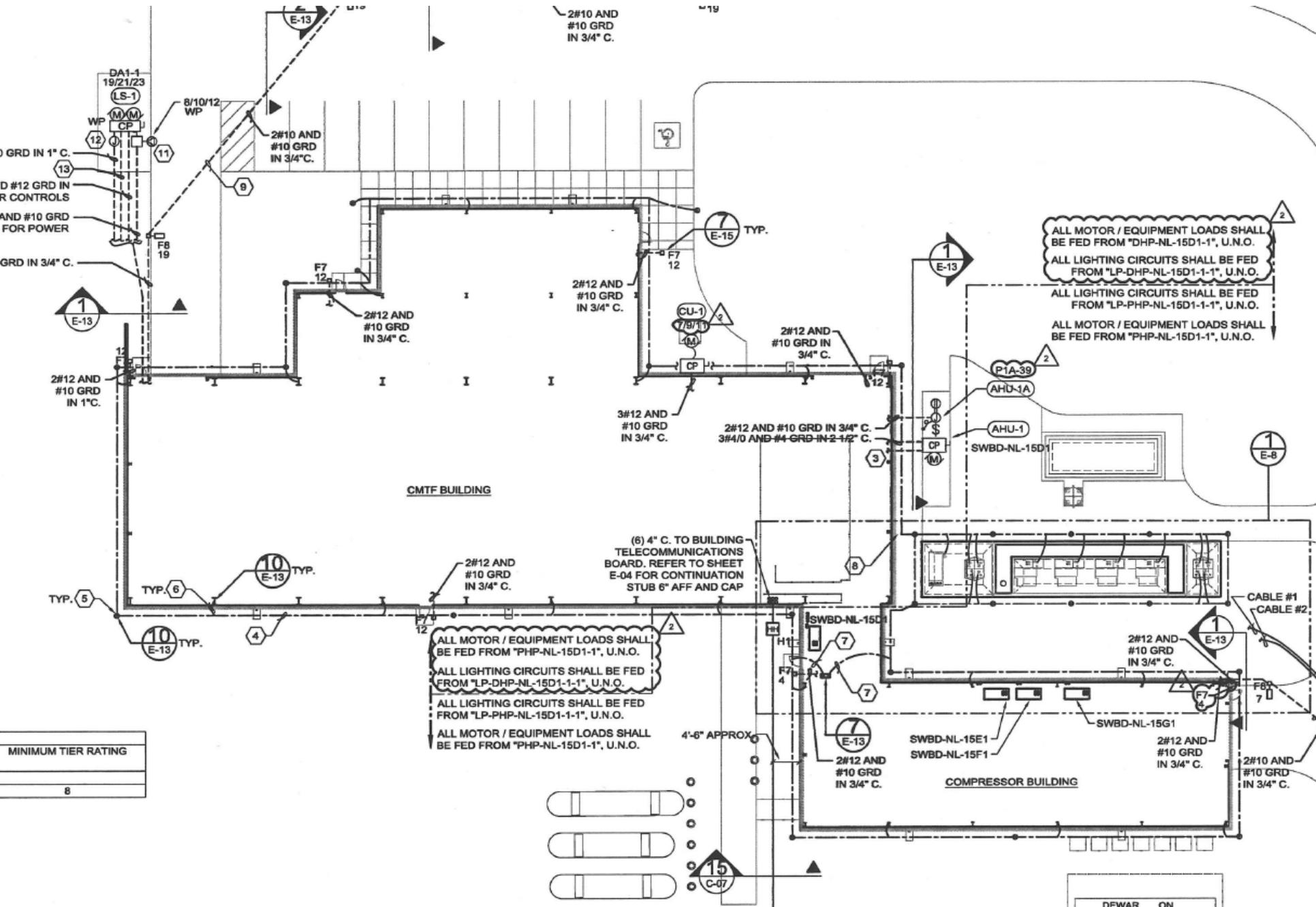


CMTF GROUNDING FOR PIP-II

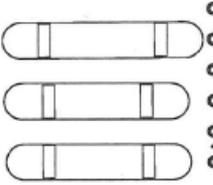
K. Carlson
PXIE Electrical Coordination Meeting
December 19th, 2013

A few quick notes about the CMTF Facility grounding plan;

1. The facility was designed primarily for Cryo-Module Testing and support of the He-superfluid plant. The decision to build an accelerator at CMTF was made well after the concrete had dried.
2. It is the object of the CMTF grounding system design to accommodate a “star” topology that will minimize ground loops and potential differences in the grounds as much as possible given the present plan, which calls for the main power switchboard and a majority of the electrical equipment to be separated by the PIP-II Cave.
3. The proposed layout is open for discussion and change



MINIMUM TIER RATING
8



DEWAR ON

A few quick notes about the CMTF Facility grounding plan;

1. The entire building is ringed with 500MCM Bare Cu at 4' below grade. Highlighted in Yellow in the next slide.
2. Approximately every second vertical support column is connected to the building grounding loop by 4-0 bare copper where the column wire is Cadwelded to the building loop there is a 12ft copper ground rod.
3. Additional ground rods are located at each corner of the building at 10 locations surrounding the transformer pad. These locations are not highlighted on the next drawing

2#10 AND #10 GRD IN 3/4" C.

