

Figure 126. Overview of U12n Tunnel portal pad, main portal (right) and extension portal (left), view northwest (2008).



Figure 127. Overview of U12n Tunnel portal pad, view east (2008).



Figure 128. Overview of U12n Tunnel portal pad upper bench (left) and muckpile lower bench (center/right), view east (2008).



Figure 129. Feature 1, portal, U12n Tunnel, view west (2008).

Feature 2

Feature 2 (Figure 130) is a concrete pad at UTM coordinates 571789 E, 4117353 N at an elevation of 6,030 ft (1,837.9 m). The 6 ft x 6 ft x 6 inch (1.8 x 1.8 x 0.15 m) pad is on a raised dirt pad just northeast of the portal entrance, has a smooth surface, and no indications that anything was attached to its surface. The block could have been the foundation for an air receiver.

Feature 3

Feature 3 (Figures 131-132) consists of the U12n Tunnel emergency evacuation plan sign, a retaining wall, two concrete pads, and a metal pipe at UTM coordinates 571808 E, 4117341 N and an elevation of 6,030 ft. The sign is 6 ft (1.8 m) tall and 8 ft wide (northwest-southeast) and constructed of 6-inch (15.2 cm) I-beam posts and a 1/4-inch (0.6 cm) metal plate sign board. The sign has a white background and a plan view schematic in black of the U12n Tunnel complex. On the back (north) of the sign are four electrical panel boxes attached to three 1 1/2-inch channel iron rails bolted to the I-beam posts. The retaining wall is 41 ft (12.5 m) northwest-southeast and consists of 6-inch I-beam posts extending vertically 2 ft 6 inches above the portal pad. Milled lumber lagging has been placed between the vertical posts to support the pad. The lagging is 2 x 12 inch (5.1 x 30.5 cm) beams of various lengths. Concrete (unfinished) has been poured near the east end of the wall to stabilize the surface.

One 2 ft (61 cm) diameter concrete pad is 6 ft 8 inches (2 m) southwest of the west end of the sign. A 3-inch (7.6 cm) galvanized conduit has been cut flush with the concrete surface of the concrete. The second pad is 2 ft in diameter and 7 ft (2.1 m) southwest of the east end of the sign. A 2-inch metal pipe extends near the east end of the wall and appears to support the wood lagging which is broken in this area.

Feature 4

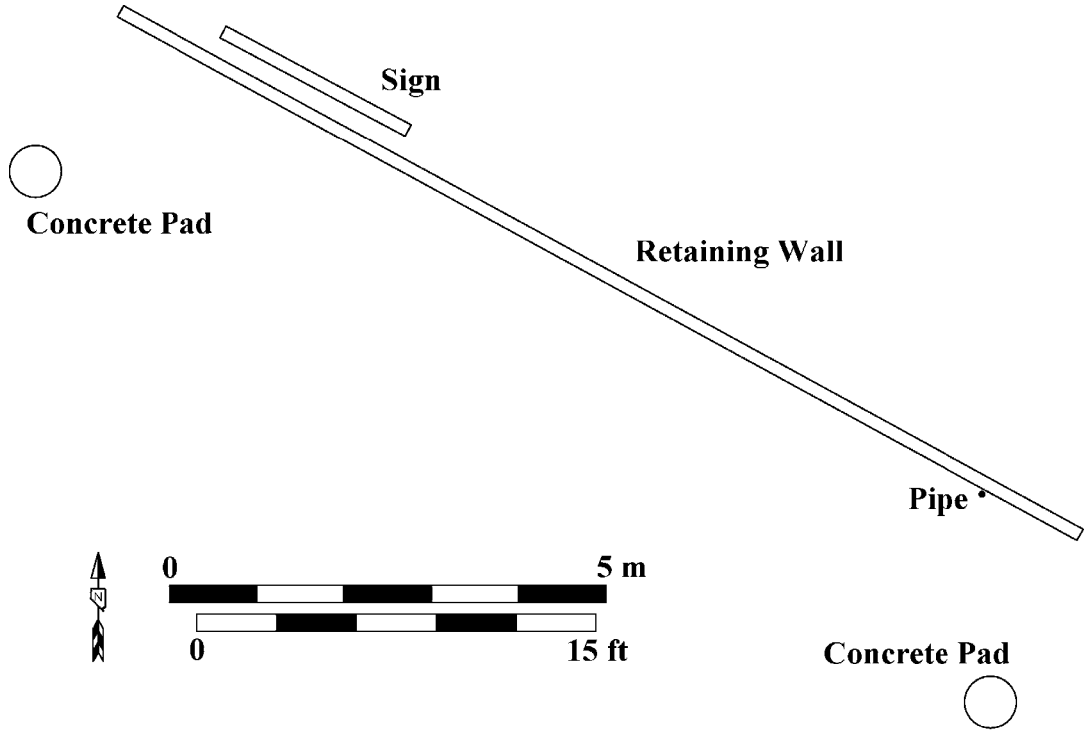
Feature 4 (Figure 133) is the concrete foundation for the re-entry substation at UTM coordinates 571790 E, 4117328 N. It measures 17 ft (5.1 m) northwest-southeast and 30 ft (9.1 m) northeast-southwest. Originally, the foundation had a smooth finish but the edges and surface are deteriorating and have exposed 1/2-inch (1.3 cm) rebar used to strengthen the concrete. Various sized galvanized conduits have been cut flush with the surface and sediments from the mesa face cover the northwest corner of the pad. Associated artifacts are insulated cable and galvanized conduit fragments.

Feature 5

Feature 5 (Figure 134) is the concrete foundation for the entry control building (12-932) at UTM coordinates 571784 E, 4117310 N. It is roughly L-shaped and measures 50 ft 3 inches (15.3 m) northwest-southeast by 51 ft (15.5 m) northeast-southwest. Along the south edge near the southeast corner is a 17 x 5 ft (5.2 x 1.5 m) ramp. At the southwest corner is a 3 x 4 ft (0.9 x 1.2 m) pad that probably is associated with a personnel entrance. The surface has a smooth finish and has been cut to allow for expansion. The outside edge of the foundation is rimmed with 3-inch angle iron. Metal plates along the exterior top surface once supported I-beams of the structures frame. Staining at the



Figure 130. Feature 2, concrete pad, U12n Tunnel, view southwest (2008).



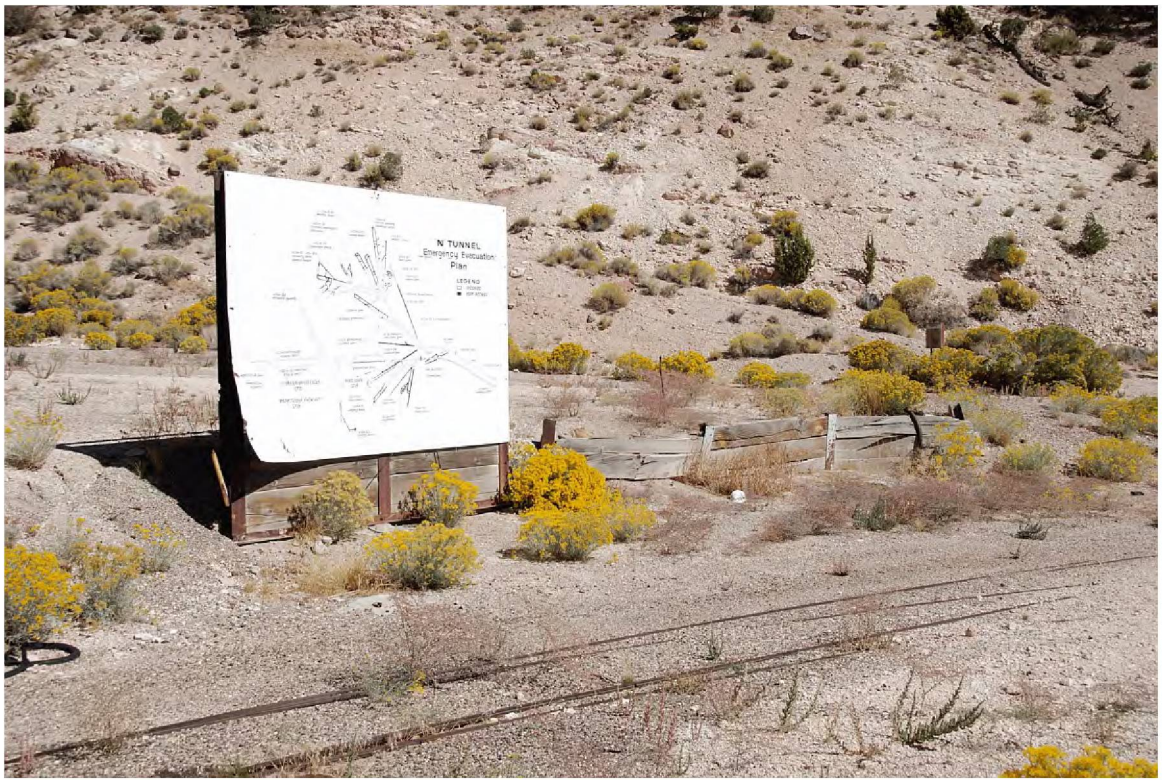




Figure 131. Plan view and photograph of Feature 3, sign and retaining wall, U12n Tunnel, view northeast (2008).

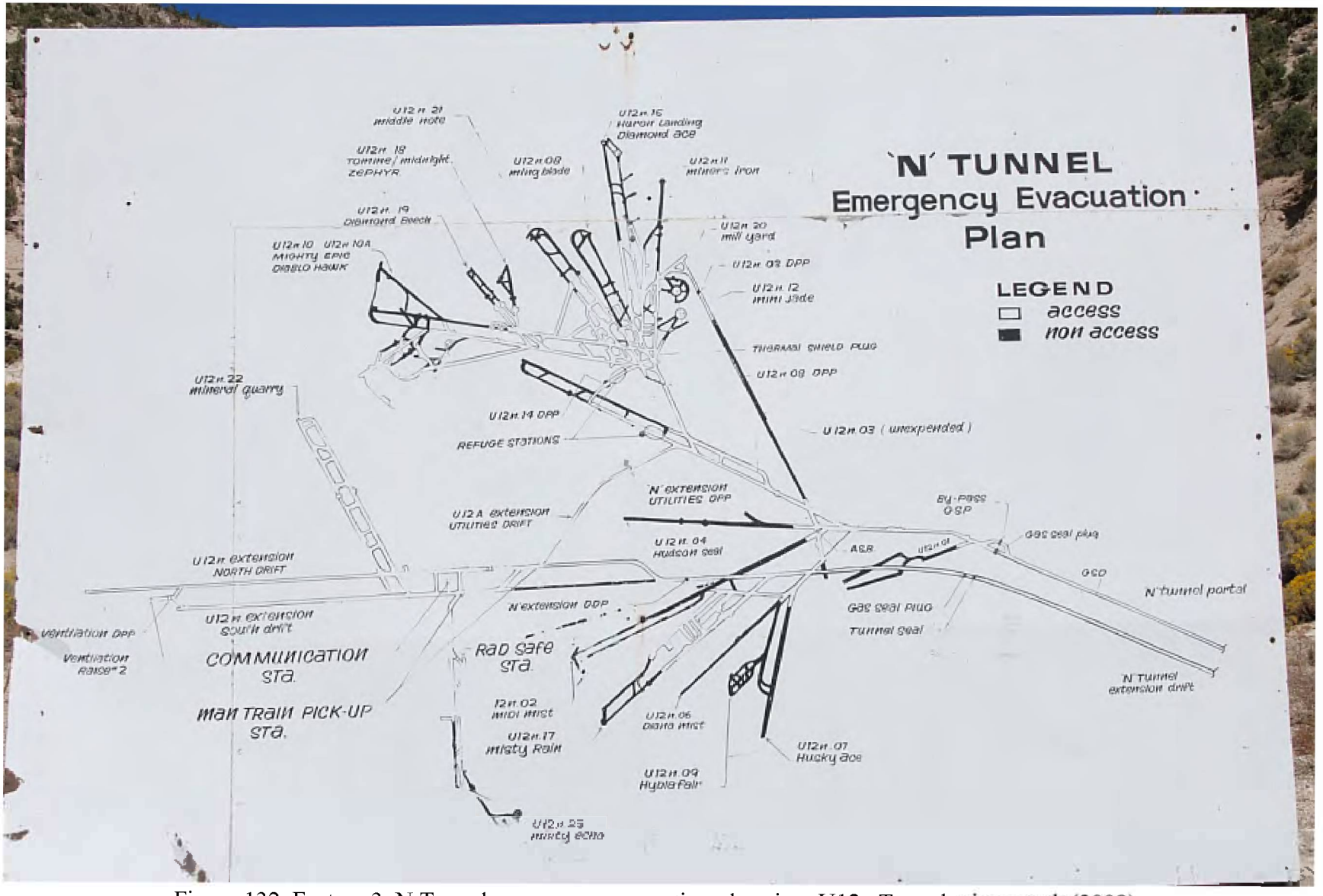



Figure 132. Feature 3, N Tunnel emergency evacuation plan sign, U12n Tunnel, view north (2008).



Figure 133. Feature 4, concrete foundation (re-entry substation), U12n Tunnel, view northeast (2008).

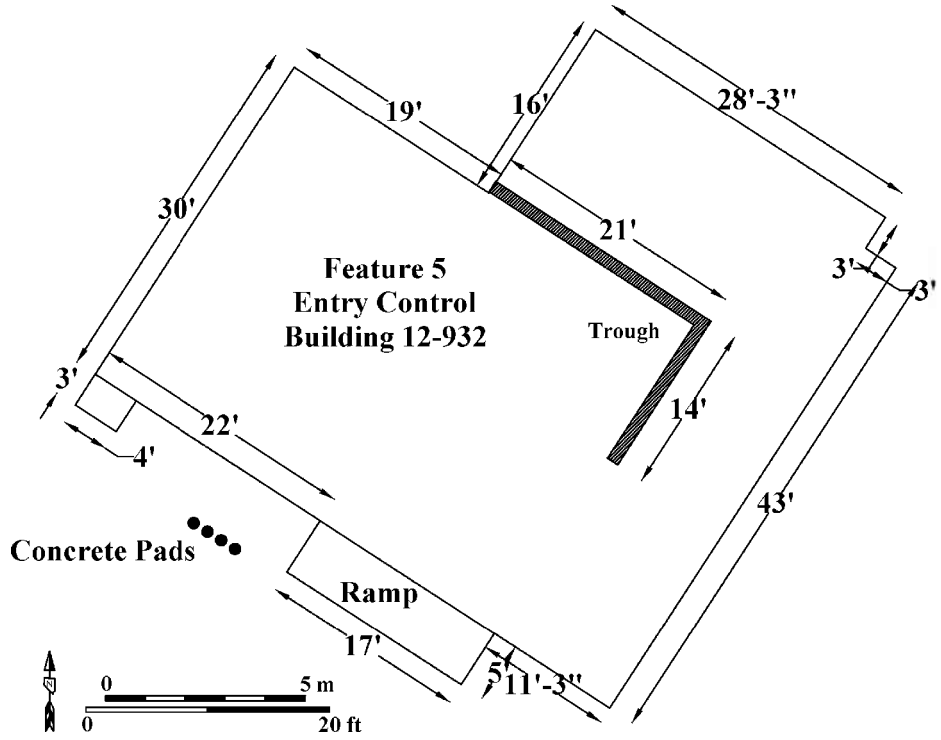



Figure 134. Plan map and photograph of Feature 5, concrete foundation (entry control building), U12n Tunnel, view northwest (2008).

southeast corner indicates the surface was covered with 1 ft asphalt floor tiles. An L-shaped metal trough extends 21 ft (6.4 m) southeast from the west edge of the foundation and then 14 ft (4.3 m) southwest. Four 4-inch concrete pads are 5 ft from the south edge of the foundation. Centered in the pads are 4-inch (10.2 cm) pipes that has been cut flush with the surface of the concrete. The pads are barely visible as they are covered with sand and gravel. Associated artifacts are insulated cable, galvanized metal, glass, nails, wire, metal plates, and milled lumber fragments.

Feature 6

Feature 6 (Figure 135) is a storage alcove at UTM coordinates 571760 E, 4117316 N. The 23 ft (7 m) wide alcove was excavated into the mesa face but is barely visible as it has been covered with a dirt mound. A small opening above the mounded soil allows partial visibility into the feature. The top side of the office ceiling is visible and is constructed of 2 x 4 inch joists and sheet rock. Electrical conduits for lighting is also visible among the 2 x 4 inch joists. The rock face above the entrance is covered with wire mesh and sealed with shotcrete. Associated artifacts are metal plates, insulated wire, and metal pipe.

Feature 7

Feature 7 (Figure 136) is the U12n Tunnel extension portal at UTM coordinates 571747 E, 4117306 N. The portal opening is behind two 10 ft wide by 20 ft (6.1 m) tall metal gates inside a 20 x 20 ft metal frame. Attached to the north gate is a metal sign labeled RESTRICTED ACCESS GATE and contains telephone numbers to call for access into the tunnel. Visually, the tunnel is arched with steel sets placed at intervals along the tunnel with wood lagging between the sets to support the surrounding rock. The first 130 ft (39.6 m) of the tunnel was mined with an Alpine miner in preparation for the use of a tunnel boring machine. The distance between the sets could not be measured because the entrance gates were locked and the tunnel was unaccessible. The sets 18 ft (5.5 m) wide by 18 ft in height. The tunnel has been plugged with a 6 inch (15 cm) thick shotcrete bulkhead approximately 100 ft (30.1 m) from the portal entrance. Exiting the tunnel are two metal rail lines. The cliff face (brow) above the portal has been covered with wire mesh and sealed with shotcrete to prevent spalling. A 4 ft x 3 ft x 1 ft telephone terminal box is mounted on 3-inch channel iron posts and set 35 ft (10.7 m) north of the portal. The box is labeled WIL-TEL BUILDING 932-2, which was the structure supported by the foundation at Feature 5. Insulated cables extend from the panel to the extension portal and the cable trough (Feature 11) above the portal. Other insulated cables extend from north and south along the cliff face and around but do not enter the portal.

Feature 8

Feature 8 (Figures 137-141) is electrical substation 12-5. It consists of three concrete foundations, a wood platform, a concrete retaining wall, conduit , an electrical panel backboard, and the bases of four powerline poles. The northern concrete foundation was used to support a 500 kilovolt backup generator. The foundation is approximately 20 ft east-west and 8 ft north-south and at UTM coordinates 571741 E, 4117267 N. The north and east sides of the foundation are covered with soil and exact dimensions were not obtained. The surface was originally smooth but is now deteriorating and cracked. West and north of the foundation is a wood platform at UTM coordinates 571735 E, 4117273 N. It is 16 ft (4.9 m) north-south by 7 ft (2.1 m) east-west and is constructed of 6 x 12 inch



Figure 135. Feature 6, covered storage alcove, U12n Tunnel, view north (2008).



Figure 136. Feature 7, extension portal, U12n Tunnel, view northwest (2008).

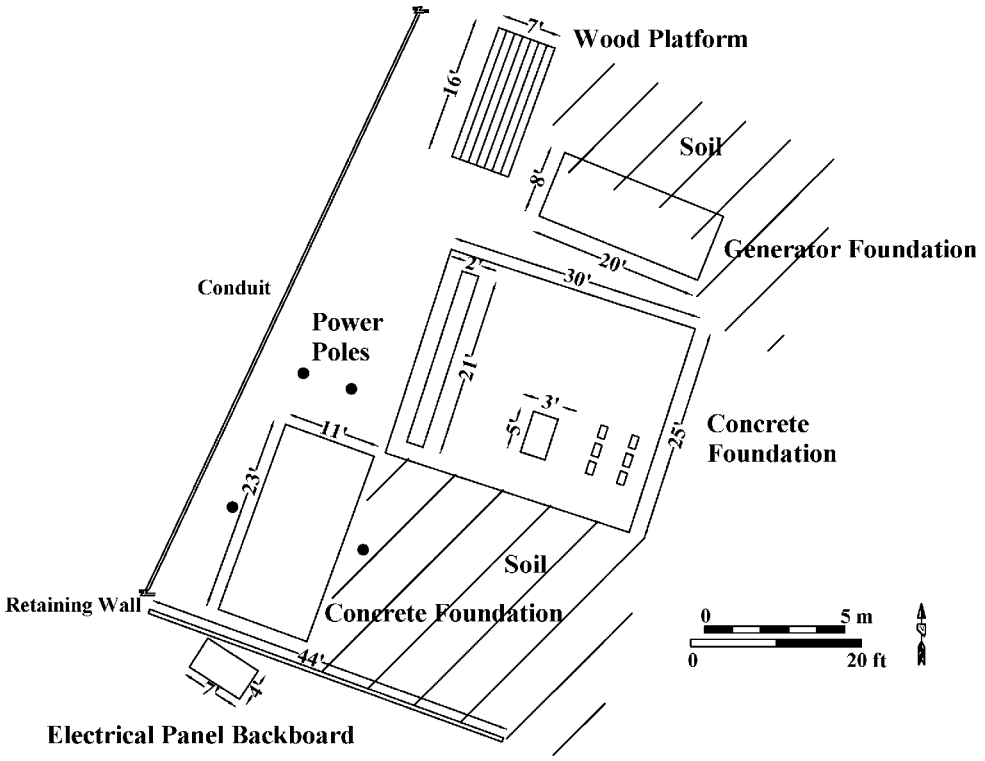





Figure 137. Plan view of Feature 8, electrical substation 12-5, and photograph of north generator foundation, view west (2008).



Figure 138. Feature 8, wood platform and center concrete foundation, U12n Tunnel, view northeast (2008).



Figure 139. Feature 8, south concrete foundation and retaining wall, U12n Tunnel, view west (2008).



Figure 140. Feature 8, cut poles and south foundation, U12n Tunnel, view northwest (2008).



Figure 141. Feature 8, concrete retaining wall and electrical panel backboard, U12n Tunnel, view northeast (2008).

milled lumber beams and 2 x 12 inch milled lumber decking. The wood platform is a walkway near conduit that extends along the edge of the portal pad.

The center concrete foundation is 25 ft north-south by 30 ft east-west and at UTM coordinates 571740 E, 4117263 N. Along the west edge is a 2 ft wide (east-west) trough that is 5 ft (1.5 m) deep. The trough is partially covered with seven metal panels labeled 1-7. Between the panels are 3-inch galvanized conduits that extend above the surface and contain three 1-inch (2.5 cm) insulated cables. The conduit in the trough was originally attached to other conduit that ends at various points along the cliff face and to the cable trough (Feature 11). This conduit is supported by metal stands (H-shaped) constructed of 1 1/2-inch channel iron. A 5 ft north-south by 3 ft east-west metal subterranean access plate is 5 ft from the south edge and 15 ft (4.6 m) from the west edge. Six 1 ft 6 inch x 10 inch (45.7 x 25.4 cm) metal plates with a rubberized surface are in a rectangular shape 7 ft from the west edge and 5 ft from the south edge. Impressions in the concrete indicate they supported a 8 x 6 ft piece of unknown equipment. Various sized conduits and bolts extend above the surface of the foundation.

The southern concrete foundation is 23 ft (7 m) north-south by 11 ft (3.4 m) east-west and at UTM coordinates 571723 E, 4117253 N. A 3 ft (91.4 m) square area at the northeast corner of the pad is 6 inches above the foundation. Extending through the surface and the south side of the pad are 2-inch and 3-inch galvanized conduits. On the surface near the foundation is a 2 ft x 2 ft x 10 inch (60.9 x 86.4 x 25.4 cm) electrical panel box. Four 1ft 4 inch (40.6 cm) diameter powerline poles have been cut near the surface and are on the east, west, and north sides of the foundation.

The concrete retaining wall is along the south edge of the south foundation and is 44 ft (13.4 m) in length (east-west) and 6 inches wide. It ranges in height from 2 to 3 ft above the portal pad surface. Along the south side near the west corner of the retaining wall is a 7 ft tall by 4 ft wide electrical panel backboard lying on the surface. The backboard is constructed of 4 x 4 inch milled lumber post and covered with 3/4 inch (1.9 cm) plywood (both side of the posts). The posts have been broken at the ground surface. Attached to the top side of the backboard are two electrical junction panels. Associated artifacts are insulated cable, galvanized conduit, plywood, nuts, bolts, washers, metal fragments, and rope.

Feature 9

Feature 9 (Figure 142) is a concrete foundation at UTM coordinates 571717 E, 4117250 N at an elevation of 6,000 ft (1,828.8 m). The 40 ft 6 inch by 40 ft 6 inch (12.3 x 12.3 m) square foundation was constructed in two stages. An outer 8 inch (20.3 cm) wide curbing was poured first and provided the form for the foundation. The concrete had a smooth finish that has deteriorated to a cracked and rough surface. Two metal rail lines cross east-west and are centered north-south in the foundation. Four 1 x 1 ft impressions near the metal rails indicate the location of beams that possibly supported a superstructure.

Feature 10

Feature 10 (Figures 143-145) is the foundation for the portal recording station at UTM coordinates 571700 E, 4117258 N at an elevation of 6,000 ft. The feature consists of one concrete foundation,



Figure 142. Feature 9, concrete foundation, U12n Tunnel, view northwest (2008).

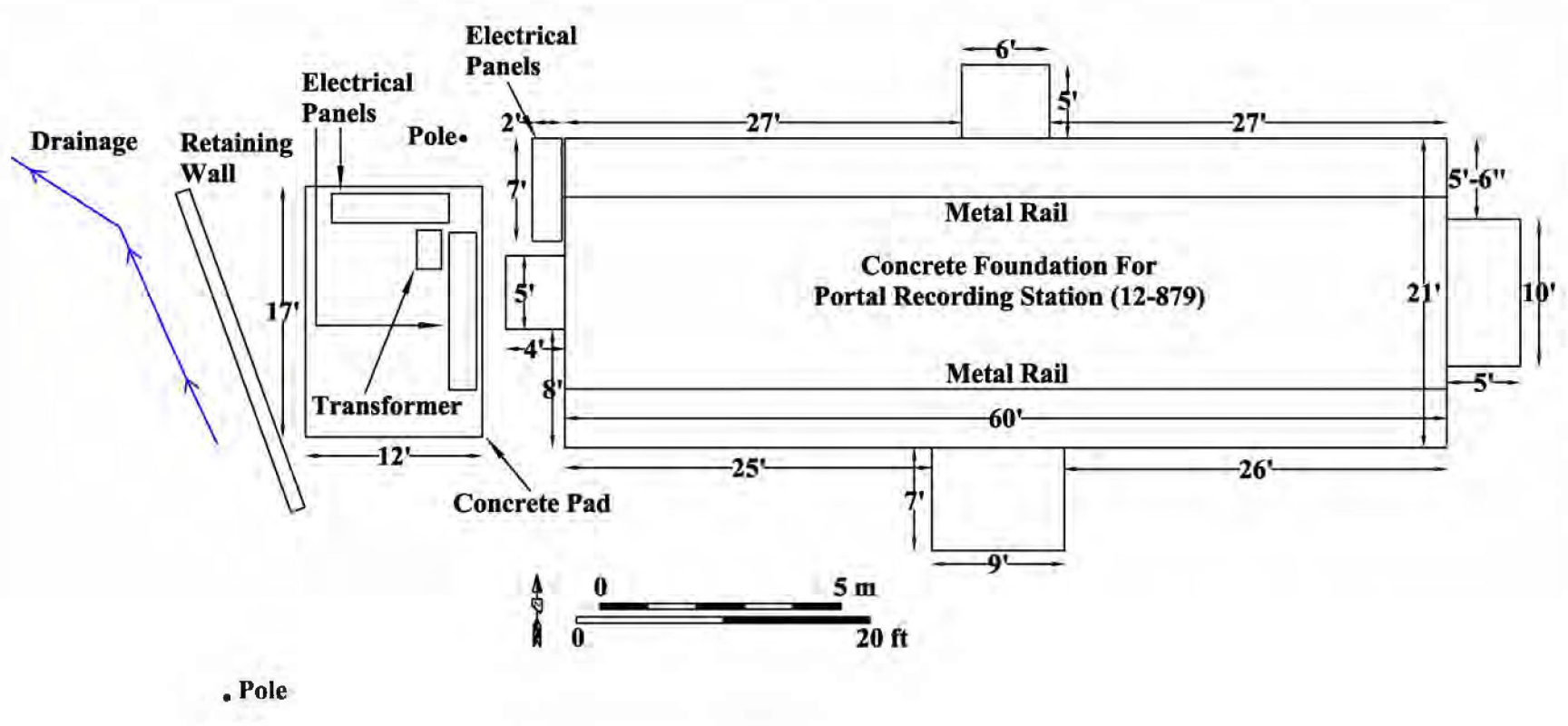



Figure 143. Plan view of Feature 10, portal recording station, U12n Tunnel.



Figure 144. Feature 10, concrete foundation for portal recording station and electrical panels, U12n Tunnel, view west (2008).




Figure 145. Feature 10, electrical panels and retaining wall, U12n Tunnel, view north (2008).

one electrical panel backboard, one concrete pad with two electrical panel backboards and one electrical transformer, one concrete retaining wall, and two power poles. The concrete foundation measures 60 ft (18.3 m) east-west by 21 ft (6.4 m) north-south. Two metal rails extend east-west and are 4 ft from the north and south edge of the foundation. Four concrete pads are attached to the foundation. On the east end is a 5 ft east-west by 10 ft north-south concrete pad that is 5 ft 6 inches (1.7 m) from the northeast corner. Centered on the north side of the foundation is a 6 ft east-west by 5 ft north-south concrete pad and centered on the south side is a 9 ft east-west by 7 ft north-south concrete pad. On the west end is a 5 ft north-south by 4 ft east-west concrete pad that is 8 ft from the northwest corner. The pads were possibly entry points into the facility.

At the northwest corner of the foundation is an 7 ft (2.1 m) north-south by 6 ft 6 inch (2 m) tall electrical panel backboard constructed of 1 1/2-inch channel iron. Attached to the west side are three 2 ft 4 inch x 2 ft x 8 inch (71.1 x 81.3 x 20.3 cm) electrical panels. West of the foundation is a 17 ft north-south by 12 ft (3.7 m) east-west concrete pad with two electrical panel backboards. The east backboard is 10 ft 8 inches (3.3 m) long by 7 ft 2 inches (2.2 m) tall and constructed of 3-inch and 1 1/2-inch channel iron. On the south end of the backboard are six ELGAR HIGH ISOLATION transformers. Centered on the backboard are two 1 ft 10 inch x 1 ft 4 inch x 9 inch (55.8 x 40.6 x 22.8 cm) electrical switch boxes and on the north end is a 3 ft x 1 ft 8 inch x 8 inch (91.4 x 50.8 x 20.3 cm) electrical panel box. The north backboard is 8 ft (2.4 m) east-west by 7 ft (2.1 m) tall and constructed of 3-inch channel iron and metal plate. Attached to the backboard are various sized switch boxes. The electrical transformer is south of the north backboard and west of the east backboard and is 2 ft 8 inches x 1 ft 8 inches x 2 ft 2 inches (81.3 x 50.8 x 66 cm).

West of the concrete pad with electrical panels is a concrete retaining wall to control runoff from the slope to the northwest. The wall is 23 ft long by 3 ft tall by 1 ft thick and has been broken near the north end. Associated artifacts are one wood pallette, one plastic box, insulated communications wire and cable. Feature 11 (cable trough) is along the north side of this feature and cables have been cut that once extended from the trough into the portal recording station.

Feature 11

Feature 11(Figure 146) is a cable trough (tray) and chain link fence that extends along the cliff face above the portal recording station (Feature 10) and ends above the U12n portal (Feature 1). The cable trough extends 505 ft (153.9 m) with the south end at UTM coordinates 571678 E, 4117257 N and the north end at coordinates are 571725 E, 4117256 N and an elevation (north end) of 6,040 ft (1,841 m). The feature is constructed of two aluminum side rails and rungs (ladder effect). The trough is supported by 3 ft tall triangular supports made of 1 1/2-inch galvanized angle iron. The height of the trough varies due to the unevenness of the terrain. Insulated cables on the trough exit at various intervals near the previously recorded features. A 4-ft chain link fence supported by metal T posts is along the west side of the trough, designed to catch any debris sliding down the slope to the portal pad.

Feature 12

Feature 12 (Figure 147) is two concrete foundations (joined) for the maintenance shop and RCMC facility. The foundations are at UTM coordinates 571710 E, 4117237 N at an elevation of 6,000 ft



Figure 146. Feature 11, cable trough and chain link fence, U12n Tunnel, view northwest (2008).

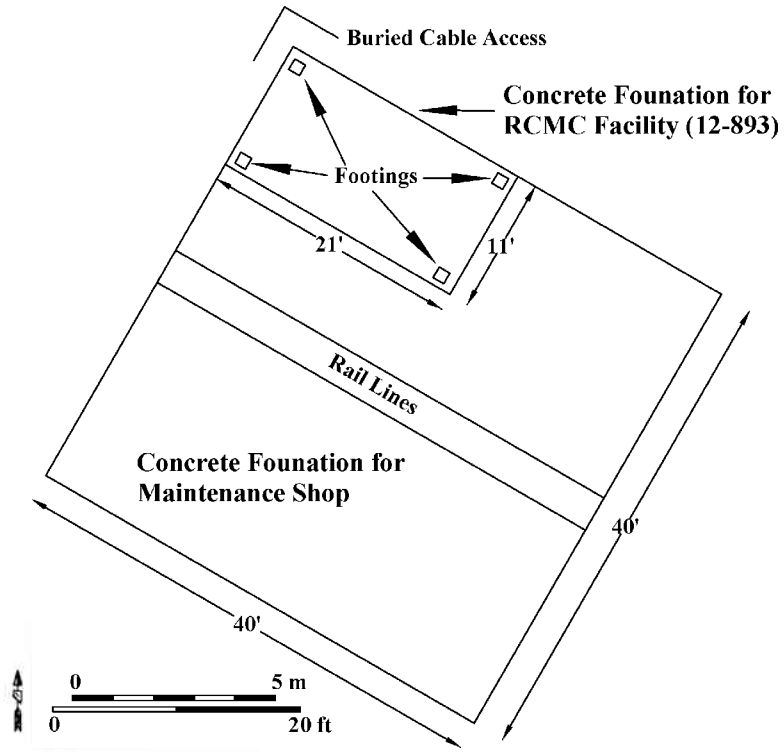



Figure 147. Plan map and photograph of Feature 12, concrete foundations for maintenance shop and RCMC facility (upper right), U12n Tunnel, view west (2008).

and were constructed in two stages. The south maintenance shop foundation is 40 x 40 ft (12.2 x 12.2 m) with an outer 8 inch wide curbing that was poured first and provided the form for the shop foundation. Two metal rail lines cross east-west and are centered north-south on the foundation and metal conduits have been cut flush with the surface of the foundation. The north foundation was for the RCMC facility (12-893), a 21 ft east-west by 11 ft north-south concrete pad that is raised 4 inches above the maintenance shop foundation. At each corner of the raised area are 1 ft square metal plates that supported I-beam posts.

Feature 13

Feature 13 (Figure 148) is a microwave tower at UTM coordinates 571694 E, 4117236 N at an elevation of 6,000 ft. The tower consists of four metal legs, cross bracing, two platforms, and five parabolic disks. The tower appears to have been erected in three sections. The lower section consists of the legs and cross bracing. The legs are 9 x 9 inch (22.9 x 22.9 cm) metal tubes, 20 ft tall and spaced 21 ft apart. They are supported by 3 ft x 3 ft concrete blocks of varying height. The northeast leg is additionally supported by a 7 ft north-south by 10 ft east-west concrete pad. A flat metal plate is welded to the top and bottom end of each leg to provides a mechanism to bolt the legs of the middle section to the lower section and to attach diagonal bracing within each section. Horizontal I-beam bracing is set every 10 ft of height. The diagonal bracing is 2 inch diameter round tubular metal that is threaded on each end to provide a tensioning mechanism for the structure. The round bracing is also attached to a rectangular metal plates at the mid point of each horizontal brace. A caged ladder is attached to the southeast corner of the tower. The center section of the tower is similar to the lower section in width (21 ft), height (20 ft), and construction. The upper section of the tower is triangular in shape and the legs are 6 x 6 inch I-beam (measurements are approximations). The southeast face is 20 ft tall with diagonal bracing connecting the top of the upper section to the top of the center section on the northwest face. Two horizontal platforms span the southeast face of the tower at approximately 50 ft (15.2 m) and 60 ft above the surface. These provide access to five parabolic dishes. A 10 ft diameter dish is mounted at the lower platform level near the southeast corner. Mounted directly above the previous dish is a 8 ft diameter dish near the southeast corner on the upper platform level. A second 8 ft diameter dish is on the northeast corner on the upper lever. A 2 inch diameter metal pipe is centered vertically between the lower and upper level platforms. Attached to this pipe are two 3 ft diameter parabolic dishes. A small L-shaped aluminum rod antenna is attached to the southwest corner of the upper platform. Artifacts associated with the tower are insulated cable, aluminum cans, and metal fragments.

Feature 14

Feature 14 (Figure 149) is the concrete foundation for the Sandia National Laboratories office (12-905) at UTM coordinates 571719 E, 4117168 N at an elevation of 5,980 ft (1,822.7 m). The foundation is 60 ft north-south by 20 ft 8 inches (6.3 m) east-west with three small concrete pads around the perimeter. The surface of the foundation has been smoothed and there is a 4 inch wide by 1/4 inch deep impression around the perimeter for the attachment of a footer (plate) probably for a metal building. Attached to the north end of the foundation is a 12 ft east-west by 6 ft north-south rough surfaced concrete pad. Centered in the pad is a 8 ft east-west by 4 ft north-south metal ramp that facilitated forklift traffic smoothly over the threshold. There are no indications (bolts, pins, etc.) that the metal ramp was secured to the concrete. Attached to the foundation near the southwest



Figure 148. Feature 13, microwave tower, U12n Tunnel, view northwest (2008).

