

MERCURY JET TARGET FOR E-951

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E-951 Collaboration for Targetry Design
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December 15, 2000

Target Requirements

Generate a one cm. diameter arcing horizontal jet of mercury to provide a 10 to 15 cm interaction length with the proton beam.

Provide an unobstructed view of the interaction zone for high speed imaging.

Operate simply, reliably and remotely.

Safely contain projectiles which may be generated by mercury-beam interactions

Manage mercury vapor generation

Mounting system to provide for easy interchange of other test targets

Materials of construction must be compatible with mercury and survive a radiation environment.

Conceptual Approach

Internal and external target containments:

Use commercial conflat vacuum components, blind-flange beam windows, quartz and/or Lexan view ports wherever possible.

Use standard instrumentation and pneumatic feedthroughs wherever possible.

Design approach:

design to reduce beam intensity on windows

optimize materials to insure survivability

insure mercury compatibility

fiducial registration for target change out

Materials Considerations

Containments:

commercially available stainless steel components for inner containment

welded stainless steel sheet for outer containment

Inconel-718 external beam windows

quartz internal viewports

Lexan external view ports

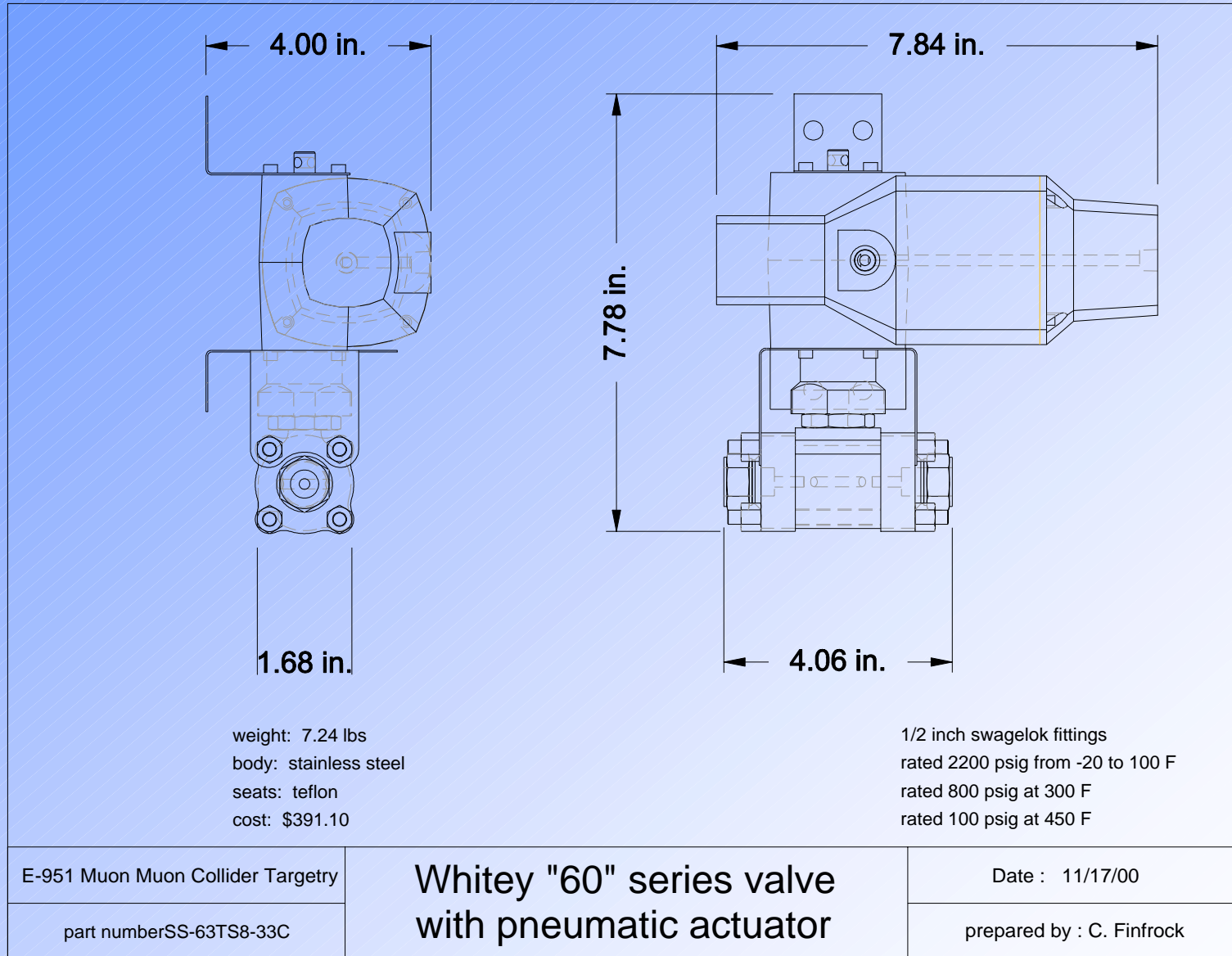
Valves:

