### COLD/HOT WATER PIPE SIZING TABLE

4. MISC. MAKE UP/ EQUIPMENT

(A) PRESSURE AVAILABLE: MAXIMUM 45 PSIG, AT BUILDING.

(B) WATER HARDNESS: NA

(C) TOTAL FIXTURE UNITS: (FLUSH VALVE)

(D) WATER DEMAND: 1. DOMESTIC 2. IRRIGATION NIGHT USE ONLY 3. A/C EQUIPMENT (RO)

5. MISC.

73 GPM N/A GPM N/A GPM - GPM

TOTAL 75 GPM

PRESSURE AVAILABLE: (PSIG, MIN. CALCULATED) +: 35 PSIG RESIDUAL PRESSURE (PSI) -: <u>25</u> PSI -: <u>3</u> PSI LOSS DUE TO ELEVATION (PSI) -: <u>N/A</u> PSI LOSS THRU METER (PSI) LOSS THRU PRV (PSI) -:<u>N/A</u> PSI LOSS THRU BACKFLOW PREVENTER (PSI) -:<u>N/A</u> PSI

FRICTION LOSS PER 100FT.  $\underline{7}$  \*100 /  $\underline{200}$  =  $\underline{3.5}$  PSI PER 100 FT

PRESSURE AVAILABLE FOR FRICTION LOSS (PSI) : \_\_\_\_7\_\_\_ PSI

PIPE SIZES BASED ON "L" COPPER, @ 3.0 PSI/100 FT., 10 FPS MAXIMUM

FIXTURE UNITS <u>FIXTURE UNITS</u> <u>FT.</u> <u>FV.</u> <u>GPM</u>  $1\frac{1}{2}$  = 47 10 28  $\frac{3}{4}$ " = 5 - 4.5 1" = 13 - 102" = 171 74 60  $1\frac{1}{4}$ " = 25 - 17.5  $2\frac{1}{2}$ " = 401 263 105

					BY OTHERS" SCHEDULE ND DIV. 11 SPEC FOR EXACT INFORMATION)
MARK	DESCRIPTION	CO2	02	EXH. (CFM)	REMARKS
1	FUME HOOD	3" 4	-	SEE NOTE 3.	1. SEE DIV. 11 SPEC. 2. SEE PLBG. PLAN FOR PIPING. 3. SEE MECH. DWGS. FOR EXHAUST DUCTWORK.
2	CO2 CYLINDERS AND MANIFOLD	3" 4	_	_	1. SEE DIV. 11 SPEC. 2. SEE PLBG. PLAN FOR PIPING.
3	OXYGEN CYLINDERS AND MANIFOLD	_	<u>3</u> "	_	1. SEE DIV. 11 SPEC. 2. SEE PLBG. PLAN FOR PIPING.
S-1	SINK-HOLD "ABSL2"	_	_	_	1. SEE DIV. 11 SPEC. "SK-1" 2. SEE PLBG. PLAN FOR PIPING. 3. SEE SCHEDULE FOR ROUGH-INS.
S-2	SINK-PROCEDURE	_	_	_	1. SEE DIV. 11 SPEC. "SK-2" 2. SEE PLBG. PLAN FOR PIPING. 3. SEE SCHEDULE FOR ROUGH-INS.
S-3	SINK-PREP	_	_	_	1. SEE DIV. 11 SPEC. "SK-3" 2. SEE PLBG. PLAN FOR PIPING. 3. SEE SCHEDULE FOR ROUGH-INS.
SSH/EW-1	SAFETY SHOWER/ EYEWASH	_	_	-	1. SEE DIV. 11 SPEC. 2. SEE PLBG. PLAN FOR PIPING. 3. SEE SCHEDULE FOR ROUGH—INS.
T-1	PROCEDURE/PREP	1"	_	_	1. SEE DIV. 11 SPEC. 2. SEE PLBG. PLAN FOR PIPING AND LOCATION(S) 3. SEE SCHEDULE FOR ROUGH—INS.
T-2	PROCEDURE/PREP	_	1"	-	1. SEE DIV. 11 SPEC. 2. SEE PLBG. PLAN FOR PIPING AND LOCATION(S). 3. SEE SCHEDULE FOR ROUGH—INS.



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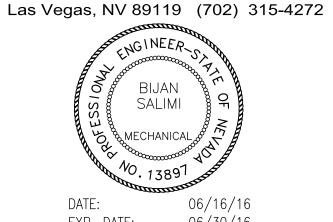
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Project **UNLV VIVARIUM** 

**4505 SOUTH** MARYLAND PARKWAY LAS VEGAS, NV 89154

Job No: 15-061

**UNIVERSITY OF NEVADA, LAS VEGAS** 

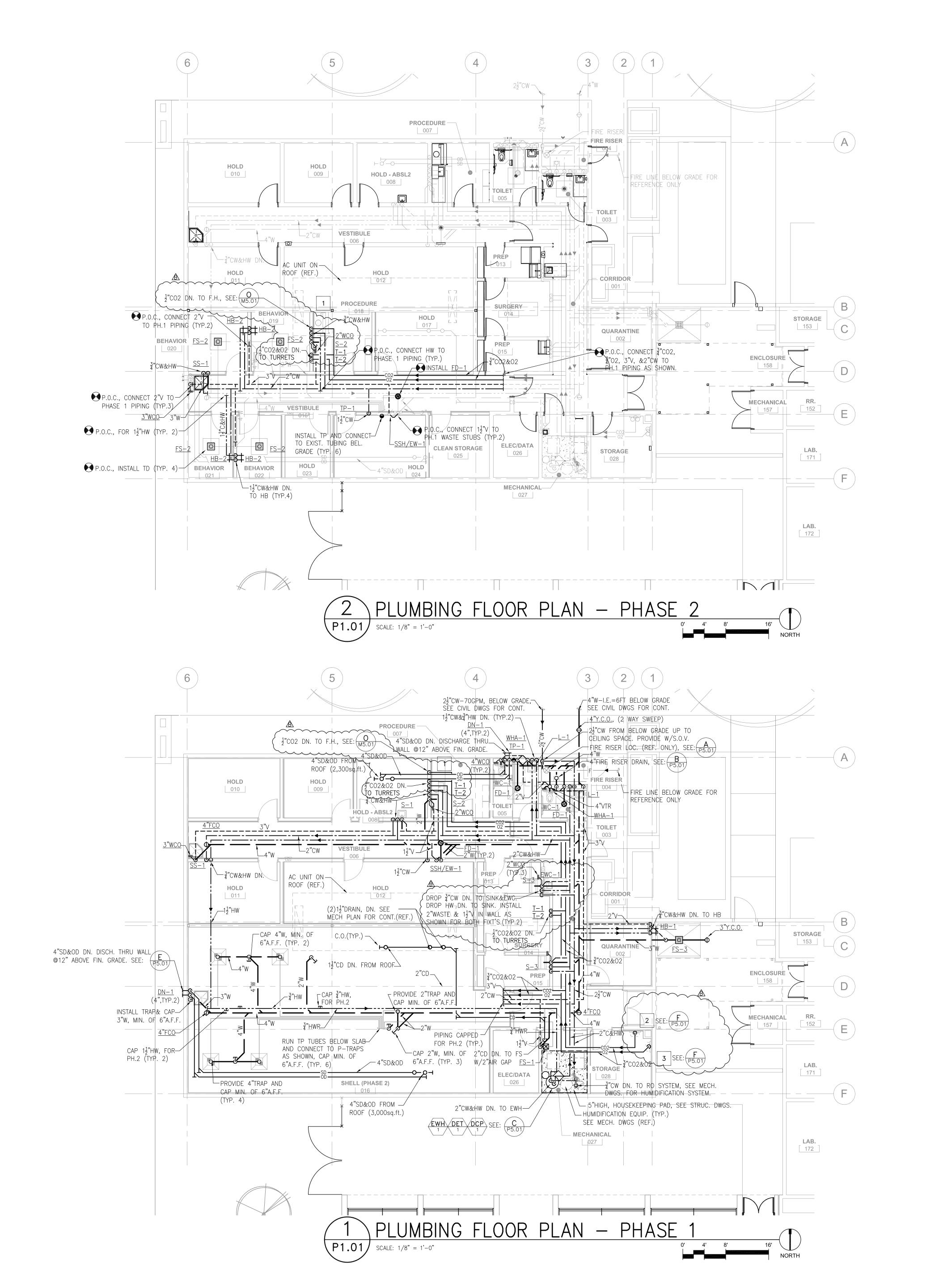
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		REVISIONS
REV	DATE	DESCRIPTION
Α	08/05/16	ADDENDUM A
В	08/19/16	ADDENDUM B

**SCHEDULES** 

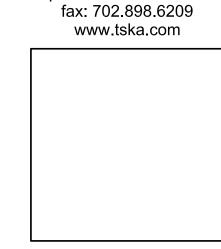
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Job No: 15-061

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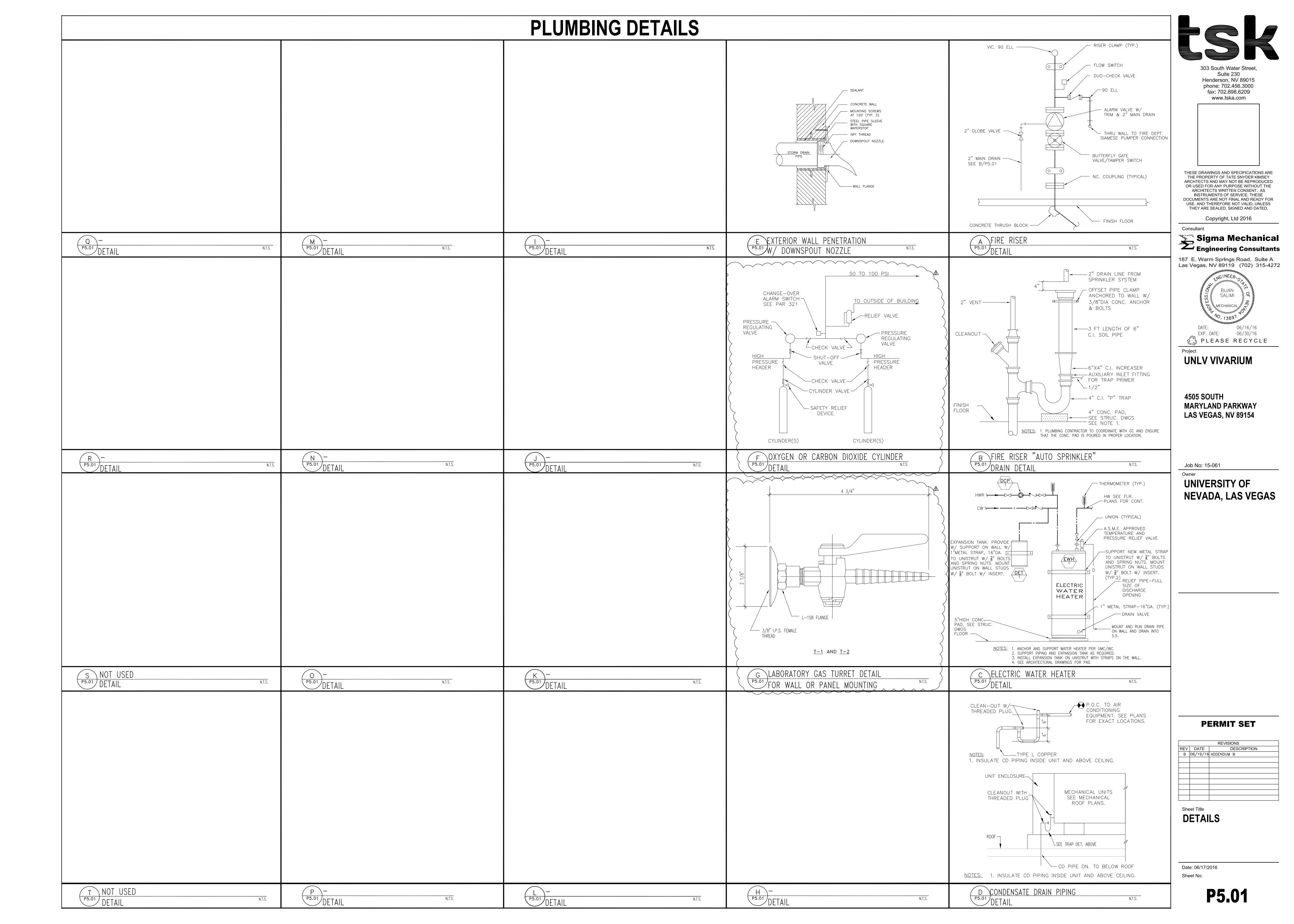
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REV	DATE	DESCRIPTION
В	08/19/16	ADDENDUM B

