NOνA

Tunnel Excavation Schemes for Near Detector

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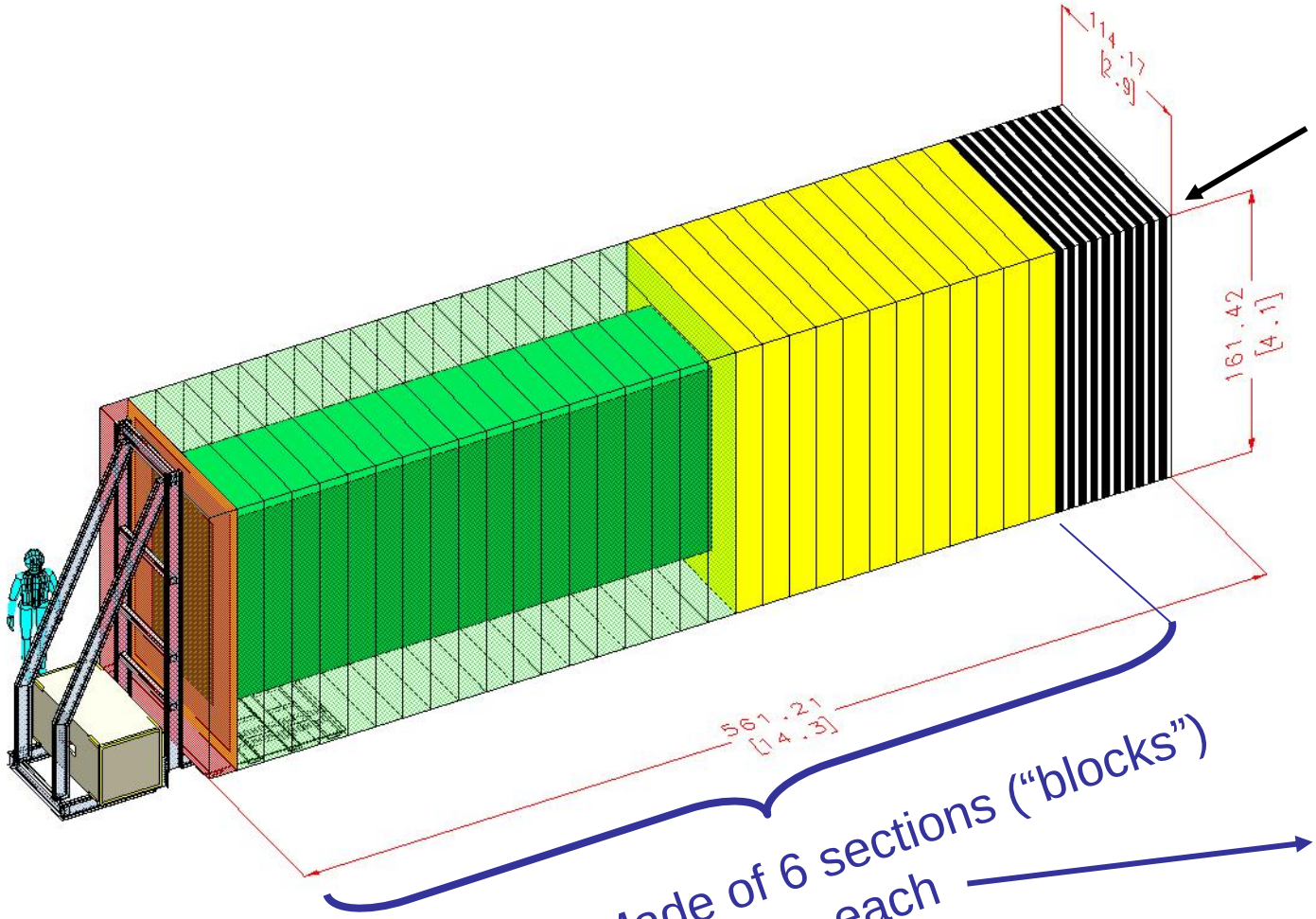
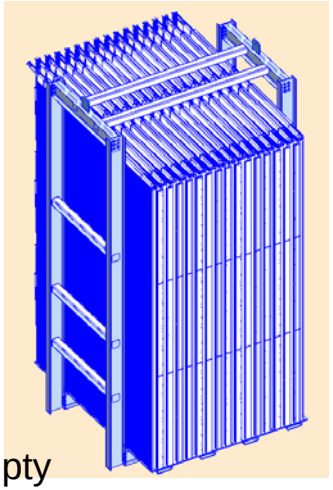
February 20, 2006