stainless steel bodies

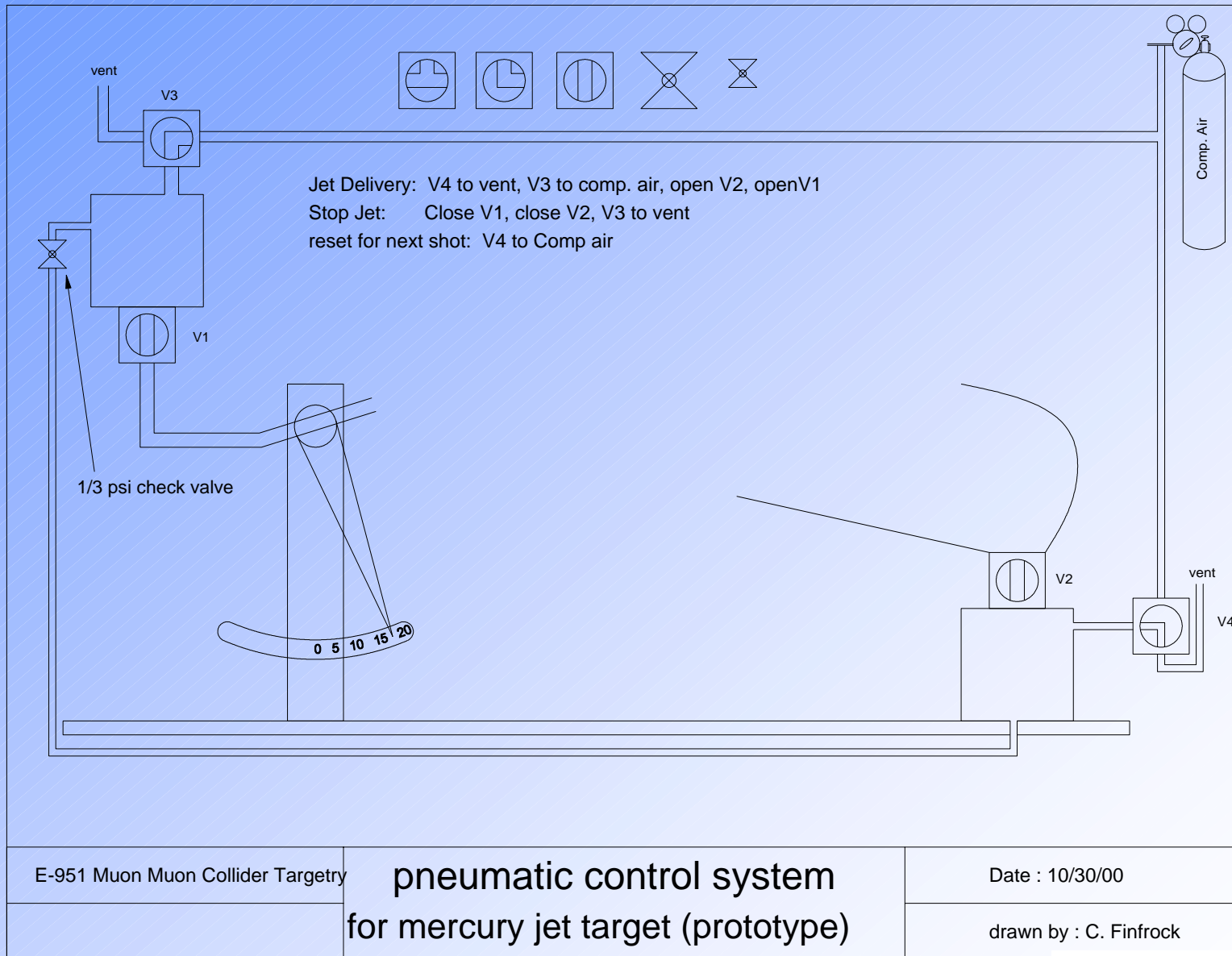
Poly-Ether-Ether-Ketone seats

Ethylene-Propylene o-rings

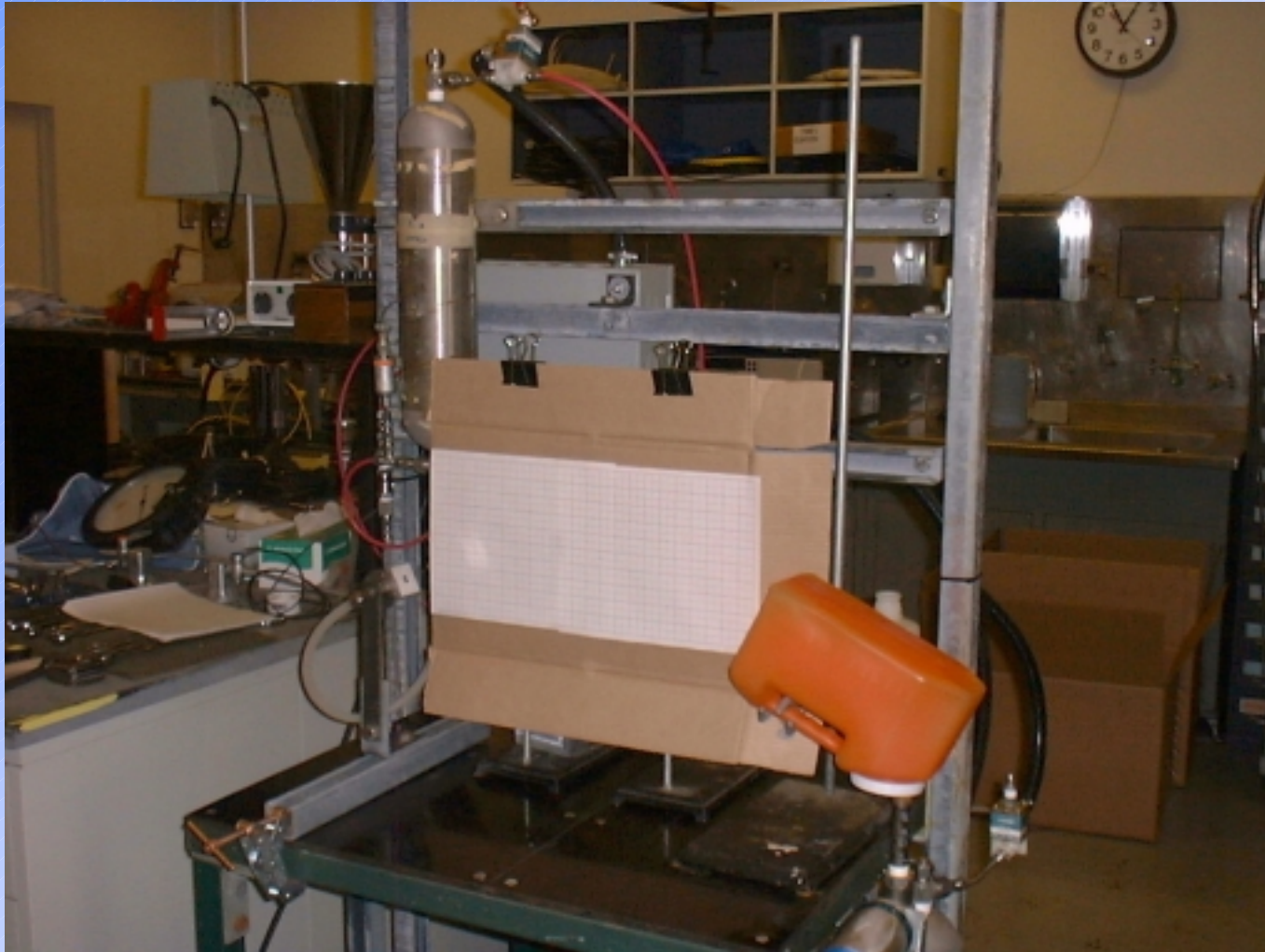
Pneumatically Actuated Ball Valve