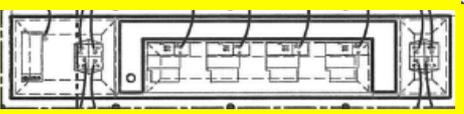
"19

500 MCM Bare Buried

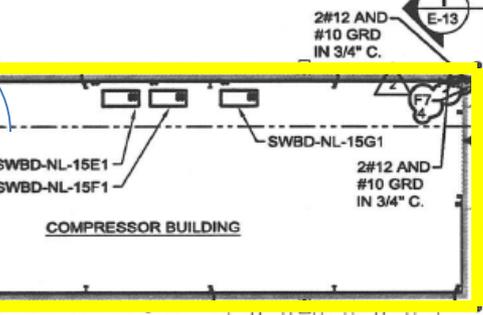
ALL MOTOR / EQUIPMENT LOADS SHALL BE FED FROM "DHP-NL-15D1-1", U.N.O.
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CMTF BUILDING

(6) 4" C. TO BUILDING TELECOMMUNICATIONS BOARD. REFER TO SHEET E-04 FOR CONTINUATION STUB 6" AFF AND CAP

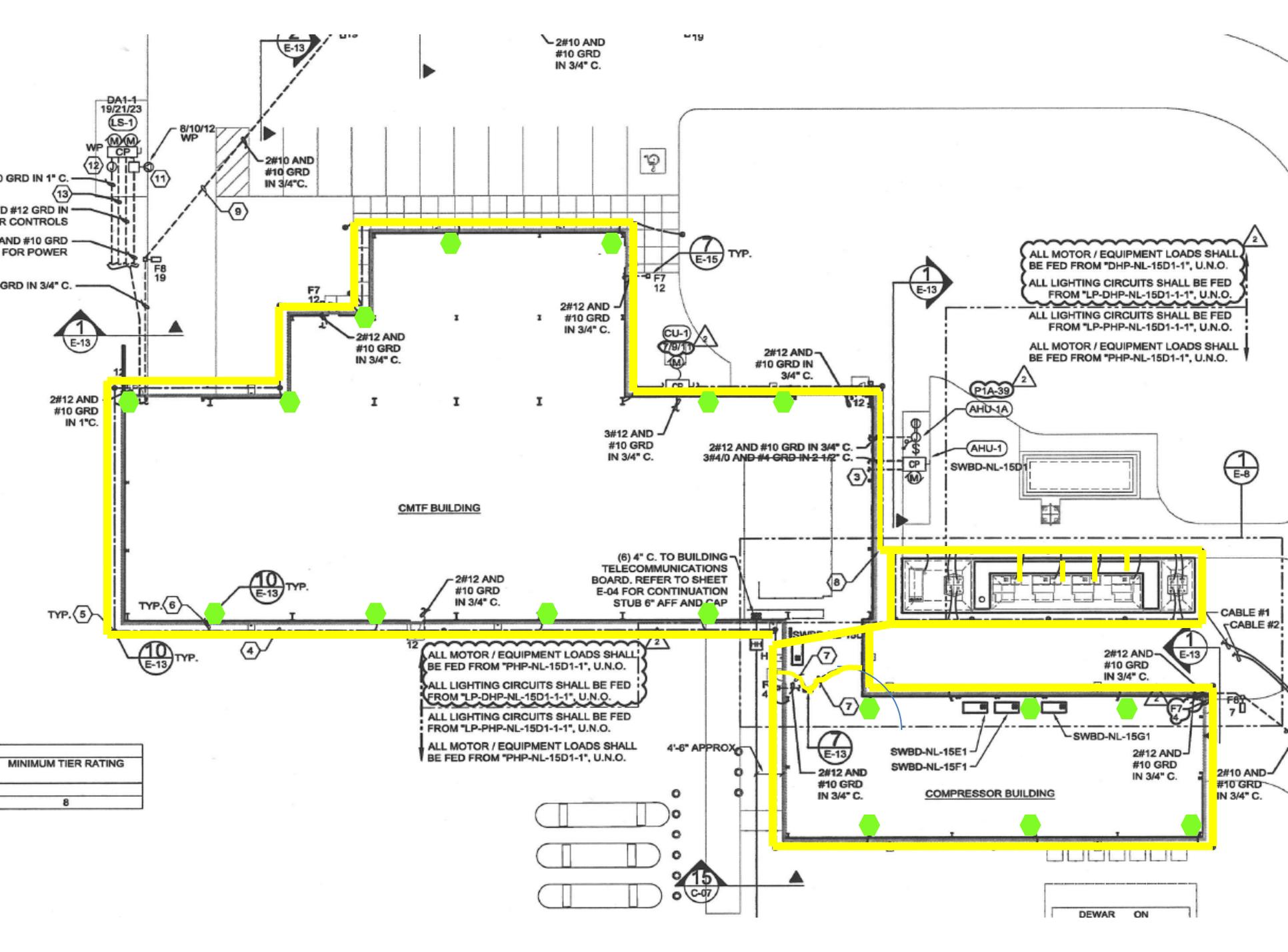


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MINIMUM TIER RATING
8

DEWAR ON



2#10 AND #10 GRD IN 3/4" C.

GRD IN 1" C.
 D #12 GRD IN R CONTROLS
 AND #10 GRD FOR POWER
 GRD IN 3/4" C.

