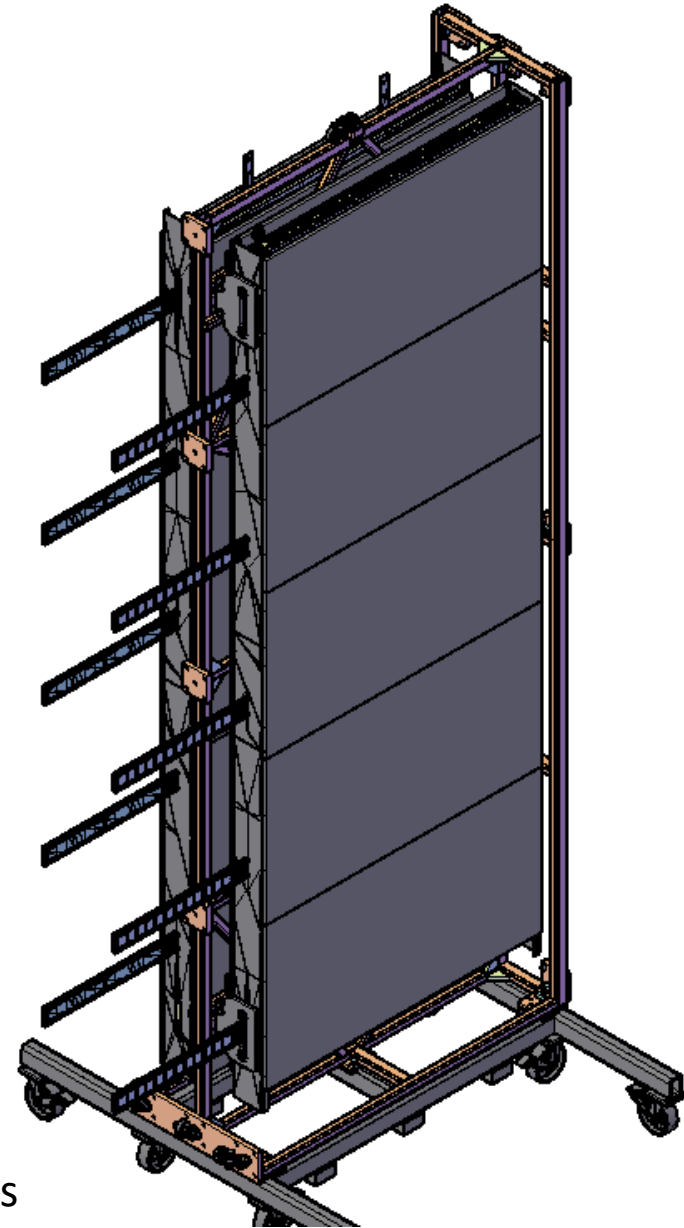


Installation

- Installing PDs
- Removing the lower (inverted) APA from the shipping box
- Transfer to the assembly fixture
- Removing the upper APA from the shipping box
- Transfer to the assembly fixture

Installing PDs

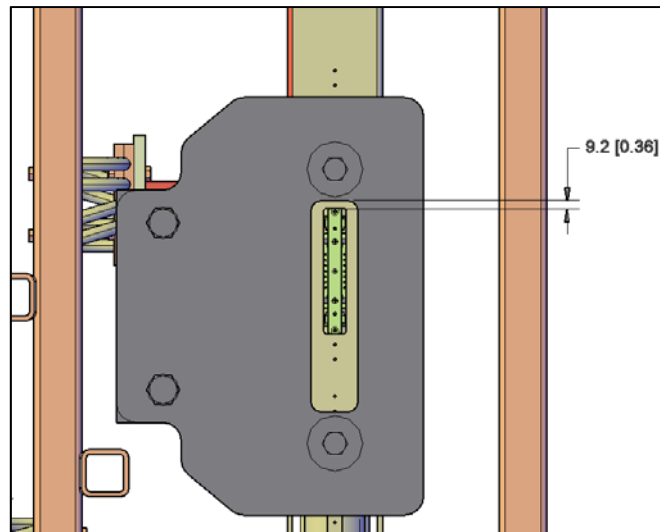
- PDS are installed while the APA is in the transport frame on the vertical cart.
- Transport box protection will be removed.
- Clearances have been provided in the frame and in the support plates to allow for the installation
- APA protection has cutouts to allow for PD installation



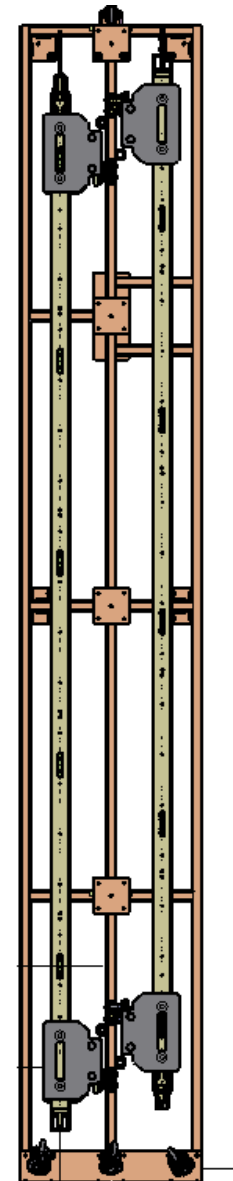
View of PDs
partially installed.

“Top edge”

- Frame provides lots of clearance for PD installation
- Support plates have cut outs to provide clearance.



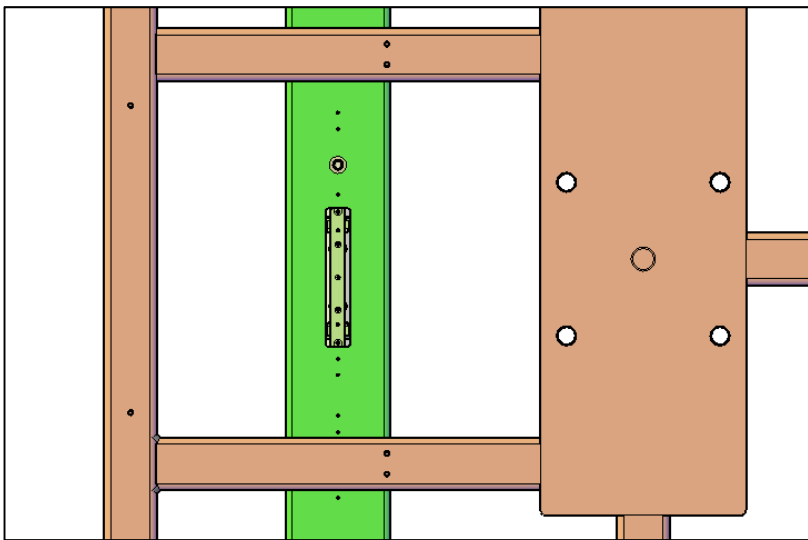
Cut out for PD installation



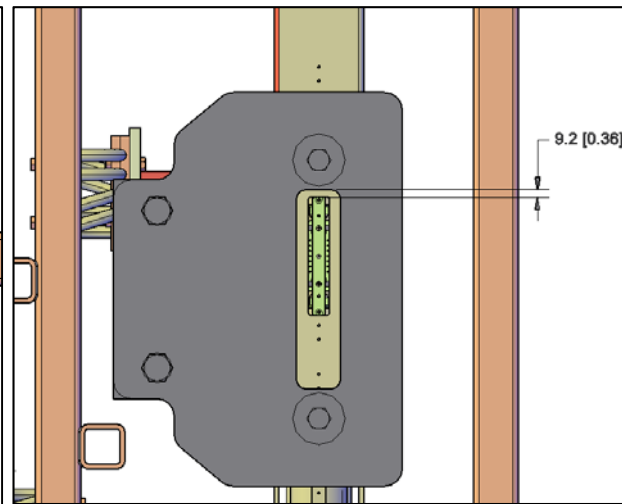
View of “top” edge of the transport frame

