

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

SUBJECT: RAMP DIAMETERS

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SOUTH RAMP - CALICO HILLS

- **DIAMETER** - 18 FT
- **LENGTH** - 7,450 FT
- **SLOPE** - 10%
- **TURNING RAD.** - 300 FT

EQUIPMENT

- **HVAC SYSTEM**
- **CONVEYOR**
- **UTILITIES**

CALICO HILLS RAMPS ESFDR REQUIREMENTS

- **TESTING**
- **PERSONNEL TRANSPORT**
- **ACCOMMODATE EQUIPMENT**
- **ACCOMMODATE UTILITIES**
- **PROVIDE ADEQUATE VENTILATION**
- **PROVIDE AN EMERGENCY ESCAPEWAY**
- **LIMIT EFFECTS TO ISOLATION CAPABILITY**



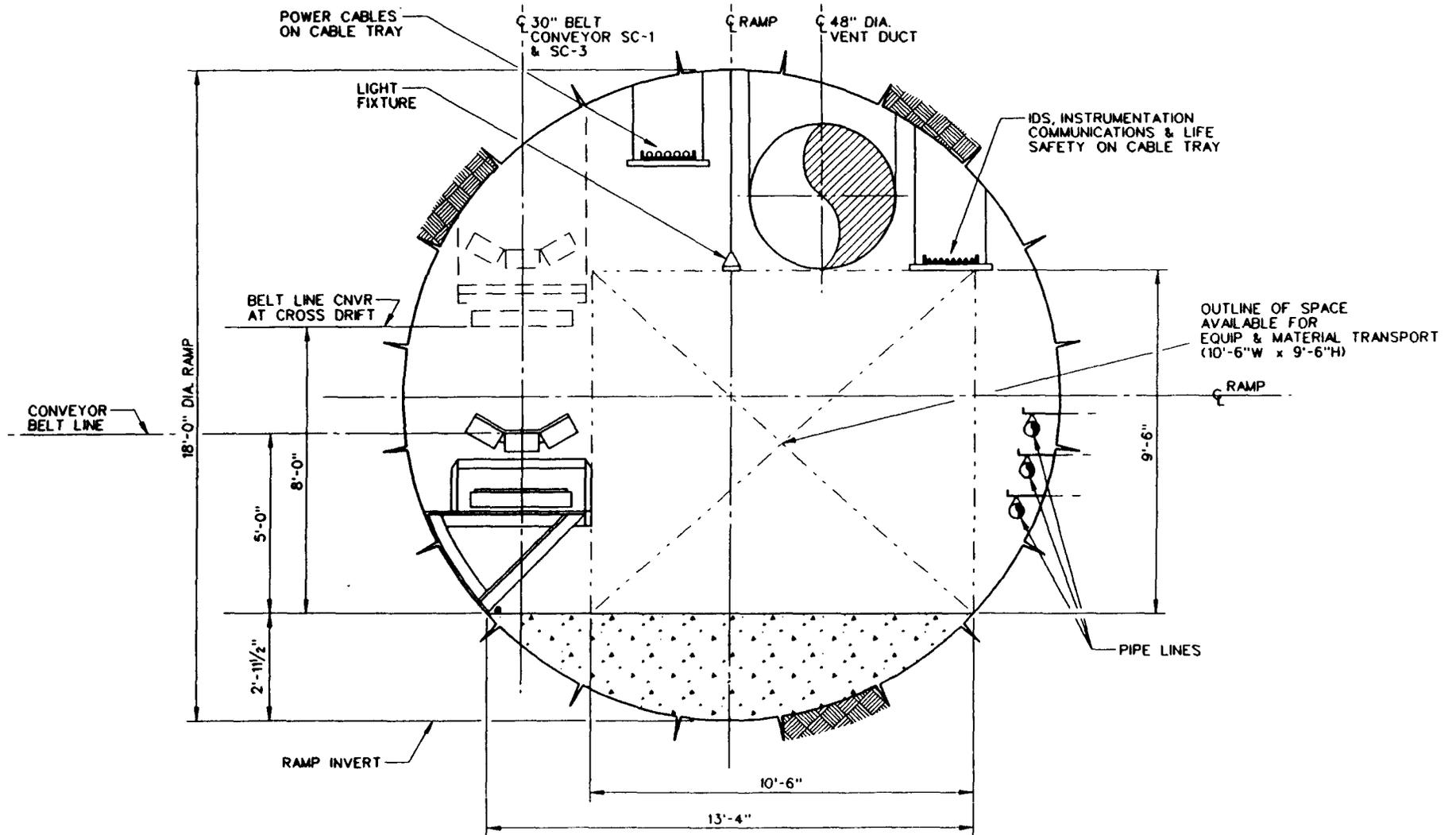
FUNCTIONAL GOALS

- **PROVIDE RAPID ACCESS TO CALICO HILLS FOR EARLY SITE SUITABILITY EVALUATION**
- **ACCOMMODATE REQUIRED TESTING**
 - **SPACE**
 - **CONFIGURATION**
- **PROVIDE A SAFE ARRANGEMENT FOR UTILITIES AND PERSONNEL MOVEMENT**

