

May 14, 2019 FINAL

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Project: D-1170 19051.A01 - DVC Cadaver Lab
Diablo Valley College, Pleasant Hill, CA
KPW Project No. 19C231

Subject: Structural Study & Letter – RE: IR A-22

Dear Brent:

In accordance with our agreement dated April 18, 2019, we have conducted a study and this letter relative to the subject building modifications and DSA IR A-22, last revised 08-25-15. The purpose of the IR A-22 (Interpretation of Regulations) is to clarify when plans and specifications for small construction projects on existing public school sites are required to be submitted to the Division of the State Architect (DSA) for review, approval, and construction oversight.

Items Reviewed/Limited Analysis conducted

KPW conducted the following due diligence efforts as the basis for the opinions stated in this letter.

- Conducted a site walk of the subject building, including the subject classroom, above ceiling spaces, and roof spaces, for purposes of observing the as-built conditions.
- Reviewed the existing structural drawings for this location on this building. These included but were not limited to drawing S2.03 prepared by Anshen & Allen Architects and Degenkolb Structural Engineers, dated July 16, 2007, for the Physical Sciences Renovation of Life Sciences project.
- Reviewed the proposed new construction drawings prepared by Costa Engineers, Inc., dated 01-14-2019, for the DVC Cadaver Lab, including drawings:
 - M1.1 Mechanical Schedules and Legends
 - MD2.1 HVAC Demolition Plan
 - M2.1 HVAC New Proposed Plan
 - M2.2 Mechanical Roof Plan
 - M3.1 Mechanical Details
 - M5.1 Control Diagrams
- Reviewed DSA IR A-22
- Conducted a structural analysis of the existing framing immediately below the proposed replacement equipment.
- Telephone discussions with Robert Englund of Costa Engineers regarding new and existing equipment and the connections of the equipment.

