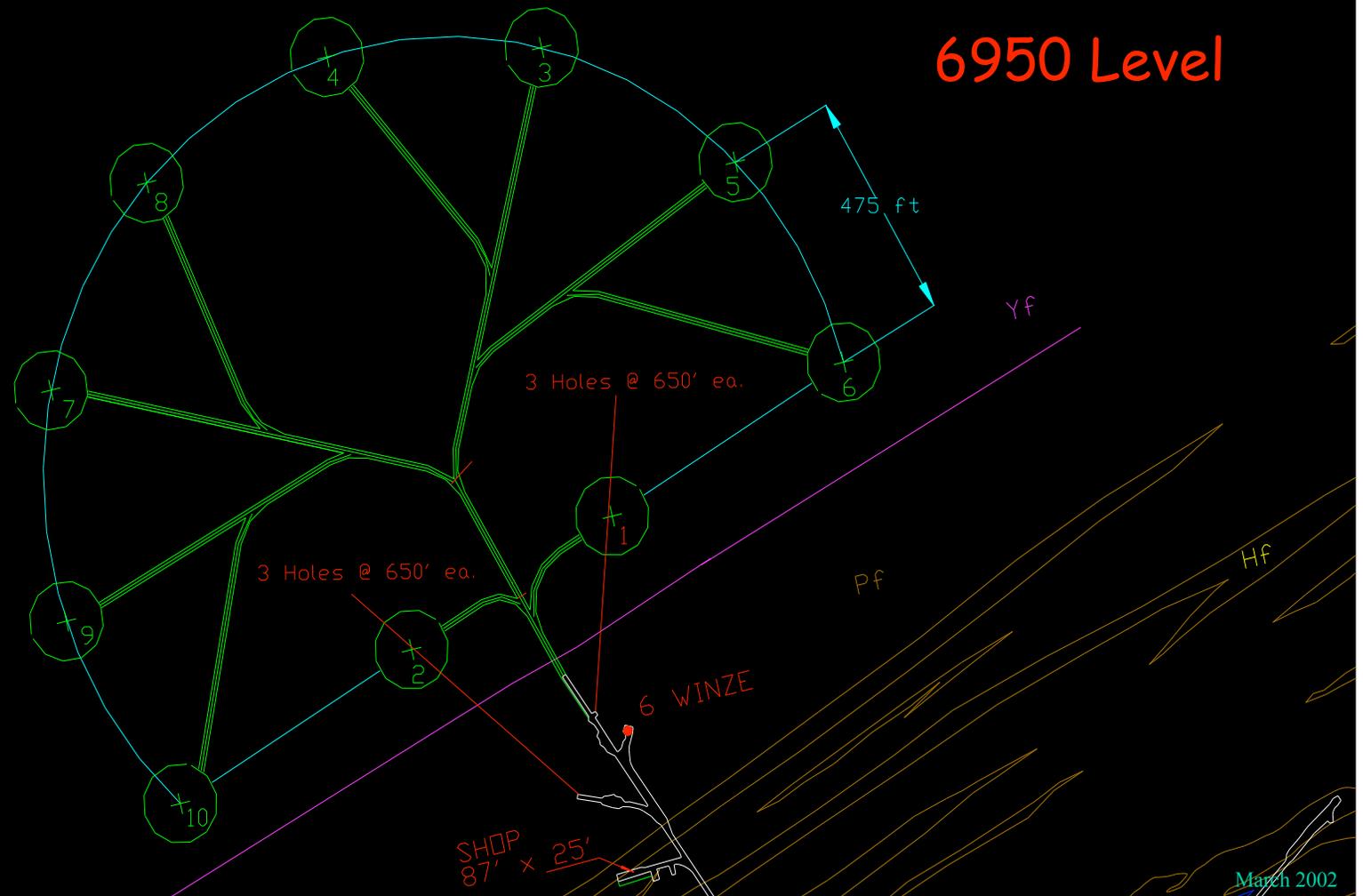


MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

- ✓ **Modular Configuration**
- ✓ **Ventilation**