“Bottom edge”

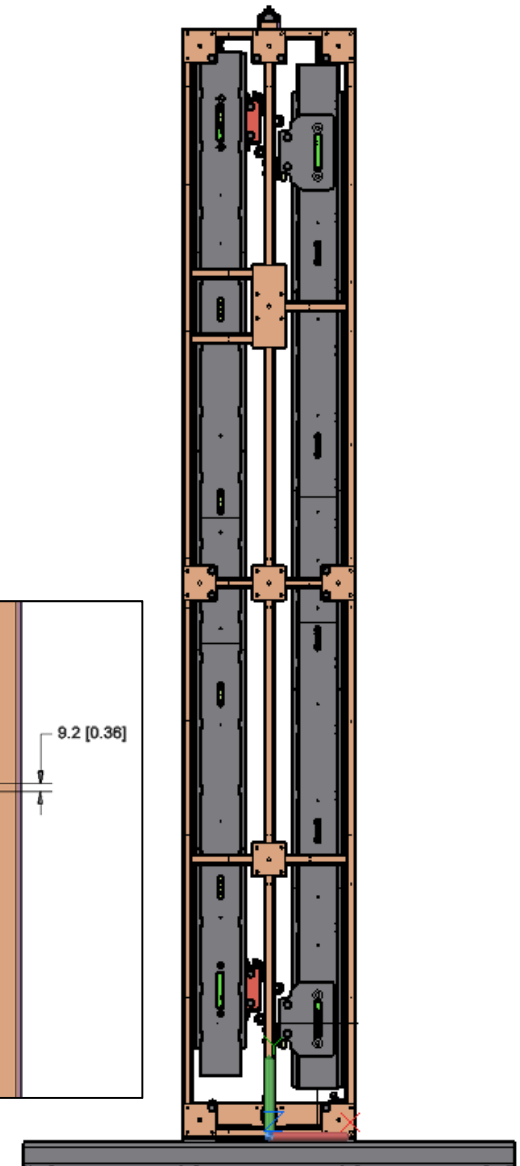
- Bottom edge has more framework, but adequate clearance has been provided.



Frame adjusted to provide clearance



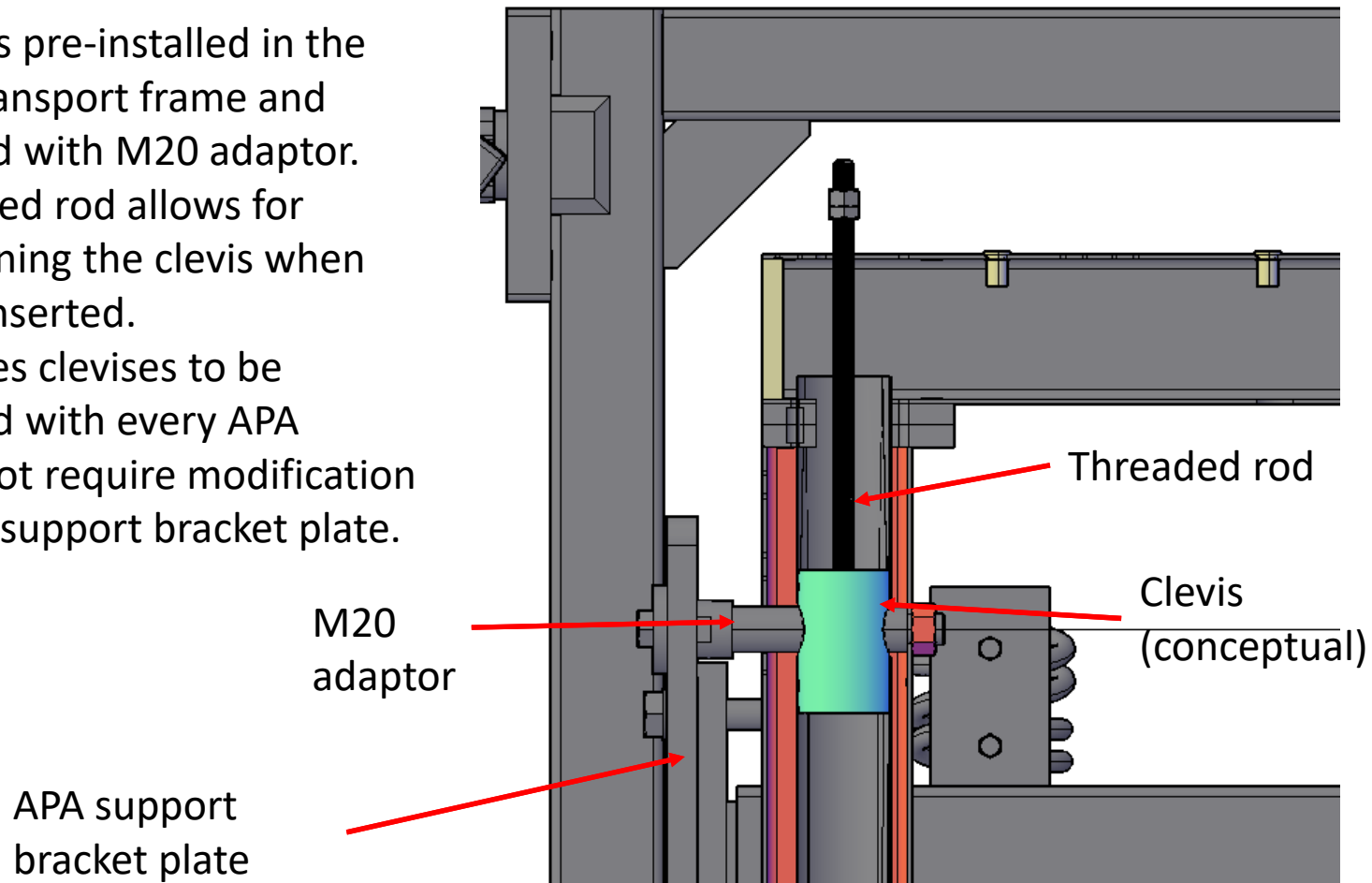
Cut out for PD installation



View of “bottom” edge of the transport frame

Conceptual plan for removing lower APA: Pre-installation of clevis

- Clevis is pre-installed in the APA/transport frame and secured with M20 adaptor.
- Threaded rod allows for positioning the clevis when pin is inserted.
- Requires clevises to be shipped with every APA
- Does not require modification to APA support bracket plate.

