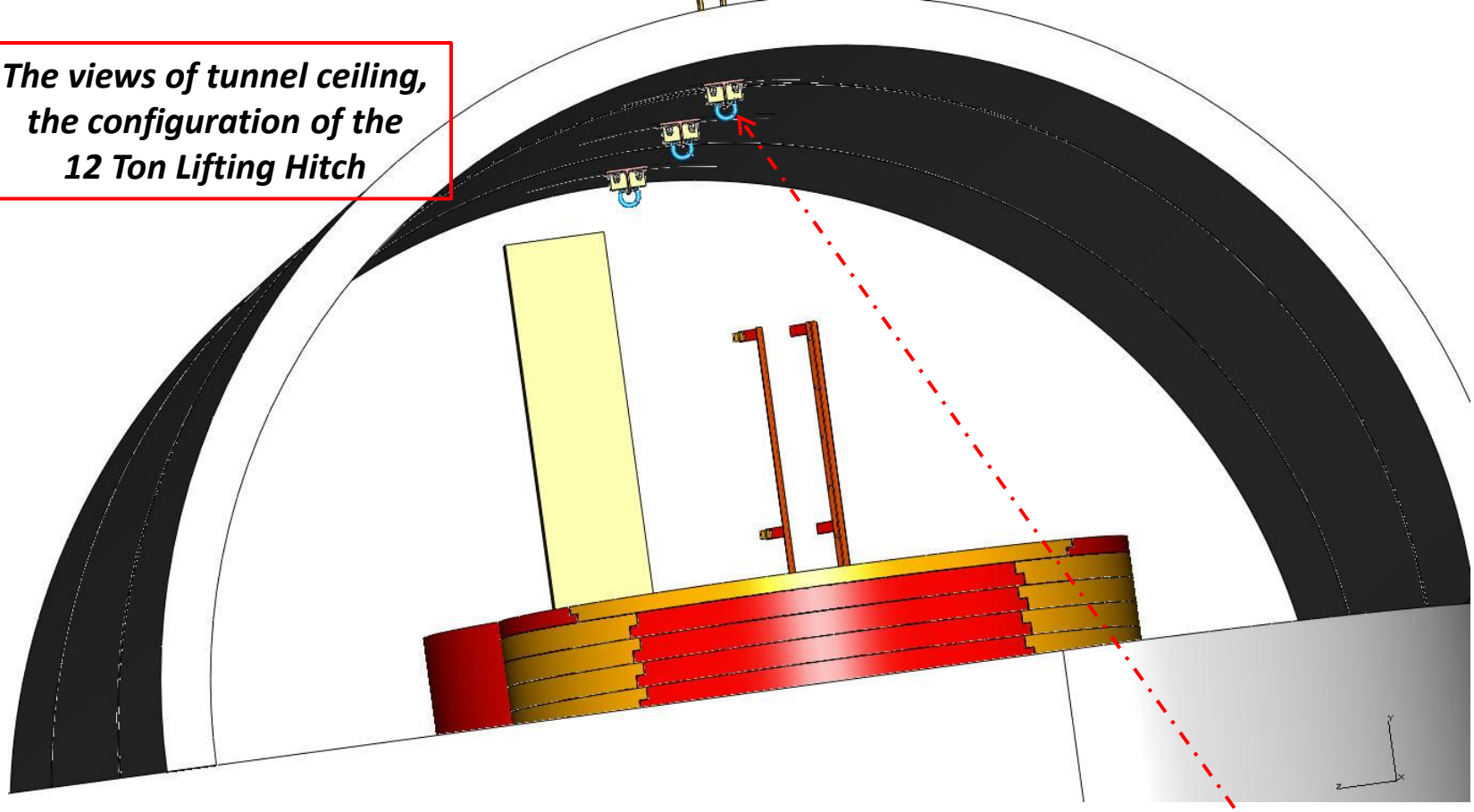
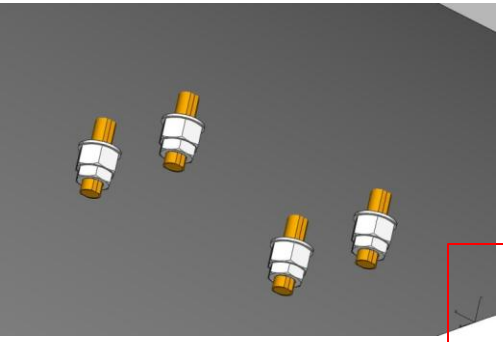
The Design of the Monorails for the Drift C3 Clean Room Area of the Snolab Ladder Lab