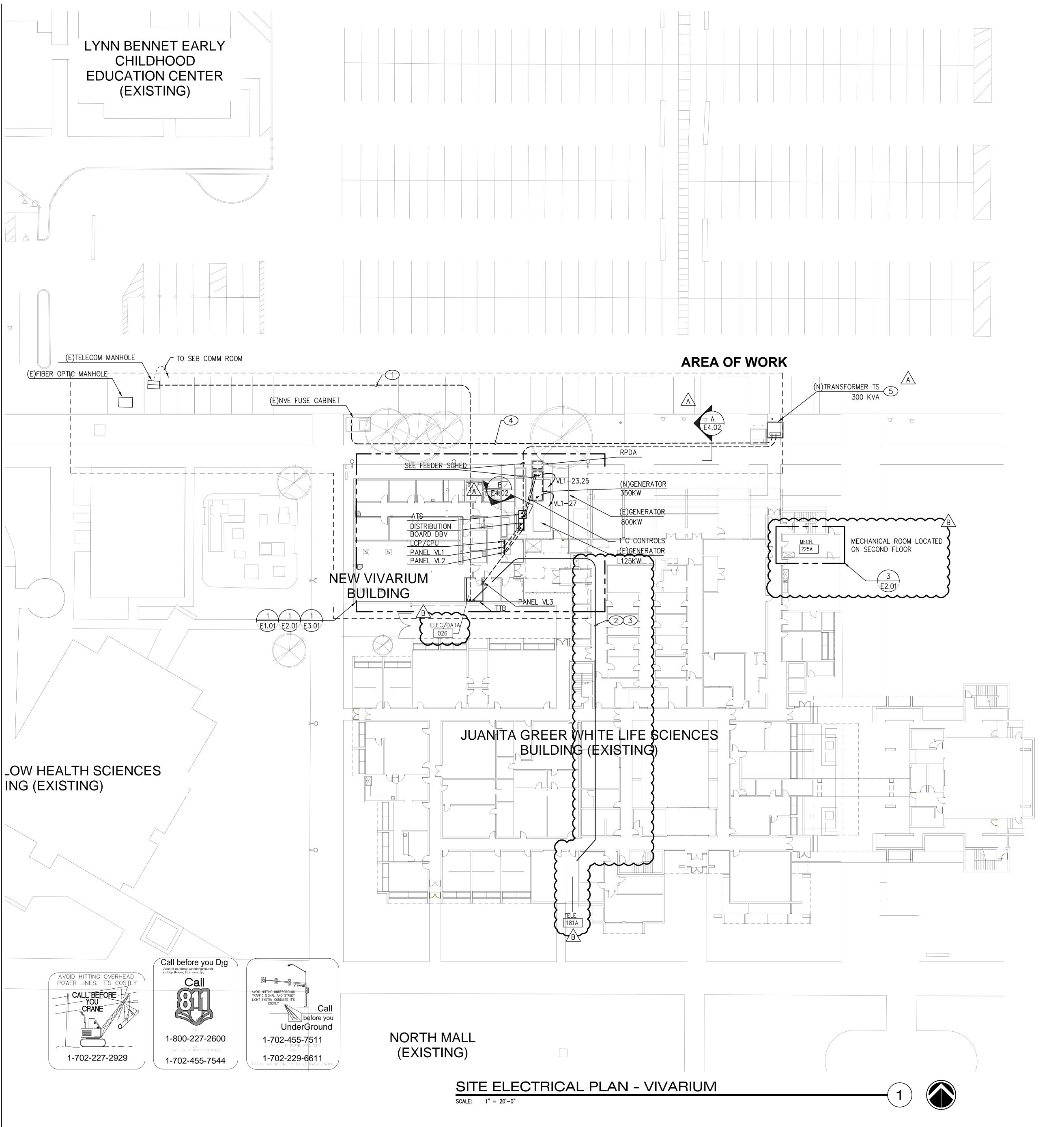
PHASED FLOOR
PLANS

Date: 06/17/2016

**KEYPLAN** 

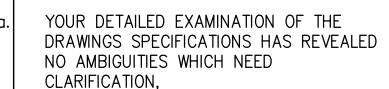
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- THE EXPERIENCE AND CAPABILITIES OF YOUR FIRM, YOUR WORKERS, AND SUBCONTRACTORS ARE ADEQUATE AND APPROPRIATE TO PERFORM THE CONSTRUCTION OF THIS TYPE OF PROJECT.

**KEYNOTES** 

4" C.O. WITH PULL STRING FROM EXISTING

COMMUNICATIONS MANHOLE TO ROOM 026

TELEPHONE TERMINAL BACKBOARD 'TTB'.

PROVIDE (2) 4" C.OL. WITH PULL TAPE

FROM ROOM 026 TTB TO WHITE HALL

3. PROVIDE 24-STRAND SM FIBER FROM ROOM 026 TTB TO WHITE HALL ROOM 181A.

INSTALL FIBER IN 1-1/4" INNER DUCT

PROVIDE TRANSFORMER PAD, BOLLARDS,
AND PRIMARY AND SECONDARY DUCTBANK

CONDUITS PER NVE PROJECT DRAWINGS.
TRANSFORMER AND PRIMARY & SECONDARY
CONDUCTORS BY NVE.

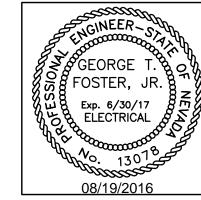
1. ROUTE CONDUIT AROUND TREES.

VERIFY LOCATION.

PLENUM SPACE.

# LSK

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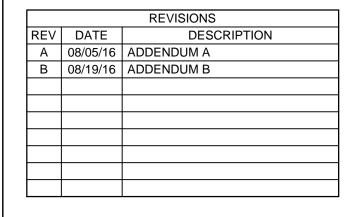
**UNLV VIVARIUM** 

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Job No: 15-061

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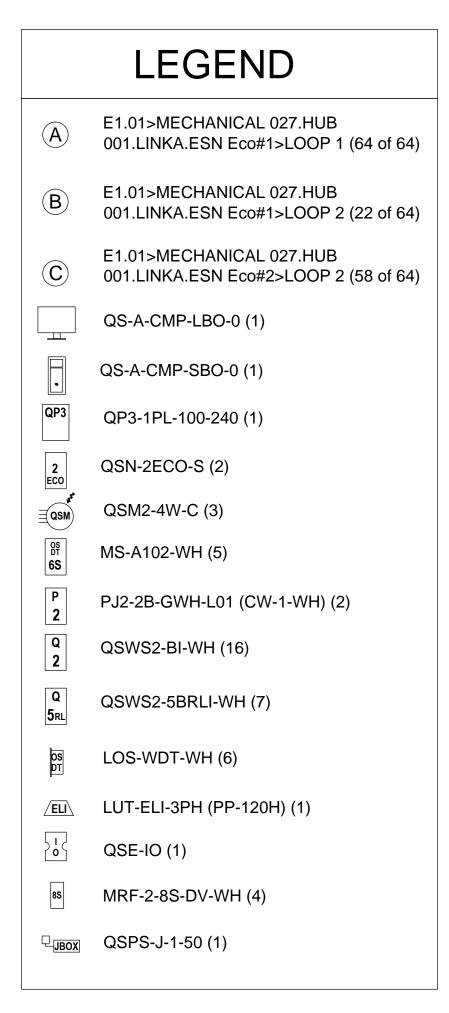
SITE ELECTRICAL PLAN- VIVARIUM