Drawing of NOvA Near Detector & Bookend



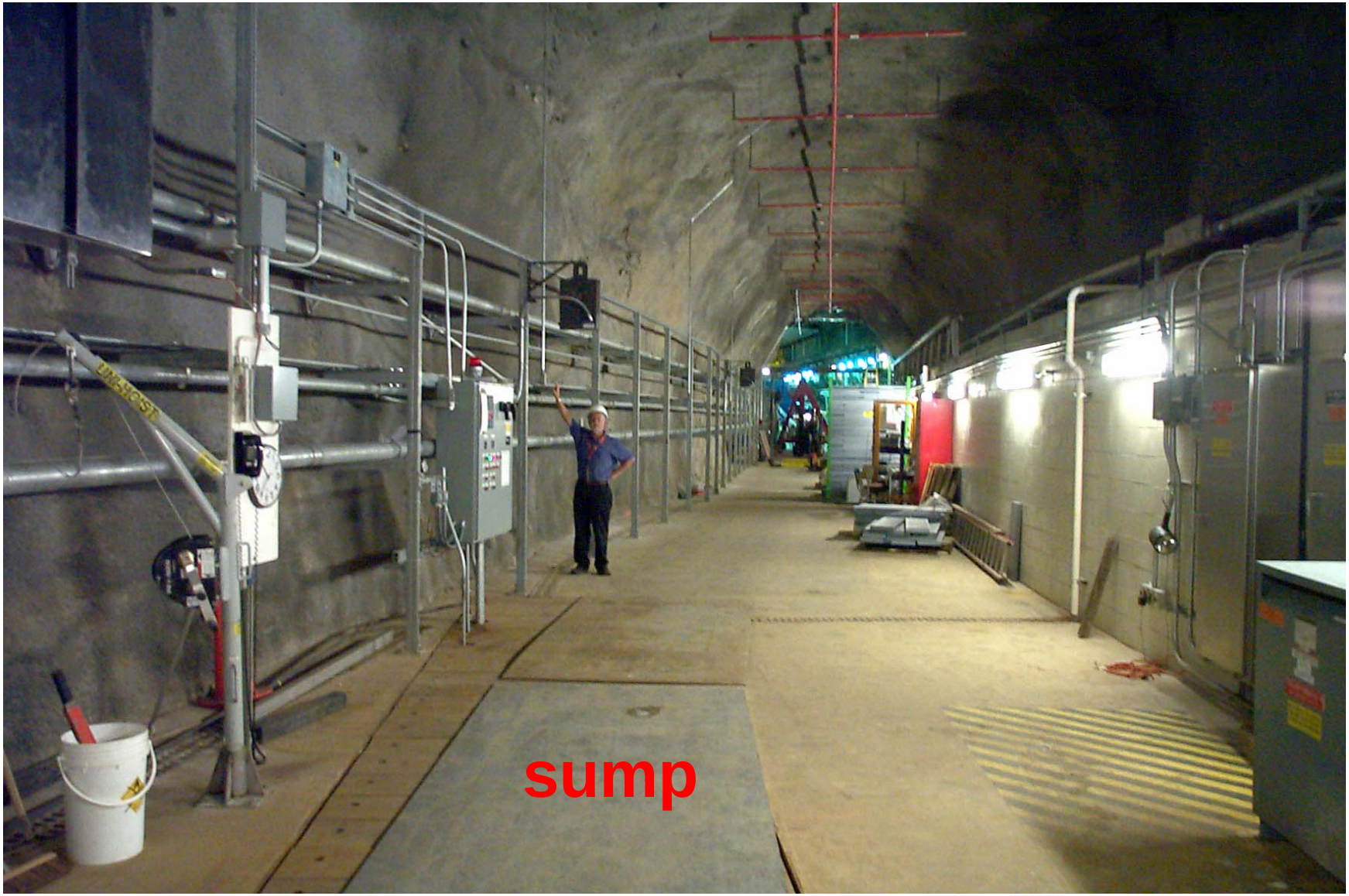
Muon Catcher:
~81 tons Steel
+ 10 planes
with scintillator