The Main Function and Design Criteria of the Monorails:

- *As a guide way for the clean room lifting hoist moving in the axial direction of the Monorail.*
- *As a structural support for the lifting hoist and the lifting objects within its lifting specifications.*
- *The individual parts must be accessible through inside of the cavern.*
- *The monorail mounted on the roof and connected with the existing threadbar which have 12 Ton lifting capacity for every 4 threadbars.*

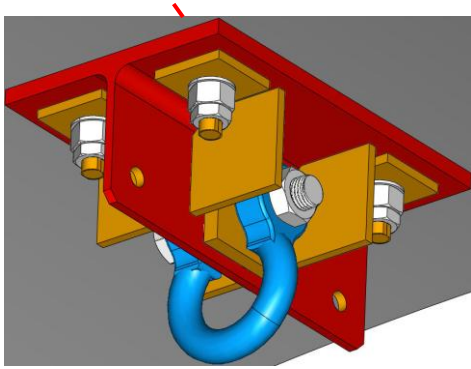
The views of tunnel ceiling, the configuration of the 12 Ton Lifting Hitch



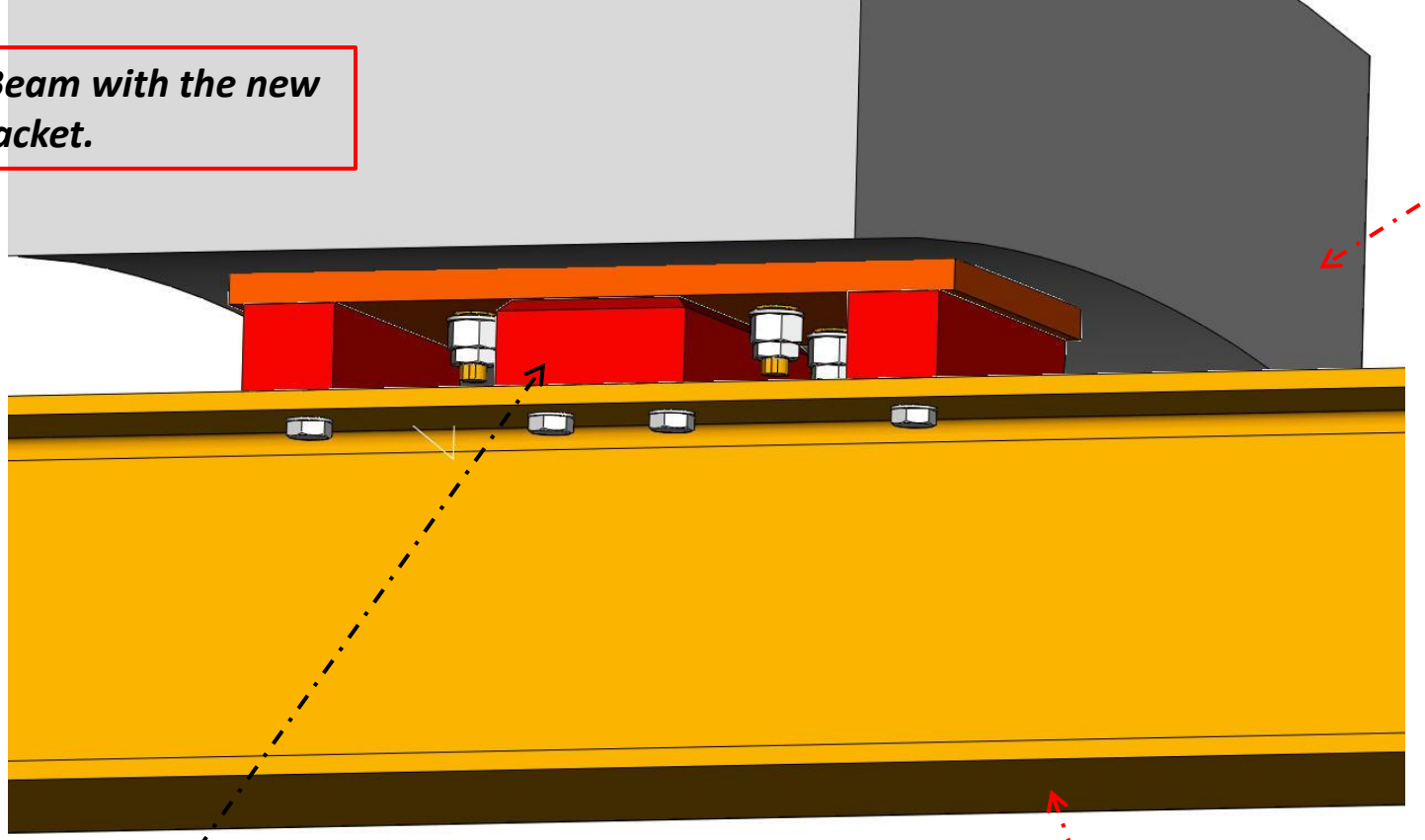


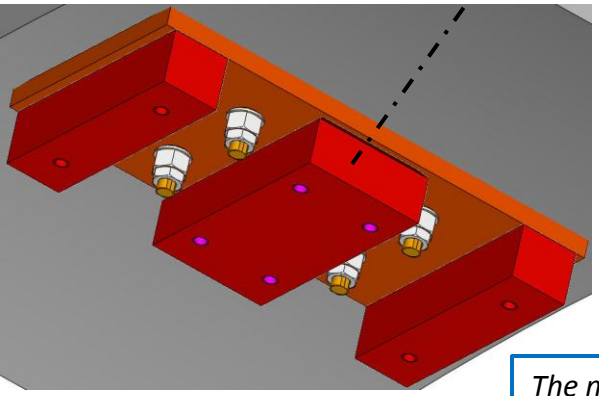
<u>The view of the existing 4 Dywidag Threadbar From the tunnel ceiling</u>
(after removed the existing mtg. bracket and the 12 Ton anchor shackle

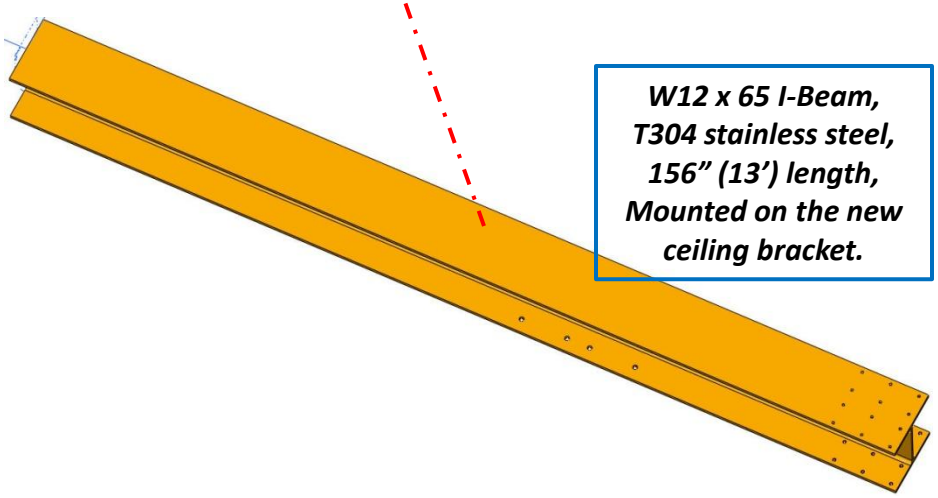
<u>The view of the existing 12 Ton Lifting Hitch mounted on the ceiling</u>
(per dwg. #99-071-E-02649)



Install the I-Beam with the new mounting bracket.