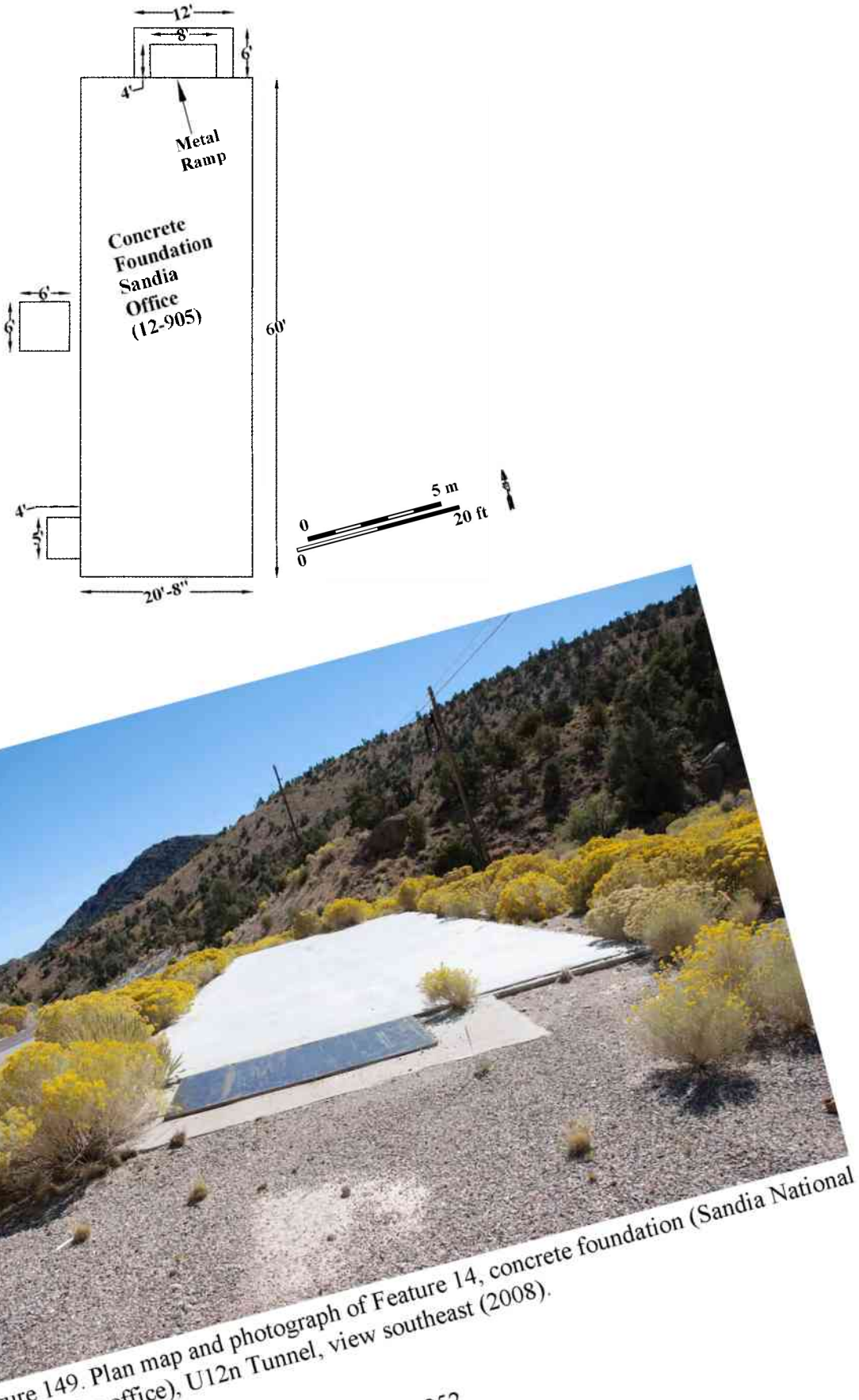



Figure 149. Plan map and photograph of Feature 14, concrete foundation (Sandia National Laboratories office), U12n Tunnel, view southeast (2008).

corner is a 5 ft north-south by 4 ft east-west rough surface concrete pad that was associated with a pedestrian entrance. Centered along the west edge and 1 ft 4 inches (0.4 m) to the west of the foundation is a 6 x 6 ft rough surface concrete pad used to support heating and air-conditioning equipment.

Feature 15

Feature 15 (Figure 150) is an electrical panel at UTM coordinates 571690 E, 4117154 N at an elevation of 5,980 ft. The electrical panel is 2 ft 6 inches tall by 1 ft 8 inches (50.8 cm) wide by 8 inches deep. It is mounted to two 1 1/2-inch channel iron legs that are 5 ft 8 inches (1.73 m) tall. Exiting the bottom of the panel are two insulated cables that have been cut, leaving only a short segment on the surface.

Feature 16

Feature 16 (Figure 151) is a wood light pole at UTM coordinates 571739 E, 4117217 N at an elevation of 6,015 ft (1,833.4 m). The 6 x 6 inch milled lumber pole is approximately 8 ft tall with a 1 ft 4 inch x 7 inch x 3 inch (40.6 x 17.8 x 7.6 cm) electrical junction box mounted to the north side of the pole. An 8 x 8 inch halogen light fixture is attached to galvanized conduit that extends 1 ft above the post.

Feature 17

Feature 17 (Figure 151) is a metal sign at UTM coordinates 571737 E, 4117218 N at an elevation of 6,010 ft (1,831.8 m). The sign is 2 ft 6 inch square and mounted on two metal T posts. The sign is painted white with red lettering, FIRE TRUCKING PARKING ONLY.

Feature 18

Feature 18 (Figure 152) is the concrete storage pad for shotcrete super sacks at UTM coordinates 571769 E, 4117246 N. The pad is 120 ft north-south by 35 ft east-west and concrete has been smoothed and expansion joints cut into the surface.

Feature 19

Feature 19 (Figure 153) is a vertical pipe at UTM coordinates 571743 E, 4117218 N. The pipe is 4 inches in diameter, 3 ft 8 inches tall, and is probably a vent or manifold on a buried water line. On the north side of the pipe are three 1-inch valves spaced 6 inches apart.

Feature 20

Feature 20 (Figure 154) is an electrical panel backboard at UTM 571745 E, 4117203 N. The backboard is 6 ft (1.8 m) north-south by 5 ft 6 inches (1.7 m) tall and constructed of 1 1/2-inch channel iron. It has an 8 inch x 8 inch x 4 ft (20.3 x 20.3 x 121.9 cm) horizontal junction box with 1-inch and 2-inch conduit extending from the box to the subsurface. Extending 1 ft 8 inches above the surface near the south leg is a vertical piece of 6-inch I-beam.



Figure 150. Feature 15, electrical panel box, U12n Tunnel, view northwest (2008).



Figure 151. Feature 16, light pole and Feature 17, sign, U12n Tunnel, view northeast (2008).



Figure 152. Feature 18, concrete storage pad, U12n Tunnel, view southwest (2008).



Figure 153. Feature 19, pipe, U12n Tunnel, view northwest (2008).



Figure 154. Feature 20, electrical panel backboard, U12n Tunnel, view north (2008).

Feature 21

Feature 21 (Figure 155) is the concrete foundation for the tunnel boring machine mechanics shop (12-906) at UTM coordinates 571769 E, 4117196 N. The foundation is 60 ft north-south by 21 ft 4 inches (6.5 m) east-west with a smooth surface and there is a 4 inch wide by 1/4 inch deep impression around the perimeter for the attachment of a footer (plate) for a metal building. Two metal rail lines extend the length of the foundation and are 6 ft from the west edge. Attached to the north end of the foundation and 1 ft 4 inches from the northwest corner is a 12 ft east-west by 6 ft north-south concrete ramp. The ramp slopes 4 inches down to the surface. Adjacent to the ramp is a 6 ft east-west by 4 ft north-south concrete pad that is probably the location of a personnel entrance into the building. The metal rail lines cross the ramp at the north end of the foundation. Attached to the south end of the foundation and 2 ft from the west edge is a 10 ft east-west by 6 ft north-south concrete ramp. The ramp slopes 4 inches down to the surface. Adjacent to this ramp is a 6 ft east-west by 4 ft north-south concrete pad that is probably the location of a personnel entrance into the building.

Feature 22

Feature 22 (Figure 156) is a metal pipe manifold at UTM coordinates 571800 E, 4117175 N. The manifold is for water and consists of a 4-inch riser (Victaulic connections) that reduces down to 2 inches and capped with a four way T. The east and west sides of the T contain 2-inch to 1-inch reducers with 1-inch pipe and ball valves. A hose is attached to the east ball valve and the west 1-inch pipe turns 90 degrees and goes underground on the west. A 3/4-inch ball valve is attached to the top of the four way T.

Feature 23

Feature 23 (Figure 157) is a loading ramp at UTM coordinates 571811 E, 4117198 N. The ramp consists of a concrete face that is 14 ft north-south by 3 ft east-west with 3 1/2-inch (8.9 cm) channel iron along the top edge of the concrete. In the west face of the concrete, centered vertically and 2 ft from the north and south edges, are two 1 ft x 8 inch plywood lined cavities. On the top surface and at each end of the concrete are 2 1/2-inch pipes (one on each end) cut flush with the surface. These pipes are for the insertion of stop signs found on the surface near the ramp. A chain that once connected both stop signs, forming a barrier across the face of the ramp, is still attached to one of the signs. The ramp is compacted soil and gravel that slopes over the 23 ft (7 m) length from 3 ft in height at the concrete face to the surface. Associated artifacts are channel iron and milled lumber.

Feature 24

Feature 24 (Figure 158) is a pipe manifold for compressed air and electrical junction box at UTM coordinates 571828 E, 4117173 N. The manifold consists of one 3 ft 7 inch (1.1 m) tall 6-inch pipe and one 2 ft tall 4-inch pipe. The 4-inch pipe extends above the surface and turns 90 degrees, contains a 4-inch butterfly valve, and is attached to the 6-inch pipe with Victaulic connections. Above this connection on the 6-inch pipe are two 4-inch welded collars. Attached to the collars are short nipples and hammer unions that have been sealed with a welded plate. Below this connection are a 2-inch and a 1-inch collar welded in the 6-inch pipe and sealed with flat plugs. On the south

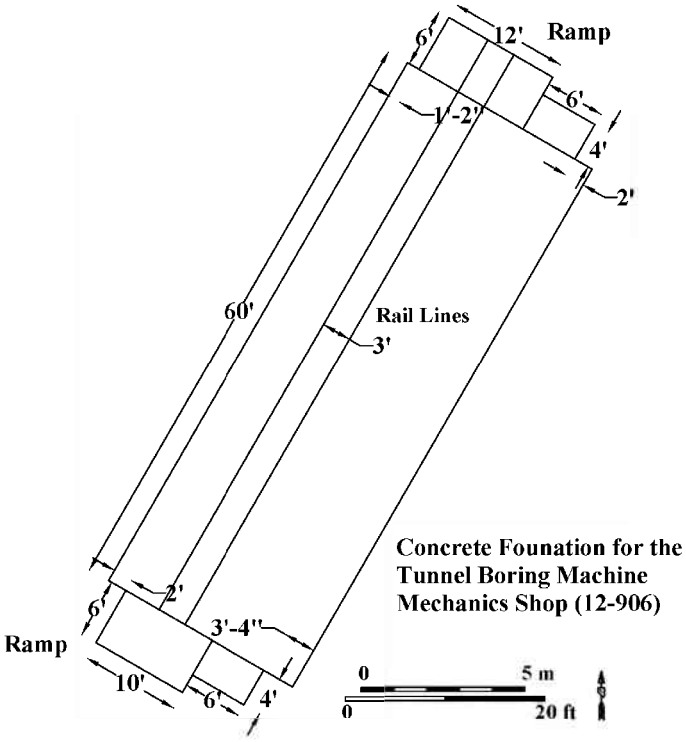





Figure 155. Plan map and photograph of Feature 21, concrete foundation for the tunnel boring machine mechanics shop, view southwest (2008).



Figure 156. Feature 22, pipe manifold, U12n Tunnel, view southeast (2008).



Figure 157. Feature 23, loading ramp, U12n Tunnel view northeast (2008).



Figure 158. Feature 24, pipe manifold and junction box, U12n Tunnel, view southeast (2008).

side of the 6-inch pipe is a 4-inch collar with a short nipple and hammer union sealed with a welded plate. On the east side of the 6-inch pipe are two connections. The top connection is a 2-inch collar welded in the pipe, a short nipple, a 2-inch ball valve, a short nipple, and a 2-inch screw union. The lower connection is a 1-inch collar welded in the pipe, a short nipple, a 1-inch ball valve, a short nipple, and a 1-inch screw union. On the north side of the pipe is one connection consisting of a 2-inch collar welded in the pipe, a short nipple, a 2-inch ball valve, a short nipple, and a 2-inch screw union. A chain approximately 10 ft in length is wrapped around the 6-inch pipe. A metal T post and electrical junction box are 6 ft south of the pipe. Two insulated cables extend from the bottom of the box. One terminates in a female electrical socket and the other is a cut end near the manifold. Associated artifacts are insulated cable and rubber seals.

Feature 25

Feature 25 (Figure 159) is a metal light pole at UTM coordinates 571841 E, 4117171 N. The pole consists of three sections that extend from the surface with no visible base support. The bottom section is square tubing that is 6 x 6 inches at the base and tapers to 4 x 4 inches at 14 ft. The middle section is 4 x 4 square tubing that is approximately 12 ft in height. It is attached to the bottom section with two bolts (stacked) and can hinge on one bolt when the other is removed to lower the upper sections. The top section is trident in shape and constructed of 3 inch round tubing. The center of the trident is approximately 3 ft in height and the two outer pipes are 1 ft in height. Electrical conduit enters the bottom of the pole but no lights are attached to the top section.

Feature 26

Feature 26 (Figure 160) is a metal light pole at UTM coordinates 571848 E, 4117195 N. The pole is similar to Feature 24 and consists of three sections that extend from the surface and is supported by a 3 ft x 3 ft x 4 inch concrete base. The bottom section is square tubing that is 6 x 6 inches at the base and tapers to 4 x 4 inches at 14 ft. The middle section is 4 x 4 square tubing that is approximately 12 ft in height. It is attached to the bottom section with two bolts (stacked) and can hinge on one bolt when the other is removed to lower the upper sections. The top section is trident in shape and constructed of 3-inch round tubing. The center of the trident is approximately 3 ft in height and the two outer pipes are 1 ft in height. Electrical conduit enters the bottom of the pole but no lights are attached to the top section.

Feature 27

Feature 27 (Figure 161) is a concrete pad for lubrication and oil dispensing drums and spill containment racks (on engineering drawing JS-012-U12n.24-C3) at UTM coordinates 571857 E, 4117203 N. It is 26 ft 8 inches (8.2 m) north-south by 8 ft east-west and 1 ft thick. The pad was formed in three sections that are separated by 8 x 8 inch milled lumber beams and the outside formed with 1/2-inch plywood (still present). The north section is 10 ft (3 m) north-south, the middle section is 5 ft 8 inches north-south, and the south section is 12 ft (3.4 m) north-south. Concrete was poured over the top of the beams providing a continuous surface. The concrete is now highly deteriorated and broken, and the beams are visible. Associated artifacts are chain, metal pipe, milled lumber fragments, and insulated wire.



Figure 159. Feature 25, metal light pole, U12n Tunnel, view east (2008).



Figure 160. Feature 26, metal light pole, U12n Tunnel, view northeast (2008).



Figure 161. Feature 27, concrete pad, U12n Tunnel, view south (2008).

Feature 28

Feature 28 (Figure 162) is a concrete pad used for a skid mounted tank (on engineering drawing JS-012-U12n.24-C3) and a lube and oil at UTM coordinates 571852 E, 4117210 N. The feature appears similar to Feature 26, however much of the concrete is broken and covered with soil. The pad is 18 ft east-west by 8 ft north-south. It was formed in three sections that are separated by 8 x 8 inch milled lumber beams. The east section is 5 ft east-west, the middle section is 3 ft east-west, and the west section is 10 ft east-west. The concrete is now highly deteriorated and broken and the south side is covered with a mound of soil and gravel. Semicircular cavities along the edges is from sandbags used in forming the pad. Associated artifacts are milled lumber fragments.

Feature 29

Feature 29 (Figure 163) is a water pipeline at UTM coordinates 571831 E, 4117204 N. The waterline was used to supply water to blend grout used in the tunnels. The exposed portion of the pipe is 6-inch metal with Victaulic connections. From the south end, the pipeline begins with a 3 ft nipple that extends at a 45 degree angle and disappears underground. The pipe then reappears 16 ft to the northeast. It then extends 20 ft north west, turns 45 degrees, then extends 7 ft to a Y coupling. The Y has a 45 degree extension facing up and another at 180 degrees. Attached to the 45 degree extension is a short nipple, a second 45 degree coupling, and a short nipple. Attached to the 180 degree extension is a short nipple, a 45 degree coupling facing up, a short nipple, and ends with a 45 degree coupling.

Feature 30

Feature 30 (Figure 164) is a concrete foundation at UTM coordinates 571835 E, 4117218 N. The surface of the 12 x 12 ft foundation is highly deteriorated and the west edge is covered with soil and gravel. Associated artifacts are a chain, washers, welding rods, and pipe fittings.

Feature 31

Feature 31 (Figure 165) is the cement operators shack concrete foundation at UTM coordinates 571834 E, 4117213 N. The surface of the 13 x 13 ft concrete foundation was smoothed but is now deteriorating with large cracks and pieces broken from the edges. Centered on the north side is a 4 ft east-west by 3 ft north-south concrete pad. A 3 x 3 ft concrete pad, is 2 ft from the southwest corner. This pad is similar to the one supporting the light pole at Feature 26. Associated artifacts are pipe fittings, broken glass, metal fragments, and bolts.

Feature 32

Feature 32 (Figure 166) is the liquid nitrogen plant concrete foundation at UTM coordinates 571830 E, 4117221 N. The foundation is 34 ft (10.4 m) north-south, 12 ft east-west, 6 inches thick, and has a smoothed surface. Rebar, 6-inch I-beam, and 1 1/4-inch (3.18 cm) bolts have been cut flush with the surface. The north edge of the foundation slopes to the surface and is 4 ft south of the rail lines.



Figure 162. Feature 28, concrete pad, U12n Tunnel, view northwest (2008).



Figure 163. Feature 29, pipeline, U12n Tunnel, view southeast (2008).



Figure 164. Feature 30, concrete foundation, U12n Tunnel, view northwest (2008).

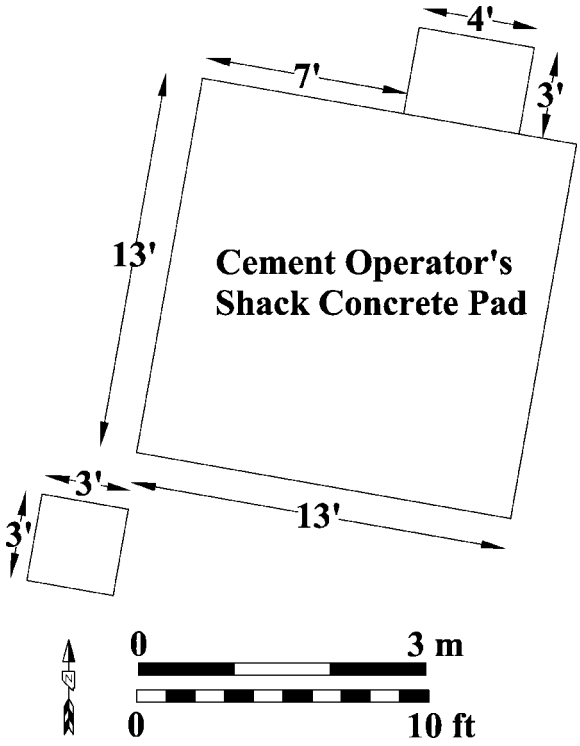





Figure 165. Plan map and photograph of Feature 31, cement operator's shack concrete foundation, U12n Tunnel, view northwest (2008).



Figure 166. Feature 32, liquid nitrogen plant concrete foundation, U12n Tunnel, view southeast (2008).

Feature 33

Feature 33 (Figure 167) is a loading dock at UTM coordinates 571819 E, 4117235 N. It was use for transferring concrete from transit mixers to rail (Moran) cars. The dock is 50 ft (15.2 m) east-west by 63 ft (19.2 m) north-south and constructed of concrete, soil, and gravel. The dock face is concrete, 4 ft in height, and has 3-inch angle iron along the top edge. It slopes to the south and is constructed of compacted soil and gravel. Areas of rough poured concrete are exposed on the surface of the ramp. On the top surface of the concrete face, 3 ft from each end, are metal stop signs mounted to 1 1/2 inch diameter by 8 ft 2 inch (2.5 m) tall galvanized pipes. Two L-shaped simple crane assemblies are on the top surface of the ramp along the north side of the concrete face. They are 2 1/2-inch pipe posts that are 10 ft in height and have a 4 ft arm that extends 90 degrees from the post. On the end of each arm is an aluminum cable reel with a carabineer attached to the end of the cable. The lanyard secured (fall protection) a laborer who monitored the loading of the concrete from the round top of the rail cars.

Feature 34

Feature 34 (Figure 168) is the concrete foundation for the experimenters holding and dry storage building (12-900) at UTM coordinates 571806 E, 4117256 N. It is constructed in two levels. The upper north level is 104 ft (31.7 m) east-west by 20 ft north-south, abuts the west end of Feature 32, and is 3 ft south of the rail lines that exit the U12n Extension Portal. The lower south level is 85 ft (25.9 m) east-west by 16 ft north-south. It is 4 inches below the upper level along the north side and abuts the west end of Feature 32. Two 6-inch I-beams are imbedded flush with the surface of the concrete and extend east-west the length of the lower level. The south I-beam is 5 ft (1.5 m) and the north I-beam is 8 ft 4 inches (2.54 m) from the south edge of the foundation. The surface of both levels have a smooth finish and metal conduit, pipe, and bolts have been cut flush with the concrete surface. Associated artifacts are metal fragments, washers, and bolts.

Feature 35

Feature 35 (Figure 169) is a loading ramp at UTM coordinates 571815 E, 4117254 N. The ramp is triangular in shape and measures 24 ft (7.3 m) east-west by 14 ft north-south on the west end and 3 ft north-south on the east end. The ramp face is constructed of concrete, metal plate, gravel, and soil. It is 1 ft 6 inches tall, slightly curved, and faced with a metal plate. The ramp slopes to the south and consists of compacted soil and gravel with areas of rough poured concrete on the surface.

Feature 36

Feature 36 (Figures 170-172) is the concrete foundation for the multi-purpose building (12-855) at UTM coordinates 571837 E, 4117272 N. On top of the foundation is a tunnel-and-pipe-seal unit, two transport dollies, and two support structures for rail transport of the tunnel-and-pipe-seal underground. The foundation is generally rectangular in shape and 90 ft (27.4 m) north-south by 42 ft (12.8 m) east-west at the south end. It is 48 ft (14.6 m) east-west at 24 ft from the south end which is 34 ft (10.4 m) east-west. The north 6 ft of the foundation slopes from a 4 inch elevation to the ground surface and ends with a 1 ft wide metal drainage pipe buried in the surface. The west 60 ft



Figure 167. Feature 33, loading dock, U12n Tunnel, view west (2008).

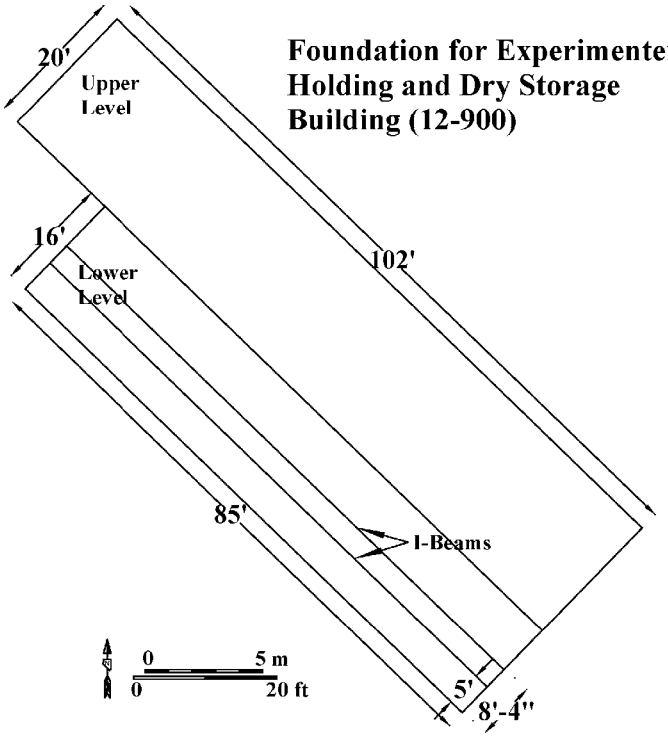



Figure 168. Plan map and photograph of Feature 34, concrete foundation (experimenters holding and dry storage), U12n Tunnel, view southeast (2008).



Figure 169. Feature 35, loading ramp, U12n Tunnel, view southwest (2008).

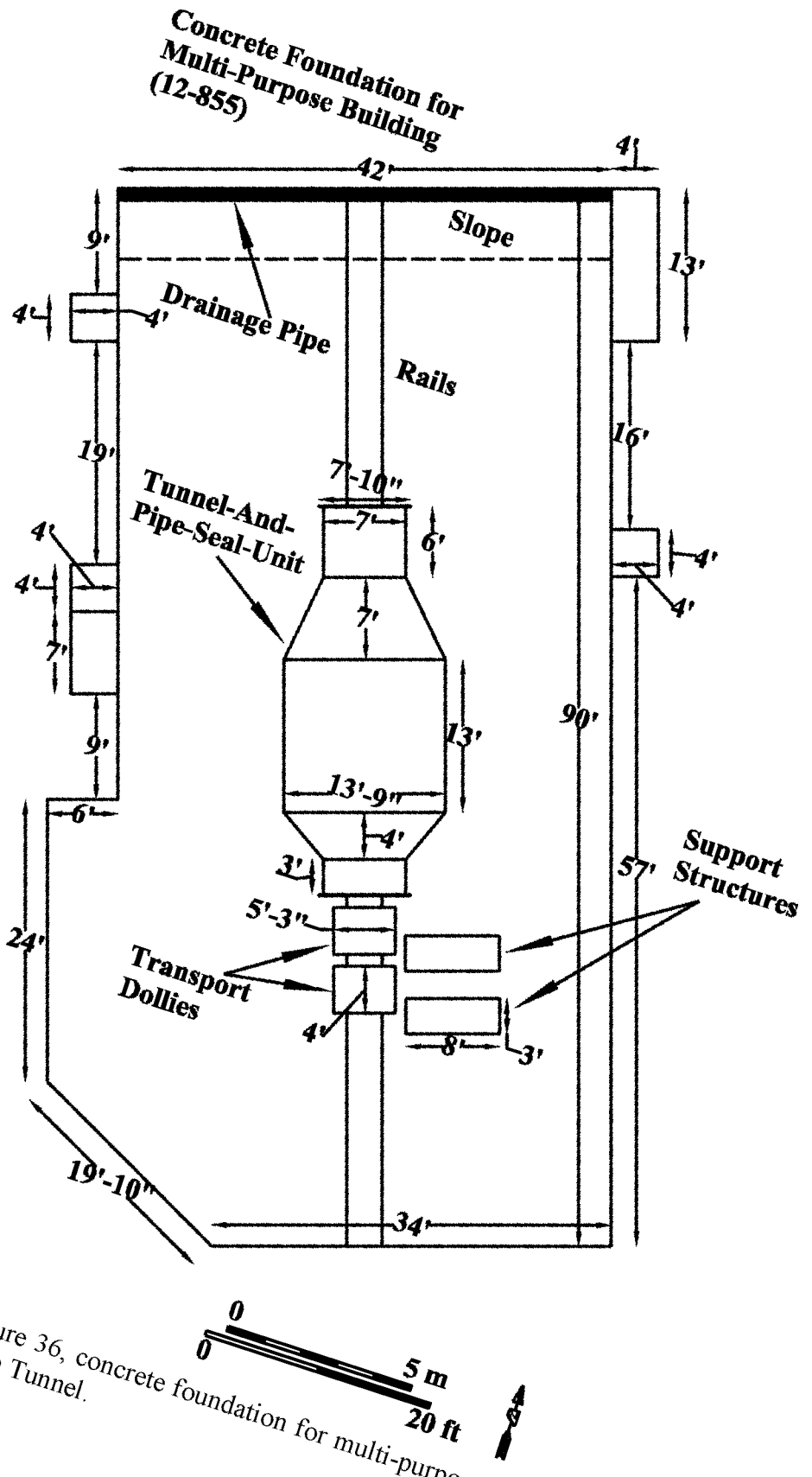



Figure 170. Plan map of Feature 36, concrete foundation for multi-purpose building and tunnel-and-pipe-seal unit, U12n Tunnel.



Figure 171. Feature 36, tunnel-and-pipe-seal unit, U12n Tunnel, view west (2008).



Figure 172. Feature 36, transport dollies and support structures, U12n Tunnel, view northeast (2008).

of the foundation was constructed with an outer 6 inch wide curbing that provided the form for the foundation. This was probably the first section constructed with the slope and south section built later. The remaining 24 ft of the foundation was not formed with a curbing and the surface has deteriorated with only small areas remaining with a smoothed surface. There are five concrete pads adjacent to the foundation, two on the east side and three on the west side. On the north side near the northeast corner is a 13 ft north-south by 4 ft east-west pad. Sixteen feet east of this pad is a 4 x 4 concrete pad, possibly for a pedestrian entrance into the building. Nine feet from the northwest corner is a 4 x 4 ft concrete pad possibly for a pedestrian entrance. Nineteen feet south of this pad is a similar 4 x 4 ft concrete pad that is adjacent to a 7 ft north-south by 4 ft east-west concrete pad. Two metal rail lines 3 ft apart have been cut off at the north and south edges of the foundation.

The tunnel-and-pipe-seal unit is 27 ft (8.2 m) from the north edge of the foundation and centered on the rail lines. The assembly is 33 ft 2 inches (10.1 m) in length, 13 ft 9 inches (4.2 m) in maximum diameter, and supported by 8 x 8 inch milled lumber cribbing. On the north end of the tunnel-and-pipe-seal unit is a 7 ft diameter flange welded to a 7 ft diameter tube that is 6 ft in length. The diameter flares over a 7 ft length to 13 ft 9 inches. The flare is not symmetrical but off-centered to the bottom of the assembly. The chamber is 13 ft in length then reduces back to a 7 ft diameter tube that extends 4 ft to the south. Attached to the south end of the tube is a 7 ft diameter flange. Two small access plates are on the south side of the unit. Extra support to the chamber is provided by 6 inch tall by 1 inch thick metal stiffener rings. Five rings are attached and five have not been attached.

South of the tunnel-and-pipe-seal unit are two hydraulic transport dollies for moving the unit on the rail lines and aligning the unit within the line-of-sight pipe system. The top of the dollies are two 5 ft (1.6 m) by 4 ft metal plates connected to the substructure with hydraulic pistons. Each dolly is supported by four metal wheels the same width as the rail lines. The wheels are not on the rails but supported by 6 x 6 inch milled lumber cribbing. The hydraulics are labeled ENERPAC and are rated between 10,000 and 18,000 PSI. Hydraulic pressure is provided by KEEL hand pumps. East of the dollies are two triangular metal structures used to support the tunnel-and-pipe-seal unit on the dollies. Each structure consists of two 10-inch I-beam frames with a base that is 8 ft in length, 5 ft tall I-beam risers, and diagonal bracing. The two frames are connected by channel iron and a metal plate welded to the outside of the riser that is 3 ft 2 inches (96.5 cm) wide and 3 ft tall.

Feature 37

Feature 37 (Figures 173-174) consists of the metal rails that extend from the U12n Tunnel portal and extension portal and fan out across the portal pad. The rails are metal and spaced 3 ft apart. Ties that connect the rails are both metal and wood stabilized with soil (between the rails) except in locations where concrete was used. Generally, the rails extend east and south from the portals and end at the edge of the dump area. The rails extend 1,115 ft (339.9 m) east from the portal and 620 ft (188.9 m) south. In several areas, such as at Feature 36, rails have been removed. Hand operated switches (Figure 175) are at the intersection of the rail lines. Artifacts found near the rails include wire, cable, rail spikes, and metal plates.

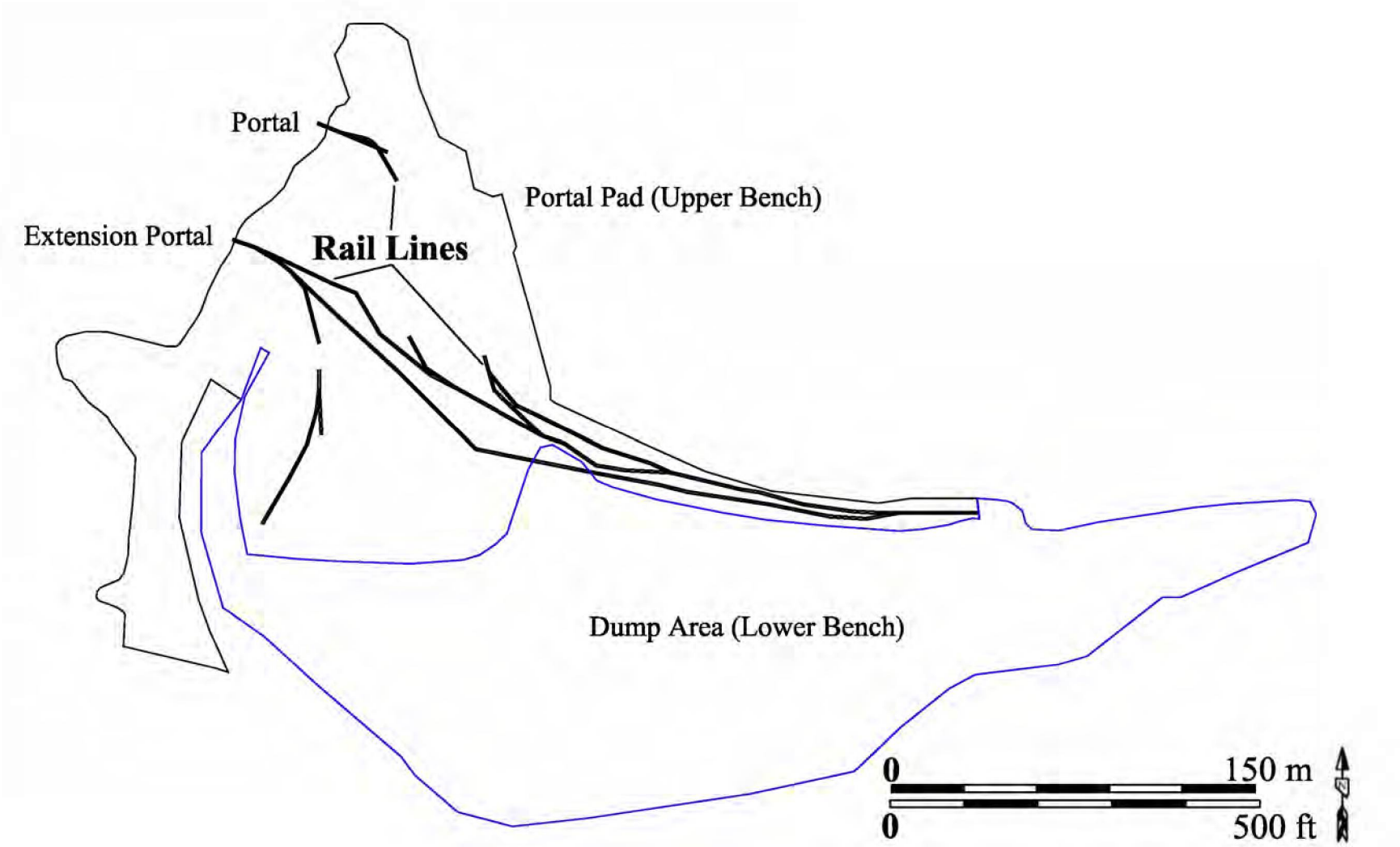



Figure 173. Plan map of Feature 37, rail lines, U12n Tunnel.



Figure 174. Feature 37, rail lines, U12n Tunnel, view northwest (2008).



Figure 175. Feature 37, switch on rail lines, U12n Tunnel, view northwest (2008).

Feature 38

Feature 38 (Figure 176) is the concrete foundation for an electrical storage building at UTM coordinates 571838 E, 4117323 N. It is approximately 35 ft north-south by 13 ft east-west. Most of the foundation is covered with gravel and soil and the surface is highly deteriorated and broken. Associated artifacts are screws, insulated cable, insulated wire, wood fragments, and washers.

Feature 39

Feature 39 (Figure 176) is a concrete storm drainage channel with metal cover. The northern UTM coordinates are 571833 E, 4117323 N and the southern coordinates are 571870 E, 4117228 N. The channel is approximately 320 ft (97.5 m) in length and 1 ft wide. It is constructed of 2 inch wide concrete walls and bottom and a diamond plate metal cover of various lengths. Most of the trough is obscured by vegetation and only visible in a few locations such as near Features 38 and 41.

Feature 40

Feature 40 (Figure 177) consists of two alcoves at UTM coordinates 571856 E, 4117316 N. Before the alcoves were excavated, the rock face was cut back into the slope and covered with chain link fencing and shotcrete. A rectangular area was excavated that is 80 ft (24.4 m) long (north-south) and 13 ft 4 inches (4.1 m) deep (east-west) on the north end and 8 ft 10 inches (2.7 m) deep on the south end. Both alcoves were then excavated into a vertical rock face in the excavated area. Excavation of the rock face and the two alcoves was undertaken with the first Alpine mining machine used at the NNSS. The alcove excavation was practice for the miners who would use the Alpine underground. The west alcove is 24 ft 6 inches (7.5 m) wide, 9 ft (2.7 m) tall, and 8 ft (2.4 m) deep. The walls of the alcove have been covered with chain link fencing and shotcrete and are secured to the rock with rock bolts and metal plates. The floor of the alcove is soil. The east alcove is 24 ft wide, 11 ft tall, and 17 ft deep. The walls of the alcove have been covered with chain link fencing and shotcrete and are secured to the rock with rock bolts and metal plates. The floor of the alcove is concrete. Insulated cable extends across the top face of the excavated area. Associated artifacts are a wood pallet, metal cutting disks, plastic fragments, and a galvanized garbage can lid.

