



TLC Engineering Solutions
1372 Peachtree Street NE
Atlanta, Georgia 30309

GRADY HEALTH SYSTEMS

ATLANTA, GEORGIA

MEDICAL VACUUM CRITERIA PACKAGE

AUGUST 6, 2021



August 6, 2021

Mr. Thomas Lemieux
Director, Facilities Development
Grady Health Systems
80 Jesse Hill Jr. Drive, SE
Atlanta, Georgia

Dear Mr. Lemieux:

Grady Health Systems contracted TLC Engineering Solutions (TLC) to provide a Criteria Package for corrections to the existing medical vacuum systems. Information provided within the report was taken from meetings with Danny Williams and Nathaniel Jessee, review of existing drawings and field surveys.

Criteria package includes the following:

- Extend 4" medical vacuum in A and B wing from level 3 down to ground level.
- Provide new vacuum pump system in Mechanical Room 4CM3.
 - Require expansion of existing Mechanical Room 4CM3.
- Provide two new medical gas master alarm panels and connection to the existing BAS for new vacuum pump. Master alarm panels shall be located adjacent to existing master alarm panels.
- Provide new 6" vacuum main from Mechanical Room 4CM3 to A and B wing.
- Extend 4" medical vacuum in A and B wing from Level 7 to Level 12.
- Interconnect new vacuum system to existing vacuum system in Level 8, Area J Mechanical Room. This will be accomplished on Level 8, A and B wing.
- Provide new 4" vacuum main to serve C and D wing.

Sincerely,

A handwritten signature in black ink that reads "Chad. Schock".

Chadwick M. Schock
Associate, Design Specialist
Plumbing / Fire Protection

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1.0 EXECUTIVE SUMMARY

1. TLC conducted a project kick-off meeting with Nathaniel Jessee and yourself on June 20, 2021. During the meeting a scoping document was produced for the basis of this Criteria document.
2. TLC conducted an onsite meeting with Nathaniel on July 13, 2021. Proposed Basement location and existing vacuum pump in the basement and Level 8 Area J Mechanical Room were reviewed.
3. TLC conducted a second onsite meeting with Nathaniel on July 21, 2021. The purpose of this trip was to determine the feasibility of locating the new vacuum pump in existing Mechanical Room 4CM3 instead of Basement as originally directed. IT was determined during the site investigation the new vacuum pump will fit in Mechanical Room 4CM3.

2.0 EXISTING MEDICAL GAS SYSTEM ANALYSIS

Medical Vacuum Pump system located on 8th floor, Area J is intended to supply vacuum to the entire hospital except for the Emergency Department which is feed from a dedicated vacuum pump system located in Mechanical Room 4CM3. Existing vacuum pump located in the 8th floor area J Mechanical room is a multiplex, Claw style vacuum pump and appears to be in good condition.

Temporary Medical Vacuum Pump system located in the Basement was installed to supplement the main system. Basement Medical Vacuum Pump was added to help overcome excessive losses in the system which has caused “low suction” alarms in the past. Basement vacuum pump is older, in poor condition and does not have the capacity to be a complete backup for the Medical Vacuum system. Currently, the Basement Medical Vacuum Pump is being utilized to provide supplemental vacuum to overcome the pressure loss associated with reduced pipe sizes.

Medical Vacuum for “A” and “B” wings are served with 2” Medical vacuum risers. “A” wing has two 2” Medical Vacuum risers (A-1 and A-2 Riser). Riser A-1 has connections 7th, 9th and 10th Floors and is interconnected to Rise A-2. “B” wing is served by one riser. A 4” medical vacuum risers were provided in A and B wings for Levels 4 thru 6 during the Flood Repair project in preparation of the proposed project.

Medical Vacuum Inlet Counts A and B Wings

Floor	Medical Vacuum “A” Wing	Medical Vacuum “B” Wing
13	126	126
12	164 ^A	165 ^A
11	123	123
10	123	126 ^B
9	123 ¹	160 ^A
8	120	160
7	126	160
6	126	129
5	126	129
4	109	129
3	13	69 ^B

Notes:

- A. Area could not be confirmed during site investigation. Medical gas outlet count provided by staff.

- B. Area could not be confirmed during site investigation. Medical gas outlet count taken from existing drawings and assumptions based on FGI minimum requirements.

Medical Gas Pipe Sizing

Medical vacuum is determined by assigning 1.5 SCFM per inlet to branch lines and 0.25 SCFM per inlet to mains. Medical vacuum inlets are classified as "Group A" (Critical Care, Surgery, Recover and similar spaces) or "Group B" (Medical / Surgical patient rooms, Exam / Treatment rooms, and similar spaces) inlet types.