Made of 6 sections ("blocks")
31 planes each

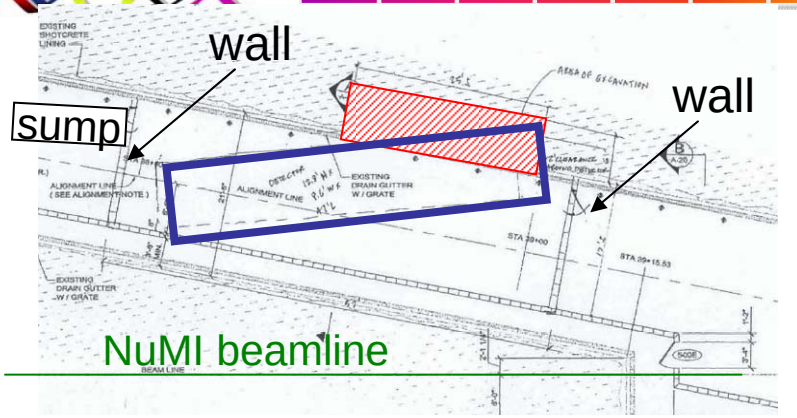


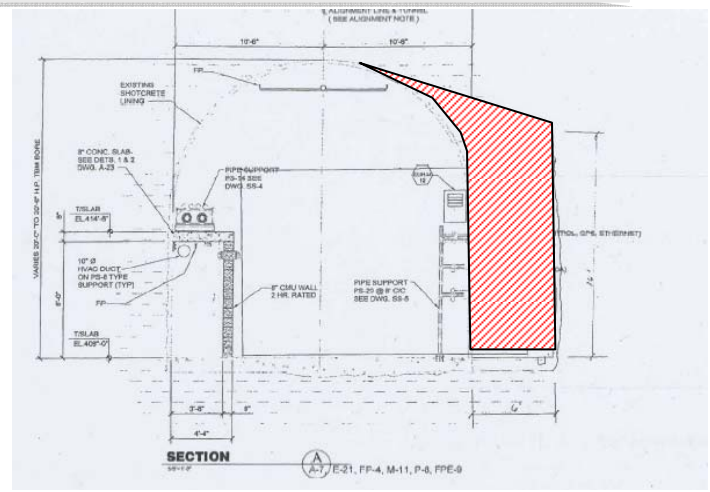
Each block:
~ 5.5 metric tons empty
~ 20 metric tons full
~ 4,500 gallons of scintillator

View of the tunnel area



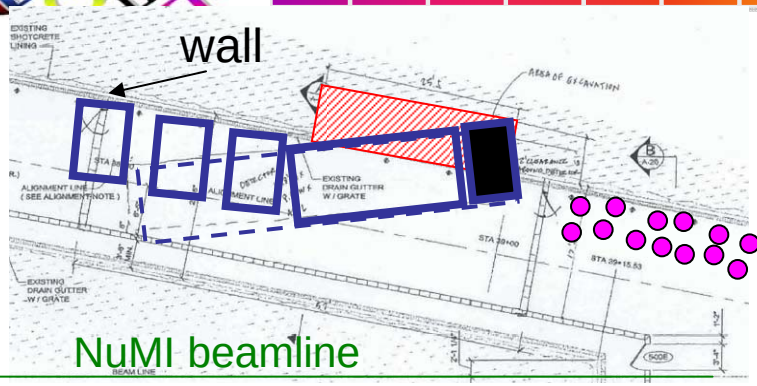
Simplest Scheme (#1)

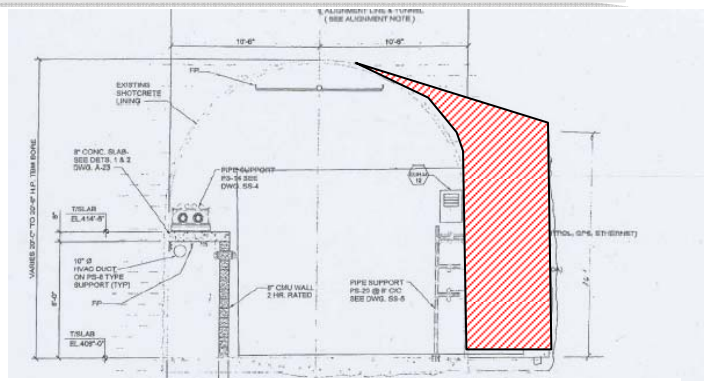




- **NOvA blocks the tunnel**
  - Still access through the escape passage on the east
- **Excavate 26’ along tunnel x 16’high x ~6’ deep**
- **FESS estimate is $ 1.25 M**
  - Takes “troublesome rock area” into account
  - Has 100% contingency
  - Earlier FESS estimate said 8 – 12 weeks with no access to MINOS Hall & no power to MINOS Hall

More on Simplest Scheme (#1)

