USCGC HEALY (WAGB-20)

Scientific Van Installation

Preliminary Design Report

Elliott Bay Design Group

Seattle • New Orleans

an ACL Company

Scientific Van Installation
Preliminary Design Report

- Introduction
- Arrangement and Sheltered Location
- Structural Modifications and Analysis
- Marine Systems Modifications
- Electrical System Modifications
- Weight Estimate
- Cost Estimate
- Modification Specifications
- Summary and Conclusions

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Introduction

- Scientific Vans currently on the HEALY Foredeck experience green water damage
- EBDG Feasibility Study conducted in Fall of 2010 assessed several alternate van locations
- Final van location and position agreed on the forward raised 02 deck
- Essentially meets sheltered location requirements with limited service or breakwater
- Structure, marine and electrical system modifications contract design, including weight and cost estimate underway

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Arrangement and Sheltered Location

- Sheltered location defined in UNOLS Vans Manual as two decks above freeboard deck
- New location is two decks above main deck, but one deck above freeboard deck and existing vans on focsle deck
- Proposed location has experienced rare green water events in high latitudes
- Additional protection can be provided by seasonal restrictions or protective breakwater
- Vans arranged to provide reasonable pathways for the shore power cables

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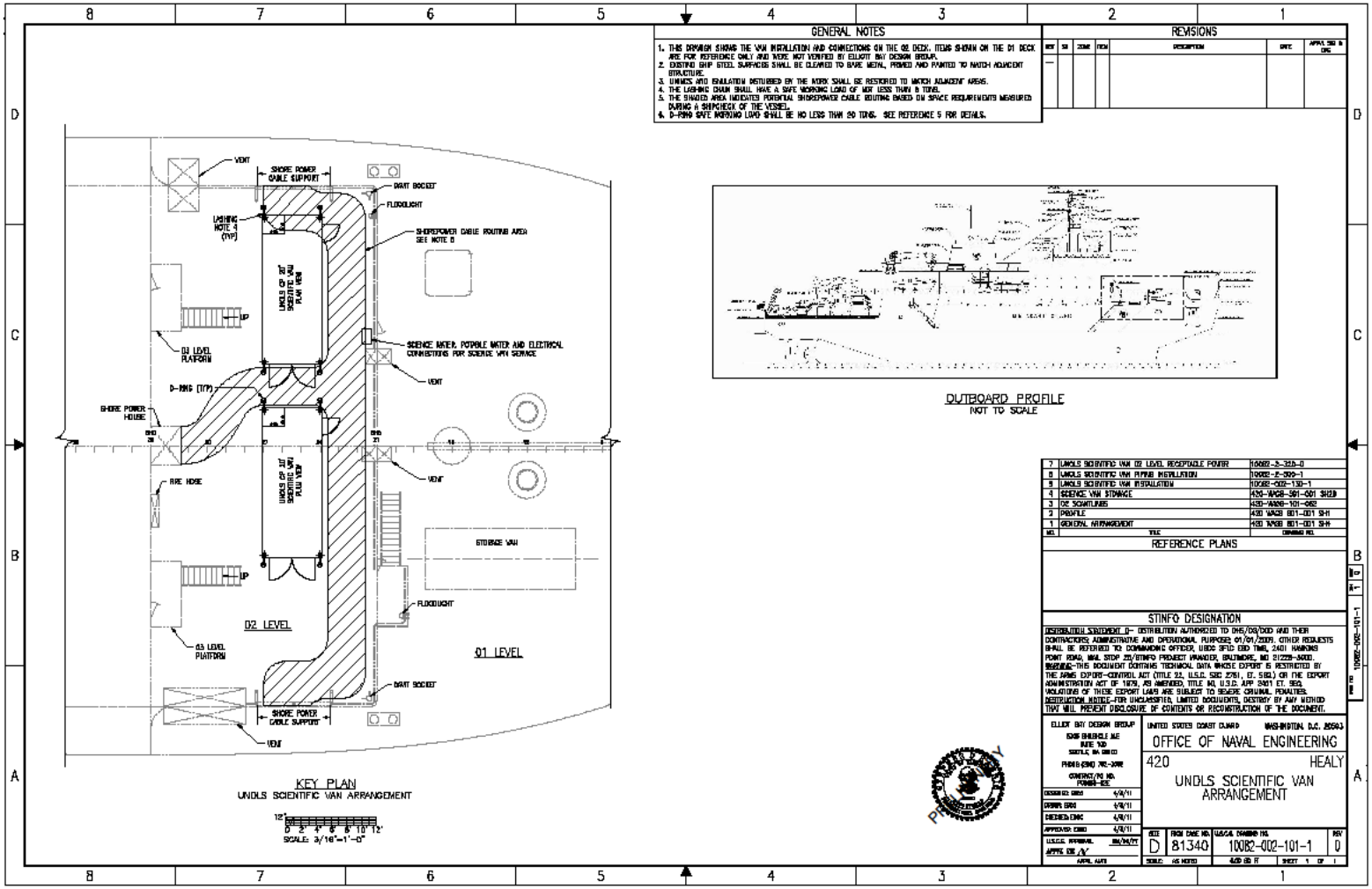
Arrangement and Sheltered Location