Pneumatic Control System for Fluid Jet



Apparatus to Simulate Hg Jet With Water



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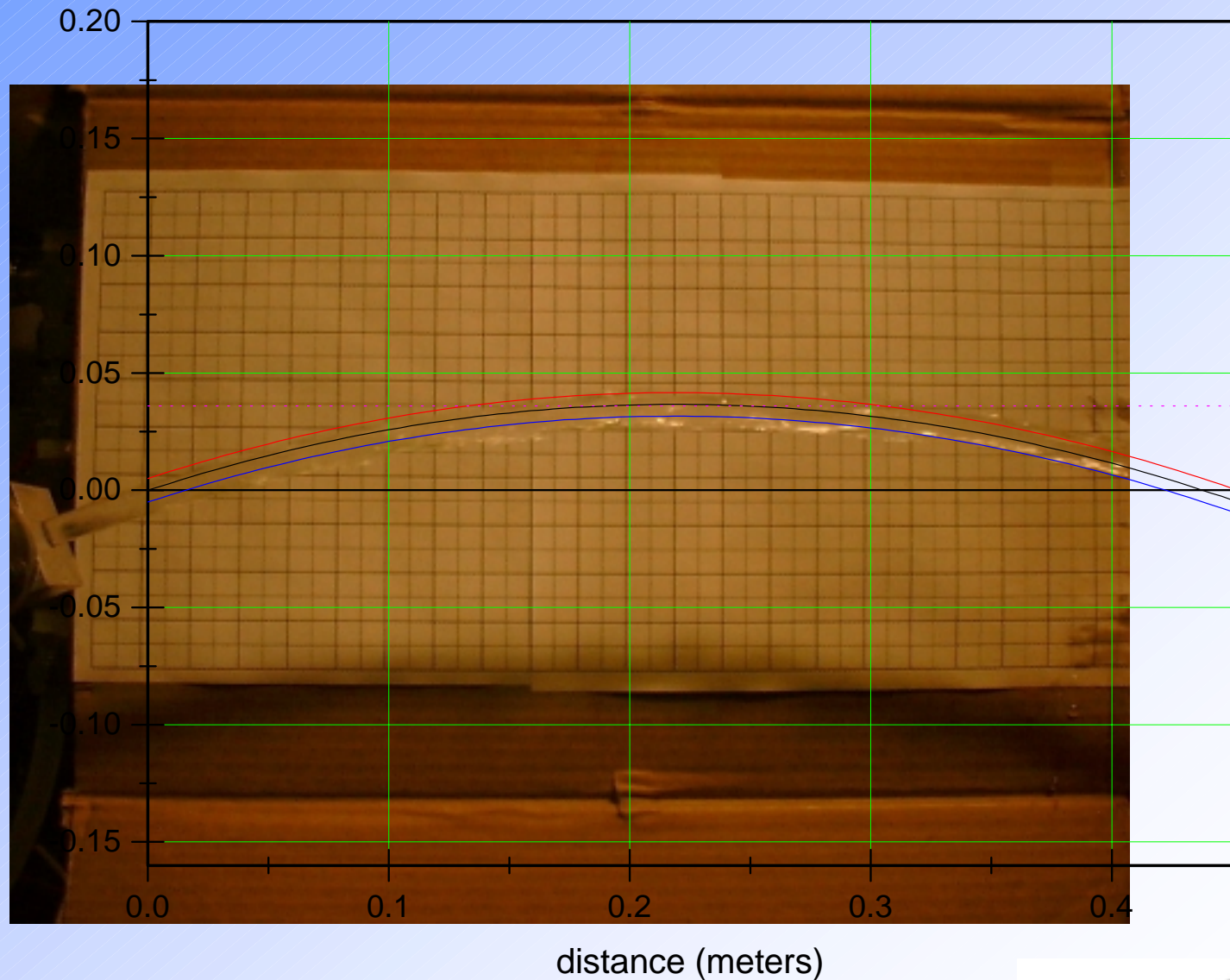
Water Arc Simulation of Mercury Jet