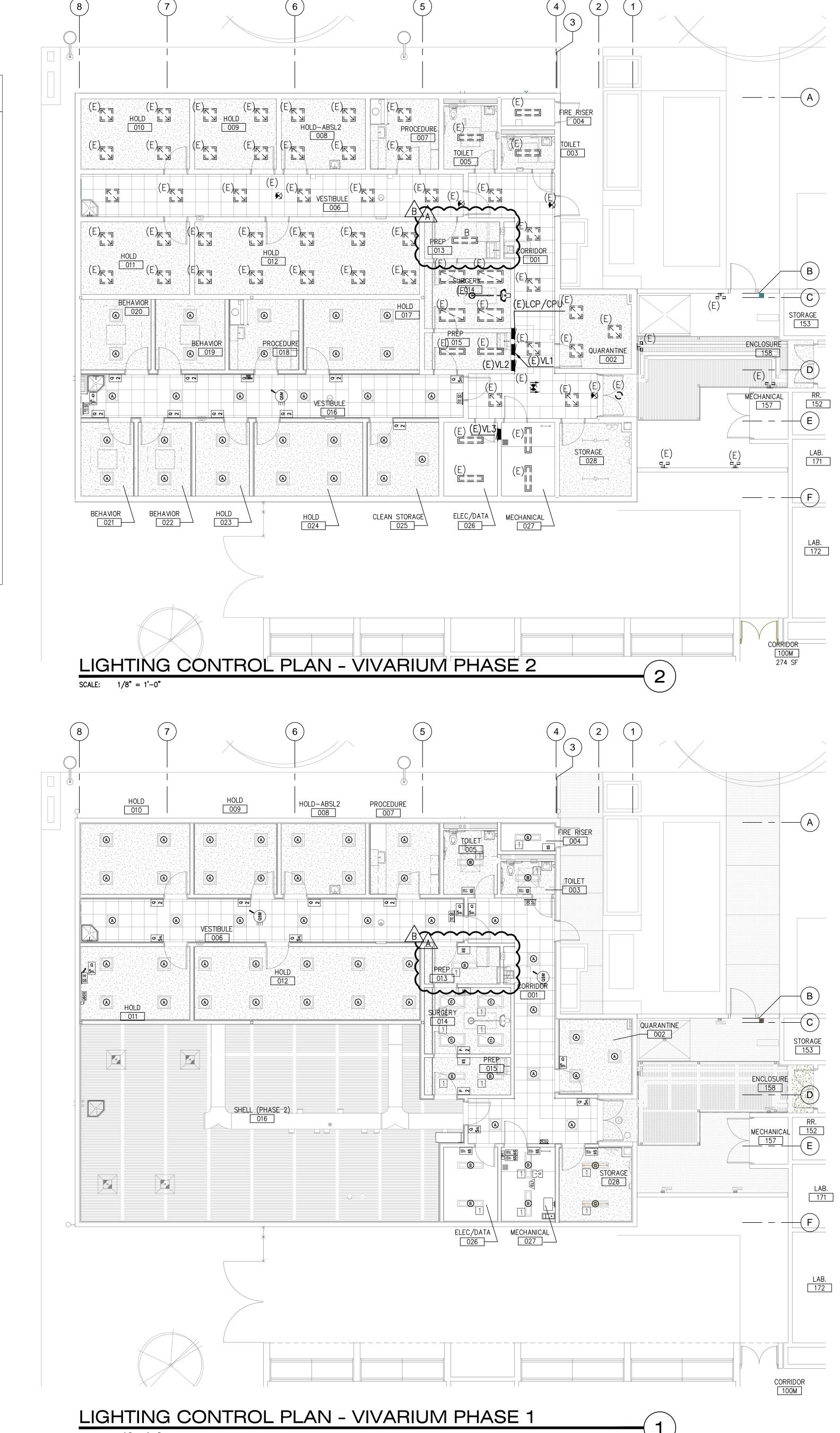
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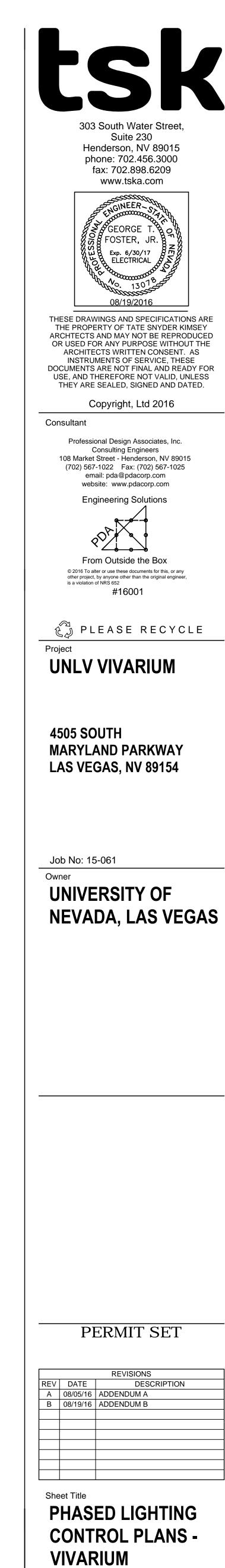
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KEYPLAN