Structural Modifications and Analysis

- Finite Element Analysis (FEA) model prepared of entire forward 02 deck with vans installed
- Environmental loads including 25,000 pound vans plus deck weight, static water pressure head, ice, vessel motion accelerations and wave impact conditions
- Additional buckling calculations performed
- Modifications limited to above deck to support 25,000 pound vans, except for wave impact
- Prepare space under 02 deck for hot work at limited positions

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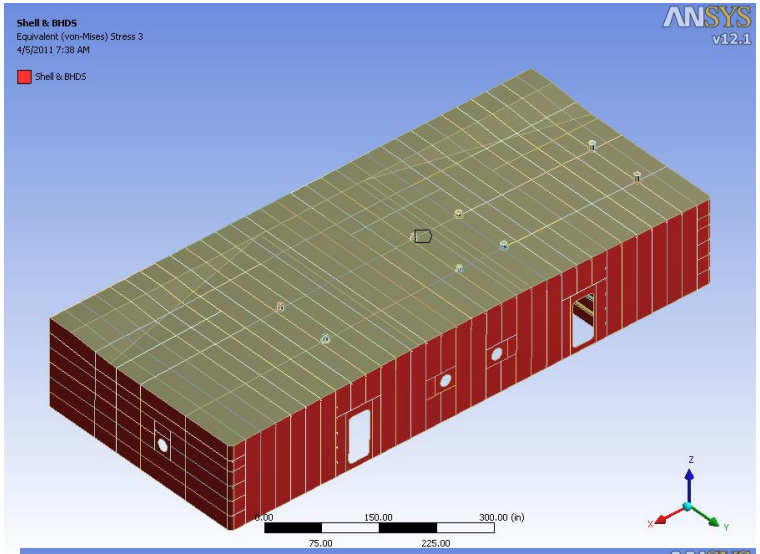
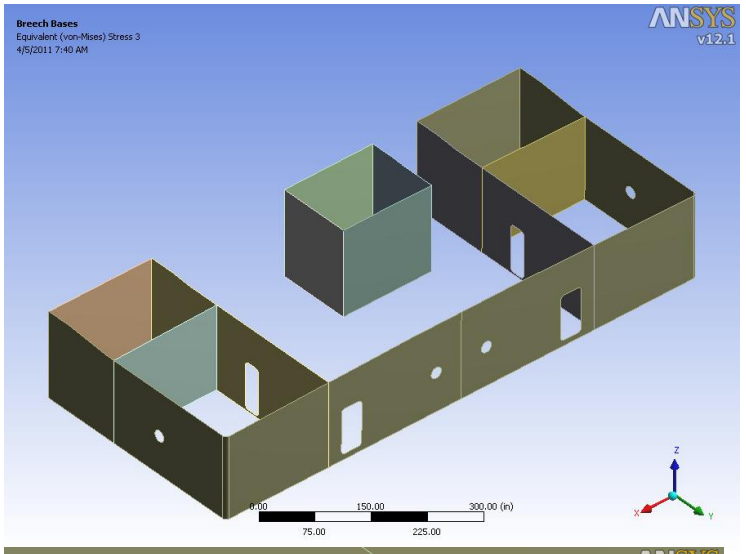
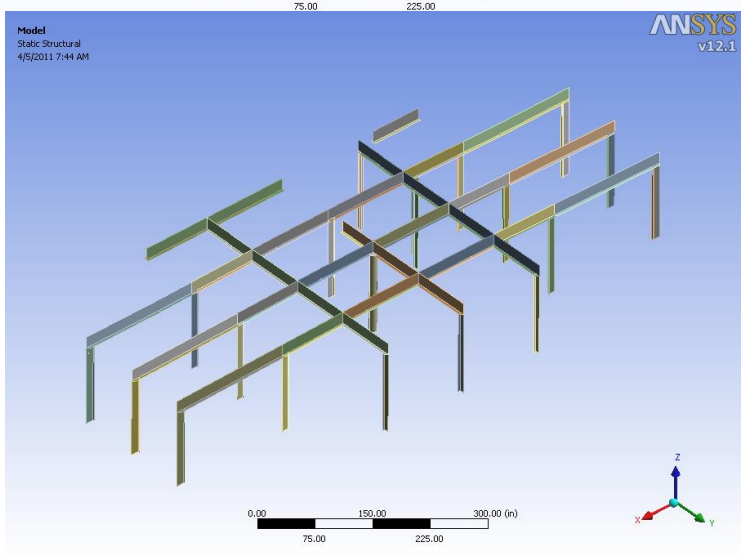
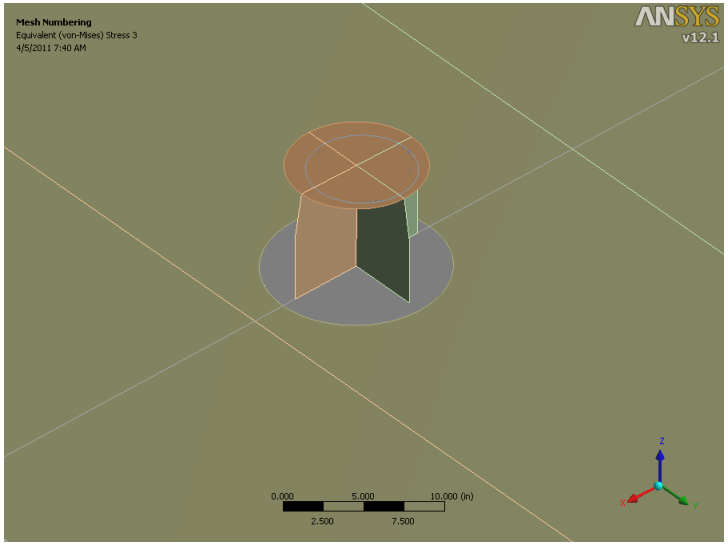
Structural Modifications and Analysis