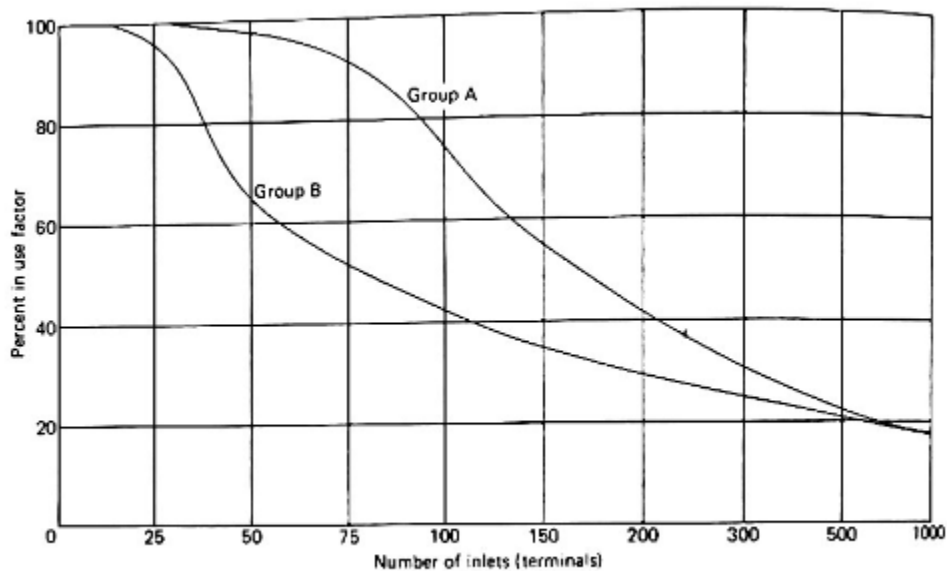


Figure A-4-8.1.1.1(b) Simultaneous use curves.

3.0 MEDICAL VACUUM

3.1 Existing Conditions

Medical vacuum is supplied to the A and B wing from multiple risers, 'A-1 Riser', 'A-2 Riser' and 'B Riser'. Facilities have noted deficiencies in maintaining sufficient vacuum on the system. Risers 'A-1' and 'A-2' are connected on floors 7 and 11 per Danny Williams.

Riser 'A-1' is 2-1/2" up to the Third floor. Floors four through twelve is 2". Riser 'A-2' is 2" from ground floor to the twelfth floor. Each floor is supplied with a 2" vacuum from Riser 'A-2'. Riser 'B' is 2" from ground floor to the twelfth floor. Prior to installing the temporary vacuum pump in the basement the facility was receiving numerous low suction alarms. The temporary vacuum pump has resolved the low suction alarms, however the vacuum pump is older and in poor condition.

As part of the recent Flood Repair project a new 4" medical vacuum riser was provide from the 3rd Floor to the 6th Floor Mezzanine with connections at each floor. This 4" medical vacuum riser shall be extended up to the 13th floor and down to the Ground Level. Each floor shall be connected to new riser and provided with lockable floor service valves.

4.0 MEDICAL VACUUM SYSTEM UPGRADE

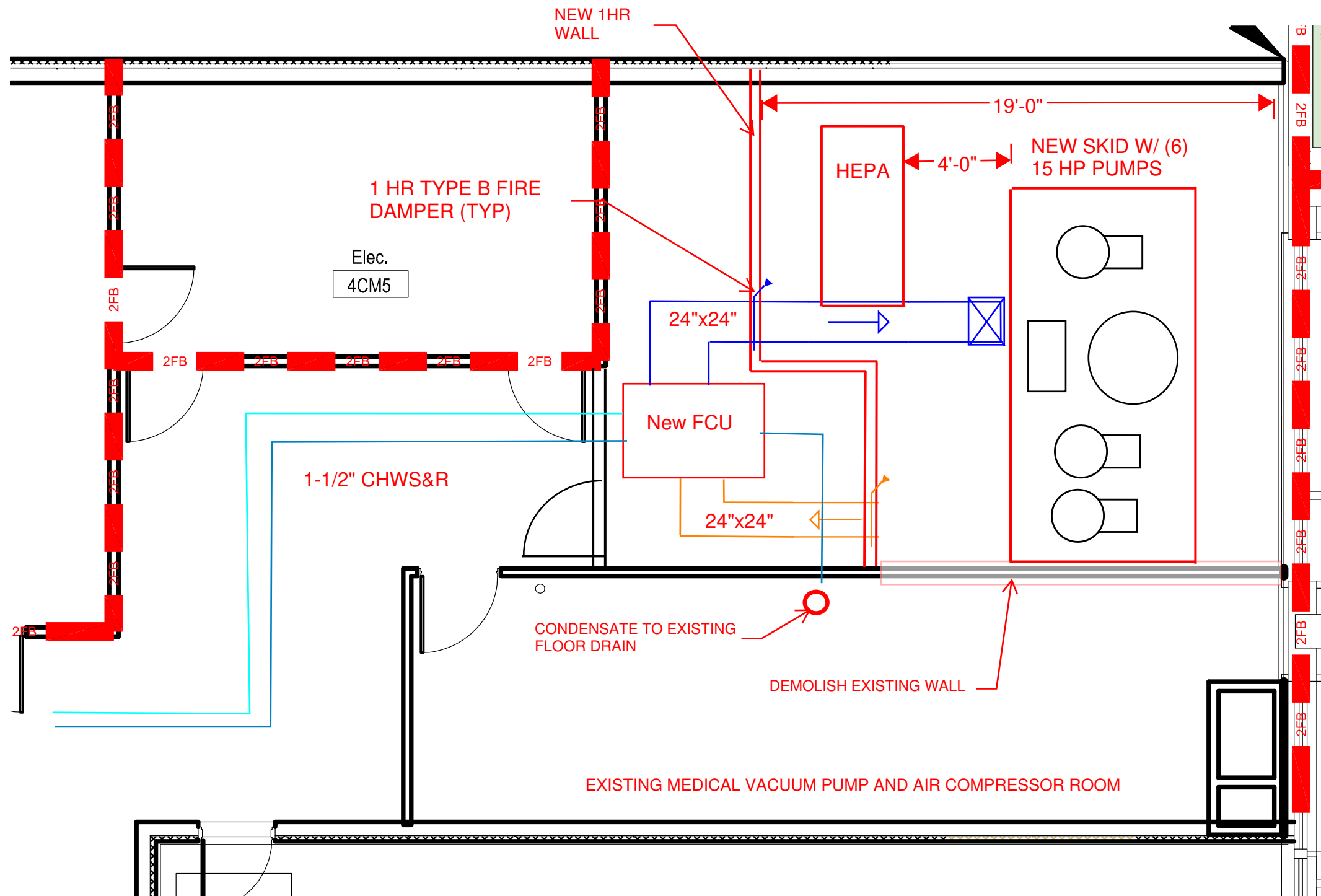
Below summarizes the upgrades required for the medical vacuum system.