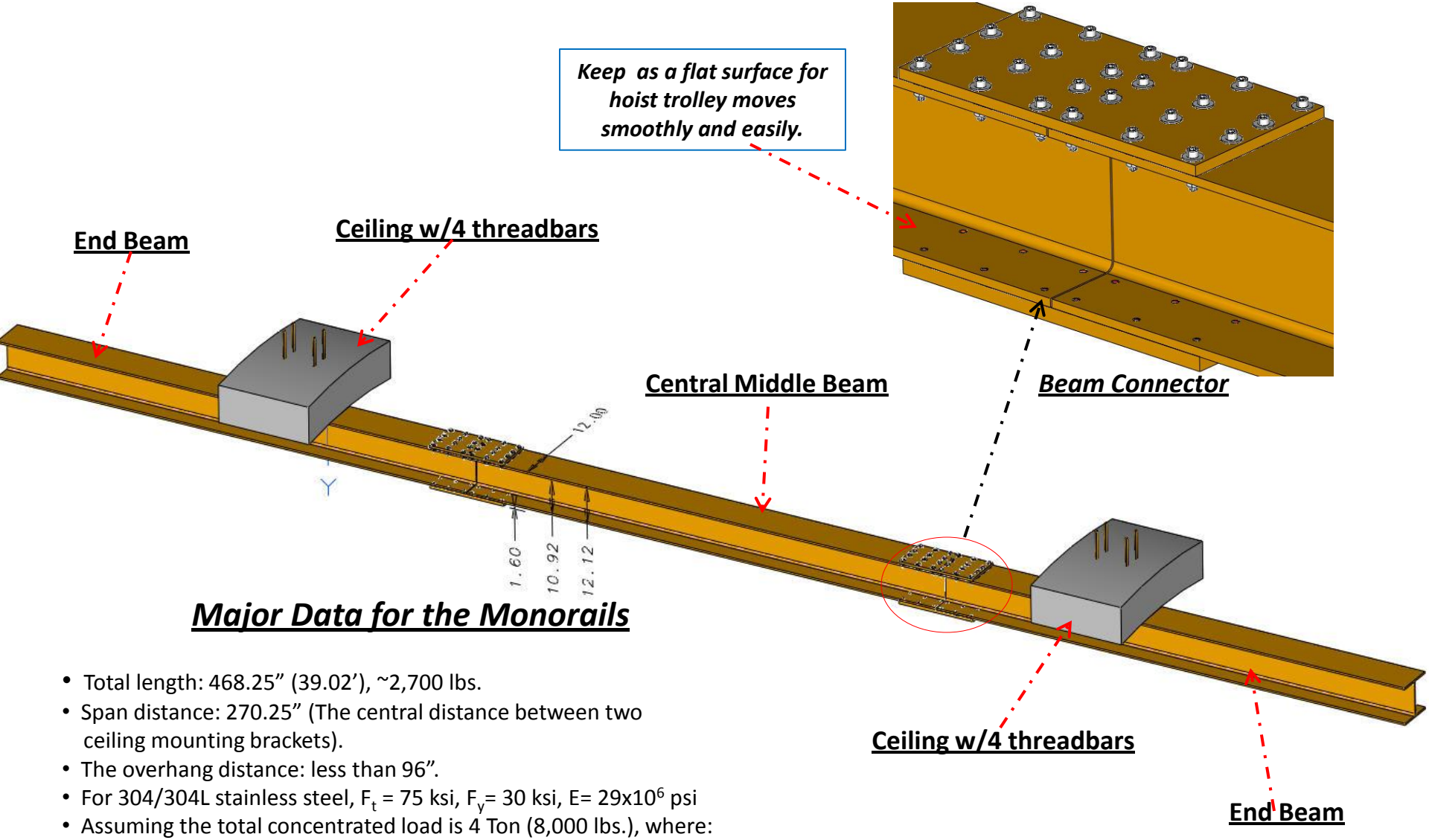




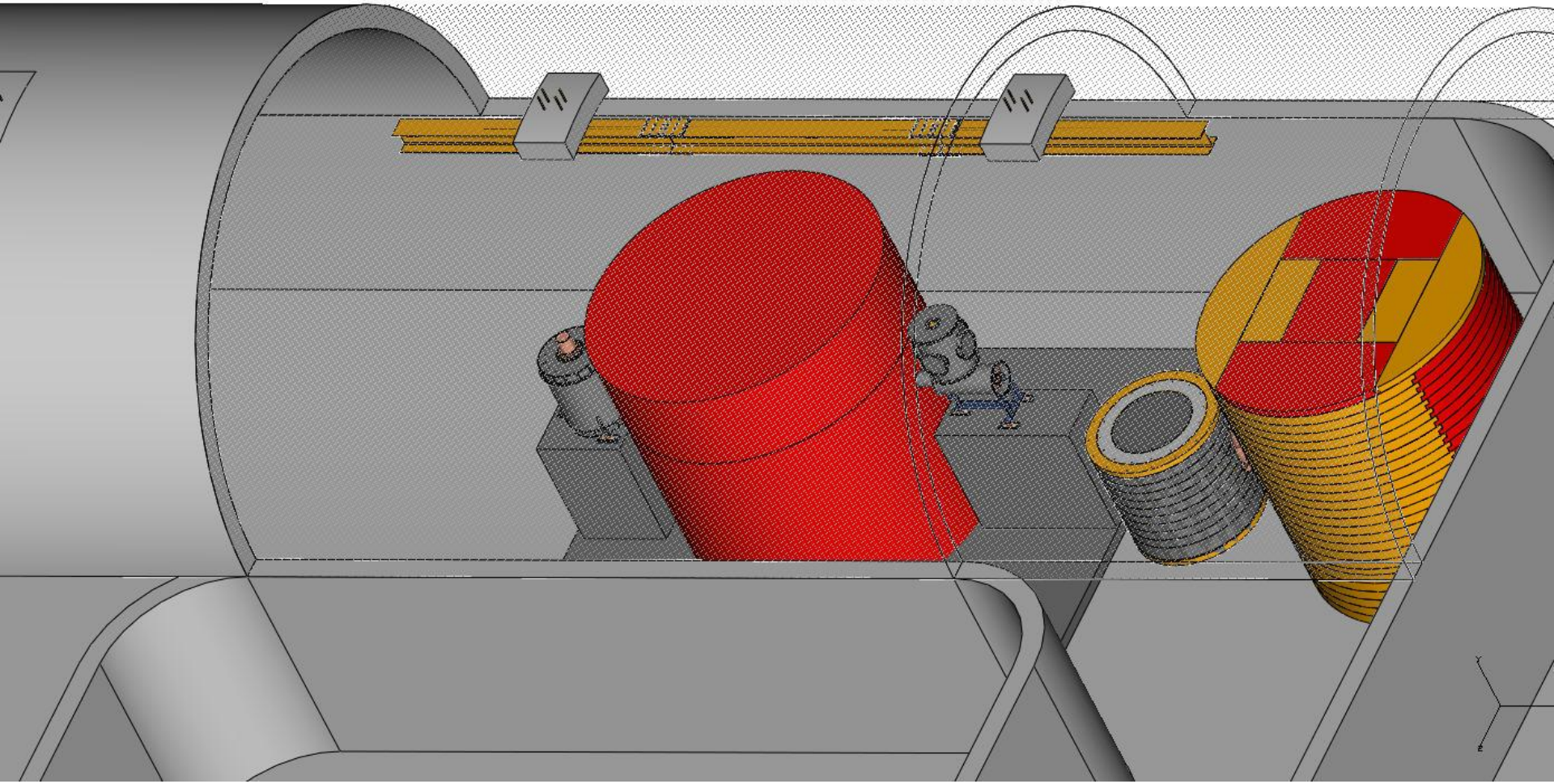


W12 x 65 I-Beam, T304 stainless steel, 156" (13') length, Mounted on the new ceiling bracket.

The new mounting bracket mounted on the ceiling with 4 existing threadbars.



Major Data for the Monorails

- Total length: 468.25” (39.02’), ~2,700 lbs.
- Span distance: 270.25” (The central distance between two ceiling mounting brackets).
- The overhang distance: less than 96”.
- For 304/304L stainless steel, F_t = 75 ksi, F_y= 30 ksi, E= 29×10^6 psi
- Assuming the total concentrated load is 4 Ton (8,000 lbs.), where: 1,000 for the crane hoist, and 7,000 lbs below the hook.
- It is found that (per the above defined boundary condition):
  F_b = 18 ksi, F_v = 12 ksi (The allowable stresses)
  $f_{b@ctr}$ = 6.7 ksi, $f_{b@end}$ = 9.021 ksi, f_v = 0.281 ksi,
  $\Delta_{@ctr}$ = 0.237”, $\Delta_{@end}$ = 0.1563”

Overall View of the Monorails