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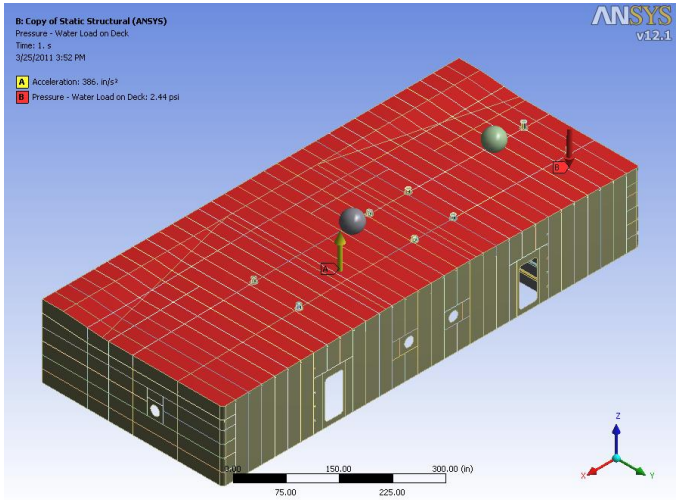
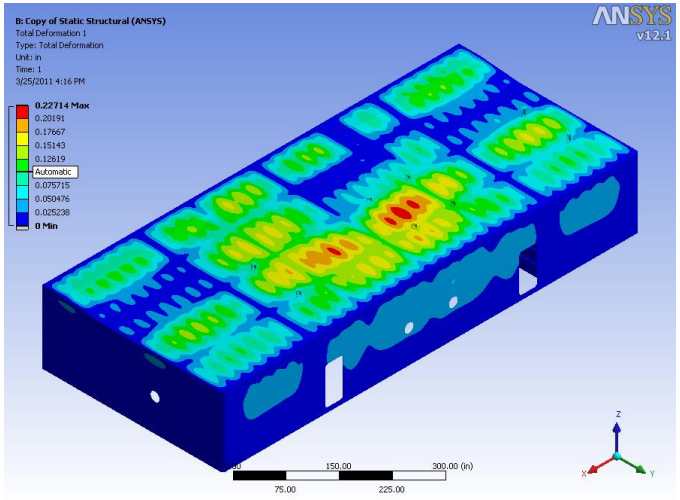
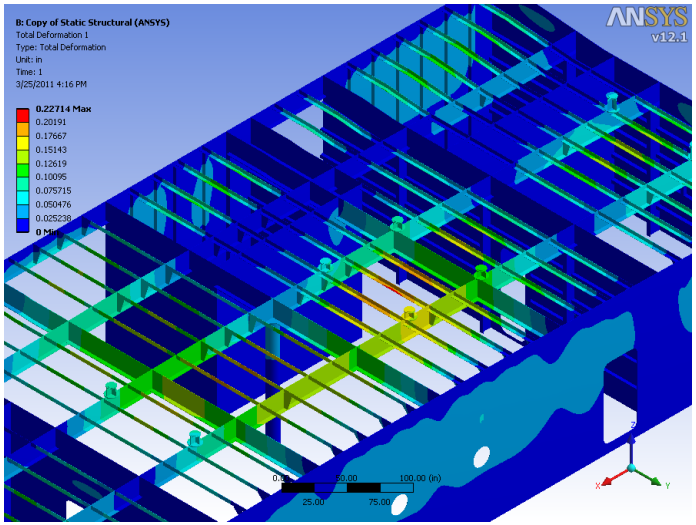
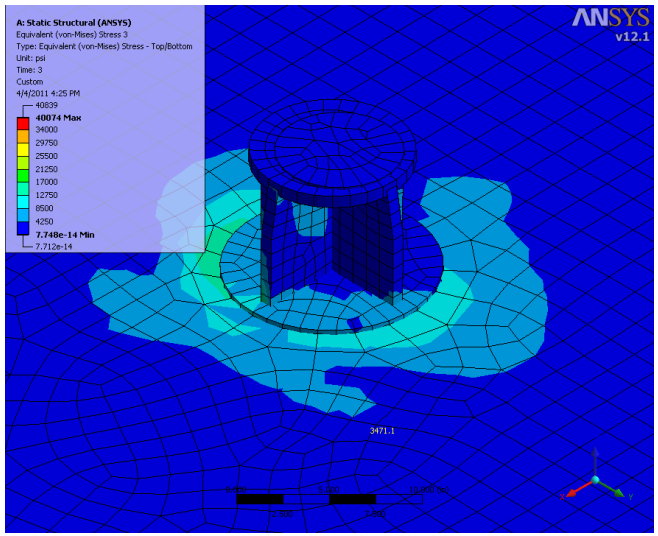
Structural Modifications and Analysis