1. Modify existing Mechanical Room 4CM3 to accommodate new medical vacuum pump, see sketch SKP-2. Room modification to include partial demolition of existing wall, construction of new 1-HR fire rated wall and incidental electrical and HVAC work, see sketches SKM-1 and SKE-2. Ensure existing Mechanical Room 4CM3 has a 1-HR fire rating, upgrade walls and door if required. Mechanical Room 4CM3 shall be completely 1-HR fire rated.
2. Provide new multiplex medical vacuum pump and HEPA filter in Mechanical Room 4CM3, see sketch SKP-2. Structural engineer to ensure equipment weight does not exceed the maximum floor loading.
3. Provide two new medical gas master alarm panels adjacent to existing master alarm panels for new vacuum pump system. Each alarm panel shall independently monitor new vacuum pump as required per NFPA 99, 2018 edition. Vacuum pump system shall also be monitored by the BAS.
4. Provide 120v, 20A dedicated circuit to Master Alarm panels from closest 120/208V Life Safety branch panel. Provide new 20A breaker in panel as necessary. Wire using (2)#10, (1)#10 Gnd in ¾"C. Upsize conduit and wire as necessary for voltage drop.
5. The new vacuum pump skid in Mechanical Room 4CM3 will consist of (6) 15-HP pumps. Per the manufacturer, the waste heat generated is approximately 165,000 BTU/H, or 14 tons. A new chilled water fan coil unit (FCU) will be installed to cool the space. The existing HVAC systems can be left in place to provide any required heating. The attached sketch shows the FCU located outside the new fire-rated partition, which keeps the pressurized water away from the electrical panels.
6. Ductwork and chilled water piping are sized per the expected load. A duct smoke detector should be included for budgeting purposes, however, code exceptions can be leveraged to eliminate the requirement. An existing floor drain in the adjacent space will receive the FCU condensate.

7. New medical vacuum pump equipment room shall be provided with strip light fixtures powered from the equipment branch at 277V. New 20A rated light switch. New convenience receptacles powered from equipment branch at 120V. New heat trace element shall be powered from the equipment branch at 120V.
8. Existing storage room light fixtures shall be relocated as needed to accommodate the new Vacuum pump room.
9. Provide a new 200A electronic trip breaker in existing equipment distribution panel (4CED2) located inside the emergency electrical room (4CM6) on the 4th floor penthouse to power Vacuum Pumps controller. Provide new 200A enclosed electronic trip breaker inside new Vacuum Pump room. Refer to attached sketches.
10. Provide 4" connection from new vacuum pump to existing vacuum pump located in Mechanical Room 4CM3. Provide lockable service valve.
11. The new FCU shall be powered from '4CED1' located in emergency room (4CM6). Provide non-fused disconnect size per manufacturer recommendations.
12. Provide 4" medical vacuum valve and cap in Mechanical Room 4CM3 for future connection.
13. Route new 6" medical vacuum from Mechanical Room 4CM3 to A and B wings. Pipe route to be across roof as shown in sketch SKP-1. Piping on roof shall be provided with heat trace system and insulation with corrugated aluminum jacket.
14. There is a need to heat trace for the vacuum lines on the 8th floor that will be crossing the roof. A new 20A GFCI breaker shall be provided in existing panel 'C8CBEA' in electrical room 8H004' on 8th floor. Contractor shall confirm available space in panel.
15. Provide 6" medical vacuum connections to each A and B wing risers. Provide new lockable service valves at connection.
16. Provide 4" medical vacuum connections to each C and D wing risers. Provide new lockable service valves at connection.

SKM-1

Mechanical Equipment Room – Level 4 Area C - HVAC



New FCU:
Carrier 42BHE40 or equal
Approx. 165 MBH total cooling
460/3
No heat
~25 GPM CHW

Existing HVAC systems shall remain.
Heat will be provided by existing system.
New FCU is supplemental cooling based
on preliminary heat rejection data from
the vacuum pump manufacturer.