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CMTF BUILDING

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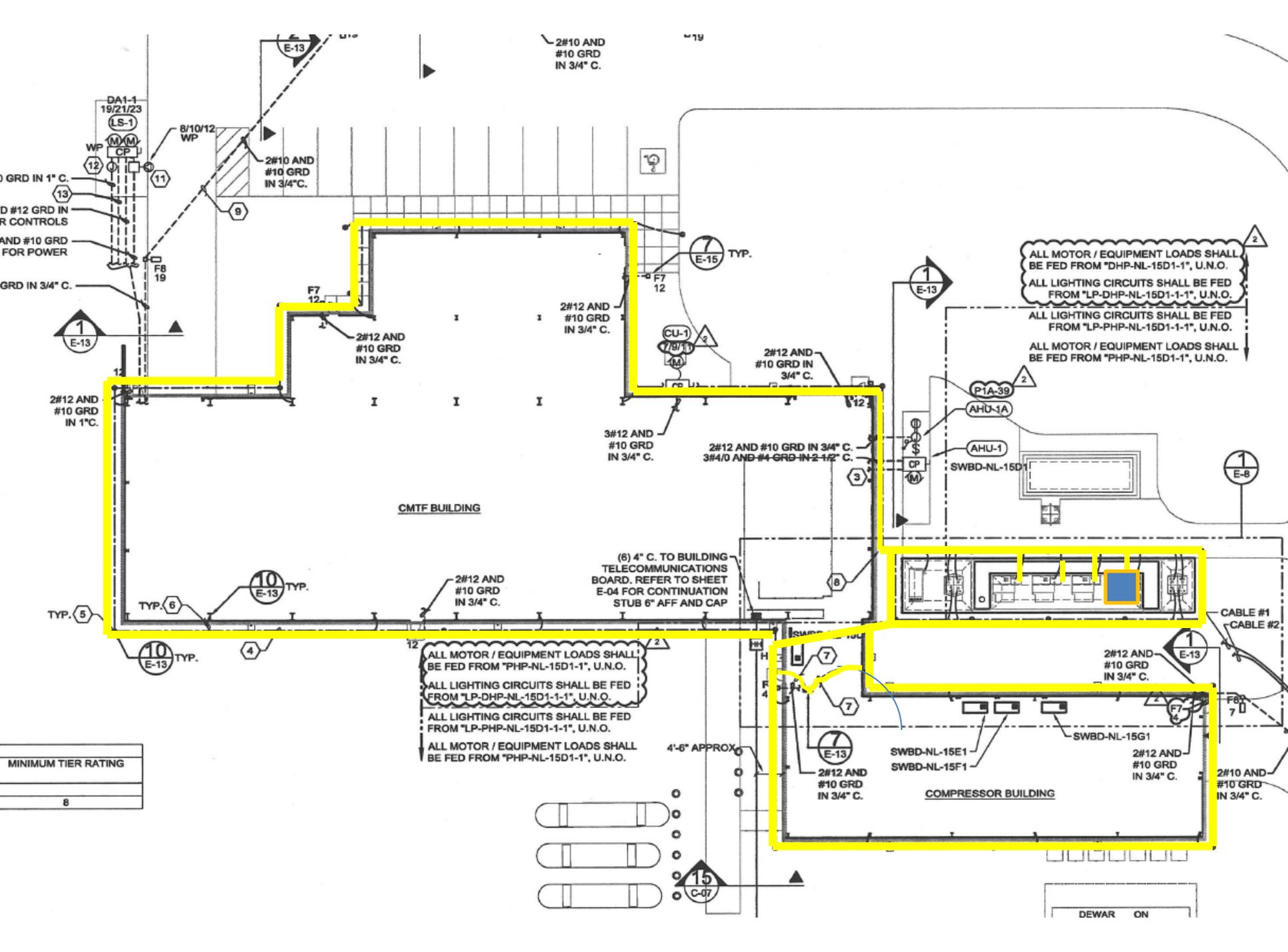
COMPRESSOR BUILDING

MINIMUM TIER RATING
8

DEWAR ON

A few quick notes about the CMTF Facility;

1. The CMTF facility receives electrical power at 13.8kV from the Master Substation on feeders 35 and 38.
2. The CMTF facility is equipped with four 1.5 MVA transformers which can be fed from either feeder system
3. Each of the transformers feed a separate 480-Volt 3-Phase 2,000-Amp switchboard. The designation of these switchboards are NL-15D, NL-15E, NL-15F and NL-15G
4. Switchboards NL-15E, F and G are only feeding the seven Helium Warm Compressors in the Engine room.
5. Switchboard NL-15D feeds all building “hotel” loads and the entire PIP-II/CMTF Test Cave technical loads.



2#10 AND #10 GRD IN 3/4" C.