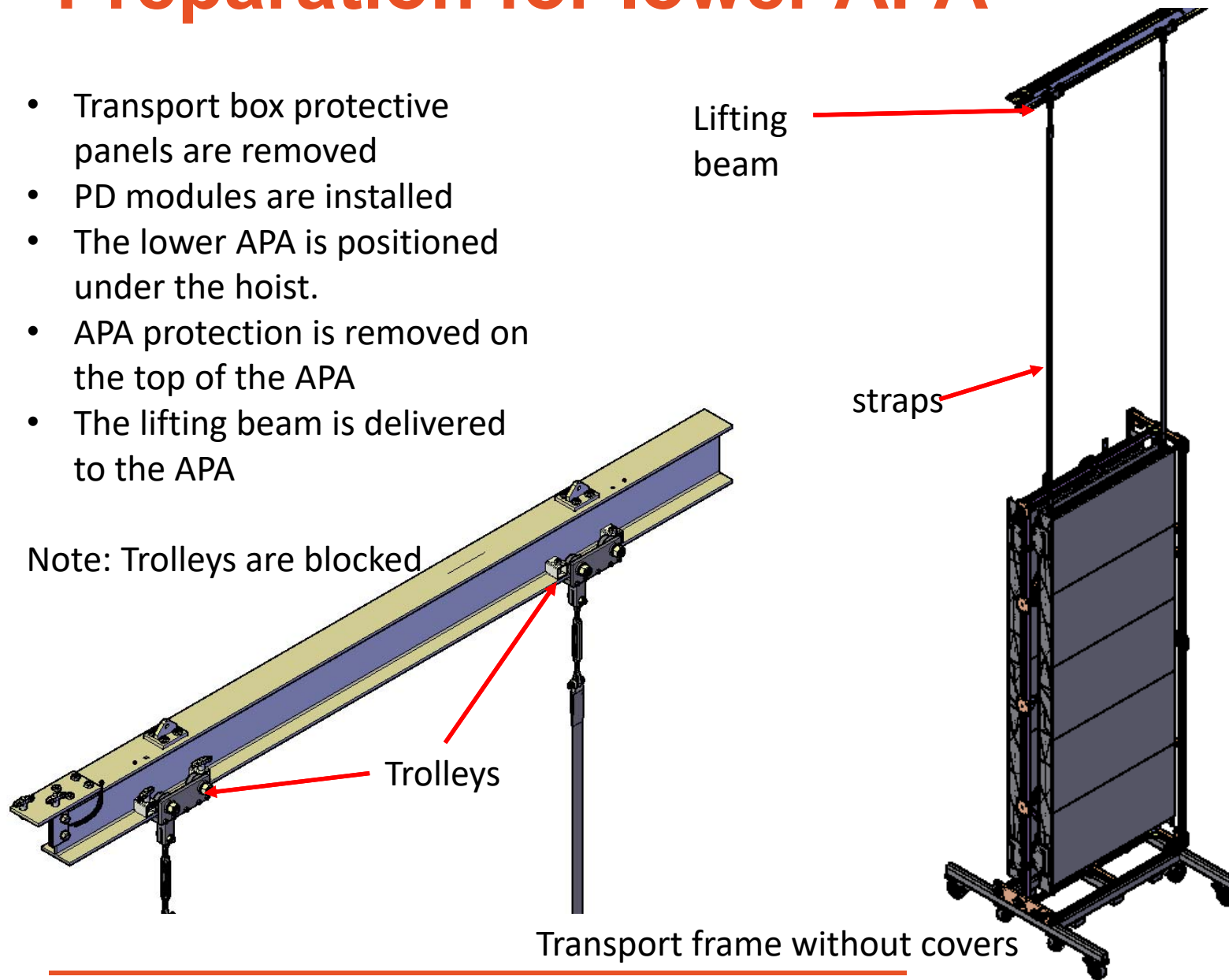


Cut away view of Lifting clevis preinstalled in APA.

Preparation for lower APA

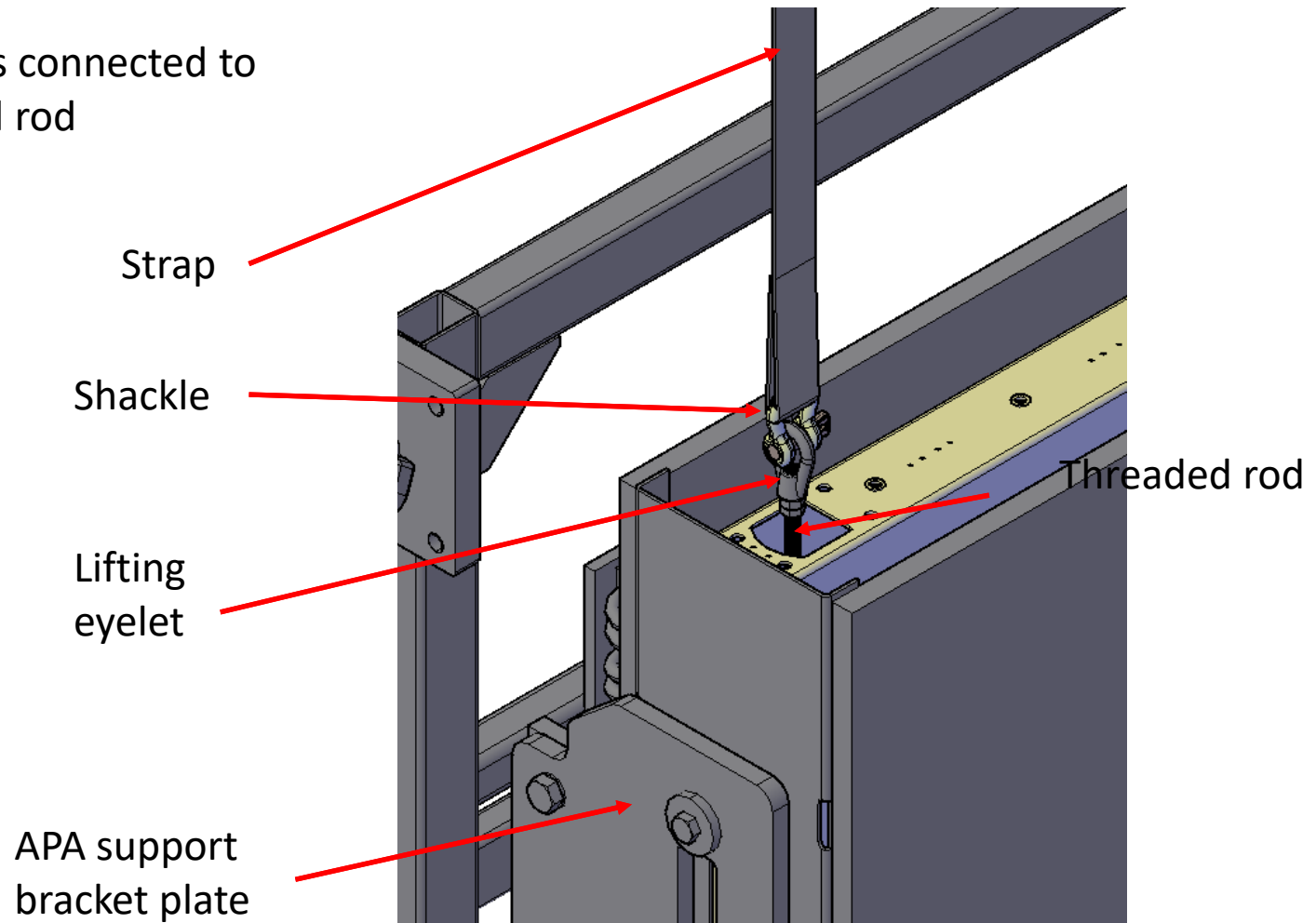
- Transport box protective panels are removed
- PD modules are installed
- The lower APA is positioned under the hoist.
- APA protection is removed on the top of the APA
- The lifting beam is delivered to the APA