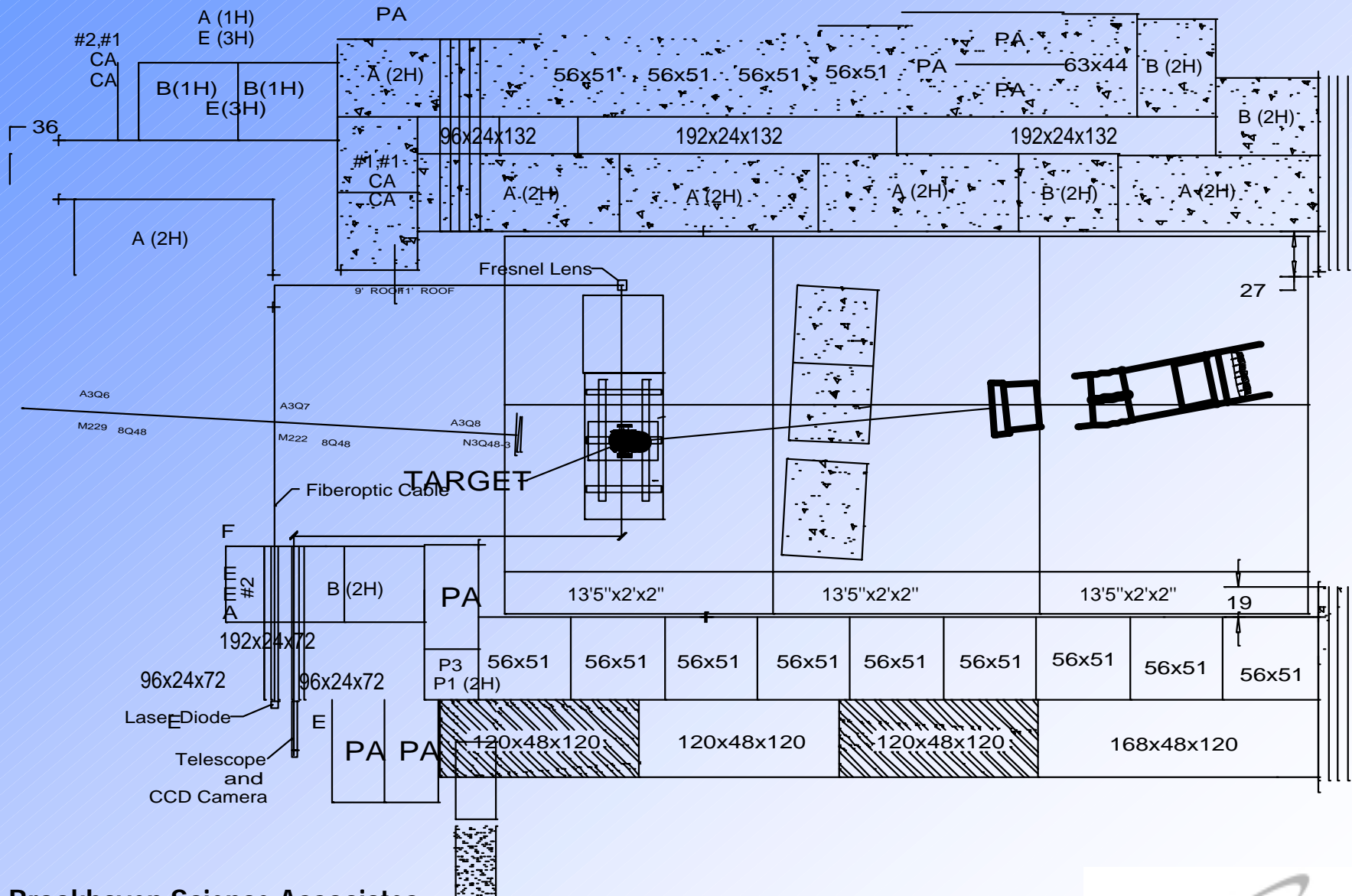
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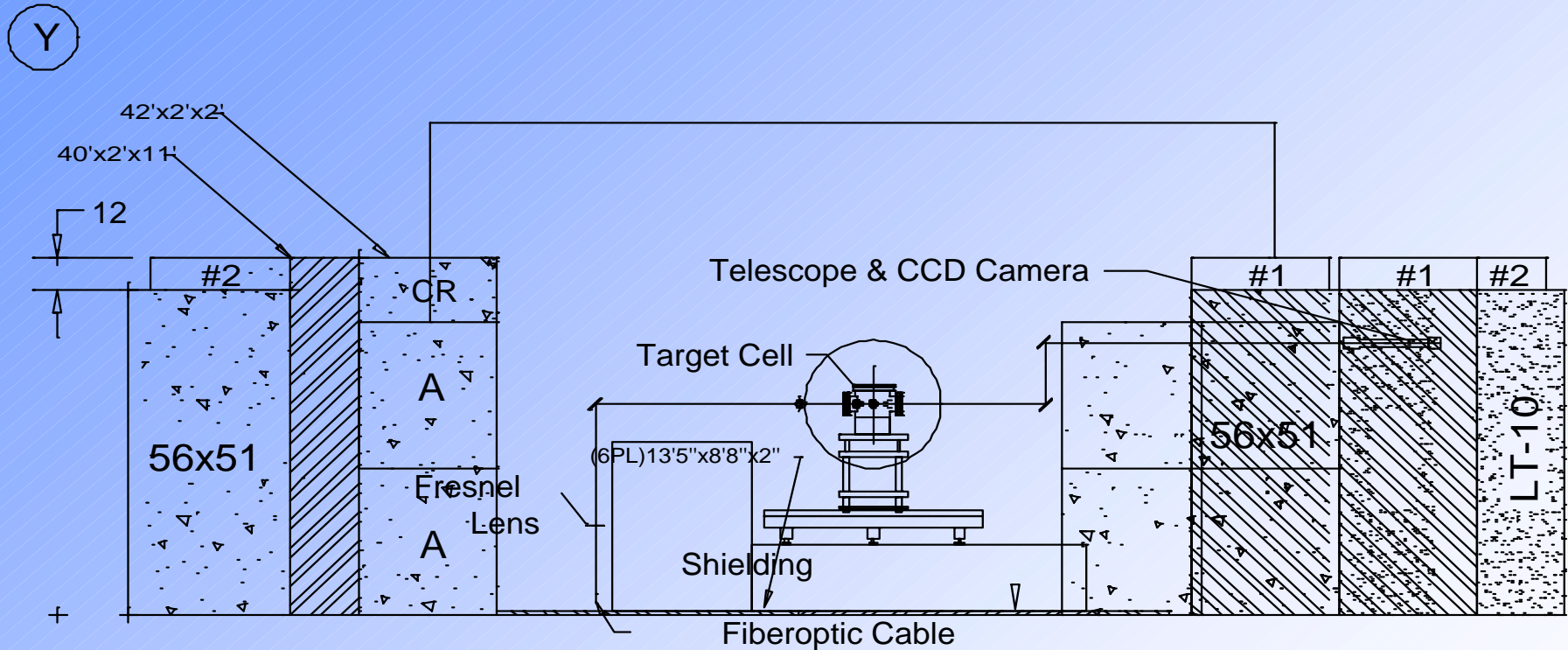
Superposition of Jet Trajectory and Calculation