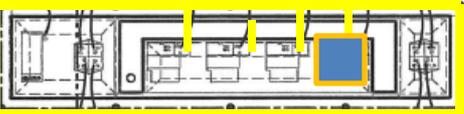
"19

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CMTF BUILDING

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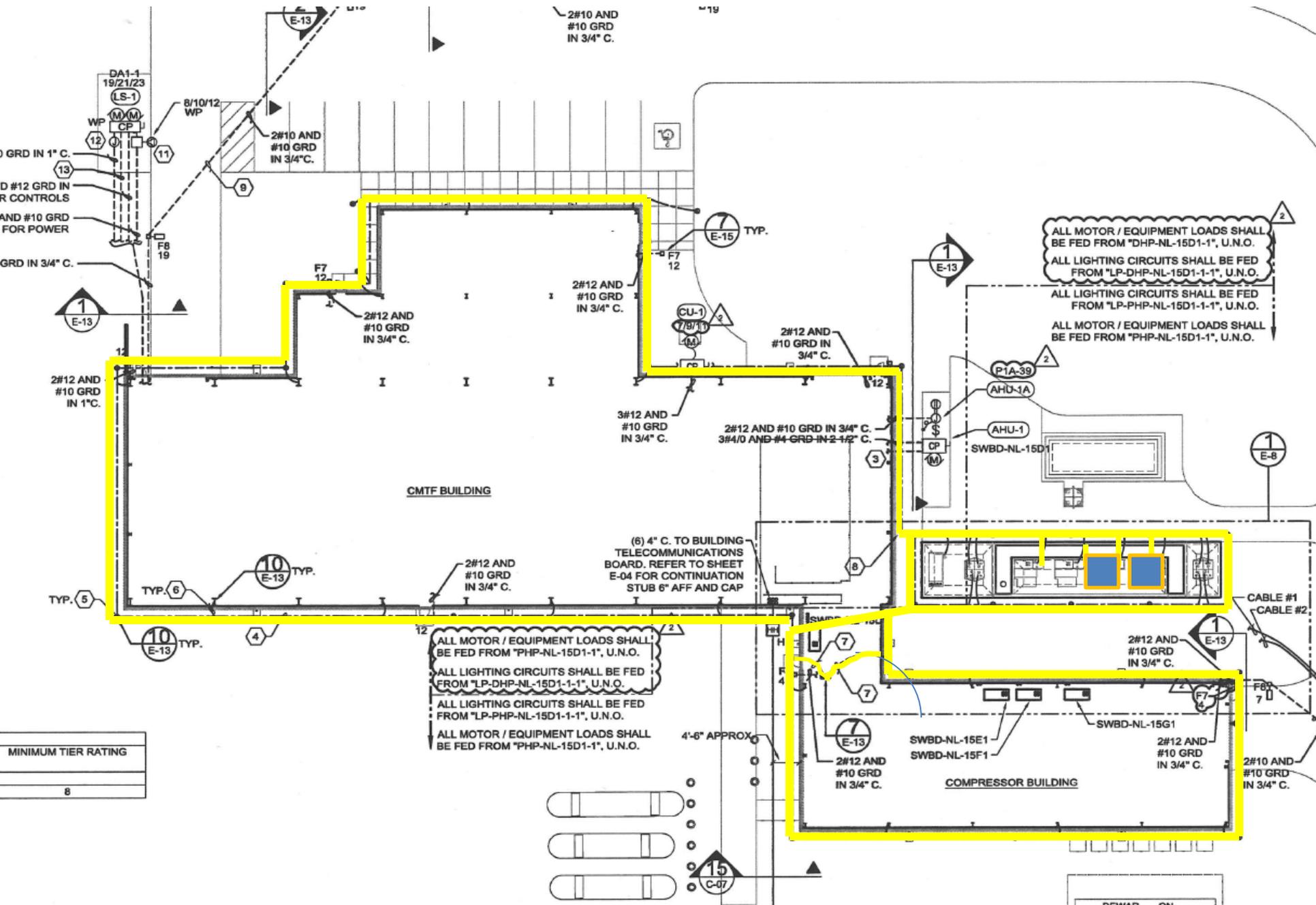


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COMPRESSOR BUILDING

MINIMUM TIER RATING
8

DEWAR ON



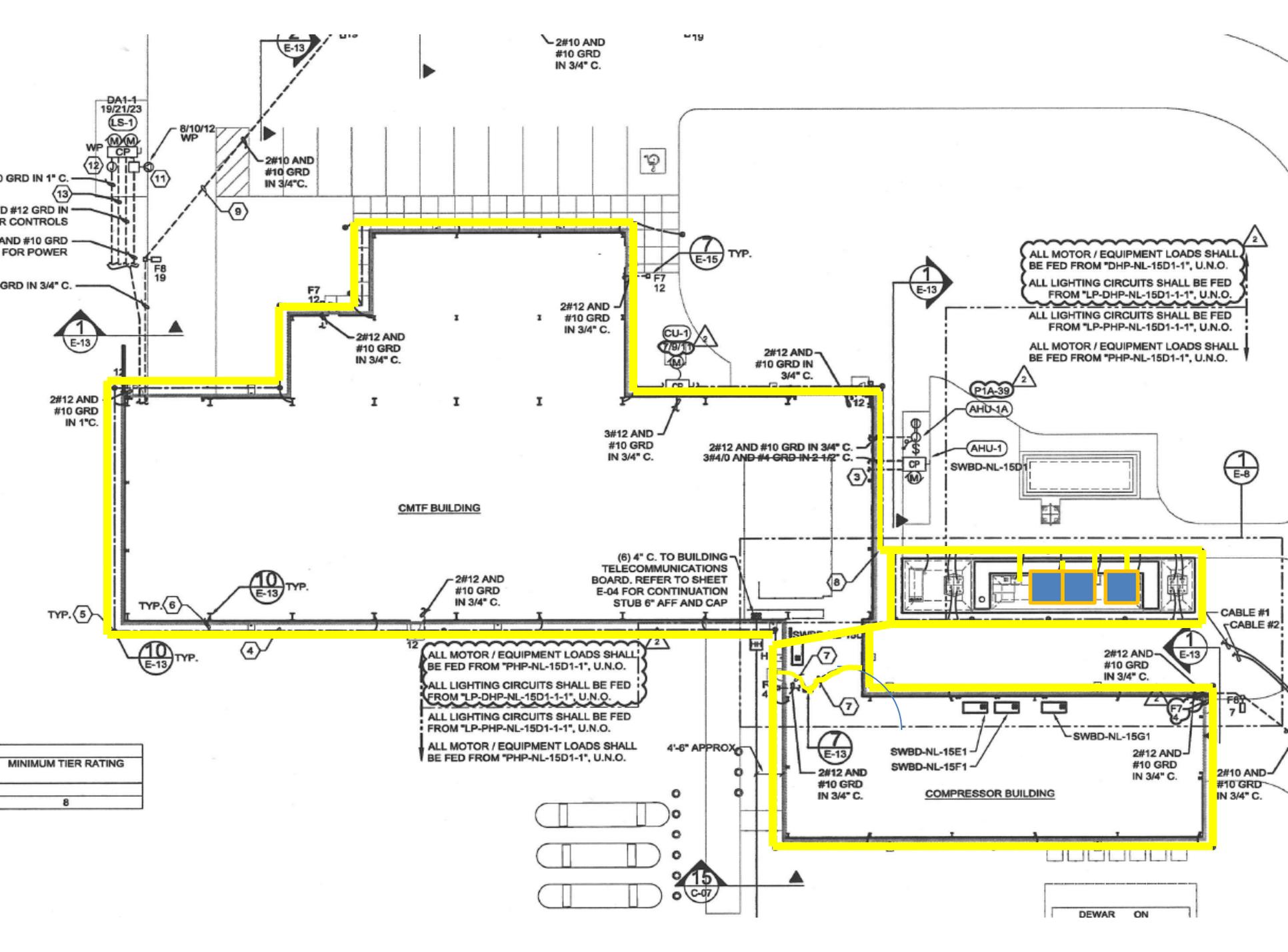
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(6) 4" C. TO BUILDING TELECOMMUNICATIONS BOARD. REFER TO SHEET E-04 FOR CONTINUATION STUB 6" AFF AND CAP

MINIMUM TIER RATING
8

DEWAR ON



2#10 AND #10 GRD IN 3/4" C.

