CHHS SCIENCE LAB RENOVATION

HAYWOOD COUNTY SCHOOLS

CONTACTS

OWNER REPRESENTATIVE

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1230 NORTH MAIN STREET
WAYNESVILLE, NC 28786

ARCHITECT

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58½ N. LEXINGTON AVENUE
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LIST OF DRAWINGS

2018 APPENDIX B:
BUILDING CODE SUMMARY FOR ALL COMMERCIAL PROJECTS

NAME OF PROJECT: CHHS SCIENCE LAB RENOVATION
ADDRESS: 3215 BROAD ST; CLYDE, NC 28721

OWNER/AUTHORIZED AGENT: DR. TREVOR PUTNAM
PHONE #: (828) 456-2441
E-MAIL: TPUTNAM@HAYWOOD.K12.NC.US

OWNED BY: CITY/COUNTY
CODE ENFORCEMENT JURISDICTION: HAYWOOD COUNTY

CONTACT: MARK LUSK ARCHITECTURE, LLC.
NAME: MARK LUSK, AIA
LICENSE #: 8685
TELEPHONE #:828.808.9757
E-MAIL: MLARCHITECTURE@CHARTER.NET

MECHANICAL, ELECTRICAL, PLUMBING: TILDEN WHITE & ASSOC., PLLC

2018 NORTH CAROLINA EXISTING BUILDING CODE: EXISTING:
ALTERATION: LEVEL II
CONSTRUCTED: UNKNOWN
CURRENT OCCUPANCY: EDUCATIONAL

RISK CATEGORY:
CURRENT: III
PROPOSED: III

BASIC BUILDING DATA:
CONSTRUCTION TYPE: V
SPRINKLERS: NO
STANDPIPES: NO
FIRE DISTRICT: NO
SPECIAL INSPECTIONS REQUIRED: NO

GROSS BUILDING AREA:
1ST FLOOR:
EXISTING: 5,009 SF
NEW: 0 SF
SUB-TOTAL: 5,009 SF
RENOVATION AREA: 895 SF

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MARK LUSK ARCHITECTURE PLLC REGISTERED ARCHITECTURAL FIRM 52786 NORTH CAROLINA SWANNANOA, NC

MARK S. LUSK REGISTERED ARCHITECT 8685 1/7/20 NORTH CAROLINA SWANNANOA, NC

CHHS SCIENCE LAB RENOVATION

Project Number: 19017
Checked:
Drawn: A. Rognas
Date: 1/7/2020
Revisions:

COVER SHEET

T101

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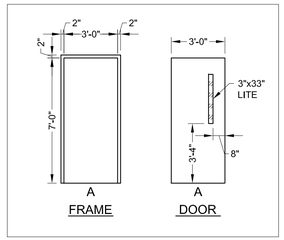


DOOR/FRAME ELEVATIONS

DOOR SCHEDULE

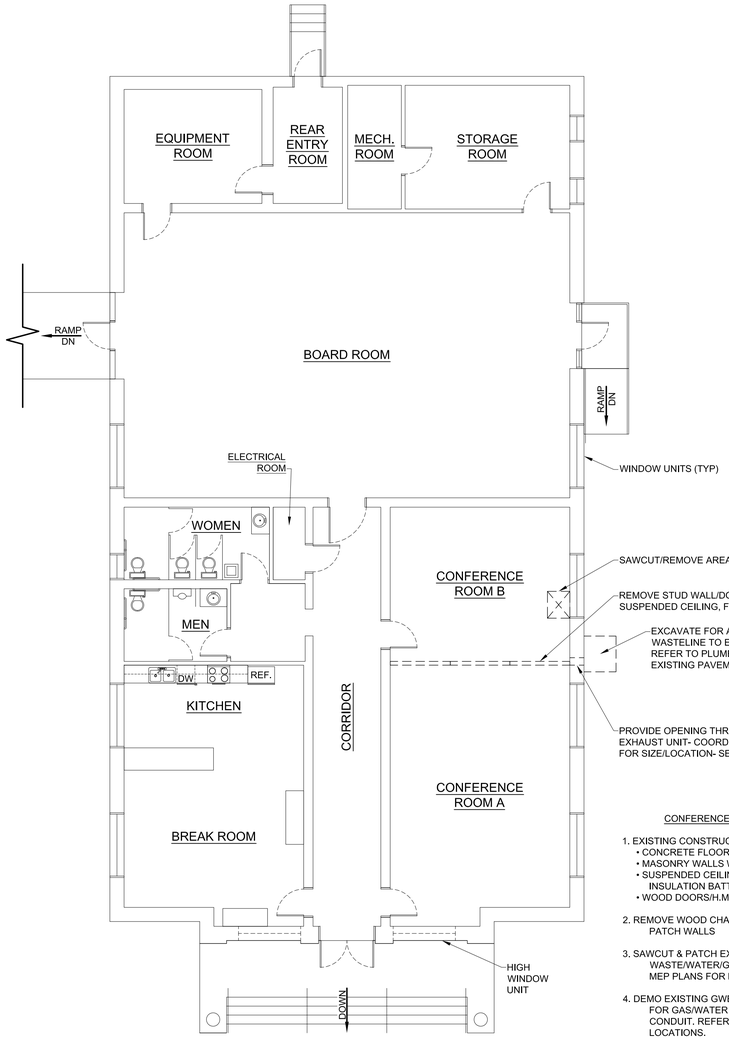
DOORS	MATERIAL	SIZE	FRAME	HARDWARE	ELEVATION
01	WOOD	3⁰x7⁰	H.M.	SET A	A/A
02	WOOD	3⁰x7⁰	H.M.	SET A	A/A
03	EXISTING	3⁰x7⁰	EXISTING		
04	EXISTING	3⁰x7⁰	EXISTING		

LEGEND

4" METAL STUD WALL W/ ⅝" GWB-
EXTEND THRU EXISTING CEILING- MODIFY EXISTING CEILING SYSTEM

EXIST'G 8" CMU WALLS W/ GWB & FURRING

1 HR RATED WALL



CONFERENCE ROOM NOTES

1. EXISTING CONSTRUCTION
   - CONCRETE FLOOR SLAB ON FILL W/ VCT
   - MASONRY WALLS W/ GWB ON FURRING
   - SUSPENDED CEILING SYSTEM W/ INSULATION BATTS (9'-9" A.F.F.)
   - WOOD DOORS/H.M. FRAMES
2. REMOVE WOOD CHAIR RAIL & BASE. PATCH WALLS
3. SAWCUT & PATCH EXISTING FLOOR FOR WASTE/WATER/GAS LINES- REFER TO MEP PLANS FOR LOCATIONS
4. DEMO EXISTING GWB FURRING & PATCH FOR GAS/WATER LINES & POWER CONDUIT. REFER TO MEP PLANS FOR LOCATIONS.

PROJ NORTH

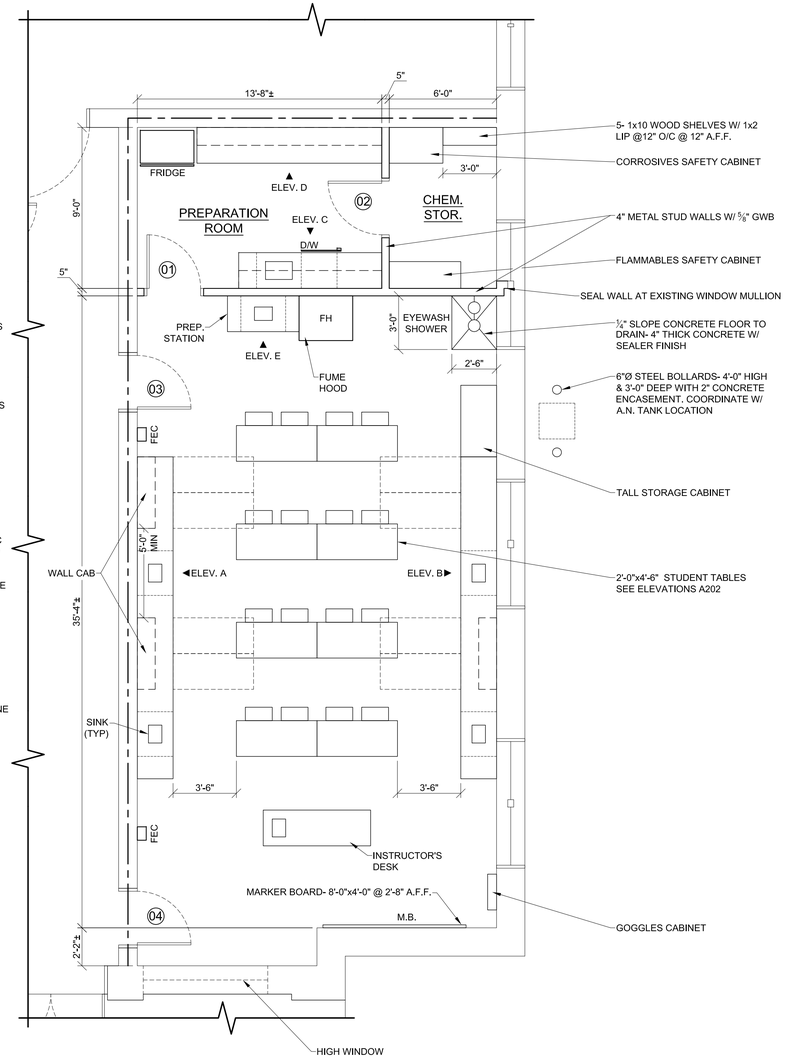
DEMOLITION PLAN
SCALE: ⅛" = 1'-0"

CONSTRUCTION NOTES

1. ALTERNATE #1: PROVIDE CASEWORK AND TABLES (DOES NOT INCLUDE INSTRUCTOR'S DESK) BASE BID- CASEWORK SHALL BE OWNER FURNISHED/ CONTRACTOR INSTALLED.
2. CONCRETE SHALL BE 3,500 PSI
3. APPLIANCES, EQUIPMENT, SINK, & GAS CONTROLS SHALL BE ACCESSIBLE COMPLIANT.
4. REPAINT/PAINT GWB WALLS.
5. PROVIDE VINYL WALL BASE

EQUIPMENT

1. INSTRUCTOR'S DESK- BASIS OF DESIGN- K-L06-WSD-72E
2. FUME HOOD- BASIS OF DESIGN- FLINN SCIENTIFIC FUME HOOD- SE 8000- EXTERIOR EXHAUST W/ BASE SE 8004
3. FLAMMABLE CABINET- BASIS OF DESIGN- DR. SAFE DS 530
4. CORROSIVES CABINET- BASIS OF DESIGN- JUSTRITE 896002
5. FRIDGE- BASIS OF DESIGN- THERMO SCIENTIFIC- 1218W09 W/ GLASS DOOR
6. DISHWASHER- BASIS OF DESIGN- MIELE G 7893
7. TALL STORAGE CABINET- BASIS OF DESIGN- U LINE H-3594ABL
8. GOGGLES CABINET- BASIS OF DESIGN- FLINN SCIENTIFIC- SE 1000
9. FEC- BASIS OF DESIGN- LARSONS 2909 SM- FULL GLASS, WHITE BAKED, ENAMEL FINISH