Feature 41

Feature 41 (Figures 178-180) consists of four joined concrete foundations along the northeast edge of the U12n Tunnel Portal pad. The four foundations were constructed separately but have been connected by concrete poured between and along the east sides providing one uninterrupted expanse of concrete. The overall dimensions of the feature are 262 ft (79.9 m) north-south by 50 ft 4 inches (15.3 m) east-west. The concrete foundations have a smooth finish while the joining concrete has a rough finish. Feature 39, the concrete drainage channel, extends north-south approximately 3 ft west, and is visible along the west side of the north two foundations. Each of the concrete foundations (north to south) will be described separately below.

The northern foundation is for the electrical shop (12-907) and is 50 ft 4 inches (15.3 x 15.3 m) square at UTM coordinates 571854 E, 4117312 N. The west 7 ft of the foundation slopes slightly

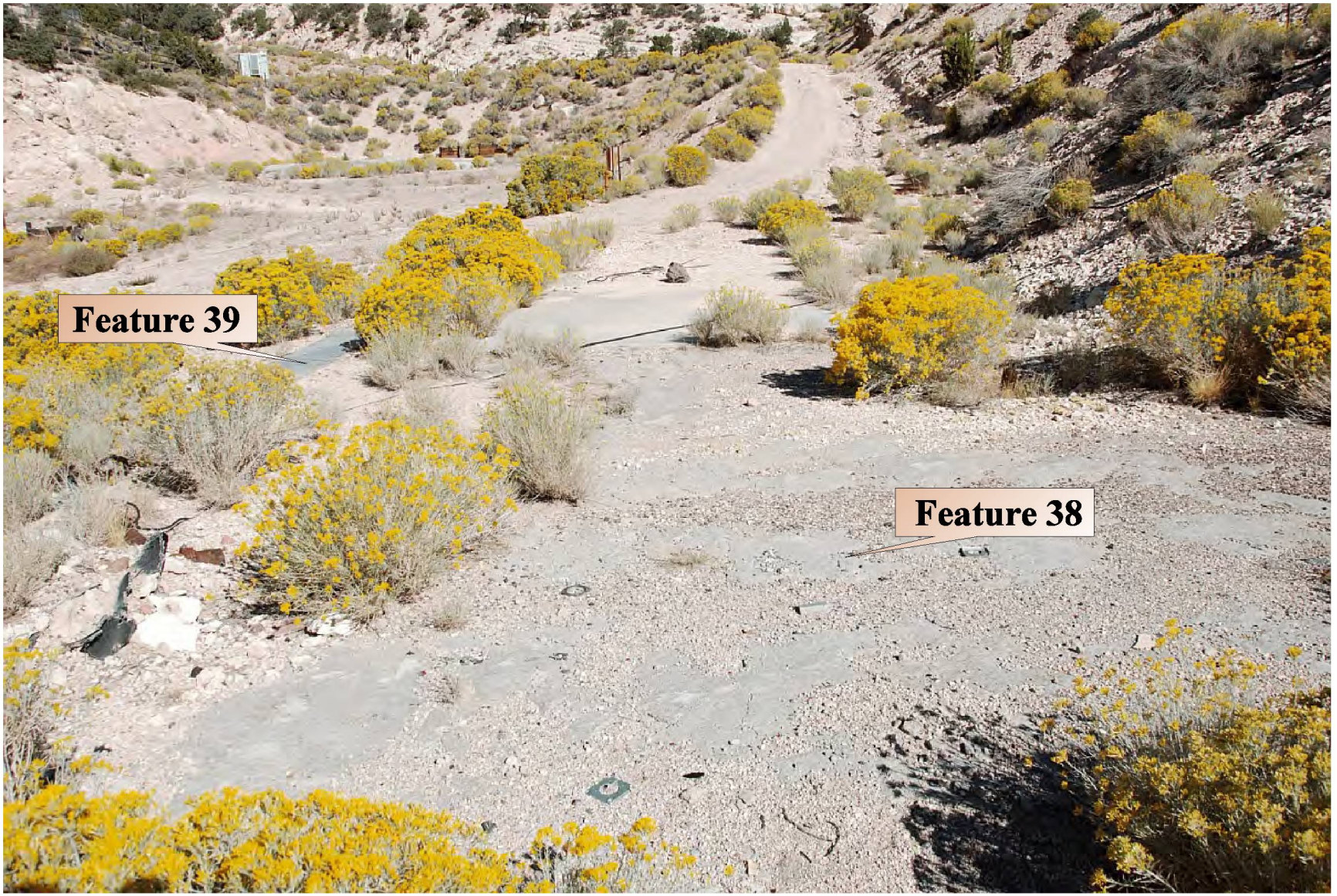


Figure 176. Feature 38, concrete foundation for electrical storage building and Feature 39, storm drainage channel, U12n Tunnel, view north (2008).



Figure 177. Feature 40, alcoves, U12n Tunnel, view northeast (2008).

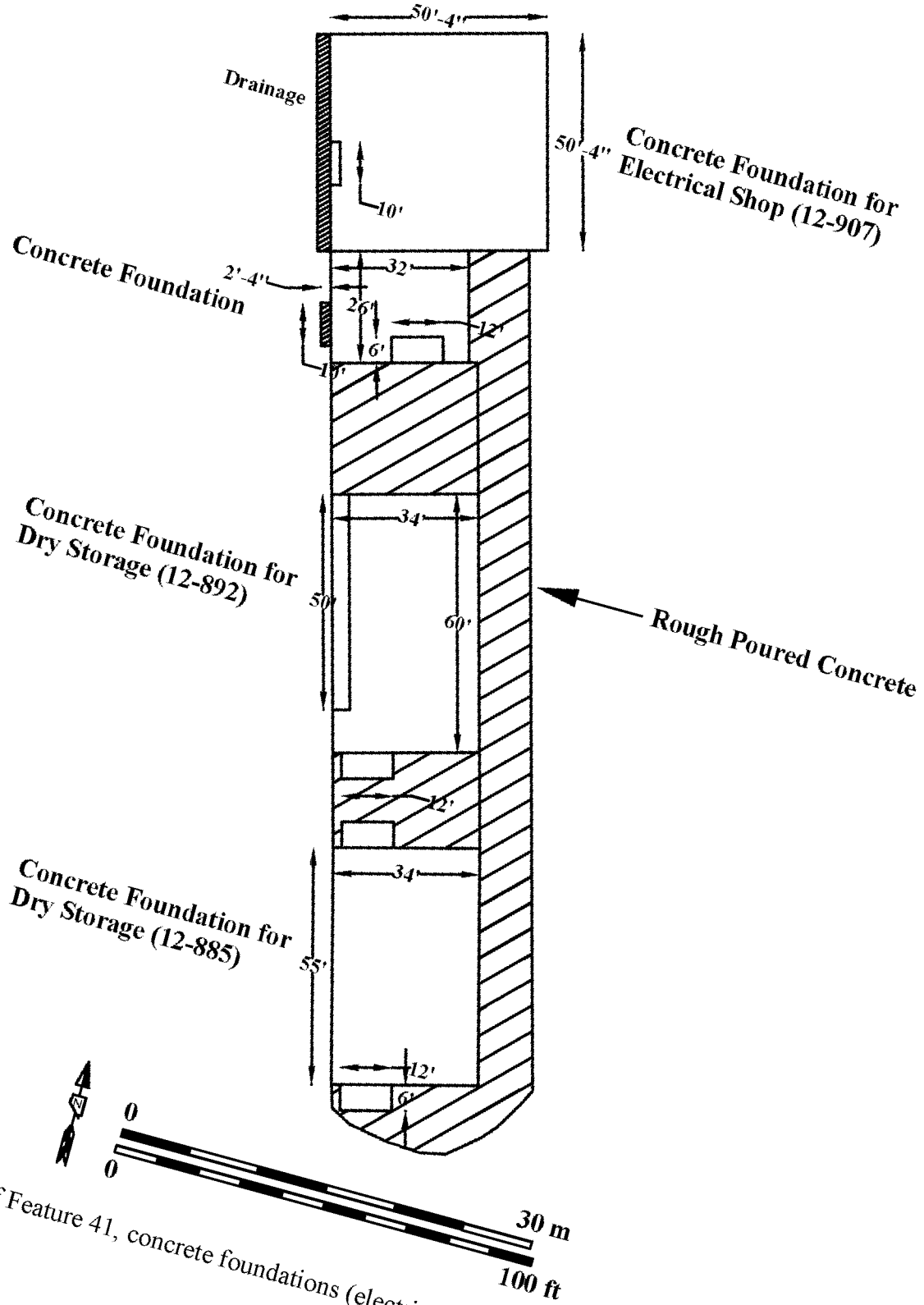



Figure 178. Plan map of Feature 41, concrete foundations (electrical shop and dry storage), U12n Tunnel.



Figure 179. Feature 41, concrete foundations, U12n Tunnel, view southeast (2008).



Figure 180. Feature 41, concrete foundations, U12n Tunnel, view northwest (2008).

to the west. A 3 ft wide metal plate covers an underground drainage along the west edge of the foundation. Three inch angle iron has been placed around the top north, east, and south surface edges but is not continuous as some pieces have been removed. Bolts that attached a structure to the concrete have been cut flush with the surface and 6 x 6 inch metal plates that supported I-beams are still attached at several locations.

The second foundation is 1 ft 4 inch (40.6 cm) lower than the electrical shop foundation and abuts it along the south edge. It was used to stage electrical equipment. The rectangular foundation is 32 ft (9.8 m) east-west by 26 ft (7.9 m) north-south and at UTM coordinates 571852 E, 4117296 N. A 6 ft north-south by 12 ft east-west ramp has been formed within the foundation along the southern edge. A 10 ft north-south by 2 ft 4 inch (71.1 m) metal covered underground drainage is along the west edge of the foundation. Associated artifacts are electrical cable, wire, conduit, bolts, nuts, and screws.

The third foundation is for dry storage (12-892) at UTM coordinates 571858 E, 4117280 N. It is rectangular, 34 ft east-west by 60 ft north-south. The west edge, 4 ft east-west by 50 ft north-south, is 4 inches below the remainder of the foundation an appears to have been used as a walk way. A 6 ft north-south by 12 ft east-west ramp is along the south side of the foundation, 2 ft from the southwest corner. Bolts that attached a structure to the concrete have been cut flush with the surface. Associated artifacts are electrical cable, pipe connections, flanges, conduit, electrical box parts, brass valves, PVC connections, plugs, and chain links.

The southern most foundation is for dry storage (12-885) at UTM coordinates 571864 E, 4117255 N. It is rectangular, 34 ft east-west by 55 ft (16.8 m) north-south. Along the north and south edges are 6 x 12 ft ramps 2 ft from the west edge. Associated artifacts are galvanized pipe, PVC pipe, unions, plugs, and collars.

Feature 42

Feature 42 (Figure 181) is an electrical panel backboard at UTM coordinates 571893 E, 4117224 N. The backboard is constructed of 1 1/2-inch channel iron (Unistrut) and is 12 ft east west and 5 ft 8 inches in height. Attached to the backboard are 10 electrical panels that vary from 3 ft x 1 ft 8 inches x 6 inches to 8 x 10 x 4 inches. Labels on panels are MAIN DISC, CAR DUMP, ROTARY DUMP, WASH RACK, MINERS STORAGE SHED, and ALPINE FEED. On the east end of the backboard is an aluminum quick connect electrical plug with the mating end and electrical cord on the surface near the backboard.

Feature 43

Feature 43 (Figure 182) is a pipe manifold at UTM coordinates 571888 E, 4117225 N. It probably was used for water and consists of a 4-inch Victaulic pipe riser that is 4 ft in height. The bottom of the riser is a Victaulic T that is not connected to other pipe and is supported by two metal T posts. Welded onto the south side of the riser are two 2-inch and two 1-inch ball valves. Near the riser is a 2 ft 10 inch tall by 1 ft 10 inch diameter yellow painted galvanized trash can with a locked top.



Figure 181. Feature 42, electrical panel backboard, U12n Tunnel, view north (2008).




Figure 182. Feature 43, pipe manifold, U12n Tunnel, view north (2008).

Feature 44

Feature 44 (Figure 183) is a camel back dump at UTM coordinates 571887 E, 4117213 N. The structure consists of the dump rail (wheel guide) and an overhead walkway used by the train swamper to observe the muck cars dumping a d to remove any residual muck from the cars with high pressure air and water hoses. The camel back was used to automatically dump muck cars into the muck dump area below. The dump rail and wheel guide were constructed on site and consists of two horizontal inclined rails, 1 ft in width, and braced with four vertical 6-inch I-beam posts. The posts vary in height to 3 ft 4 inches (101.6 cm) in the center forming the inclines. The inclines and posts are welded to a 28 ft (8.5 m) east-west by 1 ft 6 inch wide base plate that extends horizontally the length of the structure. The base is secured by bolts to a concrete foundation which is partially obscured by soil.

The overhead walk is a rectangular metal frame that is 20 ft 4 inches (6.2 m) east-west, 6 ft north-south, and 7 ft 10 inches (2.4 m) in height. The walk is supported by four pair of 4-inch I-beam legs spaced 3 ft north-south and are irregular spaced east-west. Connecting the top of the I-beam legs (each pair) are 4-inch I-beams rails that are 6 ft north-south and extend 3 ft south of the leg assembly (cantilevered). The walk is attached to the cantilevered beams. It is constructed of 2-inch angle iron posts and rails with expanded metal for the base. It is 20 ft east-west by 3 ft north south, and 3 ft 4 inches in height. A 2 ft 8 inch long extension (posts, hand rails, and expanded metal) centered on the north side of the walk provides access to a metal ladder that extends to the surface. On top of the hand rails at the east and west ends are electrical conduit and at the west end a rectangular Halogen light. At the east end of the supporting frame are two 2-inch pipes with ball valves and a rubber hose. Associated artifacts are a complete 36 inch pipe wrench and a broken 24 inch pipe wrench.

Feature 45

Feature 45 (Figures 184-188) is concrete walls along the north side of the tailings dump area, a metal walk, two concrete pads, and the rotary dump at UTM coordinates 571887 E, 4117204 N. The outer concrete walls support the side of the tailings dump area that is 22 ft (6.7 m) below the surrounding surface. The walls roughly form a U-shape and are 22 ft tall and constructed of 8-inch vertical I-beams spaced 3 ft apart and filled with 2 x 12 inch wood lagging. Because the 8-inch I-beam is wider than the 2 inch width of the lagging, wood blocks are wedged in the gaps. From the southeast corner, the wall extends 19 ft at 310 degrees. The wall then splits and continues south and west. The south wall is 30 ft in length at 190 degrees. The west wall turns to 310 degrees and extends 26 ft. At the end of the west wall, the wall splits again into two sections and extends south and southwest. The south section turns to 190 degrees and extends 62 ft (18.9 m). This section supports the east end of the rotary dump. The southwest section turns 260 degrees for 34 ft 4 inches (10.5 m). At the end of this section, the wall turns to 190 degrees and extends 50 ft. This section supports the west end of the rotary dump and much of it is covered with tailings.

At the north end of the west wall is a metal walk that extends west along the edge of the tailings dump area. It is 47 ft (14.3 m) east-west and 4 ft 2 inches (1.3 m) north-south. The walk is constructed of expanded metal for the base and pipe rails. The rails are 1 1/2-inch pipe 3 ft 2 inches in height. The eastern 8 ft of the walk is suspended over the dump area on 6-inch I-beams. The remaining section of the walk is on a concrete footing. At the end of the metal walk are two sections



Figure 183. Feature 44, camel back dump, U12n Tunnel, view northwest (2008).

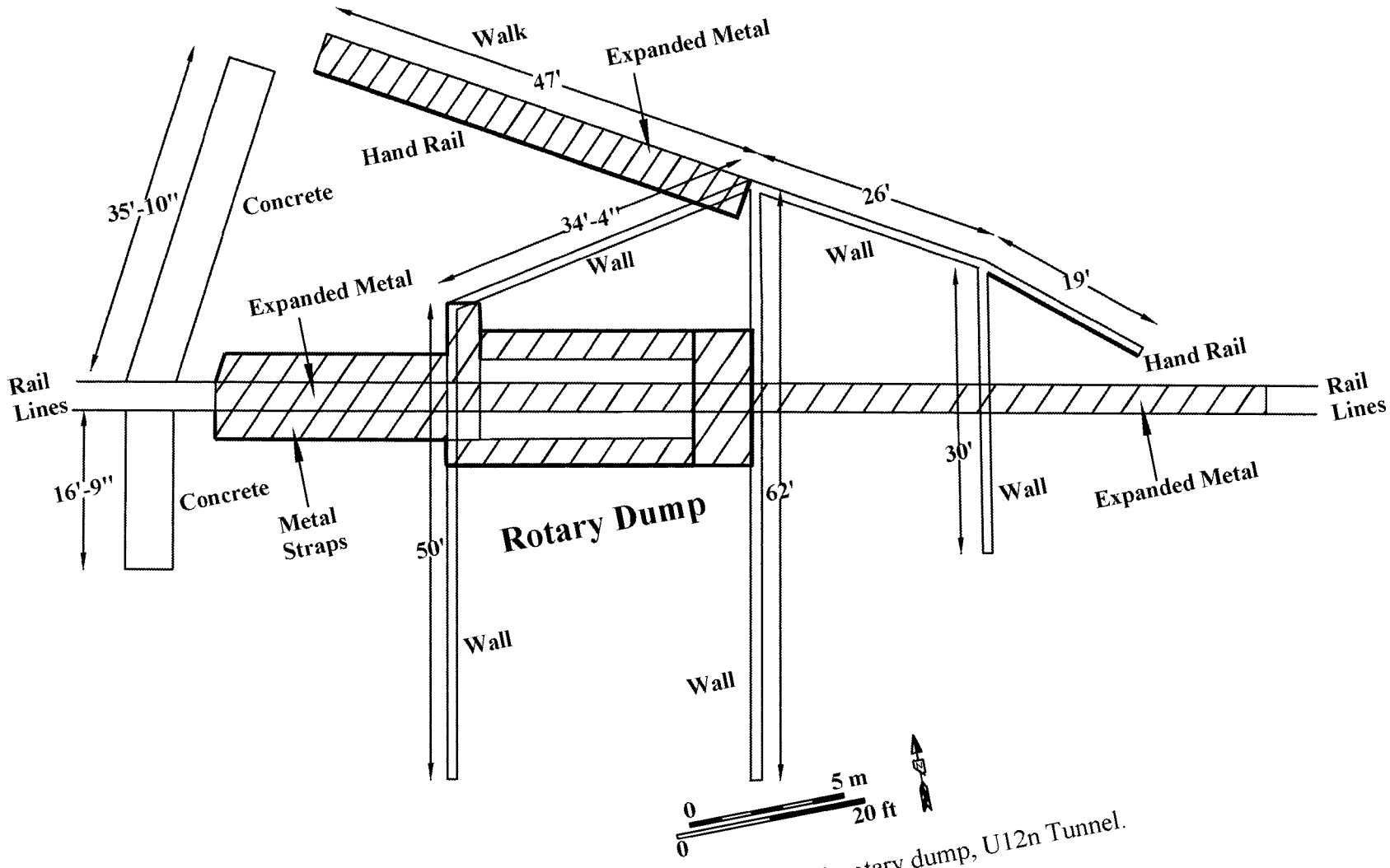



Figure 184. Plan map of Feature 45, rotary dump, U12n Tunnel.



Figure 185. Feature 45, dump area walls and rotary dump, view northeast (2008).



Figure 186. Feature 45, rotary dump, view southeast (2008).



Figure 187. Feature 45, rotary dump, U12n Tunnel, view south (2008).



Figure 188. Feature 45, motor and gear reducer, U12n Tunnel, view south (2008).

of concrete. The north section is 35 ft 10 inches (10.9 m) north-south and 5 ft wide (east-west) and ends at the north edge of the rails that enter the rotary dump. The south section begins at the south edge of the rail lines that enter the rotary dump and extends south 16 ft 9 inches (5.2 m) north-south and is 5 ft wide (east-west) .

The rotary dump is a metal frame surrounding a rotating cylindrical metal framework. The frame is almost gambrel in shape except that it has no ridge line. The frame is 22 ft 6 inches (6.9 m) east-west by 14 ft 2 inches (4.3 m) north-south and constructed of 10-inch I-beam. The east and west ends are identically constructed and consist of two vertical I-beam (posts) 11 ft 4 inches (3.5 m) in height. Welded to the top of each post at a 45 degree angle (facing center) are 5 ft sections of I-beam. A 6 ft section of I-beam connects the two diagonals closing the top of the structure. The bottom of the posts are connected by I-beams and supported by the concrete walls described above. The top of the end sections are connected by two I-beams (ridge beams) spaced 10 inches apart.

The cylindrical frame or dump section consists of two round metal end plates that are 13 ft 4 inches (4.1 m) in diameter with a 5 ft 3 inches wide by 8 ft 4inch tall rectangular opening. The round end plates are two semicircular sections bolted together. Rail lines extend east-west through the rectangular opening to allow muck cars to be emptied into the dump area below. Surrounding the end sections is a 11 inch wide metal band beveled at a 45 degree angle forming a shallow cone facing the interior of the structure. Attached to the outside of the band are two 2inch wide rims. A chain is attached to the outside rim and to a drive shaft that turns the rotary dump. The two end sections are 20 ft apart and connected with a rectangular section consisting of four horizontal 10-inch I-beam rails that are braced with vertical and diagonal I-beam supports. The rail lines are supported on two 1 ft 6 inch I-beams, metal plate, and 2-inch pipe.

The drive mechanism for the dump is mounted to the top of the metal frame. Access is by a metal ladder at the northwest corner of the frame. The drive mechanism consists of a 25 hp electric motor rated at 1,725 rpm at 400 amps. The motor is 2 ft 5 inches (73.7 cm) long and 1ft 4 inches in diameter. It is mounted to a 2 ft 3 inch (68.6 cm) east-west by 1 ft 8 inch north-south metal frame. Attached to the west end of the motor is a gear reducer. It is labeled FALK MOTOR REDUCER, model 253-120 F23A built in February 1977. Attached to the west end of the reducer is a 6 inch diameter drive shaft that extends the 20 ft length of the rotary dump. At each end of the drive shaft is a 3 5/16-inch (8.4 cm) sealed bearing. The bearings are attached to metal frames that are 1 ft 6 inches in height and 2 ft 10 inches wide. Attached to the drive shaft, 6 inches from the bearings, are 1 ft diameter by 2 inch wide chain sprockets. The chain is attached to the outside rims of the rotary dump and driven by the sprockets. When activated, the motor turns the gear reducer which turns the drive shaft that pulls the chain that rotates the dump.

A walkway on the north side is attached to the top of the frame and provides access to the drive assembly. It consists of 4-inch I-beam bottom rails 23 ft in length and 3 ft apart and covered with expanded metal for the walk surface. A handrail system surrounds the walk and constructed of 1 1/2-inch metal pipe rails and 3 ft 6 inch tall risers. At the east end of the walk is a 14 ft north-south by 6 ft east-west platform that provides a working area near the motor and gear reducer. It is constructed similar to the walk with I-beam, expanded metal, and 1 1/2-inch pipe railing. Artifacts on the platform are a grease gun, wire rope sling, chain links, a bolt cutter, high pressure water hoses, and a safety belt.

Feature 46

Feature 46 (Figure 189) is a metal light pole at UTM coordinates 571959 E, 4117187 N. The pole is 3-inch pipe 9 ft 2 inches (2.8 m) in height with a 4 ft long cross bar bolted to the top. The cross bar is 1 1/2-inch angle iron and attached to the pole with a 2-inch U bolt. At each end of the cross bar are electrical junction boxes with attached halogen lights that are approximately 8 x 6 inches. The lights face the tailings dump area to the south.

Feature 47

Feature 47 (Figure 190) is a metal light pole at UTM coordinates 571990 E, 4117184 N. The pole is 3-inch pipe 9 ft 2 inches in height with a 4 ft long cross bar bolted to the top. The cross bar is 1 1/2-inch angle iron and attached to the pole with a 2-inch U bolt. At each end of the cross bar are electrical junction boxes with attached halogen lights that are approximately 8 x 6 inches. The lights face the tailings dump area to the south.

Feature 48

Feature 48 (Figure 191) is a wash area for rail cars at UTM coordinates 572040 E, 4117190 N. The wash area is on the narrow east extension of the portal pad surface and approximately 20 ft above the dump area surface. It consists of a concrete pad, drain, overhead wash pipe and hose, water valve, electrical panel, sign, and light pole. The concrete pad is 60 ft east-west by 30 ft north-south and has rail lines that cross the pad east-west. The drain is a rectangular opening in the concrete that is covered with a 8 ft north-south by 5 ft east west metal cover constructed of flat metal straps. The drain extends at least 5 ft below the surface of the concrete and turns 90 degrees to the south and exits by a 4 ft diameter pipe on the slope between the portal surface and the dump area surface. The overhead vertical wash pipe is 3 inches in diameter and 12 ft in height. The horizontal extension arm is 7 ft in length and has a metal swivel at the end connected to a 2 inch diameter hose that is 16 ft in length. Near the vertical wash pipe is a manifold with valves that control the water to the wash pipe and hose. The main valve is inside a 6 inch diameter 2 ft tall metal pipe. Attached to the manifold is a 3 ft 4 inches x 1 ft 9 inches x 1 ft (101.6 x 53.3 x 30.5 cm) locked electrical panel box. The panel is mounted on 1 1/2-inch channel iron legs that are 4 ft 4 inches in height and 2 ft apart. South of the concrete pad is a 3 ft 4 inch east-west by 3 ft tall sign. The sign is 1/2-inch metal plate on a frame constructed of 1 1/2-inch pipe. The sign contains instructions for winter use of the wash. Near the sign is a light pole. The pole is 3-inch pipe, 9 ft 2 inches in height with a 4 ft long cross bar bolted to the top. The cross bar is 1 1/2-inch angle iron and attached to the pole with a 2-inch U bolt. At each end of the cross bar are electrical junction boxes with attached halogen lights that are approximately 8 x 6 inches. The lights do not face the wash area but dump area to the south.

Feature 49

Feature 49 (Figures 192-194) is the concrete foundation for the Reynolds Electrical and Engineering Company (REECo) office building (12-891), retaining walls, and stairs at UTM coordinates 571808 E, 4117387 N at an elevation of 6,030 ft (1,837.9 m). The north and west sides of the foundation abut the steep east slope of Rainier Mesa. The foundation was constructed in two levels. The upper



Figure 189. Feature 46, light pole, U12n Tunnel, view southwest (2008).



Figure 190. Feature 47, light pole, U12n Tunnel, view southwest (2008).

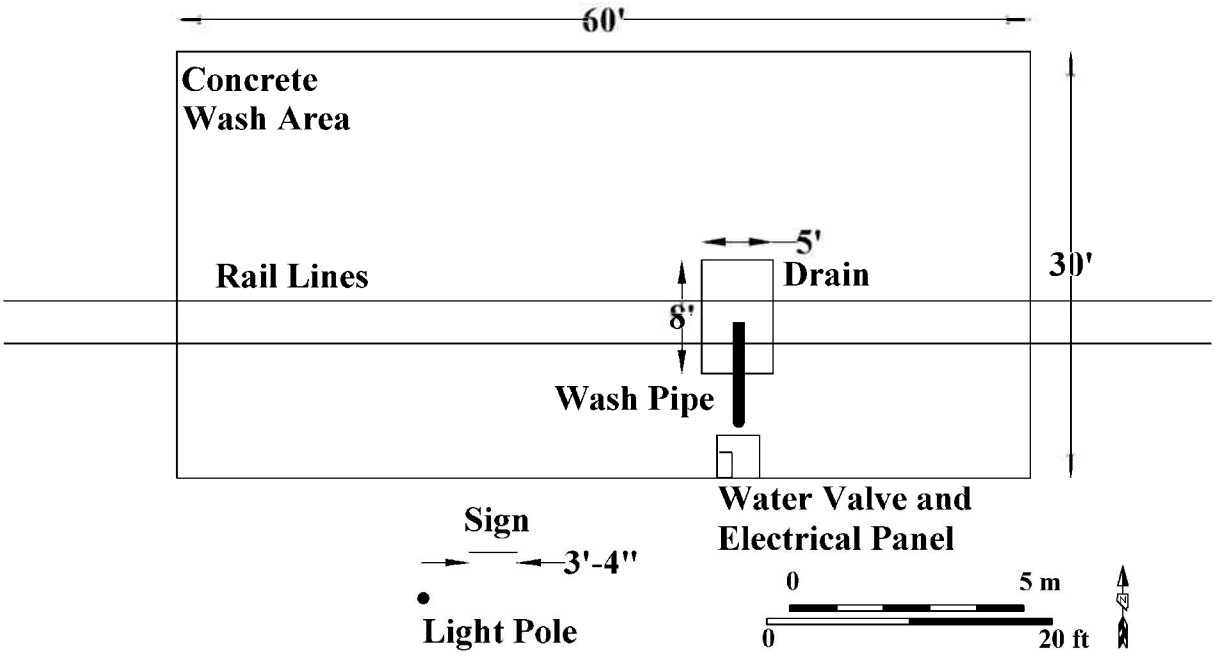





Figure 191. Plan map and photograph of Feature 48, wash area, U12n Tunnel, view east (2008).

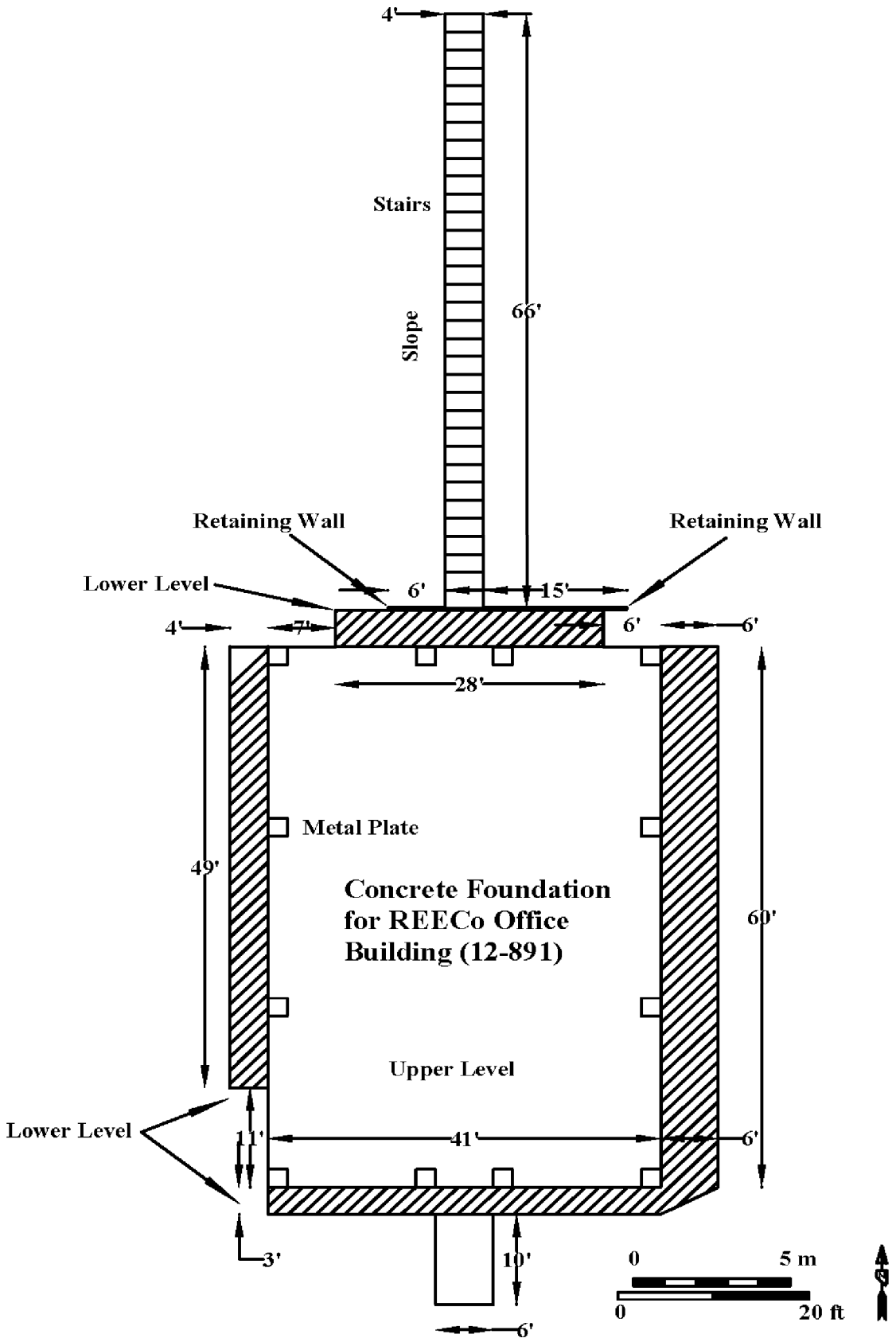



Figure 192. Plan map of Feature 49, REECo office, U12n Tunnel.




Figure 193. Feature 49, concrete foundation for REECo office building, retaining wall and stairway on right, view west (2008).

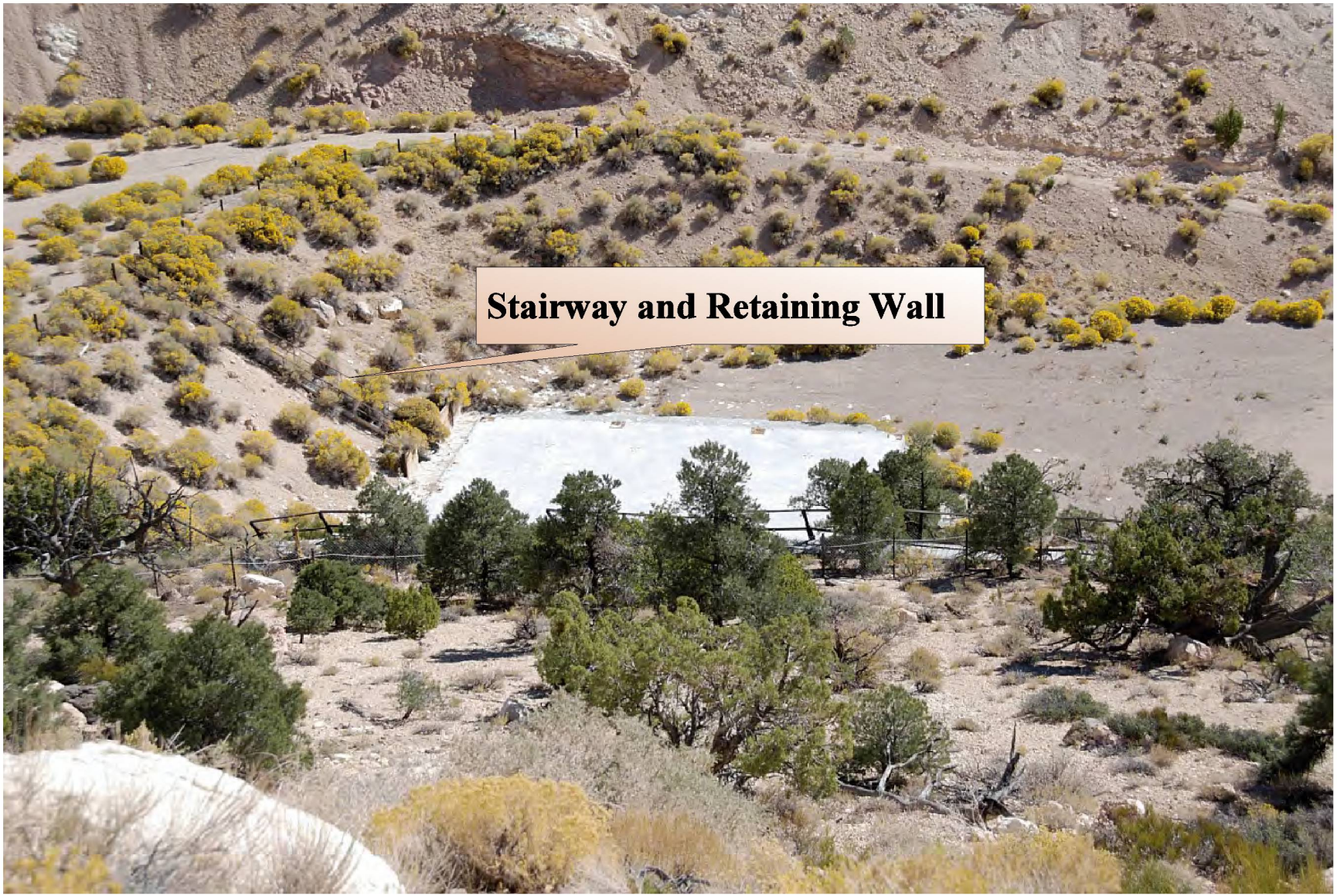



Figure 194. Feature 49, concrete foundation for REECo office building, retaining wall and stairway on left, view northeast (2008).

level is 60 ft north-south by 41 ft east-west and is 1 ft above the lower level. Embedded in the concrete around the perimeter are 2 ft square metal plates for the attachment of I-beam posts to support the building structure (now missing). The surface was covered with 1 ft square asphalt tiles of which only a few remain in place. The lower level is 1 ft below the upper level and varies in length and width. On the east side, it extends 6 ft east-west and 60 ft north-south. On the south side, it extends 3 ft north-south and 47 ft east-west. The east and south sides join at a beveled corner. The lower west level extends 49 ft (14.9 m) north-south from the northwest corner and is 4 ft east-west but does not extend to the southwest corner of the upper level. The lower north level is 28 ft east-west and 4 ft north-south and mostly covered with soil from the slope. It does not extend to the east and west sides of the upper level but is 6 ft from the northeast corner and 7 ft from the northwest corner. Along the north edge of the foundation are two metal and wood retaining walls and metal stairs. The retaining walls are constructed of vertical 6-inch I-beam 4 ft in height. Between the I-beams is 2 x 12 inch milled lumber lagging. The east section of the wall is 15 ft east-west and the west section is 6 ft east-west and separated by 4 ft. In the gap between the retaining wall are 4 ft wide galvanized stairs. The treads are galvanized metal with 1 1/2-inch pipe hand rails and posts. The stairs extend from the portal level up-slope to the level with the telephone trailer and foundation for the RNS/DNA Office. Associated artifacts are asphalt tile fragments, electrical conduit, electrical wire, and metal fragments.