Note: Trolleys are blocked



Connecting lifting gear

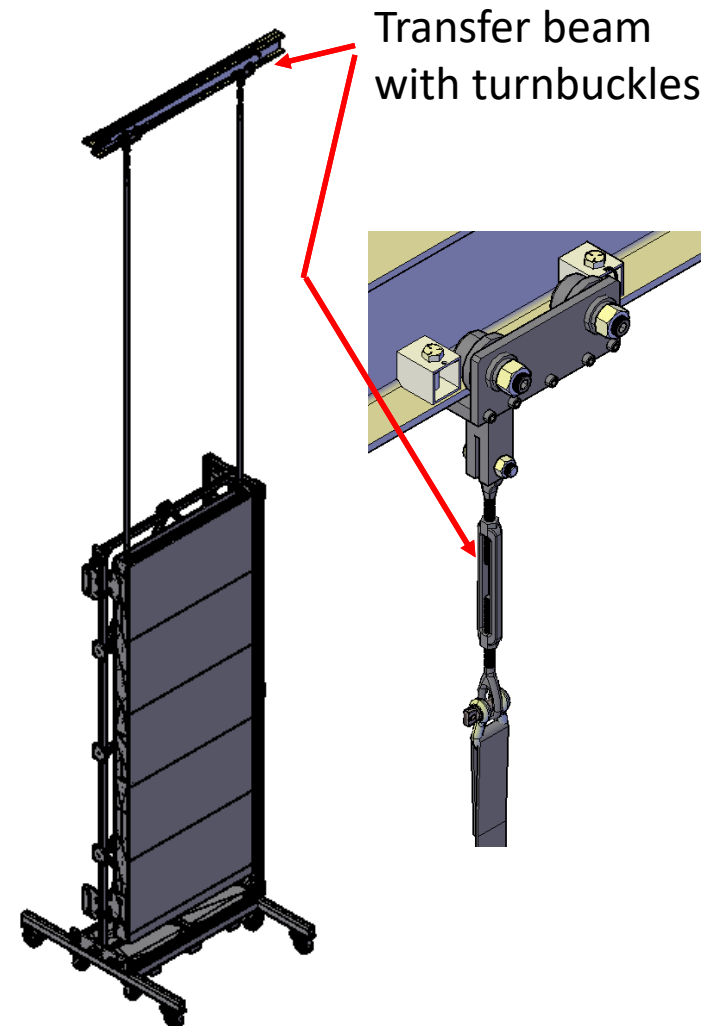
- Lifting gear is connected to the threaded rod



Lifting gear connected to the APA

Transfer of load to hoist

- The APA is lifted until the isolation springs are in a neutral position. This indicates that the load is transferred to the lifting gear and has been removed from the transport frame support brackets.
- Note: Turnbuckles will be adjusted for first use to make sure APA frame hangs straight

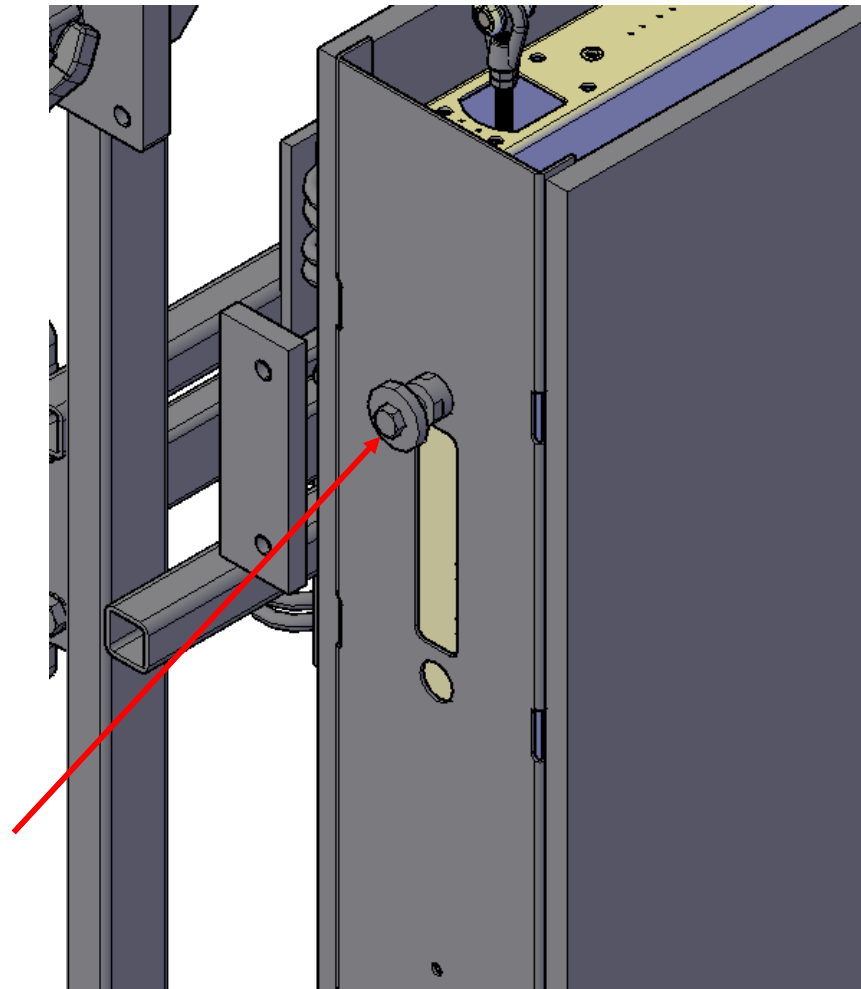


View of lifting gear and APA in Transport frame

Removing transport frame hardware

- Four support bracket plates and 6 of the 8 M20 adaptors are removed. The two adaptors supporting the load remain.

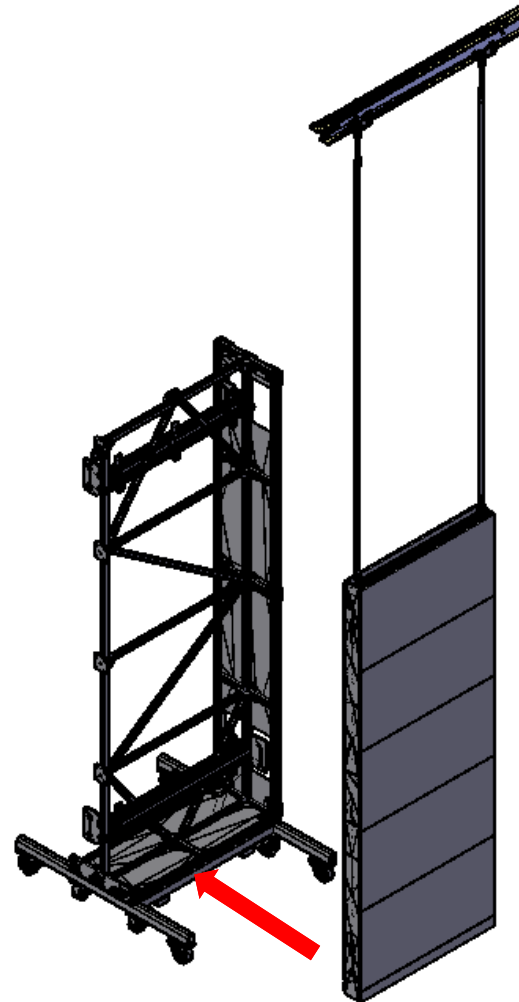
This adaptor is connected to the clevis and is left in place