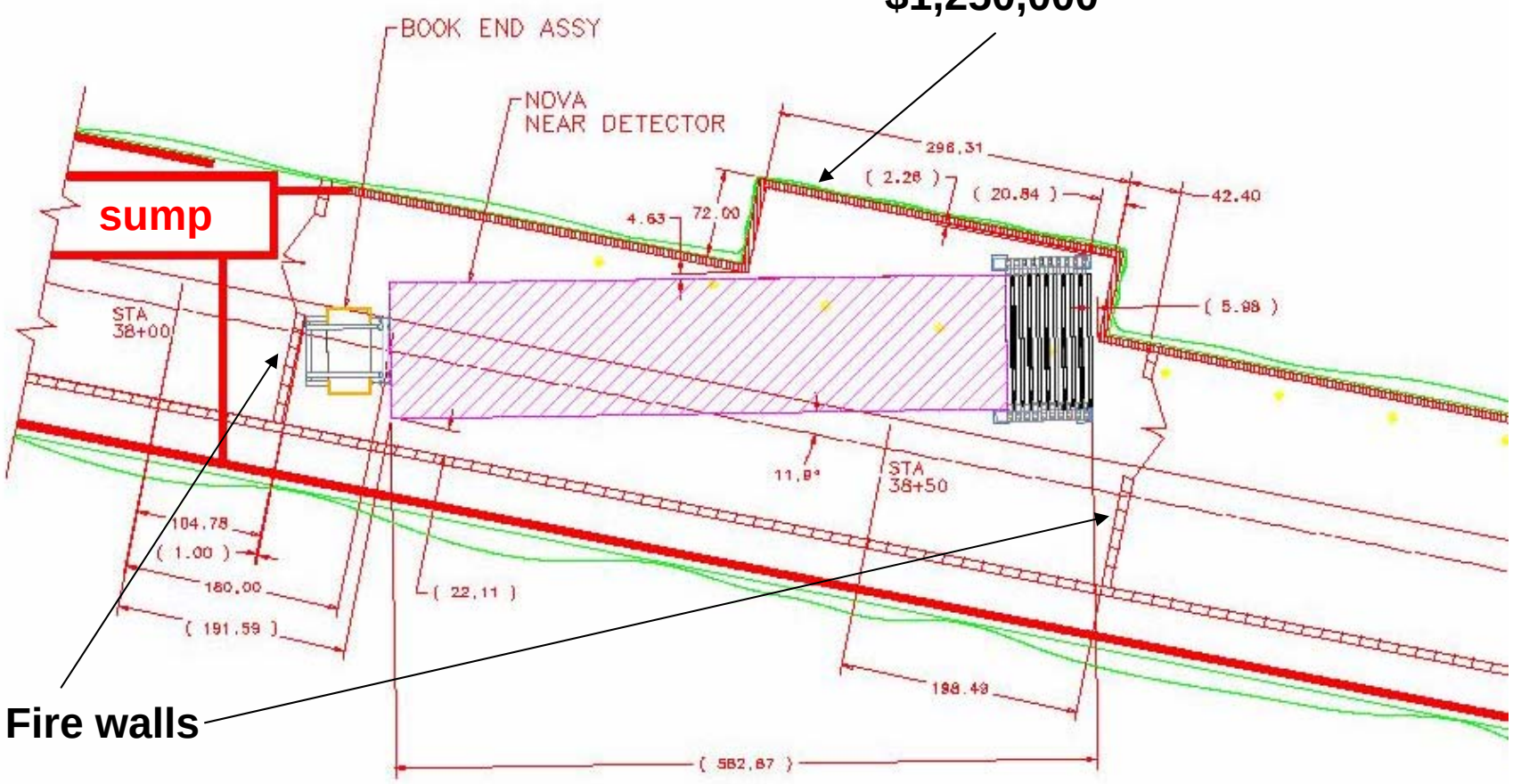




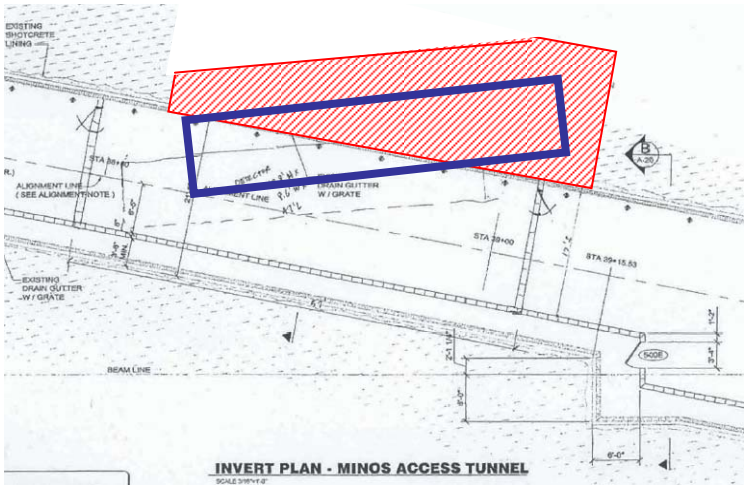
- **We believe we could drain all the scintillator from the detector in < 2 weeks**
  - This would be into ~ 550 fifty-five gallon drums
    - We would then have to move the drums into a new secondary containment along the west wall
  - And move the front of the Near detector (3 of the 6 empty PVC modules) somewhere
  - Would give access ~ like that needed to get the MINOS Near Detector into the hall.
  - Takes NOvA some undetermined time to get our detector back together, might have to rebuild secondary containment.