Overall Beam Line Layout

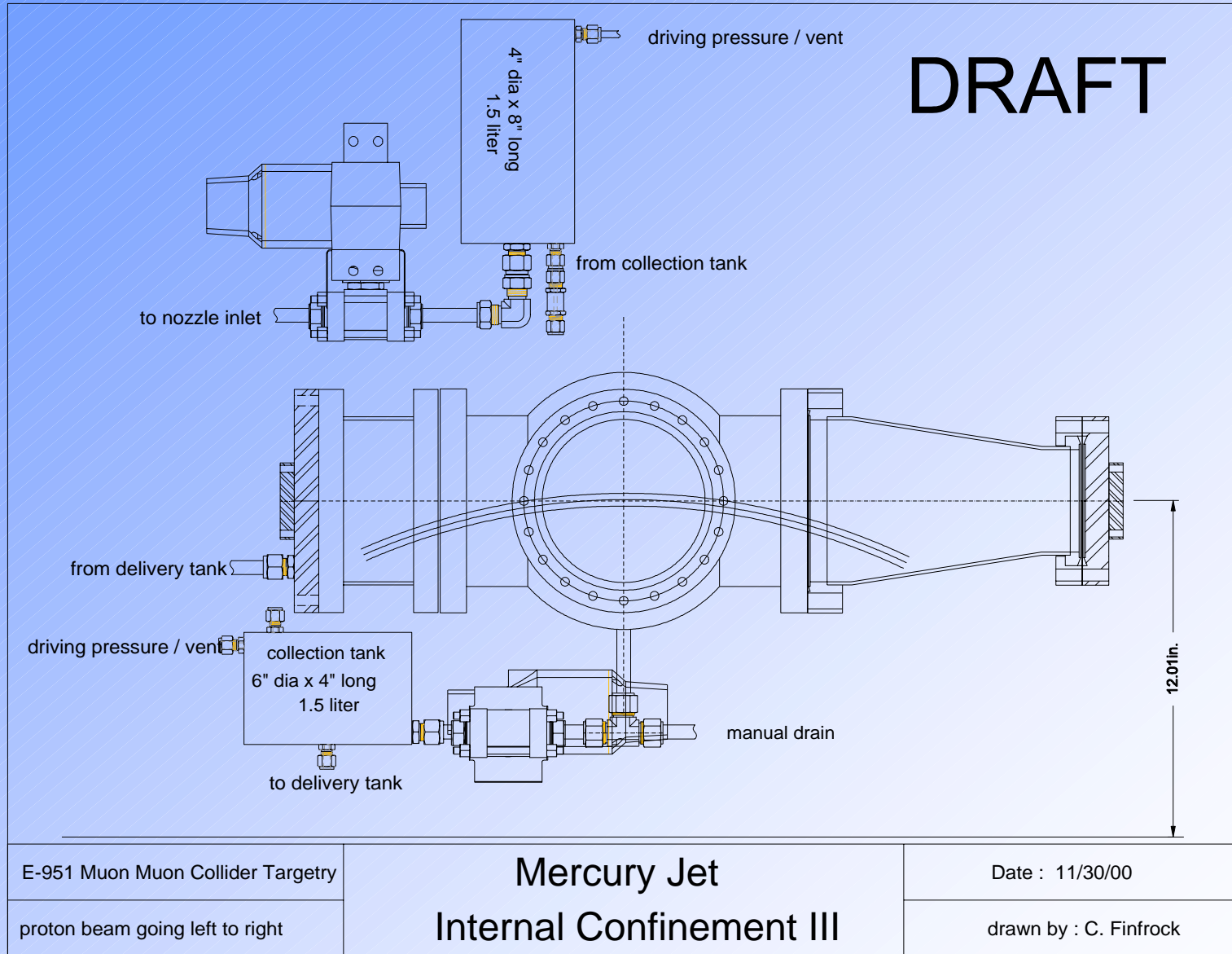


Schematic of Traversing Table Layout

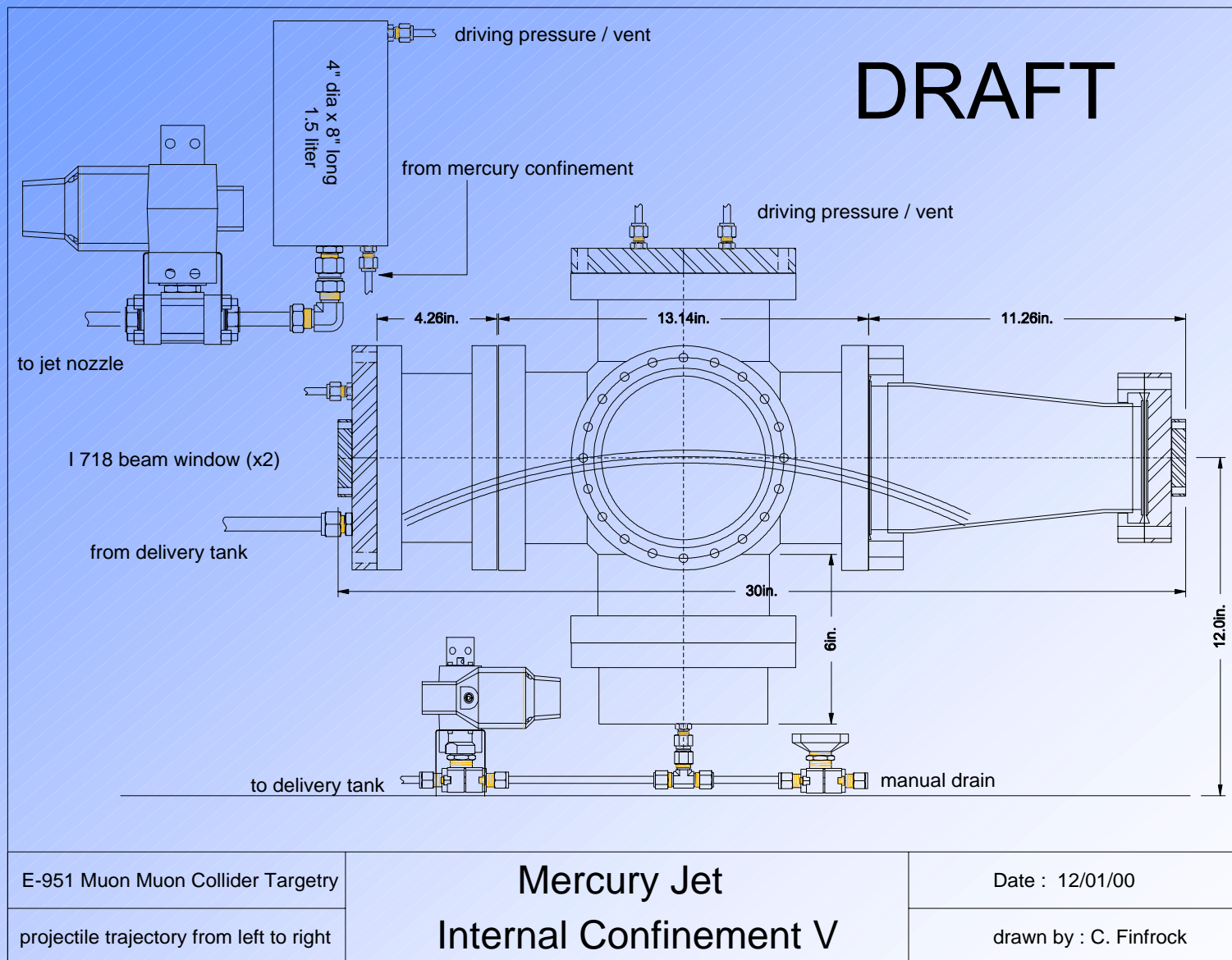


ELEVATION SECTION FF