- ✓ **Cooling**

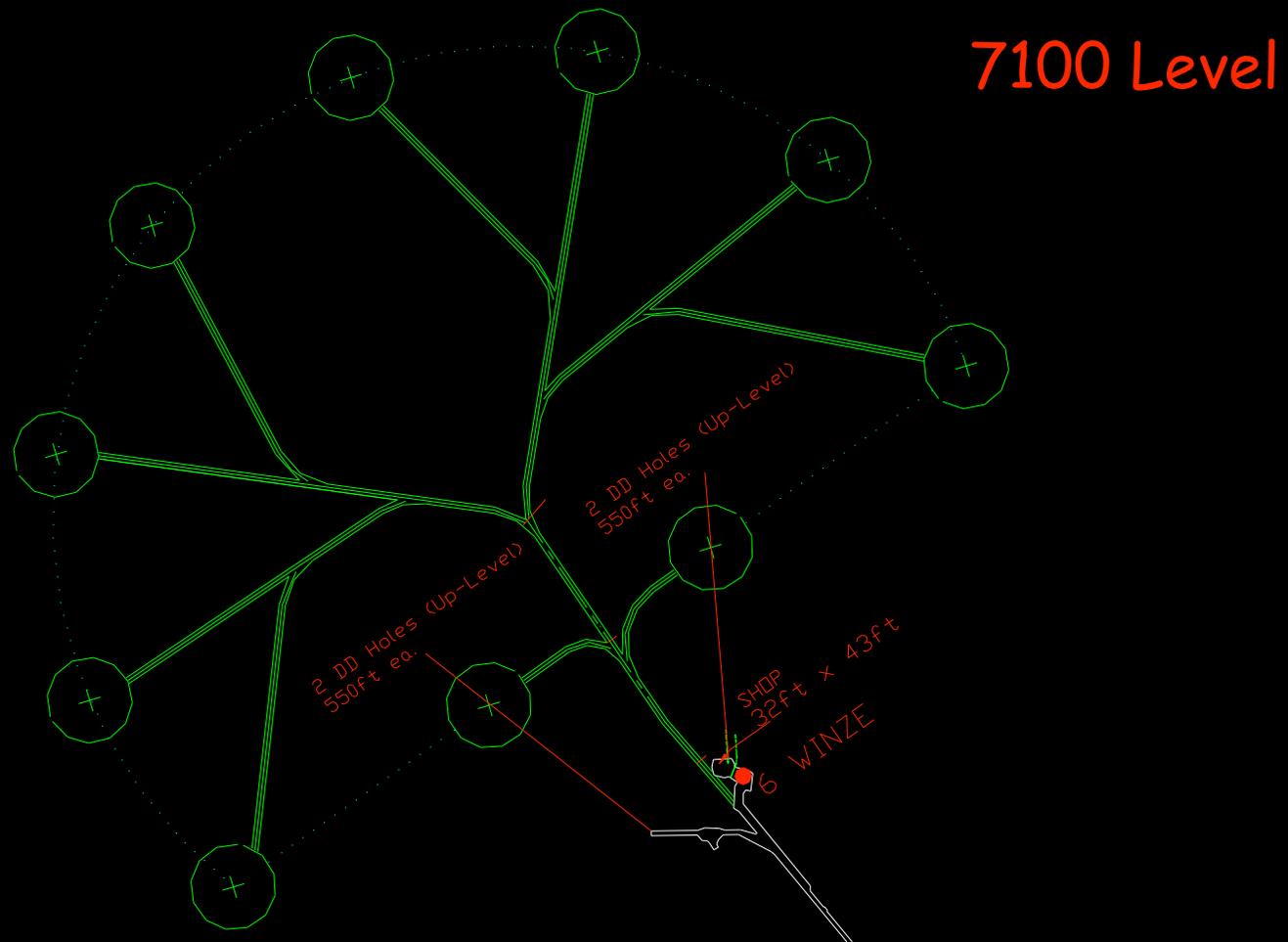
MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Modular Configuration