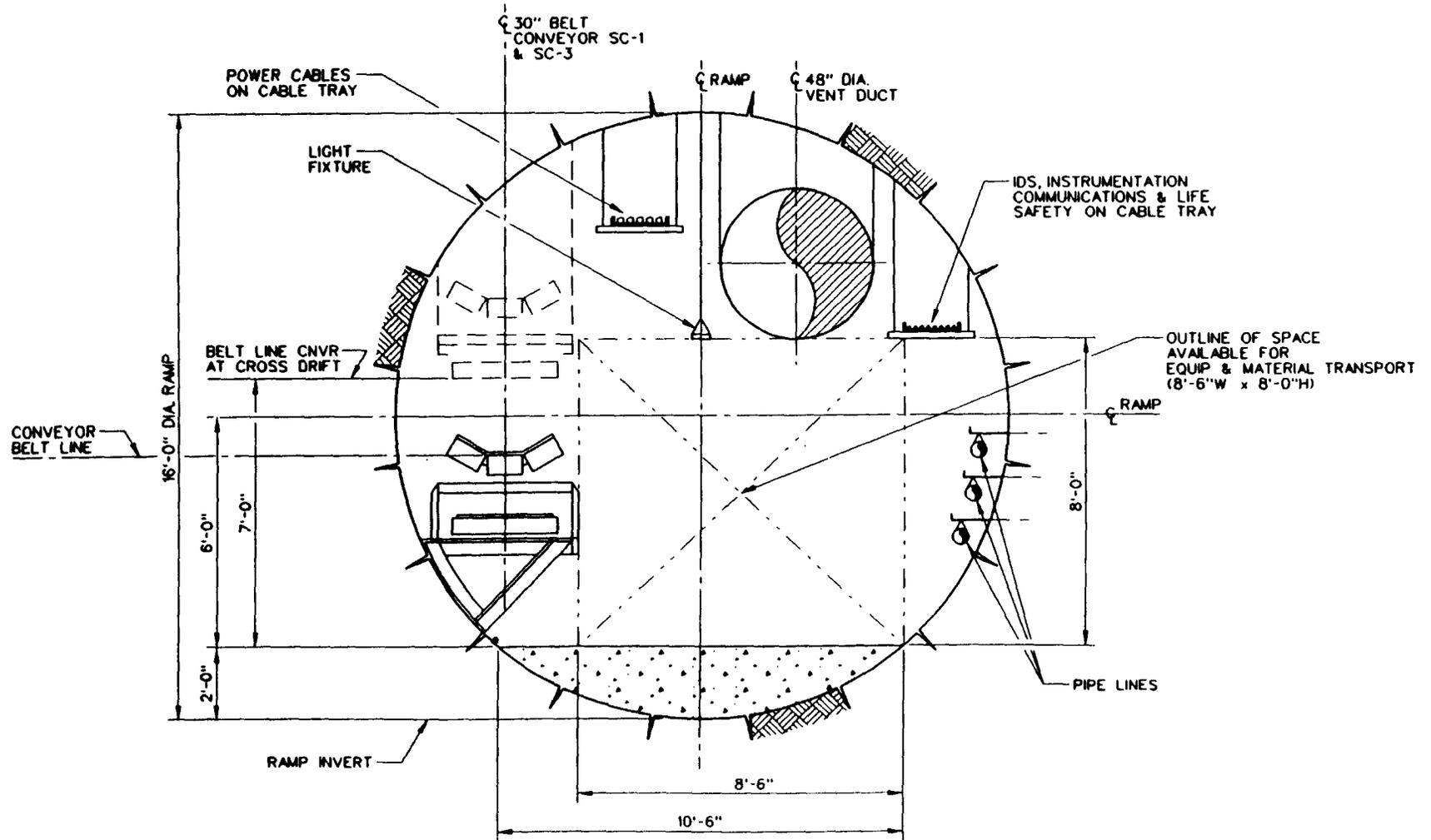
GENERAL CONSIDERATIONS

- **BASED ON REFERENCE DESIGN WITH ENHANCEMENTS OF:**
 - **OPTIONAL SHAFT**
 - **NORTHEAST LOCATION OF MAIN TEST AREA**
- **PLACEMENT OF CONVEYOR INFLUENCES THE REQUIRED DIAMETER**
- **ALCOVES MAY BE REQUIRED AT VARIOUS LOCATIONS IN THE ACCESS**
- **VENTILATION REQUIREMENTS INFLUENCE ACCESS DIAMETER**

18'-0" DIAMETER RAMP CROSS-SECTION



16'-0" DIAMETER RAMP CROSS-SECTION



HOW THE ARRANGEMENT MEETS THE REQUIREMENTS

- **NEITHER SIZE RAMP PRECLUDES TESTING**
- **THE CROSS-SECTION ALLOWS THE SPECIFIED EQUIPMENT TO FUNCTION AND MOVE FREELY**
- **ADEQUATE SPACE IS PROVIDED FOR VENTILATION AND UTILITIES**
- **ACCORDING TO BEST AVAILABLE INFORMATION, SIZE HAS LIMITED IMPACT AND IS NOT CONSIDERED SIGNIFICANT TO ISOLATION CAPABILITY**

HOW THE ARRANGEMENT MEETS FUNCTIONAL GOALS