Feature 50

Feature 50 (Figure 195) is a fire hydrant, barricade supports, electrical panel, and pipe at UTM coordinates 571827 E, 4117342 N and an elevation of 6,030 ft. The fire hydrant is cylindrical, 1 ft 10 inches tall, and labeled MUELLER 1966 CHAT TN. It is bolted to 2 1/2-inch pipe that extends 1 ft above the surface. Three 4-inch pipes (bollards) extend 2 ft 6 inches above the surface and provide a barrier around the hydrant. On the surface next to the hydrant are three triangular wood barricade supports. The supports are under dense vegetation and no measurements were obtained. The electrical panel is 2 ft 8 inches x 1 ft 8 inches x 6 inches and supported on 1 1/2-inch channel iron (Unistrut) legs 5 ft 9 inches (1.7 m) in height. The pipe is 1 ft 8 inches in diameter and extends 6 inches above the surface. The top is capped with a 2 ft diameter metal plate.

Feature 51

Feature 51 (Figure 196) is a wood walkway above the U12n portal and extension portal at UTM coordinates 571775 E, 4117393 N at an elevation of 6,060 ft (1,847.1 m). The walk is 180 ft long (54.9 m) and 3 ft wide and constructed of 2 x 6 inch milled lumber runners and treads in 10 ft sections. There is a 4 ft tall railing along the east side made of 2 x 4 inch milled lumber post and rails. The walk is secured to the surface with rock bolts and cables. It was used to access plastic conduit and insulated cable that extends along the west side of the walk.

### *Telephone Pad*

Adjacent to and north of the portal pad is a smaller irregular-shaped telephone pad (Figures 197-198).The pad is cut into the steep face of Rainier Mesa at an elevation 6,040 ft (1,841 m) and is 230 ft (70.1 m) east-west by 110 ft (33.5 m) north-south and encompasses 0.39 acres (0.16 hectares).The



Figure 195. Feature 50, fire hydrant, electrical panel, and pipe, U12n Tunnel, view south (2008).

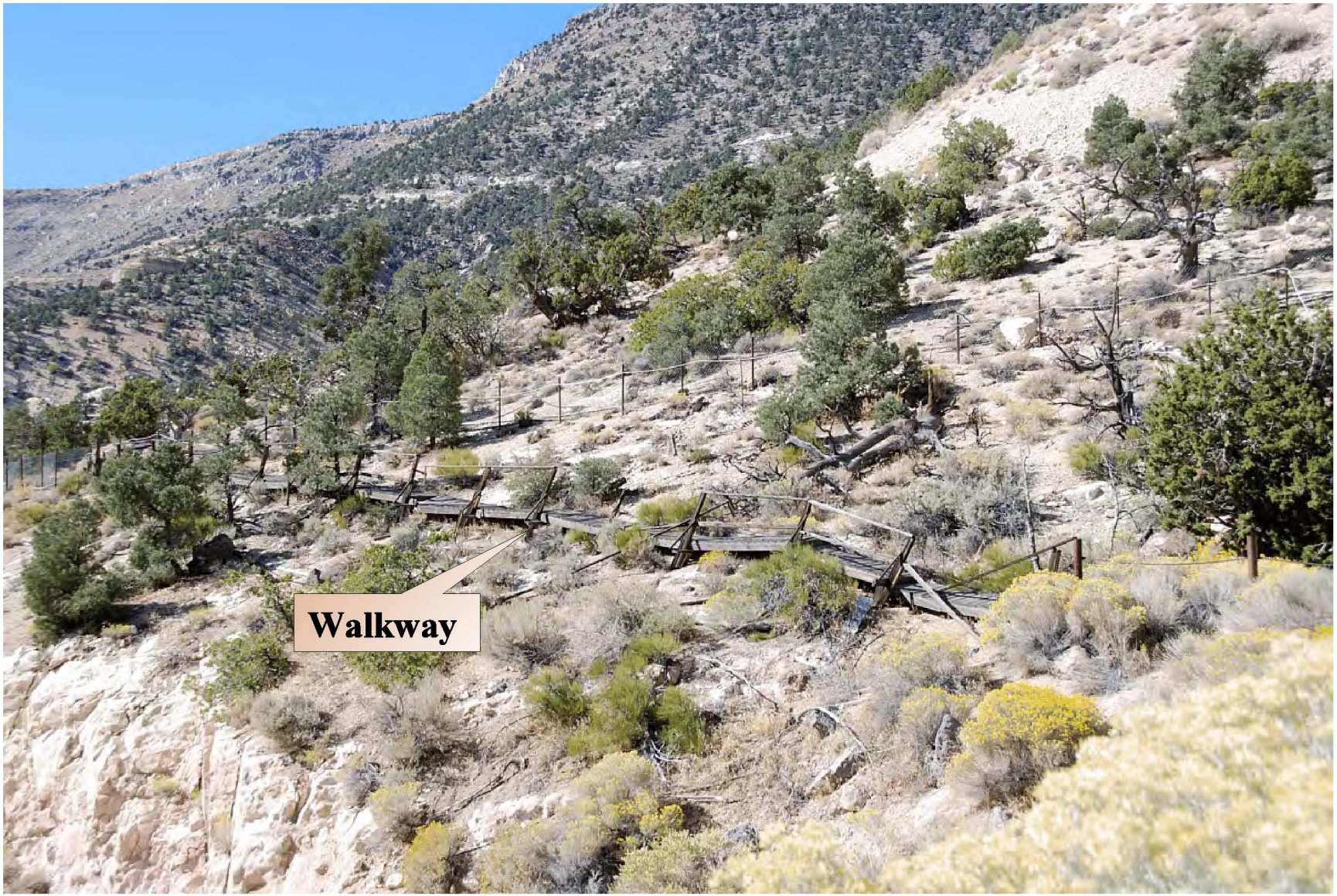


Figure 196. Feature 51, wooden walkway, U12n Tunnel, view south (2008).

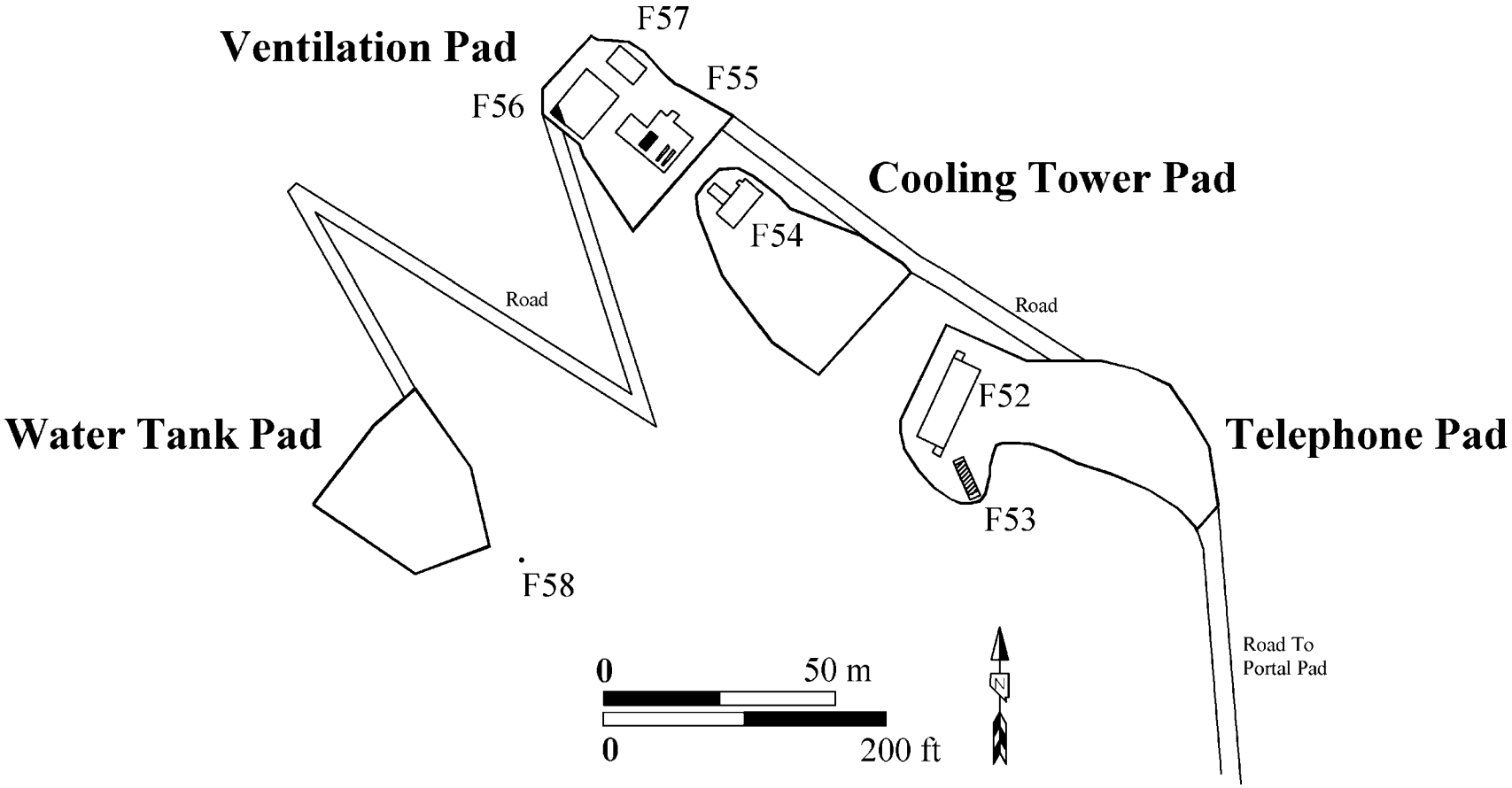



Figure 197. Plan map of U12n Tunnel complex telephone pad, cooling tower pad, ventilation pad, and water tank pad.



Figure 198. Overview of the telephone pad, U12n Tunnel, view east (2008).

north and west edges of the pad are defined by the steep slope of Rainier Mesa and the south and east slopes drop sharply to the portal pad below. Access to the pad is by a dirt road from the portal pad that also extends upslope to the cooling pad, ventilation pad, and water tank pad. Two features (Features 52 and 53) recorded on the telephone pad is communications equipment on a concrete pad.

Feature 52

Feature 52 (Figure 199) is the concrete foundation for the RSN/DNA office building (12-921) on the telephone pad at UTM coordinates 571777 E, 4117429 N. The foundation is 61 ft 6 inches (18.7 m) north-south by 21 ft east-west. The surface was covered with 1 ft square asphalt floor tiles but they are deteriorating and some are missing. On the north edge at the west corner and the south edge at the west corner are 6 x 6 ft concrete pads used for personnel entrances. Associated artifacts are asphalt tiles, milled lumber fragments, metal fragments, and a galvanized trash can.

Feature 53

Feature 53 (Figures 200-201) is a concrete foundation and telephone trailer on the telephone pad at UTM coordinates 571777 E, 4117402 N. The concrete foundation is 30 ft north-south by 8 ft east-west. The foundation supports an aluminum sided trailer that is 23 ft 8 inch (7.2 m) north-south by 7 ft 8 inch (2.4 m) east-west. It is 10 ft in height and the north exterior side is labeled BELL TELEPHONE Co. OF NEVADA. Attached to the south exterior side is a 5 ft 10 inch (1.8 m) tall by 2 ft 7 inch (0.8 m) wide by 1 ft thick aluminum air conditioning system. Entrance into the trailer is through two 2 ft 6 inch wide by 7 ft 10 inch (2.4 m) tall doors in the west side of the trailer. The interior of the trailer is paneled with painted Masonite and contains fluorescent lighting fixtures that extend the length of the trailer and are mounted on the east and west walls. On the east wall at the north end is a 6 ft 8 inch tall by 11 ft long fuse panel. The fuse banks within the panel are labeled as to which building or equipment they are associated (BLD 921, BLD 891, etc.). A push button telephone is within the panel. North of the panel is a thermostat that controls the air conditioning system. The floor is Masonite panels. Electrical cables enter through the southeast corner at the floor level. Associated artifacts are a sawhorse, metal chair, electrical cables and wire, a metal trash can, and record books.

### *Cooling Tower Pad*

Above the telephone pad is the irregular-shaped cooling tower pad (Figures 197 and 202). It is a dirt and gravel pad at an elevation of 6,080 ft (1,853.2 m) and is 150 ft (45.7 m) northwest-southeast by 98 ft (30 m) northeast-southwest and encompasses 0.26 acres (0.11 hectares). The north and west edges of the pad are defined by the steep slope of Rainier Mesa and the south and east edges slope sharply to the portal pad below. One feature (Feature 54) recorded on the cooling tower pad is a concrete pad for the cooling tower that has been removed.

Feature 54

Feature 54 (Figure 203) is the concrete foundation on the cooling tower pad at UTM coordinates 571730 E, 4117467 N. The foundation is for the cooling tower (water) and is 32 ft north-south by



Figure 199. Feature 52, concrete foundation for the RSN/DNA office building, view southwest (2008).



Figure 200. Feature 53, telephone trailer and concrete foundation, U12n Tunnel, view southeast (2008).



Figure 201. Feature 53, telephone trailer interior, view southeast (2008).



Figure 202. Overview of the cooling tower pad, U12n Tunnel, view east (2008).



Figure 203. Feature 54, concrete foundation for the cooling tower, U12n Tunnel, view northeast (2008).

16 ft east-west. The surface of the concrete was brushed and there are impressions of metal plates in the foundation. Attached to the west edge and 3 ft from the northwest corner is a 3 x 3 ft concrete pad used to support pumping equipment. Along the west edge and 8 ft from the southwest corner is a 15 ft east-west by 8 ft north-south concrete pad. It is 3 inches west of the west edge and not attached to the foundation. Associated artifacts are rope, metal fragments, milled lumber fragments, and bolts.

### *Ventilation Pad*

Above the water cooling tower pad is the rectangular ventilation pad (Figures 197 and 204). It is a dirt pad at an elevation of 6,120 ft (1,865m) and is 115 ft (35.1 m) northwest-southeast by 105 ft (32 m) northeast-southwest and encompasses 0.22 acres (.089 hectares). The north and west edges of the terrace are defined by the steep slope of Rainier Mesa and the south and east edges slopes sharply to the water cooling pad and eventually to the portal pad below. Three features (Features 55-57) recorded on the ventilation pad are concrete foundations for ventilation equipment, air compressors, and the operator's shack.

Feature 55

Feature 55 (Figure 205) is a concrete foundation on the ventilation pad at UTM coordinates 571715 E, 4117479 N. The foundation was for a ventilation fan and an electrical substation. It appears as one expanse of concrete but is actually two foundations that abut along one edge. They are described as one feature with measurements given for each foundation. Overall, the continuous concrete is irregular in shape with maximum dimensions being 45 ft (13.7 m) east-west by 32 ft north-south. The foundation for the ventilation fan (south) is 32 ft north-south by 30 ft east-west. Four raised footings (two pairs) are near the south and east corner. Individual footings are 13 ft in long, 1 ft 6 inches wide, and 6 inches thick. They are 3 ft 8 inches apart (one pair) and 3 ft 6 inches from the south edge of the foundation. The two pairs are 9 ft 4 inches (2.8 m) apart east-west. Grout was poured between the west pair but not the east pair. The footings probably were for the ventilation fan assembly. A 6 x 6 ft pad is along the north edge near the west corner and probably is for a pedestrian entrance. The electrical substation foundation (north) is 17 ft north-south by 15 ft east-west. A 4-inch conduit is along the north edge of the foundations an bolts have been cut flush with the surface of each. Associated artifacts are metal fragments, insulated cable, braided cable, and bolts.

Feature 56

Feature 56 (Figure 206) is the concrete foundation for two air compressors at UTM coordinates 571699 E, 4117488 N. The foundation is on the ventilation fan pad and is 40 ft north-south by 30 ft east-west. Three inch conduit has been cut flush with the surface and the southwest corner of the pad is covered with rock and soil from the nearby slope. Associated artifacts are metal conduit, metal fragments, insulated cable, braided cable, and a wire rope sling.



Figure 204. Overview of the ventilation pad, U12n Tunnel, view east (2008).

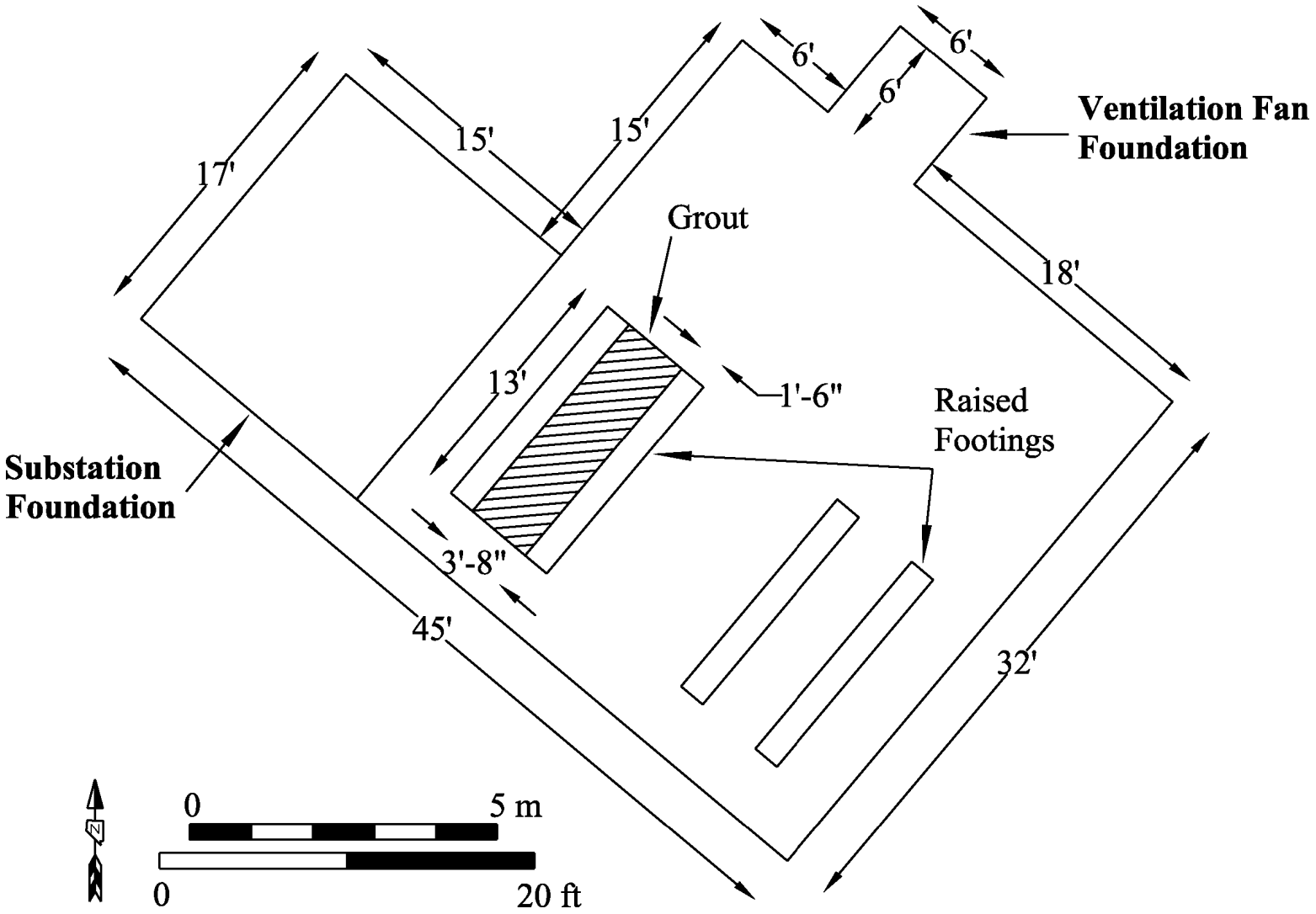



Figure 205. Plan map of Feature 55, ventilation fan and electrical substation concrete foundation.



Figure 206. Feature 56, concrete foundation for the two air compressors, U12n Tunnel, view west (2008).

Feature 57

Feature 57 (Figure 207) is a concrete foundation for the compressor operator's shack at UTM coordinates 571705 E, 4117494 N. The foundation is on the ventilation pad and is 25 ft east-west by 15 ft north-south. The edges of the concrete are deteriorated and exposing gravel within the matrix. Various sized conduit has been cut flush with the surface. Associated artifacts are galvanized conduit and plexiglass.

### *Water Tank Pad*

West of the ventilation pad is the water tank pad (Figures 197-208). The water tank pad is at an elevation of 6,200 ft (1,889.8 m) and is 115 ft northwest-southeast by 105 ft northeast-southwest and encompasses 0.2 acres (0.8 hectares). The pad was the location of three 10,000 gallon water tanks that provided non-potable water used for mining, drilling, and other tunnel operations. No features were recorded on the pad as the tanks have been removed; however, one feature (Feature 58) is 25 ft (7.6 m) to the south and on the slope below the water tank pad and above the portal pad.

Feature 58

Feature 58 (Figure 209) is a metal gate valve, fiberglass insulated pipe connections, and electrical heat tape near the water tank pad at UTM coordinates 571678 E, 4117388 N. Visible above the surface is the handle for the gate valve and an insulated elbow (faces west) that is sealed with a flat steel plug. A second insulated elbow faces east and is connected to a third insulated elbow that extends below the surface. The connections are associated with a pipe line that carried water from the three tanks on the pad (20 ft to the west) down a drill hole approximately 180 ft deep to the U12n Tunnel main drift. Only milled lumber fragments remain on the pad.

### *Muckpile*

In this report the muckpile (lower bench) is described as the area south of and below the portal pad (upper bench). However, the portal pad is on top of a previous area used as a muckpile and pond area. The muckpile is an irregular-shaped elongated area south of and below the portal pad (Figures 197-210). The pad ranges in elevation from 5,900 ft (1,798.3 m) at the base to 6,000 ft along the top surface. It is 1,450 ft (442 m) east-west by 500 ft (152.4 m) north-south and encompasses 8.7 acres (3.5 hectares). It consists of construction waste and debris generated during initial mining of the tunnel and reentry mining operations. The rotary dump (Feature 59) was recorded along the northwest edge of muckpile and, although it is positioned over the muckpile, it was recorded as part of the portal pad. Also, a large concrete pad and fencing within the muckpile is but no attempt was made to record these features because they are within a keep out area. Two features (Features 59 and 60) were recorded at the muckpile.

Feature 59

Feature 59 (Figure 211) is a metal sign along the N Tunnel Road at UTM coordinates 571741 E, 4117175 N, and near the entrance to the portal pad. It is 3 ft x 1 ft 6 inches, painted white with black



Figure 207. Feature 57, concrete foundation for the compressor operator's shack, U12n Tunnel, view northwest (2008).



Figure 208. Overview of water tank pad, U12n Tunnel, view south (2008).



Figure 209. Feature 58, metal gate valve and insulated elbows, U12n Tunnel, view northwest (2008).



Figure 210. Overview of the muckpile (lower level), U12n Tunnel, view northwest (2008).



Figure 211. Feature 59, sign, U12n Tunnel, view northeast (2008).

lettering, and attached to two T posts that are 4 ft 6 inches (1.4 m) in height. The sign is labeled NO PARKING BETWEEN SIGNS. The second sign was not located.

Feature 60

Feature 60 (Figure 212) is a cable fence and chain gate at UTM coordinates 571808 E, 4117142 N and at the west end of the muckpile. The fence posts are 3-inch pipe that are 3 ft 8 inches in height and have been secured to the surface with concrete. The fencing is two 3/8-inch (0.9 cm) cables that are inserted through holes in the post 1 ft 8 inches apart. Attached to the top cable are yellow signs with black lettering, UNDERGROUND RADIOACTIVE MATERIAL. No attempt was made to enter the muckpile because of this posting. The entrance to the muckpile on the lower level is secured by a chain welded to one post and locked to a second post. Metal T posts with plates, signs, are on each side of the gate but the lettering has faded.

***Powder Magazines Pad***

The powder magazines pad is on an oval-shaped dirt pad south of the portal pad and west of the N Tunnel Road (Figures 213 and 214). The three magazines are at an elevation of 6,000 ft and on a dirt pad that is 295 ft (89.9 m) east-west by 75 ft (22.9 m) north-south and encompass 0.35 acres (0.14 hectares). Four features (Features 61-64) were recorded on the pad.

Feature 61

Feature 61 (Figure 214) is two metal boxes at UTM coordinates 571766 E, 4117005 N. The boxes are on the north and south sides of a dirt road that provides access to the powder magazines (described next). They are 19 ft (5.8 m) apart and each box is 1 ft 3/4 inches x 7 inches x 7 inches (32.4 x 17.8 x 17.8 cm) and mounted on 4-inch channel iron that is 3 ft 4 inches tall. The boxes have a hinged lid with a wire handle and printed on the east face of each box is PLACE SMOKING DEVICES HERE.

Feature 62

Feature 62 (Figure 215) is a powder magazine at UTM 571743 E, 4116999 N. It is a 7 ft diameter by 16 ft long cylindrical white metal magazine that appears to have been constructed from line-of-sight pipe. The ends of the pipe have been sealed with metal plates painted red. A 3 ft wide by 5 ft 9 inch tall door is in the north end provides access into the magazine. On the door are placards and stenciling for EXPLOSIVE A, NO SMOKING, and Capacity 500 lbs. Also, there is a paper tag with printed coordinates N 37.11905, W 116.11549. Spray painted on the door is N-1. The magazine is mounted on two 6-inch I-beam rails that extend the length of the pipe. Below the door are wood steps constructed of 3/4-inch plywood runners and 2 x 6 inch milled lumber steps. A 4 x 4 inch milled lumber post with a metal plate for mounting of a fire extinguisher is to the east of the door. Associated artifacts are a shovel and a metal plate.



Figure 212. Feature 60, fence and gate to the muckpile on lower level, U12n Tunnel, view east (2008).

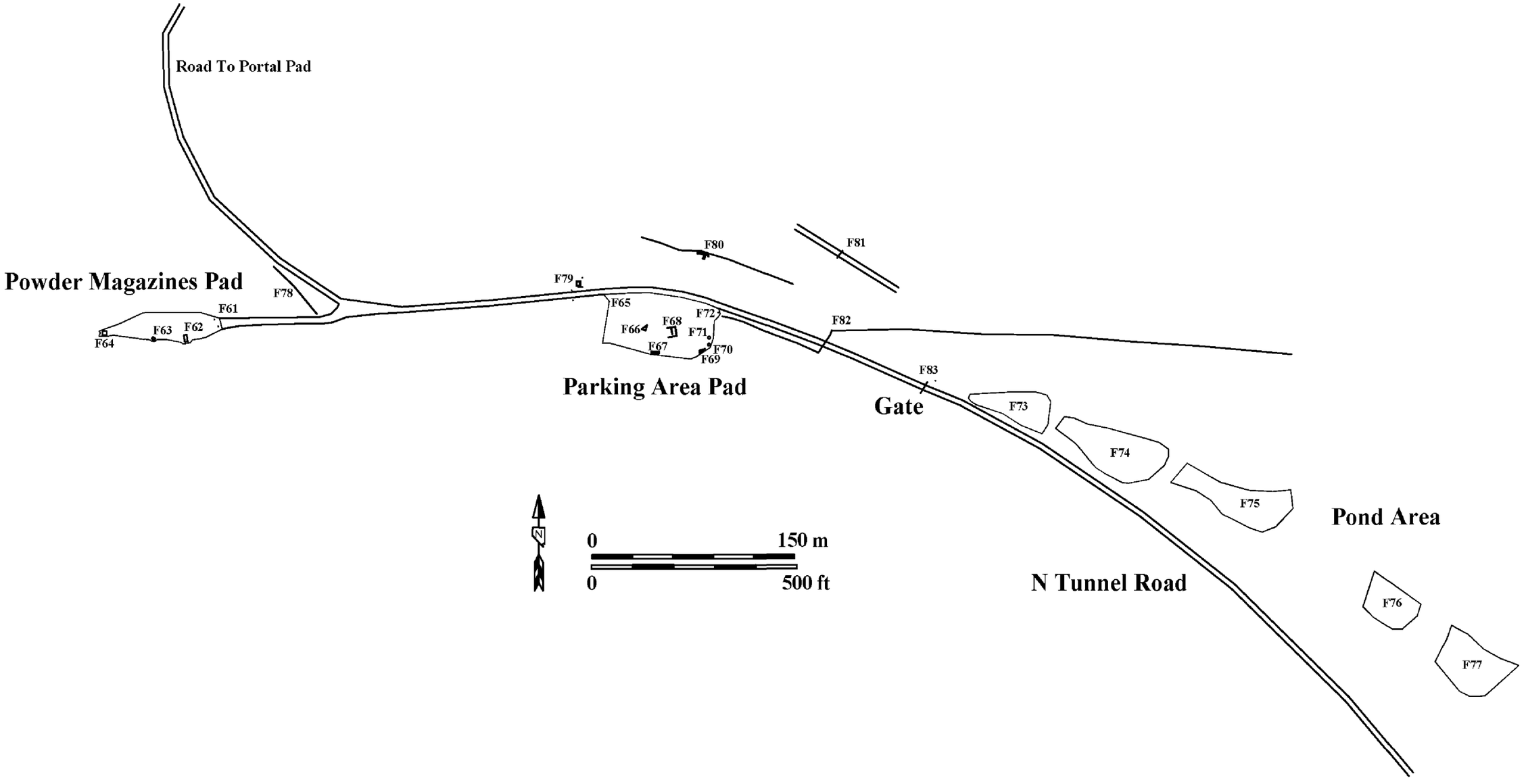



Figure 213. Plan map of the U12n Tunnel complex powder magazines pad, parking area pad, pond area, and miscellaneous features along N Tunnel Road.

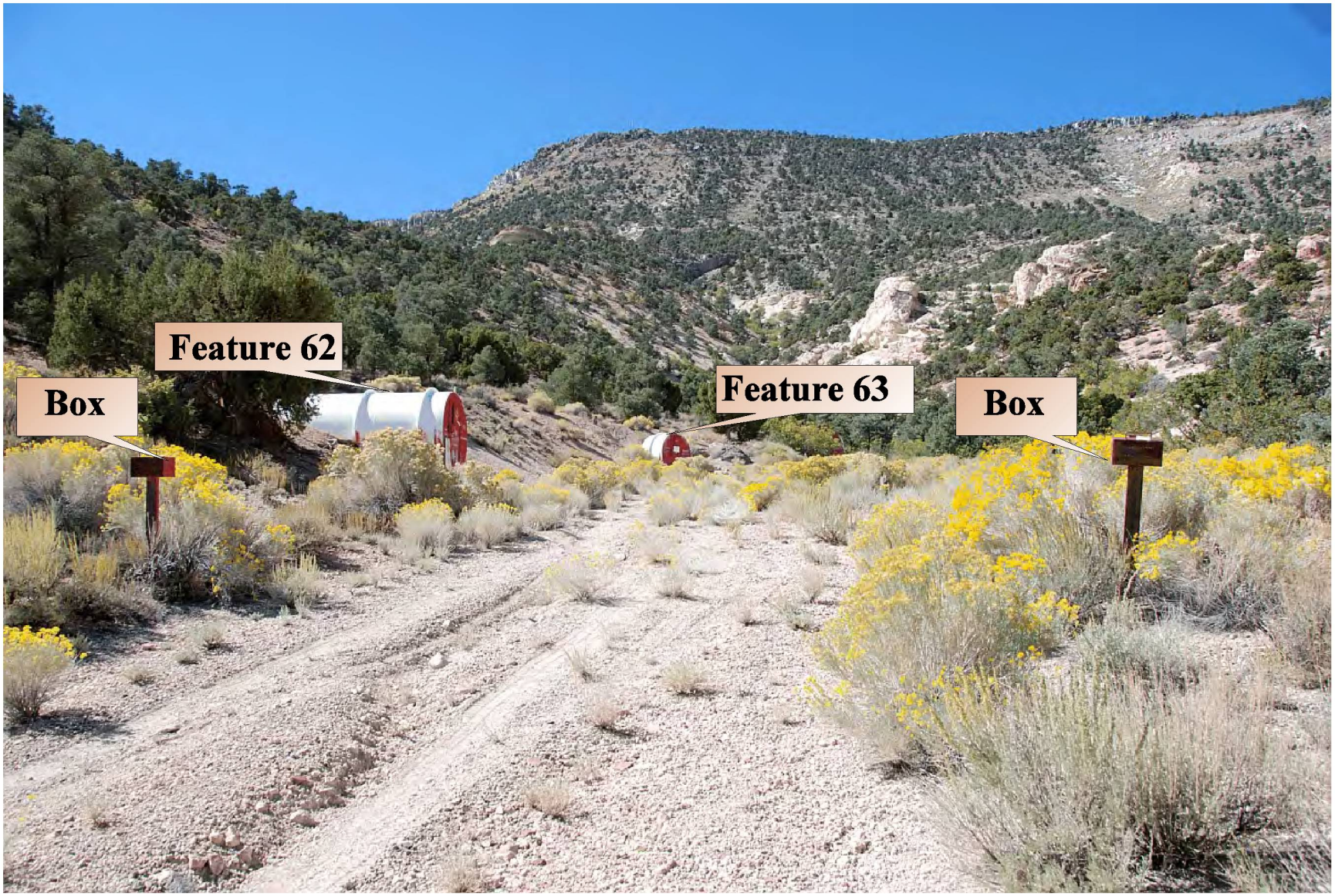


Figure 214. Feature 61, metal boxes and overview of powder magazines pad, U12n Tunnel, view west (2008).



Figure 215. Feature 62, powder magazine #1, U12n Tunnel, view southwest (2008).

Feature 63

Feature 63 (Figure 216) is a powder magazine at UTM 571719 E, 4116997 N. It is a 7 ft diameter by 5 ft long cylindrical white metal magazine that appears to have been constructed from line-of-sight pipe. The ends of the pipe have been sealed with metal plates and painted red. A 3 ft wide by 5 ft 9 inch tall door is in the north end provides access into the magazine. On the door are placards are stenciling for EXPLOSIVE A, NO SMOKING, and Capacity 10 lbs. Also, there is a paper tag with printed coordinates N 37.11909, W 116.11565. Spray painted on the door is N-2. The magazine is mounted on two 6-inch I-beam rails that extend the length of the pipe. Below the door are wood steps constructed of 3/4-inch plywood runners and 2 x 6 inch milled lumber steps. A 4 x 4 inch milled lumber post with a metal plate for mounting of a fire extinguisher is on the surface east of the door.

Feature 64

Feature 64 (Figure 217) is a powder magazine at UTM 571719 E, 4116997 N. It is a 10 ft diameter by 10 ft long cylindrical white metal magazine that appears to have been constructed from line-of-sight pipe. The ends of the pipe have been sealed with metal plates painted red. A 3 ft wide by 5 ft 9 inch tall door is in the north end provides access into the magazine. On the door are placards and stenciling for EXPLOSIVE A, NO SMOKING, Capacity 1500 lbs, and a metal plate labeled FUSE BURNING RATE SEC. PER FOOT. Spray painted on the door is N-3. The magazine is mounted on two 6-inch I-beam rails that extend the length of the pipe. Below the door are wood steps constructed of 3/4-inch plywood runners and 2 x 6 inch milled lumber steps. A metal T post and plate for mounting of a fire extinguisher is south of the door. Associated artifacts are a 10 ft long aluminum loading rack with 1 ft 8 inch wide rollers.

***Parking Area Pad***

The parking area pad is a rectangular-shaped dirt and gravel pad along the south side of N Tunnel Road (Figures 197-218). The pad is at an elevation of 5,880 ft (1,792.2 m) and is 265 ft (80.8 m) east-west by 145 ft (44.2 m) north-south and encompasses 0.8 acres (0.32 hectares). Eight features (Features 65-72) were recorded on the pad.

Feature 65

Feature 65 (Figure 219) is a wood sign and post at UTM coordinates 572056 E,4117023 N at the parking area. The sign is 1 ft 6 inches x 1ft, made of 1/2-inch plywood, and has been painted white with black lettering that is not legible. The sign is attached with 3/8-inch carriage bolts to a 4 x 4 inch milled lumber post that is 5 ft 6 inches in height.

Feature 66

Feature 66 (Figure 220) is three metal T posts at UTM coordinates 572084 E, 4117006 N at the parking area. The T posts extend 2 ft above the surface and are in a triangular pattern 16 ft (4.9 m) on the long side and 10 ft (3 m) on the short side. No function for the posts has been determined at this time.



Figure 216. Feature 63, powder magazine #2, U12n Tunnel, view southwest (2008).



Figure 217. Feature 64, powder magazine #3, U12n Tunnel, view southwest (2008).



Figure 218. Overview of the parking area pad, U12n Tunnel, view southeast (2008).



Figure 219. Feature 65, wood sign, U12n Tunnel, view west (2008).



Figure 220. Feature 66, T posts, U12n Tunnel, view northwest (2008).

Feature 67

Feature 67 (Figure 221) is concrete barriers (parking curbs) and a ladder at UTM coordinates 572093 E, 4116987 N at the parking area. The 12 barriers are 1 ft wide at the base, 6 inches in height in the center, and 8 ft long and form a trapezoid or triangle in end view. The barriers are not stacked but randomly placed and most are broken. The wood step ladder is 8 ft tall, broken, and appears to have been discarded at this location.