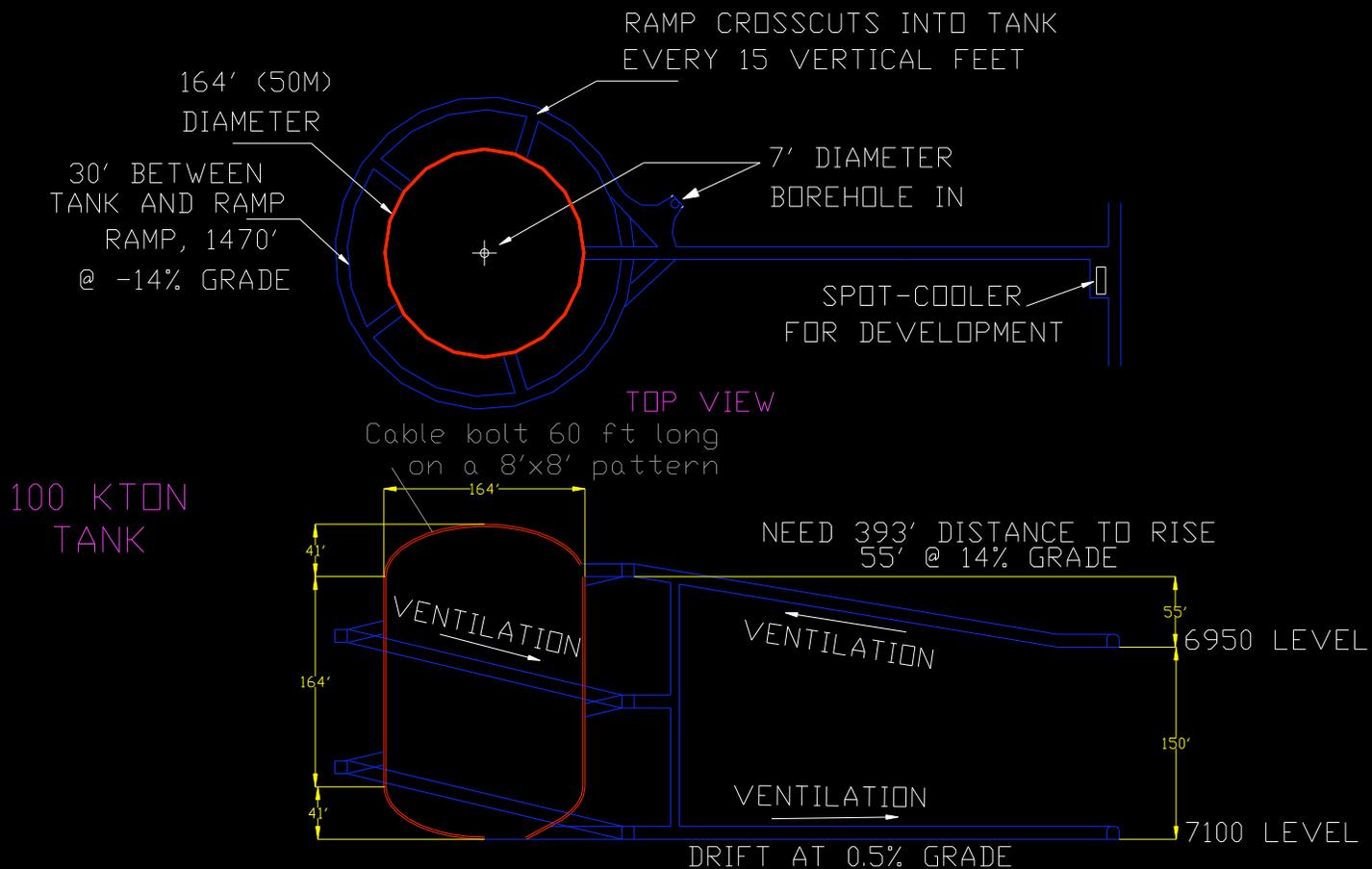
MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Modular Configuration



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Modular Configuration



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Ventilation

- ⇒ Total airflow for the top sill development is planned at 200,000 cfm.
- ⇒ The air would flow into the top access drift, down the chamber ramps and boreholes, and out of the bottom access drift on the 7100 and back to 31 Exhaust.