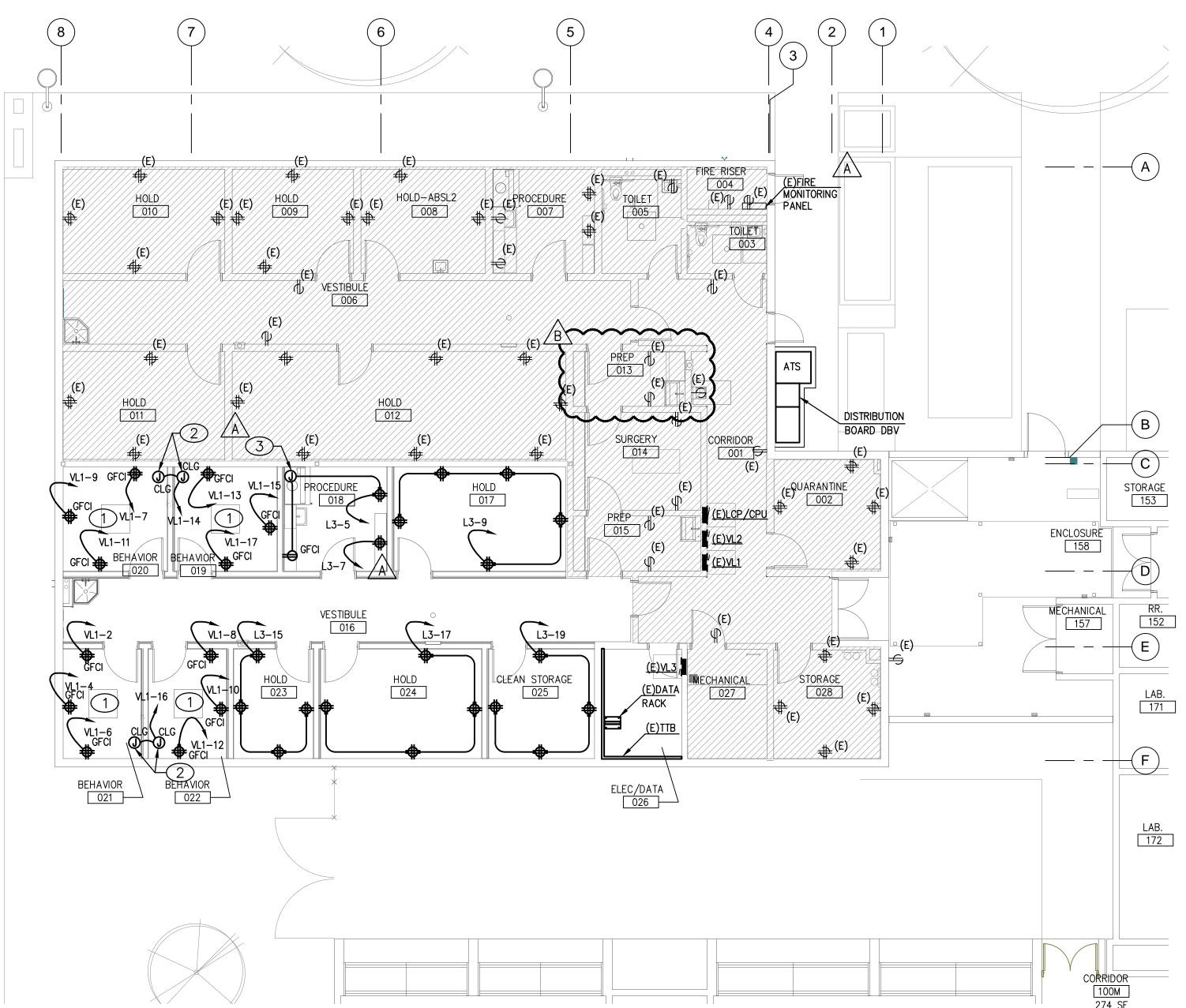


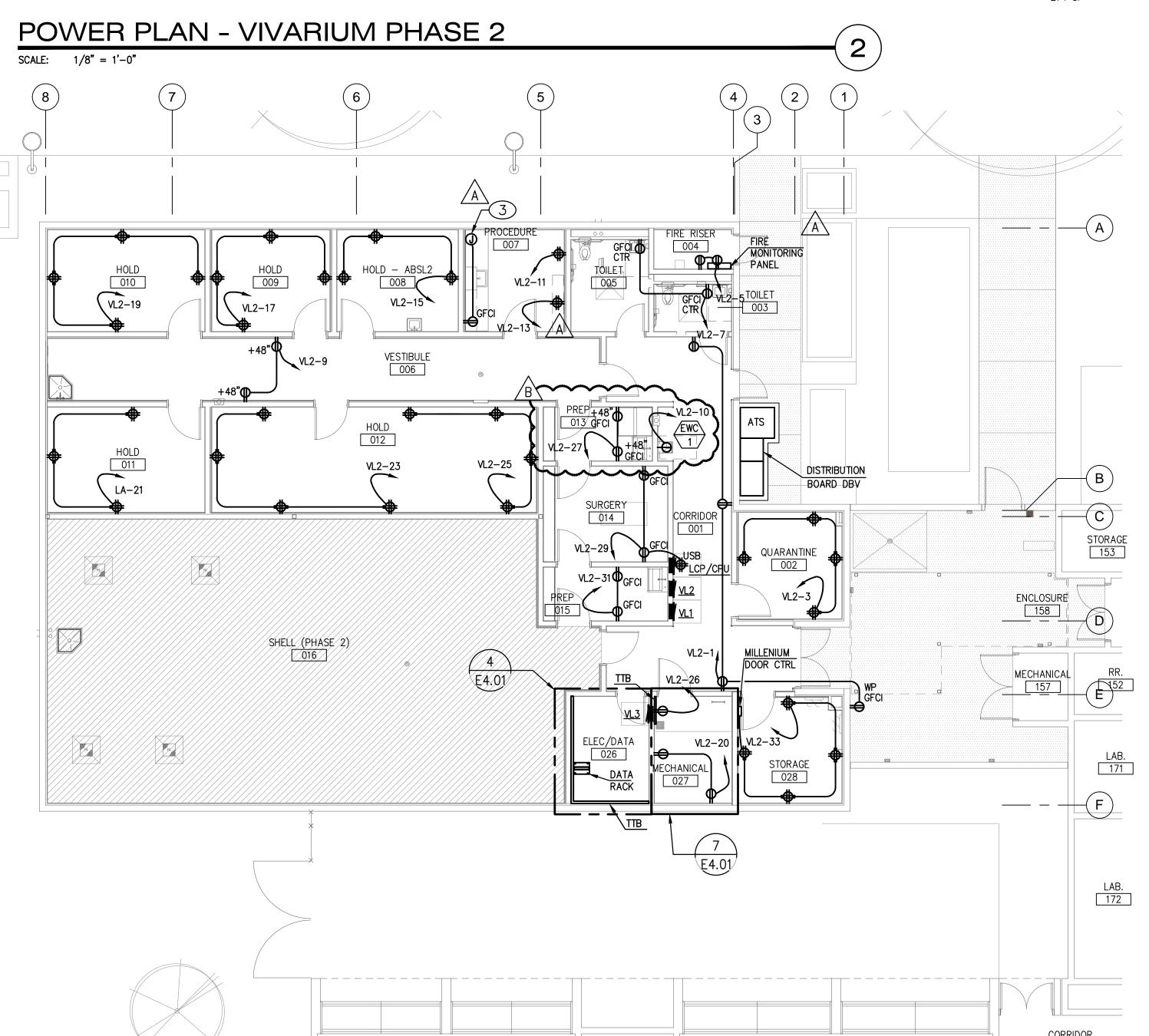


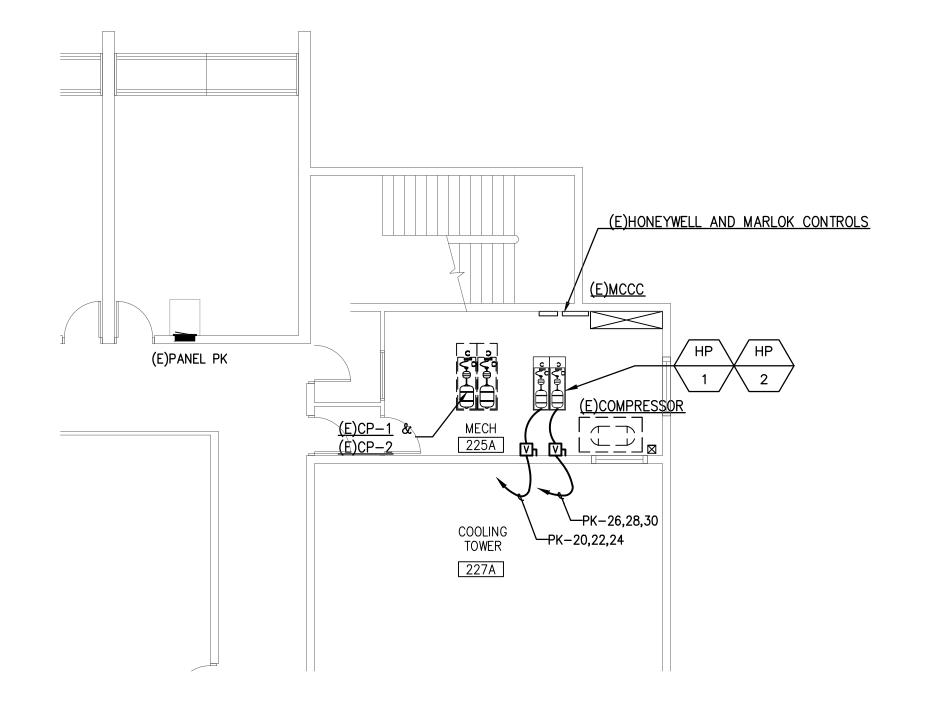


Date: 06/17/2016 Sheet No:

E1.02







POWER PLAN - VIVARIUM

SCALE: 1/8" = 1'-0"

MECHANICAL ROOM 225A

#### GENERAL NOTES

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ONLY AUTHORIZED DATA HAVE BEEN USED TO ARRIVE AT YOUR BID FIGURE, AND

THE EXPERIENCE AND CAPABILITIES OF YOUR FIRM, YOUR WORKERS, AND SUBCONTRACTORS ARE ADEQUATE AND APPROPRIATE TO PERFORM THE CONSTRUCTION OF THIS TYPE OF PROJECT.

2. ALL CONDUIT PENETRATIONS AND FIXTURES SHALL BE VERMIN PROOF.

VERIFY ALL DEVICE MOUNTING HEIGHTS
PRIOR TO ROUGHING IN. IN HOLDING,
QUARANTINE AND BEHAVIOR ROOMS, MOUNT
120V, 20A, QUADRUPLEX OUTLETS AT WALLS
6'-0" ABOVE FLOOR, UNLESS NOTED
OTHERWISE.

#### **KEYNOTES**

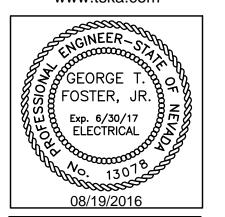
ALL RECEPTACLES IN THIS ROOM SHALL BE WP, GFCI AND ISOLATED GROUND.

CEILING MOUNTED JUNCTION BOX FOR CAMERA. VERIFY EXACT LOCATION WITH OWNER'S REPRESENTATIVE PRIOR TO ROUGH—IN.

JUNCTION BOX FOR FUME HOOD.
COORDINATE LOCATION AND REQUIREMENTS
WITH HOOD CONTRACTOR.



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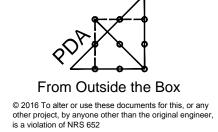
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## UNLV VIVARIUM

4505 SOUTH MARYLAND PARKWAY LAS VEGAS, NV 89154

Job No: 15-061

UNIVERSITY OF NEVADA, LAS VEGAS

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REVISIONS
REV DATE DESCRIPTION
A 08/05/16 ADDENDUM A
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PHASED POWER PLANS
- VIVARIUM

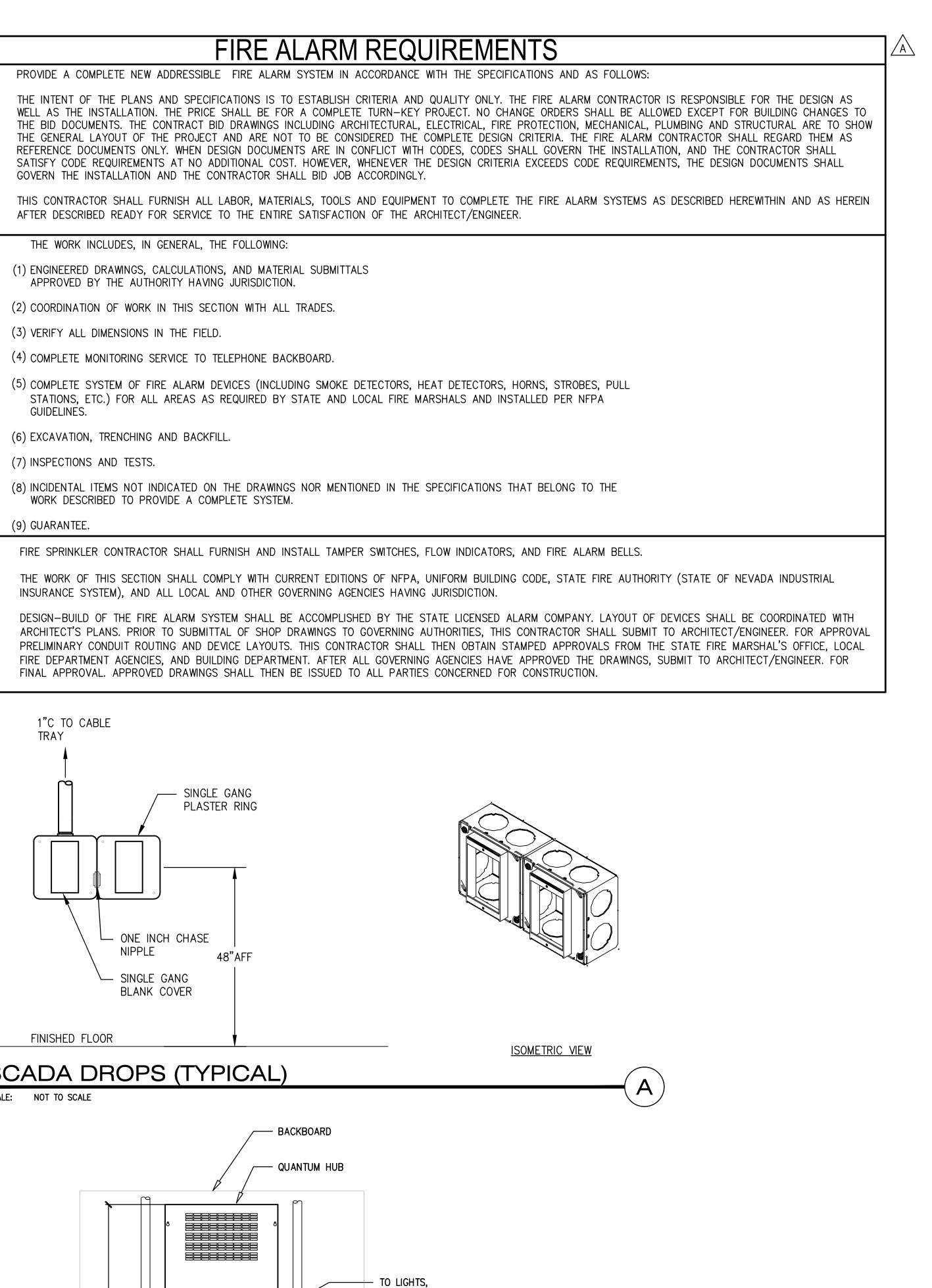
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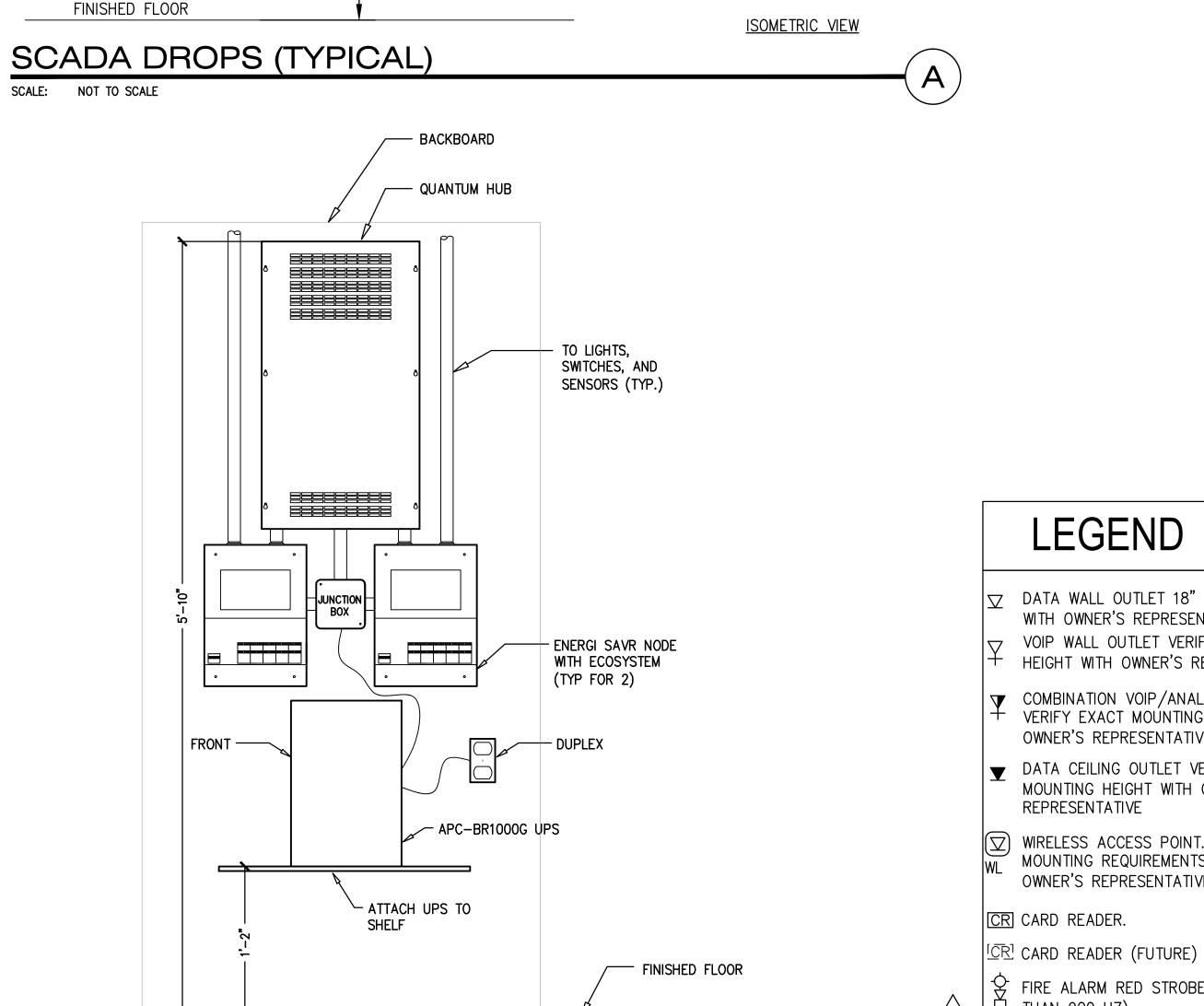
E2.01

POWER PLAN - VIVARIUM PHASE 1

SCALE: 1/8" = 1'-0"

NEW VIVARIUM MECH. RM.