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Design:		Sketch No.: SKM-1	
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SKP-1

Partial Level 3 Plan – Medical Gas



Revision:

Supplement to Drawing No.:

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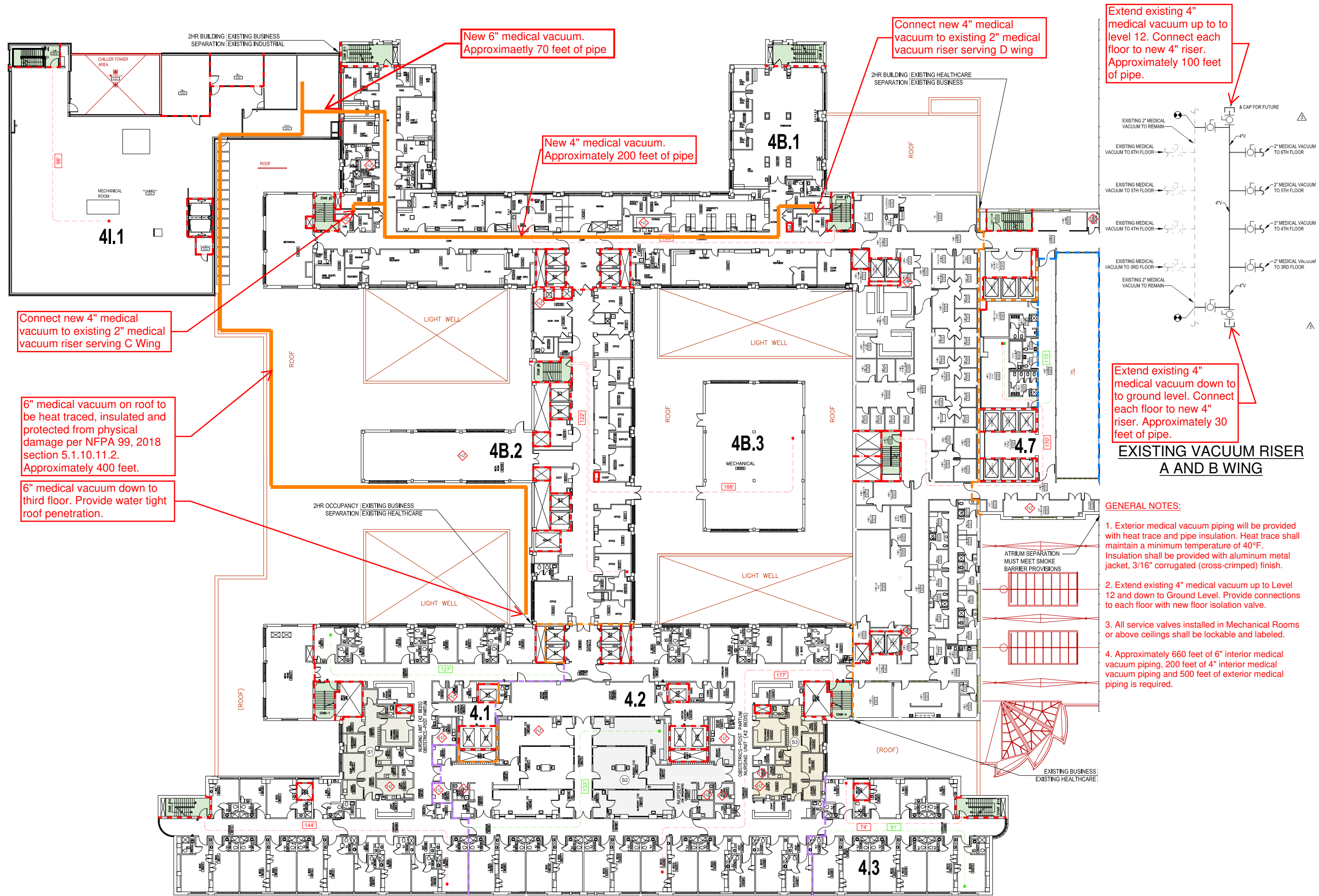


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SKP-1

SKP-2

Level 4 Overall Plan – Medical Gas



Extend existing 4" medical vacuum down to ground level. Connect each floor to new 4" riser. Approximately 30 feet of pipe.

**EXISTING VACUUM RISER
A AND B WING**

GENERAL NOTES:

1. Exterior medical vacuum piping will be provided with heat trace and pipe insulation. Heat trace shall maintain a minimum temperature of 40°F. Insulation shall be provided with aluminum metal jacket, 3/16" corrugated (cross-crimped) finish.
2. Extend existing 4" medical vacuum up to Level 12 and down to Ground Level. Provide connections to each floor with new floor isolation valve.
3. All service valves installed in Mechanical Rooms or above ceilings shall be lockable and labeled.
4. Approximately 660 feet of 6" interior medical vacuum piping, 200 feet of 4" interior medical vacuum piping and 500 feet of exterior medical piping is required.