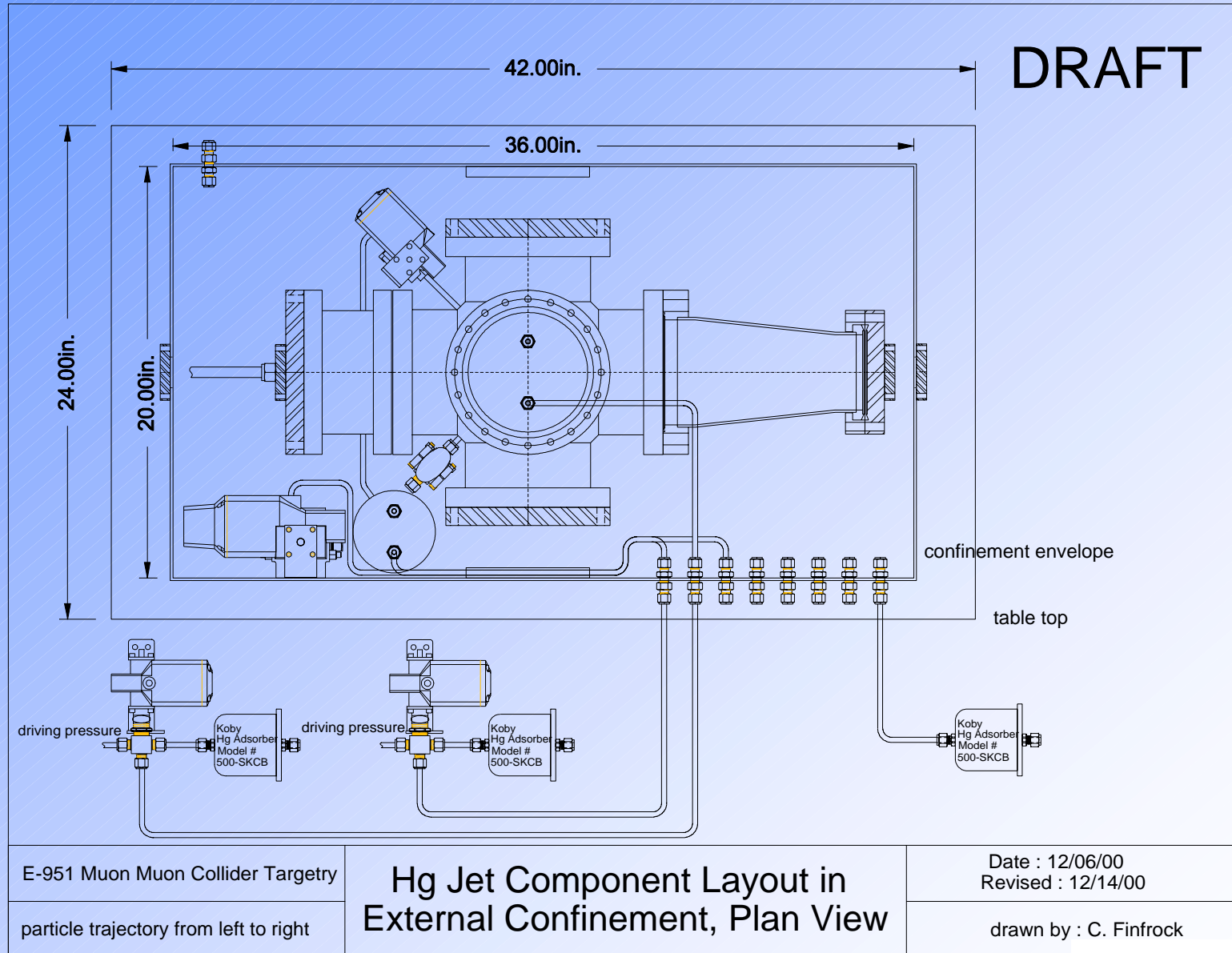
Mercury Jet Internal Confinement, Remote Reservoir Design



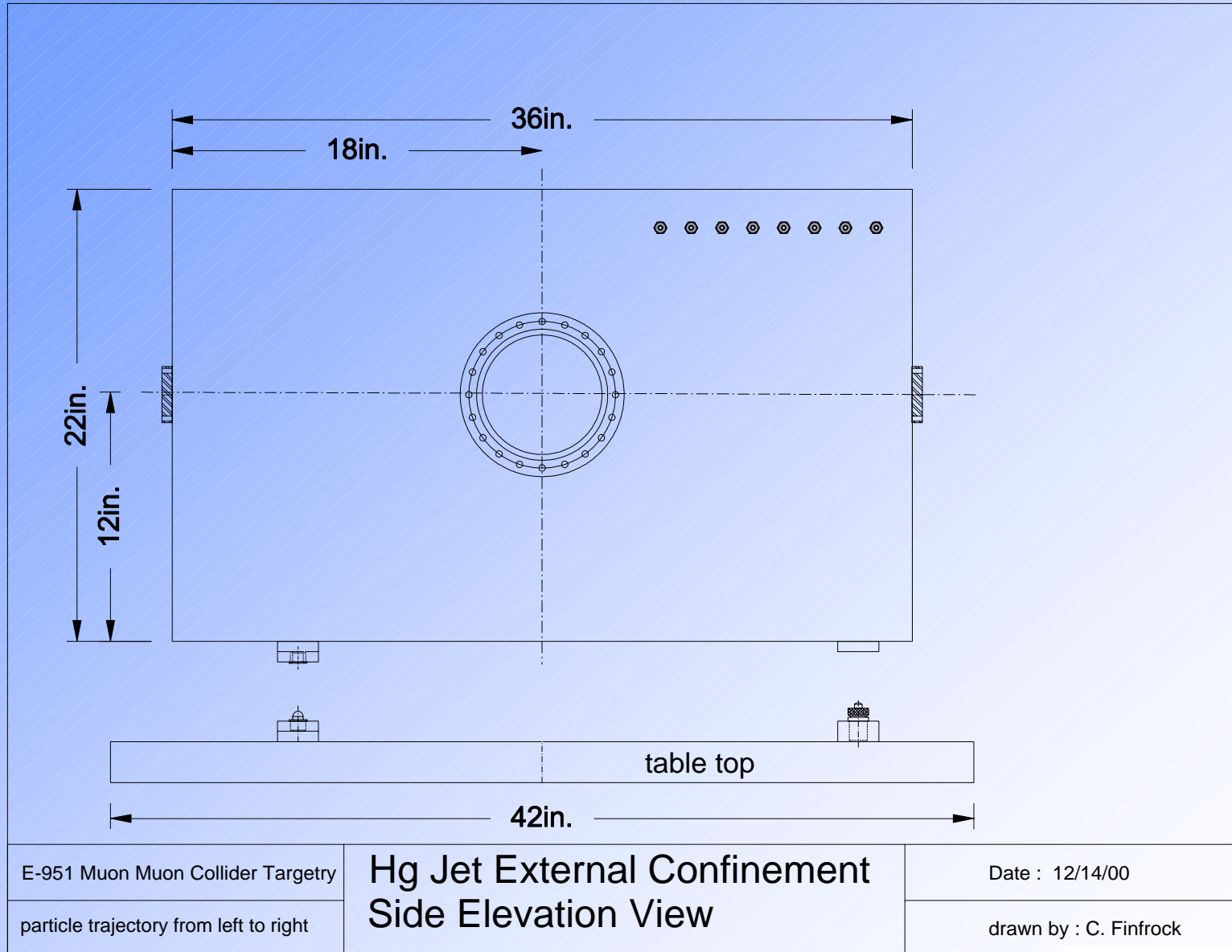
Mercury Jet Internal Confinement, Integral Reservoir Design