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Cooling

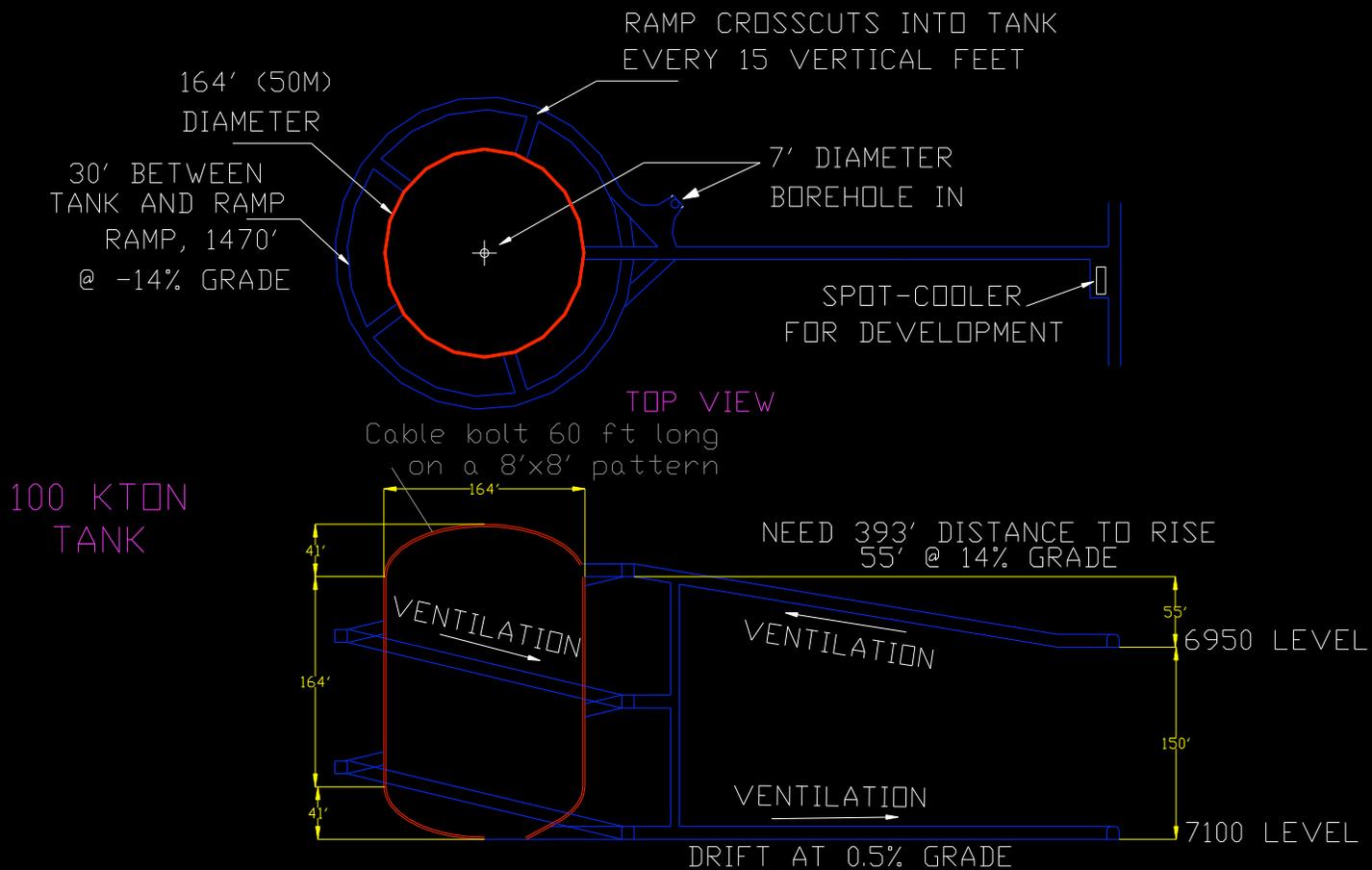
- ⇒ The 350-ton Dunham-Bush chiller will be used to cool development of the tops of the chambers via chilled water coils.
- ⇒ Three chambers can be excavated at the same time.
- ⇒ It is currently planned to keep the ultra-pure detector water at 50°F. Two or three 575-ton machines in the 6950 Vent Plant could supply chilled water for this task. Insulated 12" supply and return chilled water lines will be installed across the 6950 level to the detector area

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

- ✓ Construction Methodology
- ✓ Estimated Timeline
- ✓ Estimated Costs
- ✓ Assumptions