Feature 68

Feature 68 (Figure 222) is milled lumber beams at UTM coordinates 572105 E, 4117005 N at the parking area. The beams form a partial rectangle that measures 20 ft north-south by 20 ft east-west. Two 6 x 8 inch milled lumber beams that are 10 ft long have been placed end to end forming the north, east, and south sides. There are no beams on the west side. A16 ft long beam has been placed north-south midway on the feature. No use for the feature has been determined at this time.

Feature 69

Feature 69 (Figure 223) is a concrete barriers (parking curbs) and a metal sign at UTM coordinates 572127 E, 4116989 N at the parking area. Two types of barriers are present. On type is 1 ft wide at the base, 6 inches in height in the center, 8 ft long, and forms a trapezoid in end view. The second type is 1 ft wide at the base, 6 inches in height, and is triangular in end view. Unlike the barriers at Feature 70, these have been placed side by side. Also, the surface around the barriers has been covered with a thin layer of concrete that is deteriorating. A white metal sign with black lettering, lying on the surface, is labeled NO DUMPING OR WASH OUT. The metal sign was attached to plywood backboard on a 4 x 4 inch post that is 3 ft in height (standing).

Feature 70

Feature 70 (Figure 224) is a metal cable spool at UTM coordinates 572130 E, 4116992 N at the parking area. The cable spool is 6 ft in diameter and 2 ft wide. It contains 1/2 inch 500HM coaxial cable. The cable is labeled ANDREW 36060-44 HELIX 6/87 65831 DOE-NV-RF-14REV.7.

Feature 71

Feature 71 (Figure 225) is pipe clamps at UTM coordinates 572130 E, 4116997 N at the parking area. The clamps are 20 inch Victaulic style and made by Gustin Bacon. The clamps are in a pile and no rubber gaskets were found.

Feature 72

Feature 72 (Figure 226) is two signs and a pipe at UTM coordinates 572137 E, 4117015 N at the parking area. A metal stop sign is mounted to a 6 x 6 inch post that is 5 ft 11 inches (1.8 m) in height. Three feet to the west is a second sign that consists of a 1 ft 6 inch x 11 inch piece of plywood mounted on a 4 x 4 inch post that is 6 ft 1 inch (1.9 m) in height. The black lettering on the white painted plywood has faded and is not legible. On the surface south of the signs is a 10 ft long,



Figure 221. Feature 67, concrete barriers (parking curbs) and ladder, U12n Tunnel, view northeast (2008).



Figure 222. Feature 68, wood beams, U12n Tunnel, view northwest (2008).



Figure 223. Feature 69, concrete barriers (parking curbs), U12n Tunnel, view northeast (2008).



Figure 224. Feature 70, metal cable spool, U12n Tunnel, view southeast (2008).



Figure 225. Feature 71, pipe clamps, U12n Tunnel, view northwest (2008).



Figure 226. Feature 72, signs and pipe, U12n Tunnel, view southeast (2008).

1 ft 8 inch diameter spiral welded Victaulic style grooved pipe. The pipe is the same diameter as the clamps at Feature 71.

***Pond Area***

The pond area consists of five irregular-shaped retention ponds with earthen berms along the north side of N Tunnel Road (Figure 227 - only 3 shown). The ponds (Features 73-77) are between 5,680 ft (1,731.3 m) and 5,780 ft (1,761.7 m) in elevation and vary in size and area. The pond area consists of 5 ponds that empty, unfenced, and overgrown with vegetation. Because of the function of the ponds, no attempt was made to enter or record exact measurements of the features.

Feature 73

Feature 73 (Figure 228) is pond 1 at the pond area along the N Tunnel Road. Pond 1 is at UTM coordinates 572323 E, 4116956 N, roughly triangular in shape, 200 ft (60.1m) east -west by 85 ft (25.9 m) north-south, and encompasses 0.26 acres (0.11 hectares). The pond is at an elevation of 5,780 ft and has a berm up to 6 ft in height and a metal sign labeled **"N** tunnel pond #**1**". There is a 6 ft high berm between the southern edge of the pond and the N Tunnel Road to keep storm water flowing down the road from entering the pond.

Feature 74

Feature 74 (Figure 229) is pond 2 at the pond area at UTM coordinates 572387 E, 4116931 N. It is irregular in shape, 260 ft (79.2 m) east-west by 115 ft (35 m) north-south, and encompasses 0.52 acres (0.21 hectares). The pond is at an elevation of 5,760 (1,755.6 m) and has a berm up to 6 ft in height and a metal sign labeled **"N** tunnel pond #**2"**. There is a 6 ft high berm between the southern edge of the pond and the N Tunnel Road to keep storm water flowing down the road from entering the pond.

Feature 75

Feature 75 (Figure 230) is pond 3 at the pond area at UTM coordinates 572484 E, 4116906 N. It is irregular in shape, 300 ft (91.4 m) east-west by 100 ft (30.5 m) north-south, and encompasses 0.45 acres (0.18 hectares). The pond is at an elevation of 5,740 (1,749.6 m) and has a metal sign labeled "**N** tunnel pond #**3"**.

Feature 76

Feature 76 (Figure 231) is pond 4 at the pond area at UTM coordinates 572623 E, 4116829 N. It is roughly rectangular in shape, 140 ft (42.7 m) east-west by 85 ft (25.9 m) north-south, and encompasses 0.25 acres (0.1 hectares). The pond is at an elevation of 5,680 (1,731.3 m) and has a metal sign labeled **"N** tunnel pond #**4"**.

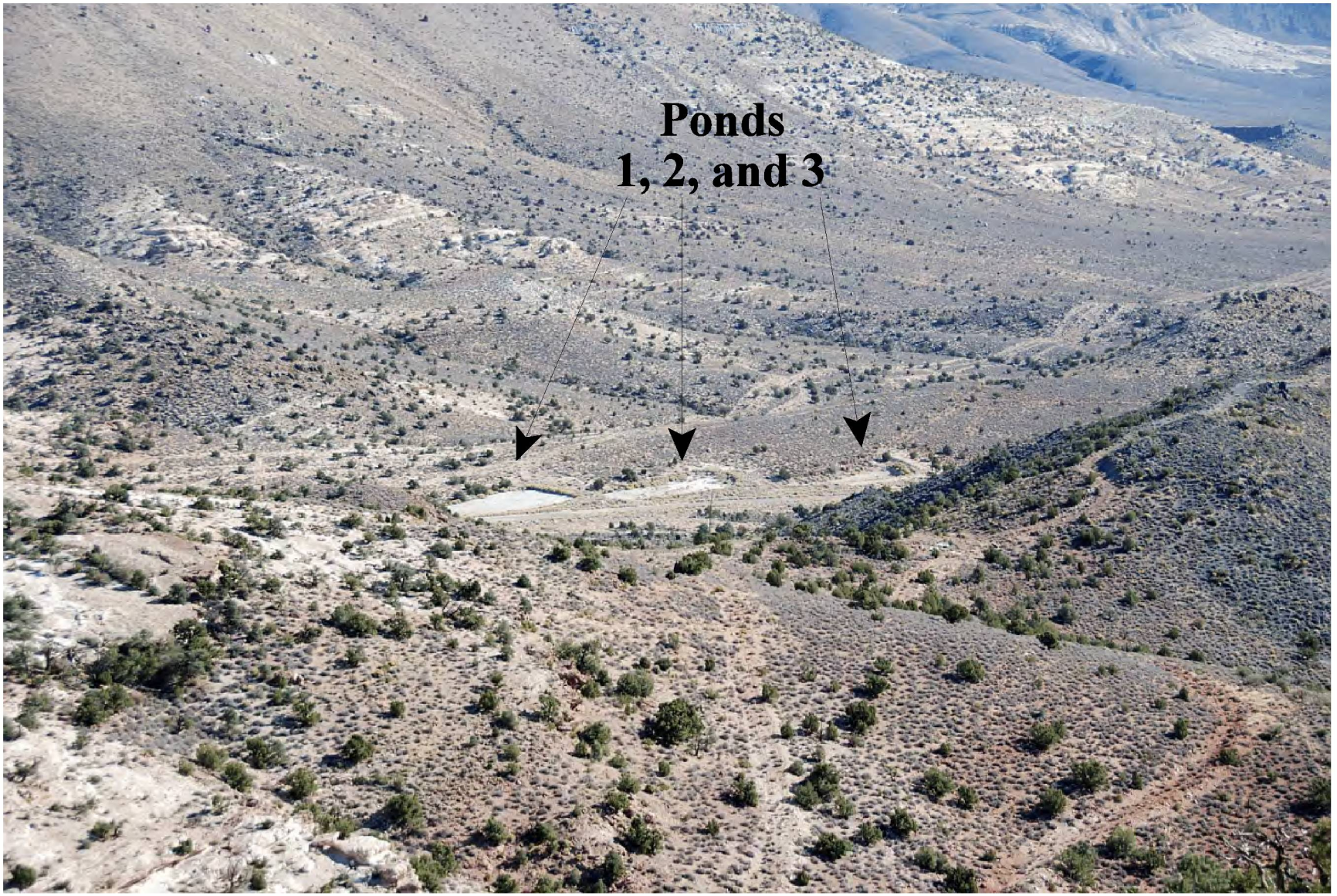


Figure 227. Overview of the U12n Tunnel complex retention pond area, view northeast (2008).



Figure 228. Feature 73, pond 1, U12n Tunnel, view east (2008).



Figure 229. Feature 74, pond 2, U12n Tunnel, view northeast (2008).



Figure 230. Feature 75, pond 3, U12n Tunnel, view southeast (2008).



Figure 231. Feature 76, pond 4, U12n Tunnel, view southeast (2008).

Feature 77

Feature 77 (Figure 232) is pond 5 at the pond Area at UTM coordinates 572689 E, 4116790 N. It is roughly rectangular in shape, 160 ft (48.8 m) east-west by 105 ft north-south, and encompasses 0.41 acres (0.17 hectares). The pond is at an elevation of 5,660 (1,725.2 m) and has a metal sign labeled **N** tunnel pond #**5**.

***Miscellaneous Features Along N Tunnel Road***

Six miscellaneous features recorded along N Tunnel Road are near the muckpile south of the U12n Tunnel portal pad and extend to the pond area (Figure 197). The features are on both the north and south sides of the road and between 5,700 ft (1,737.4 m) and 5,980 ft (1,822.7 m) in elevation. Two features (Features 78 and 79) were recorded along the N Tunnel Road between the powder magazines and the parking area pad. Two features (Features 80 and 81) were recorded north of the N Tunnel Road and north of the parking area pad. Two features (Features 82 and 83) were recorded along the N Tunnel Road between the parking area pad and the pond area.

Feature 78

Feature 78 (Figure 233) is a pipeline at UTM coordinates 571807 E, 4117048 N (west end), 571822 E, 4117034 N (east end), and an elevation of 5,960 ft (1,816.6 m). The 6-inch Victaulic pipe is exposed for 153 ft (46.7 m) in a drainage on the south side of the N Tunnel Road. The east and west ends of the pipeline are lying on the bottom surface of the drainage. However, the center section crosses a deep portion of the drainage and is supported by crossed T posts (X shape), approximately 6 ft above the surface. Concrete has been poured in the bottom of the west drainage and supports the pipe.

Feature 79

Feature 79 (Figure 234) is a wood building, rock wall, panel box, and barricade along the N Tunnel Road at UTM coordinates 572034 E, 4117037 N and an elevation of 5,860 ft (1,786.1 m). The building served as a traffic control point for access to the U12n Tunnel Complex. It is 8 ft 2 inches north-south, 6 ft 3 inches (1.9 m) east-west, 8 ft in height, and constructed of 2 x 4 inch milled lumber framing and 1/2-inch plywood sheeting. The roof is gabled (north-south) and drops 1 ft 9 inches from the ridge line to the eave. It has 2 x 4 inch rafters, no joists, and plywood decking. The decking is covered with rolled roofing material. The roof extends 2 ft from the exterior facades of the building. Centered on the ridge line is a 2 1/2-inch pipe approximately 4 ft in height. On top of the pipe are four 1 ft 4 inch diameter flood lights. The shack is mounted on 6 x 6 inch skids.

Centered in the south facade is a 2 ft 8 inch wide by 6 ft 8 inch tall door opening. The door has two (vertical) 2 ft 8 inch wide by 1 ft 9 inch tall plexiglass widows in the top section. The bottom of the door has a piece of 1/2-inch plywood nailed to the exterior surface. The west facade has a 5 ft x 3 ft 4 inch horizontal double sliding wood framed window with an aluminum screen. Near the north corner on the west facade is a 1 ft 1/2 inch x 8 1/2 inch x 4 1/2 inch (30.6. x 21.6 x 11. 4 cm) electrical switch box. Centered in the north facade is a 5 ft x 3 ft 4 inch fixed wood-framed window



Figure 232. Feature 77, pond 5, U12n Tunnel, view southeast (2008).



Figure 233. Feature 78, pipeline, U12n Tunnel, view north (2008).



Figure 234. Figure 79, traffic control point building, U12n Tunnel, view west (2008).

opening. Plexiglass for the window is in on the floor below the opening. Centered below the window opening is a 1 ft 9 inch x 1 ft 2 inch plywood shelf. It is braced on each end with 2 x 4's placed diagonally across the corners and attached to the adjacent walls. In the east facade is a 5 ft x 3 ft 4 inch horizontal double sliding wood-framed window. The structure was originally painted blue or green with red trim. Painted in red on the east facade is LITTLE HOUSE ON THE HILL.

The interior walls and floor of the structure are plywood. In the ceiling are two recessed 1 ft square light fixtures with plastic covers. Below the widow on the north wall is a 2 ft 1 inch x 1 ft 4 inch x 4 inch cavity. Above the window level is a 1 ft 6 inch triangular shelf mounted in the corner of the north and east walls. On the east wall at the north corner 2 ft above the floor is a 1 ft 9 inch x 1 ft 2 inch shelf. On the east wall at the south corner below the window level is a 2 ft 4 inch x 1 ft shelf. Below the shelf and recessed into the wall is a 1 ft 5 inch x 1 ft 9 inch (43.2 x 53.3 cm) ELECTROMODE electric heater. On the west wall near the north corner is a 1 ft 4 inch x 1 ft breaker (fuse) box.

Four feet from the south facade and centered on the door is a 1 ft tall by 1 ft wide rock wall (not pictured) that extends at least 10 ft to the east. Most of the wall is obscured by vegetation. At the end of the wall is a 3-inch galvanized pipe approximately 8 ft in height. A junction box (not pictured), possibly telephone, is mounted to a 6 x 6 inch wood post 12 ft from the northeast corner of the structure. The barricade (not pictured) consists of two 4 inch diameter by 3 ft 4 inch tall concrete filled metal posts on the north and south sides of N Tunnel Road. A section of chain that served as the barricade is still attached to the north post.

Feature 80

Feature 80 (Figure 235) is the tunnel drain discharge monitoring station on a pipe line at UTM coordinates 572126 E, 4117065 N and an elevation of 5,840 ft (1,780 m). The 6-inch metal Victaulic pipe line is north of the N Tunnel Road and visible above the surface for approximately 395 ft (120.4 m). The sampling station consists of two metering boxes, a possible instrument storage box, an electrical panel, a vertical pipe, two batteries, three wood pallets, and two compressed gas cylinders. The west metering metal box is 4 ft in length, 1 ft 6 inches in width, and 1 ft 6 inches tall. The box has no top and is open to access the flowing water that enters from the pipe on the west end. The second metering box is adjacent to the east edge of the first box and shaped like a bow tie. It is 3 ft long, 1 ft wide (at each end), and 1 ft 2 inches in height. The box reduces down to 3 inches in the center. A third metal box is 3 ft 6 inches east-west, 2 ft 6 inches north-south, south of the metering boxes, and is probably for instrument storage. Labeling on the box is N-Tunnel Pond EFF. Near the box is a 10 inch diameter metal pipe that extends 2 ft above the surface. Southeast of the metering boxes are two electrical panels mounted on two 6-inch channel iron legs that are 6 ft in height. The panels are 3 ft x 3 ft x1 ft 5 inches and mounted back to back. Below the electrical panels are two 12 volt lead acid batteries. Three 8 ft x 4 ft wood pallets are south and west of the metering boxes and probably were used for decking above a possibly wet surface. At the west end of the pallets are two 4 ft long by 1 ft 2 inch diameter compressed gas cylinders.

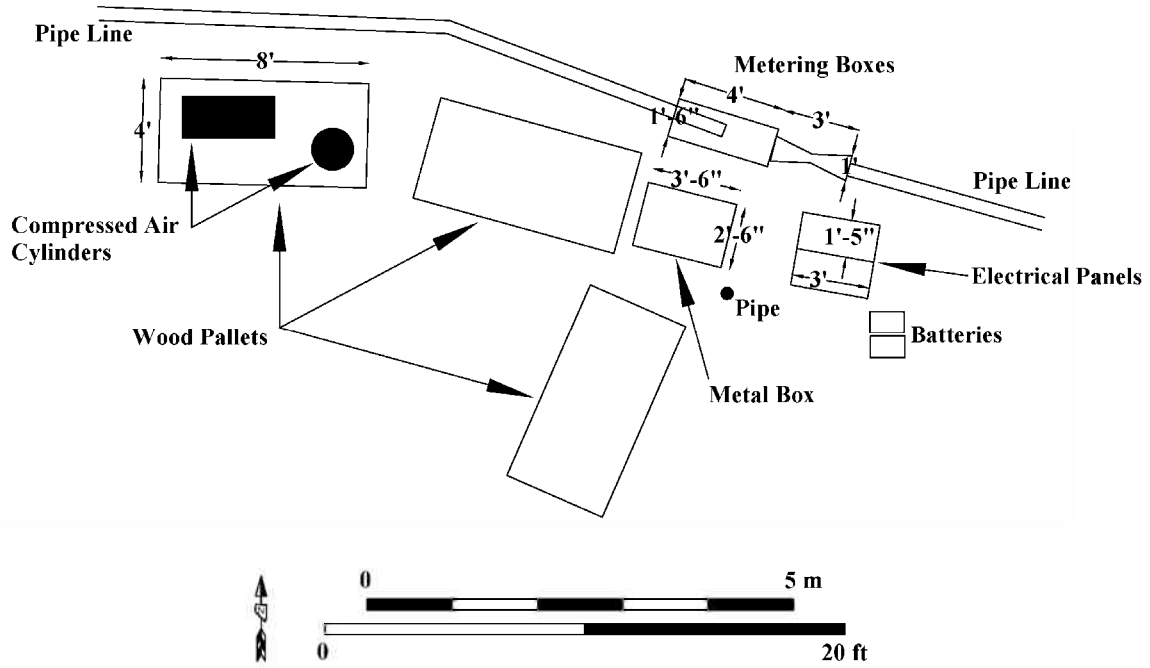





Figure 235. Plan map and photograph of Feature 80, tunnel drain discharge monitoring station and waterline, U12n Tunnel, view southwest (2008).

Feature 81

Feature 81 (Figure 236) is a wood gate on the original N Tunnel dirt access road at UTM coordinates 572229 E, 4117059 N and north of the N Tunnel Road at an elevation of 5,840 ft. The gate consists of two metal posts on each side of a dirt road and a wood X frame gate. The posts are 4-inch diameter metal pipe 6 ft 6 inches in height and set 21 ft apart. The gate is two rectangular frames 8 ft 6 inches (2.6 m) in length and 5 ft in height. An X brace provides support for the frames. The south half of the gate is still attached to the post while the north half is lying on the surface near the south post. A chain and lock secured the two halves together. The hinges are made of metal rods attached vertically to the metal posts. Round metal collars, attached vertically along the sides of the gate, slip over the rods allowing the gate to pivot.

Feature 82

Feature 82 (Figures 237 and 238) is an electrical panel, metal signs, and plastic conduit at UTM coordinates 572221 E, 4117002 N along the N Tunnel Road at an elevation of 5,820 (1,773.9 m). The electrical panel is 2 ft 6 inches x 1 ft 8 inches x 8 inches mounted on 1-inch channel iron (Unistrut) legs. Near the panel and on each side of the N Tunnel Road are two signs that are labeled BURIED CABLE. A 2 1/2-inch gray plastic conduit extends south from the panel, crosses under the road, and then turns west for 250 ft (76.2 m) and ends near the east edge of the parking area and east of Feature 75. The conduit extends north from the panel, turns east for 1,119 ft (341.1 m) along the north side of the pond area, and then goes under ground. This point is marked with a sign labeled BURIED CABLE. A bladed area for the buried line extends approximately 650 ft (198.1 m) northeast and disappears in a drainage.

Feature 83

Feature 83 (Figure 239) is a metal barricade across the N Tunnel Road at UTM coordinates 572292 E, 4116965 N and an elevation of 5,800 ft (1,767.8 m). The barricade (presently used) consists of two vertical 6-inch I-beams 4 ft 2 inches tall that are set in concrete on each side of the N Tunnel Road. Attached to each I-beam are two horizontal metal plates that form the top and bottom pivot points for the barricade arms (gate). The arms are roughly triangular in shape and consists of a vertical pivot end pipe, top horizontal pipe, bottom angled pipe, vertical bracing, and a closure pipe. The pivot end of the arms is a vertical 2-inch pipe 3 ft 4 inches in height. The top horizontal pipe is 15 ft in length, the bottom angled pipe is 12 ft in length, and the vertical brace is 1 ft 8 inches in height. The top horizontal pipe extends 3 ft from the intersection of the angled pipe. When closed, the two horizontal pipes are connected by a sliding closure. The closure consists of two stacked and welded pieces of 2 1/2-inch pipe. The 2 1/2-inch pipe is slid over each end of the 2-inch horizontal pipe ends and secured with a chain and lock. Orange plastic netting has been attached to the arms to make the barricade more visible. North and east of the north I-beam are three 4 x 6 inch milled lumber posts that have been cut off 5 inches above the ground surface. The posts are spaced 3 ft apart and appear to have supported a sign that is now missing.



Figure 236. Feature 81, wood gate across original dirt access road, U12n Tunnel, view northwest (2008).



Figure 237. Feature 82, electrical panel, U12n Tunnel, view southwest (2008).



Figure 238. Feature 82, conduit, U12n Tunnel, view east (2008).



Figure 239. Feature 83, barricade across N Tunnel Road, U12n Tunnel, view west (2008).

## Mesa Area Feature Descriptions

The mesa area contains 119 features generally related to data recording facilities, cable holes and pre- and post-shot drill holes, and ventilation equipment for activities at the U12n Tunnel complex (Figure 240). Cable holes were for the recording of data during testing. Pre-shot drill holes were for evaluating the geology of the subsurface and placement of instruments near the tunnel testing locations. Post-shot drill holes were for the collection of material samples around the test location. The features are listed in Table 5 and drill hole coordinates in Table 6. Locational information is in UTM coordinate system NAD 27, Zone 11. Bennett (1991) was used for all drill hole information except location which was taken in the field with a Garmin GPS handheld unit.

### *Mesa Slope*

The mesa slope extends from 6,020 ft at the portal pad to 7,340 ft (2,237.2 m) at the east edge of the Mesa Trailer Park. Features 84-86 are drill holes along the abandoned Rainier Mesa Road that extends up the steep face of the mesa.

Feature 84

Feature 84 (Figure 241) is the UE-12n #5 exploratory drill hole at UTM coordinates 571125 E, 4116551 N, at an elevation of 6,664 ft (2,031.2 m), and drilled to a depth of 503 ft (153 m) (Bennett 1991). The drill hole is near the intersection of the abandoned Rainier Mesa Road and the north end of the dirt pad for the U12b Tunnel Station 12-304. No pipe or other artifacts related to the drill hole were found at the location. However, the road and dirt pad have been graded to push back rock fall from the mesa slope. The drill hole coordinates are within the rock fall and vegetation that obscures the edge of the road and dirt pad.

Feature 85

Feature 85 (Figure 242) is the UE-12n #7 exploratory drill hole at UTM coordinates 570948 E, 4117122 N, at an elevation of 6,893 ft (2,101.0 m), and drilled to a depth of 832 ft (254 m) (Bennett 1991). The drill hole pad is part of the abandoned Rainier Mesa Road that has been disturbed by grading of the surface to push back rock fall from the mesa slope. No pipe was found but the sign identifying the drill hole is visible at the location. The drill hole coordinates are within the rock fall and vegetation that obscures the edge of the road.

Feature 86

Feature 86 (Figure 243) is the UE-12n #4 exploratory drill hole at UTM coordinates 570947 E, 4117132 N, at an elevation of 6,894 ft (2,101.2 m), and drilled to a depth of 831 ft (253 m) (Bennett 1991). The drill hole pad is part of the abandoned Rainier Mesa Road. No pipe or other artifacts related to the drill hole were found at the location. No pipe or other artifacts related to the drill hole were found at the location. However, the road has been graded to push back rock fall from the mesa slope. The drill hole coordinates are within the rock fall and vegetation that obscures the edge of the road.

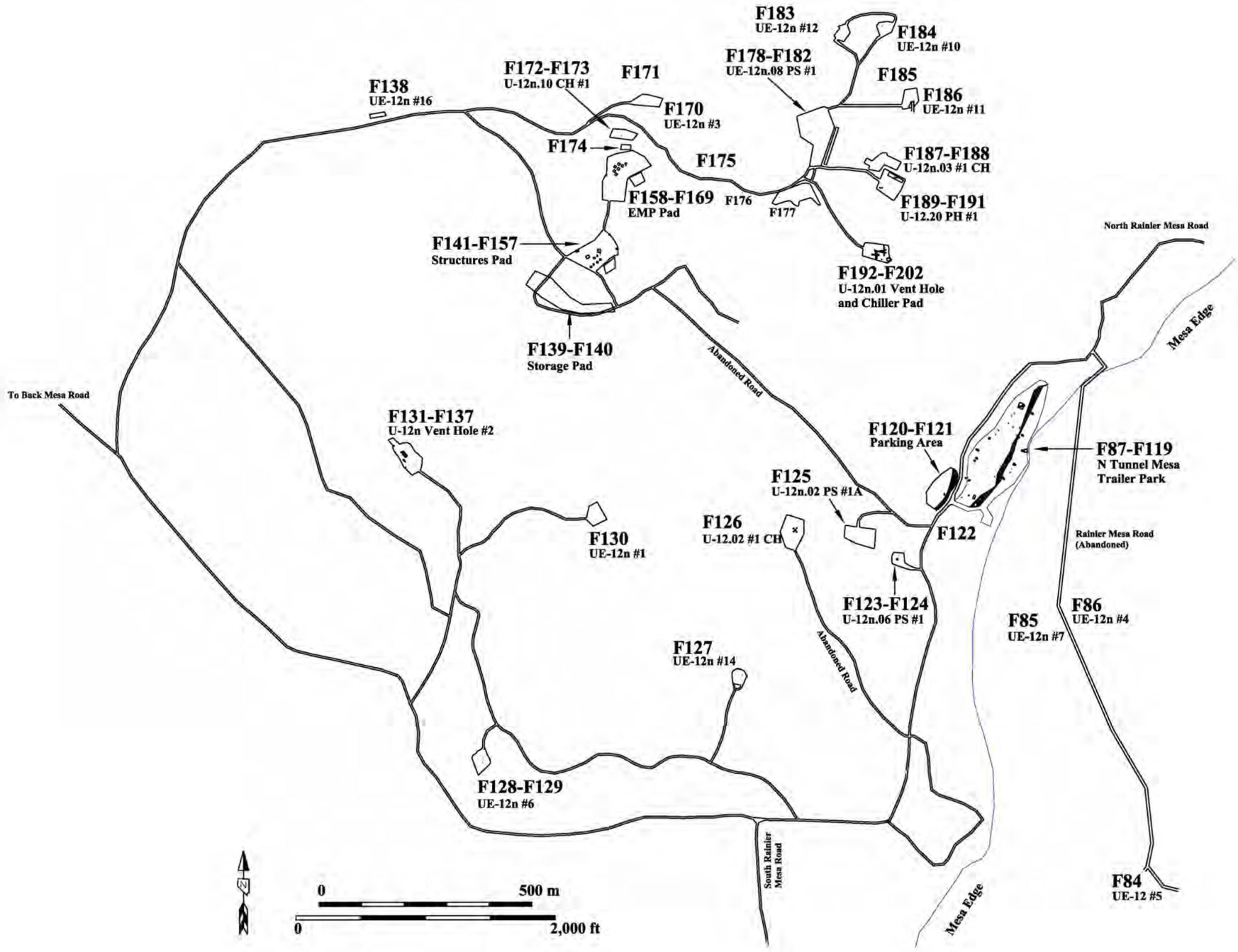



Figure 240. Plan map of the U12n Tunnel complex Rainier Mesa area.

Table 5. List of Features at the Mesa Area.

| NO. | FEATURE TYPE | ELEVATION (ft-m) | EASTING | NORTHING |
|---|---|---|---|---|
| | MESA AREA | | | |
| Mesa Slope | | | | |
| 84 | UE-12n #5 | 6,664 - 2,031.2 | 571125 | 4116551 |
| 85 | UE-12n #7 | 6,893 - 2,101.0 | 570948 | 4117122 |
| 86 | UE-12n #4 | 6,894 - 2,101.2 | 570947 | 4117132 |
| Mesa Trailer Park | | | | |
| 87 | U12n Mesa Cable Building Foundation/Cable Holes 1,2, 3 | 7,300 - 2,225.0 | 570850 | 4117649 |
| 88 | Concrete Pad | 7,300 - 2,225.0 | 570826 | 4117627 |
| 89 | Concrete Pad | 7,300 - 2,225.0 | 570820 | 4117623 |
| 90 | Concrete Pad | 7,500 - 2,286.0 | 570812 | 4117605 |
| 91 | Concrete Pad | 7,500 - 2,286.0 | 570823 | 4117596 |
| 92 | Pipe and Concrete | 7,300 - 2,225.0 | 570789 | 4117589 |
| 93 | Pipe and Concrete | 7,300 - 2,225.0 | 570823 | 4117579 |
| 94 | Electrical Substation Foundation | 7,300 - 2,225.0 | 570767 | 4117572 |
| 95 | Concrete Pad | 7,300 - 2,225.0 | 570743 | 4117542 |
| 96 | Concrete Pad | 7,300 - 2,225.0 | 570740 | 4117523 |
| 97 | Concrete Pad | 7,300 - 2,225.0 | 570735 | 4117518 |
| 98 | Stair or Cable Access | 7,300 - 2,225.0 | 570716 | 4117478 |
| 99 | Electrical Substation Foundation | 7,300 - 2,225.0 | 570722 | 4117472 |
| 100 | Electrical Panel | 7,300 - 2,225.0 | 570702 | 4117431 |
| 101 | Concrete | 7,300 - 2,225.0 | 570720 | 4117436 |
| 102 | Loading Ramp | 7,300 - 2,225.0 | 570732 | 4117428 |
| 103 | U-12n.01-4 PPS | 7,339 - 2,236.9 | 570782 | 4117460 |
| 104 | Light Pole Support | 7,300 - 2,225.0 | 570780 | 4117479 |
| 105 | Telephone Junction Box | 7,300 - 2,225.0 | 570761 | 4117499 |
| 106 | Concrete Pad | 7,300 - 2,225.0 | 570794 | 4117504 |

Continued

Table 5. List of Features at the Mesa Area (continued).

| NO. | FEATURE TYPE | ELEVATION (ft-m) | EASTING | NORTHING |
|---|---|---|---|---|
| Mesa Trailer Park | | | | |
| 107 | Stair or Cable Access | 7,300 - 2,225.0 | 570836 | 4117575 |
| 108 | Electrical Panel Backboard | 7,300 - 2,225.0 | 570839 | 4117596 |
| 109 | Electrical Switch Station | 7,310 - 2,228.1 | 570731 | 4117410 |
| 110 | Electrical Substation #5 Concrete Pads | 7,340 - 2,237.2 | 570800 | 4117479 |
| 111 | U-12n.01-3 PPS | 7,341 - 2,237.5 | 570815 | 4117488 |
| 112 | U-12n.01-2 R/C | 7,341 - 2,237.5 | 570818 | 4117489 |
| 113 | Pipe | 7,340 - 2,237.2 | 570816 | 4117490 |
| 114 | Pipe | 7,340 - 2,237.2 | 570820 | 4117498 |
| 115 | Stair or Cable Access | 7,340 - 2,237.2 | 570804 | 4117514 |
| 116 | Electrical Substation #2 Concrete Pads | 7,340 - 2,237.2 | 570827 | 4117510 |
| 117 | U-12.01-5 CH | 7,330 - 2,234.2 | 570858 | 4117539 |
| 118 | Electrical Substation #1 Concrete Pads | 7,340 - 2,237.2 | 570846 | 4117578 |
| 119 | Electrical Substation #8 Concrete Pads | 7,340 - 2,237.2 | 570871 | 4117628 |
| Parking Area | | | | |
| 120 | Electrical Substation #7 Concrete Pads | 7,300 - 2,225.0 | 570662 | 4117440 |
| 121 | Stair or Cable Access | 7,300 - 2,225.0 | 560674 | 4117440 |
| Mesa Area General | | | | |
| 122 | Electrical Panels | 7,360 - 2,243.3 | 570647 | 4117372 |
| 123 | U-12n.06 PS #1 | 7,408 - 2,258.0 | 570552 | 4117287 |
| 124 | Pole Tower | 7,400 - 2,255.5 | 570530 | 4117293 |
| 125 | U-12n.02 PS# 1A and #1AS | 7,373 - 2,247.3 | 570454 | 4117342 |
| 126 | U-12n.02 #1 CH | 7,203 - 2,195.5 | 570311 | 4117354 |
| 127 | UE-12n #14 | 7,415 - 2,260.1 | 570187 | 4117055 |
| 128 | UE-12n #6 | 7,527 - 2,294.2 | 569576 | 4116811 |
| 129 | Core Samples | 7,420 - 2,261.6 | 569580 | 4116841 |

Continued

Table 5. List of Features at the Mesa Area (continued).

| NO. | FEATURE TYPE | ELEVATION (ft-m) | EASTING | NORTHING |
|---|---|---|---|---|
| Mesa Area General | | | | |
| 130 | UE-12n #1 | 7,321 - 2,231.4 | 569867 | 4117381 |
| 131 | U-12n Vent Hole #2 | 7,340 - 2,237.2 | 569390 | 4117536 |
| 132 | Electrical Substation | 7,340 - 2,237.2 | 569394 | 4117517 |
| 133 | Fiberglass Telephone Booth | 7,340 - 2,237.2 | 569396 | 4117503 |
| 134 | Electrical Panel | 7,340 - 2,237.2 | 569388 | 4117512 |
| 135 | Milled Lumber | 7,340 - 2,237.2 | 569367 | 4117552 |
| 136 | Light Poles | 7,340 - 2,237.2 | 569390 | 4117504 |
| 137 | UE-12n #13 | 7,355 - 2,241.8 | 569349 | 4118331 |
| 138 | UE-12n #16 | 7,527 - 2,294.2 | 569421 | 4117506 |
| 139 | UE-12n #15 | 7,371 - 2,246.7 | 569702 | 4117958 |
| 140 | UE-12n #15a | 7,369 - 2,246.1 | 569703 | 4117954 |
| 141 | U-12n.10A Structure CH | 7,384 - 2,250.6 | 569851 | 4118010 |
| 142 | Electrical Panel Backboard | 7,380 - 2,249.2 | 569854 | 4118005 |
| 143 | Pole Tower | 7,380 - 2,249.2 | 569854 | 4117999 |
| 144 | Concrete Pad | 7,380 - 2,249.2 | 569848 | 411800 |
| 145 | Concrete Pad | 7,380 - 2,249.2 | 569842 | 4117995 |
| 146 | Concrete Pad | 7,380 - 2,249.2 | 569856 | 4117991 |
| 147 | Concrete Pad | 7,380 - 2,249.2 | 569849 | 4117985 |
| 148 | Concrete Pad | 7,380 - 2,249.2 | 569839 | 4117980 |
| 149 | Concrete Pad | 7,380 - 2,249.2 | 569834 | 4117979 |
| 150 | Pole Tower | 7,380 - 2,249.2 | 569826 | 4117995 |
| 151 | Loading Ramp | 7,380 - 2,249.2 | 569829 | 4117995 |
| 152 | Concrete Pad | 7,380 - 2,249.2 | 569796 | 4118008 |
| 153 | Milled Lumber | 7,380 - 2,249.2 | 569874 | 4118047 |
| 154 | Electrical Junction Box | 7,380 - 2,249.2 | 569894 | 4118002 |

Continued

Table 5. List of Features at the Mesa Area (continued).

| NO. | FEATURE TYPE | ELEVATION (ft-m) | EASTING | NORTHING |
|---|---|---|---|---|
| Mesa Area General | | | | |
| 155 | Electrical Breaker Box | 7,380 - 2,249.2 | 569887 | 4118000 |
| 156 | Electrical Panel Backboard | 7,380 - 2,249.2 | 569893 | 4118015 |
| 157 | Pit | 7,380 - 2,249.2 | 569862 | 4117975 |
| 158 | U-12n.10A EMP CH | 7,384 - 2,250.6 | 569914 | 4118215 |
| 159 | Electrical Panels | 7,380 - 2,249.2 | 569915 | 4118210 |
| 160 | Concrete Pad | 7,380 - 2,249.2 | 569905 | 4118213 |
| 161 | Concrete Pad | 7,380 - 2,249.2 | 569897 | 4118213 |
| 162 | UE-12n #9/Inst. | 7,383 - 2,250.3 | 569894 | 4118214 |
| 163 | Concrete Pad | 7,380 - 2,249.2 | 569888 | 4118211 |
| 164 | Concrete Pad | 7,380 - 2,249.2 | 569896 | 4118206 |
| 165 | Concrete Pad | 7,380 - 2,249.2 | 569886 | 4118201 |
| 166 | Concrete Pad | 7,380 - 2,249.2 | 569890 | 4118193 |
| 167 | Electrical Panel Backboard | 7,380 - 2,249.2 | 569869 | 4118189 |
| 168 | Pit | 7,380 - 2,249.2 | 569222 | 4118182 |
| 169 | U-12n.10 PS #1 | 7,368 - 2,245.8 | 569882 | 4118151 |
| 170 | UE-12n #3 | 7,479 - 2,279.6 | 569970 | 4118359 |
| 171 | Antenna | 7,480 - 2,279.9 | 569953 | 4118405 |
| 172 | U-12-n.10 CH #1 | 7,425 - 2,263.1 | 569904 | 4118280 |
| 173 | Electrical Panels | 7,400 - 2,255.5 | 569896 | 4118269 |
| 174 | Pit | 7,400 - 2,255.5 | 569904 | 4118260 |
| 175 | UE-12n #8 | 7,395 - 2,254.0 | 570080 | 4118200 |
| 176 | Electrical Panels | 7,360 - 2,243.3 | 570188 | 4118147 |
| 177 | Anemometer | 7,340 - 2,237.2 | 570275 | 4118136 |
| 178 | U-12n.08 PS #1 | 7,349 - 2,240.0 | 570345 | 4118289 |
| 179 | U-12n.18 PS #1A, PS#1AA, and PS#1AAB | 7,344 - 2,238.5 | 570354 | 4118310 |