PROJ NORTH

FLOOR PLAN
SCALE: ¼" = 1'-0"

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FLOOR PLAN

A201

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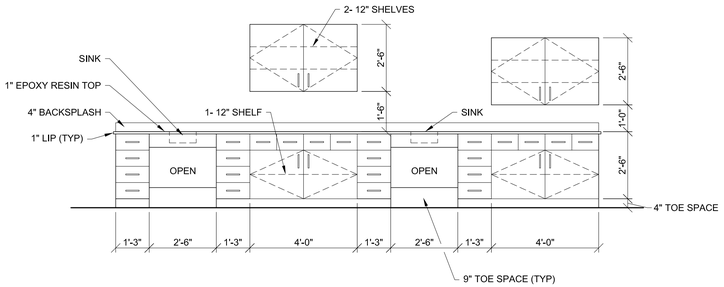
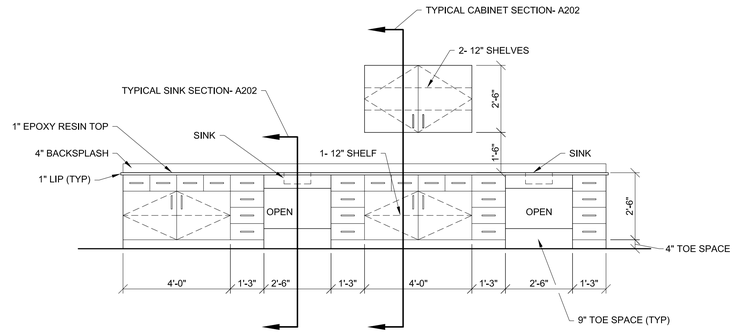
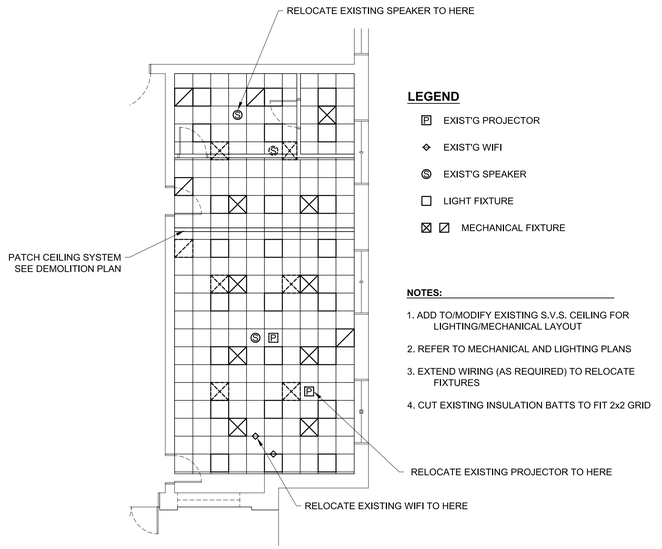


CASEWORK ELEVATION A
SCALE: ⅜" = 1'-0"



CASEWORK ELEVATION B
SCALE: ⅜" = 1'-0"



LEGEND

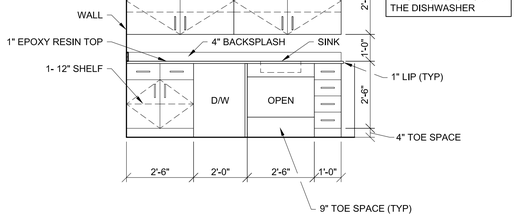
- EXIST'G PROJECTOR
- EXIST'G WIFI
- EXIST'G SPEAKER
- LIGHT FIXTURE
- MECHANICAL FIXTURE

NOTES:

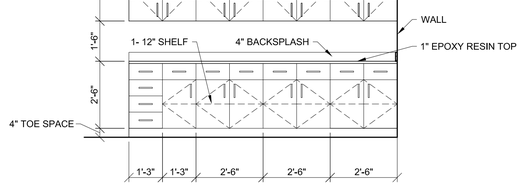
1. ADD TO/MODIFY EXISTING S.V.S. CEILING FOR LIGHTING/MECHANICAL LAYOUT
2. REFER TO MECHANICAL AND LIGHTING PLANS
3. EXTEND WIRING (AS REQUIRED) TO RELOCATE FIXTURES
4. CUT EXISTING INSULATION BATTS TO FIT 2x2 GRID

PROJ NORTH

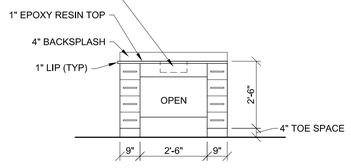
REFLECTED CEILING PLAN
SCALE: ⅛" = 1'-0"



CASEWORK ELEVATION C
SCALE: ⅜" = 1'-0"



CASEWORK ELEVATION D
SCALE: ⅜" = 1'-0"



CASEWORK ELEVATION E
SCALE: ⅜" = 1'-0"

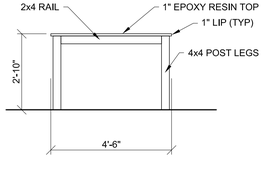


TABLE ELEVATION A
SCALE: ⅜" = 1'-0"

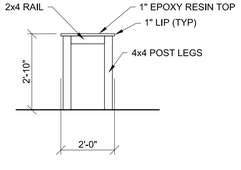
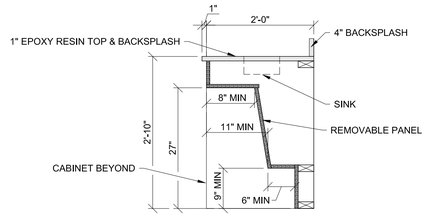
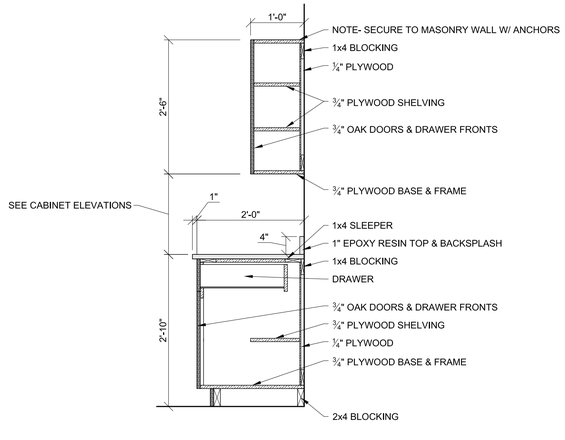


TABLE ELEVATION B
SCALE: ⅜" = 1'-0"



SINK SECTION
SCALE: ¾" = 1'-0"



CABINET SECTION
SCALE: ¾" = 1'-0"

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ELEVATIONS

A202

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PLUMBING LEGEND

Cold Water Piping Below Grade	
Cold Water (CW)	
Hot Water (TW)	
Hot Water Return (TWR)	
140°F Water (HW)	
140°F Water Return (HWR)	
Natural Gas Piping	G
Sanitary Waste Piping	
Vent Piping	
Vent Thru Roof (VTR)	
Primary Roof Drainage Piping (Slashes Indicate Below Grade)	RD
Secondary Roof Drainage Piping (All Above Grade)	SRD
Point of Connection (NEW) (field verify exact location)	
Point of Removal (OLD)	
Floor Drain (FD)	
Floor Sink (FS)	
Floor Cleanout (FCO)	
Grade Cleanout (GCO)	
Wall Cleanout (WCO)	
Pipe Drop	
Water Service Riser	
Ball Valve	
Check Valve	
Gate Valve	
Globe Valve	
Balancing Valve	
Pressure Reducing Valve	
Solenoid Valve	
Water Hammer Arrestor (WHA)	
Hose Bibb (HB)	
Wall Hydrant (WH)	
Yard Hydrant (YH)	
Air Admittance Valve (AAV)	
Mixing Valve	

INSTANTANEOUS GAS WATER HEATER SCHEDULE

tag	IGWH
manufacturer	Rheem
model	RTGH-C95XLN
type	Outdoor instantaneous gas-fired
heating input (mbh)	199
thermal efficiency	95%
recovery (gpm at 45° rise)	8.4
volts/phase	120V/1Ø
mca	4.0
mcop	15
shipping weight (lbs)	82
notes	1,2,3
1. Provide service access in accordance with Code and manufacturer's recommendations.	
2. Provide 5 gal expansion tank.	
3. See piping detail.	

PLUMBING EQUIPMENT SCHEDULE

TAG	EQUIPMENT
AAV	Air Admittance Valve: Studor Mini-Vent or equal with Oatey or equal Sure-Vent model 39010 wall box with metal grille faceplate.
ANT	Acid neutralization tank: MIFAB MI-NEUT-30 or equal. Protect with bollards.
EFW	Emergency Eye/Face Wash: Guardian Equipment GBF1704 or equal. Barrier Free, pedestal mounted eye/face wash with stainless steel bowl, Schedule 40 galvanized pipe and fittings, ½" U.S. made chrome plated stay open ball valve, powder coated cast aluminum flag handle and floor flange. Unit shall have (4) polypropylene 'GS Plus' spray heads with integral "flip-top" dust covers, filters and 1.8-GPM flow control orifices mounted on a chrome plated brass eyewash assembly. Unit shall include ANSI compliant sign. Unit complies with ADA requirements for accessibility by handicapped persons. Unit shall be hydrostatically tested to meet or exceed ANSI Z358.1 - 2009, and come with a full 2-year warranty. Provide TMV G3600 thermostatic mixing valve to deliver tepid water.
EWS	Emergency Eye Wash/Shower: Guardian Equipment GBF1909 or equal. Barrier Free, combination eye/face wash and shower safety station with ABS plastic shower head, stainless steel bowl, powder coated cast aluminum flag handle and floor flange, 1 ¼" IPS Schedule 40 galvanized pipe and fittings, 1" IPS and ½" IPS U.S. made chrome plated brass stay open ball valves, and polished stainless steel pull rod. Unit shall have (4) polypropylene 'GS Plus' spray heads with integral "flip-top" dust covers, filters, and 1.8-GPM flow control orifices mounted on a chrome plated brass eyewash assembly. Unit shall include ANSI compliant sign. Unit complies with ADA requirements for accessibility by handicapped persons. Unit shall meet or exceed ANSI Z358.1 - 2009, and come with a full 2-year warranty. Provide FC29 regulator (20 gpm), and TMV G3800 thermostatic mixing valve to deliver tepid water.
ET	Expansion Tank: Amtrol ST-12 or equal. 4.4 gallons, 3.2 gallons acceptance.
FCO	Floor cleanout: Zurn model ZN-1400 or equal. Dura-coated cast iron, polished nickel bronze top, bronze plug.
FD	Floor drain: Zurn model ZN-415-S or equal. Dura-coated cast iron, polished nickel bronze top. Provide with Sure Seal Inline Trap Sealer or equal.
GCO	Ground cleanout: Zurn Z-1440-BP or equal. Dura-coated cast iron body with bronze plug. Set in 12"x12"x4" concrete pad flush with grade. See detail.
MV	Mixing valve - point of use. Lawler TMM-1000 or equal.