"19

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CMTF BUILDING

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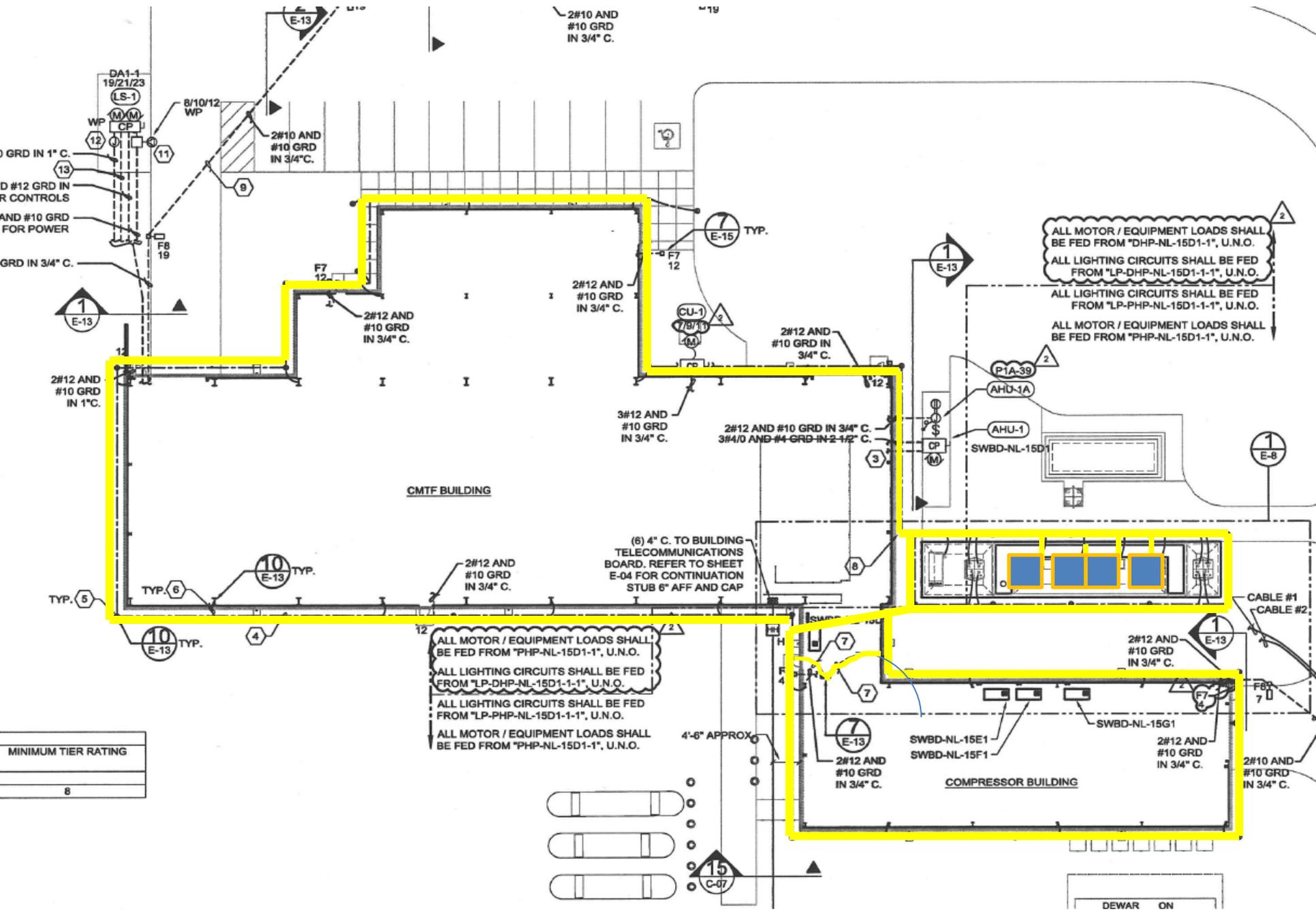
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COMPRESSOR BUILDING