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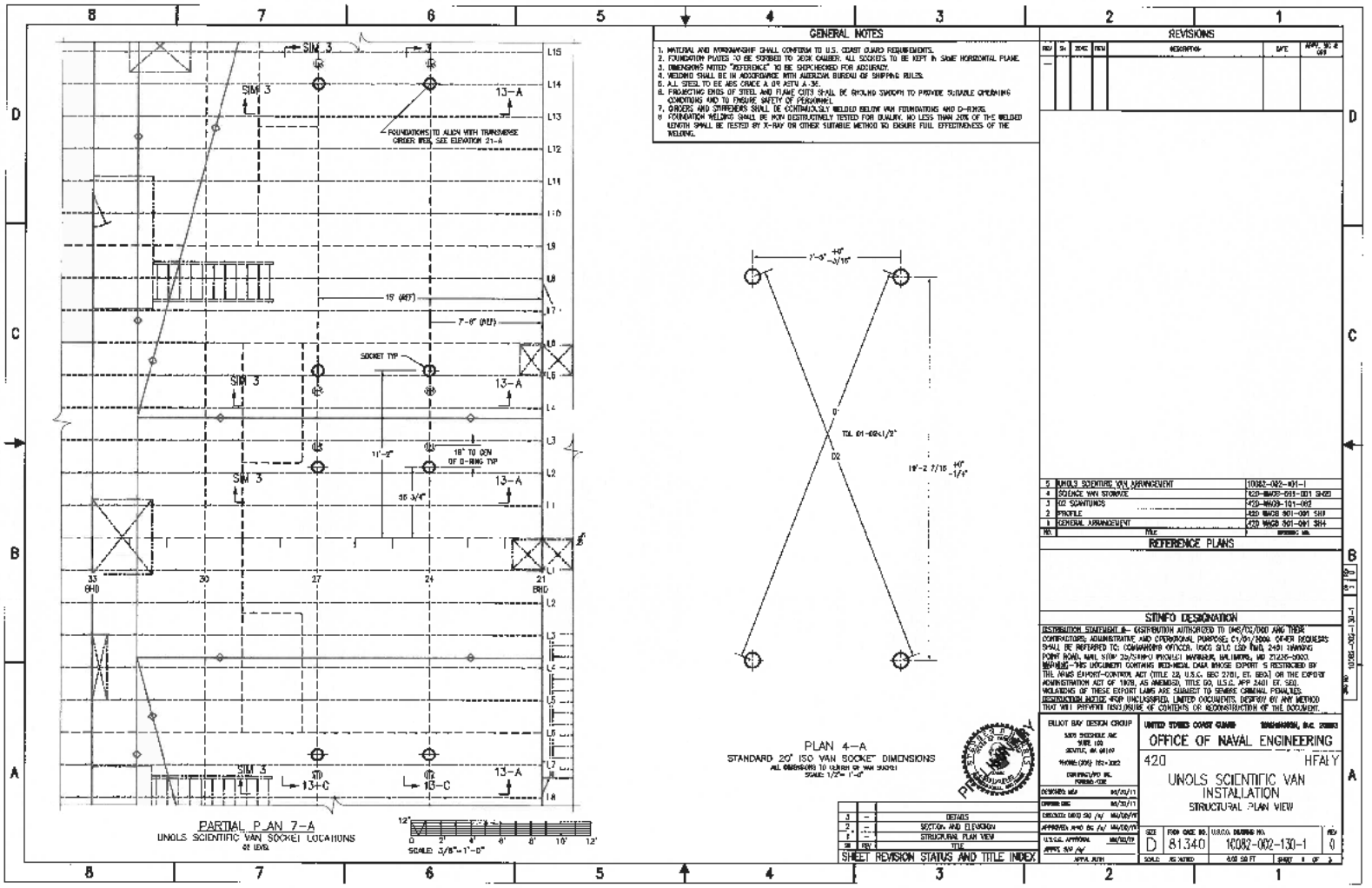