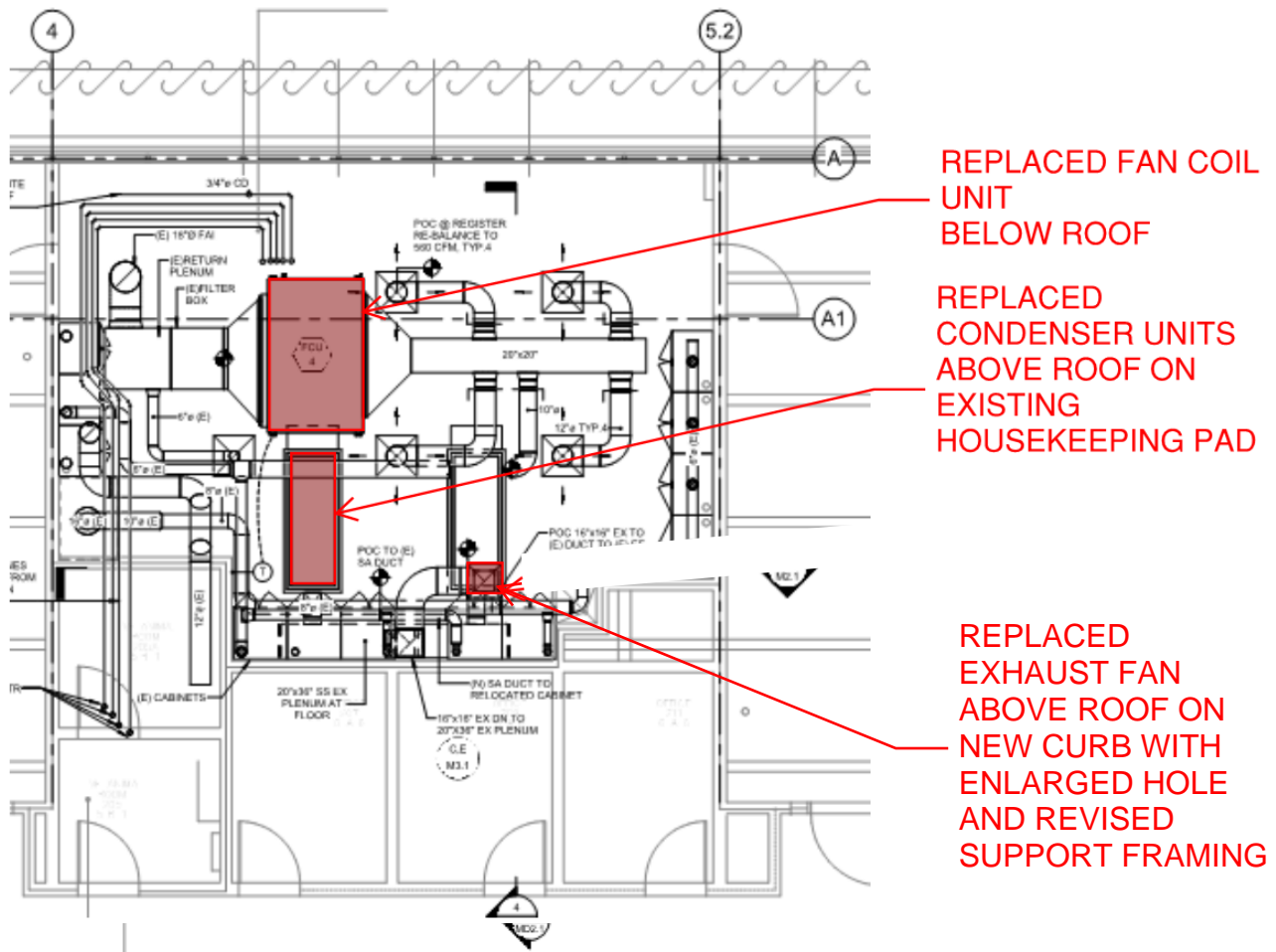
Scope of Project

The proposed new project calls for the replacement “in-kind” of existing mechanical equipment, specifically:

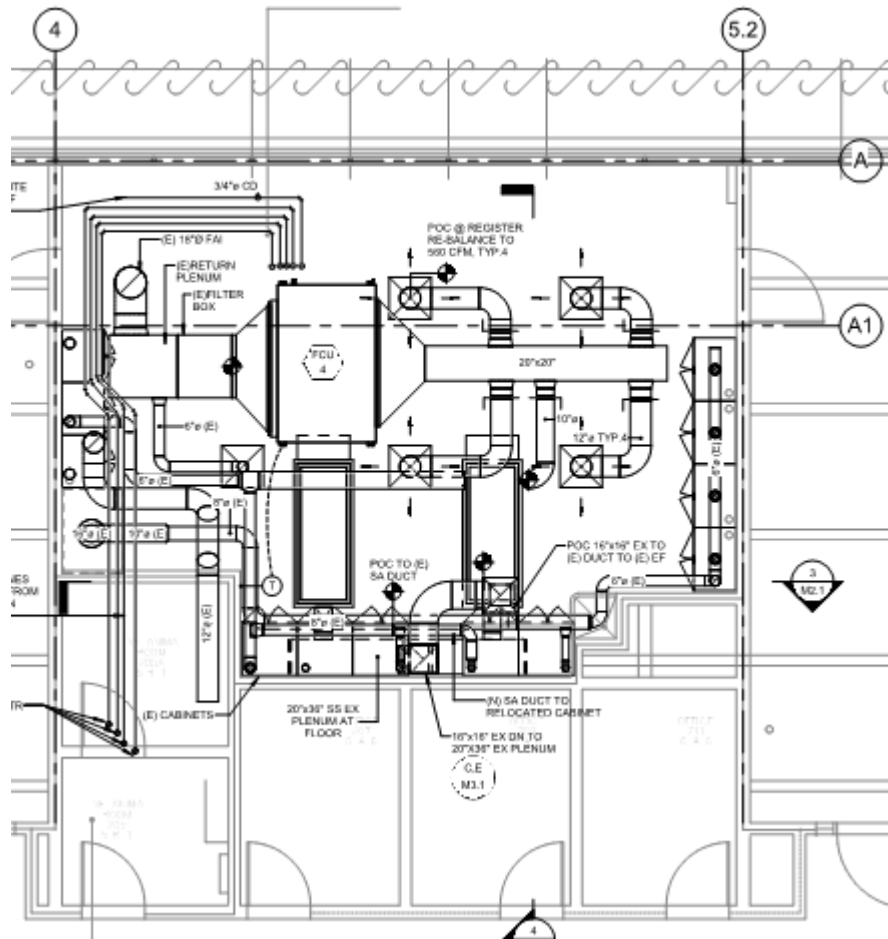
- Replace existing Fan Coil unit hung below roof within the existing ceiling system
New Unit Weight: 1290 #. Existing Unit Weight: 1200#
- Replace the existing Condenser Units supported on a housekeeping pad on the roof
New Unit Weight: 440 #. Existing Unit Weight: 770#
- Replace the Exhaust Fan on the roof
New Unit Weight: 80#. Existing Unit Weight: 120#

Building / Room Structural Description

The existing building is a 2 story wood steel hybrid building. The Cadaver Lab D-110 is located on the 2nd floor, below the roof framing, between lines 4-5/A-B. The roof immediately above the cadaver lab which supports this equipment has a built up roof over 3/8” plywood over 2x T&G decking over 6x12 beams at 5 ft. oc between W18x beams at 23’-4” oc, supported on steel columns.