View of edge of APA after support plate removal

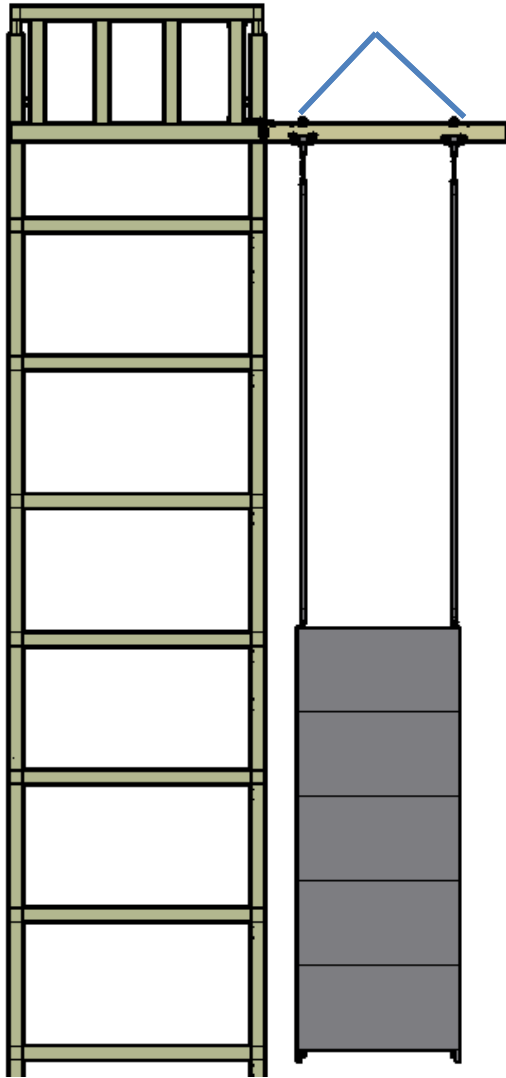
Clearing path for APA

- The transport frame is pulled out of the way so the APA frame can be lifted by the hoist and translated towards the APA assembly fixture.



Transport Frame pushed back from the APA

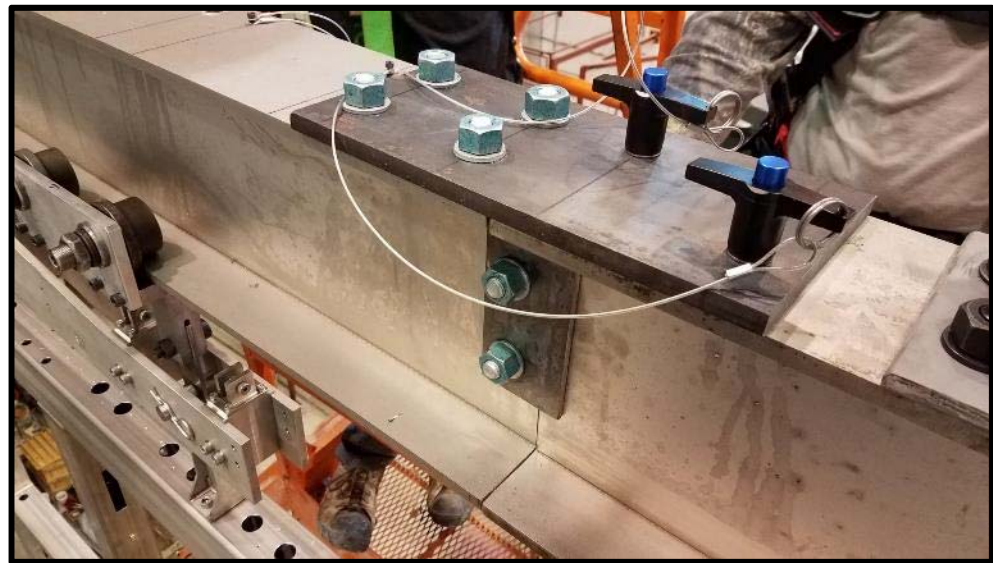
Transferring the APA to the tower



Lower APA and assembly tower



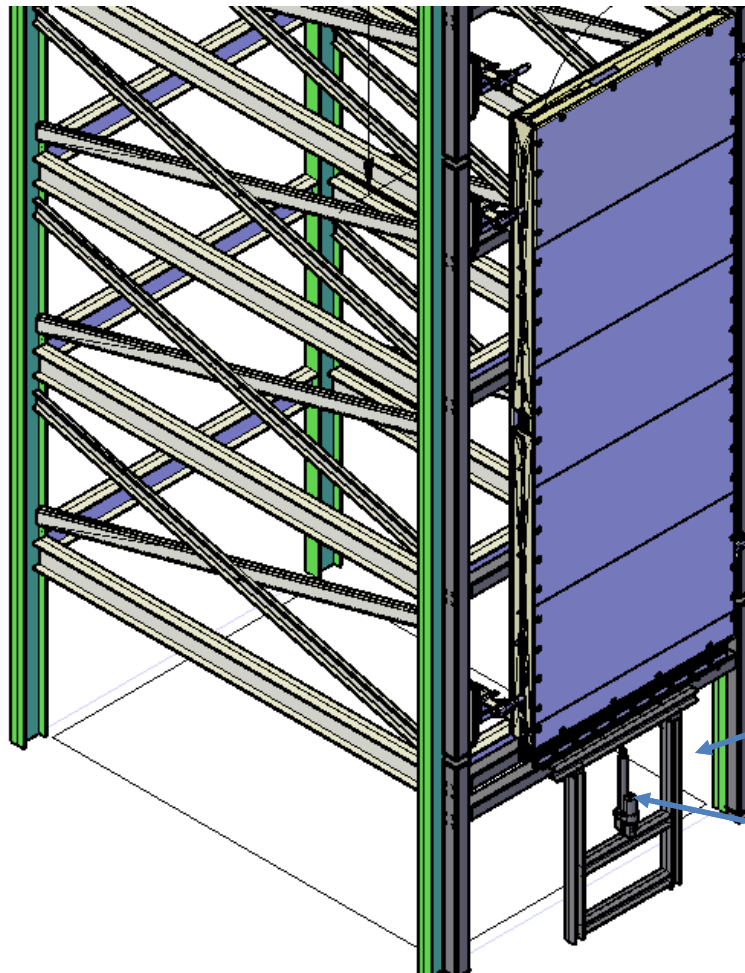
APA supported on lifting beam from trolleys



Lifting beam connected for transfer to assembly fixture

Initial position on Tower

Lower APA is secured to the assembly tower and is supported on stand
~300mm below final height