Details of Simplest Tunnel Concept

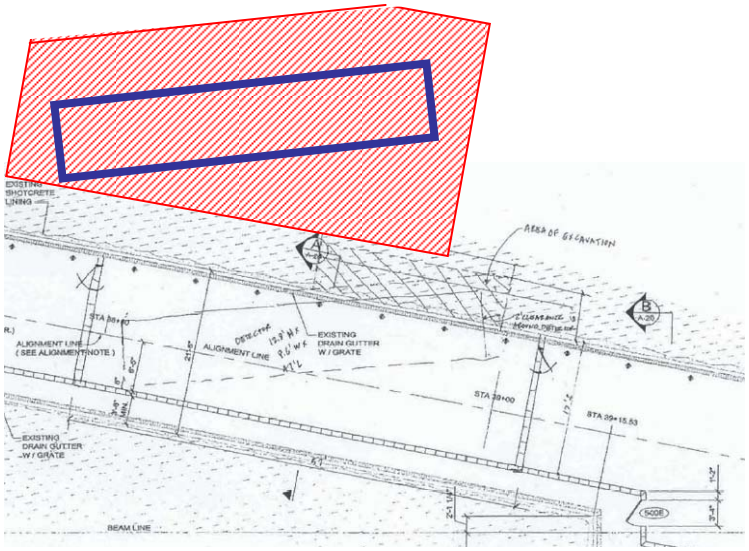
Excavation cost
$1,250,000



2 Schemes with deeper excavations

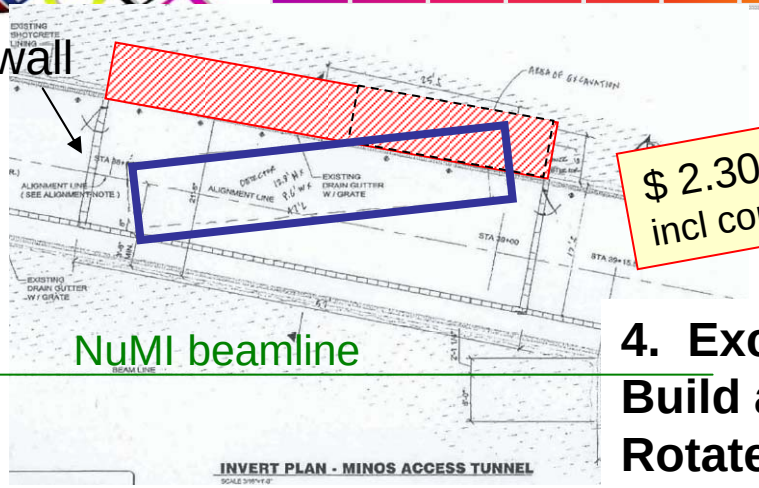


2. Block only half of tunnel
Excavate 52’ x 16’ x 12’
~ 3 times plan I volume
$ 3.62 M
Do not drain detector
Do not compromise
original containment

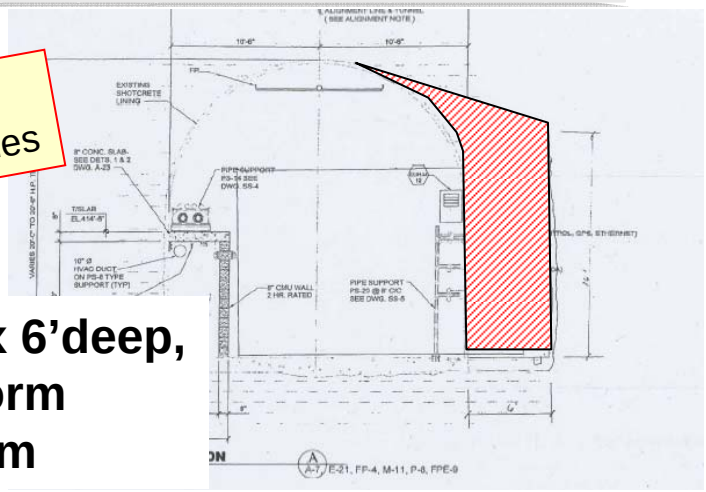


3. Completely out of tunnel
Excavate 52’ x 16’ x 25’
~ 6 times plan I volume
Conceptual picture, many ways to do this
BUT, FESS says “no estimate”
Needs geotechnical stability analysis
Area recalled as “troublesome rock”
Worry about large spans