PLUMBING SPECIFICATIONS

1. **Shop Drawings:** Provide product data for all equipment and materials. Include pertinent dimensions, materials of construction, performance characteristics, weights and factory and field wiring diagrams.
2. **Operation and Maintenance Manuals:** Provide 3 bound O&M Manuals at the completion of the project. Include approved shop drawings and manufacturer's maintenance manuals.
3. **Record Drawings:** Contractor shall maintain a set of drawings on the job site to record all differences between the project documents and "As-Built". Contractor shall provide a set of "As-Built" drawings to the Owner at the completion of the project.
4. **Warranty:** Contractor shall warranty the installation against defects for a period of one year from the date of Owner acceptance. Any defective materials or workmanship shall be replaced at no cost to the Owner.
5. **Permits and Fees:** Contractor shall obtain and pay for all permits, fees and inspections required under his portion of the work.
5. **Electrical Coordination:** The plumbing contractor shall be responsible for providing disconnect switches for plumbing equipment not provided with factory mounted disconnect switches and the wiring from plumbing equipment to the disconect switch. All wiring and devices shall be in accordance with the NEC and electrical specifications. The electrical contractor shall be responsible for wiring and all devices upstream of disconnect device.
6. **General Duty Valves:** Valve pressure and temperature ratings shall be not less than indicated and as required for system pressures and temperatures. Valve shall be the same as upstream piping unless otherwise indicated. Valves in insulated piping shall have 2-inch stem extensions on gate valves with rising stem. Ball valves shall be provided with extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation. Brass or bronze ball valves shall be two-piece, full-port, brass trim, MSS SP-110, 150 psig SWP, 600 psig CWP, two piece body, forged brass, threaded or solder ends, PTFE or PTE seats, and chrome plated ball. Bronze gate valves shall be Class 125, MSS SP-80, Type 1, non-rising stem or Type 2, rising stem, with a 200psig CWP, ASTM B 62 bronze body with integral seat, solid wedge bronze disc, asbestos free packing and threaded or solder joint ends. Bronze globe valves shall be Class 125, MSS SP-80, Type 1 with a 200psig CWP, ASTM B 62 bronze body with integral seat, asbestos free packing and threaded solder joint ends.
7. **Piping Insulation:** Flexible elastomeric insulation shall be closed-cell, sponge- or expanded-rubber materials complying with ASTM C 534, Type I for tubular materials. Mineral-fiber, preformed pipe insulation shall be Type I, 850 Deg F, mineral or glass fibers bonded with a thermosetting resin, complying with ASTM C 547, Type I, Grade A, with factory-applied ASJ or with factory-applied ASJ-SS. Install insulation continuously through non-fire rated walls and partitions. Install insulation continuously through penetrations of fire-rated walls and partitions and seal in accordance with a UL approved through penetration firestop system. Domestic cold, hot and recirculated hot water insulation shall be 1-inch thick. Insulate exposed piping including drain and water supplies under handicapped lavatories and sinks, to meet the requirements of ADA 4.19.4, ADAAG 606.5, ICC/ANSI A117.1 606.6, or GSA & DOD's ABA 606.5.requirement to "protect against contact - no sharp or abrasive surfaces"
8. **Pipe Hangers and Supports:** Carbon-steel pipe hangers and supports shall be MSS SP-58, Types 1 through 58, factory-fabricated components. Galvanized metallic coatings may be pregalvanized or hot dipped. Hanger rods shall be continuous-thread rod, nuts, and washer made of carbon steel. Copper pipe hangers shall be MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components. Hanger rods shall be continuous-thread rod, nuts, and washer made of carbon steel. Trapeze pipe hangers shall be MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts. Thermal-hanger shield inserts for shall be heavy duty with minimum 100psig compressive strength. For trapeze or clamped systems insert and shield shall cover entire circumference of pipe. For clevis or band hanger insert and shield shall cover lower 180 degrees of pipe. Pipe positioning systems shall be IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications. Supports for piping installed above a roof shall be B-Line BD Series with 14 gauge galvanized channel and recycled rubber base.
9. **Domestic Water Piping (Metallic):** Hard copper tube shall be ASTM B 88, Type L water tube, drawn temper. Soft copper tube shall be ASTM B 88, Type K water tube, annealed temper. Fittings shall be cast-copper, solder-joint fittings, ASME B16.18, pressure fittings or wrought-copper, solder-joint fittings, ASME B16.22 pressure fittings. Bronze flanges shall be ASME B16.24, Class 150, with solder-joint ends. Copper unions shall be MSS SP-123 cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends. Above grade water piping shall be Type L hard copper. Below grade piping shall be Type K soft copper. Piping shall be tested for leaks in accordance with Chapter 312 of the 2018 NC Plumbing Code. Domestic water piping shall be sanitized in accordance with Chapter 610 of the 2018 NC Plumbing Code.
10. **Y-Pattern Strainers:** Bronze body, 125 psig pressure rating, threaded end connections, stainless steel with round 0.033 inch perforations and pipe plug on drain.
11. **Drain Valves:** MSS SP-110, standard-port, two-piece ball valves, 400-psig minimum CWP. bronze or brass body, chrome-plated brass ball, replaceable seats and seals, threaded or solder joint inlet, garden-hose thread outlet complying with ASME B1.20.7 and cap with brass chain.
12. **Chemical Drain and Vent Piping:** Special drainage system for corrosive or acid waste shall be manufactured from CPVC Type IV Grade I compounds with a minimum cell classification of 23447. Pipe and Fittings shall conform to ASTM F 2618. Pipe shall be Schedule 40 dimensions. One-Step solvent cement shall be specially formulated for chemical waste applications and conform to ASTM F493. All pipe, fittings and cement shall be supplied as a system by a single manufacturer and shall be certified by NSF International for use in corrosive waste drainage systems and shall bear the mark "NSF-cw". Special Drain system to be the ChemDrain® system as manufactured by Charlotte Pipe and Foundry Co. Installation to be in accordance with manufacturer's instructions and all applicable local code requirements. Buried pipe shall be installed in accordance with ASTM D 2321 and ASTM F 1668. The system is intended for use in non-pressure chemical waste applications with a maximum working temperature of 220° F.
13. **Fuel-Gas Piping:** Steel Pipe shall be ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B with malleable-iron threaded fittings, ASME B16.3, Class 150, standard pattern. Unions shall be ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends. Paint gas piping with two coats of safety yellow oil based enamel paint. Label gas piping in accordance with the section 401.5 of the NC Fuel Gas Code.
14. **Fuel-Gas Specialties:** Indoor, fixed-appliance flexible connectors shall comply with ANSI Z21.24. Outdoor, appliance flexible connectors: Comply with ANSI Z21.75. Connectors shall be corrugated stainless-steel tubing with polymer coating with an operating-pressure rating of 0.5 psig and zinc coated steel threaded ends (ASME B1.20.1). Y-Pattern Strainers shall be ASTM A 126, Class B, cast iron body with bolted cover and bottom drain connection and threaded end connections, 125 psig CWP rating. Strainer screen shall be 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
15. **Installation:** Materials, fixtures, equipment, accessories and installation shall comply with the requirements of the 2018 NC Plumbing Code, 2018 NC Energy Code, applicable sections of the 2018 NC Building Code and local ordinances. Equipment and materials shall be installed in compliance with manufacturer's installation recommendations and acceptable industry standards. All pipe shall be substantially supported to prevent sags. Piping shall be run parallel to walls and structure unless indicated otherwise. All water piping and other piping subject to freezing shall be run within the thermal envelope of the building unless noted otherwise. Piping subject to freezing that is noted to be install outside of the thermal envelope shall be heat traced with self limiting heat tape and insulated per the insulation specification. It is the responsibility of the contractor to field verify existing conditions and dimensions prior to beginning work.

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NORTH CAROLINA PROFESSIONAL SEAL 028953 ENGINEER TILDEN A. WHITE

1/10/2020

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58-1/2 N. Lexington, Asheville, NC 28801
828-255-4327 Project 19119

CHHS SCIENCE LAB RENOVATION

Project Number: 19017
Checked: TW
Drawn: -
Date: 1/7/2020
Revisions:

PLUMBING NOTES & SCHEDULES

P1

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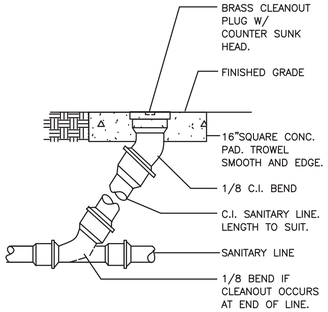
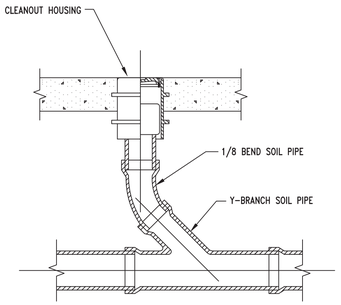
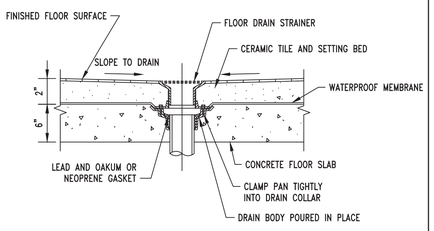


