INSTALL SAFETY CLOSURES AT ABANDONED MINES TO PROTECT VISITORS AND PRESERVE RESOURCES

VARIOUS NATIONAL PARKS IN THE INTERMOUNTAIN AND PACIFIC WEST REGIONS
ADIT BACKFILL
NO SCALE

NOTES:
1. PLACE BOLDOCK OR ROCK AT THE SITE OF THE SLUPE AND BLEND INTO GRADING AS DIRECTED BY THE CONTRACTING OFFICER TO PROTECT FROM EROSION.
2. RANDOM FILL SHALL CONSIST OF ON-SITE MATERIALS SUCH AS NINE WASTE ROCK, SOIL, OR SUB-SOIL. RANDOM FILL SHALL BE FREE OF ORGANIC DEBRIS AND SHALL BE OF A GRADE IN THE\n   INDICATED COMPACTED CONDITION.
3. OPTIONAL PVC PIPE LENGTHS SHALL BE JOINED USING SUP\n   COUPONS AND PVC CEMENT.
NOTE:
RANDOM FILL SHALL CONSIST OF ON-SITE MATERIALS SUCH AS MINE WASTE ROCK, SOIL OR SUB SOIL. RANDOM FILL SHALL BE FREE OF ORGANIC DEBRIS AND SHALL BE OF A GRADE PERTINENT COMPACTING.

1. SHAFT BACKFILL
NO SCALE
1. DRY Laid STONE WALL WITH BACKFILL
   NO SCALE

2. DRY Laid STONE WALL WITH BACKFILL DETAIL
   NO SCALE

NOTES:
1. Rainbow fill shall consist of on-site materials such as waste rock, soil, or sub-soil. Random fill shall be free of organic debris and shall be of a graduation permitting compaction.
2. Optional PVC pipe lengths shall be joined using slip couplings and PVC cement.
3. For visibility, stone should be selected that is uniform in shape and not round.
4. Stones shall be stacked in a staggered manner overlapping joints in previous courses. Joints between courses shall not be allowed to overlap.
5. Stones shall be placed in the slope at an angle of 15-25 degrees to provide stability. Joints between courses shall be chinked with rock chips for stability as needed.
1. **Stone Wall with Backfill Option**

   - Native stone wall seen details this sheet.
   - Extend pipe 8" beyond face of building.
   - Weight variable to accommodate gradient of pipe.

2. **Stone Wall Elevation**

3. **Stone Wall Section**

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**NOTES:**

1. Native stone shall be collected on site for construction of the native stone wall. Stone quality and size shall be approved by the CO.

2. Optional random fill shall consist of On-Grade Materials such as mine waste rock, 3:1 or Sub-Grade Random fill shall be free of organic debris and shall be of a gradation permitting compaction.

3. Repair in wall is optional and should be used at the contracting officer's discretion.

4. Optional pipe liners shall be joined using slip couplings and PVC cement.

5. If stone wall will be exposed to the elements or covered by vegetation, compact exposed mortar joints then prime finish with water only, no acid wash.

6. Mortar on all face joints to be compacted. Continuous mortar must fill all internal joints without voids.

7. Rock attachment: Optional repair pins (bars) shall be inserted into holes drilled a minimum of 8" into rock walls and floor. Pins shall be secured using an interdendence fit created by offsetting the bar with a 45° hammer blow then driving the bar into the hole. Holes shall be drilled if larger in diameter than the pin. Grouting of pins is not required.
1. CONCRETE BLOCK WALL ELEVATION
   NO SCALE

   TYPICAL ELEVATION

   REMOVE ALL LOOSE ROCKS TO CREATE A DEPRESSION FOR REPAIR BLOCKS AT SIDES AND TOP.

   8" x 8" x 15" CONCRETE BLOCK

   OPTIMAL 1.5" (#4) REBAR

   PINNING DEPTH = 6"

   THIN BLOCKS TO FIT SHOULDER AGAINST WALLS AND CEILING

   2. CONCRETE BLOCK WALL SECTION
   NO SCALE

   TYPICAL SECTION

   CONTINUOUS MORTAR WITHOUT Voids

   CORE OF ALL BLOCKS TO BE FILLED WITH CONCRETE (OPTIONAL)

   OPTIONAL, #4 REBAR FORMING GRID 24" x 24" IN CENTER OF CONCRETE BLOCKS

   8" x 8" x 15" CONCRETE BLOCK

   PINNING DEPTH = 6"

   OPTIONAL 1.5" (#4) REBAR

   OPTIMAL 6" SCHEDULE 80 PVC DRAIN/VENTILATION PIPE MINIMUM 2% GRADE

   NO SCALE

NOTES:

1. OPTIONAL REBAR REINFORCEMENT.

2. ROCK ATTACHMENT:
   OPTIMAL REBAR PINS (#8) SHALL BE INSERTED INTO HOLES DRILLED A MINIMUM OF 6" INTO ROCK WALLS AND FLOOR. PINS SHALL BE SECURED USING AN INTERIM REINFORCEMENT FIT CREATED BY DEFORMING THE BAR WITH A DIRENCE HAMMER FORM THAT DEFORM THE BAR INTO THE HOLES. HOLES SHALL BE DRILLED A LARGER IN DIAMETER THAN THE PINS. GROWING OF PINS IS NOT REQUIRED.
ANGLE IRON BAT GATE WITH PERIMETER RING OPTION

NOTES:
1. THIS IS AN OPTIONAL GATE FOR OPENINGS LESS THAN 6'-6" WIDE, OR IN CASES WHERE UNINTERRUPTED BAT PLAIN SPACE IS REQUIRED.
2. ALL NEEDS OF GATE BARS TO PERIMETER RING SHALL BE FITTED, WELDED ON BOTH TOP AND BOTTOM SIDES OF BAR.
4. ALLOWABLE SPANS (GATE BARS):
   - 4" x 4" x 1/8" ANGLE WITHOUT STIFFNERS..............8'-0"
   - 4" x 4" x 3/8" ANGLE WITH STIFFNERS..................15'-0"
   - 3" x 3" x 1/8" SQUARE TUBING (OPTIONAL)..............8'-0"
NOTES:

1. Optional owl perch may be placed in cupola walls or wall, suited to family sizes to roost and/or enter while the perch shall not be mounted to removable rails.