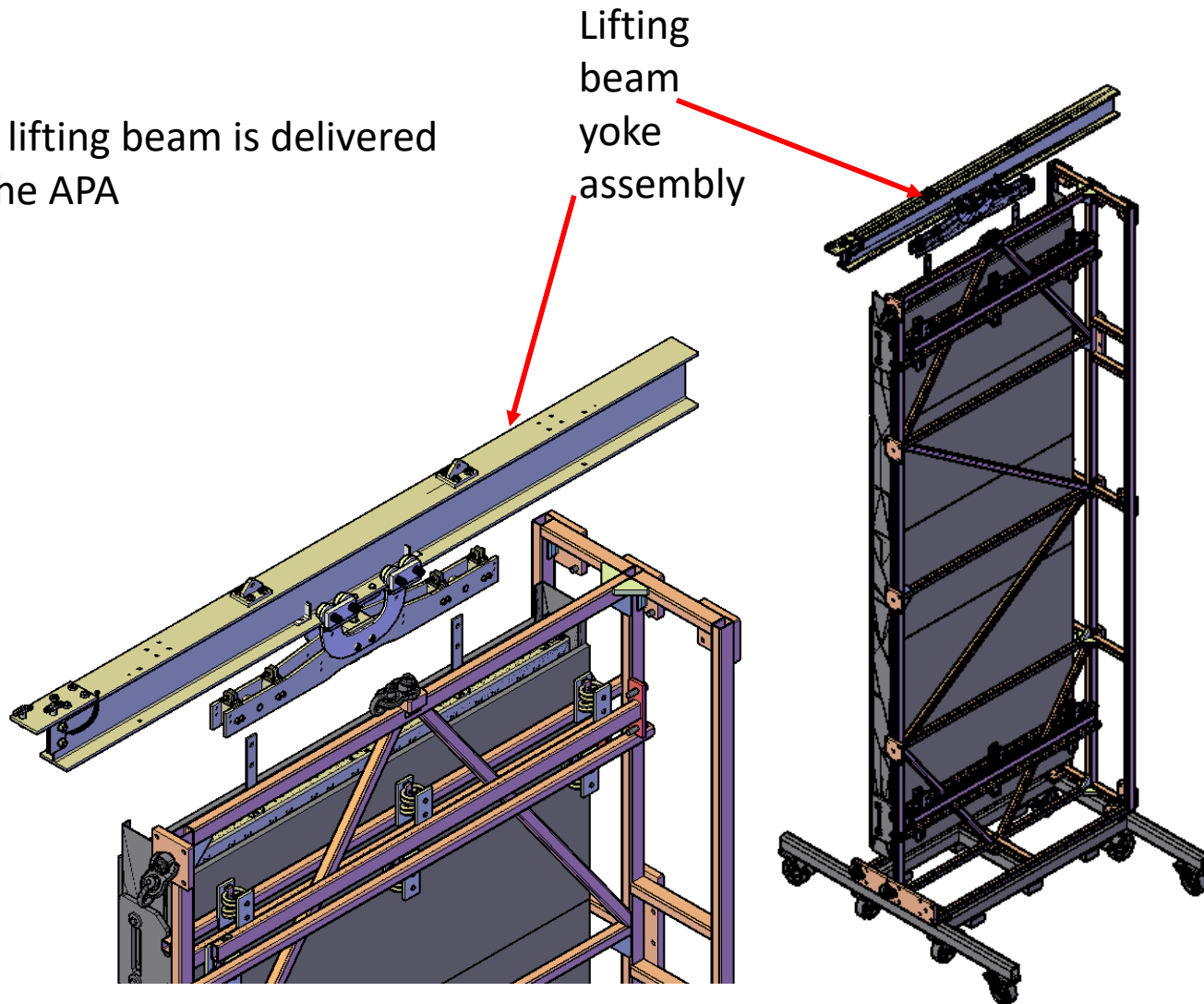
ISO view

Actuator Stand

Electric Actuator for lifting after
PD cables are connected. Max
Travel speed ~15 inches per
minute.

Preparation for upper APA

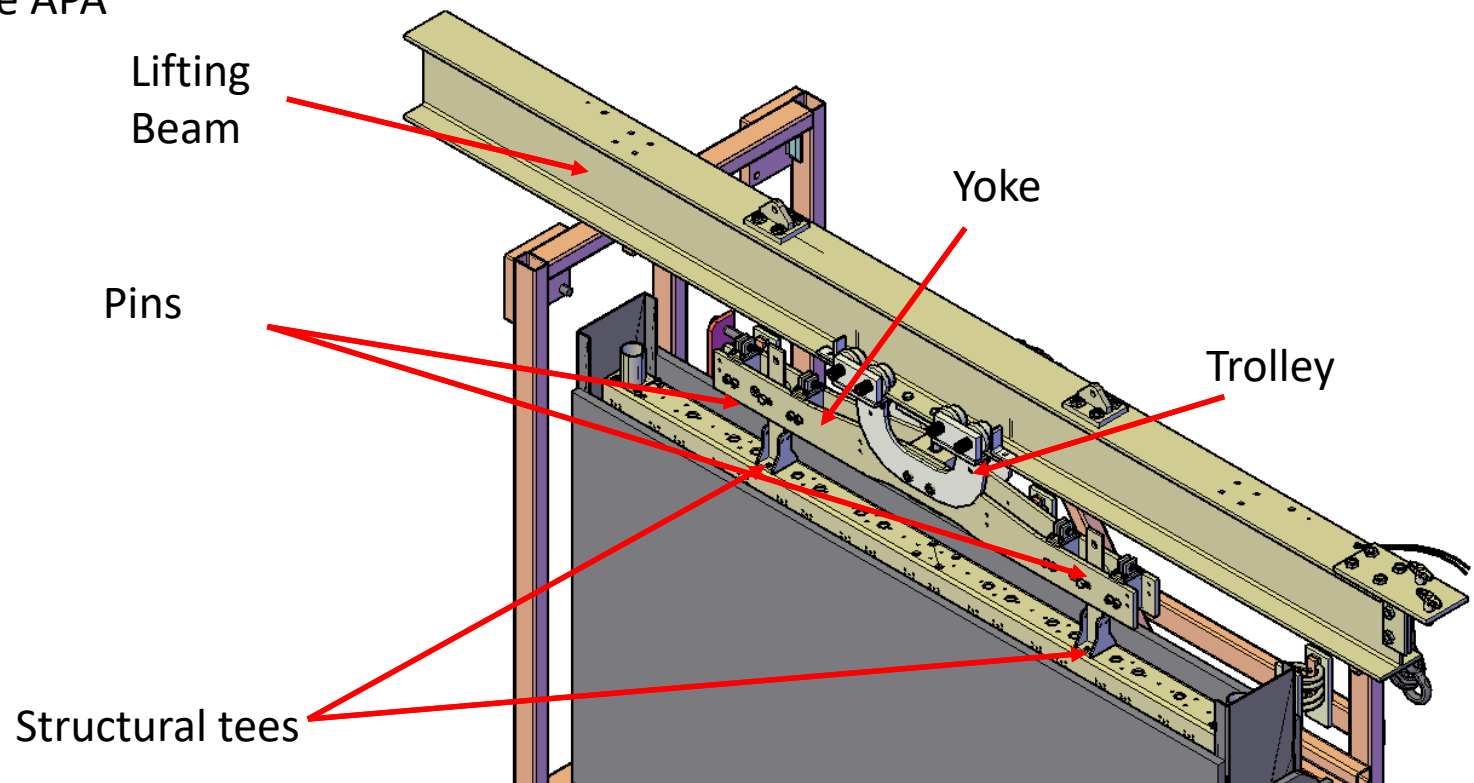
- The lifting beam is delivered to the APA