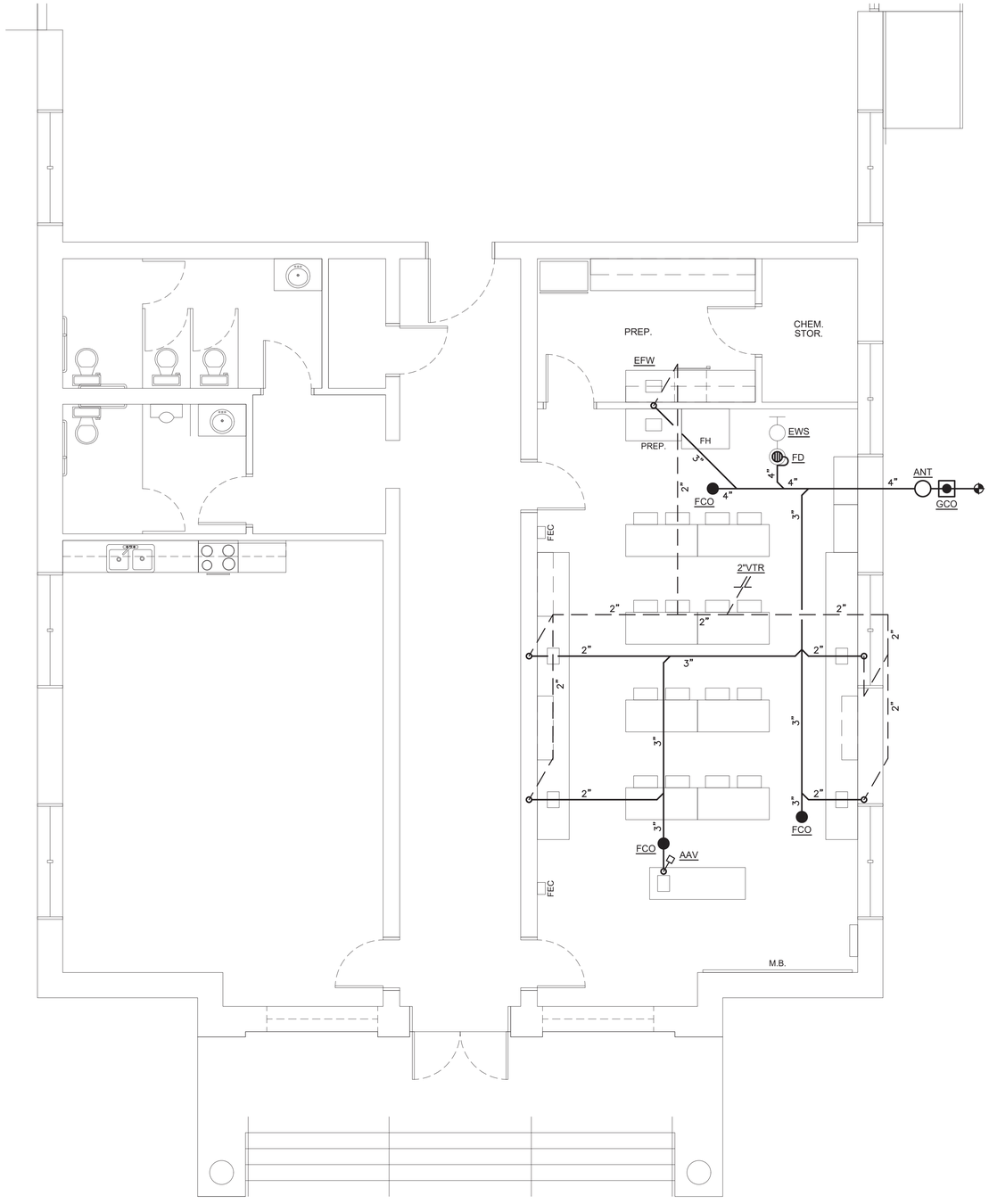
4 P2 GROUND (GRADE) CLEANOUT DETAIL
SCALE: NONE



3 P2 FLOOR CLEANOUT DETAIL
SCALE: NONE



2 P2 FLOOR DRAIN IN OPEN AREA DETAIL
SCALE: NONE



1 P2 SANITARY PIPING PLAN
SCALE: 1/4" = 1'-0"

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CHHS SCIENCE LAB RENOVATION

Project Number: 19017
Checked: TW
Drawn: -
Date: 1/7/2020
Revisions:

SANITARY PIPING PLAN

P2

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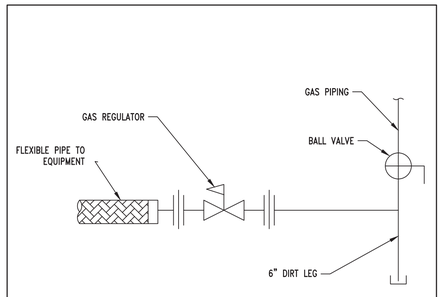
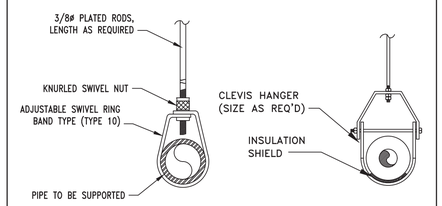
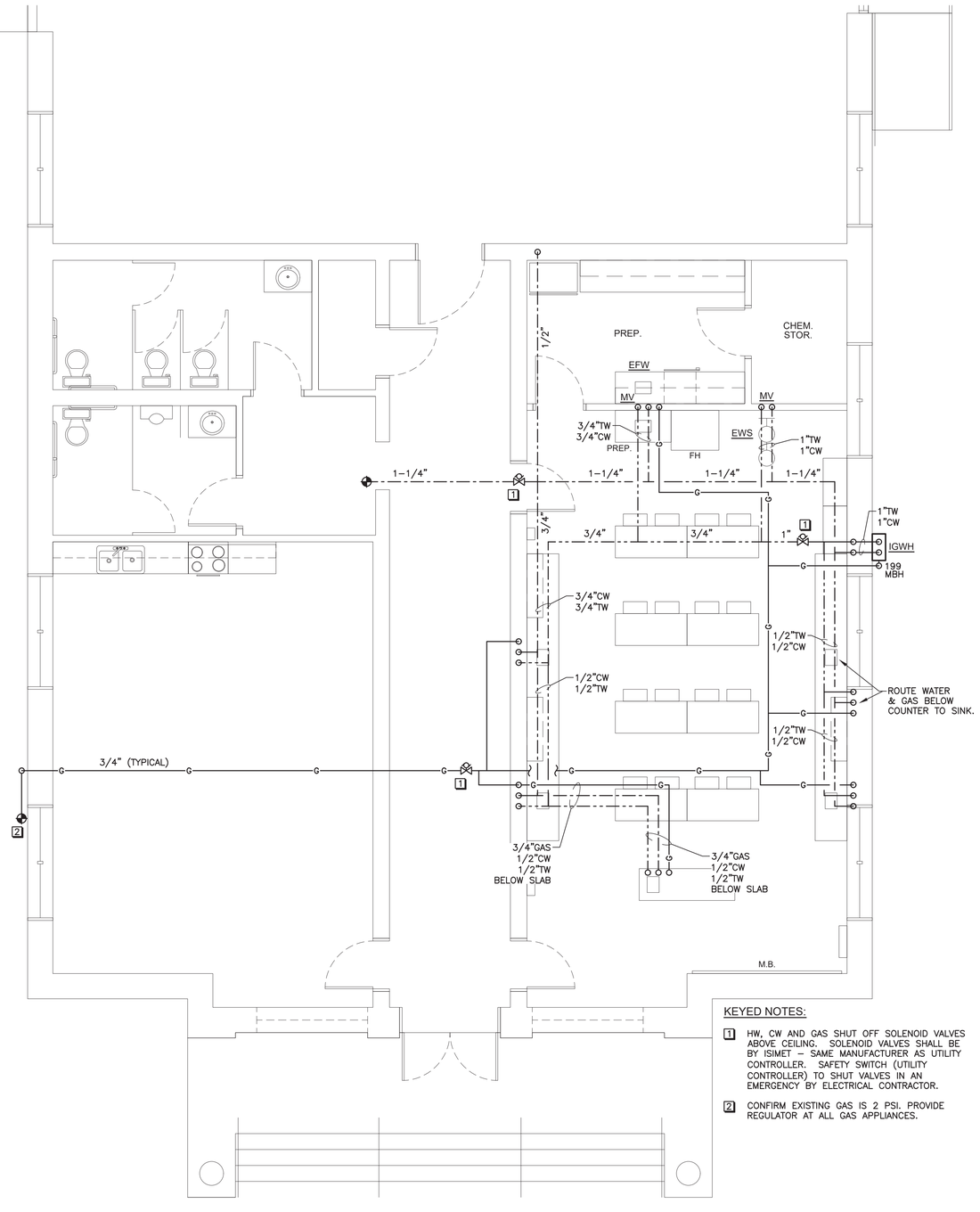


3 / P3 GAS CONNECTION DETAIL
SCALE: NONE



2 / P3 PIPE SUPPORT DETAIL
SCALE: NONE



KEYED NOTES:

1. HW, CW AND GAS SHUT OFF SOLENOID VALVES ABOVE CEILING. SOLENOID VALVES SHALL BE BY ISIMET – SAME MANUFACTURER AS UTILITY CONTROLLER. SAFETY SWITCH (UTILITY CONTROLLER) TO SHUT VALVES IN AN EMERGENCY BY ELECTRICAL CONTRACTOR.
2. CONFIRM EXISTING GAS IS 2 PSI. PROVIDE REGULATOR AT ALL GAS APPLIANCES.

1 / P3 PLUMBING SUPPLY PIPING PLAN
SCALE: 1/4" = 1'-0"

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PLUMBING SUPPLY PIPING PLAN

P3

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MECHANICAL SPECIFICATIONS

1. **Shop Drawings:** Provide product data for all equipment and materials for approval prior to purchasing. Include pertinent dimensions, materials of construction, performance characteristics, weights and factory and field wiring diagrams.
2. **Operation and Maintenance Manuals:** Provide 3 bound O&M Manuals at the completion of the project. Include approved shop drawings and manufacturer's maintenance manuals.
3. **Record Drawings:** Contractor shall maintain a set of drawings on the job site to record all differences between the project documents and "As-Built". Contractor shall provide a set of "As-Built" drawings to the Owner at the completion of the project.
4. **Warranty:** Contractor shall warranty the installation against defects for a period of one year from the date of Owner acceptance. Any defective materials or workmanship shall be replaced at no cost to the Owner.
5. **Electrical Coordination:** The mechanical contractor shall be responsible for providing disconnect switches for mechanical equipment not provided with factory mounted disconnect switches and the wiring from mechanical equipment to the disconect switch. All wiring and devices shall be in accordance with the NEC and electrical specifications.
6. **Permits and Fees:** Contractor shall obtain and pay for all permits, fees and inspections required under his portion of the work.
7. **Testing and Balancing:** Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section. Prepare test reports for both fans and outlets. Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer. Include a list of instruments used for procedures, along with proof of calibration. The final report shall contain the following in addition to certified field-report data, fan curves, manufacturers' test data and field test reports prepared by system and equipment installers, other information relative to equipment performance; do not include Shop Drawings and product data. In addition to form titles and entries, include the following data title page, name and address of the TAB contractor, project name, project location, report date, signature of TAB supervisor who certifies the report, table of contents. The report shall contain a summary of contents including the following, indicated versus final performance, notable characteristics of systems, description of system operation sequence if it varies from the Contract Documents, nomenclature sheets for each item of equipment, data for terminal units, including manufacturer's name, type, size, and fittings, notes to explain why certain final data in the body of reports vary from indicated values, test conditions for fans performance forms including settings for outdoor-, return-, and exhaust-air dampers, conditions of filters, cooling coil, wet- and dry-bulb conditions, fan drive settings including settings and percentage of maximum pitch diameter and other system operating conditions that affect performance.
8. **Duct Insulation: Mineral-Fiber Blanket Insulation:** Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket (FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II). FSK Jacket Adhesive shall comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints. Insulation nominal density of 1.5 lbs/cu.ft for 1½-2" thicknesses and 0.75 lbs/cu.ft for 3" thick. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type 1A or Type 1B with factory-applied FSK jacket (FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II). FSK Jacket Adhesive shall comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints. Insulation nominal density shall be 3 lbs/cu.ft.