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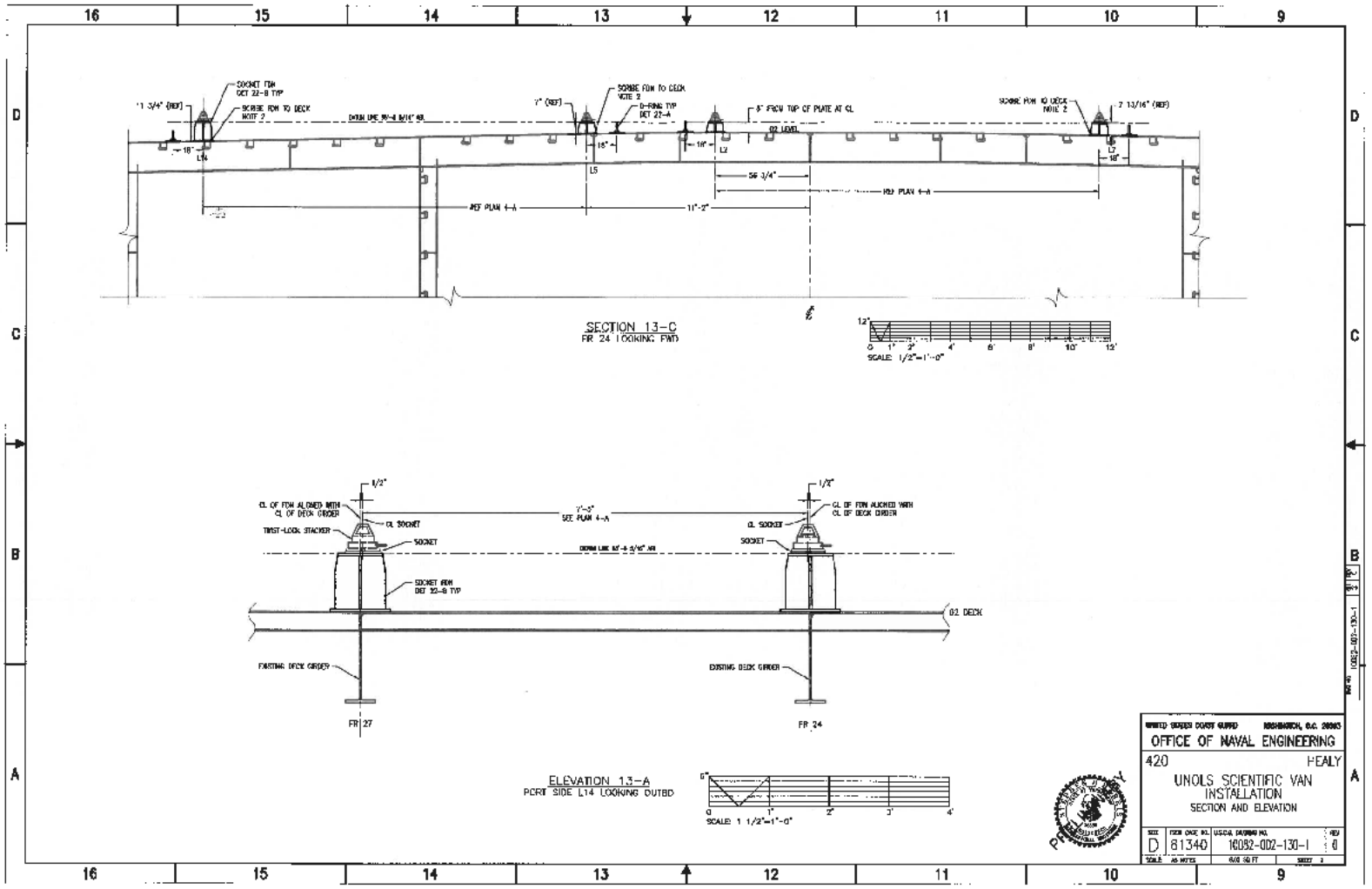

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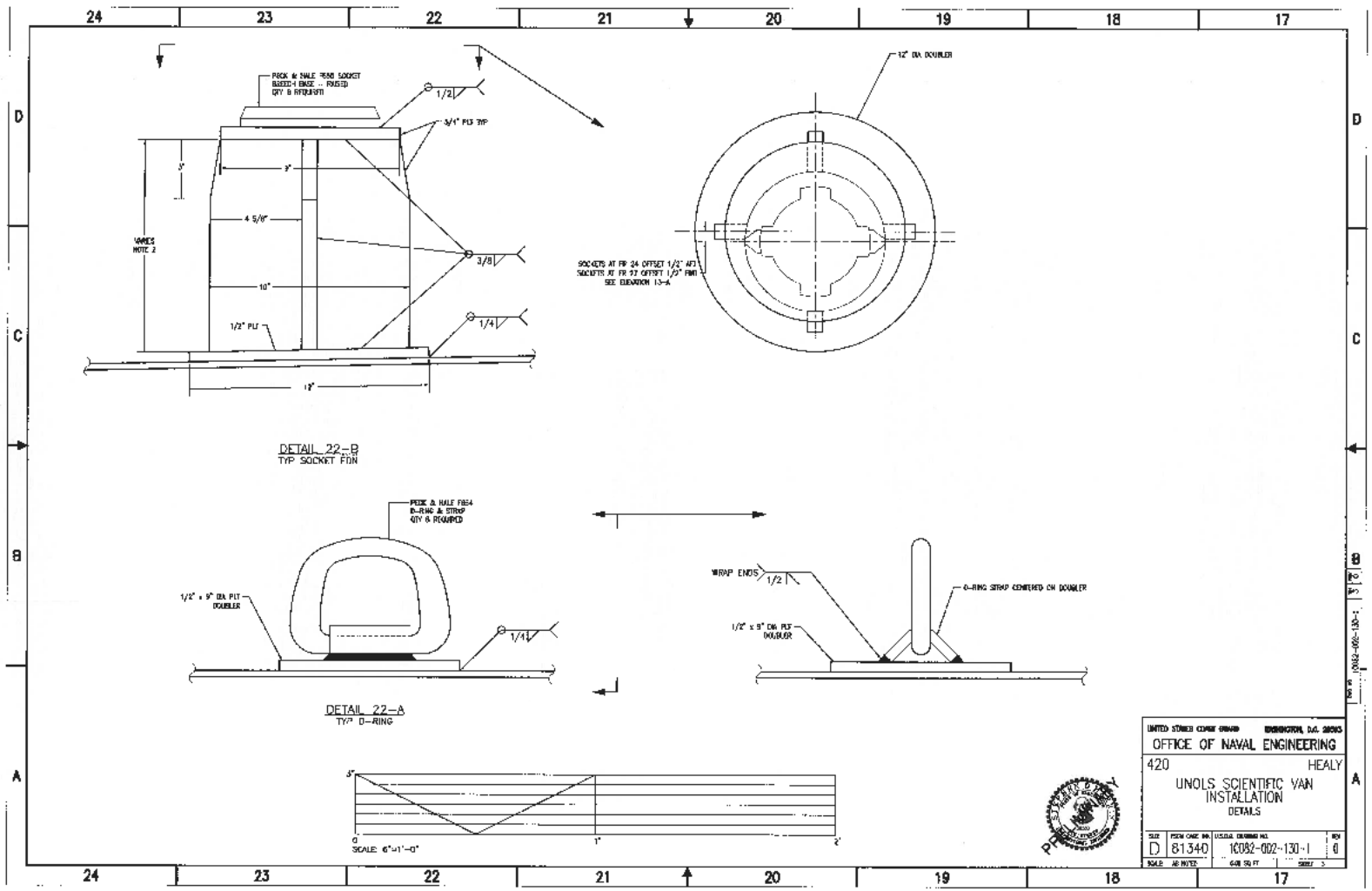