- **PROVIDES ACCESS FOR PERSONNEL
AND EQUIPMENT**
- **ROCK MASS EXPOSURE: EITHER SIZE WILL
ACCOMMODATE MAPPING ACTIVITY**
- **VENTILATION: EITHER SIZE WILL
ACCOMMODATE AIR REQUIREMENTS FOR
CALICO HILLS ACCESSES**
- **9.5 FT OF HEADROOM WILL FACILITATE THE
MOVEMENT OF ANTICIPATED MECHANICAL
EXCAVATORS BEHIND A WORKING TBM**

CONCLUSIONS

- **THE VENTILATION, MUCK HANDLING, AND TRANSPORTATION EQUIPMENT SPACE REQUIREMENTS ARE THE PRIMARY DETERMINANTS FOR RAMP SIZE**
- **THE TESTING PROGRAM (AS SCHEDULED) CAN BE ACCOMMODATED WITH EITHER RAMP SIZE**
- **ALL APPLICABLE ESFDR REQUIREMENTS AFFECTING RAMP DIAMETER FOR CALICO HILLS ARE MET BY THE PROPOSED 18 FT DIAMETER SIZE**

CALICO HILLS RAMP SIZE (DIAMETER)

<u>FACTOR</u>	<u>16 FT</u>	<u>18 FT</u>
TESTING	YES	YES
VENTILATION	YES	YES
MUCK HANDLING	YES	YES
EQUIPMENT/PERSONNEL MOVEMENT	NO	YES