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Construction Methodology



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

General Parameters Used for Schedule & Cost

☆ Work Schedule

3 Shifts / Day x 5 Day / Week

☆ Manpower -3 Supervisors

24 Hourly Employees For One Chamber

41 Hourly Employees For Three Simultaneous Chambers

☆ Equipment For Construction Of 1 or 3 Simultaneous Chambers

4 LHD's

2 Bolters

2 Face Jumbos

1 Long Hole Drills

2 Bench Drills

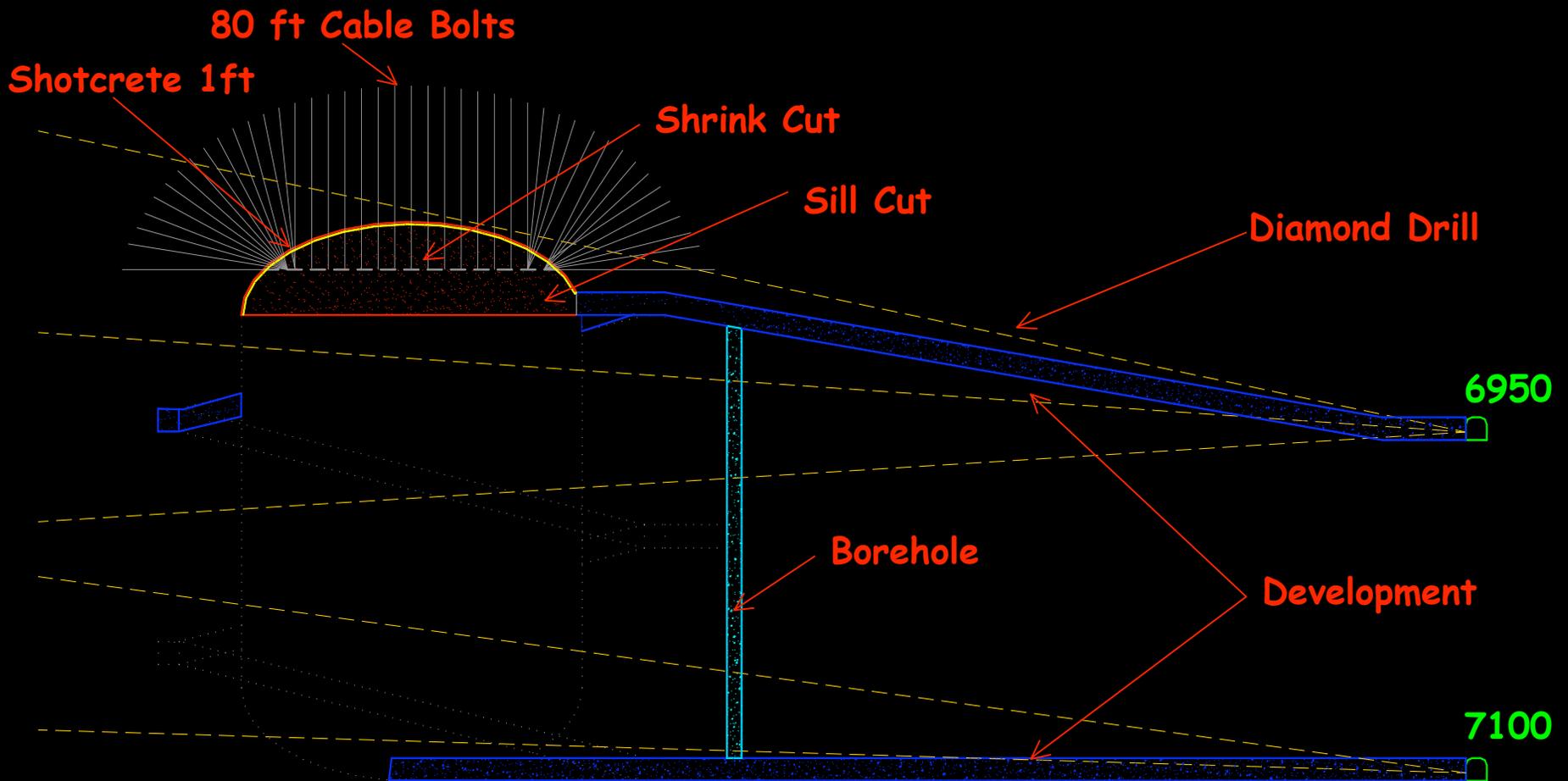
2 Lift Trucks

2 Support Vehicles

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Timeline

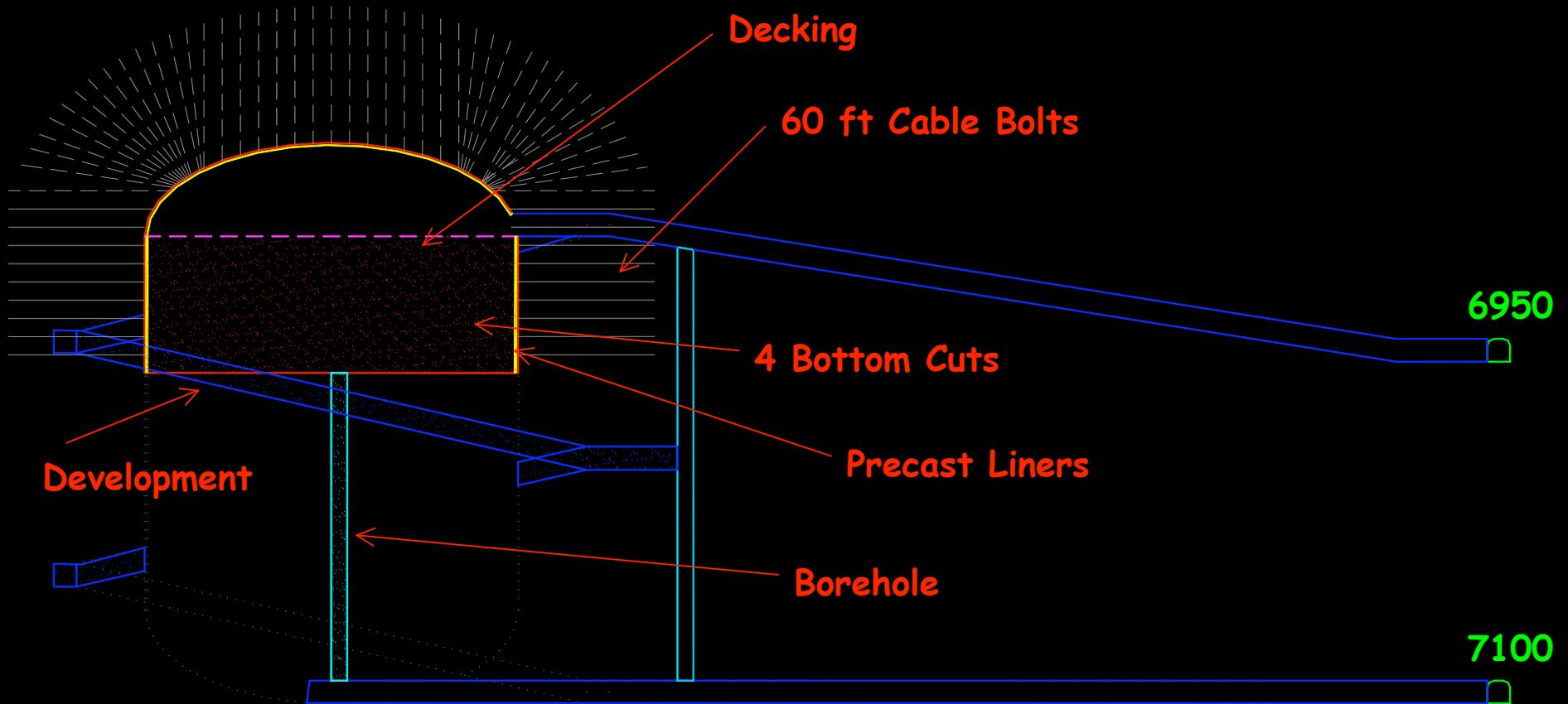