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Marine System Modifications

- Science seawater supply from existing scientific van supply lines on the 01 Level, and routed vertically to forward edge of the 02 Deck
- Potable water routed from outside vestibule, penetrating one joiner bulkhead then routed vertically to forward edge of the 02 deck
- Piping modifications are confined to the port side 01 Deck entry vestibule to minimize fabrication costs
- Insulated and heated supply hoses are provided to prevent freezing of the exposed hoses

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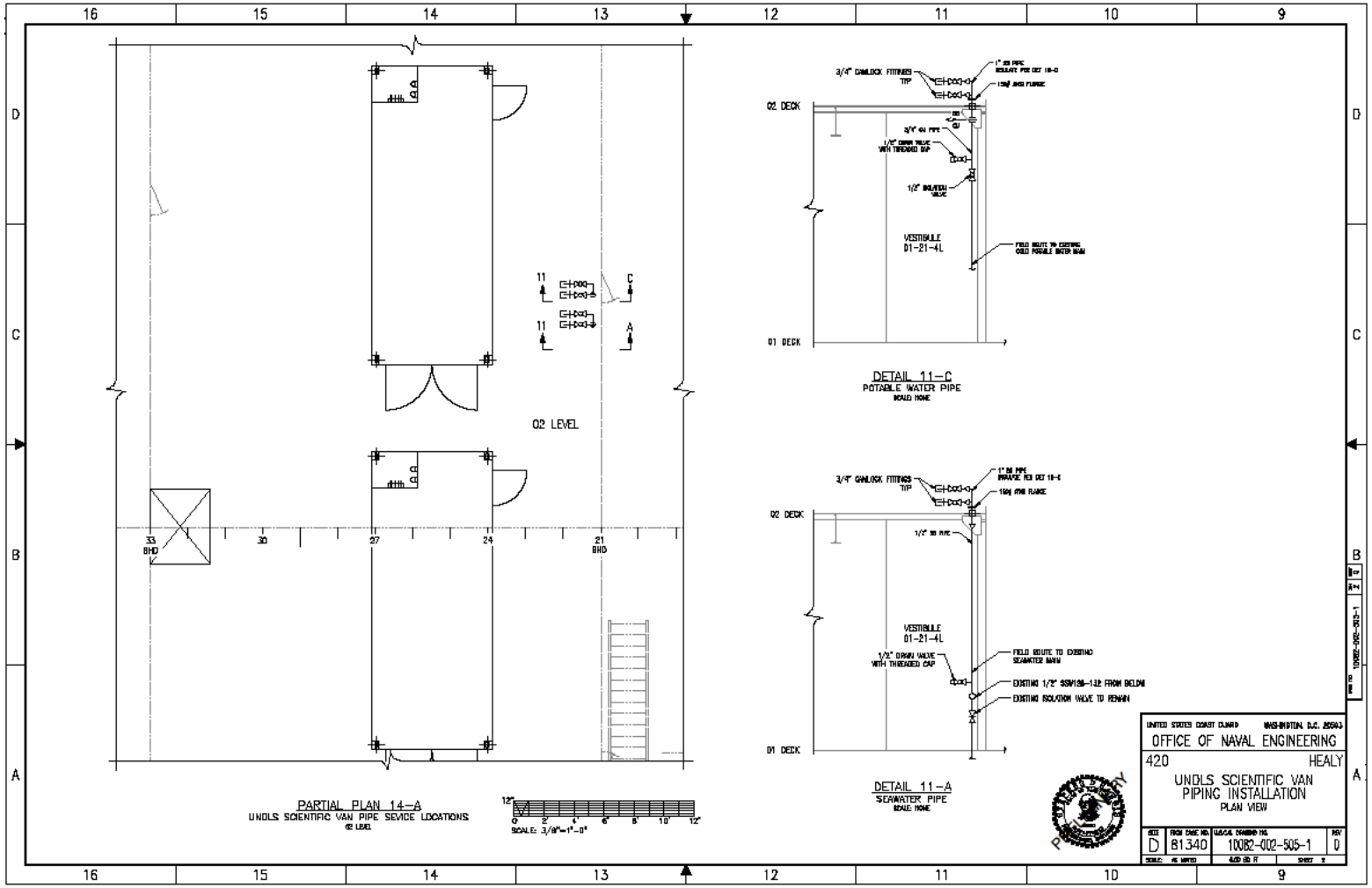
Marine System Modifications