Supply Air (concealed):	1-1/2" FG Blanket, R4.7 installed.
Supply Air (exposed):	1-1/2" FG Board, R6 installed.
Supply Air (above attic insulation):	3"FG Blanket, R8 installed.
Supply Air (outdoors):	2"FG Board, R8 installed with embossed aluminum jacket.
Return Air (concealed):	not required
Return Air (exposed):	not required
Return Air (above attic insulation):	3"FG Blanket, R8 installed.
Return Air (outdoors):	2"FG Board, R8 installed with embossed aluminum jacket.
Outside Air (concealed):	1-1/2" FG Blanket, R4.7 installed including intake plenum.
Outside Air (exposed):	1-1/2" FG Board, R6 installed including intake plenum.
Outside Air (above attic insulation):	not required.
Outside Air (outdoors):	not required.
Exhaust Air (exposed):	1" FG Board for the first 10 feet from wall or roof penetration including exhaust plenum.
Exhaust Air (concealed):	1-1/2" FG Blanket for the first 10 feet from outside wall or roof penetration including exhaust plenum.

9. **Metal Ducts:** Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated. Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction, select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Materials shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections. Galvanized sheet steel shall comply with ASTM A 653/A 653M with a galvanized coating designation of G60. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Aluminum Sheets: Comply with ASTM B 209 (ASTM B 209M) Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view. Sealants and gaskets shall have surface-burning characteristics with a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL. Hanger rods for noncorrosive environments shall be cadmium-plated steel rods and nuts. Strap and rod sizes shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
10. **Round Longinitudinal Seam Ducts (Single Wall):** General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
11. **Flexible Ducts:** Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film with a pressure rating of 10-inch wg positive and 1.0-inch wg negative a maximum air velocity of 4000 fpm, a temperature range of minus 20 to plus 210 deg F and an insulation value of R4.
12. **In-Line Centrifugal Fans:** Housing shall be split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting. Direct-drive units shall have motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing. Belt-driven units shall have motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing. Fan wheels shall be aluminum, airfoil blades welded to aluminum hub. Provide fan with variable-speed controller, solid-state control to reduce speed from 100 to less than 50 percent, companion flanges on inlet and outlet duct connections, fan guards with 1/2- by 1-inch mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork and motor and drive cover (belt guard) of epoxy-coated steel. Provide elastomeric hangers and flexible connections on fans that are not internally isolated.
13. **Ceiling Fans:** Ceiling mounted exhaust fans shall be of the centrifugal direct drive type. The fan housing shall be constructed of heavy-gauge galvanized steel. The housing interior shall be lined with 1/2 inch (13 mm) acoustical insulation. The outlet duct collar shall include a polypropylene backdraft damper on SP-A50 - 90 and a spring loaded aluminum backdraft damper on SP-A110 and larger. Outlet shall be adaptable for horizontal or vertical discharge. The designer grille for sizes SP-A50 through SP-A390 shall be constructed of high-impact polystyrene and for sizes SP-A410 through SP-A1550, the grille shall be constructed of aluminum. Grilles shall be non-yellowing. The access for wiring shall be external. The motor disconnect shall be internal and of the plug-in type. The motor shall be mounted on vibration isolators. The fan wheel shall be of the forward-curved centrifugal type and dynamically balanced. All fans shall bear the AMCA Certified Ratings program AMCA Sound and Air Performance seal and shall be UL/cUL Listed. Ceiling or wall mount fans shall be model SP as manufactured by Greenheck Fan Corporation or equal.
14. **Centrifugal Roof Fans:** Housing shall be removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone. Upblast Units shall be provide with spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and galvanized steel hinged subbase arrangement to permit service and maintenance. Fan wheels shall have aluminum hub and wheel with backward-inclined blades. Belt Drives shall be resiliently mounted to housing with steel fan shaft turned, ground, and polished; keyed to wheel hub. Shaft bearings shall be permanently lubricated, permanently sealed, self-aligning ball bearings. Pulleys shall be cast-iron, adjustable-pitch motor pulley. Fan and motor shall be isolated from exhaust airstream. Variable-speed controller shall be a solid-state controller to reduce speed from 100 to less than 50 percent. Disconnect switch shall be nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit. Bird screens shall be removable, 1/2-inch mesh, aluminum or brass wire. Dampers shall be counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops or motorized dampers with parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops. Roof curbs shall be galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
15. **Grilles, Registers and Diffusers:** Ceiling Diffusers shall be constructed of steel with a white baked enamel finish. Diffusers shall be plaque face style designed for T-bar mounting with an adjustable pattern. Diffusers shall be provided with a combination damper and equalizing grid. See schedule for sizes and capacities. Fixed face grilles shall be constructed of Steel with a white baked enamel finish. Grilles shall have 1 inch frames with fixed 45 degree curved blades at ¾" on center. See schedule for sizes and capacities.
16. **Installation:** All work and materials shall be in accordance with the applicable sections of the N.C. Building Code and local codes and ordinances. Equipment and materials shall be installed in compliance with manufacturer's installation recommendations and acceptable industry standards. The mechanical contractor is responsible for verifying existing conditions and dimensions before beginning work. Perform all work in a neat workman-like manner and in accordance with industry standards.

MECHANICAL LEGEND

Supply Diffuser (Type X, YYY CFM)

Return Grille (Type X)

Rectangular Duct X" Wide, Y" Deep (Inside Clear Dimension) — XxY

Round duct X" Diameter (Inside Clear Dimension) — X"ø

Duct Transition: Rectangular To Rectangular — XxY | XXxYY

Duct Branch Tap: Round Spin-In Damper — XxY

Connect to Existing System

Thermostat - Mount 48" AFF

Fire Damper - FD

NORTH CAROLINA PROFESSIONAL SEAL 028953 ENGINEER TILDEN A. WHITE

2018 APPENDIX B BUILDING CODE SUMMARY:

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT

Method of Compliance
[X] Prescriptive [ ] Energy Cost Budget

Thermal Zone 4
Winter Dry Bulb: **16°F**
Summer Dry Bulb: **85°F**

Interior Design Conditions
Winter Dry Bulb: **68°F**
Summer Dry Bulb: **75°F**
Relative Humidity: **50%**

Building Heating Load: **21 mbh**

Building Cooling Load: **29 mbh**

Mechanical Spacing Conditioning System
Unitary
description of unit: **Existing Gas Furnace Split System**
heating efficiency: **See Schedules**
cooling efficiency: **See Schedules**
heat output of unit: **See Schedules**
cooling output of unit: **See Schedules**
Boiler
total boiler output. If oversized, state reason. **n/a**
Chiller
total chiller capacity. If oversized, state reason. **n/a**

List equipment efficiencies: **See Schedules**

Equipment schedules with motors (mechanical systems)
motor horsepower: **- see schedules**
number of phases: **- see schedules**
minimum efficiency: **- manufacturer's standard meeting ASHRAE 90.1**
motor type: **- manufacturer's standard**
# of poles: **- manufacturer's standard**

EXHAUST FAN SCHEDULE

tag	EF1	EF2	EF3	EF4
serves	PREP.	CHEM. STOR.	FUME HOOD	SCIENCE LAB
manufacturer (or equal)	Greenheck	Greenheck	Greenheck	Greenheck
model	SP-A190	SP-A90	SFB-9	CUE-070
type	ceiling	ceiling	inline	roof upblast
drive	direct	direct	belt	direct
rpm	1400	870	1000	2500
airflow (cfm)	186	80	810	1000
esp (inches H2O)	0.25	0.25	0.375	0.25
max. sones	2.0	0.4	12	na
control	Switch	Switch	Switch on hood	Emergency exhaust. Controlled by Utility Controller.
voltage	120V/1Ø	120V/1Ø	120V/1Ø	120V/1Ø
power (watts)	49.2	15.0	1/3 hp	1/2 hp
weight (lbs)	17	12	120	75
applicable notes	1,2,3	1,2,3	1,2,4	1,2

1. Provide unit mounted disconnect and backdraft damper.
2. Wall switches by E.C.
3. Provide Greenheck Model RJ pitched roof cap with insect screen. ((4"Ø, 6x9, 10x10)
4. Provide speed controller, spark proof fan wheel, and Hi-Pro Polyester coating on all airstream surfaces. Fan shall run continuously.

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MECHANICAL NOTES & SCHEDULES

M1

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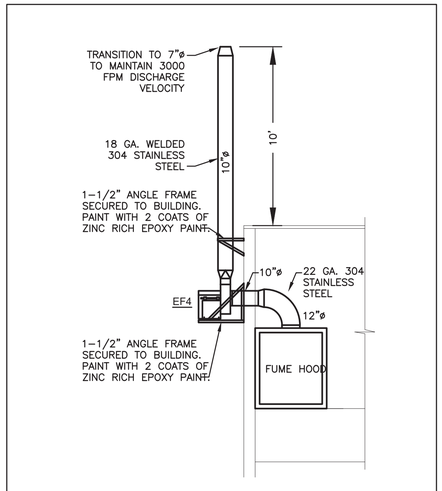
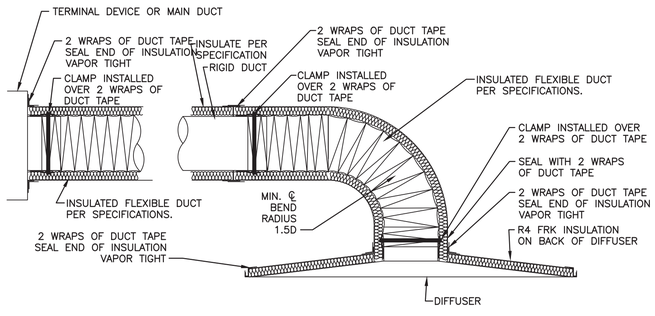
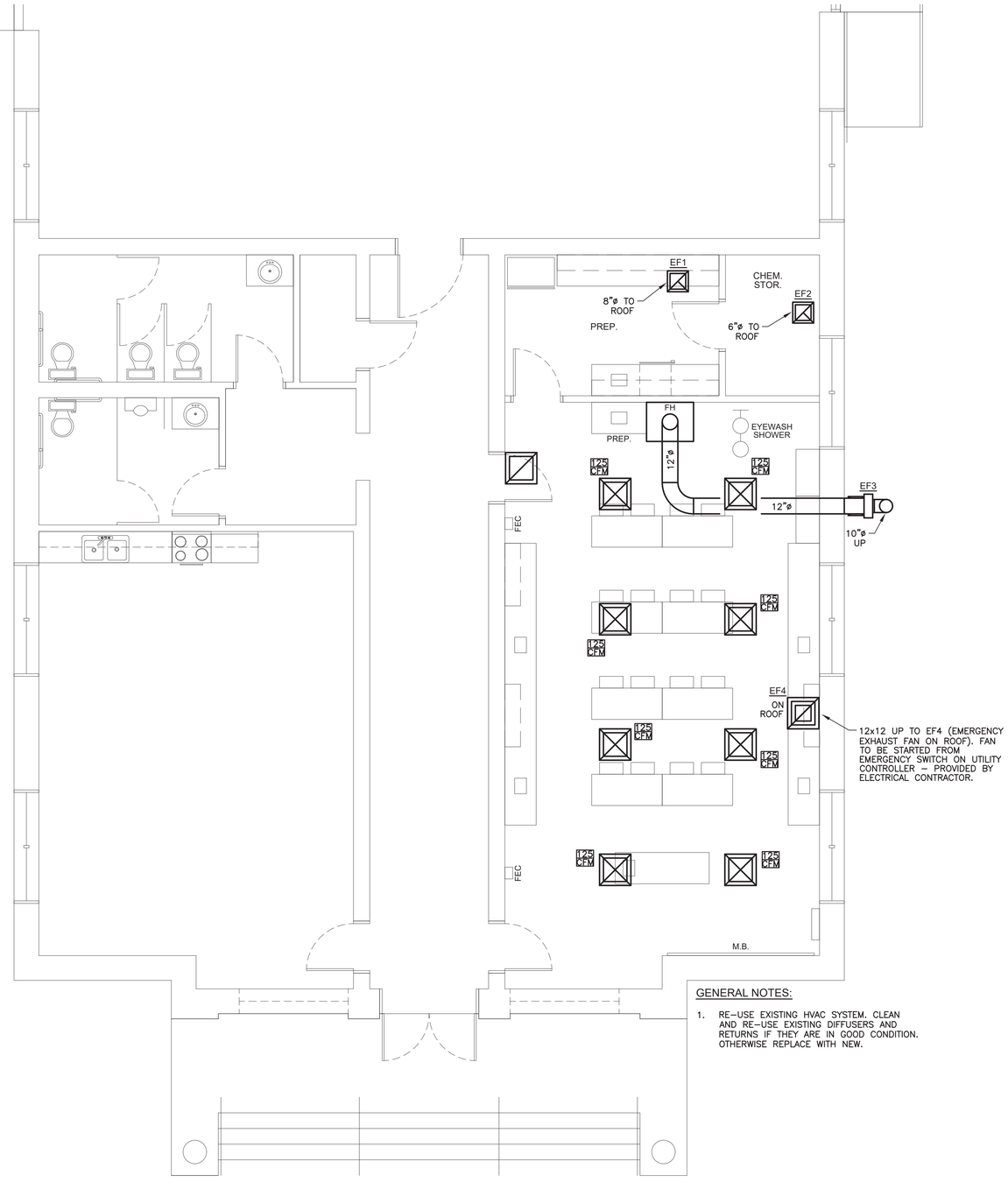