MINIMUM TIER RATING
8

DEWAR ON



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CMTF BUILDING

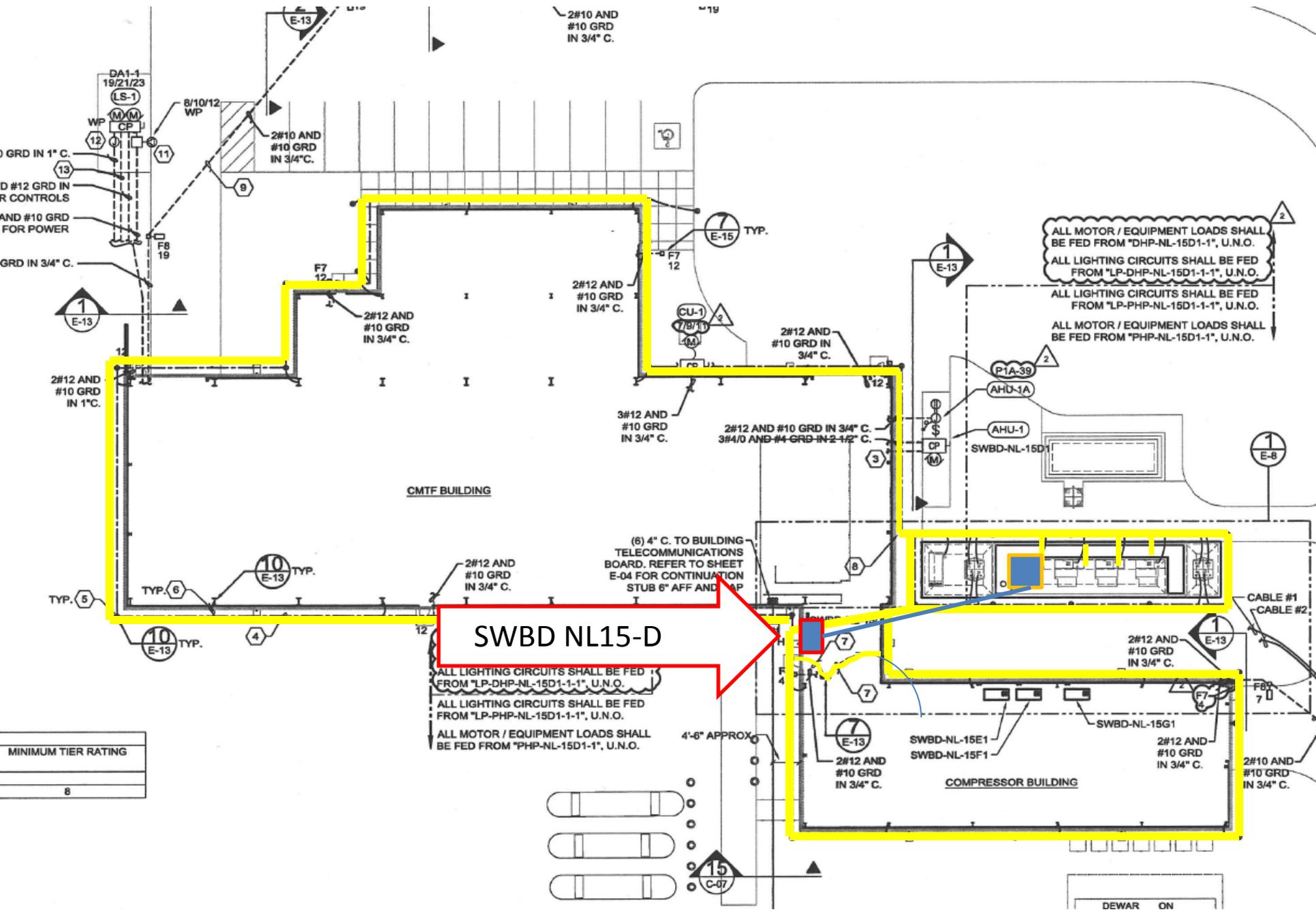
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COMPRESSOR BUILDING

MINIMUM TIER RATING
8

DEWAR ON



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SWBD NL15-D

(6) 4" C. TO BUILDING TELECOMMUNICATIONS BOARD. REFER TO SHEET E-04 FOR CONTINUATION STUB 6" AFF AND TAP

MINIMUM TIER RATING
8

DEWAR ON

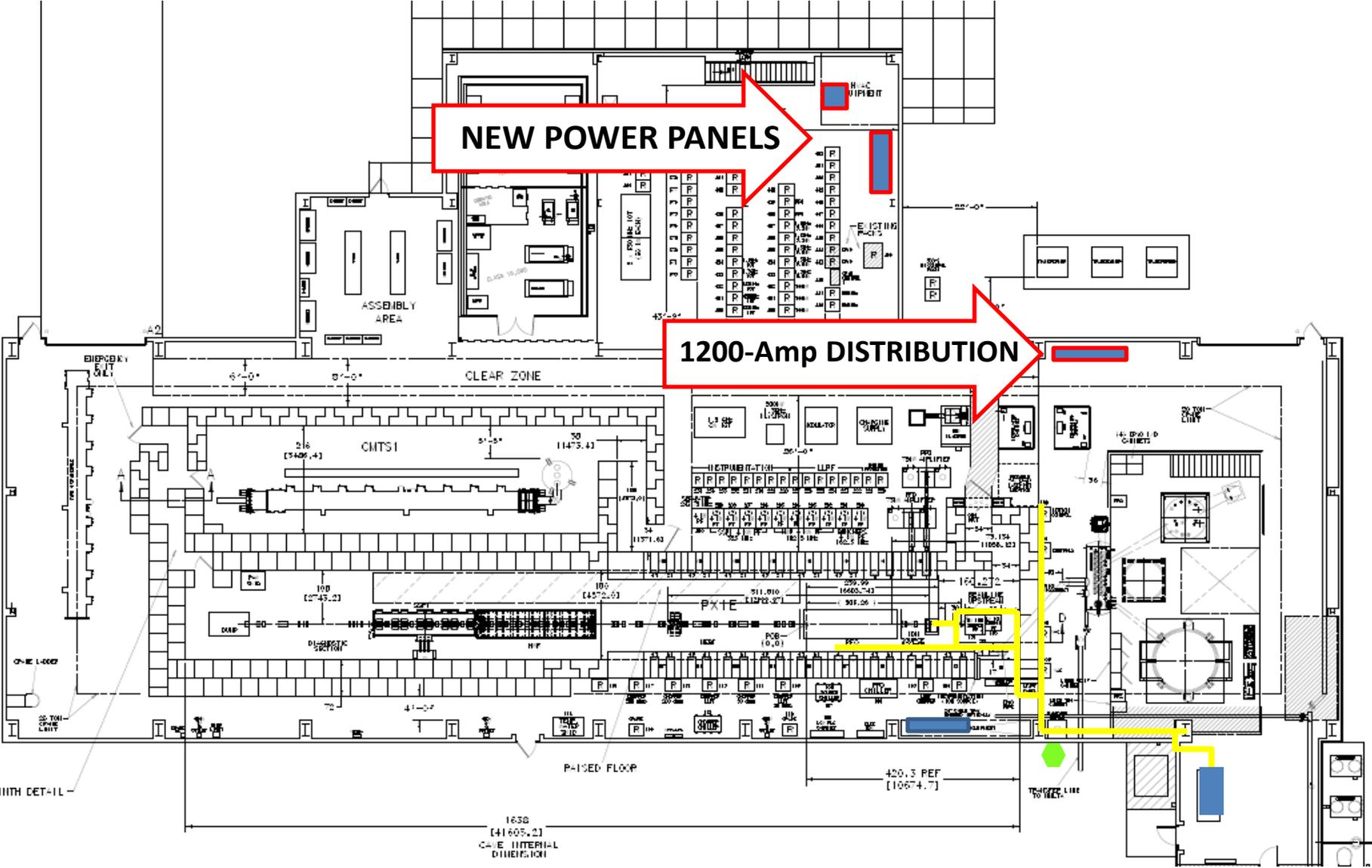
For the next year, a grounding topology for the PIP-II accelerator will exist that would feature a small group of racks nearby the cave, with a small number of magnet supplies located temporarily inside the cave; and two RF Power Amplifiers located immediately outside the West side of the cave.