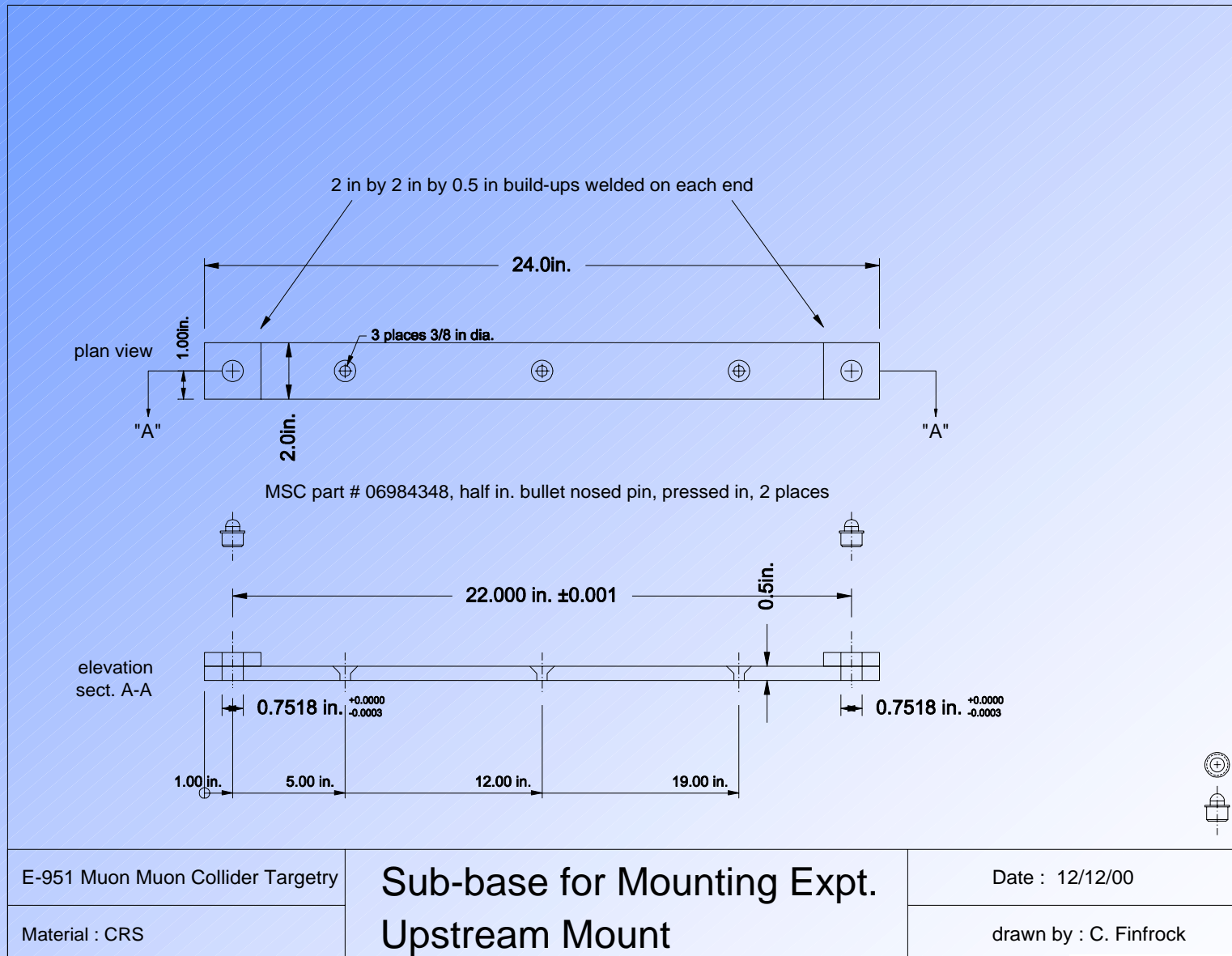
Looking Into The Secondary Confinement From Above