Continued

Table 5. List of Features at the Mesa Area (continued).

| NO. | FEATURE TYPE | ELEVATION (ft-m) | EASTING | NORTHING |
|---|---|---|---|---|
| Mesa Area General | | | | |
| 180 | U-12n.15 PS#1A, PS #1AA, PS #1AB, PS #1AC, and #1AD | 7,347 - 2,239.4 | 570345 | 4118316 |
| 181 | UE-12n #2 | 7,344 - 2,238.5 | 570360 | 4118319 |
| 182 | Pit | 7,340 - 2,237.2 | 570413 | 4118298 |
| 183 | UE-12n #12 | 7,412 - 2,259.2 | 570408 | 4118521 |
| 184 | UE-12n #10 | 7,378 - 2,248.8 | 570516 | 4118538 |
| 185 | Pole Tower | 7,340 - 2,237.2 | 570505 | 4118400 |
| 186 | UE-12n #11 | 7,309 - 2,227.8 | 570586 | 4118361 |
| 187 | U-12n.03 #1 CH | 7,304 - 2,226.3 | 570521 | 4118215 |
| 188 | Casing Sleeves | 7,300 - 2,225.0 | 570561 | 4118218 |
| 189 | U-12n.20 PH #1 | 7,317 - 2,230.2 | 570534 | 4118168 |
| 190 | Pipe | 7,320 - 2,231.2 | 570512 | 4118154 |
| 191 | Mud Pit | 7,320 - 2,231.2 | 570566 | 4118175 |
| 192 | U-12n.10 Vent Hole | 7,280 - 2,218.9 | 570501 | 4118008 |
| 193 | Stored Equipment | 7,280 - 2,218.9 | 570524 | 4118011 |
| 194 | Electrical Substation | 7,280 - 2,218.9 | 570526 | 4117992 |
| 195 | Electrical Panel | 7,280 - 2,218.9 | 570530 | 4117983 |
| 196 | Electrical Panel | 7,280 - 2,218.9 | 570515 | 4117993 |
| 197 | Concrete Pad | 7,280 - 2,218.9 | 570504 | 4117993 |
| 198 | Concrete Pad | 7,280 - 2,218.9 | 570504 | 4118001 |
| 199 | Concrete Pad | 7,280 - 2,218.9 | 570508 | 4118001 |
| 200 | Electrical Panel Backboard | 7,280 - 2,218.9 | 570504 | 4118003 |
| 201 | Chill Water System Pump Skid | 7,280 - 2,218.9 | 570502 | 4118002 |
| 202 | Water Tank | 7,280 - 2,218.9 | 570498 | 4118001 |

Table 6. Drill Holes, UTM Coordinates, and Drilled Depth (Bennett 1991).

| DRILL HOLE | EASTING | NORTHING | DEPTH (ft-m) |
|---|---|---|---|
| U-12n.01-2 Radiochemical | 570818 | 4117489 | 1,296 - 395 |
| U12n.01-3 Pre-Postshot | 570815 | 4117488 | 800 - 244 |
| U-12n.01-4 Pre-Postshot | 570782 | 4117460 | 836 - 255 |
| U-12n.01-5 Cable Hole | 570858 | 4117539 | 1,290 - 393 |
| U-12n Cable Hole #1 | 570845 | 4117648 | 1,221 - 372 |
| U-12n Cable Hole #2 | 570840 | 4117646 | 1,228 - 374 |
| U-12n Cable Hole #3 | 570836 | 4117646 | 1,235 - 376 |
| U-12n.02 Cable Hole #1 | 570311 | 4117354 | 1,233 - 376 |
| U-12n.02 Postshot #1A and #1AS | 570454 | 4117342 | 1,570 - 479 |
| U-12n.03 Cable Hole #1 | 570521 | 4118215 | 1,248 - 390 |
| U-12n.06 Postshot #1 | 570552 | 4117287 | 975 - 297 |
| U-12n.06 Pre-Postshot #1D | 570532 | 4117294 | Abandoned |
| U-12n.08 Postshot #1 | 570345 | 4118289 | 525 - 160 |
| U-12n.10 Cable Hole #1 | 569904 | 4118280 | 1,375 - 419 |
| U-12n.10 Vent Hole | 570501 | 4118008 | 1,240 - 378 |
| U-12n.10 Postshot #1 | 569882 | 4118151 | 544 - 169 |
| U-12n.10a EMP Cable Hole | 569914 | 4118215 | 1,330 - 405 |
| U-12n.10a Structure Cable Hole | 569851 | 4118010 | 1,355 - 413 |
| U-12n.15 Postshots 1A to 1AD | 570345 | 4118316 | 1,631 - 497 |
| U-12n.18 Postshot | 570354 | 4118310 | 1,564 - 477 |
| U-12n.20 Peep Hole #1 | 570534 | 4118168 | 1,250 - 381 |
| U-12n Vent Hole #2 | 569390 | 4117537 | 1,252 - 382 |
| UE-12n Exploratory #1 | 569867 | 4117381 | 2,001 - 610 |
| UE-12n Exploratory #2 | 570360 | 4118319 | 1,779 - 542 |
| UE-12n Exploratory #3 | 569970 | 4118359 | 1,409 - 429 |
| UE-12n Exploratory #4 | 570947 | 4117132 | 831 - 253 |
| UE-12n Exploratory #5 | 571125 | 4116551 | 503 - 153 |
| UE-12n Exploratory #6 | 569576 | 4116811 | 2,317 - 706 |
| UE-12n Exploratory #7 | 570948 | 4117122 | 832 - 254 |
| UE-12n Exploratory #8 | 570080 | 4118200 | 1,784 - 544 |
| UE-12n Exploratory #9 | 569894 | 4118214 | 1,550 - 472 |
| UE-12n Exploratory #10 | 570516 | 4118538 | 1,877 - 572 |
| UE-12n Exploratory #11 | 570586 | 4118361 | 1,882 - 574 |
| UE-12n Exploratory #12 | 570408 | 4118521 | 1,733 - 528 |
| UE-12n Exploratory #13 | 569421 | 4117506 | 1,086 - 331 |
| UE-12n Exploratory #14 | 570187 | 4117015 | 1,738 - 530 |
| UE-12n Exploratory #15a | 569703 | 4117954 | 1,934 - 589 |
| UE-12n Exploratory #16 | 569349 | 4118331 | 2,237 - 682 |




Figure 241. Graded area at Feature 84, UE-12n #5 exploratory drill hole, U12n Tunnel, view northwest (2008).




Figure 242. Graded area at Feature 85, UE-12n #7 exploratory drill hole, U12n Tunnel, view northwest (2008).




Figure 243. Graded area at Feature 86, UE-12n #4 exploratory drill hole, U12n Tunnel, view southwest (2008).

### *Mesa Trailer Park*

Features 87-119 are at the mesa trailer park (Figures 244-246), a large dirt and gravel pad that is 1,150 ft (350.5 m) north-south by 405 ft (123.4 m) east-west and encompasses 4.3 acres (1.76 hectares). The east edge of the park is the sheer east slope of Rainier Mesa and the west edge is North Rainier Mesa Road.

The trailer park is constructed on two levels. The lower level, on which most of the features are located, is at an elevation of 7,300 ft (2,225 m) and the upper level is at 7,340 ft (2,237.5 m). Features 87-108 are on the lower level, Feature 109 is on the slope between the levels at 7,310 ft (2,228.1 m), and Features 110-119 are on the upper level. The features, on both levels, consist of drill holes, concrete pads, and electrical equipment associated with testing within the U12n Tunnel.

Feature 87

Feature 87 (Figure 247) is the concrete foundation for the U12n mesa cable building, U-12n #1, #2, and #3 Cable Holes, three wood forms with metal frames, and two small concrete pads. UTM coordinates for the cable holes are 570845 E, 4117689 N; 570840 E, 4117646 E; and 570836 E, 4117646 N, respectively. Cable hole #1 was drilled to 1,221 ft (372m), cable hole #2 was drilled to 1,235 ft (374 m), and cable hole #3 was drilled to 1,235 ft (376 m) (Bennett 1991). The concrete foundation for the cable building is 40 x 40 ft, orientated at 23 degrees, and at UTM coordinates 570850 E, 4117649 N. On the foundation are three plywood grout forms that are identical in size but not symmetrically placed. Each form surrounds one of the cable holes. The forms measure 8 ft 10 inches x 8 ft 10 inches x 8 ft (2.6 x 2.6 x 2.4 m) and are recessed 4 inches into the concrete pad. They are constructed of 1-inch plywood and 2 x 6 inch framing with the framing (studs and top and bottom plates) on the exterior of the form. Also, a 4-inch channel iron frame measures 9 ft 5 inches x 9 ft 5 inches x 8 ft (2.8 x 2.8 x 2.4 m) and encloses the form for additional support. The metal frame is along the top, bottom, and side edges of the wood form. On the south and west sides of the forms are Unistrut racks with coaxial fittings for cable attachment. The fittings are numbered for cable identification. All of the joints on the forms and the coaxial fittings are sealed with silicon calking. Along the east and north side of the foundation are two 4 x 4 ft concrete pads. The east pad has a 2 x 2 ft metal plate centered in the surface and the north pad has an impression from a similar plate but the plate is missing. Both pads have bolts that have been cut flush with the surface. Associated artifacts are insulated cable and wire, a brass valve, and wood and plastic fragments.

Feature 88

Feature 88 (Figure 248) is a concrete pad at UTM coordinates 570826 E, 4117627 N. The rough-poured concrete is pad is 3 ft in diameter and has four 5/8-inch (1.6 cm) bolts bent flush to the surface. The pad appears circular; however, the edges are covered with dirt and vegetation.

Feature 89

Feature 89 (Figure 249) is a concrete pad at UTM coordinates 570820 E, 4117623 N. The rough-poured concrete pad is triangular in shape, 3 ft on the short side, 4 ft on the long sides and is partially buried. It has two 5/8-inch bolts cut flush with the surface and a 2-inch wide impression along the

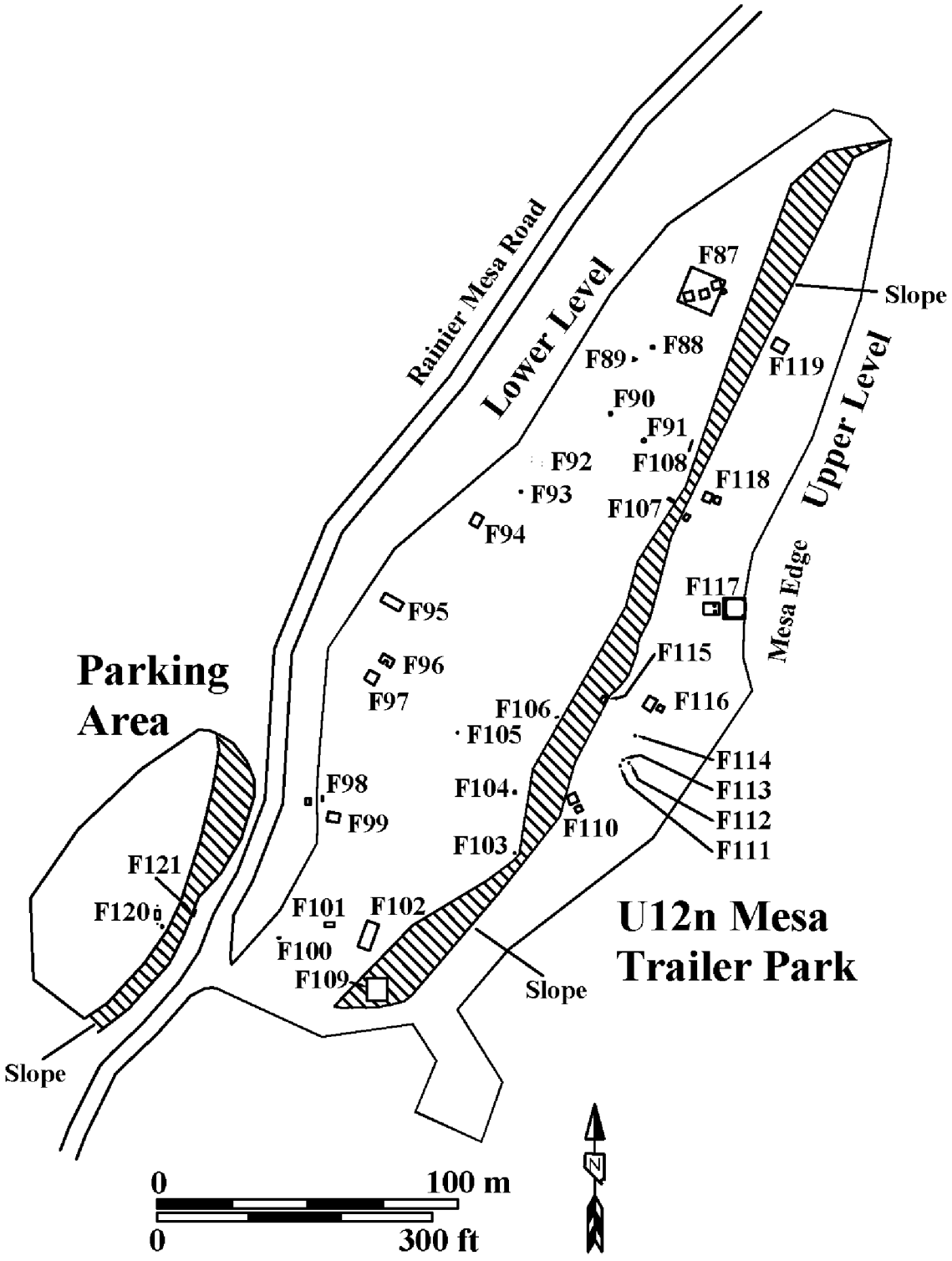



Figure 244. Plan map of the U12n Tunnel complex Rainier Mesa trailer park and parking area.



Figure 245. Overview of the U12n Tunnel complex, mesa trailer park lower level, view southwest (2008).



Figure 246. Overview of the U12n Tunnel complex mesa trailer park upper level, view south (2008).

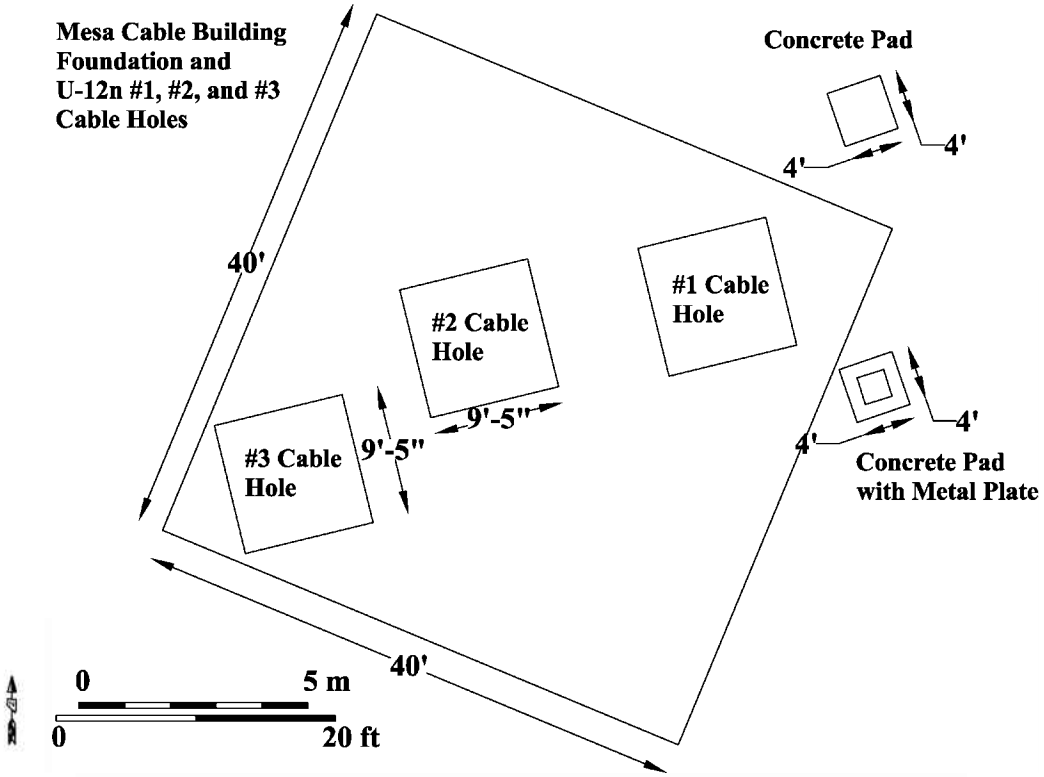



Figure 247. Plan view and photograph of Feature 87, mesa cable building foundation and U-12n #1, #2, and #3 cable holes, U12n Tunnel, view north (2008).



Figure 248. Feature 88, concrete pad, U12n Tunnel, view southeast (2008).



Figure 249. Feature 89, concrete pad, U12n Tunnel, view northwest (2008).

west side from a 2 x 4 laid in the wet concrete. A yellow grout is on the surface of the pad along the southeast side.

Feature 90

Feature 90 (Figure 250) is a concrete pad at UTM coordinates 570812 E, 4117605 N. The rough-poured concrete is 3 ft in diameter and appears circular; however, the edges are covered with dirt and vegetation.

Feature 91

Feature 91 (Figure 251) is a concrete pad at UTM coordinates 570823 E, 4117596 N. The rough-poured concrete is 4 ft in diameter and has 1-inch bolts has been cut flush with the surface. The pad appears circular; however, the edges are covered with dirt and vegetation.

Feature 92

Feature 92 (Figure 252) is metal pipe and concrete at UTM coordinates 570789 E, 4117589 N. The feature consists of four pieces of 8-inch metal pipe set in concrete and cut flush with the surface. The pipes are 12 ft apart northwest-southeast and 5 ft apart north-south with a two-track road crossing the center of the feature.

Feature 93

Feature 93 (Figure 253) is a metal pipe and circular concrete pad at UTM coordinates 570823 E, 4117579 N. The metal pipe is 7 inches in diameter, cut flush with the surface, and centered in a 2 ft 4 inch diameter rough-poured concrete pad.

Feature 94

Feature 94 (Figure 254) is a concrete pad for an electrical substation at UTM coordinates 570767 E, 4117572 N. The pad is shown on Holmes and Narver engineering drawing JS-012-U12n.15-E45.1 dated March 11, 1982. The pad is 13 ft north-south and 10 ft east-west and oriented at 30 degrees. The concrete has a smooth finish with two 2-inch galvanized conduits cut flush with the surface. On each corner of the pad is a 1/2-inch galvanized eye bolt. Associated artifacts are a HIGH VOLTAGE sign, metal rods and bolts, insulated cable and wire, galvanized pipe, rope, and rubber hose.

Feature 95

Feature 95 (Figure 255) is a concrete pad at UTM coordinates 570743 E, 4117542 N. The concrete pad is 23 ft east-west by 10 ft north-south and orientated at 30 degrees. The concrete is not level with the north side of the pad which is approximately 3 inches higher than the south side of the pad. The surface of the concrete is highly deteriorated but some areas show a brushed finish. Associated artifacts are insulated wire, nails, light bulbs, a hack saw blade, bolts, and wood fragments.



Figure 250. Feature 90, concrete pad, U12n Tunnel, view southeast (2008).



Figure 251. Feature 91, concrete pad, U12n Tunnel, view southeast (2008).

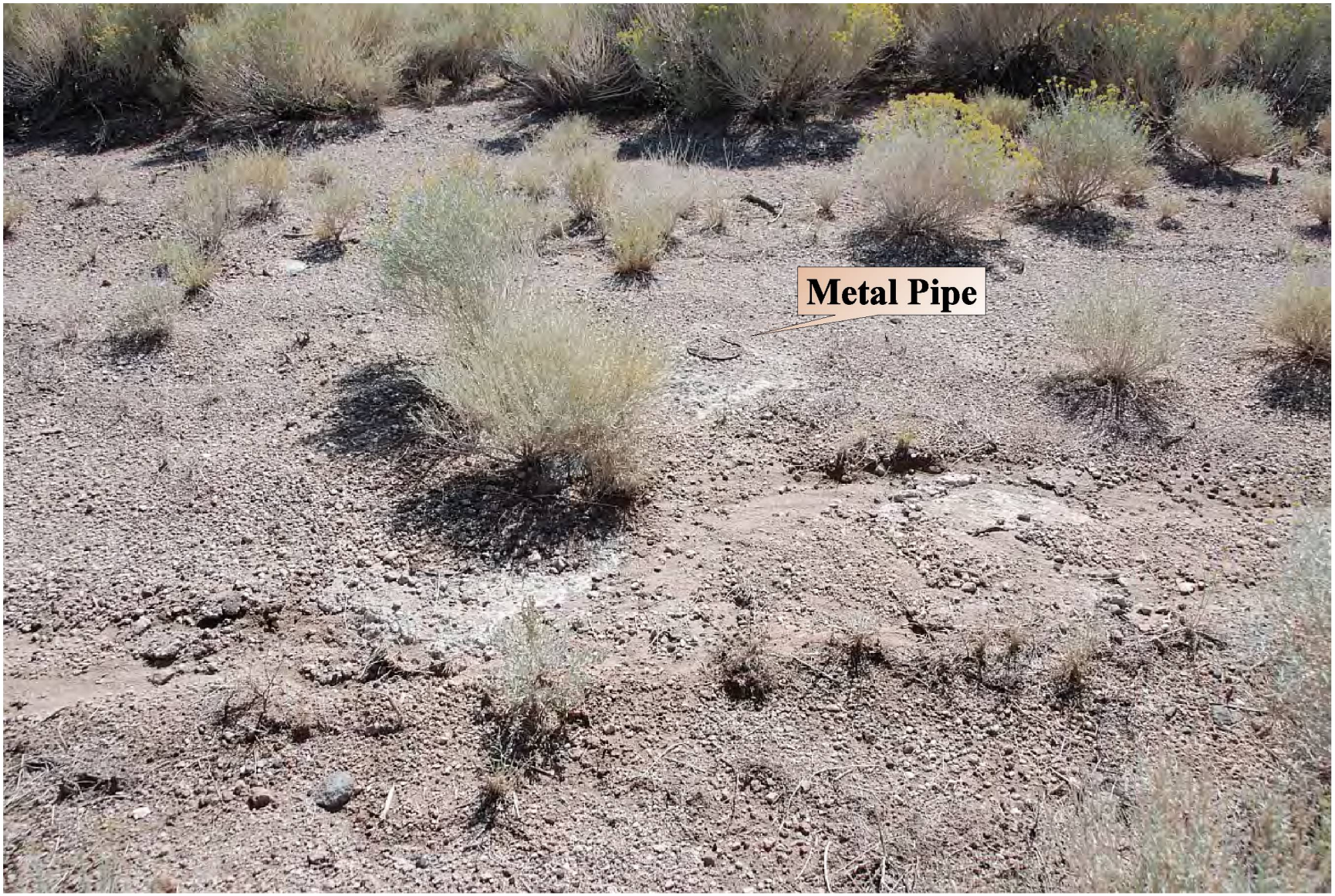


Figure 252. Feature 92, metal pipe and concrete, U12n Tunnel, view east (2008).



Figure 253. Feature 93, pipe and concrete pad, U12n Tunnel, view north (2008).



Figure 254. Feature 94, electrical substation concrete pad, U12n Tunnel, view northwest (2008).



Figure 255. Feature 95, concrete pad, U12n Tunnel, view northeast (2008).

Feature 96

Feature 96 (Figure 256) is a concrete pad at UTM coordinates 570740 E, 4117523 N. The exterior dimensions of the pad are14 ft east-west by 9 ft north-north and is oriented at 30 degrees. Centered in the south side is a 4 x 4 ft opening giving the pad a U shape. The rough poured concrete was formed with plywood and 2 x 4's which are still lying along the south edge of the pad. Associated artifacts are insulated wire, broken glass, and wood fragments.

Feature 97

Feature 97 (Figure 257) is a concrete pad at UTM coordinates 570735 E, 4117518 N. The pad is 12 x 12 ft and orientated at 30 degrees. The surface of the concrete has been brushed and there are two 2-inch galvanized conduits near the center of the pad that have been cut flush with the surface. Associated artifacts are bolts, washers, insulated cable, and a yellow lens cover for a light (possibly flashing type).

Feature 98

Feature 98 (Figure 258) is stairs or cable access supports between the U12n trailer park and the access road to the west. It is at UTM coordinates 570716 E, 4117478 N and consists of two concrete blocks and milled lumber beams on the slope between the upper and lower levels of the Trailer Park. The upper support consists of a 6 x 6 inch milled lumber beam that is 5 ft 4 inches (1.6 m) long and resting on a concrete block. The block is buried and the exact size is unknown. Three bolts secure the beam to the concrete. Approximately 12 ft downslope at UTM coordinates 570712 E, 4117477 N is the lower support. It consists of 5 ft x 7 ft x 1 ft (1.5 x 2.1 x 0.3 m) concrete block. The access conforms to a stairway shown on the Radiological Sciences Department Field Operations engineering drawing 4-32 dated September 9, 1968. Associated artifacts are insulated cable and wire and cans.

Feature 99

Feature 99 (Figure 259) is a concrete pad for an electrical substation at UTM coordinates 570722 E, 4117472 N. The pad is 13 ft north-south by 10 ft east-west and orientated at 10 degrees. The surface of the concrete has been brushed and there are two 2 inch galvanized conduit in the center of the pad that have been cut flush with the surface. Along the west edge are two 3-inch galvanized conduit that extend above the surface and encase three 7/8-inch (2.2 cm) insulated cables. The pad is shown on Holmes and Narver engineering drawing JS-012-U12n.15-E45.1 and dated March 11, 1982 and is labeled SUB #4 NOT USED.

Feature 100

Feature 100 (Figure 260) is an electrical panel at UTM coordinates 570702 E, 4117431 N. The panel is 2 ft 6 inches x 3 ft x 1 ft and supported by two 4-inch channel iron legs that are 5 ft 6 inches (1.4 m) in height. The panel is labeled SOUTH FEEDER, HIGH VOLTAGE, and is locked.



Figure 256. Feature 96, concrete pad, U12n Tunnel, view northeast (2008).



Figure 257. Feature 97, concrete pad, U12n Tunnel, view south (2008).



Figure 258. Feature 98, stairs or cable access supports, U12n Tunnel, view southwest (2008).



Figure 259. Feature 99, electrical substation concrete pad, U12n Tunnel, view west (2008).




Figure 260. Feature 100, electrical panel, U12n Tunnel, view northeast (2008).

Feature 101

Feature 101 (Figure 261) is an expanse of concrete at UTM coordinates 570720 E, 4117436 N. The concrete measures 10 ft east-west by 5 ft north-south and probably was left over from another pour and disposed at this location. Associated artifacts are a woven hemp mat and asphalt.

Feature 102

Feature 102 (Figure 262) is a loading ramp at UTM coordinates 570732 E, 4117428 N. The ramp face is constructed of 6-inch I-beam posts spaced 3 ft apart and the gaps filled with 6 x 6 x 3 ft milled lumber lagging. It is 13 ft 5 inches east-west and 2 ft 8 inches in height. A 1 ft 3 inch wide by 1 ft 4 inch long piece of 1/8-inch diamond plate metal extends along the top edge of the ramp. The east and west sides are constructed similar to the face and consist of 6-inch I-beam spaced 6 ft apart and filled with 6 inch x 6inch x 6 ft lagging. The slope section of the ramp is compacted soil and extends 30 ft and is oriented at 20 degrees. The area south of the ramp has been covered with asphalt. Associated artifacts are milled lumber fragments, wire, and metal fragments.

Feature 103

Feature 103 (Figure 263) is the U-12n.01-4 PPS pre-postshot drill hole at UTM coordinates 570782 E, 4117460 N, at an elevation of 7,339 ft (2,236.9 m), and drilled to a depth of 836 ft (255 m) (Bennett 1991). The drill hole is marked by one white sign lying on the surface and one oxidized sign with welded lettering. No pipe is visible above the surface because rock fall and dense vegetation obscure the area.

Feature 104

Feature 104 (Figure 264) is a concrete block to support a light pole at UTM coordinates 570780 E, 4117479 N. The block is 2 ft x 2 ft x 1 ft and has 1 1/2-inch galvanized conduit extending through the surface encasing 3/4-inch insulate cable. Four 5/8-inch bolts around the conduit attached the light pole base to the concrete.

Feature 105

Feature 105 (Figure 265) is a telephone junction box at UTM coordinates 570761 E, 4117499 N. The galvanized box is 1 ft 10 inches x 8 inches x 3 inches and attached to a 6 x 6 milled lumber post that is 6 ft in height. It is a low voltage telephone junction box labeled 0601D.

Feature 106

Feature 106 (Figure 266) is a concrete pad at UTM coordinates 570794 E, 4117504 N. The pad is 3 ft 2 inches x 3 ft 2 inches x 5 inches and resting on its edge and does not appear to be in its original location. The pad may be the bottom support section for a stair or cable run support such as Feature 107.



Figure 261. Feature 101, excess concrete, U12n Tunnel, view southeast (2008).



Figure 262. Feature 102, loading ramp, U12n Tunnel, view northeast (2008).



Figure 263. Feature 103, U-12n.01-4 PPS pre-postshot drill hole, U12n Tunnel, view northeast (2008).



Figure 264. Feature 104, concrete block, U12n Tunnel, view northeast (2008).



Figure 265. Feature 105, telephone junction box, U12n Tunnel, view northeast (2008).



Figure 266. Feature 106, concrete pad, U12n Tunnel, view east (2008).

Feature 107

Feature 107 (Figure 267) is a stair or cable run support at UTM coordinates 570836 E, 4117575 N. The feature consists of two concrete blocks with milled lumber beams near the bottom and top of the slope between the upper and lower levels of the U12n trailer park. The lower concrete block is 7 ft x 2 ft x 1 ft 2 inches and has a 4 inch x 6 inch x 62 inch milled lumber beam bolted to the long edge. The block is not in its original position and lying on its side. The upper block is 7 ft x 5 ft x 1 ft with a 4 inch x 6 inch x 5 ft 2 inch milled lumber beam bolted to the west edge. It is at UTM coordinates 570838 E, 4117571 N and is in its original position.

Feature 108

Feature 108 (Figure 268) is an electrical panel backboard at UTM coordinates 570839 E, 4117596 N on the lower level of the mesa trailer park. The backboard is 12 ft north-south and 7 ft 8 inches (2.3 m) in height. It consists of 3/4-inch and 1-inch plywood mounted to two 6 inch x 6 inch x 5 ft 6 inch milled lumber posts, two 4 x 4 x 7 ft 8 inch posts, and one 3 inch diameter by 6 ft 6 inch tall galvanized pipe. There are 10 low voltage electrical junction boxes (communication type) on the east side and 2 on the west side. Labeling on two boxes is 0601A-1 and 0601A-2.

Feature 109

Feature 109 (Figure 269) is an electrical switch station at UTM coordinates 570731 E, 4117410 N at an elevation of 7,310 ft (2,228.1 m). It consists of a chain link fence around power poles and electrical switches. The chain link fence is 25 ft north-south by 22 ft east-west and 8 ft in height. A gate at the southwest corner is locked and there is no access into the feature. Inside the fence are two power poles and switches that connect to a power line that extends to the southeast. On a concrete pad near the power poles is a 10 x 5 ft concrete pad and a set of automatic oil filled switches. The 4,160 volt switch station is shown on the Holmes and Narver engineering drawing JS 012 N09 E22 dated August 27, 1974.

Feature 110

Feature 110 (Figure 270) is two concrete pads for electrical substation #5 at UTM coordinates 570800 E, 4117479 N at an elevation of 7,520 ft (2,292.1 m). The west pad is 10 x 10 ft and has two 3-inch galvanized conduits extending through the center. The east pad is 7 ft north-south by 6 ft 2 inches east-west and has been broken into several pieces and all but one remain in their original location. The pads location conforms to Substation #5 shown on the Holmes and Narver engineering drawing JS 012 N09 E22 dated August 27, 1974.

Feature 111

Feature 111 (Figure 271) is the U-12n.01-3 PPS pre-postshot drill hole at UTM coordinates 570815 E, 4117488 N, at an elevation of 7,341 ft (2,237.5 m) and drilled to a depth of 800 ft (244 m) (Bennett 1991). The feature consists of 10 3/4 inch (27.3 cm) casing extending 8 inches above the surface. The top of the pipe is sealed with a welded metal plate. The location is heavily overgrown with vegetation but marked with a welded metal sign 4 ft in height.



Figure 267. Figure 107, stairs or cable access supports, U12n Tunnel, view east (2008).



Figure 268. Feature 108, electrical panel backboard, U12n Tunnel, view southeast (2008).



Figure 269. Feature 109, electrical switch station, U12n Tunnel, view southwest (2008).



Figure 270. Feature 110, concrete pad for electrical substation #5, U12n Tunnel, view north (2008).



Figure 271. Feature 111, U12-n.01-3 PPS pre-postshot drill hole, U12n Tunnel, view northwest (2008).

Feature 112

Feature 112 (Figure 272) is the U-12n.01-2 R/C drill hole at UTM 570818 E, 4117489 N, at an elevation of 7,341 ft and drilled to a depth of 1,296 ft (395 m) (Bennett 1991). The feature consists of 12 1/4 inch (31.1 cm) diameter casing extending 1 ft 9 inches above the surface. Two pieces of 6-inch I-beam have been welded to the sides of the casing at ground surface for support. The top of the casing is sealed with a 1 ft 7 inch (48.3 cm) diameter flange and bolted plate. Four galvanized eye bolts are attached to bolts that secure the flange. Associated artifacts are insulated cable and metal fragments.

Feature 113

Feature 113 (Figure 273) is a vertical pipe at UTM coordinates 570816 E, 4117490 N. The feature is a 3-inch vertical pipe that extends 3 inches above the surface. Welded to the top of the pipe is a 9 inch diameter six bolt flange that is unsealed.

Feature 114

Feature 114 (Figure 274) is a vertical pipe at UTM coordinates 570820 E, 4117498 N. The feature is a 3-inch vertical pipe that extends 3 ft above the surface. Welded to the top of the pipe is a 9 inch diameter six bolt flange blank that seals the open end of the pipe.

Feature 115

Feature 115 (Figure 275) is a stair or cable run support at UTM coordinates 570804 E, 4117514 N. The feature consists of a subsurface concrete block of unknown dimensions and a milled lumber beam. The milled lumber beam is 4 inches x 6 inches x 5 ft 2 inches an bolted to the west edge of the concrete. The feature may be the upper support section for stairs described in Feature 106 and roughly corresponds to the location of stairs shown on the Holmes and Narver engineering drawing JS 012 N09 E22 dated August 27, 1974. Associated artifacts are a metal T post and insulated cable.

Feature 116

Feature 116 (Figure 276) is two concrete pads at UTM coordinates 570827 E, 4117510 N for electrical substation #2. The west pad is 14 ft north-south by 10 ft east-west and has two 3-inch galvanized conduits extending through the center. The dimensions of the second pad were not determined because it has been broken and stacked near its original location. The pads locations conform to Substation #2 shown on the Holmes and Narver engineering drawing JS 012 N09 E22 dated August 27, 1974.

Feature 117

Feature 117 (Figures 277-279) is the U-12.01-5 CH cable hole at UTM coordinates 570858 E, 4117539 N, at an elevation of 7,330 ft (2,234.2 m) and drilled to a depth of 1,290 ft (393 m) (Bennett



Figure 272. Feature 112, U-12n.01-2 R/C drill hole, U12n Tunnel, view southwest (2008).



Figure 273. Feature 113, pipe, U12n Tunnel, view southeast (2008).



Figure 274. Feature 114, pipe, U12n Tunnel, view north (2008).



Figure 275. Feature 115, stairs or cable run support, U12n Tunnel, view southwest (2008).



Figure 276. Feature 116, concrete pads for electrical substation #2, U12n Tunnel, view southwest (2008).