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Electrical System Modifications

- Two existing 220 VAC science van receptacles on the 01 Level are supplied by 10kVA transformers located at the 01 Level, Frame 21
- Two new 450 VAC (single-phase) 50-amp receptacles on the 02 Level are required due to lack of 450 VAC breakers
- The increased receptacle power will also permit increased heating for the vans during extreme weather
- Heat tape will utilize normal 120 VAC power supplied via new receptacles on the 02 Level

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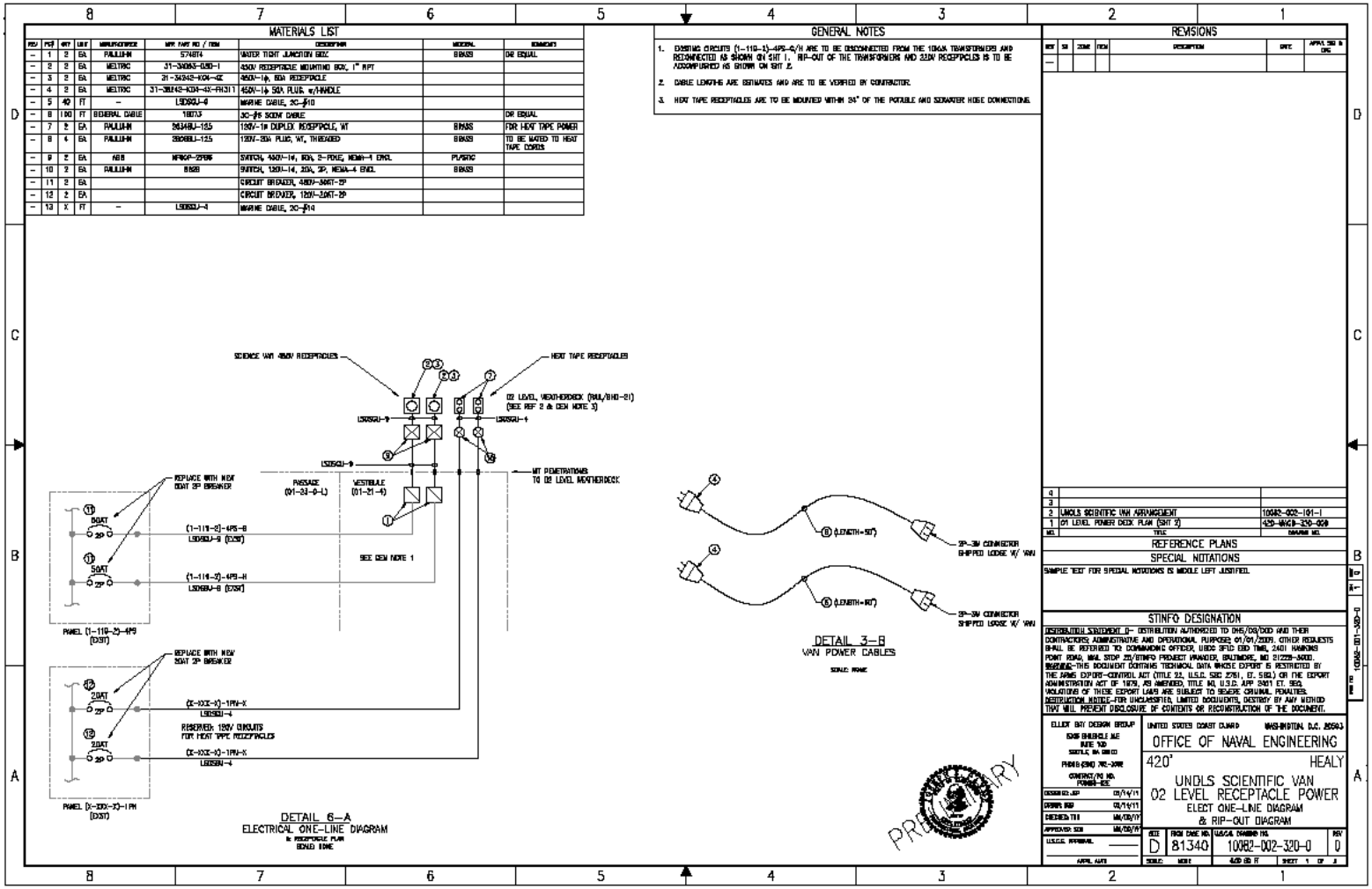
Electrical System Modifications