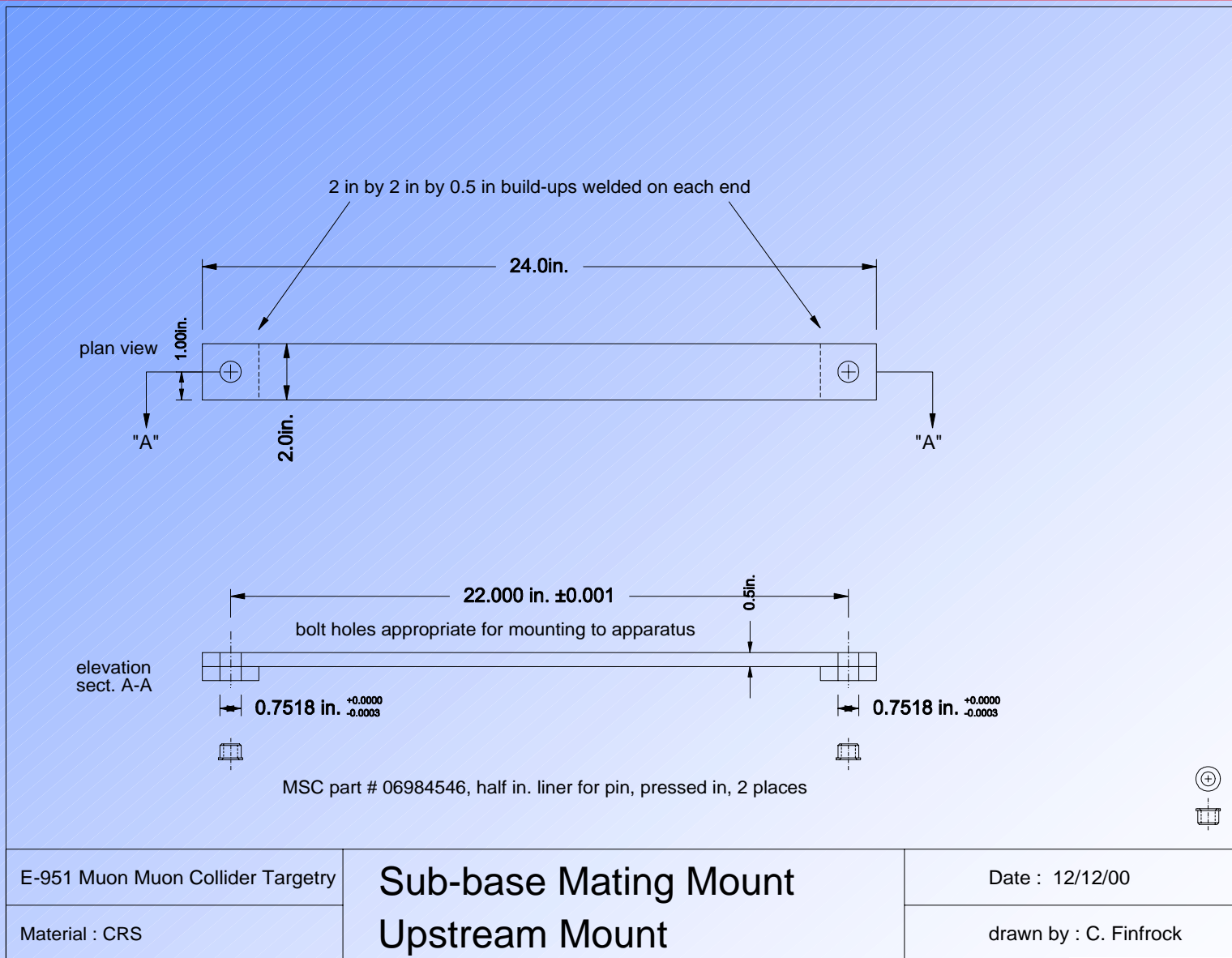
Side View of the Secondary Confinement



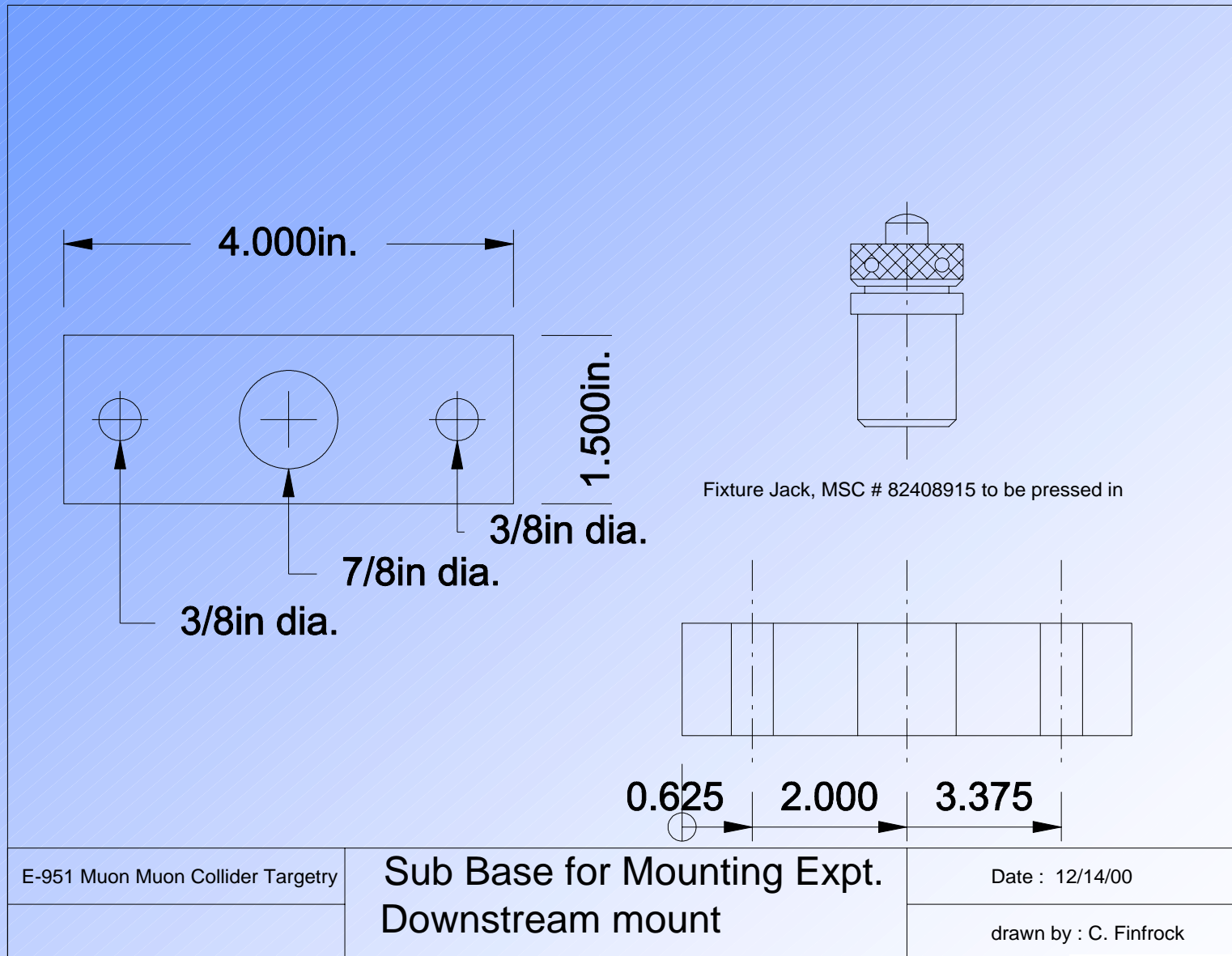
Detail of the Upstream Experiment Mount, Table Component



Detail of the Upstream Experiment Mount, Target Component



Detail of the Downstream Experiment Mount, Table Component



Current Status

Water jet tests are essentially complete.

Mercury jet target designs are substantially complete, minor detailing still underway.

Test stand will be installed in beam line very soon.

Materials list with prices and quotes about 75% complete. Ready to order many components now.

Next step is to prepare for the experiment safety review, then begin target construction.