LUTRON CONTROL PANEL

REFER TO SHEET E1.02; E1.03; E1.04; E1.05 AND E4.01 FOR ADDITIONAL INFORMATION

**ELEVATION** 

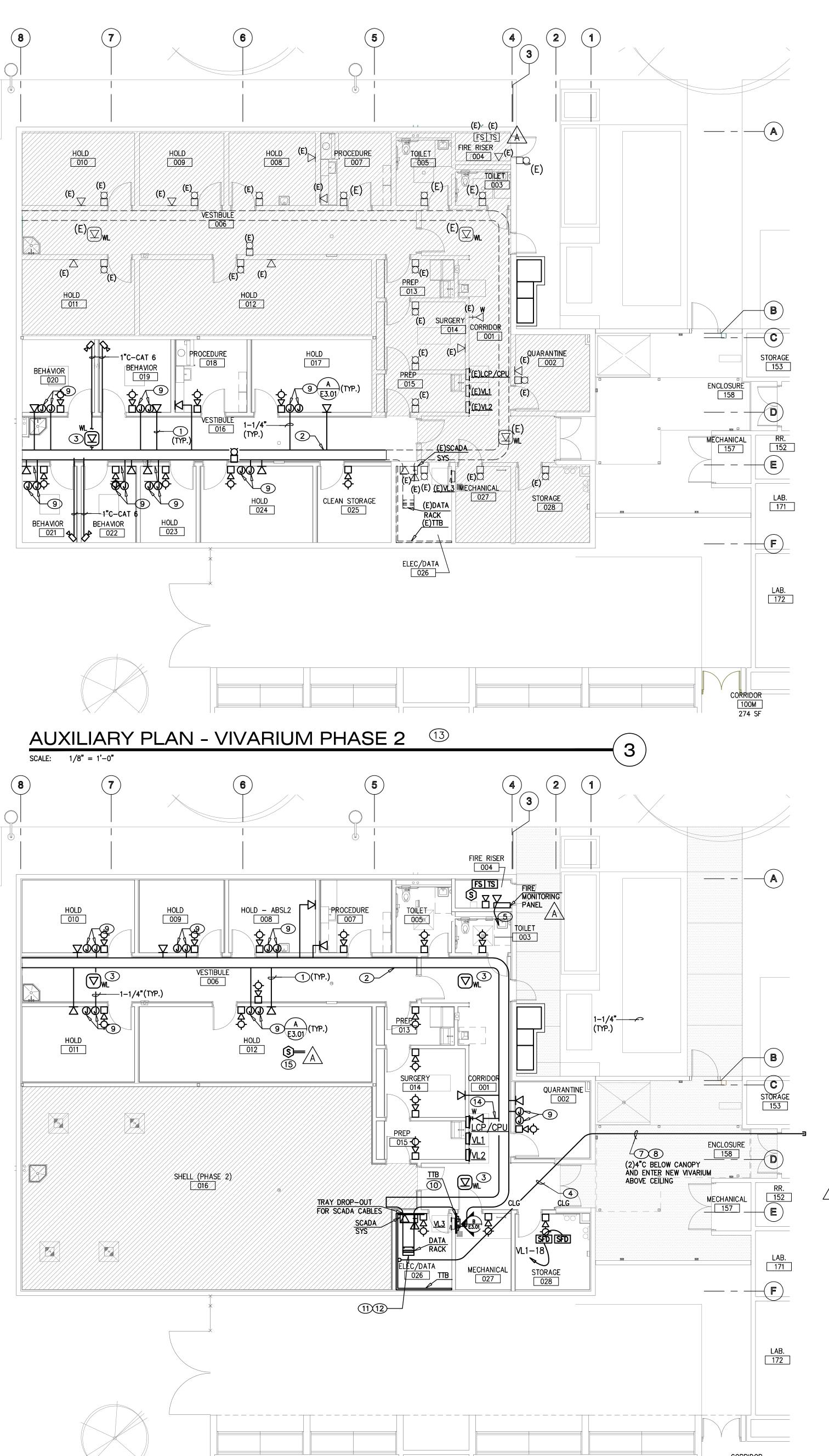
SCALE: NOT TO SCALE

# LEGEND

- DATA WALL OUTLET 18" AFF. COORDINATE WITH OWNER'S REPRESENTATIVE VOIP WALL OUTLET VERIFY EXACT MOUNTING HEIGHT WITH OWNER'S REPRESENTATIVE
- COMBINATION VOIP/ANALOG WALL OUTLET VERIFY EXACT MOUNTING HEIGHT WITH OWNER'S REPRESENTATIVE
- ▼ DATA CEILING OUTLET VERIFY EXACT MOUNTING HEIGHT WITH OWNER'S REPRESENTATIVE
- WIRELESS ACCESS POINT. VERIFY EXACT MOUNTING REQUIREMENTS AND LOCATION WITH OWNER'S REPRESENTATIVE
- CR CARD READER.

В

- FIRE ALARM RED STROBE AND HORN (LESS THAN 900 HZ)
- 片 FIRE ALARM HORN (LESS THAN 900 HZ)



AUXILIARY PLAN - VIVARIUM PHASE 1

SCALE: 1/8" = 1'-0"

**GENERAL NOTES** 

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ALL CONDUIT PENETRATIONS AND FIXTURES

SHALL BE VARMIN PROOF

3. I FIRE ALARM CHIME STROBE LESS THAN | 900 MEGAHERTZ.

1. VERIFY ALL DEVICE MOUNTING HEIGHTS PRIOR TO ROUGHING IN.

5. ALL DATA OUTLET CABLING SHALL BE CAT-6A.

#### **KEYNOTES**

1"C TO CABLE TRAY. PROVIDE CAT-6A CABLE FROM OUTLET TO ROOM 026 DATA RACK. REFER TO DETAIL 2/E4.01 FOR ADDITIONAL INFORMATION.

2. | 18"x4" DEEP CENTER SUPPORT OPEN LADDER CABLE TRAY.

WIRELESS ACCESS POINT (2)CAT-6A CABLES FROM EACH LOCATION TO DATA RACK IN ROOM 026.

I. DO NOT ROUTE THIS CONDUIT THROUGH FIRE

RATED ROOM 028. 3/4"C TO CABLE TRAY FOR FIRE PANEL

6. | FIRE ALARM STROBES TO FLASH RED.

MONITORING.

| PROVIDE (1) 24 STRANDS OF SINGLE-MODE FIBER FROM ROOM 026 TO WHITE HALL ROOM 181A LIN ONE-OF TWO-4" CONDUITS. REFER

PROVIDE (1)25 PAIR TELEPHONE CABLE FROM ROOM 026 TO WHITE HALL ROOM IN ONE OF TWO 4"CONDINTS. REFER TO E FS1.01 FOR ADDITIONAL INFORMATION 

IN EACH BEHAVIOR, HOLDING AND QUARANTINE ROOM, ALONG THE WALL ADJACENT TO THE CORRIDOR, PROVIDE(1) CONDUIT FROM TWO INDIVIDUAL 4-S DEEP BOXES (WITH SINGLE GANG RINGS SEPARATED BY 2 INCHES), 48" AFF, UP TO CABLE TRAY FOR SCADA SYSTEM. SEE DETAIL-A/E3.01.

10. 3'x8'x3/4" FIRERATED BACKBOARD.

. DIV. 16 CONTRACTOR SHALL INSTALL CAT 6A CABLE BETWEEN THE EV VALVE ON ROOF DOWN INTO DATA ROOM. THE CAT 6A CABLE INSTALLATION FOR THE ENERGY VALVE CONTROL MODULE SHALL BE REVIEWED AND APPROVED (CERTIFIED) BY THE UNLV OFFICE OF INFORMATION TECHNOLOGY PRIOR TO CONNECTION TO THE DATA NETWORK.

12. PROVIDE A 750VA RACK-MOUNTED UPS FOR JACE EQUIPMENT.

3. PROVIDE A COMPLETE CODE COMPLIANT DESIGN/BUILD FIRE ALARM SYSTEM THROUGHOUT THE ENTIRE BUILDING. CONNECT ALARM. TROUBLE, AND SUPERVISORY FORM-C CONTACTS FROM THE FACP TO THE BAS/JACE FOR CAMPUS BAS MONITORING.

ROUTE ONE CAT-6A TO LUTRON CONTROL PANEL IN ROOM 027.

15. VERIFY DUCT SMOKE DETECTOR LOCATION.

NOTE:

LOW VOLTAGE INSTALLATION SHALL MEET UNLV CAMPUS WIRING STANDARDS DATED AUGUST 26, 2015

# **KEYPLAN** VIVANIOM TO THE PROPERTY OF TH \_\_\_\_ WHITE HALL 4+-

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SENGINEER.

\$ SGEORGE

FOSTER, JR.