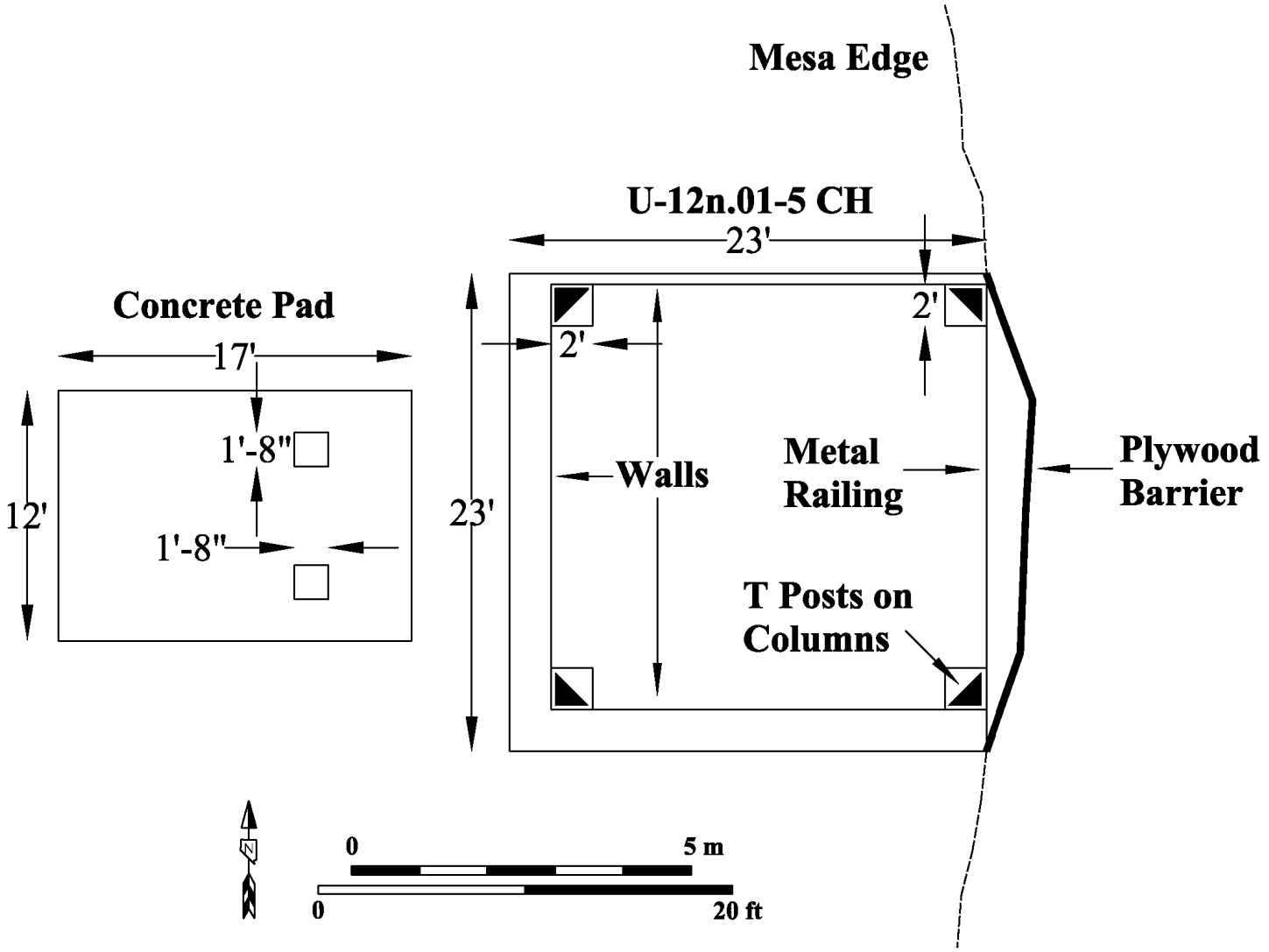



Figure 277. Plan map of Feature 117, U12n.01-5 cable hole, U12n Tunnel.



Figure 278. Feature 117, concrete pad, U12n Tunnel, view southwest (2008).



Figure 279. Feature 117, concrete pad for the U-12n.01-5 CH, U12n Tunnel, view northeast (2008).

1991). The cable hole consists of two concrete features. The west feature is a 17 ft east-west by 12 ft north-south concrete pad. Two 1 ft 8 inch x 1 ft 8 inch depressions 2 inches deep are 4 ft from the east edge and 2 ft from the north and south edges. Eight 1-inch bolts have been cut flush with the bottom surface of the depressions. These are for the attachment of a metal structure. The east feature is a concrete structure that surrounds the U12.01-5 cable hole. The structure is a recessed foundation with walls along the north, south, and west sides. The east edge of the structure has no wall and is open to the vertically plunging mesa face. The structure is 23 ft north-south by 23 ft east-west and the walls are 2 ft 10 inches in height. The south and west walls are 2 ft thick and the north wall is 6 inch inches thick. The top of the walls are flush with the surface. Inside the walls at each corner are 2ft x 2ft concrete columns 2 ft 10 inches in height. On top of each column are three metal T posts welded together at the top forming a tripod type structure. Protruding through the top surface of each column, along the north and south edges, are four 1-inch bolts. Along the open east side of the structure is a 3 ft 8 inch tall metal railing. Outside of the railing is a barrier (wall) constructed of 2 x 4 inch milled lumber and sheets of 3/4-inch plywood. The barrier has partially collapsed and suspended precariously over the mesa edge. A welded metal sign on the south side of the structure is labeled U12N.01-5 CH. Associated artifacts are plexiglass fragments, braided cable, insulated cable, insulated wire, and wood fragments.

Feature 118

Feature 118 (Figure 280) is two concrete pads at UTM coordinates 570846 E, 4117578 N for electrical substation #1. The west pad is 10 ft north-south by 9 ft east-west and two 3-inch galvanized conduit extending 3 inches above the surface. The pad is cracked in several areas around the conduits. The east pad is 6 ft east-west by 7 ft north-south and has two 3-inch galvanized conduits cut flush with the surface. The pads locations conform to Substation #1 shown on the Holmes and Narver engineering drawing JS 012 N09 E22 dated August 27, 1974.

Feature 119

Feature 119 (Figure 281) is a concrete pad at UTM coordinates 570871 E, 4117628 N for electrical substation #8. The pad is 12 ft north-south by 15 ft 6 inches (4.7 m) east-west and has a smooth finish. Bolts around the perimeter of the pad have been cut flush with the surface. The location of the pad conforms to Substation #8 shown on the Holmes and Narver engineering drawing JS 012 N09 E22 dated August 27, 1974.

***Parking Area***

The parking area (Figure 282) is west of the mesa trailer park at an elevation of 7,300 ft (2,225.0 m) and is 335 ft (102.1 m) north-south by 165 ft (50.3 m) east-west and encompasses 0.36 acres (0.15 hectares). The east edge of the parking area is North Rainier Mesa Road. Features 120 -121 are at the parking area and consist of electrical equipment associated with the U12n Tunnel.

Feature 120

Feature 120 (Figure 283) is a concrete pad, conduit, and electrical panel at UTM coordinates 570662 E, 4117440 N for electrical substation #7. The concrete pad is 5 ft east-west by 10 ft north-south with



Figure 280. Feature 118, concrete pads for electrical substation #1, U12n Tunnel, view northwest (2008).



Figure 281. Feature 119, concrete pad for electrical substation #8, U12n Tunnel, view southwest (2008).




Figure 282. Overview of mesa parking area, U12n Tunnel, view northwest (2008).



Figure 283. Feature 120, concrete pad for electrical substation #7, U12n Tunnel, view south (2008).

bolts protruding through the surface at each corner. Two 3 1/2-inch galvanized conduit 4 inches in height are 5 ft from the north and south edges and centered east-west on the pad. South of the pad is a 3 ft 1 inch x 2 ft 7 inch x 1 ft electrical panel box painted red. The box is supported by two 3-inch channel iron legs. It is labeled SOUTH FEEDER FROM OFC 2 IN SUB 5-3. The location of the pad and feeder box conforms to Substation #7 shown on the Holmes and Narver engineering drawing JS 012-U12n.15-C21 dated June 29, 1981.

Feature 121

Feature 121 (Figure 284) is a stair or cable run support at UTM coordinates 560674 E, 4117440 N. It consists of a 7 ft north-south by 1 ft east-west by 1 ft 4 inch tall concrete block. A wood platform attached to the block is 5 ft 4 inch north-south by 2 ft 10 inches east-west and constructed of 2 x 6 inch milled lumber. The front edge of the platform is supported by a 6 x 6 inch milled lumber beam 5 ft 2 inches in length that is bolted to the west edge of the concrete block. South of the support is a metal post with a rectangular sign with no lettering.

***Mesa Area General***

The remaining 80 features are generally grouped around drill hole locations and along existing roads (Figure 240). Isolated features are described individually and drill hole locations are described with the associated features. Drill hole coordinates (Zone 11, NAD 27) are in Table 5.

Feature 122

Feature 122 (Figure 285) is two electrical panels at UTM 570647 E, 4117372 N. The panels are at an elevation of 7,360 ft (2,243.3 m) and along the east side of the Rainier Mesa Road. Each panel is 2 ft 6 inches x 1 ft 8 inches x 1 ft 2 inches and supported by a 3-inch channel iron frame that is 4 ft north-south by 6 ft in height. The north panel is labeled 2041 and the south panel is labeled 9732.

Feature 123

Feature 123 (Figure 286) is a concrete pad at UTM coordinates 570552 E, 4117287 N for the U-12n.06 PS #1 postshot drill hole. The drill hole is at an elevation of 7,408 ft (2,258.0 m) and drilled to a depth of 975 ft (297m) (Bennett 1991). The drill hole is near the center of a roughly square dirt pad that is 100 x 100 ft (30.5 x 30.5 m), encompasses 0.22 acres (0.09 hectare), and accessed by a road that enters the pad from the southeast corner. No pipe is visible above the surface, however a slightly domed, 10 x 10 ft concrete pad, marks the location of the drill hole. Near the south edge of the concrete pad is a 1 ft 8 inch x 7 inch (50.8 x 17.8 cm) metal plate with welded lettering that identifies the drill hole. A handle for an 18 inch (45.7 cm) pipe wrench is on the concrete pad near the north edge. Bennett (1991) lists the abandoned (drilling not attempted or not completed) U12n.06 PS#1D drill hole at UTM coordinates 570532 E, 4117294 N, only a few feet from the PS#1 drill hole. The area was investigated but no indication of the hole being drilled was found. However, PS#1D is a directional drill hole that could have been drilled in the PS#1 drill hole.



Figure 284. Feature 121, stair or cable access support, U12n Tunnel, view east (2008).



Figure 285. Feature 122, electrical panels, U12n Tunnel, view southeast (2008).

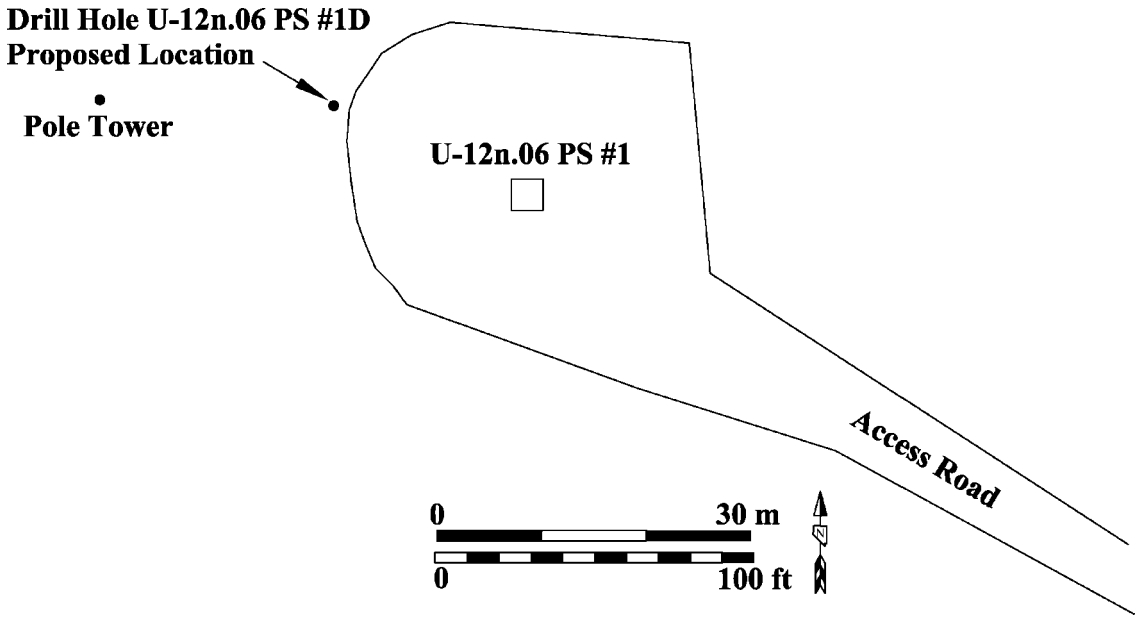





Figure 286. Plan map of Feature 123, concrete pad for the U-12n.06 PS #1 drill hole, location of proposed drill hole U-12n.06 PS #1D, location of Feature 124, pole tower, and photograph of Feature 123, view northeast (2008).

Feature 124

Feature 124 (Figure 287) is a metal pole tower at UTM coordinates 570530E, 4117293N. It is at an elevation of 7,400 ft and west of drill holes U-12n.06 PS #1 and U-12n.06 PS #1D. The tower consists of a 1 7/8 inch (4.8 cm) diameter pipe that is 30 ft in height. The pipe is set in a hole drilled in the exposed bedrock and supported by three guy wires attached to the tower at approximately 20 ft above the surface. Two of the guy wires are secured to galvanized metal stanchions embedded in the surface and one guy wire is tied to a large boulder. Attached to the top of the tower is a rope pulley. Welded to the tower at 6 ft above the surface is a square nut and a 3/8-inch (9.5 mm) rod that functions as a base cleat to secure the rope from the pulley. Associated artifacts are communication wire, cable, and crushed cans.

Feature 125

Feature 125 (Figure 288) is the U-12n.02 PS #1A and #1 AS postshot drill hole at UTM coordinates 570454 E, 4117342 N, at an elevation of 7,373 ft (2,247.3 m), and drilled to a depth of 1,570 ft (479 m) (Bennett 1991). The drill hole is near the center of a rectangular dirt pad that is 250 ft (76.2 m) east-west by 130 ft (39.6 m) north-south, encompasses 0.7 acres (0.29 hectare), and accessed by a road that enters from the north. No pipe is visible above the surface, however a galvanized conduit extends above the surface and has an attached metal sign that identifies the drill hole number, coordinates, and surface elevation. Near the U-12n.02 PS #1A and #1 AS drill hole is the U-12b.07 #2 R/C drill hole. No pipe is visible above the surface but its location is marked with a metal sign lying on the surface. Associated artifacts are communications wire, metal fragments, welding rods, milled lumber fragments, and broken glass.

Feature 126

Feature 126 (Figures 289-291) is the U-12n.02 #1 CH cable hole at UTM coordinates 570311 E, 4117354 N, at an elevation of 7,203 ft (2,195.5 m), and drilled to a depth of 1,233 ft (4376 m) (Bennett 1991). The drill hole is near the center of an irregular-shaped dirt pad that is 190 ft (57.9m) east-west by 290 ft (88.4 m) north-south, encompasses 0.8 acres (0.34 hectare), and accessed by a road that enters from the south. The cable hole consists of a 10 3/4 inch (27.3 cm) diameter casing that does not extend above the surface of a 10 x 10 ft concrete slab on which the casing is centered. Adjacent to the casing on the west side is a 2 ft 6 inch long by 9 inch wide by 2 ft tall metal stand. East of the casing are two 1 ft x 9 inch metal plates that possibly supported a metal stand described previously. Near the pad is a metal sign with welded lettering that identifies the cable hole, its location, and elevation. Approximately 18 ft (5.4 m) from each corner of the cable pad are 6 x 6 ft concrete pads (Figure 290). Centered in the small pads are 2 ft x 2 ft metal plates with 1 3/4 inch (4.4 cm) diameter by 6 inch long bolts welded to each corner. The northeast and southeast pads appear to have been moved from their original locations. Associated artifacts are metal fragments, welding rods, communications wire, and rubber fragments.



Figure 287. Feature 124, pole tower, U12n Tunnel, view south (2008).

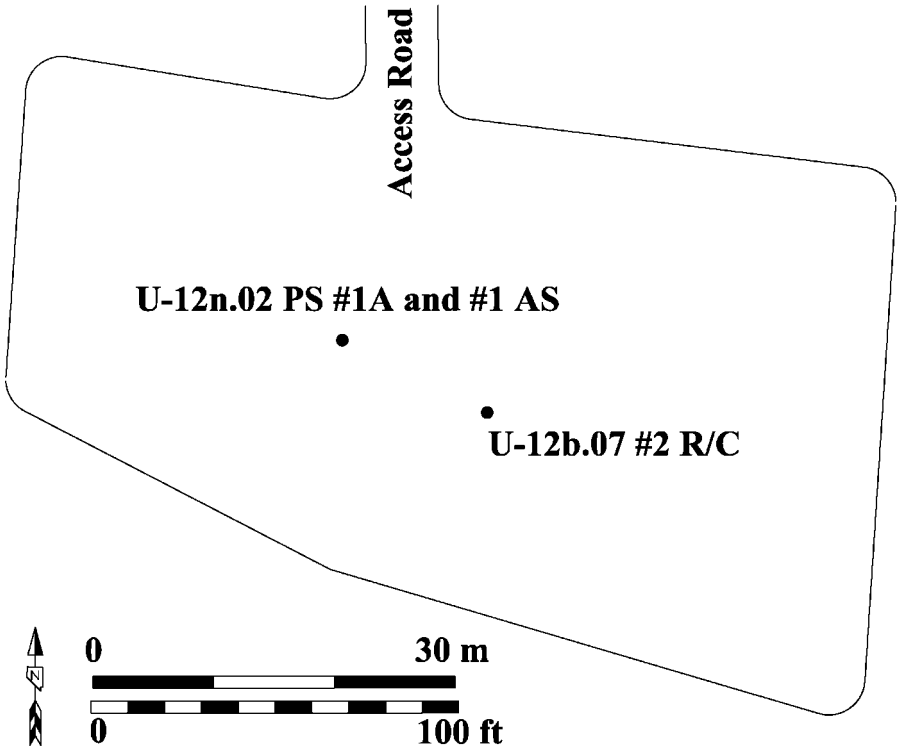





Figure 288. Plan map and photograph of Feature 125, U-12n.02 PS #1 and # 1AS drill hole, U12n Tunnel, view southeast (2008) and U12b.07 #2RC drill hole.

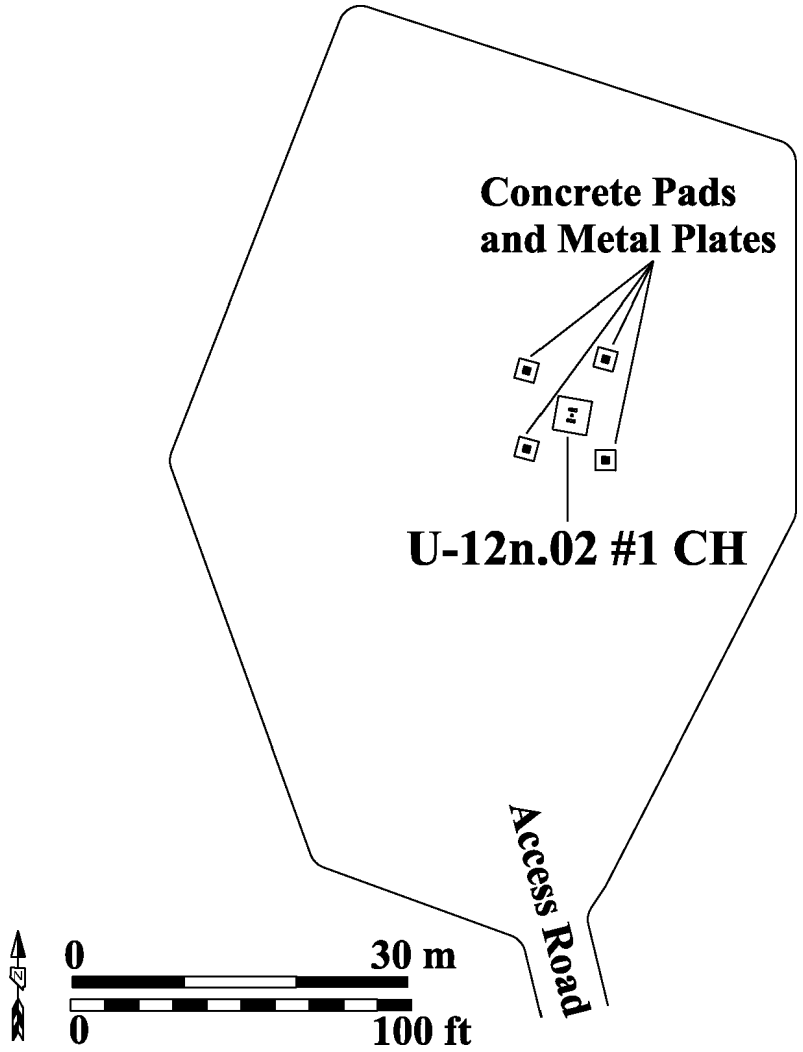



Figure 289. Plan map of Feature 126, U-12n.02 #1 CH drill hole, U12n Tunnel.



Figure 290. Photograph of Feature 126, U12-n.02 #1 CH drill hole and metal stand, view northwest (2008).



Figure 291. Photograph of Feature 126, concrete pad and metal plate, U-12n.02 #1 CH, view southwest (2008).

Feature 127

Feature 127 (Figure 292) is the UE-12n #14 exploratory drill hole at UTM coordinates 570187 E, 4117055 N, at an elevation of 7,415 ft (2,260.1 m), and drilled to a depth of 1,738 ft (528 m) (Bennett 1991). The drill hole is near the north edge of a roughly circular dirt pit that is 105 ft north-south by 118 ft (365.9 m) east-west, and encompasses 0.3 acres (0.13 hectares) and accessed by a dirt road that enters from the south. The drill hole consists of a 3-inch vertical pipe that is 3 ft 4 inches in height and capped by a welded metal plate. A welded metal sign identifies the drill hole. Associated artifacts are wood fragments and insulated wire.

Feature 128

Feature 128 (Figure 293) is the UE-12n #6 exploratory drill hole at UTM coordinates 569576 E, 4116811 N, at an elevation of 7,527 ft (2,294.2 m), and drilled to a depth of 2,317 ft (706 m) (Bennett 1991). The drill hole is near the center of a rectangular dirt pad that is 210 ft (64 m) north-south by 140 ft (42.7 m) east-west and encompasses 0.41 acres (0.16 hectares) and accessed by a dirt road that enters from the north. It consists of a 6-inch (15.2 cm) casing that extends 3 inches above the surface. The casing has been cemented to the top and two metal signs (one lying on the surface) mark the location of the drill hole. Associated artifacts are a metal paint bucket, insulated wire, pipe fragments, rubber hose fragments, metal fragments, milled lumber fragments, and welding rods.

Feature 129

Feature 129 (Figures 293 and 294) is core samples at UTM coordinates 569580 E, 4116841 N. The samples are at the north end of the UE-12n #6 drill hole (Feature 128) and consist of approximately 100 core sample fragments. The 3 inch diameter samples are of various lengths and are near the access road to the well pad. Associated artifacts are milled lumber fragments and a metal sign with no labeling.

Feature 130

Feature 130 (Figure 295) is the UE-12n #1 exploratory drill hole at UTM coordinates 569867 E, 4117381 N, at an elevation of 7,321 ft (2,231.4 m), and drilled to a depth of 2,001 ft (610 m) (Bennett 1991). The drill hole is near the east edge of an irregular-shaped dirt pad that is 188 ft (57.3 m) north-south by 160 ft (48.8 m) east-west and encompasses 0.41 acres (0.17 hectares). It consists of a 6 -inch casing extending 1 ft above the surface. The location is marked by a metal sign with the drill hole number, coordinates, and surface elevation. Along the south side of the drill hole and concealed within vegetation are highly fragmented core samples. Associated artifacts are milled lumber fragments, crushed cans, lath, plastic fragments, and rubber fragments.

Feature 131

Feature 131 (Figures 296-299) is the U-12n Vent Hole #2 at UTM coordinates 569390 E, 4117536 N, at an elevation of 7,340 ft (2,237.2 m), and drilled to a depth of 1,252 ft (382 m) (Bennett 1991).

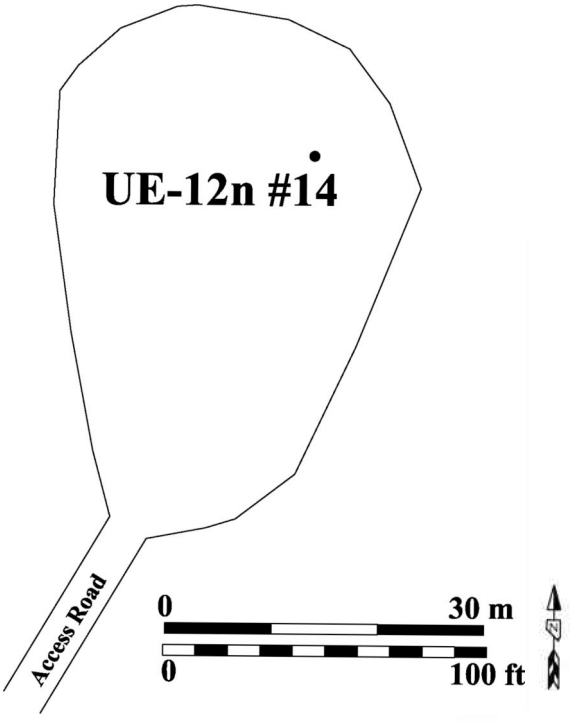





Figure 292. Feature 127, UE-12n #14 exploratory drill hole, U12n Tunnel, view northeast (2008).

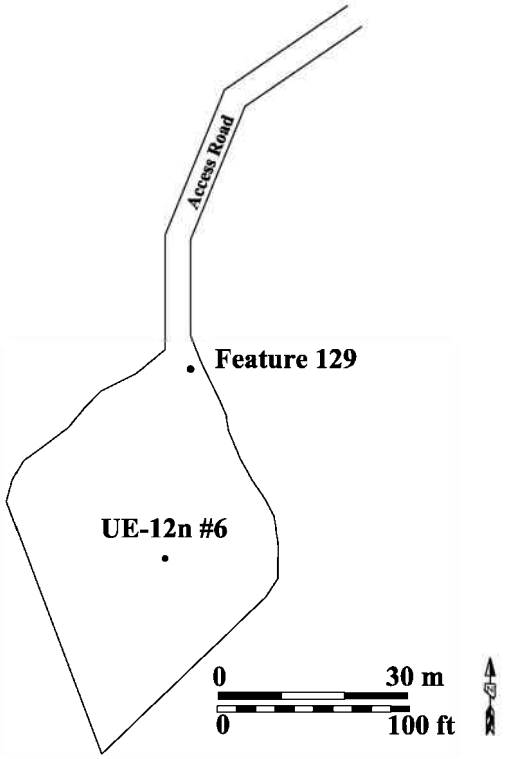





Figure 293. Plan map and photograph of Feature 128, UE-12n #6 exploratory drill hole, and Feature 129, core samples, U12n Tunnel, view northeast (2008).



Figure 294. Feature 129, core samples, U12n Tunnel, view southwest (2008).

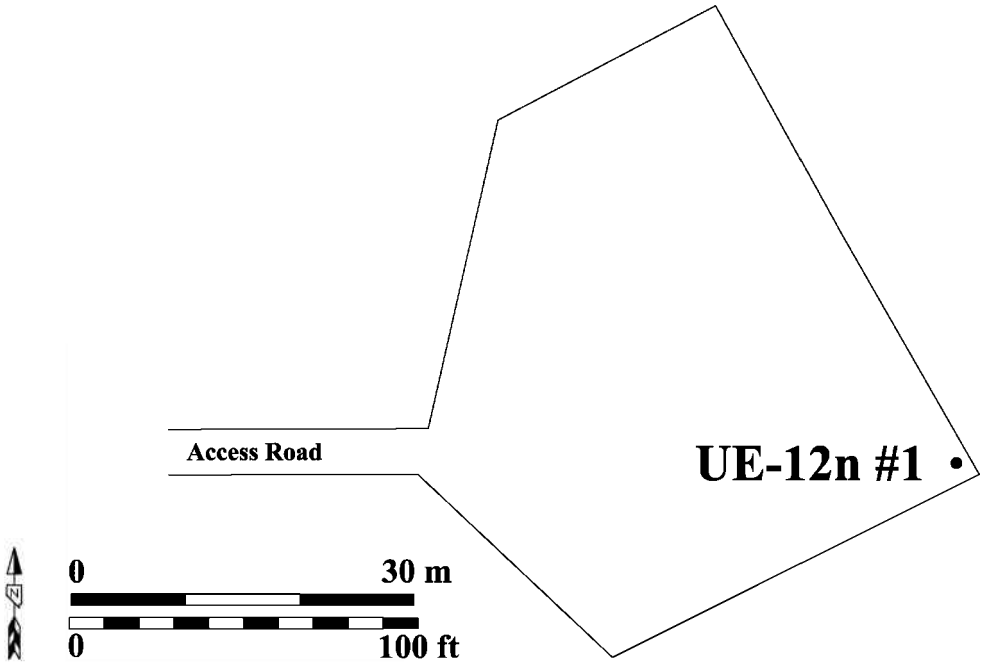





Figure 295. Plan map and photograph of Feature 130, UE-12n #1 exploratory drill hole, U12n Tunnel, view southeast (2008).

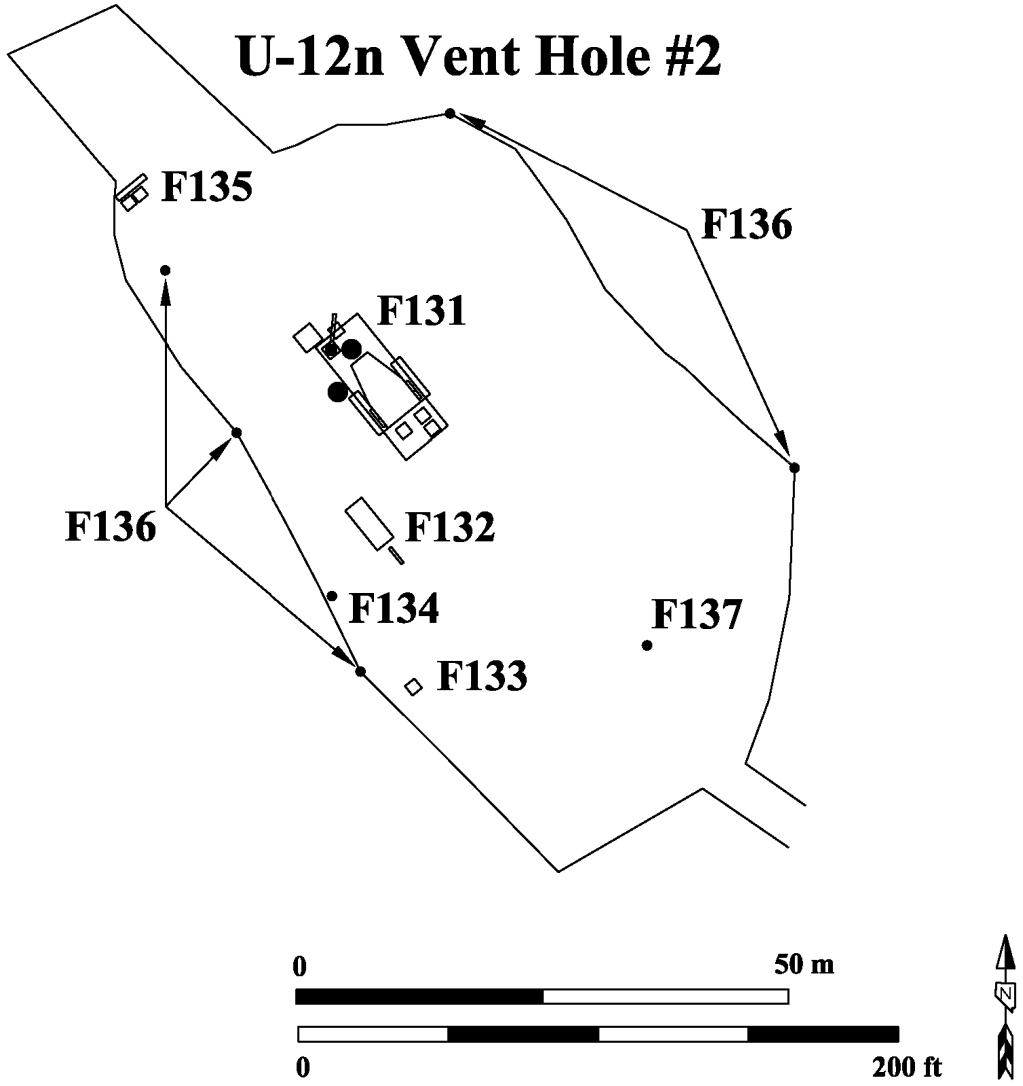



Figure 296. Plan map of the U-12n Vent Hole #2 and location of Features 131-137.

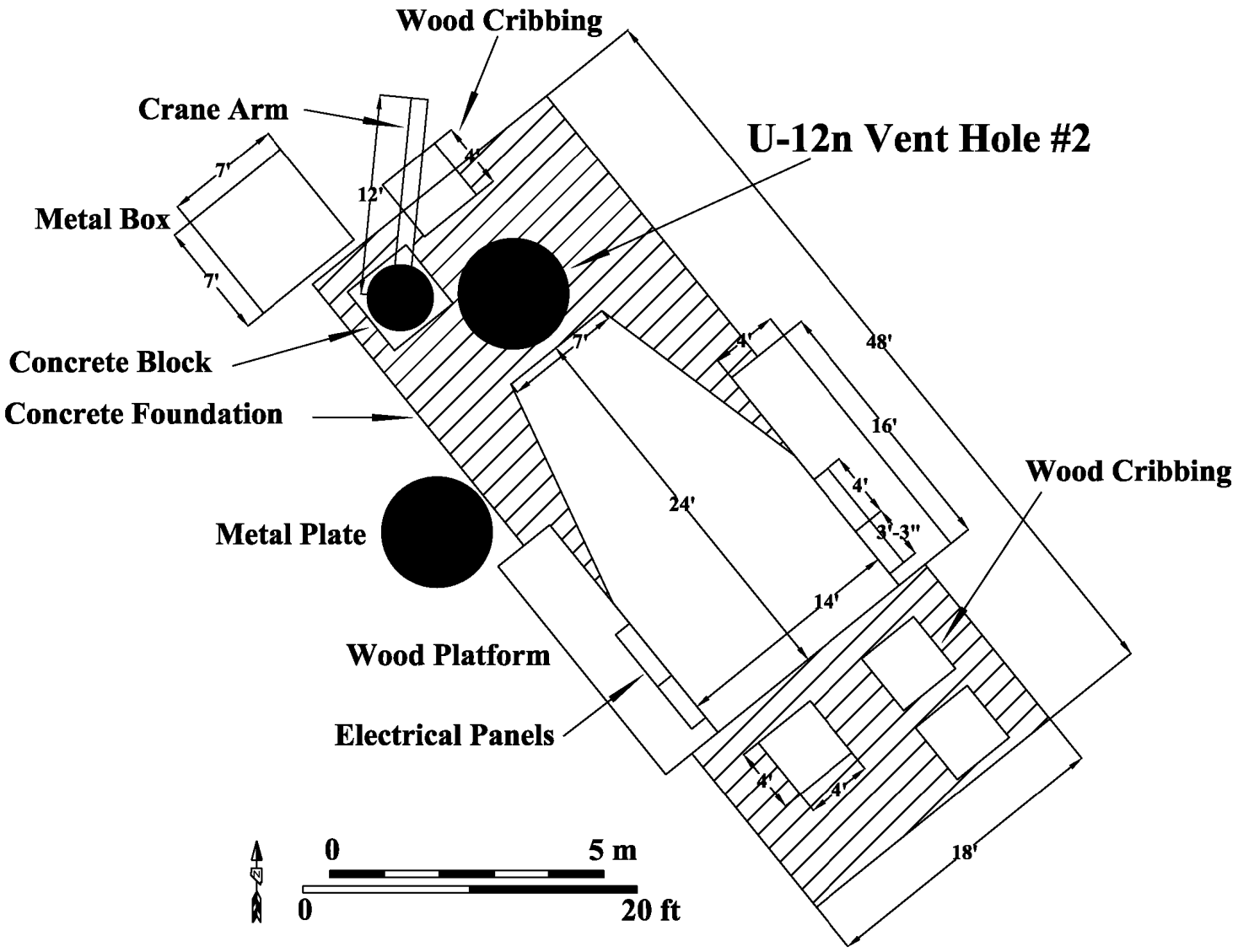



Figure 297. Plan map of Feature 131, U-12n Vent Hole #2, U12n Tunnel.



Figure 298. Feature 131, U-12n Vent Hole #2, U12n Tunnel, view southeast (2008).



Figure 299. Feature 131, U-12n Vent Hole #2 and turn-tube containment door, U12n Tunnel, view southwest (2008).

It is on a dirt pad that is 330 ft (100.6 m) north-south by 130 ft east-west and encompasses 0.83 acres (0.33 hectares). Features 132-137 are on the U-12n Vent Hole #2 dirt pad.

The vent hole consists of the vent hole cap, a metal vent conduit, a crane, a metal box, a metal plate, and wood cribbing. The vent hole and metal vent are on a 48 ft north-south by 18 ft east-west concrete pad. The vent hole pipe is centered east-west on the pad and 8 ft from the north edge. It is 6 ft 8 inches in diameter and 2 ft in height and capped with a metal dome structure (turn-tube containment door) that is 6 ft 8 inches in diameter and 1 ft 8 inches in height. Both the pipe and containment door terminate with a rim that fits into a closure mechanism. The closure mechanism is two semicircular clamps, grooved around the interior, that extend around the vent hole and containment door rims. The clamps are attached to long bolts and a gear and pulley system operated by an Electric Master XL Speed Reducer gear box. An electric motor, now missing, powered the gear box. The gear box turned the bolts which pulled the clamps to an open or closed position around the rims. The vent hole is in its test readiness configuration (i.e., surface piping and ventilation fans disconnected and turn-tube door closed).