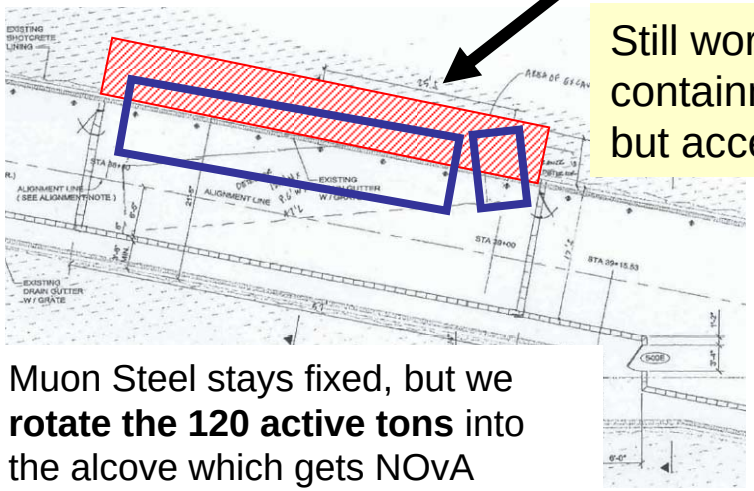
One more scheme #4



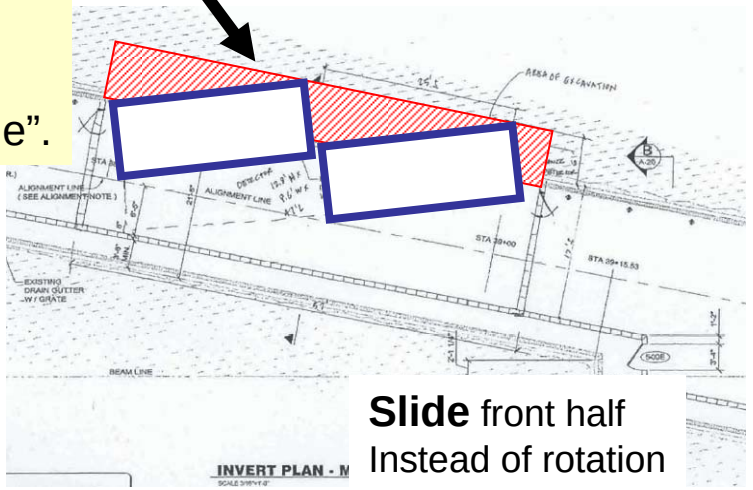
$ 2.30 M
incl contingency via NOvA rules



4. Excavate 60’ x 16’ x 6’deep,
Build a movable platform
Rotate or Slide platform



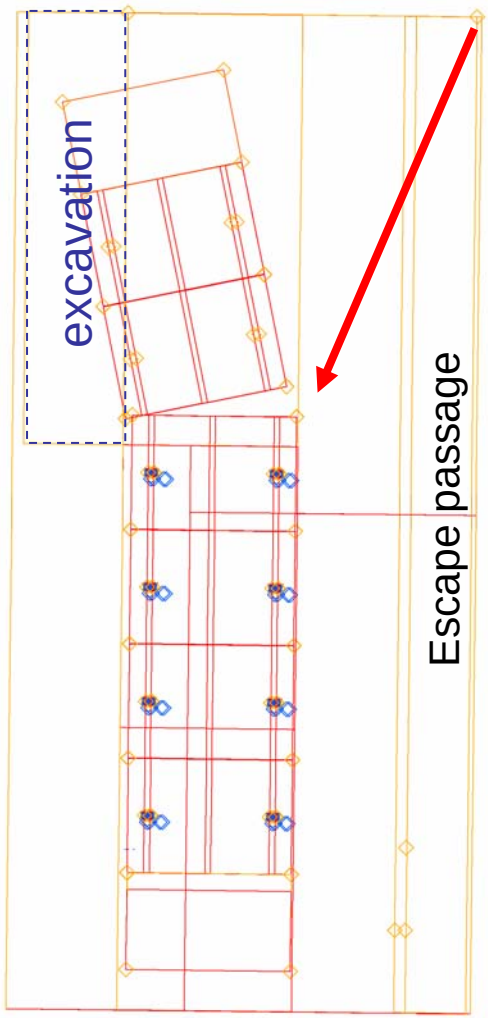
Still worries about
containment & FP,
but access is “possible”.