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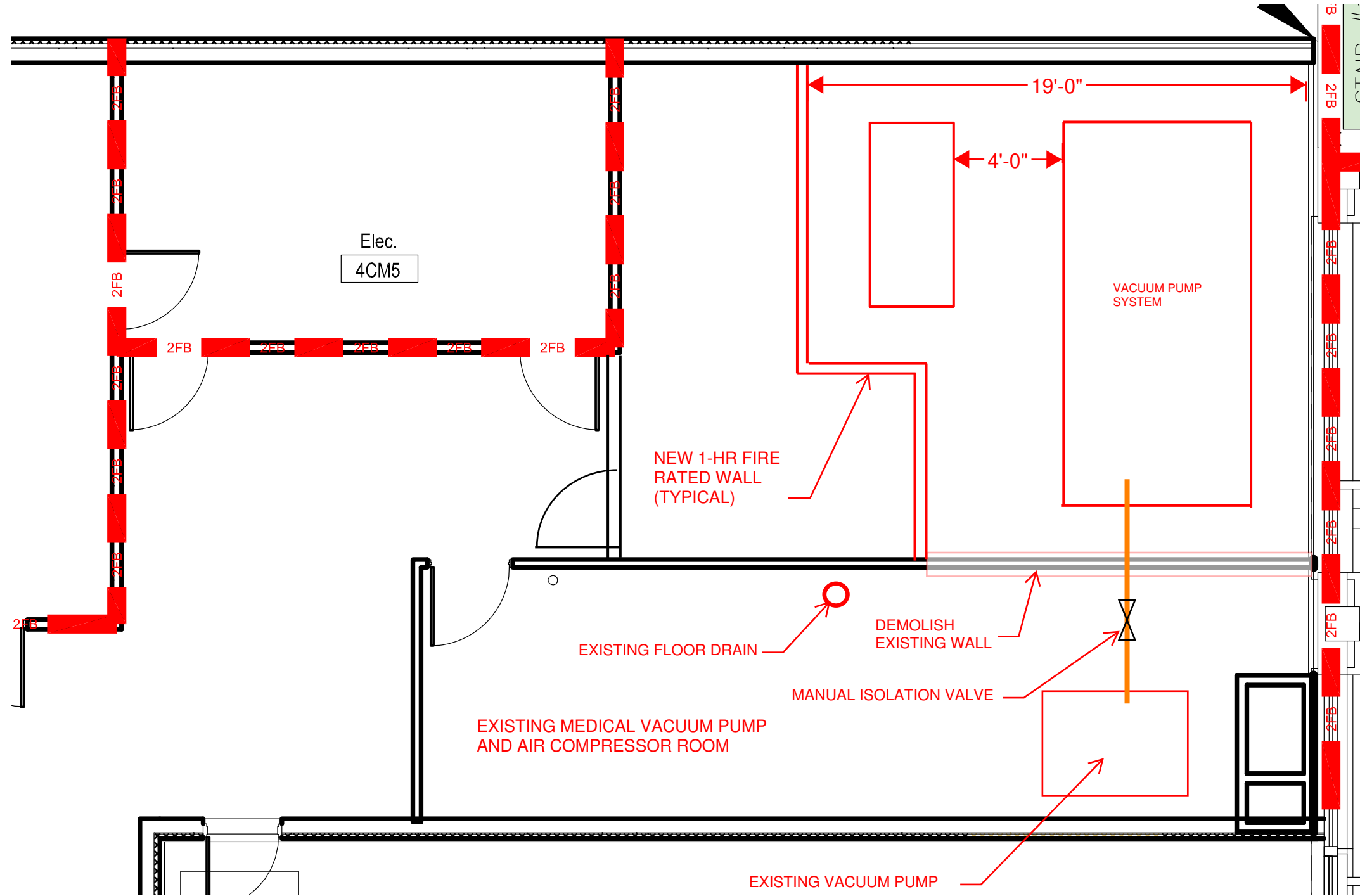
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SKP-3

Mechanical Equipment Room – Level 4 Area C – Medical Gas



GENERAL NOTES:

1. New medical vacuum pump located in proposed medical equipment room. Basis of Design: PowerEx model CVPH1506.
2. Medical vacuum pump shall be provided with NFPA 2018 compliant HEPA filter assembly. Basis of design PowerEX model MVF40Q.
3. Structural engineer to determine equipment weights are acceptable. Vacuum pump weight is approximately 5,799 lbs. HEPA filters weight is approximately 1,000 lbs.
4. Route drain from new vacuum pump system to existing floor drain. Provide pipe protection as required where drain crosses walk path.
5. Route 8" vacuum pump exhaust up through roof. Provide watertight roof penetration and gooseneck with screen. Exhaust shall be 25 feet from any air intakes.
6. Provide 4" connection with manual isolation valve from new vacuum system. to existing vacuum pump.
7. New medical vacuum pump system shall be monitored by two new medical gas master alarm panels. Each master alarm panels shall be located adjacent to existing master alarm panels. Provide interface to the facility BAS system.