3/M2 FUME HOOD DETAIL
SCALE: NO SCALE



2/M2 FLEXIBLE DUCT CONNECTION DETAIL
SCALE: NO SCALE



GENERAL NOTES:

1. RE–USE EXISTING HVAC SYSTEM. CLEAN AND RE–USE EXISTING DIFFUSERS AND RETURNS IF THEY ARE IN GOOD CONDITION. OTHERWISE REPLACE WITH NEW.

1/M2 MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

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MECHANICAL PLAN

M2

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ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
(J)	JUNCTION BOX PER N.E.C.
LP1-2	HOMERUN – PANEL DESIGNATION AND CIRCUIT NUMBER
$	SINGLE POLE SWITCH – 20A – 120/277V – MOUNT 46" A.F.F. TO BOTTOM
$D	DIMMER SWITCH
$3	THREE-WAY SWITCH – 20A – 120/277V – MOUNT 46" A.F.F. TO BOTTOM
$$	INDICATES SWITCHES ARE TO PROVIDE MULTIPLE LIGHT LEVELS (INBOARD, OUTBOARD SWITCHING OF LAMPS)
M	115 OR 277 VOLT MOTOR AS NOTED ON PLANS
	FUSED OR NON-FUSIBLE HEAVY DUTY DISCONNECT SWITCH – BY DIVISION 16
$M	2-POLE OR 3-POLE MANUAL MOTOR STARTER. PROVIDE WITH OVERLOAD PROTECTION.
OS	WALL MOUNTED OCCUPANCY SENSOR, SOUND AND MOTION ACTIVATED – SENSOR SWITCH WSX-PDT (WSX-PDT-2P FOR TOILET ROOMS)
OS	CEILING MOUNTED OCCUPANCY SENSOR WITH DUAL STAGE ILLUMINATION – NLIGHT RCMS-PS150-PDT-10-AR-G2 – VERIFY EXACT WIRING REQUIREMENTS WITH MANUFACTURERS CUT SHEETS BEFORE BEGINNING ANY WORK.
XXX	STANDARD 20A OUTLET – NEMA 5-20R DUPLEX. MOUNT 16" A.F.F. "GFI" DENOTES GROUND FAULT TYPE, NON-FEED THRU, "EWC" DENOTES OUTLET FOR ELECTRIC WATER COOLER – COORDINATE LOCATION WITH PLUMBING CONTRACTOR – NEMA 5-20R DUPLEX "WP" DENOTES WEATHERPROOF IN USE NEMA 5-20R DUPLEX, "ACT" DENOTES MOUNTED ABOVE COUNTER TOP OR BACKSPLASH, "BB" DENOTES MOUNTED ON THE BACKSIDE OF THE BAR JUST BENEATH THE BARTOP TYPICAL FOR RESTAURANTS AND BARS, "TR" DENOTES TAMPER RESISTANT. "USB" DENOTES LEGRAND TM826USB.
	TWO STANDARD 20A OUTLETS IN A 2-GANG BOX – NEMA 5-20R DUPLEX – COMMON COVER PLATE – MOUNT 16" A.F.F. TO BOTTOM OF DEVICE.
	COMMERCIAL GRADE 20AMP 120 VOLT "POP UP" RECESSING TABLETOP RECEPTACLE – LEW ELECTRIC PUR20-(COLOR).
▼	TELEPHONE/DATA OUTLET MTD. 16" AFF TO BOTTOM. PROVIDE 1" CONDUIT WITH PULL CORD FROM OUTLET TO COMMUNICATION BACKBOARD. STUB OUT 6" ABOVE BACKBOARD. PROVIDE NYLON BUSHING ON END OF CONDUIT. OUTLET BOX SHALL BE A 4" SQ. BOX WITH SINGLE GANG PLASTER RING. PROVIDE BLANK COVERPLATE ON OUTLET BOX.
TV	CABLE TV OUTLET MTD. 16" AFF TO BOTTOM OR AS INDICATED. PROVIDE 1" CONDUIT WITH PULL CORD FROM OUTLET TO COMMUNICATION BACKBOARD. STUB OUT 6" ABOVE BACKBOARD. PROVIDE NYLON BUSHING ON END OF CONDUIT. OUTLET BOX SHALL BE A 4" SQ. BOX WITH SINGLE GANG PLASTER RING. PROVIDE BLANK COVERPLATE ON OUTLET BOX.
⏚	GROUNDING FOR SERVICE OR SEPARATELY DERIVED SYSTEM, PER N.E.C.
	SPECIAL POWER OUTLET.

LIGHTING FIXTURE SCHEDULE

TAG	TYPE						VOLTAGE	FIXTURE WATTS	LAMPS		MOUNTING				# OF BALLASTS	DESCRIPTION	MANUFACTER & MODEL (OR EQUAL)
	INCAND.	FLUOR.	LED	METAL HAL.	H.P.S.	OTHER			NUMBER	WATTS / TYPE	RECESSED	CEILING	PENDANT	WALL	LANDSCAPE		
A			X				120	50	-	LED	X					2 x 2 LED TROFFER	LITHONIA 2ACL2-35L-33L-EZ1-LP835
X1			X				120	1	-	LED				X		LED EXIT SIGN WITH BATTERY	LITHONIA LE-S-1-R-120-EL-N
X2			X				120	5	-	LED				X		LED EXIT SIGN W/ EM HEADS	LITHONIA LHQM-LED
X3			X				120	2	-	LED				X		EM LIGHTS W/ BATTERY BACKUP	LITHONIA ELM2 LED

1. CONTRACTOR SHALL COMPLY WITH INSULATION CONTACT (IC) RATING FOR RECESSED FIXTURES WHERE INSULATION IS INSTALLED DIRECTLY ABOVE. CEILING (SEE ARCHITECTURAL SHEETS).

2. VERIFY MOUNTING HEIGHT WITH OWNER PRIOR TO INSTALLATION

WIRING DEVICE NOTES

1. Switches shall be Hubbell CS115 or equivalent and receptacles shall be Hubbell CR20 or equivalent. Devices shall be white or as directed by architect.

2. Switches shall be as follows:

single pole 20 amp	CSB20AC1-I
3 way 20 amp	CSB20AC3-I
4 way 20 amp	CSB20AC4-I
motor starter switch	Square D type "K" series

3. Duplex receptacle shall be as follows:

20 amp duplex	PS5362I
20 amp duplex-GFCI	2095IL
20 amp duplex-Weather GFI	2095TRWRI

Note: Duplex receptacles have nylon face and side wire type. Receptacles shall have brass contacts, brass terminal screws and green ground wire screw. GFCI receptacle shall be included with a trip indicator light.

4. Coverplates shall be oversized stainless steel SSJX or as directed by architect.

5. Outlet boxes shall not be mounted back-to-back.

6. Receptacles shall be 20 amp unless 15 amp is required by equipment served.

7. Weatherproof in use covers shall be clear equal to Leviton. For horizontal mount covers use part no. "5997-CL". For vertical mount covers use part no. "5977-CL".