The long-range plan calls for additional Distribution;

1. On order is a new 1200-Amp 480-Volt 3-Phase panel with power monitoring.
2. This panel will feed the first set of requirements for the PIP-2 Cave, and a new set of distribution for the mezzanine.
3. The plan will include running power duct and conduit across the access walk-way, due to the late arrival of the CCI Helium cold compressor system – this will be after June 2014.
4. Power for the PIP-II Solenoid and Corrector Magnet supplies and the new solid state RF Power Amplifiers has been installed so that those systems can be powered prior to the CCI ColdBox installation

NEW POWER PANELS

1200-Amp DISTRIBUTION



SEE L-6/PIINTH DETAIL

Within the first half of 2014, it is expected that the cable trays and related 2-0 bare copper safety grounds would be completed to the area near the new distribution panel DHP-NL15D1-4 which will be located along the West wall of the CMTF building high-bay.

The location of the new DHP-NL15D1-4 1200-Amp distribution on the west wall of the high-bay and related installation of the cross-over cable trays will create an additional building ground location and related cable tray grounding location to the building ground.

Please note the location of the green symbols, on the next slide, indicating the location of the vertical steel columns which are directly connected to the building ground loop. Although not ideal for the instrumentation grounding, the electrical code will require bonding of the new Distribution panel to this building ground.

For the next year, a grounding topology for the PIP-II accelerator will exist that would feature a small group of racks nearby the cave, with a small number of magnet supplies located temporarily inside the cave; and two RF Power Amplifiers located immediately outside the West side of the cave.

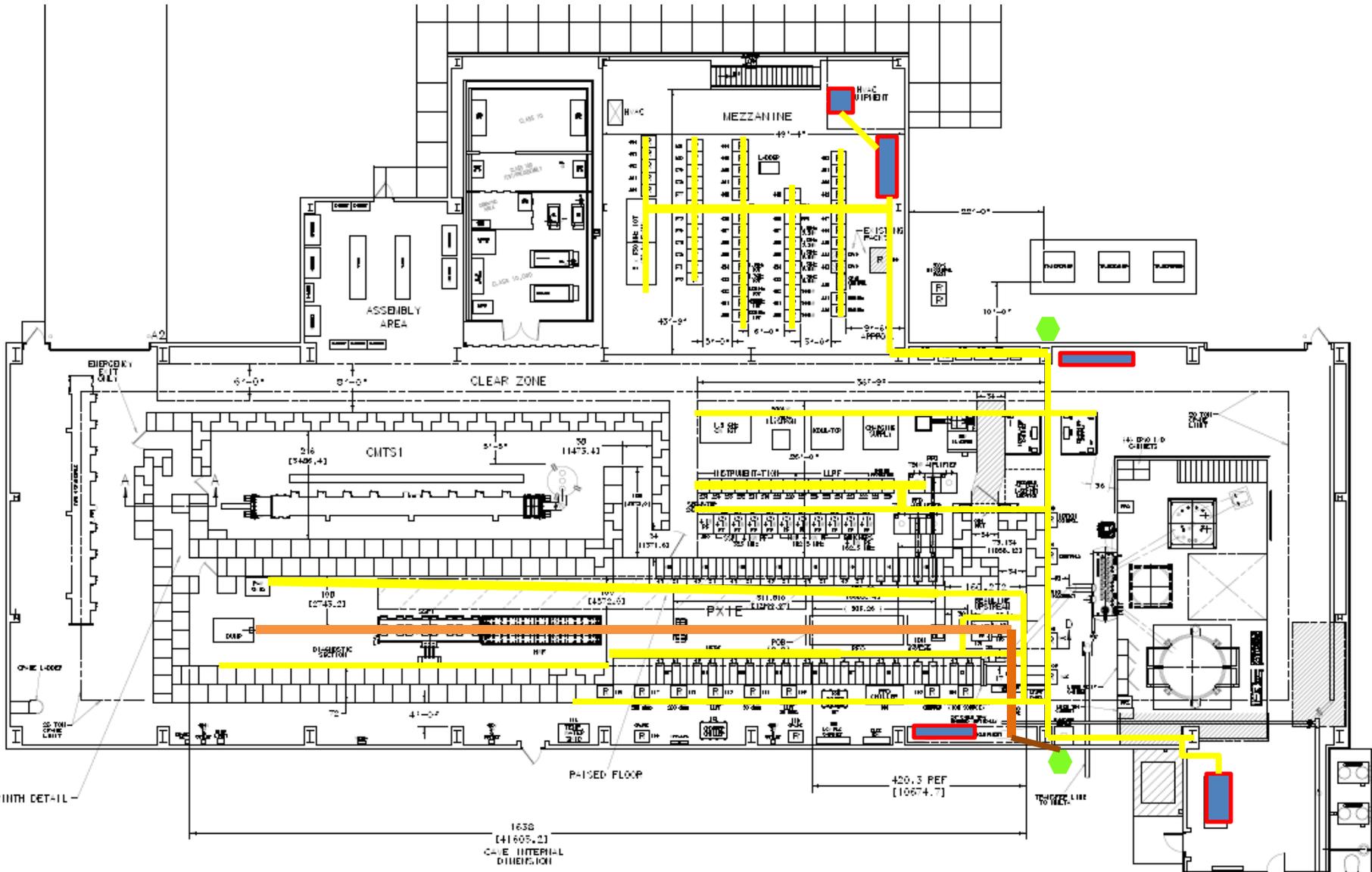
Within that year, it is expected that the cable trays and related 2-0 bare copper safety grounds would be completed to the area near the new distribution panel DHP-NL15D1-4 which will be located along the West wall of the CMTF building highbay.