Exp. 6/30/17 ELECTRICAL

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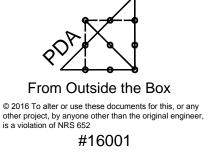
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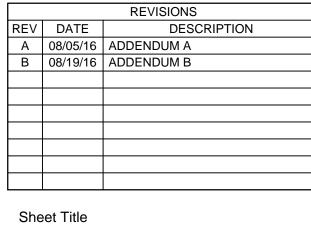
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**4505 SOUTH** MARYLAND PARKWAY LAS VEGAS, NV 89154

Job No: 15-061

**UNIVERSITY OF NEVADA, LAS VEGAS** 

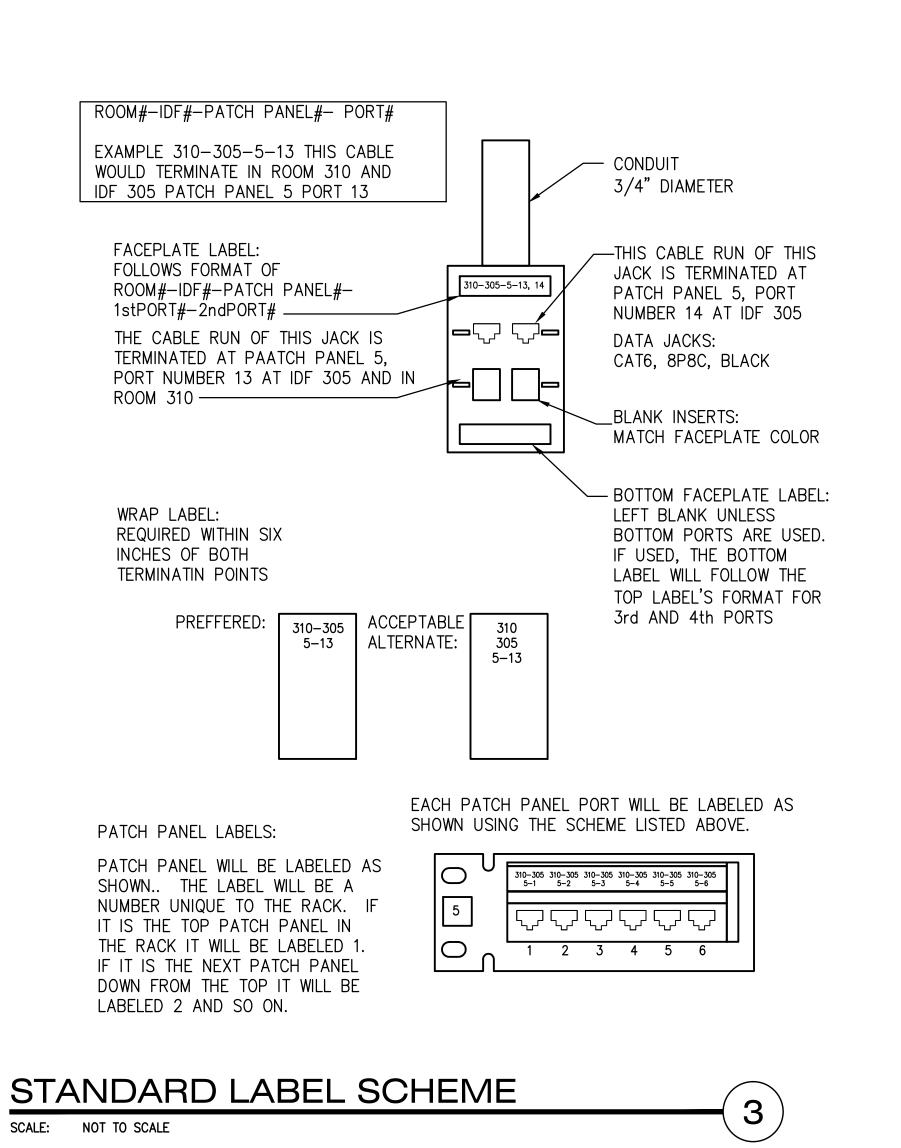
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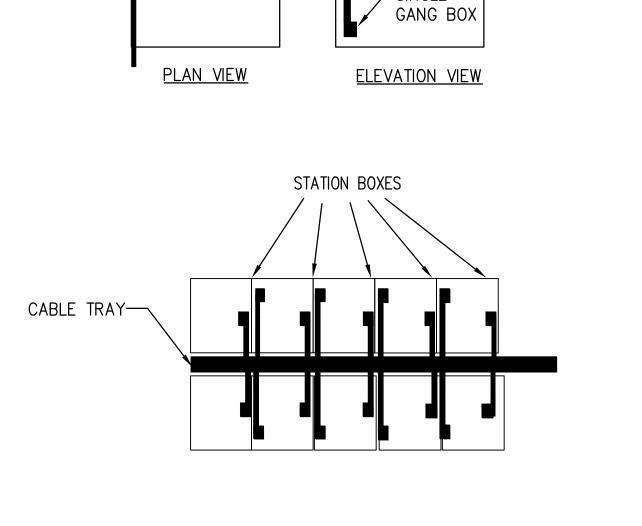


PHASED AUXILIARY **PLANS - VIVARIUM** 

Date: 06/17/2016 Sheet No:

E3.01

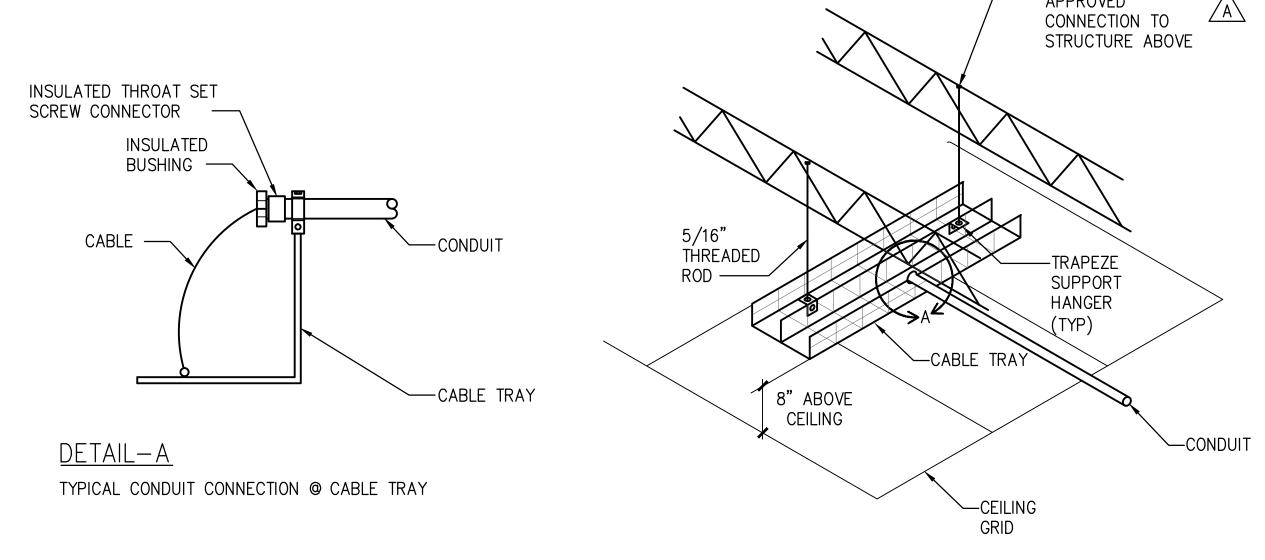




SINGLE GANG BOX 1"

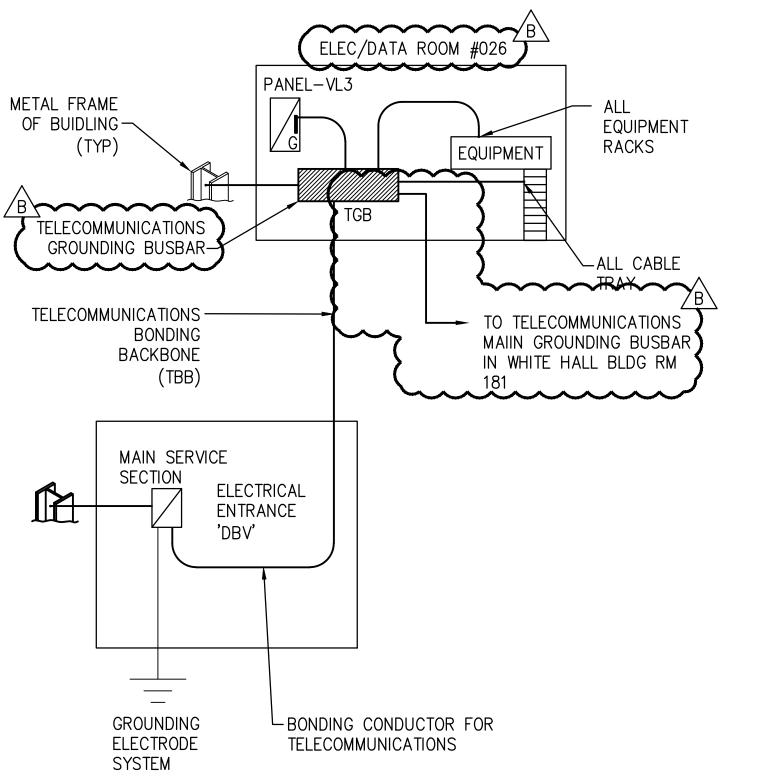
CONDUIT TO

CABLE TRAY





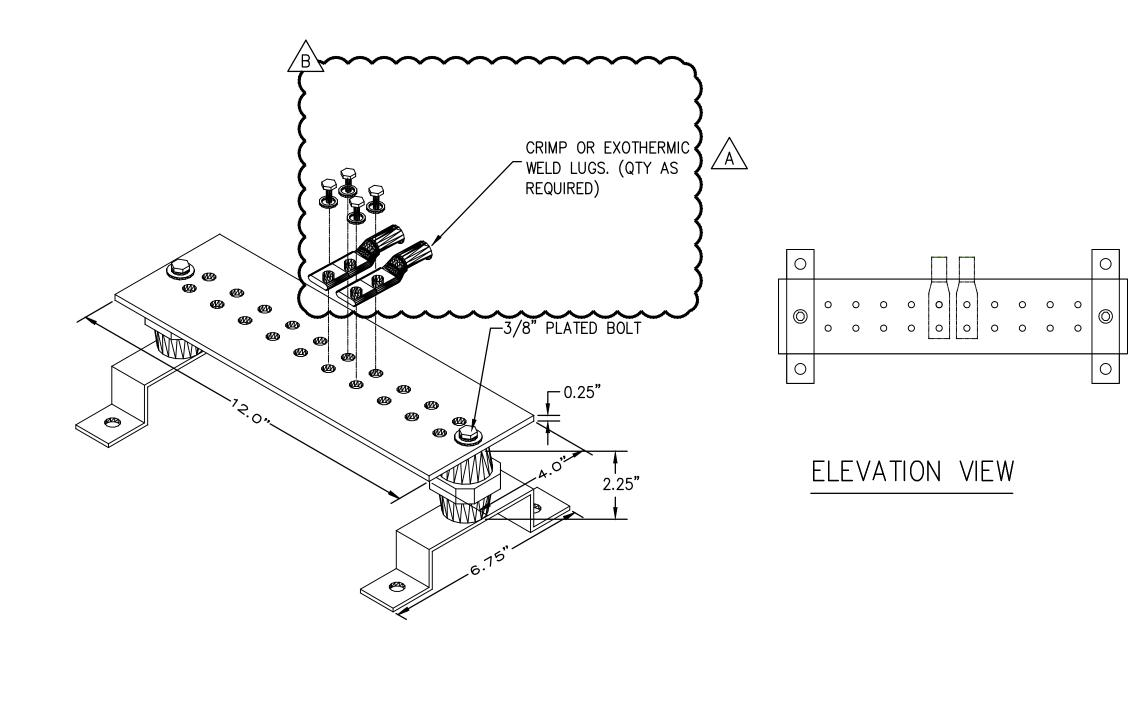




LOW VOLTAGE GROUNDING DETAIL

SCALE: NOT TO SCALE





REFERENCE E3.01

SCALE: 1/4" = 1'-0"