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Sketch No.:

SKP-3

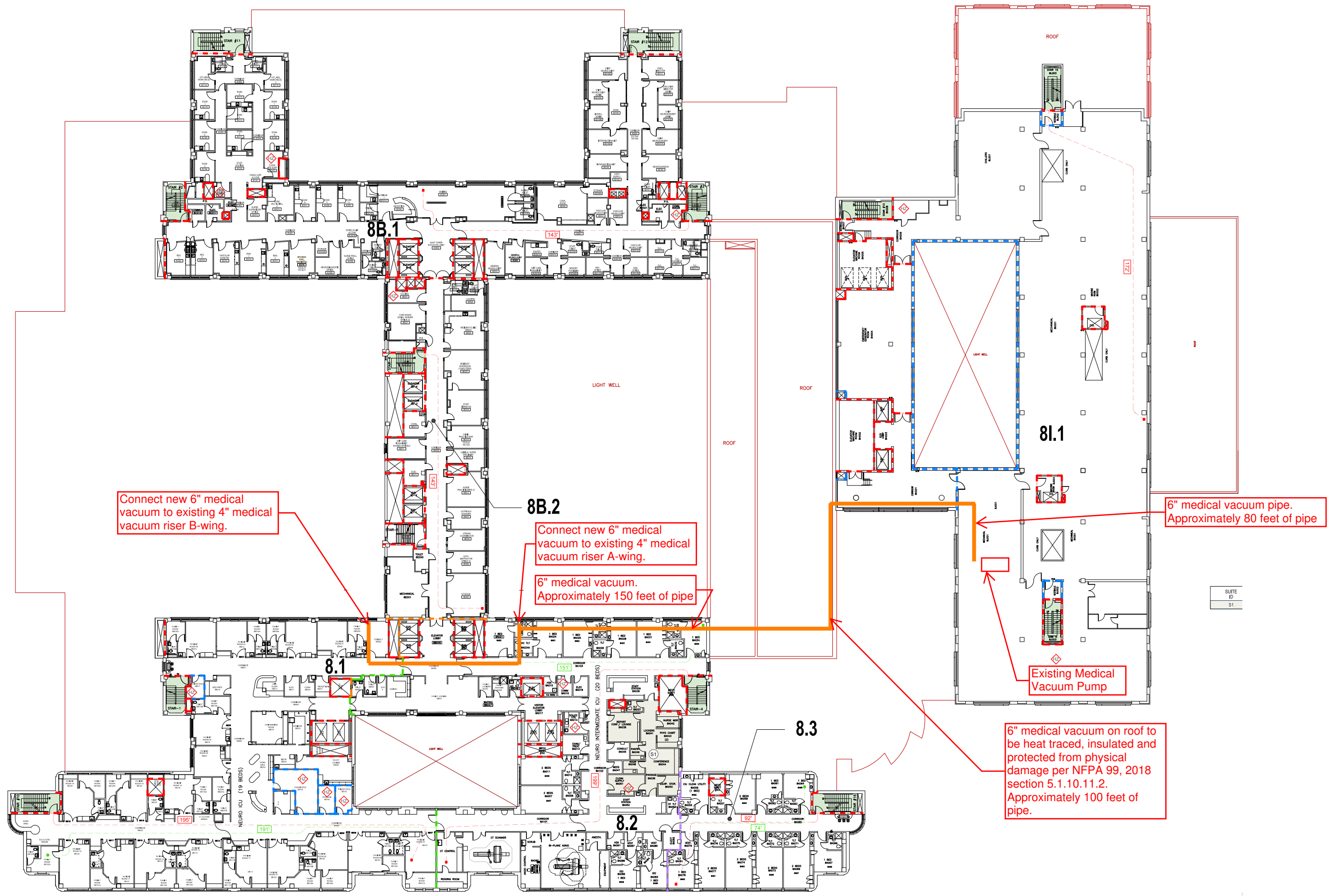
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SKP-4