8. All outlets (including telephone and data) shall have cover plates.

2018 APPENDIX B BUILDING CODE SUMMARY:

ELECTRICAL SYSTEM AND EQUIPMENT

Method of Compliance:

Energy Code:	[X] Prescriptive	[ ] Performance
ASHRAE 90.1:	[X] Prescriptive	[ ] Performance

Lighting schedule(each fixture type)

lamp type required in fixture	(see fixture schedule)
number of lamps in fixture	(see fixture schedule)
ballast type used in the fixture	(see fixture schedule)
number of ballasts in fixture	(see fixture schedule)
total wattage per fixture	(see fixture schedule)
total interior wattage (whole space allowable)	NOT TO EXCEED .926KW
total exterior wattage specified vs. allowed	NA

Additional Prescriptive Compliance:

506.2.1 :More Efficient Mechanical Equipment	[X] Prescriptive	[ ] Performance
506.2.2 :Reduced Lighting Power Density	[ ] Prescriptive	[ ] Performance
506.2.3 :Energy Recovery Ventilation System	[ ] Prescriptive	[ ] Performance
506.2.4 :Higher Efficiency Service Water Heating	[ ] Prescriptive	[ ] Performance
506.2.5 :On-Site Supply of Renewable Energy	[ ] Prescriptive	[ ] Performance
506.2.6 :Automatic Daylighting Control Systems	[ ] Prescriptive	[ ] Performance

BRANCH CIRCUIT CONDUCTOR SIZING TABLE

For circuits with branch circuit protection rated 20 amps or less, copper conductors shall be sized according to the following:

voltage	distance (ft)	home run (AWG)	remainder (AWG)
120	0 - 50	12	12
	50 - 90	10	12
	90 - 140	8	10
	140 +	6	10
208	0 - 95	12	12
	95 - 160	10	12
	160 - 250	8	10
	250 +	6	10

ELECTRICAL NOTES

1. The intent of these drawings and specifications are to describe the installation of a complete, fully adjusted, and operational system.
2. Provide five sets of electrical equipment submittals to the GC for the architect, engineer, GC and owner to review and approve prior to purchasing.
3. The contractor shall provide all supervision, labor, material, equipment. machinery, and any and all other items necessary to complete the system. All work shall be performed in a neat and workmanlike manner in accordance with industry standards.
4. All work under this section shall be accomplished in strict accordance with state building codes and the National Electric Code. Coordinate with local power company requirements.
5. The contractor shall obtain all necessary approval, obtain all permits and pay all fees required for the installation of their work.
6. The drawings are diagrammatic only. The contractor may need to make field adjustments to accommodate actual field conditions.
7. Devices located in rated walls shall have sufficient separation from other devices to allow proper installation and firestopping.
8. The contractor shall refer to the architectural and structural drawings for the general construction of the building, for floors and ceiling heights, for locations of wall, partitions, beams, etc.
9. Manufacturer's listed are to establish a standard of quality and not intended to limit the selection to these manufacturers. Any substitutions must be approved by the architect and engineer.
10. Contractor shall verify all listed model numbers with manufacturers to insure proper application of equipment.
11. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations.
12. The contractor shall perform any and all trenching, excavation and backfilling required for the installation of this work.
13. The contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of this work.
14. All work shall be coordinated with the general contractor and other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate architectural, structural, mechanical, plumbing and electrical features of construction.
15. The electrical contractor shall visit the site before submitting his bid so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything which could have been anticipated from a visit to the site.
16. Equipment shall be installed in accordance with manufacturer's written instructions.
17. Provide grounding for all conduits, motor frames, metal casings, receptacles, system neutral, etc. and as required by NEC as minimum. Resistance to ground shall not exceed 25 OHMS.
18. A green insulated copper ground wire, sized per NEC, shall be installed in all raceways, electric metallic tubing used for feeders, branch circuits, flexible conduit, and as otherwise noted on the drawings.
19. All fixtures shown on the plans shall be furnished and installed, complete with all mounting accessories, lamps and tubes. Fixtures shall be independently supported from structure. Re-use existing fixtures that are in good condition. If additional fixtures need to be supplied, match existing fixtures.
20. All wiring shall be run in conduit. The minimum indoor conduit size shall be ½". Indoor conduit shall be electrical metallic tubing or type AC, MC, or nonmetallic sheathed cable may be used for branch circuits where allowed by NEC and not subject to physical damage, moisture or dampness. Connection to equipment shall be flexible metal conduit except in wet or damp locations use liquid tight flexible metal conduit. Indoor boxes and enclosures shall be NEMA type 1, except in damp or wet locations use NEMA type 4, stainless steel. Where nonmetallic conduit is used below the slab, provide a minimum of Schedule 80 PVC conduit to turn up into the building space or at any exterior walls, inside or outside framed walls, exterior landscape poles, or equipment. Use raceway fittings compatible with raceway and suitable for use and location. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions. Raceways shall run parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical. Provide grounding connections for raceway, boxes, and components as indicated and instructed by manufacturer. Tighten connections and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL standard 486A.
21. All underground raceways shall be identified by "underground line marking tape" located directly above the raceway at 6" below finished grade. Tape shall be permanent, bright-colored, continuous, magnetic strip, printed plastic tape compounded for direct burial not less than 6" wide and 4mils thick. Printed legend shall be indicative of the service it is marking. Conduits exposed to different temperatures shall be sealed as required by NEC Article 300.7A.
22. Color for devices shall be coordinated with the general contractor.
23. Receptacles shall comply with UL Standard 498, "electrical attachment plugs and receptacles," heavy-duty grade 20 AMP rated except as otherwise indicated.
24. Ground-fault circuit interrupter (GFI) receptacles shall comply with UL Standard 943. "Ground fault circuit interrupters," with integral NEMA 5-20R duplex receptacle.
25. Single pole and three/four-way toggle type snap switches shall be 20 AMP 120/277 V. AC., rated, quite-type A.C. switches. NRTL listed and labeled as complying with UL Standard 20 "general use snap switches," and with federal specification W-S-896.
26. Wall plates: single and combination types shall be 302 stainless steel that mate and match with corresponding wiring devices.
27. Conductors shall be color coded in accordance with NEC as follows:

Phase	208/120 Volts	480/277 Volts
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green

28. Electrical equipment shall be identified with labels of engraved plastic-laminate on each major unit of electrical equipment.
29. Panelboards/loadcenters shall be type, rating, and features as indicated on the schedules. Enclosures shall be NEMA type 1, flush or surface mounted as indicated. Cabinet shall be code gauge, galvanized steel. Fronts shall be sheet steel with gray lacquer finish with hinged locking door. Ground and neutral bus shall be 100% rated. Bus shall be copper or aluminum. Main and neutral lugs shall be plug-on type. Equipment ground bus shall be adequate for feeder and branch-circuit equipment ground conductors bonded to box. Directory frame shall be metal, mounted inside each panel door. At the completion of this installation, type circuit designations on the directory card and leave in the card holder provided inside cabinet doors. Tandem circuit breakers shall not be used. Multi-pole breakers shall have common trip. The minimum interrupting rating for circuit breakers rated at 120/240 volts shall be 22,000 AMPS RMS symmetrical. For flush mounted panels provide a minimum of (4) -1" conduits stubbed to the ceiling space for future use.
30. All wiring for equipment shall be copper with one of the following types of insulation: THW, THHW, THWN with a rating of at least 75 DEG. C. All wiring located above the ceiling shall be plenum-rated.
31. Final locations of all exit and emergency lights shall be verified with the building inspector prior to installation.
32. Branch circuits shall not exceed 80% of overcurrent protection. Devices shall be relocated to another circuit if found to be in excess of 80%.
33. Electrical contractor shall be responsible to supply a coordinated study as described in the NEC or as required by permitting officials with all gear submitted involving generators, elevators, or any life safety equipment.

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CHHS SCIENCE LAB RENOVATION

Project Number: 19017
Checked: TW
Drawn: -
Date: 1/7/2020
Revisions:

ELECTRICAL NOTES & SCHEDULES

E1

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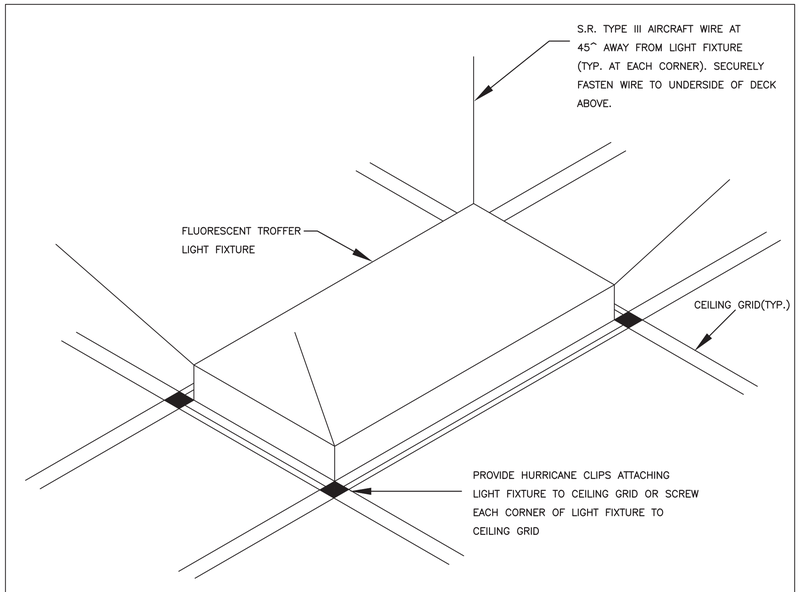
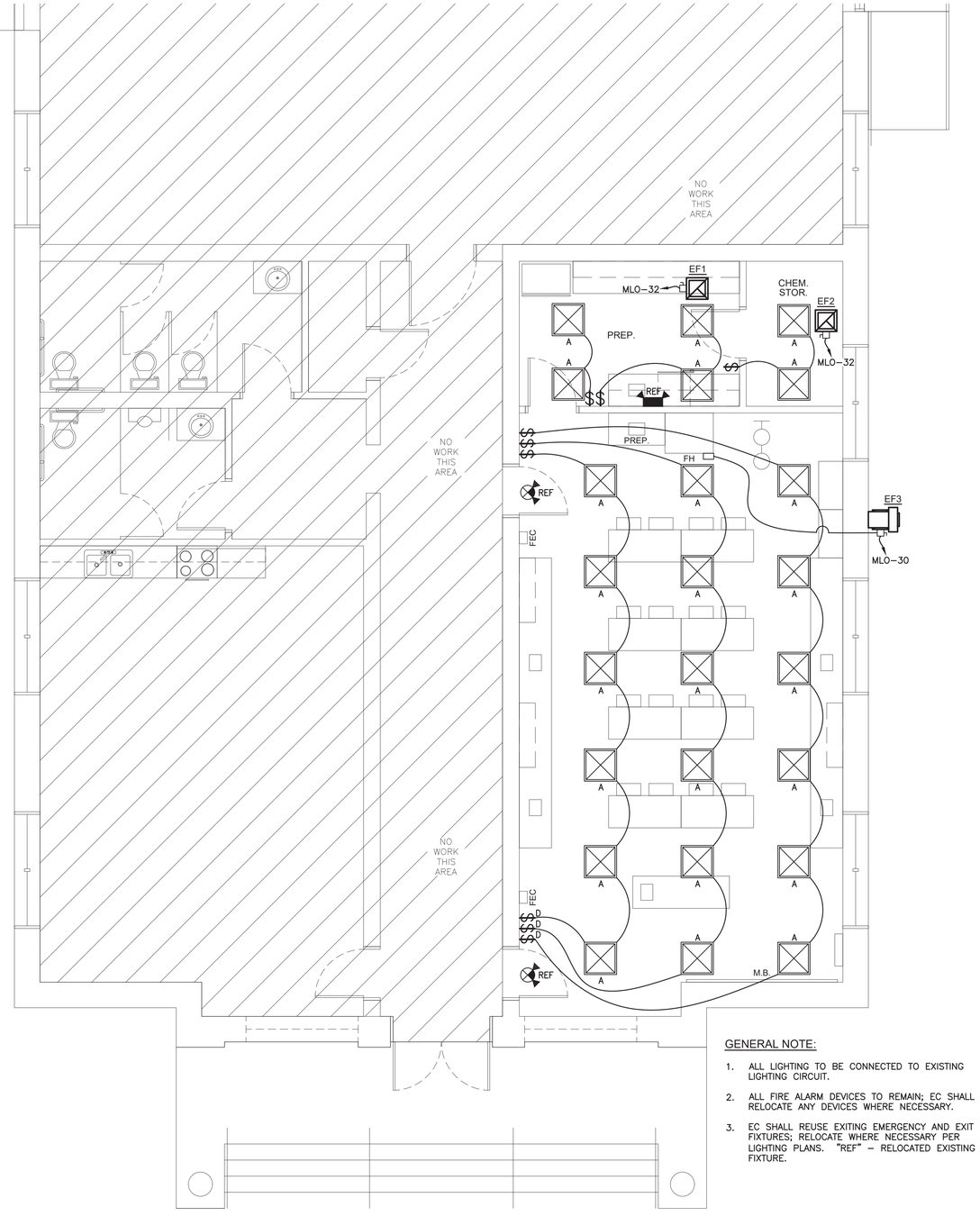


2 / E2 SEISMIC RESTRAINT FOR FLUORESCENT TROFFER LIGHT FIXTURE
SCALE: NONE



GENERAL NOTE:

1. ALL LIGHTING TO BE CONNECTED TO EXISTING LIGHTING CIRCUIT.
2. ALL FIRE ALARM DEVICES TO REMAIN; EC SHALL RELOCATE ANY DEVICES WHERE NECESSARY.
3. EC SHALL REUSE EXITING EMERGENCY AND EXIT FIXTURES; RELOCATE WHERE NECESSARY PER LIGHTING PLANS. "REF" – RELOCATED EXISTING FIXTURE.