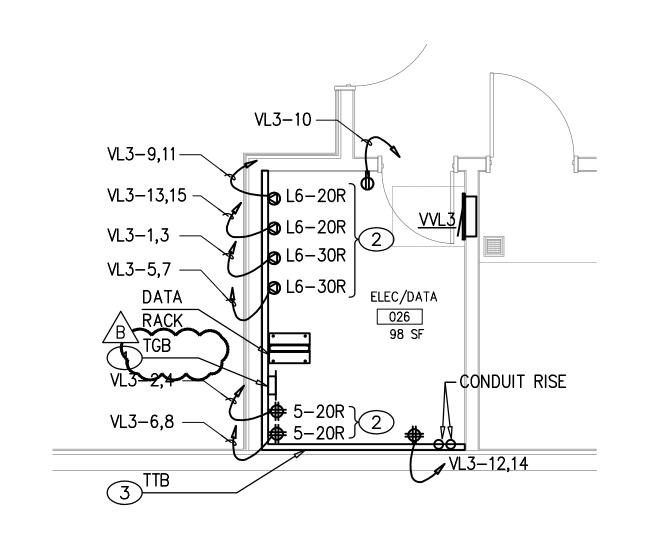
- FASTENED

TO CABLE

BUSHING

TRAY WITH

1" CONDUIT



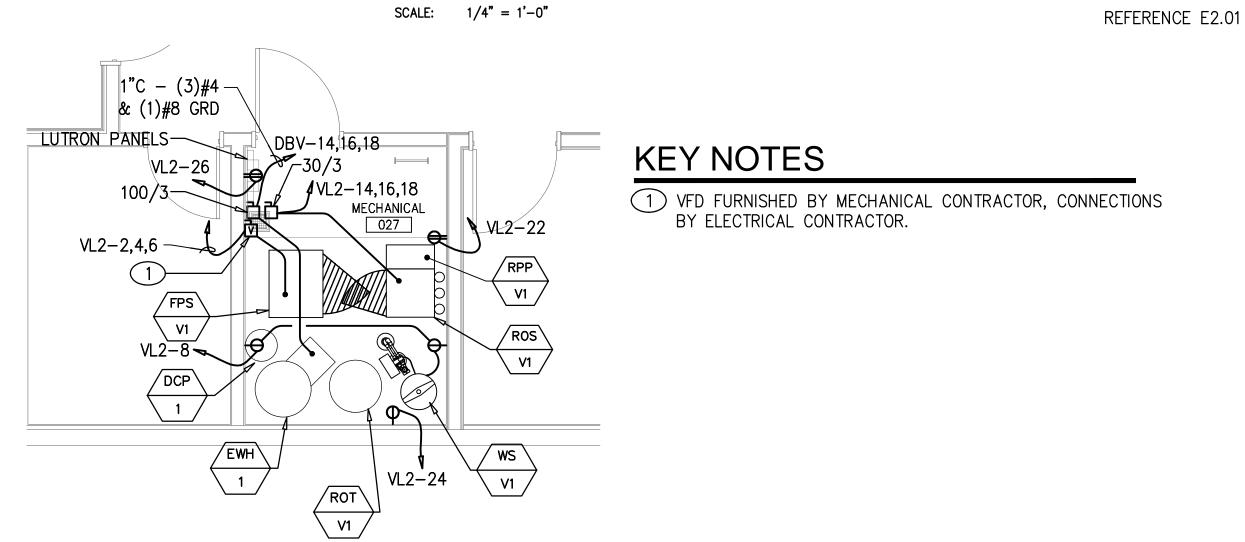
#### **KEY NOTES**

1 REFER TO DETAIL 5/E4.01 FOR ADDITIONAL INFORMATION.

2 THESE OUTLETS SHALL BE ORANGE COLOR AND LOCATED (A) WITHIN 4'-0" OF THE REAR OF THE RACKS. VERIFY EXACT LOCATION AND REQUIREMENTS WITH OWNER'S REPRESENTATIVE PRIOR TO ROUGH-IN. ONE CIRCUIT PER RECEPTACLE, DO NOT SHARE NEUTRAL.

3 BACKBOARDS SHALL BE PLYWWOD 3/4"x4'x8' SHEETS, GRADE A, TREATED ON ONE SIDE WITH FIRE RESISTANT PAINT OR MATERIAL, INSTALLED WITH FINISHED SIDE

## ENLARGED ELEC/DATA RM ELECTRICAL PLAN



ENLARGED MECH RM ELECTRICAL PLAN

REFERENCE E2.01



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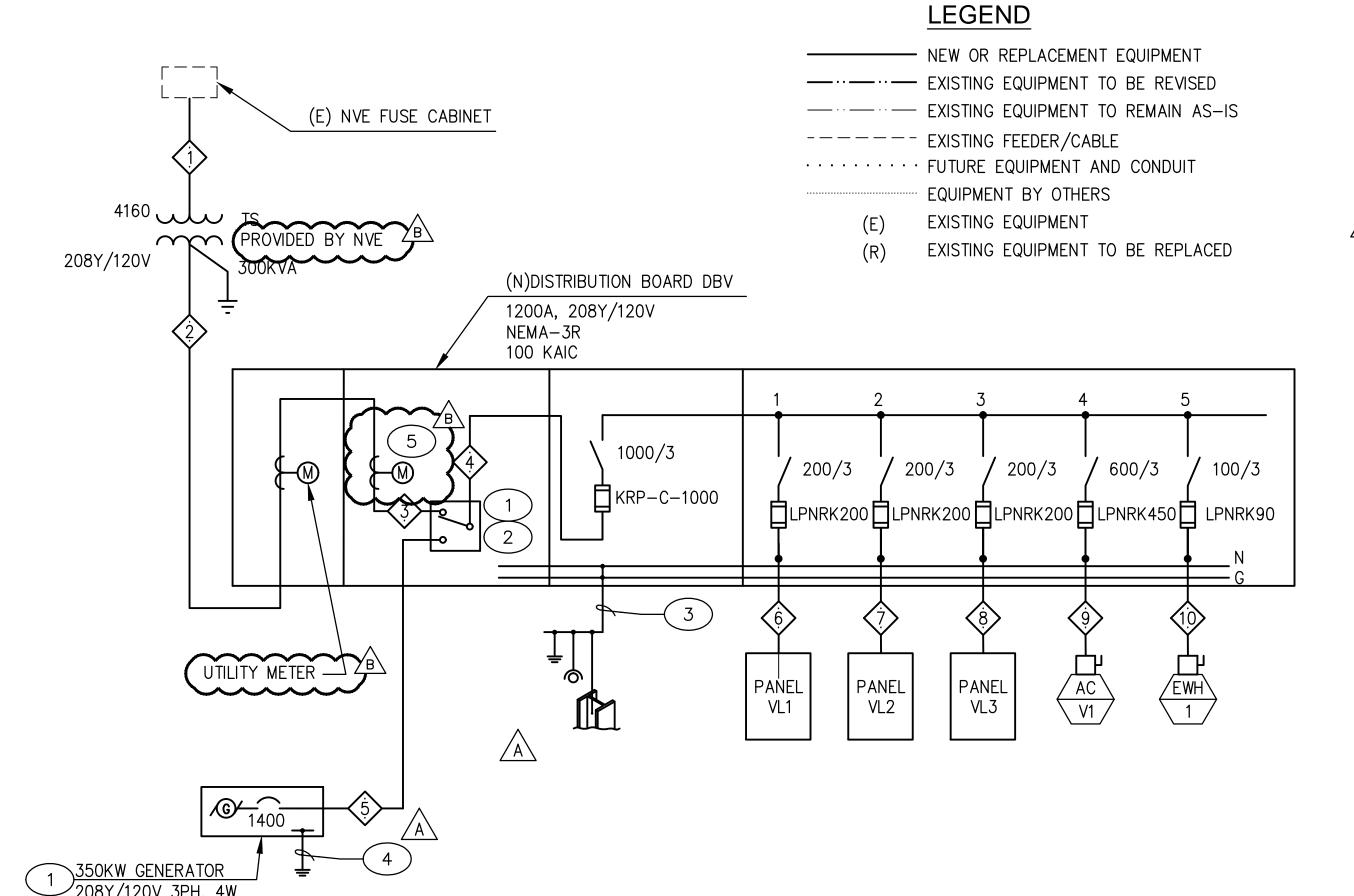
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REV DATE DESCRIPTION
A 08/05/16 ADDENDUM A B 08/19/16 ADDENDUM B

**DETAILS** 

E4.01



#### **KEY NOTES:**

PROVIDE FORM-C CONTACT FOR EMERGENCY AND NORMAL POWER

1200A SERVICE ENTRANCE RATED ATS. #1/0 CU GEC - 1"C TO GROUNDING ELECTRODE, COLD WATER SERVICE AND BUILDING STEEL PER NEC 250.

(5) CUSTOMER OWNED DIGITAL METER.

(4) PROVIDE #4/0 COPPER GEC TO 3/4"X10FT COPPER CLAD GROUND

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Job No: 15-061

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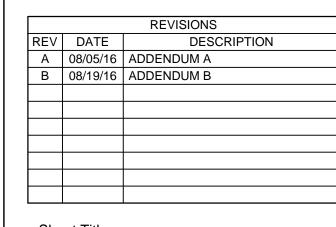
NOTICE:

THE DESIGN PROFESSIONAL HAS PERFORMED ALL REQUIRED VOLTAGE DROP CALCULATIONS AND ALL BRANCH CIRCUITS AND FEEDERS COMPLY WITH NEC 210-19(A)(1) FPN No. 4.

THE DESIGN PROFESSIONAL HAS PERFORMED ALL REQUIRED SHORT CIRCUIT CALCULATIONS AND THE AIC RATINGS INDICATED FOR EACH DEVICE IS ADEQUATE TO PROTECT THE EQUIPMENT AND ELECTRICAL SYSTEM.

THE DESIGN PROFESSIONAL HAS PERFORMED ALL REQUIRED LOAD CALCULATIONS AND VERIFIES THAT ALL UPSTREAM PANELS AND EQUIPMENT ARE NOT OVERLOADED.