Year One



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Timeline

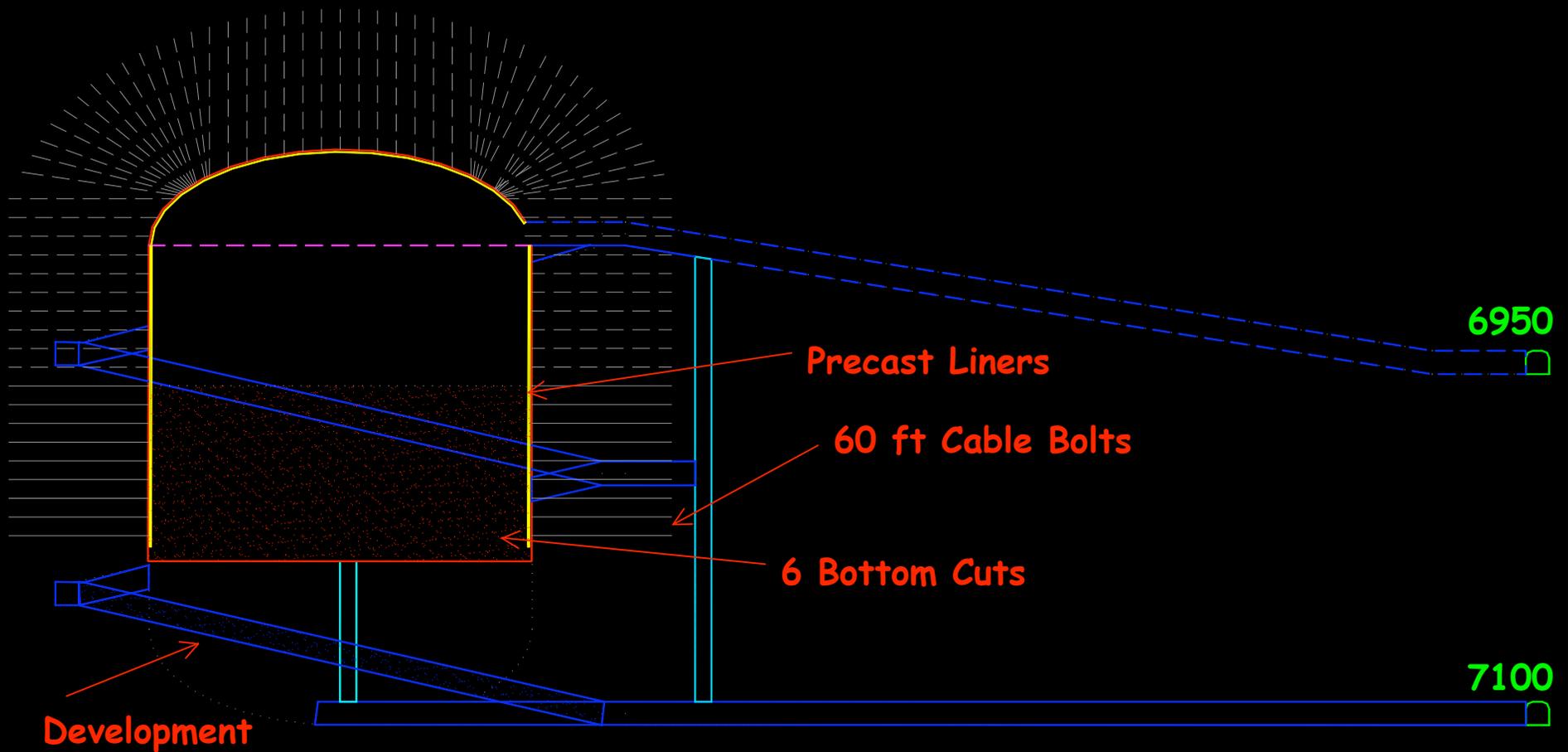
Year Two



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Timeline

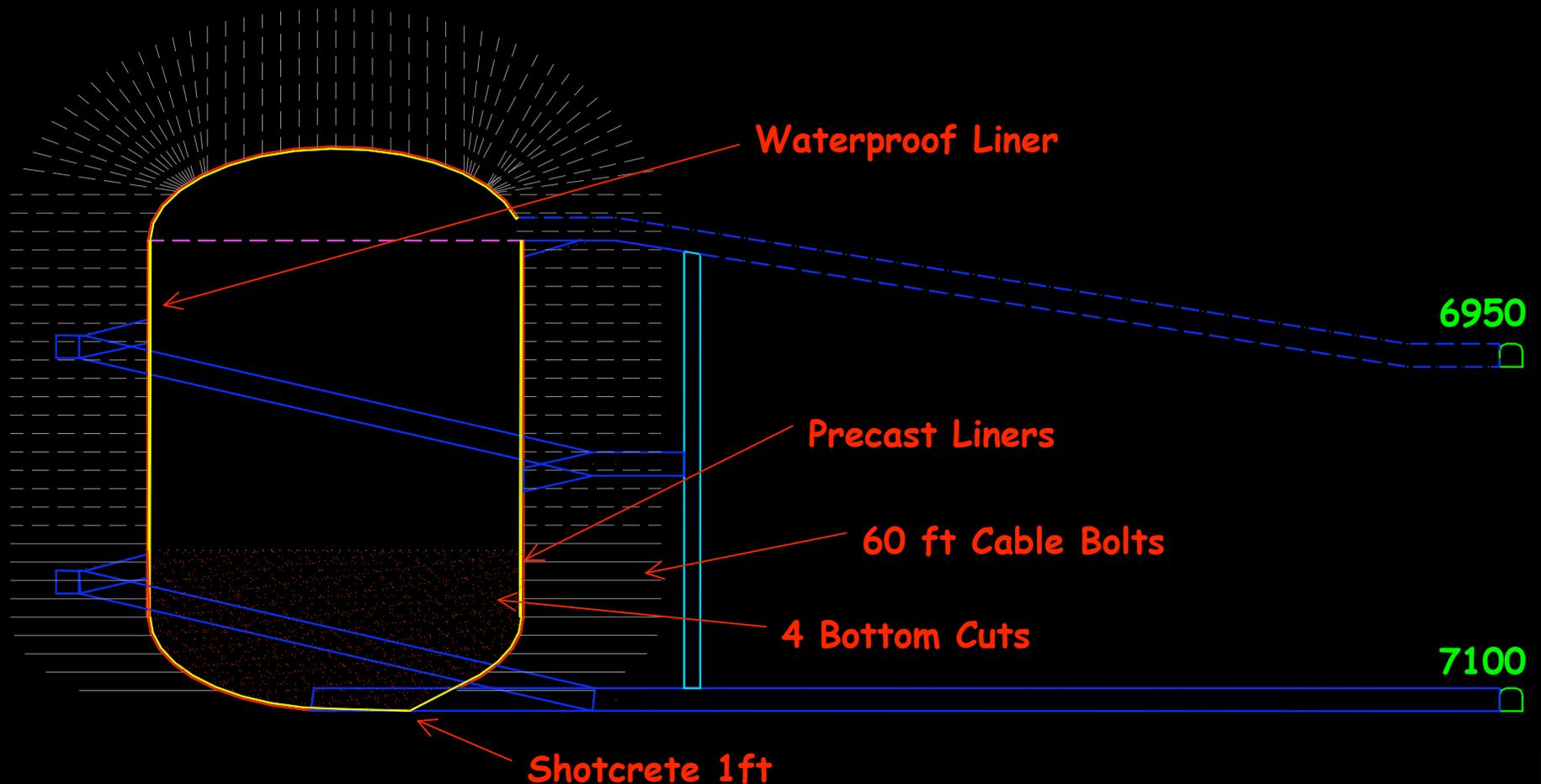
Year Three



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Timeline

Year Four



MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Timeline

Total time for excavation and construction

208 Weeks

or

4 Years

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Costs For 1 Chamber (\$MM)

⇒ Labor & Benefits \$ 5.51

⇒ Mining & Construction

★ Equipment Operation \$ 1.30