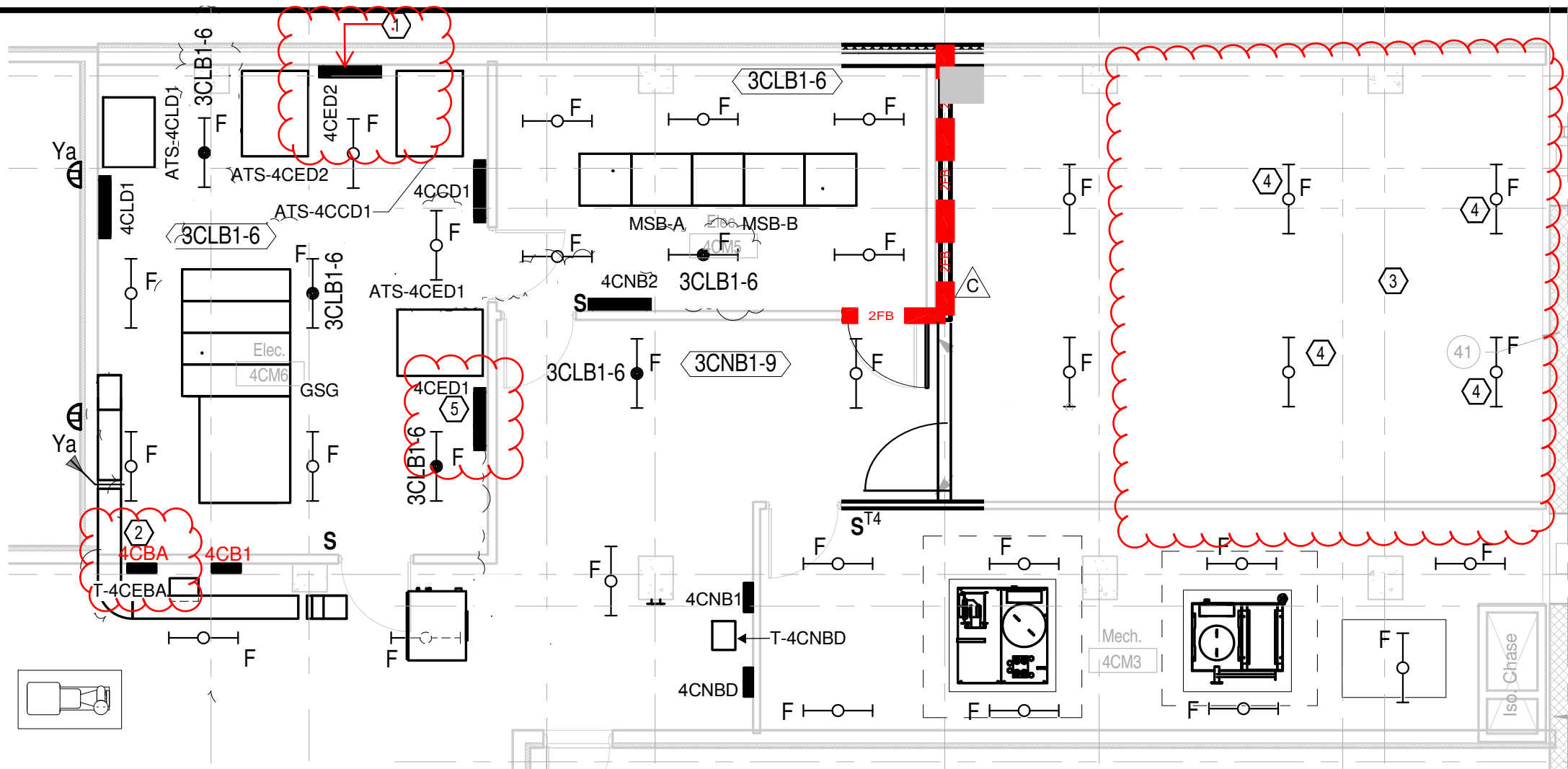
Level 8 Overall Plan – Medical Gas



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SKE-1

Partial Penthouse – Level 4 Area C – Electrical



EXISTING PARTIAL 4TH FLOOR PENTHOUSE
1/8"-1'-0"

AREA OF WORK

POWER KEY NOTES

- 1 PROVIDE NEW 200A , 3-POLE ELECTRONIC TRIP BREAKER IN PANEL '4CED2' FOR VACUUM PUMP CONTROLLER. MATCH EXISTING TYPE AND AIC RATING. PROVIDE 30 DAY METER READING OF PANEL TO CONFIRM PANEL HAS ELECTRICAL CAPACITY TO ADD LOAD. METER SHALL BE DONE AT 15 MINUTE INTERVALS. PROVIDE 7 DAY SNAP SHOT. WIRE USING (3)#3/0, (1)#6 GND IN 2 1/2"C.
- 2 PROVIDE NEW 20A GFCIA BREAKER IN PANEL '4CEBA' SPACE#18 FOR HEAT TRACING OF VACUUM PIPES ROUTED OVER THE ROOF. COORDINATE WITH VACUUM PIPE INSTALLER FOR EXACT ROUTING AND LOCATION. PROVIDE MOTOR RATED SWITCH AT POINT OF CONNECTION. WIRE USING (2)#10, (1)#10 GND IN 3/4"C.
- 3 REFER TO SKE-2 FOR ELECTRICAL WORK ON THIS AREA.
- 4 EXISTING LIGHT FIXTURES TO BE DISCONNECTED AND REMOVED. REMOVE CONDUIT AND WIRING BACK TO NEXT ACTIVE DEVICE TO REMAIN. AT LEAST TWO OF THE REMOVE FIXTURES SHALL BE RELOCATED TO PORTION OF STORAGE ROOM TO REMAIN.
- 5 EXISTING PANEL '4CED1' SHALL BE USED TO POWER NEW MECHANICAL EQUIPMENT TO SERVE NEW PUMP ROOM. PROVIDE BREAKER, CONDUIT AND WIRING.