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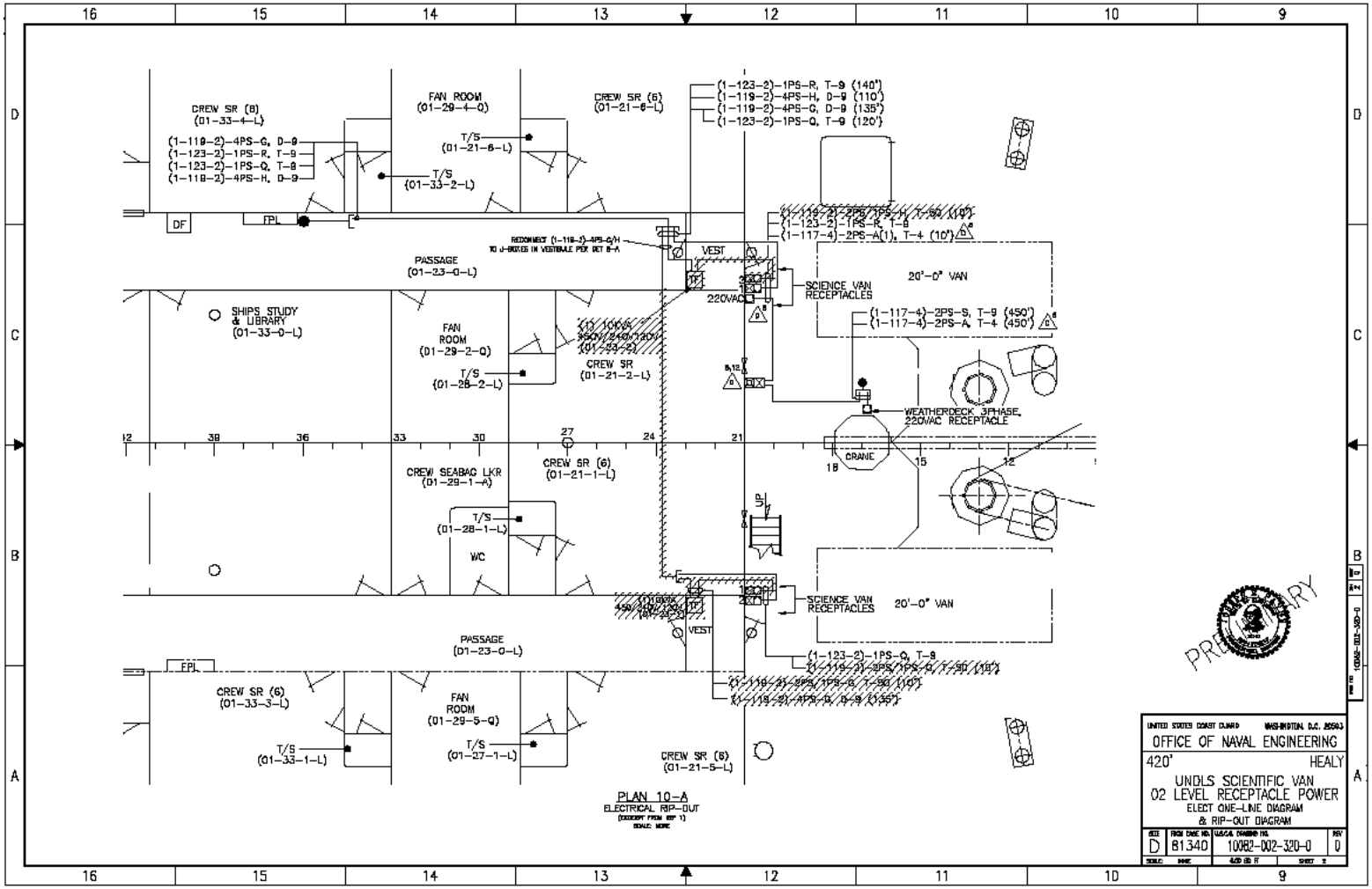

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Weight Estimate

- Extent of structural modifications for two vans reduced from preliminary study following a more detailed structural analysis and simplification of van foundations including:
- Structural additions – 780 lbs
- Outfit additions – 510 lbs
- Piping additions – 305 lbs
- Electrical additions – 75 lbs
- Total additions – 1670 lbs

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Cost Estimate

- Simplified structural modifications also significantly reduce cost of installation of two vans including:
- Structural additions – $14,060
- Outfit additions – $ 7,890
- Piping additions – $ 6,310
- Electrical additions – $15,120
- Project admin – $ 1,690
- Total additions – $45,070

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Summary and Conclusions

- Analysis results indicate the existing 02 Deck structure has adequate strength for supporting two 25,000 lb scientific vans, without under-deck structural modifications
- The results further confirm the van foundations and structure modifications are not feasible to resist extreme green water loading
- The estimated modification weight for installing two vans is approximately 1,700 pounds
- The estimated cost is $45,100 for installing two vans pending final shipyard selection

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