2. Optional cupola tops (4, 5, 6) may be used to house any rain closure structures. 10" x 10" in minimum size. Larger sizes require additional corner spine support and custom design.
NOTES:

1. WELDED STEEL GRATING CREATES A SECURE TOP FOR CUPOLAS AND LOW PROFILE BUT ACCESSIBLE DENTAL. THE STRONG CONSTRUCTION AND SPIN BARTABLES MAKE THIS TOP CLOSURE MATERIAL FANTastically INSTALL AND ATTRACTIVE. WELDED GRATING IS AVAILABLE PAINTED, NOT DR GALVANIZED AND UNFINISHED.

2. FISH PLATES SHALL BE USED ANYWHERE ADDITIONAL SUPPORT BETWEEN ANGLE IRON GATE BARS IS REQUIRED. FISH PLATES ARE USED TO CONNECT BARS VERTICALLY, AND TO MAINTAIN BAY SPACING. FISH PLATES SHALL BE CONTINUOUSLY WELDED TO THE GATE BARS, ON BOTH SIDES, AT ALL CONTACT POINTS.
Table of Grating Spans

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<tr>
<th>Bearing Bar Size</th>
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<th>Cross Bar Spacing</th>
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Steel beams will be used to reduce all grating spans to a maximum of seven from the shaft space of these mats (12), or less. W4 x 12 steel beams will be used for shaft beam, these feet (72) and twenty feet (20), W4 x 20 steel beams may be used.

Notes:
1. A grade beam if required shall be installed around the entire perimeter of the steel grate.

Shaft Steel Grate with 1-Beam Support

Various National Parks
Intermountain and Pacific West Regions

No. Scale: 1/10" = 1'-0"
1. **SQUARE TUBE BAT GATE PROFILE**
   NO SCALE

2. **LOCKING BAR DETAIL**
   NO SCALE

3. **LOWER HALF OF GATE OPTIONAL TORTOISE ACCESS**
   NO SCALE
1. A variety of top closures are possible for all cupolas. Illustrated is welded steel grating. But additional options may be used. Refer to details COT-1 and COT-1-4 (1) (2) COT-6 for additional top closure methods.

2. A grade beam shall be used when shaft collar is irregular, or composed of incompetent material. The top shall be level and square.

### Shaft Closure Square Tubing Cupola

No Scale

### Shaft Square Tubing Cupola Footing Section

No Scale
**ADIT POLYURETHANE FOAM (PUF) CLOSURE WITH BACKFILL**

**NOTES:**

1. Thickness of PUF fill shall equal the passage height as measured along the ceiling drop block.

2. Temporary forms may be constructed of any material capable of sustaining an initial lift of foam materials. Commonly used include plywood, plastic sheeting, dimension lumber, rebar, expanded metal, foam board, and fence materials.

3. Optional PVC pipe lengths shall be joined using slip couplings and PVC cement.
**NOTES:**

1. The optional ventilation/steam pipe shall be placed through the bottom form unobstructed by cross-members. The ventilation/steam pipe shall be open to the shaft after installation of the form. The ventilation pipe shall be supported by a top or other load-bearing device such that the joint is not placed on the bottom form.

2. The optional 2" inch steel ventilation/steam pipe shall be installed in the approximate center of the pit installation and shall extend vertically to the lines and grades as shown on the plan in the drawing.

3. The optional steel ventilation/steam pipe shall extend up through the entire pit and backfill material to provide ventilation and drainage of the structure. The 2" inch steel pipe shall be 3 feet above ground level, and a 180° turn bend installed.

4. Clean debris other than free, attached or permanent structures from the shaft before pit is installed as directed by the contracting officer. Historic structural features shall be preserved and maintained; any historic debris removed shall be placed nearby to the size of the opening.

5. The formwork shall be installed below the surface of the ground. The depth of form required to place a shaft shall be determined by the following formula: The depth of pit in vertical openings shall be at least 1.5 times the largest dimension of the opening. In circular or near circular features, the minimum depth shall be 1.5 times the diameter (or average diameter) of the feature. Cross-member supports may be placed as indicated, and sufficient clearance shall be provided to avoid making the pit too deep. Pit shall be left open as indicated, but the pit shall be backfilled as soon as possible. Any existing pipes shall be backfilled as indicated by the arrows to avoid placing personnel inside the shaft.
**Plan – Wire Netting Shaft Closure**

**Notes:**
1. Netting anchors shall be split set stabilizers 12" x 24" minimum length, manufactured by International Rollform, or approved equivalent.
2. As directed by the contracting officer, clean soil and loose rock between edges of the shaft or slope opening and edges of the net prior to installation.
3. Bury the outer boundary of the net, including the perimeter cable and anchors, to a minimum depth of 12 inches.
4. Depth and placement of split set stabilizers are indicated in the contract specifications, and shall be installed as per manufacturer's recommendations.
5. Optional concrete perimeter anchor blocks or cap are recommended for added support. One piece of #4 rebar shall be placed in the trench, centered in the concrete.