Views of lifting beam positioned above the APA

Connecting lifting gear

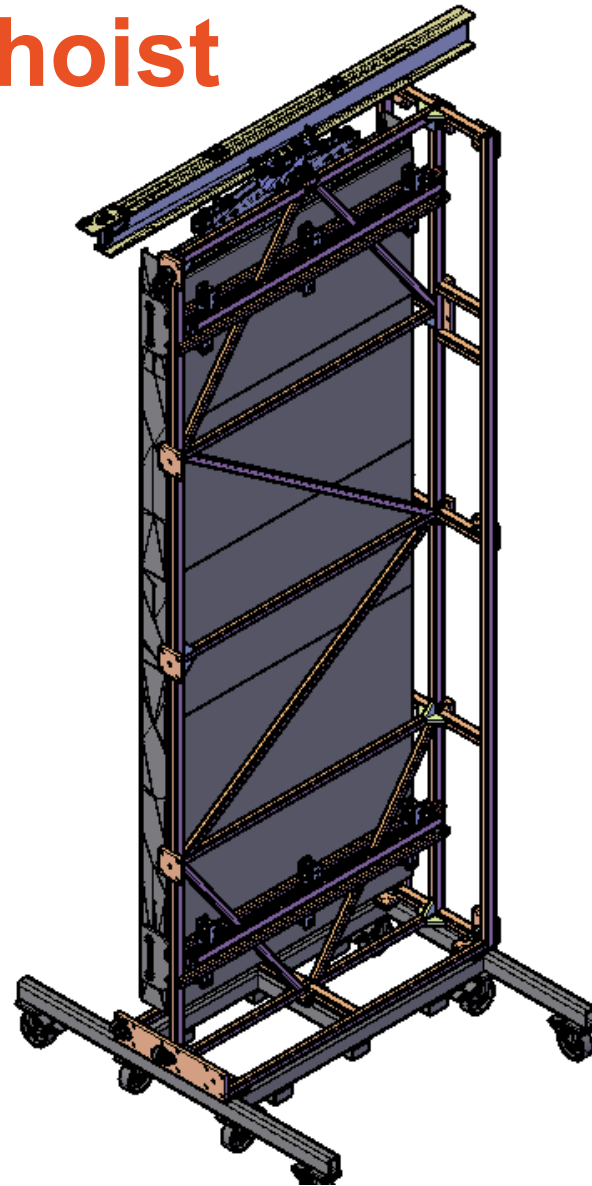
- Yoke is pinned to the structural tees mounted to the top of the APA



Lifting gear connected to the APA

Transfer of load to hoist

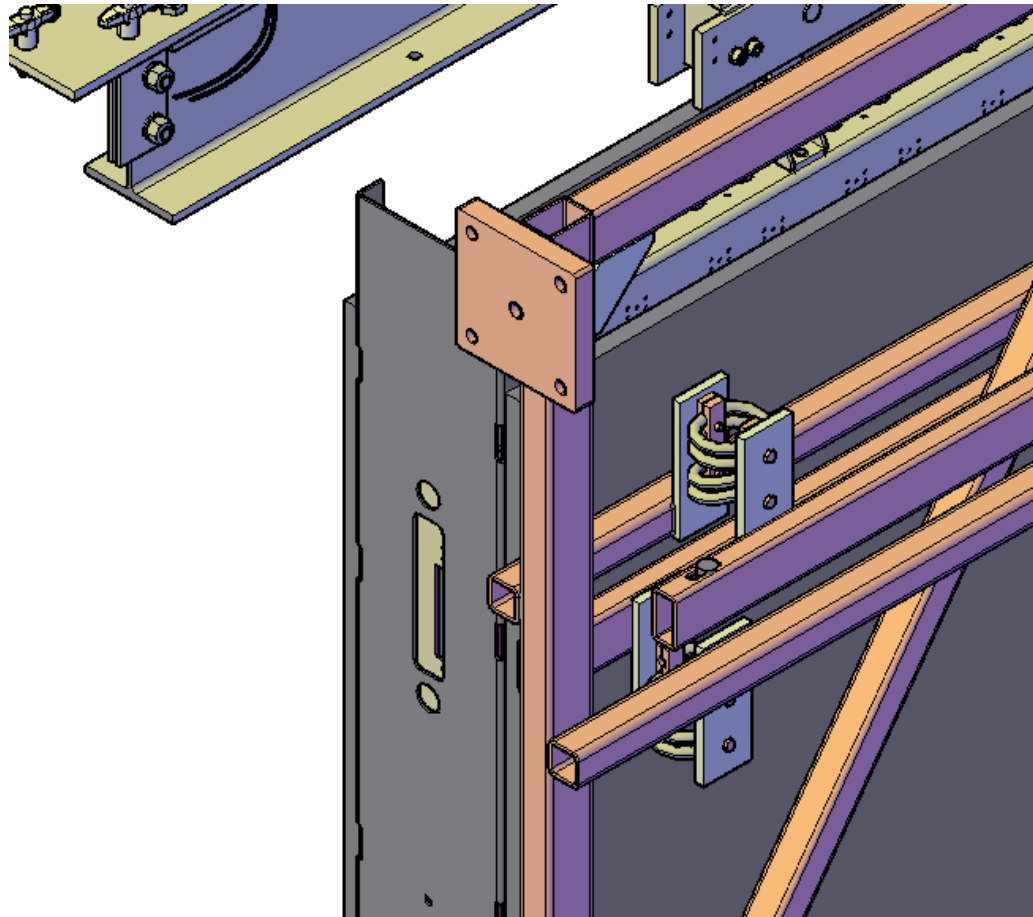
- The APA is lifted until the isolation springs are in a neutral position.



View of lifting gear and APA in Transport frame

Removing transport frame hardware

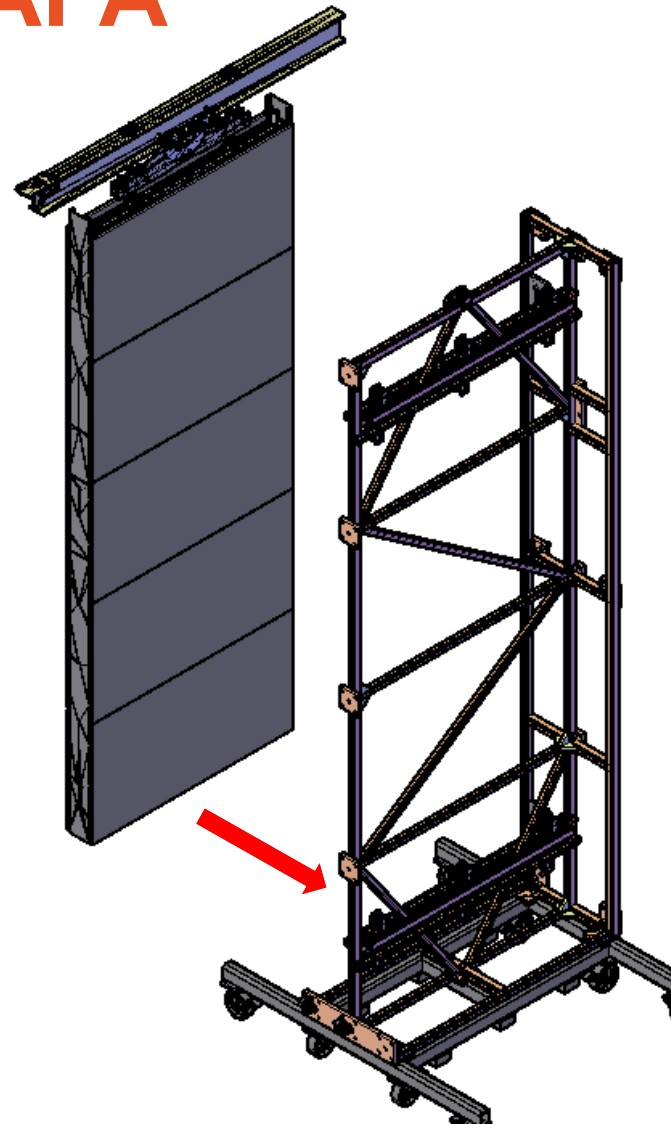
- Four support bracket plates and 8 M20 adaptors are removed.