1 / E2 LIGHTING PLAN
SCALE: 1/4" = 1'-0"

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LIGHTING PLAN

E2

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LOCATION: EXISTING
MANUFACT.: EXISTING
MODEL: EXISTING
MOUNTING: SURFACE

PANEL: **MLO**
FED FROM: EXISTING

VOLTS		Ph	W
208	120	3	4

FULLY RATED
EXISTING

CONN VA	#	LOAD	Ph	N	G	C	BKR	A	B	C	BKR	Ph	N	G	C	LOAD	#	CONN VA
0	1	(EX)HALL REC	-	-	-	-	20	■			20	-	-	-	-	(EX)LIGHTS	2	0
0	3	(EX)HALL REC	-	-	-	-	20		■		20	-	-	-	-	(EX)CAN LTS	4	0
0	5	(EX)HALL REC	-	-	-	-	20			■	20	-	-	-	-	(EX)MTG LTS	6	0
0	7	(EX)HALL REC/LTS	-	-	-	-	20	■			20	-	-	-	-	(EX)MTG LTS	8	0
0	9	(EX)KIT REC/LTS	-	-	-	-	20		■		20	-	-	-	-	(EX)MTG REC	10	0
0	11	(EX)DISHWASHER	-	-	-	-	20			■	20	-	-	-	-	(EX)MTG REC	12	0
0	13	(EX)BATHRM	-	-	-	-	20	■			20	-	-	-	-	(EX)KIT REC	14	0
0	15	(EX)KIT REC	-	-	-	-	20		■		20	-	-	-	-	(EX)KIT REC	16	0
0	17	(EX)KIT REC	-	-	-	-	20			■	20	-	-	-	-	(EX)KIT REC	18	0
0	19	(EX)MICROWAVE	-	-	-	-	20	■			20	-	-	-	-	(EX)KIT REC	20	0
360	21	REC	12	12	12	1/2	20		■		20	-	-	-	-	(EX)FLOOR REC	22	0
360	23	REC	12	12	12	1/2	20			■	20	-	-	-	-	(EX)FLOOR REC	24	0
360	25	REC	12	12	12	1/2	20	■			20	12	12	12	1/2	REC	26	180
360	27	REC	12	12	12	1/2	20		■		20	12	12	12	1/2	EF4	28	900
360	29	REC	12	12	12	1/2	20			■	20	12	12	12	1/2	EF3	30	1200
1620	31	REC	12	12	12	1/2	20	■			20	12	12	12	1/2	EF1&2	32	250
1440	33	REC	12	12	12	1/2	20		■								34	0
360	35	REC	12	12	12	1/2	20			■							36	0
900	37	REC	12	12	12	1/2	20	■									38	0
720	39	REC	12	12	12	1/2	20		■								40	0
1080	41	REC	12	12	12	1/2	20			■							42	0

24	SUBTOTAL AMPS Ph A	
24	SUBTOTAL AMPS Ph B	
18	SUBTOTAL AMPS Ph C	

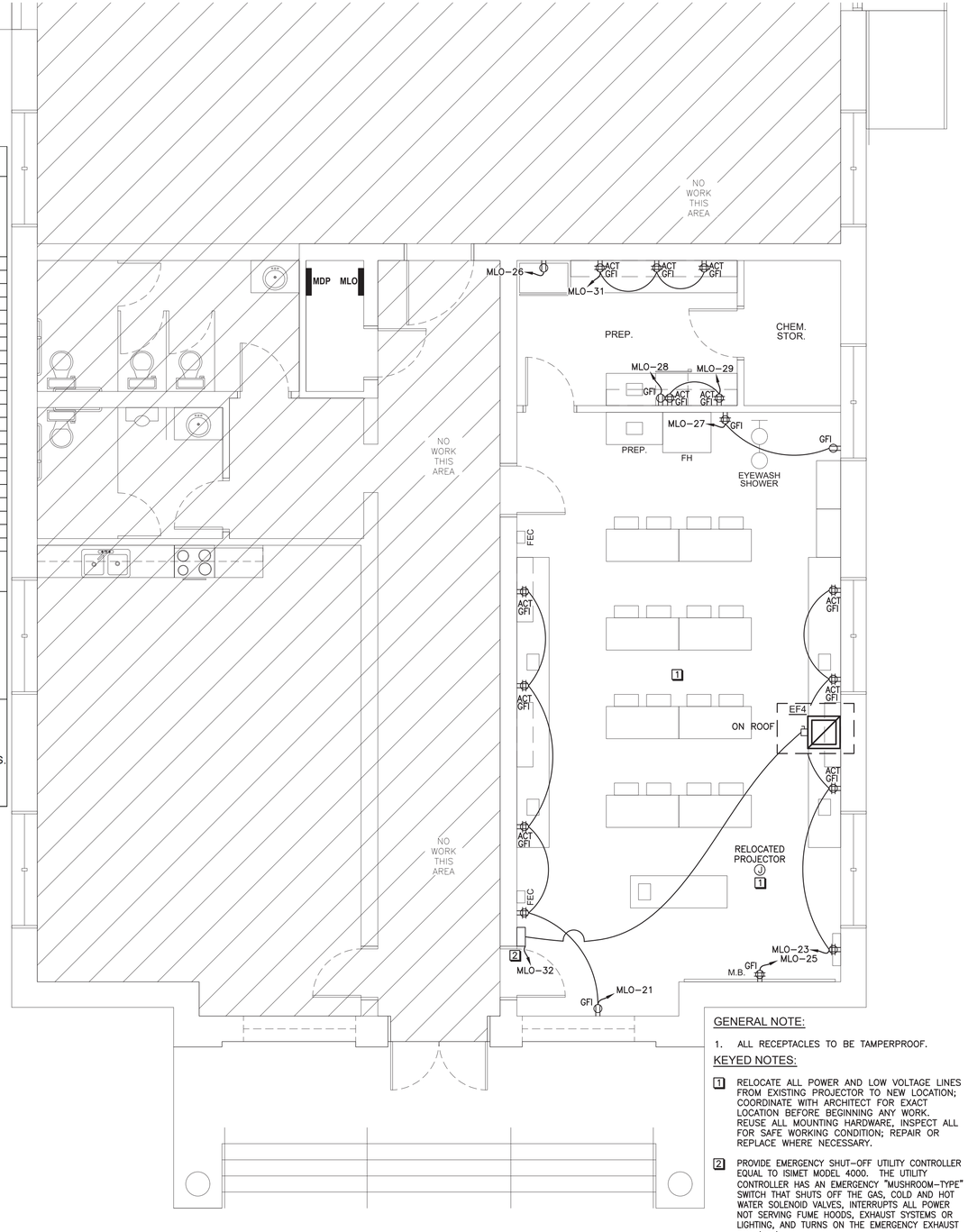
MAIN BREAKER:		AMPS
MAIN LUGS:	225	AMPS (MIN)
BUS AMPACITY:	225	AMPS (MIN)

SUBTOTAL AMPS Ph A	4
SUBTOTAL AMPS Ph B	8
SUBTOTAL AMPS Ph C	10

LOAD	CONNECTED	DF	DEMAND	
LIGHTING	0	125	0	
A/C	0	100	0	
HEATING	0	100	0	
NON-VENT MOTORS	0	100	0	
VENTILATION	2350	100	2350	
KITCHEN	0	100	0	
RECEPTACLES	8100	100	8100	
MISCELLANEOUS	0	100	0	
FUTURE	0	100	0	
TOTAL	10450		10450	(VA)
	29		29	(AMPS)

VA ph A	3310
VA ph B	3780
VA ph C	3360
TOTAL	**10.5 kVA**

NOTES
1. PANEL SHALL BE PROVIDED WITH A FULL NEUTRAL.
2. PANEL BUSSING MATERIAL SHALL BE CU.
3. PROVIDE A FULLY RATED GROUND BUS.
4. *BKR INDICATES GROUND FAULT TYPE CIRCUIT BREAKER.
5. ALL BRANCH CIRCUITS SHALL BE FED WITH COPPER CONDUCTORS.
6. SEE POWER RISER DIAGRAM FOR FEEDER AND CONDUIT SIZE.
7. PANEL SHALL BE SERVICE ENTRANCE RATED.
8. MDP SHALL BE DEAD FRONT.



GENERAL NOTE:

1. ALL RECEPTACLES TO BE TAMPERPROOF.

KEYED NOTES:

1 RELOCATE ALL POWER AND LOW VOLTAGE LINES FROM EXISTING PROJECTOR TO NEW LOCATION; COORDINATE WITH ARCHITECT FOR EXACT LOCATION BEFORE BEGINNING ANY WORK. REUSE ALL MOUNTING HARDWARE, INSPECT ALL FOR SAFE WORKING CONDITION; REPAIR OR REPLACE WHERE NECESSARY.

2 PROVIDE EMERGENCY SHUT-OFF UTILITY CONTROLLER EQUAL TO ISIMET MODEL 4000. THE UTILITY CONTROLLER HAS AN EMERGENCY "MUSHROOM-TYPE" SWITCH THAT SHUTS OFF THE GAS, COLD AND HOT WATER SOLENOID VALVES, INTERRUPTS ALL POWER NOT SERVING FUME HOODS, EXHAUST SYSTEMS OR LIGHTING, AND TURNS ON THE EMERGENCY EXHAUST FAN (EF6).

1/E3 POWER PLAN
SCALE: 1/4" = 1'-0"

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POWER PLAN

E3