In order to present a “ clean” beamline grounding topology for the PIP-II accelerator; I propose a 4” copper bar ground that would run the length of the accelerator along and below the beamline. This would present a low-inductance grounding path for the higher frequency noise, and would be in addition to any other ground paths presented by connections to cable tray grounds, cryogenic or water piping and device shield connections.

The plan would be that this grounding bus-bar would be insulated from other grounds once it leaves the area of the source until it is connected to the “holy bolt.”



Low- Inductance 4" Copper Bus Isolated from Supporting Tray



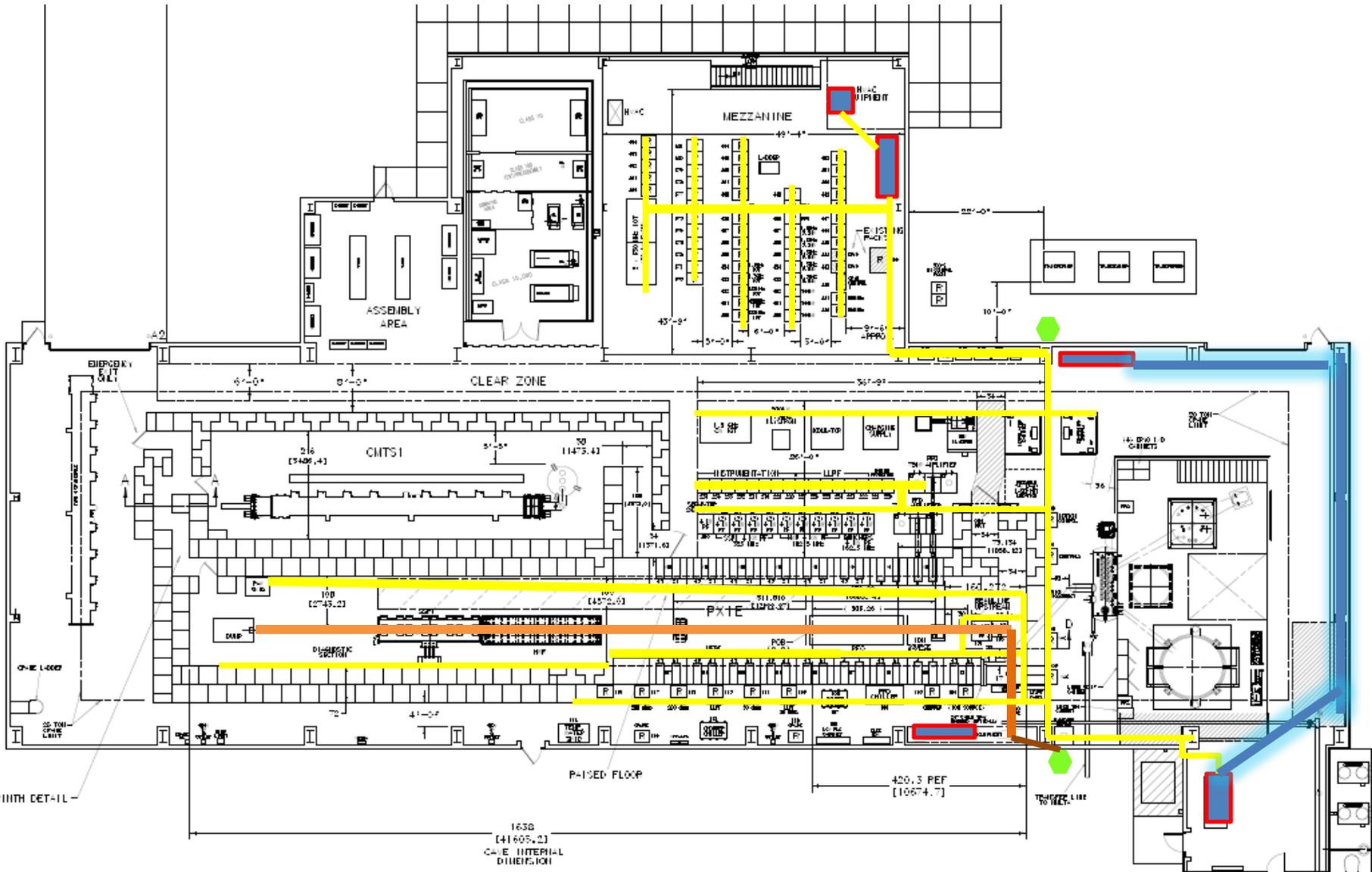
SEE L-6/PIINTH DETAIL

The proposed grounding system
would be completed by the end of
2014.....



CMTF Grounding for PIP-II
K. Carlson 19 Dec 2013





SEE L-6/PIINTH DETAIL

Questions ?

We do expect continued discussion

Thank You



CMTF Grounding for PIP-II
K. Carlson 19 Dec 2013





CMTF Grounding for PIP-II
K. Carlson 19 Dec 2013