CANNOT ACCOMMODATE
AN 8 FT WIDE ROADWAY
AND A 30 INCH WALKWAY
(AS CONFIGURED)

TOPOPAH SPRING RAMPS ESFDR REQUIREMENTS

- **TESTING**
- **PERSONNEL TRANSPORT**
- **ACCOMMODATE EQUIPMENT**
- **ACCOMMODATE UTILITIES**
- **PROVIDE ADEQUATE VENTILATION**
- **PROVIDE AN EMERGENCY ESCAPEWAY**
- **LIMIT EFFECTS TO ISOLATION CAPABILITY**
- **CAPABLE OF FUTURE USE IN A POTENTIAL REPOSITORY**

TOPOPAH SPRING RAMPS FUNCTIONAL CONSTRAINTS

● TRANSPORTATION

- A 36 INCH WIDE CONVEYOR IS NEEDED FOR MUCK REMOVAL**
- MUST ACCOMMODATE RUBBER-TIRED VEHICLES OF MAXIMUM 8 FT WIDTH**
- A 9 FT WIDE MECHANICAL EXCAVATOR MAY TRAVERSE THE TS RAMP ON ITS WAY TO CALICO HILLS**

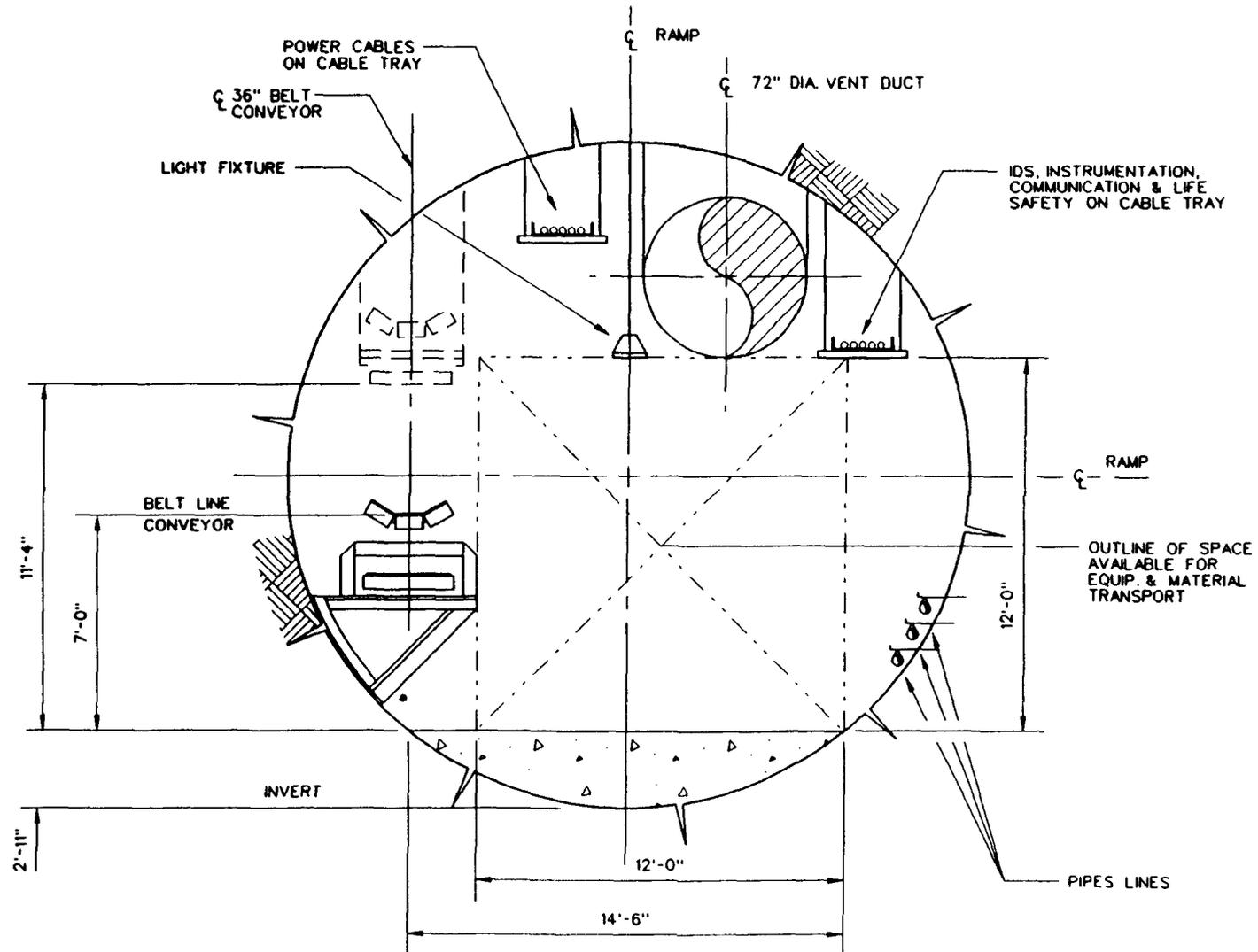
● VENTILATION

- A 72 INCH DIAMETER VENT TUBE IS NEEDED FOR A GIVEN PERIOD**
- MUST ACCOMMODATE 400,000 CFM**
- AIR VELOCITY SHOULD NOT EXCEED 600 FPM**