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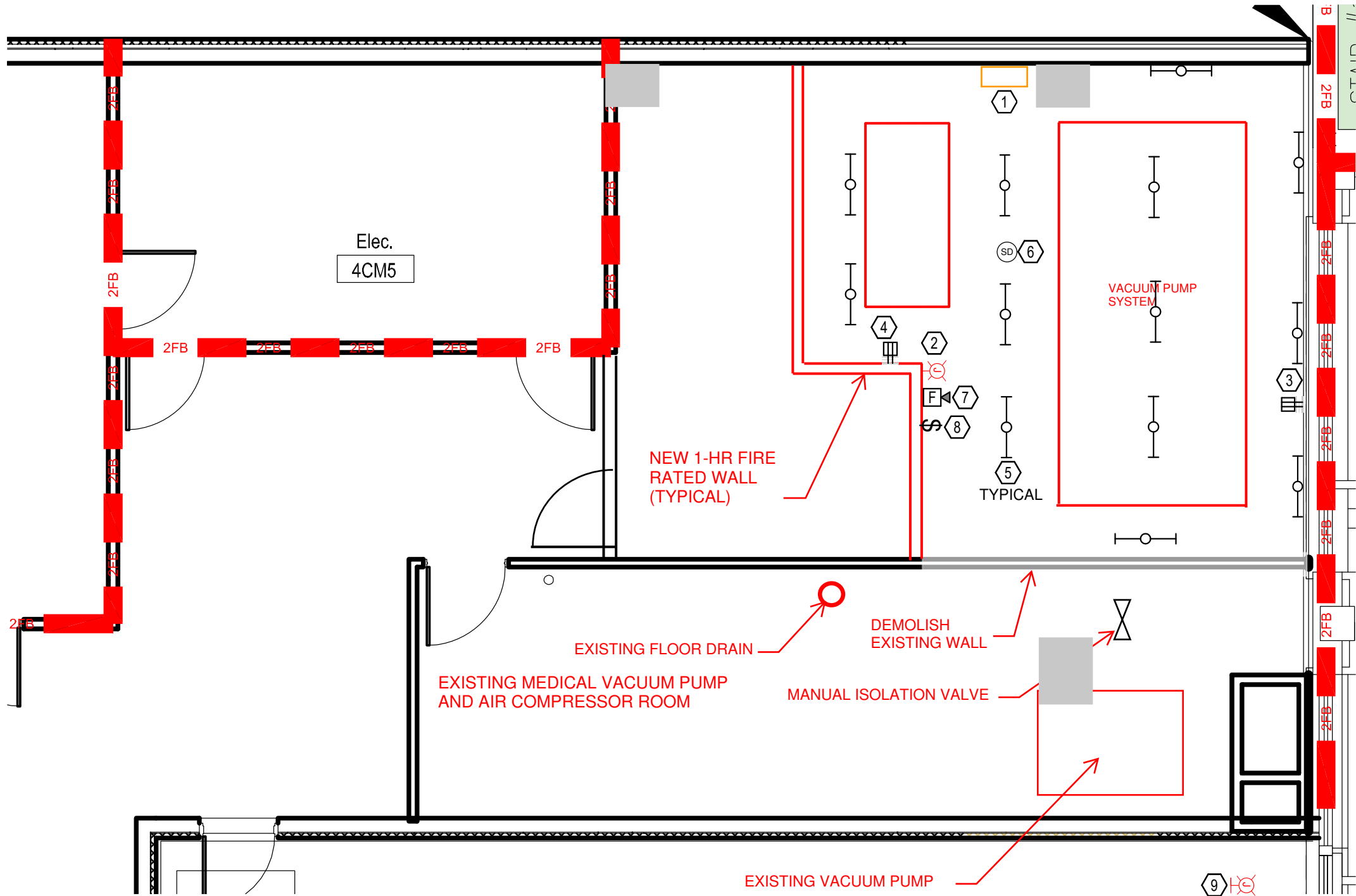
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SKE-1

SKE-2

Mechanical Equipment Room – Level 4 Area C – Electrical



EXISTING PARTIAL 4TH FLOOR PENTHOUSE
NTS

POWER/LIGHTING KEY NOTES

- 1 PROVIDE NEW 200A ENCLOSED ELECTRONIC TRIP BREAKER FOR VACUUM PUMP CONTROLLER. WIRE USING (3)#3/0, (1)#6 GND IN 2 1/2" C. PROVIDE 42" CLEARANCE IN FRONT OF DISCONNECT.
- 2 PROVIDE NEW JUNCTION BOX AND NEW MOTOR RATED SWITCH FOR HEAT TRACING OF VACUUM LINES ROUTED ON EXTERIOR OF BUILDING.
- 3 EXISTING RECEPTACLE TO REMAIN.
- 4 PROVIDE NEW RECEPTACLE WIRE TO PANEL '4CBA'. PROVIDE NEW 20A BREAKER, MATCH EXISTING AIC, IN AVAILABLE SPACE.
- 5 NEW LED STRIP LIGHT FIXTURES, 5000 LUMENS, MULTIVOLT, PROVIDED WITH WIRE GUARD. MOUNTED AT 10'-0" AFF. WIRE TO 20A SPARE BREAKER IN PANEL '4CB1'.
- 6 PROVIDE SMOKE DETECTOR INSIDE OF ROOM AND CONNECT TO EXISTING FIRE ALARM SYSTEM.
- 7 PROVIDE HORN/STROBE FIRE ALARM DEVICE INSIDE OF ROOM AND CONNECT TO EXISTING FIRE ALARM SYSTEM.
- 8 PROVIDE NEW 20A RATED TOGGLE SWITCH.
- 9 PROVIDE NEW JUNCTION BOX AND NEW MOTOR RATED SWITCH FOR HEAT TRACING OF VACUUM LINES ROUTED ON EXTERIOR OF BUILDING ON EIGHT FLOOR. PROVIDE NEW 20A, 120V, GFCI BREAKER IN EQUIPMENT PANEL 'C8CBEA' IN ELECTRICAL ROOM '8H004' ON 8TH FLOOR. COORDINATE WITH VACUUM LINES INSTALLER PRIOR TO ROUGH-IN. MATCH EXISTING BREAKER TYPE AND AIC RATING.

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