Muon Steel stays fixed, but we **rotate the 120 active tons** into the alcove which gets NOvA out of a large fraction of the tunnel.

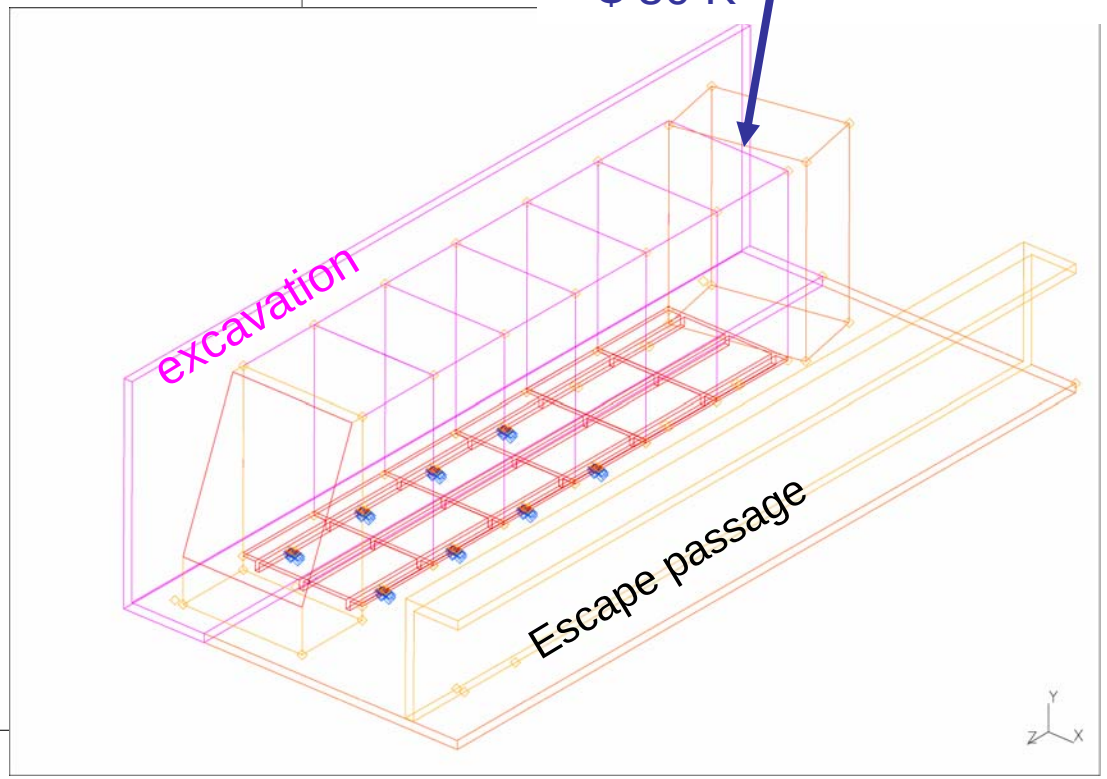
Slide front half
Instead of rotation

Rotating N **Empty** modules:

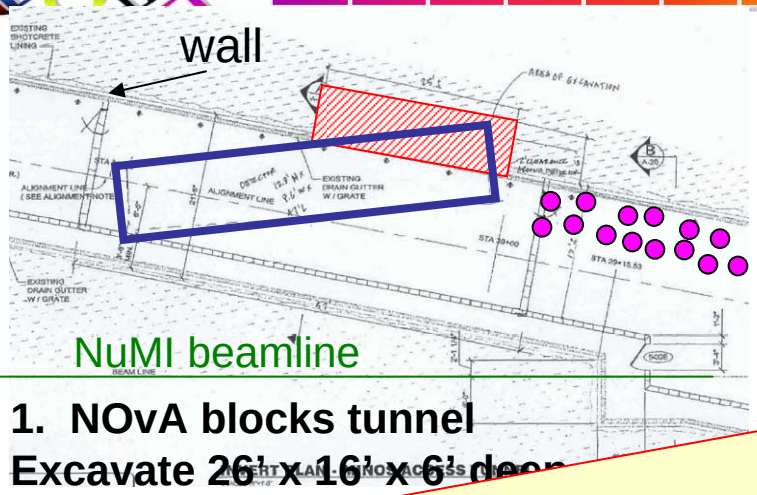


Top view, minimum excavation
Rotate 4 modules,
Create ~**6 ft clear space**,
~ $ 25 K Hilman or Air bearings