★ Supplies \$ 4.51

★ Precast Concrete Liner \$ 3.25

Subtotal \$ 9.06

⇒ Other (Outside Contractor) \$ 0.12

⇒ 15% Contingency \$ 2.20

TOTAL \$ 16.89

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Estimated Costs

⇒ Operating Costs Not Included In Estimate

- ★ Equipment Purchase or Lease
- ★ Cost of Waste Handling
- ★ General Operation of the Mine
- ★ Engineering, Geology
- ★ Power and water Consumption

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Assumptions

- ⇒ A waste handling system is in place and capable of handling up to 540 tons per shift (8,000 tons / week) before the excavation work is started on the chamber.
- ⇒ Ventilation is sufficient enough to do more than one activity at a time in the chamber.
- ⇒ Labor is multi-tasked in order to operate and construct all aspects of the chamber.
- ⇒ After construction, shops areas and other miscellaneous excavations will be used for permanently installed equipment such as that needed for cooling, electronics, etc.

MEGATON MODULAR MULTI-PURPOSE NEUTRINO DETECTOR

✓ Summary

- ⇒ Estimated construction time for one chamber is four years
- ⇒ Estimated cost for one chamber is \$17.0MM
- ⇒ This is a snapshot of the planning done to date. Any future changes can only improve the design and reduce the cost and time.