View of edge of the APA after the support plates have been removed.

Clearing path for APA

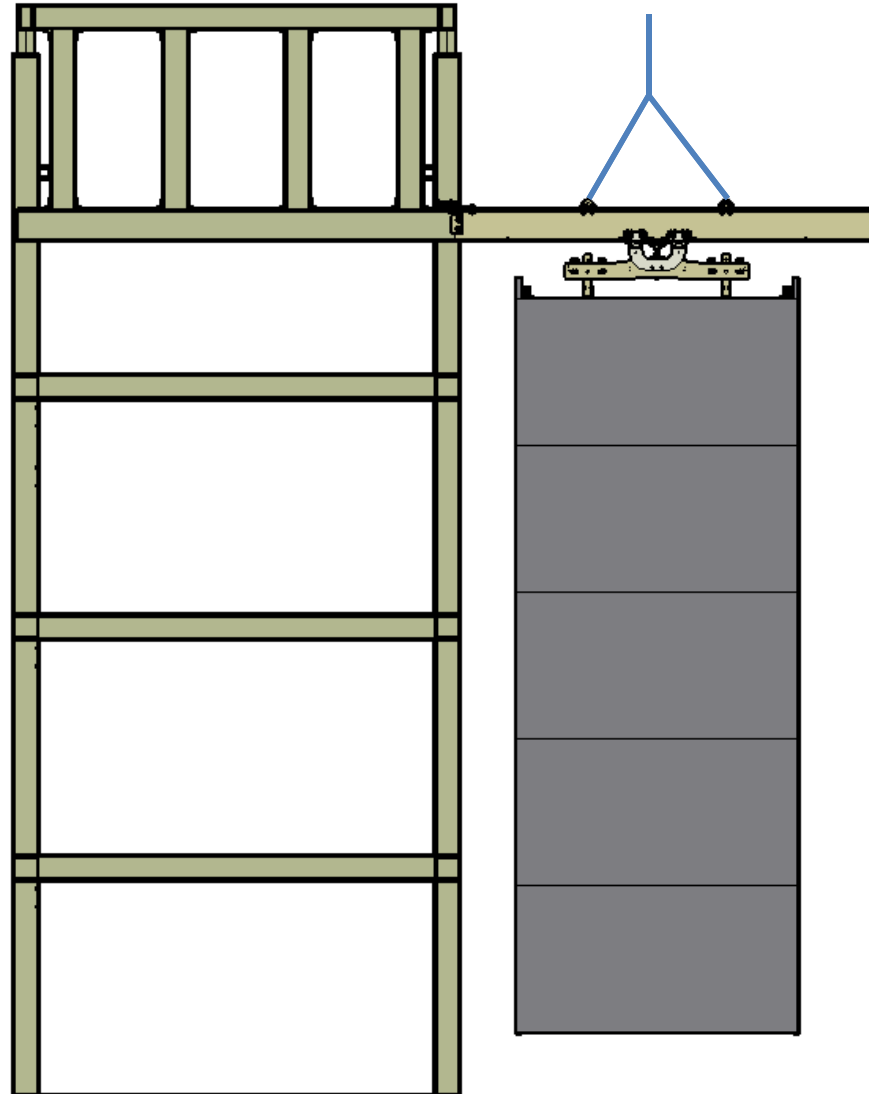
- The transport frame is pulled out of the way so the APA frame can be lifted by the hoist and translated towards the APA assembly fixture.



Transport Frame pushed back from the APA

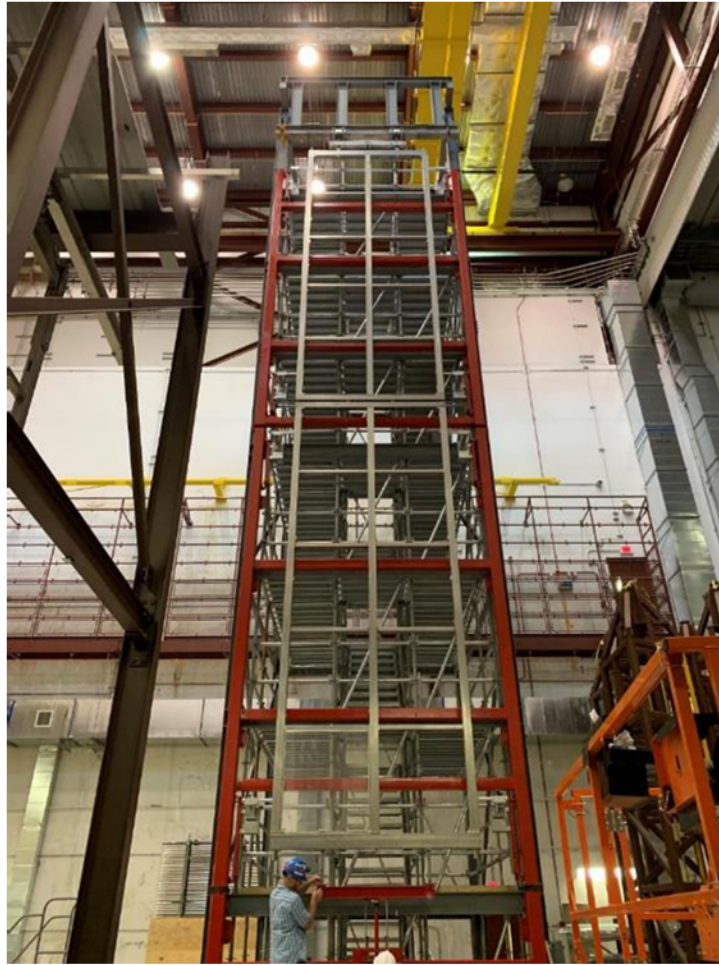
Transfer to the assembly tower beam

Lifting beam is connected and the APA is transferred in the same way as for the lower APA.



APA assembly fixture

Image of upper and lower APA frames assembled on the tower



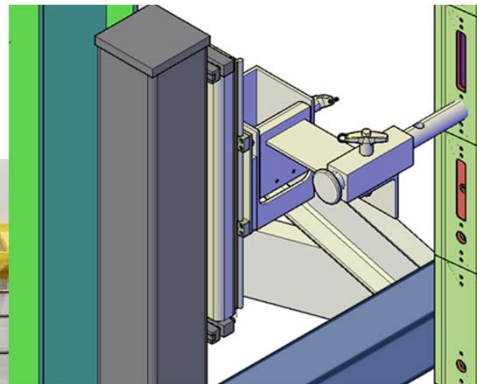
Back Up Slides

APA assembly fixture

- Stabilizers do not support any load but position and guide the APAs
- The actuator stand lifts the lower APA to make connections to the upper APA
- Stabilizers pivot out of the way to allow the assembled pair to pass by
- Successfully tested at Ash River



Stabilizer being deployed



Stabilizer



Actuator stand

Connection between upper and lower APA

- APA to APA links support the Lower APA.
- Alignment pins control the alignment between the top and bottom APA