3D view, Scheme #4
Rotate 6 modules,
Create ~**10 ft clear space**,
~ $ 50 K



The Five Scenarios



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Excavate 26’ x 16’ x 6’ deep

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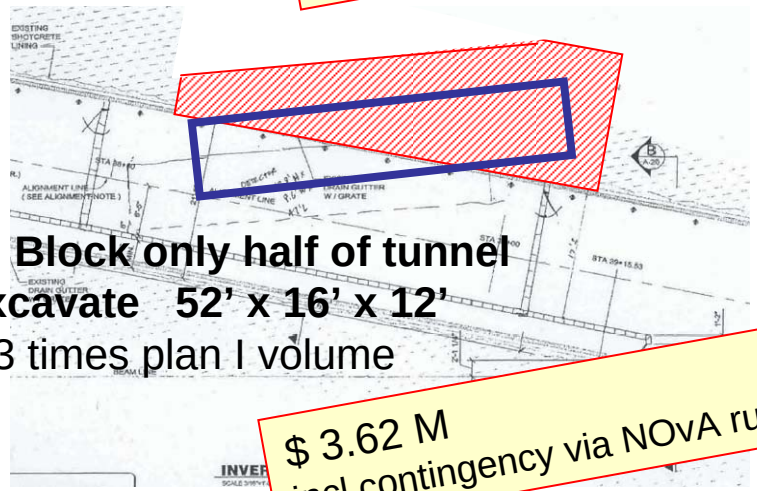
incl contingency via NOvA rules



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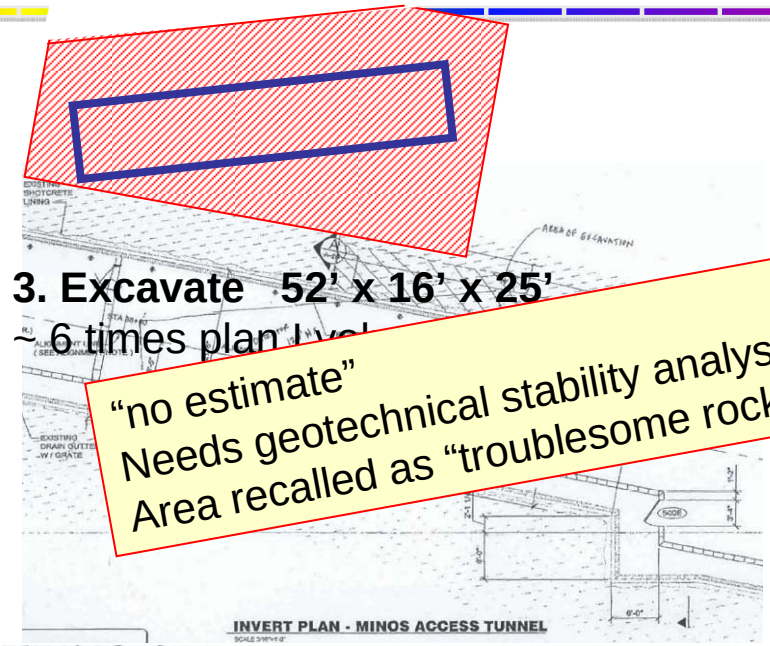

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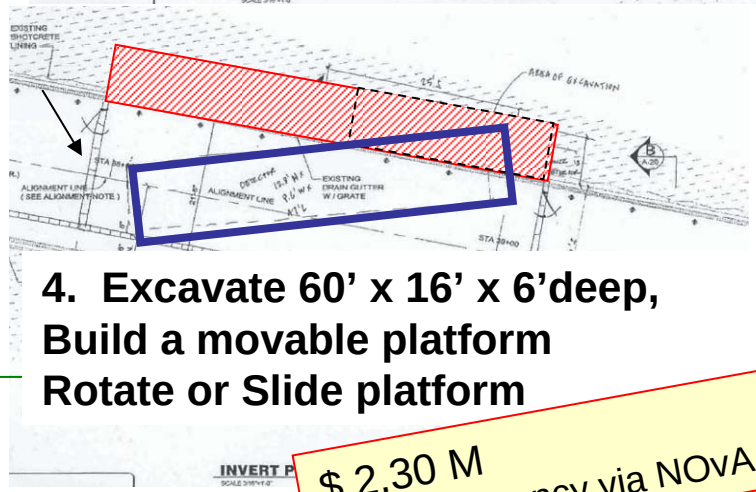

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