PARTIAL DEMO PLAN



PARTIAL PROPOSED NEW PLAN

IR 22-A Requirements relative to the project scope

Per IR A-22, replacement in-kind mechanical units may be eligible for exemption subject to the notes in Appendix A of the subject IR. Specifically, in Appendix A, under Project Description item 14.

Replacement in kind of mechanical, electrical, or plumbing units, subject to the following exemption footnotes:

- SS Review: Footnote 9
- AC Review: Footnote 13
- FLS Review: Footnote 9

Footnote 9: Mechanical, electrical, and plumbing unit replacement in-kind includes any or all units on a building when all of the following requirements are met:

- o Each new unit must be of equal or lesser weight to the existing unit being replaced, and weigh no greater than 2000 lbs.
- o Each new unit must be placed in the same location as the existing unit.

- Each new unit must be placed without requiring alteration to the existing structural framing or altering existing supporting curb or platform.
Exception: Adaptive metal curbs may be utilized provided the applied combined gravity plus lateral forces to the structure are not increased.
- Each new unit must be placed without requiring alteration to the existing ceiling.
- Each new unit must be placed without requiring replacement of ductwork, grilles, electrical components, etc.

Footnote 13: Under the definition of “Alteration” in Chapter 2 Section 202 of the CBC, this work is considered “changes to mechanical and electrical systems” that is not an alteration for purposes of accessibility. It also falls under CBC Section 11B-202.4 Exception 7 and does not trigger path of travel upgrade requirements unless usability (read “accessibility”) of the facility is affected.

Structural Assessment of Existing support framing relative to this project scope

Overall, the building and its roof are in good condition.

Our structural review of the impacts to the existing framing are limited to the support framing below the condenser pad and the support framing above the fan coil unit.

Condenser Pad support framing: The condenser pad is supported by 6x12 framing below the 2x decking. The 6x12 framing is adequate for the new replacement condenser units, which weigh 440 # (less than the 770# of the existing condenser units).

Fan Coil Unit support framing: The Fan coil unit is supported by Unistrut which is supported under 6x12 framing. The 6x12 framing would be approximately 3.5% overstressed under new loads which includes the 1,290 # fan coil unit. Comparatively, the 6x12 framing is 2.5% overstressed under the existing loads which includes 1,200 # existing fan coil unit).

Exhaust fan support framing: The fan is supported by framing and blocking below the 2x decking. The framing below is adequate for the new replacement fan loading, which weigh 80 # (less than the 120# of the existing fan unit). However, the opening would need to be larger, cutting more 2x decking, and in turn requiring reframing of the blocking below as well as the curb above for the enlarged hole size.

DSA IR A-22 Compliance - Opinion

In our experience, our professional opinion is that DSA would enforce a strict interpretation of the subject IR for exemption.

This proposed project would likely **NOT** comply with the exemptions of the subject IR based on the following:

- The new Fan Coil unit is heavier than the existing. The location of the unit is slightly different, and its size and supporting Unistrut installation is slightly different.
- The framing that supports the new Fan Coil unit is currently slightly overstressed by code. Even the proposed marginal increase in Fan Coil unit weight further exacerbates the concern.
- The new exhaust fan ductwork is about 4” larger in each direction than the existing exhaust fan ductwork, and it will require enlarging the roof opening penetration through the 2x T&G decking, requiring framing and hangers below. This will require structural calculations, hanger callouts, and anchorage details, all subject to DSA SS review.
- New ductwork will be required.

It is unclear whether any replacement to the ceiling tiles or any new electrical lines would need to be run, but that could be specifically prohibited within the exemption notes.

Recommendations

Compliance with the IR A-22 could be obtained if the following adjustments to the scope are met:

- The new fan coil unit is sized to not exceed the weight of the existing. This may be accommodated by further evaluation of the existing unit’s weight or by specifying a lighter new unit. The new fan coil unit should ideally be 1100# or lighter to bring the stress of the existing 6x12 support beams down to their code allowable levels.
- Size the ductwork of the new exhaust fan to match the existing
- Avoid new ductwork
- Avoid replacement of any ceiling tiles, grilles, electrical components, etc.

This letter is our professional opinion regarding the proposed project and an assessment of its compliance with the exemptions of DSA IR A-22. We have made some assumptions which are stated in this letter. Our review of the site conditions, the existing drawings and proposed drawings, and interpretations of the DSA IR A-22, have been made based on our experience with similar projects and our experiences with DSA and their enforcement of regulations. Our recommendations have been made accordingly.

If you have any questions, please contact John Westphal

Very truly yours,

KPW Structural Engineers, Inc.



John Westphal, SE 4575
Principal