PERMIT SET



SINGLE LINE DIAGRAM **AND SCHEDULES** 

Date: 06/17/2016

Sheet No:

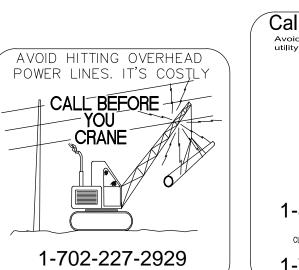
E5.02

SINGLE LINE DIAGRAM SCALE: NOT TO SCALE

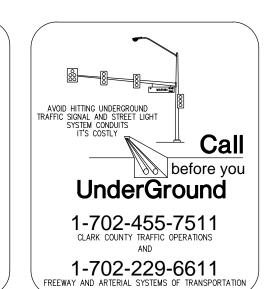
PROJEC	T#	16001													Professional Design Associates, Ir
							F	<b>EEDE</b>	ER .	SCHE	<b>DULE</b>				
PROJEC	T NAME:		UNLV VIV	'ARIUM											18-Aug
FEEDER	SCHEDU	E NOTES	<b>S</b> :												
1.	SIZING IN	FORMATIO	N BASED	ON THE	IN / THW	И СОИ	DUCTOR	S IN METALI	LIC CONE	DUIT UNLESS	OTHERWIS	E NOTED, PER 20	)11 N.E.	C.	
2.	CONDUC	TOR SIZES	S BASED	ON 75°C	. REQU	JIREMEN	VTS. ALL	TERMINATIO	NS SHALL	. BE 75°C RA	TED.				
$\overline{}$	FEEDER			CONDUCTOR INFORMATION AND SIZES CONDUIT											
NUMBER		I NEO IN		MATERIAL	VOLTS	%	PHASE		NEUTRAL		GROUND	UND INFOR		l	REMARKS
TAG	FROM	~~~	CAPACITY	CU OR AL	DROP	DROP DROP	QUANTITY	SIZE	QUANTITY	SIZE	SIZE	MATERIAL	SIZE	QUANTITY	
1	UTILIT	тѕ	WA	CU	0.68	0.02	3	#1/0		N/A	#6	NON-METALLIC	4"	1	BY UTILITY
2	TS/E	METER	100%	CU	0.55	0.26	3	400 kcmil	1	400 kcmil	N/A	NON-METALLIC	3"	3	PARALLEL FEEDERS
3	METER	ATS	100%	CU	0.28	0.13	3	1200 A	1	1200 A	50%	BUS DUCT		1	BUS
4	ATS	DVB	100%	CU	0.28	0.13	3	1200 A	1	1200 A	50%	BUS DUCT		1	BUS
5	GEN	ATS	100%	CU	0.26	0.12	3	350 kcmil	1	350 kcmil	#3/0	NON-METALLIC	3"	4	PARALLEL FEEDERS
6	DBV	VL1	100%	CU	0.84	0.40	3	#3/0	1	#3/0	#6	NON-METALLIC	2"	1	
7	DBV	VL2	100%	CU	0.84	0.40	3	#3/0	1	#3/0	#6	NON-METALLIC	2"	1	
8	DBV	VL3	100%	CU	1.12	0.54	3	#3/0	1	#3/0	#6	NON-METALLIC	2"	1	
	DBV	AC-V1	100%	CU	1.46	0.70	3	250 kcmil	1	250 kcmil	#2	METALLIC	2 1/2"	2	PARALLEL FEEDERS
9	004	1	,						1				1		

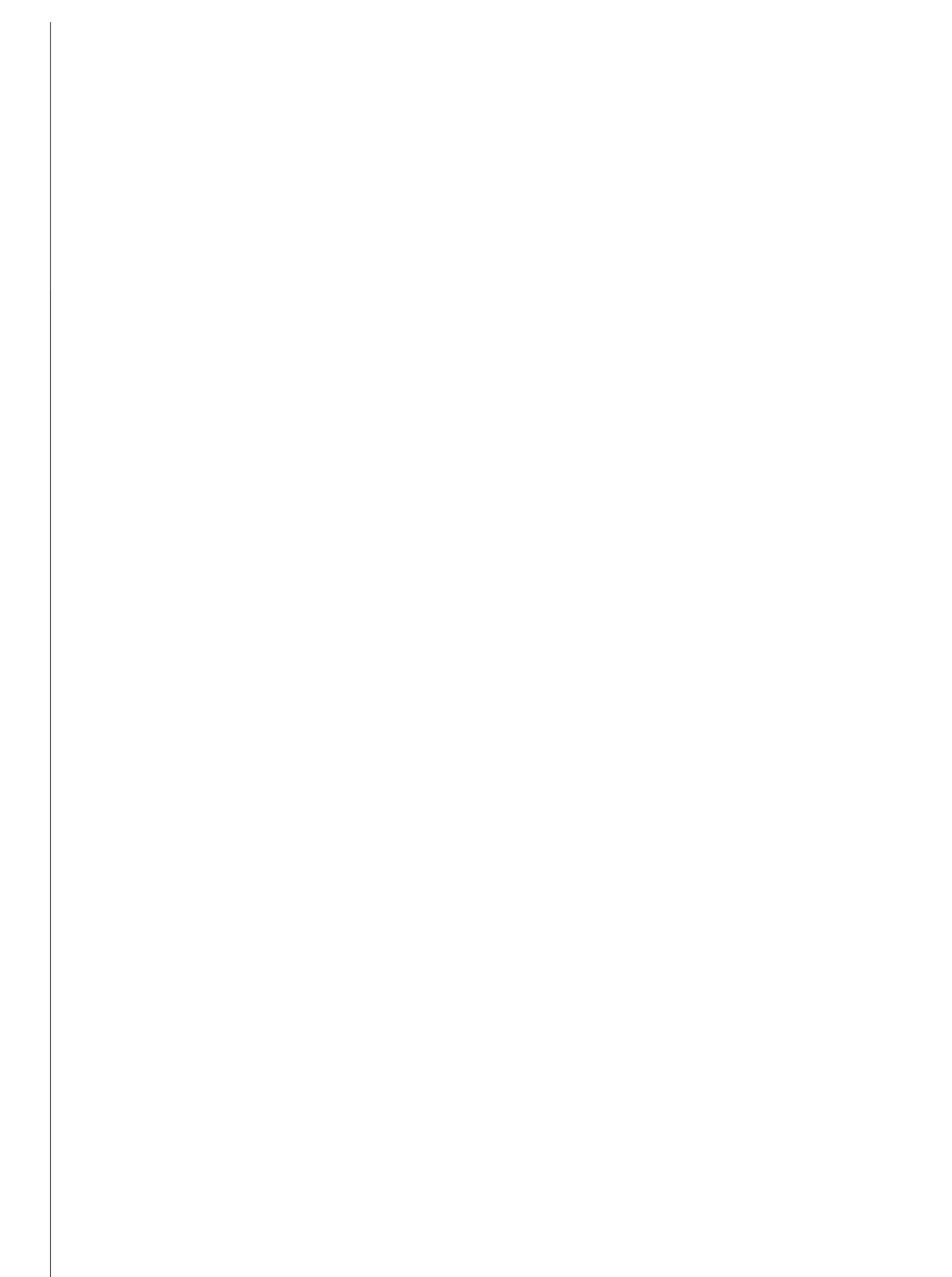
Project # 16001		Pro	fessional Design Associates
SHORT	<b>CIRCUIT</b>	<b>ANALYSIS</b>	REPORT
Project Name: UNLV VIVARIU	М		18-A
BRANCH	AVAILABLE	AT	EQUIPMENT
NUMBER $\square$	SCA	EQUIPMENT	AIC RATING
0	94,573	UTILITY	N/A
1	32,116	DBV	65,000
2	14,170	PNL VL1	22,000
3	13,594	PNL VL2	22,000
4	13,063	PNL-VL3	22,000
5	9.542	A/C-1	10.000

ALL WIRE SHALL BE COPPER TYPE THWN, WHERE NONMETALLIC CONDUIT IS USED A GROUND WIRE SIZED PER N.E.C. SHALL BE PROVIDED AND INSTALLED PER N.E.C. INCREASE CONDUIT SIZE AS REQUIRED BY N.E.C.









PROJECT NUMBER: 16001

120

277

277

SURFACE

CEILING

LED

5000K

4.6W

LED

RED LETTER

WITH WHITE BACKGROUND

LIGHTING FIXTURE SCHEDULE PROJECT NAME: UNLV VIVARIUM 17-Aug-16 CONTROL MEDIA | VOLTS | U | S | I LAMP (S) MANUFACTURER'S CATALOG NUMBER MOUNTING DESCRIPTION / REMARKS TYPE (LENS, LOUVER,ETC.) 23 W SYMMETRIC KENALL SEALED AIR-TIGHT FIXTURE WITH RED LED DIFFUSED DR ACRYLIC | CSEDO-22-23R/45L-50K8-DCC-DV-5F-2H-SYM | OVELAPPING DOOR IP65 RATED 120 45 W 630nm RED LED FOR VIVARIUM 5000K LED 277 ENVIRONMENT LUTRON "H" SERIES DRIVER 2 X 2 RECESSED SEALED AIR-TIGHT FIXTURE WITH A 23 W SYMMETRIC KENALL DIFFUSED DR ACRYLIC CSEDO-14-23R/45L-50K8-DCC-DV-5F-2H-SYM I OVELAPPING DOOR IP65 RATED RED LED 120 45 W 630nm RED LED FOR VIVARIUM 5000K LED 277 ENVIRONMENT. 1 X 4 RECESSED 67 W SYMMETRIC SEALED AIR-TIGHT FIXTURE WITH KENALL CSEDO-24-67L50K-DCC-DV-5F-2H-SYM LED 5000K DIFFUSED DR ACRYLIC OVERLAPPING DOOR IP65 RATED 120 2 X 4 RECESSED 277 IMPACT RESISTANT EATON MOUNT AT 9'-0" AFF XTOR3A TEMPERED GLASS WALL LED 5000K 120 277 EATON - PORTFOLIO 6 INCH RECESSED DOWNLIGHT LD6A30D010TE ERW6A30840 6LW1LI WIDE DISTRIBUTION WITH 120 SPECULAR CLEAR TRIM 277 BURTON AIM LED SINGLE CEILING LUXO MEDICAL PRODUCTS 277 SURGERY LED \ ALEDSC LIGHT

PROJECT #:	16001							Profes	sional Design Associates, Inc.
			TRA	ANSFOR	RMER S	CHEDU	LE		
PROJECT NAME:	UNLV VIVARIU	М							17-Aug-16
TRANSFORMER DESIGNATION	KVA RATING	PRIMARY VOLTAGE	SECONDARY VOLTAGE	MATERIAL (WINDINGS)	DEGREE C TEMP. RISE	MOUNTING METHOD	ENCLOSURE TYPE	GROUND SIZE NEC 250	REMARKS
TL1	2	120-1Ø	24-1Ø	COPPER	115	WALL	INDOOR	N/A	
TL2	2	120-1Ø	24-1Ø	COPPER	115	WALL	INDOOR	N/A	
TL3	2	120-1Ø	24-1Ø	COPPER	115	WALL	INDOOR	N/A	
TL4	2	120-1Ø	24-1Ø	COPPER	115	WALL	INDOOR	N/A	
TL5	2	120-1Ø	24-1Ø	COPPER	115	WALL	INDOOR	N/A	
TL6	2	120-1Ø	24-1Ø	COPPER	115	WALL	INDOOR	N/A	

SIMPLE SEAL

CSESO14-45L50K-DCC-1-DV-2F-2H-SYM

EATON

EEX-6-1/2-R

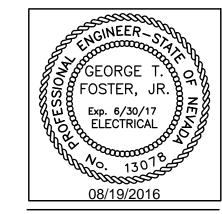
Professional Design Associates, Inc.

SEALED AIR TIGHT FIXTURE

1X4 SURFACE

LED EXIT SIGN

303 South Water Street, Suite 230 Henderson, NV 89015 phone: 702.456.3000 fax: 702.898.6209 www.tska.com



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**Engineering Solutions** 

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**4505 SOUTH MARYLAND PARKWAY LAS VEGAS, NV 89154** 

Job No: 15-061

**UNIVERSITY OF NEVADA, LAS VEGAS** 

PERMIT SET

REVISIONS
REV DATE DESCRIPTION
A 08/05/16 ADDENDUM A
B 08/19/16 ADDENDUM B

Sheet Title
SCHEDULES

Date: 06/17/2016