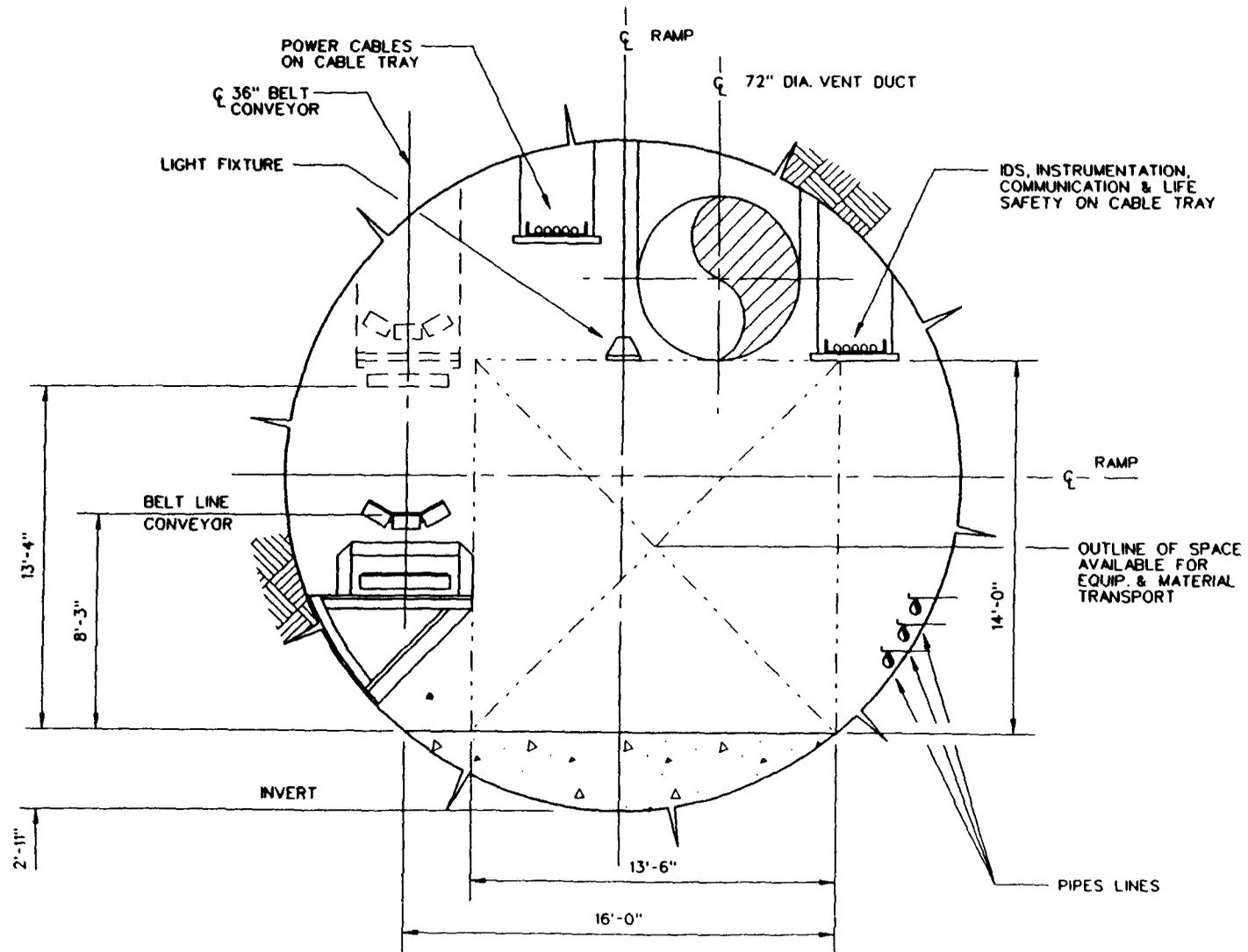
● GENERAL

- PROVIDE A 30 INCH WIDE WALKWAY**

23'-0" DIAMETER RAMP CROSS-SECTION



25'-0" DIAMETER RAMP CROSS-SECTION



HOW THE FUNCTIONAL CONSTRAINTS ARE SATISFIED

- **A 36 INCH WIDE CONVEYOR IS PROVIDED**
- **ROAD WIDTH ACCOMMODATES AN 8 FT WIDE VEHICLE AND A 30 INCH WALKWAY**
 - **MECHANICAL EXCAVATOR MAY PASS ON AN OCCASIONAL BASIS**
- **A 72 INCH DIAMETER VENT DUCT PROVIDES ENOUGH AIR FOR ABOUT 400 SQUARE FEET (DRIFT CROSS-SECTION)**
 - **PERMITS 400,000 CFM AIR FLOW EXHAUSTING AT 1,000 FPM IN THE DRIFT**
- **PROVIDES AMPLE SPACE FOR UTILITIES**
- **THE FACT THAT THE TESTING PROGRAM CAN BE IMPLEMENTED IN A 25 FT DIAMETER RAMP IS SUPPORTED BY PROVIDING SPACE FOR RELOCATING UTILITIES AND VENT DUCT WHEN DEVELOPING TEST ALCOVES**

CONCLUSIONS

TS ACCESS RAMPS

- **THE 25 FT DIAMETER CROSS-SECTION FULFILLS REQUIREMENTS AND CONSTRAINTS**
- **BASED ON VENTILATION, 25 FEET IS AN ADEQUATE SIZE FOR ESF DESIGN**
- **THE DIAMETER IS INFLUENCED BY THE NEED FOR A FLAT ROADWAY IN A ROUND OPENING**
 - **FUTHER ANALYSIS SHOULD DETERMINE THE PREFERENCE FOR BOTTOM CUTTING OR BACKFILL**
- **TWO, FIVE FOOT WIDE VEHICLES CAN PASS WITHOUT THE NEED FOR A CUTOUT**

TOPOPAH SPRING RAMP DIAMETER

<u>FACTOR</u>	<u>23 FT</u>	<u>25 FT</u>
VENTILATION	NO	YES
EQUIPMENT/PERSONNEL MOVEMENT	MARGINAL	YES
TESTING	YES	YES
* FUTURE USE CONSIDERATION	NO	YES

* POTENTIAL REPOSITORY VENTILATION AND AVAILABLE SPACE FOR
TRANSPORTER (REF. SAND84-1010) WITHOUT ADDITIONAL EXCAVATION