Centered on the vent hole and to the south is a metal vent conduit. The north opening of the conduit measures 7 x 7 ft. It then extends 14 ft to the south and flares to 14 ft wide and 7 ft in height. The 14 ft wide conduit extends 10 ft south to the end of the conduit. The conduit is supported on 6 x 6 inch milled lumber cribbing and secured to the concrete pad with 7/16-inch (1.1 cm) braided cable. On the interior of the conduit, at the point the conduit expands to 14 ft in width, is a 1 3/4-inch wire mesh screen. Four feet south of the screen are two 1 inch horizontal rods with metal plates that are baffles that can open and close within the conduit. At the south end of the conduit is a 1 3/4-inch wire mesh screen. The south end is closed with a meal plate that has two 5 ft diameter round openings (side by side). Two 350 hp blowers (now removed) were attached, one on each opening. On the exterior of the conduit, along east and west sides, are two 4 ft east-west by 16 ft north-south wood platforms. The platforms are constructed of 2 x 4, 4 x 4, and 4 x 6 inch milled lumber. The platforms provide access to electrical panels and controls for the baffles. At the south end of the platforms and the east and west sides of the conduit, are two 6 ft 6 inch x 3 ft 3 inch x 1 ft 1 inch (198.1 x 99 x 33 cm) electrical panels. On the north side of each electrical panel are 4 switch boxes. One box is labeled Vent 1 Damper Disconnect. Below the switch boxes, on the west side, are actuators for the interior baffles. The actuators are Dayton right angle gear drive motors. The actuators are attached with worm gears to 1 ft round gears at the end of the baffle shafts. At the south end of the pad are 5 ft tall wood cribbing stacks of 4 x 4 inch milled lumber.

Near the northwest corner of the foundation is a pipe and beam crane. The base is a 4 ft 6 inch x 4 ft 6 inch x 3 ft concrete block. On top of the block is a 4 ft diameter 1/2 inch thick metal plate attached to the concrete with 1 1/8-inch bolts. The plate is the base for a 1 ft 3 inch diameter vertical metal pipe that is 12 ft in height. A 1-ft I-beam arm extends horizontally 12 ft from the metal pipe. On the I-beam arm is a 3 ton BUDGIT electric winch. The operating switch for the winch is on an electrical cable on the concrete base.

Outside of the foundation near the northwest corner is a metal box that is 7 x 7 x 7 ft. The east side of the box is open and is the same measurement as the north end of the metal conduit at the vent hole. A 6 ft 8 inch diameter metal pipe exits the bottom of the box and is the same size as the vent

hole pipe. The structure is an adapter that fits on the vent hole pipe and attaches to the metal conduit. Inside of the box are seven 2 ft wide curved metal louvers that redirect the air at a 90 degree angle.

At the north end of the west wood platform is a 6 ft 8 inch diameter metal plate possibly used to seal the top of the vent pipe or the bottom of the metal box described above. At the north center of the pad is a 4 x 4 ft stack of 6 x 6 inch milled lumber cribbing that is 1 ft 8 inches in height. At the south end of the pad are three 4 x 4 ft stacks of 6 x 6 inch milled lumber cribbing. Two of the stacks are 5 ft in height and one is 4 ft 6 inches in height. The cribbing does not support any features and may have been stored for future use.

Feature 132

Feature 132 (Figures 296 and 300) is an electrical substation at UTM coordinates 569394 E, 4117517 N. The substation consists of two concrete pads and a high voltage panel box. The north pad is 17 ft north- south by 7 ft east-west. On each corner of the pad and centered on the north and south edges are 1 ft 5 inch tall by 2 7/8 inch diameter metal jack stands. Each stand consists of a 10 x 10 inch metal base plate with a vertical 2 7/8 inch diameter vertical pipe. A threaded rod inserted in the end of the pipe can be adjusted vertically. On the northeast corner of the pad is a 2 ft 10 inch north-south by 6 ft tall metal frame constructed of 4-inch channel iron. The frame supported electrical panels that are missing; however, conduit with insulated cables extend above the surface below the frame. Along the west edge of the pad is a 8 ft 4 inch north-south by 7 ft 6 inch tall metal electrical panel backboard with no panels. The vertical legs of the frame are 6-inch channel iron and the horizontal members are 4-inch channel iron. Below the frame are 4 1/2-inch, 4-inch, 2 1/4-inch, and 1-inch galvanized conduit. Two metal rails are along the south side of the pad. The first rail is 2 ft 2 inches from the south edge, is a 3 ft long piece of 6 inch channel iron rail, and is mounted on rubber "shock absorbers." A second similar rail is 4 ft 4 inches from the south edge and parallel to the first. A panel box or transformer probably was mounted on the rails. Galvanized conduit is near the east end of the rails. A second 6 ft 8 inch north-south by 1 ft 2 inch east-west concrete pad is 2 ft south of the first pad. On the pad is a high voltage panel box. The panel box is 4 ft 8 inches in length, 3 ft 6 inches wide, and 5 ft 10 inches in height. It is secured with four galvanized stanchions and 3/4-inch rope. The box is labeled FED FROM OFC QR 87-1 and FEEDS TO VENT #2 N PAD #12-6-41160-3-1. Along the east side of the top surface of the pad is a 5 ft north-south by 2 ft east-west trough through which conduit and electrical cables extend from below the pad into the panel box.

Feature 133

Feature 133 (Figures 296 and 301) is a telephone booth at UTM coordinates 569396 E, 4117503 N. The booth is 4 x 4 x 8 ft and needed because of the noise produced at the vent hole when the two 350 horsepower ventilation fans were in operation. The walls of the structure are made of fiberglass, Celetex, and Masonite. The Masonite is sandwiched between the fiberglass and Masonite panels. The door for the structure is on the surface and contains a 2 ft 2 inch square aluminum sliding window. Attached to the west interior wall is a 1 ft wide shelf that extends between the north and south walls. A phone jack is centered above the shelf. A 2 ft square light fixture is mounted to the ceiling and the light switch is on the south wall. On the exterior of the south wall at the east corner is a 1 ft 6 inch x 1 ft x 7 inch wood box.



Figure 300. Feature 132, electrical substation at U-12n Vent Hole #2, U12n Tunnel, view northwest (2008).



Figure 301. Feature 133, telephone booth, and Feature 134, electrical panel at U-12n Vent Hole #2, U12n Tunnel, view northwest (2008).

Feature 134

Feature 134 (Figures 296 and 301) is a electrical panel box at UTM coordinates 569388 E, 4117512 N. The panel box is 2 ft 6 inches x 1 ft 8 inches x 8 inches and attached to two 7 ft 6 inch tall 1 3/4-inch channel iron (Unistrut) legs.

Feature 135

Feature 135 (Figures 296 and 302) is a stack of milled lumber and plywood at UTM coordinates 569367 E, 4117552 N. The stack includes 6 x 6 , 4 x 4, and 2 x 4 inch milled lumber of lengths form 4 to 12 ft. The 1/2-inch plywood is 3 ft 6 inches long by 10 inches wide.

Feature 136

Feature 136 (Figures 296 and 303) is five wood light poles that surround the U12n Vent Hole #2 dirt pad. There are three poles on the west side of the pad at UTM coordinates 569390 E, 4117504 N; 569378 E, 4117528 N; and 569371 E, 4117545 N. The two poles on the east side of the pad are at UTM coordinates 569400 E, 4117561 N and 569435 E, 4117525 N. They are approximately 8 inches in diameter and 20 ft in height with rectangular light fixtures mounted to the top of the poles. The south pole on the west side of the pad has two light fixtures and the remaining poles have one light fixture.

Feature 137

Feature 137 (Figures 296 and 304) is the UE-12n #13 exploratory drill hole at UTM coordinates 569349 E, 4118331 N, at elevation 7,355 ft (2,241.8 m), and drilled to a depth of 1,086 ft (331 m) (Bennett 1991). The drill hole is on the south end of the U-12n Vent Hole #2 dirt pad. It consists of a 8-inch (20.3 cm) casing that extends 3 ft 6 inches above the surface and has a 1 ft diameter metal plate hinged to the top. A sign identifies the location and is labeled UE12-N.13 CEMENTED BACK TO SURFACE.

Feature 138

Feature 138 (Figure 305) is the UE-12n #16 exploratory drill hole at UTM coordinates 569421 E, 4117506 N, at elevation 7,527 ft (2,294.2 m), and drilled to a depth of 1,086 ft (331 m) (Bennett 1991). It is on the east end of a dirt pad that is 120 ft (34.2 m) east-west by 31 ft (9.4 m) north -south and encompasses 0.08 acres (0.03 hectares). The drill hole consists of 6-inch casing that extends 3 ft 5 inches (1.04 m) above the surface and is capped with welded metal plate. Associated artifacts are wood fragments and insulated wire.

Feature 139

Feature 139 (Figures 306 and 307) is the UE-12n #15 exploratory drill hole at UTM coordinates 569702 E, 4117958 N, at an elevation of 7,371 ft (2,2436.7 m), and drilled to a depth of 585 ft (178 m) (Bennett 1991). It is on an irregular-shaped dirt storage pad that is 675 ft (205.7 m) east-west and 165 ft (50.3 m) north-south and encompasses 1.7 acres (0.7 hectares). The pad is labeled Storage Pad



Figure 302. Feature 135, stacked lumber at U-12n Vent Hole #2, U12n Tunnel, view north (2008).



Figure 303. Feature 136, light pole (one of five) at U-12n Vent Hole #2, U12n Tunnel, view southwest (2008).




Figure 304. Feature 137, UE-12n #13 exploratory drill hole near the U-12n Vent Hole #2, U12n Tunnel, view north (2008).

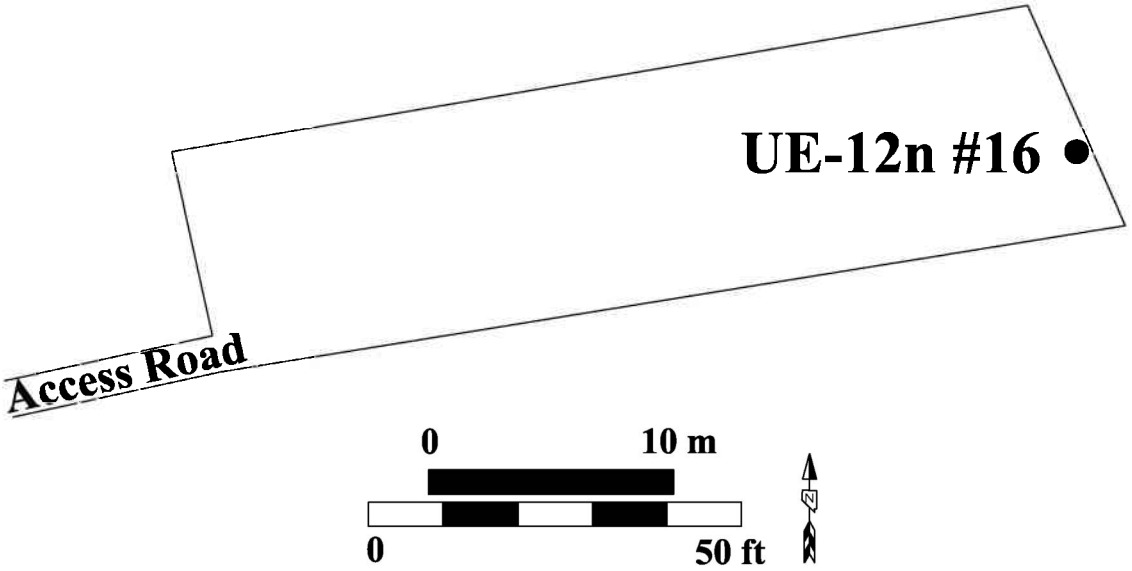



Figure 305. Plan map and photograph of Feature 138, UE-12n #16 exploratory drill hole, U12n Tunnel, view northeast (2008).

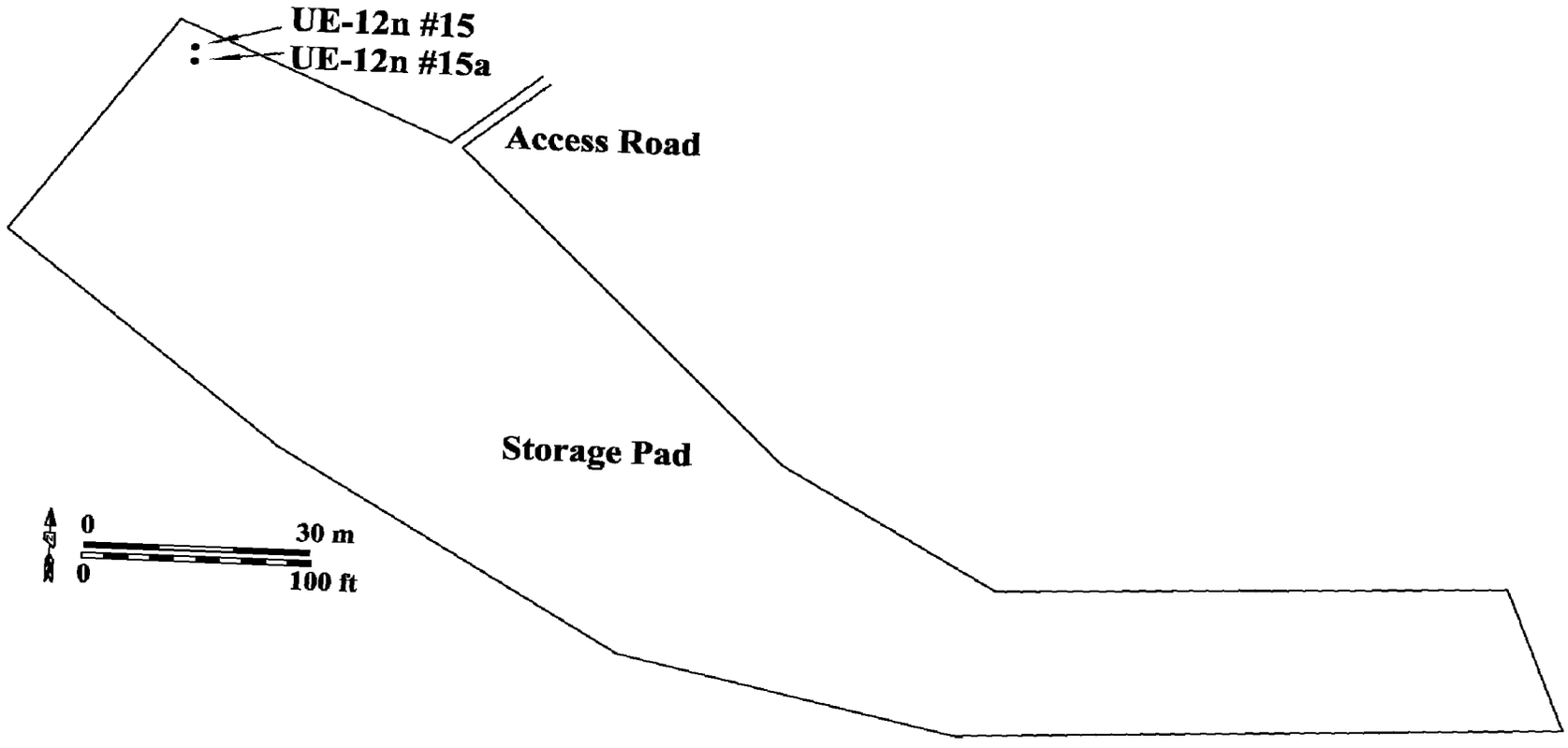



Figure 306. Plan map of Features 139 and 140, UE-12n #15 and UE-12n #15a, on dirt storage pad.




Figure 307. Feature 139, UE-12n #15 exploratory drill hole, U12n Tunnel, view northwest (2008).

on the JS-12-U12n.19-C1 engineering drawing (1984). The drill hole consists of 7 5/8-inch casing 3 inches in height and capped with a welded metal plate. Extending 3 inches above the plate is a 4-inch nipple that has been sealed with a welded metal plate. Welded to the west side of the casing is a 6 x 4 inch metal plate with a brass grounding clamp. A welded metal sign identifies the drill hole. The UE-12n #15a drill hole is 6 1/2 ft (1.9 m) south of this drill hole. Associated artifacts are insulated wire and concrete fragments.

Feature 140

Feature 140 (Figures 306 and 308) is the UE-12n #15a exploratory drill hole at UTM coordinates 569703 E, 4117954 N, at an elevation of 7,369 ft (2,246.1 m), and drilled to a depth of 1,934 ft (589 m) (Bennett 1991). It is 6 1/2 ft to the south of UE12n EX#15. The drill hole is 7 5/8-inch casing extending 3 inches above the surface. Screwed to the top of the casing is a 9 inch long collar that has been sealed with a welded metal plate. A welded metal sign identifies the drill hole. Associated artifacts are insulated wire and concrete fragments.

Feature 141

Feature 141 (Figures 309 and 310) is the U-12n.10A Structure CH cable hole at UTM coordinates 569851 E, 4118010 N, at an elevation of 7,384 ft (2,250.6 ft), and drilled to a depth of 1,355 ft (413 m) (Bennett 1991). The drill hole is on an irregular-shaped dirt and gravel pad that is 370 ft (112.7 m) east-west by 325 ft (99.1 m) north-south and encompasses 1.2 acres (0.5 hectares). The cable hole consists of a 25 x 25 ft concrete pad, metal dome, and metal rack near the center of the dirt pad. The dome is 12 ft in diameter and 9 ft in height, centered on the pad, and secured to the concrete with 1 1/2-inch bolts spaced every 1 ft around the perimeter of the domes flanged base. Welded to the side of the dome in rectangular patterns are 3-inch nipples spaced 6 inches on center right to left and 3 inches on center top to bottom. There are 49 nipples on the south side, 42 on the northwest, 42 nipples on the southwest, and 54 on the north. The nipples provide access to the cable hole for instrument cables. On the northwest and south sides of the dome are 5 ft 3 inch wide by 6 ft 6 inch tall metal racks bolted to the concrete and to the dome. Associated artifacts on the pad are insulated wire, wood and rubber fragments, bolts, nuts, and cable spools. Features 142-157 are on or near the U-12n.10A Structure CH.

Feature 142

Feature 142 (Figures 309 and 311) is an electrical panel backboard at UTM coordinates 569854 E, 4118005 N. The backboard is constructed of 3-inch channel iron and is 7 ft 6 inches north-south by 5 ft in height. Eight 2 ft 6 inch x 1 ft 8 inch x 6 inch electrical panel boxes are mounted to the backboard, four on the east and four on the west sides. At the north end of the backboard is a 4 x 4 inch milled lumber post 6 ft in height. Nailed to the north side of the post is a blank sign board.



Figure 308. Feature 140, UE-12n #15a exploratory drill hole, U12n Tunnel, view northwest (2008).

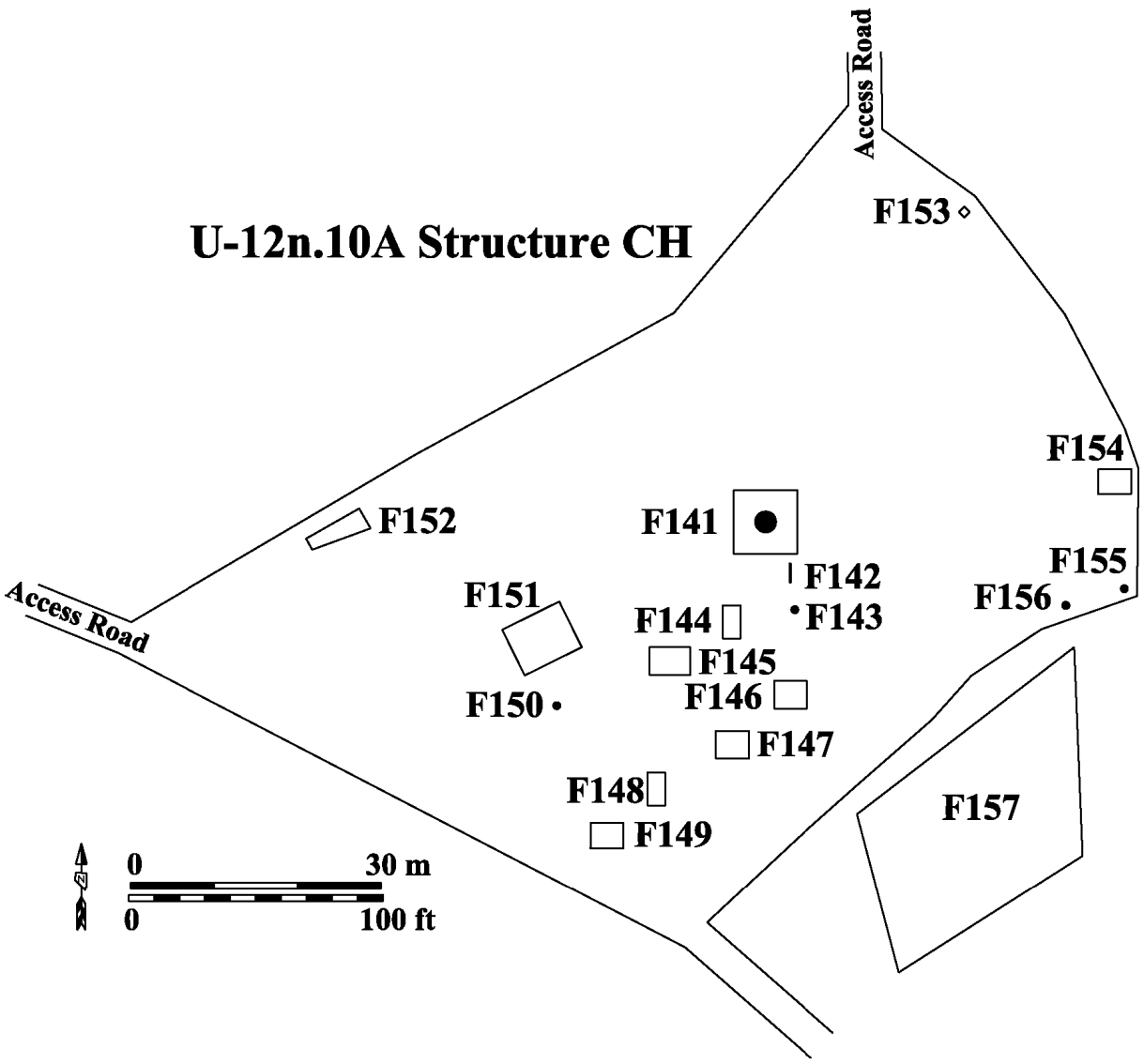



Figure 309. Plan map of U12n.10A Structure CH cable hole dirt pad and location of Features 141-157.



Figure 310. Feature 141, U12n.10A Structure CH cable hole, view northeast (2008).



Figure 311. Feature 142, electrical panel backboard at U12n.10 CH, U12n Tunnel, view northeast (2008).

Feature 143

Feature 143 (Figures 309 and 312) is a pole tower at UTM coordinates 569854 E, 4117999 N. The tower is a 2 1/2-inch pipe that extends 3 ft from the surface and reduces down to 1 3/4-inch pipe and extends to 15 ft. The tower is leaning to the northeast at approximately 20 degrees. Attached to the top of the tower is an aluminum pulley.

Feature 144

Feature 144 (Figures 309 and 313) is a concrete pad at UTM coordinates 569848 E, 4118000 N. The concrete pad is 13 ft north-south by 7 ft east-west. The concrete has not been smoothed or brushed but left rough and a piece of 2 x 4 inch milled lumber used for forming the pad is still present on the east side.

Feature 145

Feature 145 (Figures 309 and 314) is a concrete pad at UTM coordinates 569842 E, 4117995 N. The concrete pad is 11 ft north-south by 16 ft east-west. The concrete has not been smoothed or brushed but left rough and 2 x 4 inch milled lumber used for forming the pad are still present on the east and west sides.

Feature 146

Feature 146 (Figures 309 and 315) is a concrete pad at UTM coordinates 569856 E, 4117991 N. The concrete pad is 11 ft north-south by 13 ft east-west. The concrete has not been smoothed or brushed but left rough and 2 x 4 inch milled lumber used for forming the pad are still present on all sides.

Feature 147

Feature 147 (Figures 309 and 316) is a concrete pad at UTM coordinates 569849 E, 4117985 N. The concrete pad is 11 ft north-south by 13 ft east-west. The concrete has not been smoothed or brushed but left rough and 2 x 4 inch milled lumber used for forming the pad are still present on all sides. Associated artifacts are a shovel and wood fragments.

Feature 148

Feature 148 (Figures 309 and 317) is a concrete pad at UTM coordinates 569839 E, 4117980 N. The concrete pad is 13 ft north-south by 7 ft east-west. The concrete has not been smoothed or brushed but left rough and 2 x 4 inch milled lumber used for forming the pad are still present on all sides. Associated artifacts are insulated wire and wood fragments.



Figure 312. Feature 143, pole tower and the U-12n.10A Structure CH, U12n Tunnel, view northwest (2008).



Figure 313. Feature 144, concrete pad at the U-12n.10A Structure CH, U12n Tunnel, view east (2008).



Figure 314. Feature 145, concrete pad at the U-12.10A Structure CH, U12n Tunnel, view north (2008).



Figure 315. Feature 146, concrete pad at the U12n.10A Structure CH, U12n Tunnel, view east (2008).



Figure 316. Feature 147, concrete pad at the U-12n.10A Structure CH, U12n Tunnel, view north (2008).



Figure 317. Feature 148, concrete pad at the U-12n.10A Structure CH, U12n Tunnel, view north (2008).

Feature 149

Feature 149 (Figures 309 and 318) is a concrete pad at UTM coordinates 569834 E, 4117979 N. The concrete pad is 10 ft north-south by 13 ft east-west. The concrete has been smoothed and 2 x 4 inch milled lumber used for forming the pad are still present on all sides. Associated artifacts are insulated wire and wood fragments.

Feature 150

Feature 150 (Figures 309 and 319) is a pole tower at UTM coordinates 569826 E, 4117995 N. The tower is constructed in four sections. The bottom three sections are 4-inch diameter pipe 13 ft in height with each section ending with a four bolt flange. The top section is approximately 6 ft in height and ends in a four bolt flange. The four flanged sections are bolted together and supported by nine guy wires, three on each of the bottom sections. The guy wires are attached to metal plates welded to the tower and to triangular shaped galvanized plates bolted to galvanized stanchions embedded in the surface of the dirt pad. On top of the tower is a 2 ft diameter parabolic dish.

Feature 151

Feature 151 (Figures 309 and 320) is a loading ramp at UTM coordinates 569829 E, 4117995 N. The ramp is constructed of compacted soil and gravel and is 25 ft north-south by 20 ft east-west and 4 ft at the highest point. Associated artifacts are cable spools with cable and wood fragments.

Feature 152

Feature 152 (Figures 309 and 321) is a concrete pad at UTM coordinates 569796 E,4118008 N. The concrete pad is 24 ft long (east-west), 9 ft wide at the east end, and 5 ft wide at the west end. The pad is approximately 2 inches thick, exhibits no evidence of being constructed with forms, and is now highly deteriorated.

Feature 153

Feature 153 (Figures 309 and 322) is milled lumber at UTM coordinates 569874 E, 4118047 N. The feature consists of a 4 x 8 ft sheet of plywood lying on the surface. On top of the plywood are three 6 x 6 inch milled lumber beams 3 ft in length and spaced 3 ft apart. They are attached to the plywood with a yellow foam insulation. Lying on top of and perpendicular to the three beams are two 8 ft long 6 x 6 inch milled lumber beams. No mechanical fasteners connect the beams to the plywood or beams to beams.

Feature 154

Feature 154 (Figures 309 and 323) is an electrical junction box at UTM coordinates 569894 E, 4118002 N. The box is 2 x 2 x 1 ft and is lying horizontally to the surface and supported by 1 1/2-inch angle iron legs 2 ft in height. Insulated cables enter the box through the east and south sides.



Figure 318. Feature 149, concrete pad at the U-12n.10A Structure CH, U12n Tunnel, view north (2008).



Figure 319. Feature 150, pole tower at the U-12n.10A Structure CH, U12n Tunnel, view north (2008).



Figure 320. Feature 151, loading ramp at the U-12n.10A Structure CH, U12n Tunnel, view northeast (2008).



Figure 321. Feature 152, concrete pad at the U-12n.10A Structure CH, U12n Tunnel, view east (2008).



Figure 322. Feature 153, wood at the U-12n.10A Structure CH, U12n Tunnel, view southeast (2008).



Figure 323. Feature 154, electrical junction box at the U-12n.10A Structure CH, U12n Tunnel, view southwest (2008).

Feature 155

Feature 155 (Figures 309 and 324) is an electrical breaker box at UTM coordinates 569887 E, 4118000 N. The box is 1 ft 6 inches x 10 inches x 4 inches and is mounted to a 4 x 4 ft sheet of 3/4-inch plywood that is lying on the surface. Insulated cable enters the bottom of the box.

Feature 156

Feature 156 (Figures 309 and 325) is an electrical panel backboard at UTM coordinates 569893 E, 4118015 N. The backboard, lying on the surface, consists of a 4 x 4 ft sheet of 3/4-inch plywood with two 4 x 4 milled lumber post 7 ft in length. Attached to the backboard is a low voltage electrical junction box that is 1 ft 10 inches x 8 inches x 4 inches. Insulated cable is attached to the south leg of the backboard.

Feature 157

Feature 157 (Figures 309 and 326) is a pit at UTM coordinates 569862 E, 4117975 N. The pit is 100 ft east-west and 65 ft (19.8 m) north-south and encompasses 0.14 acres (0.05 hectares). Sides of the pit range in height from 2 ft to 4 ft. Associated artifacts are insulated cable, insulated wire, and wood fragments.

Feature 158

Feature 158 (Figures 327 and 328) is the U-12n.10a EMP CH cable hole at UTM coordinates 569914 E, 4118215 N, at an elevation of 7,384 ft (2,250.6 m), and drilled to a depth of 1,330 ft (405 m) (Bennett 1991). The drill hole is on a dirt and gravel pad that is 390 ft (118.9 m) north-south by 330 ft east-west and encompasses 2 acres (0.8 hectares). Features 158-168 are on or near the dirt pad. The U12n.10A EMP CH consists of a 12 x 12 ft concrete pad and 9 ft diameter metal dome structure. The dome was designed to be gas tight to contain any radioactive gas that could potentially follow any of the 72 cables from the tunnel to the surface during the test. The dome, 7 ft in height, is centered on the pad and secured to the concrete with 1 1/4-inch bolts spaced 1 ft apart around the perimeter of the dome's flanged base. Welded to the side of the dome in three rectangular patterns are 3-inch nipples spaced 6 inches on center right to left and 3 inches on center top to bottom. There are 32 nipples on the south side, 16 on the west, 24 nipples on the north. The nipples provide both protection and access to the cable gas blocked connectors attached to th end of each instrument cable. A galvanized metal rack is 2 ft from the side of the dome at each set of nipples. The racks are constructed of 1 1/2-inch galvanized channel iron (Unistrut) and are 6 ft wide and 3 ft 4 inches in height. The top of the rack is diagonally braced to a rim that extends around the top side of the dome. On the west side is a locked 2 ft 6 inch x 1 ft 8 inch x 8 inch electrical panel mounted horizontally to the top of the galvanized rack. Chicken wire is attached at several places to the rim on the dome. Associated artifacts on the pad are insulated cable and wire, cans, wood and rubber fragments, bolts, metal plates, chicken and barbed wire, plastic, canvas, I-beam, and a galvanized bucket and trash.



Figure 324. Feature 155, electrical breaker box at the U-12n.10A Structure CH, U12n Tunnel, view southwest (2008).



Figure 325. Feature 156, electrical panel backboard at the U-12n.10A Structure CH, U12n Tunnel, view southwest (2008).



Figure 326. Feature 157, pit at the U-12n.10A Structure CH, U12n Tunnel, view northeast (2008).

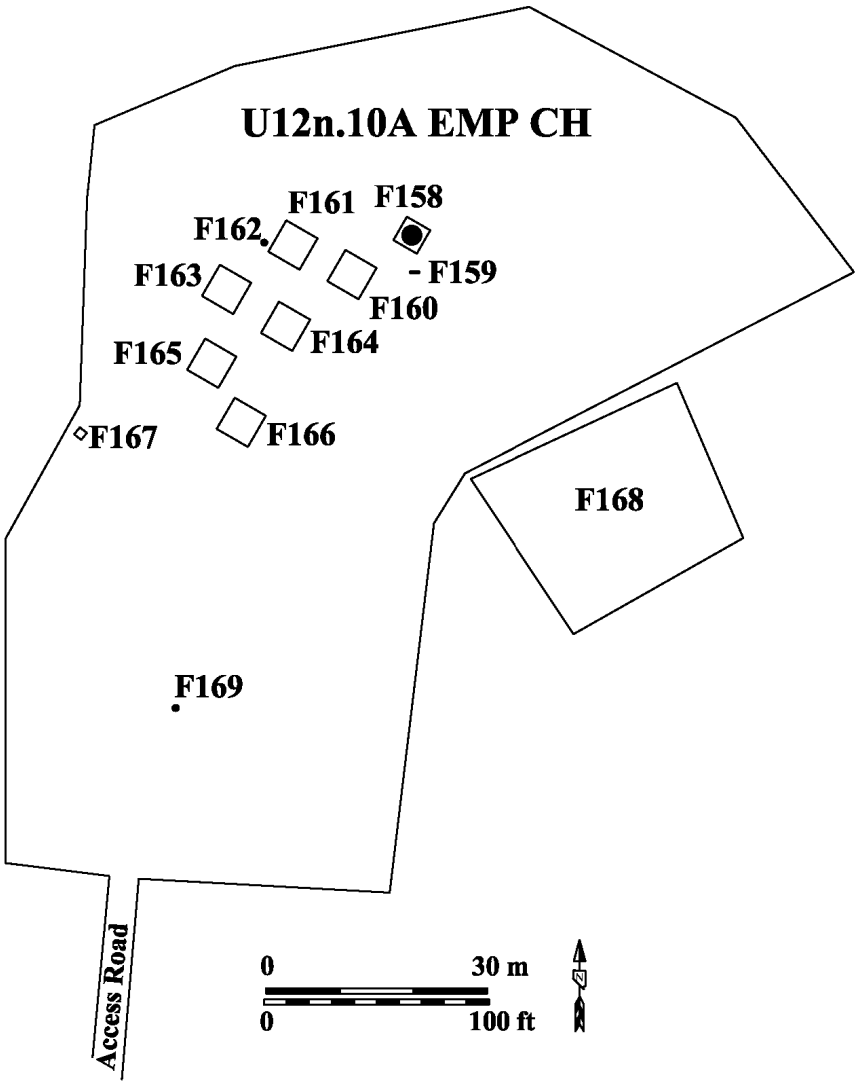



Figure 327. Plan map of U-12n.10A EMP CH cable hole dirt pad and location of Features 158-169.



Figure 328. Feature 158, U-12n.10A EMP CH, U12n Tunnel, view northeast (2008).

Feature 159

Feature 159 (Figures 327 and 329) is electrical panels at UTM coordinates 569915 E, 4118210 N. The feature consists of a 4 ft east-west by 5 ft 5 inch tall metal frame with three 2 ft 6 inch x 1 ft 8 inch x 8 inch electrical panels. Two panels are on the south and one on the north sides of the frame.

Feature 160

Feature 160 (Figures 327 and 330) is a concrete pad at UTM coordinates 569905 E, 4118213 N. The pad is 16 x 16 ft, 1 ft thick, and has a rough surface. Associated artifacts on the pad are metal plates and rods, a galvanized turnbuckle, a 2-inch pipe cap, and a 2-inch pipe collar with metal rod loop.

Feature 161

Feature 161 (Figures 327 and 331) is a concrete pad at UTM coordinates 569897 E, 4118213 N. The pad is 16 x 16 ft, 1 ft thick, and has a rough surface. The U12n.10 PS#1 drill hole is 3 ft 8 inches west of the southwest corner of the pad.

Feature 162

Feature 162 (Figures 327 and 332) is the UE-12n #9/Inst. exploratory drill hole at UTM coordinates 569894 E, 4118214 N, and elevation of 7,383 ft (2,250.3 m) and drilled to a depth of 1,550 ft (472 m). It is 3 ft 5 inches west of Feature 161. The drill hole consists of a 5-inch pipe that extends 4 ft 4 inches above the surface and is capped with a hinged flat metal plate. A white metal sign identifies the drill hole number, coordinates, and surface elevation.

Feature 163

Feature 163 (Figures 327 and 333) is a concrete pad at UTM coordinates 569888 E, 4118211 N. The pad is 16 x 16 ft, 1 ft thick, and has a rough surface. Along the south and west edges, 1 1/2-inch bolts have been cut flush with the surface. Associated artifacts on the pad are insulated cable and metal plates.

Feature 164

Feature 164 (Figures 327 and 334) is a concrete pad at UTM coordinates 569896 E, 4118206 N. The pad is 16 x 16 ft, 1 ft thick, and has a rough surface.

Feature 165

Feature 165 (Figures 327 and 335) is a concrete pad at UTM coordinates 569886 E, 4118201 N. The pad is 16 x 16 ft, 1 ft thick, and has a rough surface. Along the south and west edges, 1 1/2-inch bolts have been cut flush with the surface.



Figure 329. Feature 159, electrical panels at the U-12n.10A EMP CH, U12n Tunnel, view southwest (2008).



Figure 330. Feature 160, concrete pad at the U-12n.10A EMP CH, U12n Tunnel, view southwest (2008).



Figure 331. Feature 161, concrete pad at the U-12n.10A EMP CH, U12n Tunnel, view east (2008).



Figure 332. Feature 162, UE-12n #9 exploratory drill hole, U12n Tunnel, view northeast (2008).



Figure 333. Feature 163, concrete pad at the U-12n.10A EMP CH, U12n Tunnel, view northeast (2008).



Figure 334. Feature 164, concrete pad at the U-12n.10A EMP Ch, U12n Tunnel, view northeast (2008).



Figure 335. Feature 165, concrete pad a the U-12n.10A EMP CH, U12n Tunnel, view northeast (2008).

Feature 166

Feature 166 (Figures 327 and 336) is a concrete pad at UTM coordinates 569890 E, 4118193 N. The pad is 16 x 16 ft, 1 ft thick, and has a rough surface. Along the edges, 1 1/2-inch bolts have been cut flush with the surface. Associated artifacts on the pad are insulated cable and metal plates.

Feature 167

Feature 167 (Figures 327 and 337) is an electrical panel backboard at UTM coordinates 569869 E, 4118189 N. The backboard is a 4 x4 ft sheet of 3/4-inch plywood attached to two 4 x 4 inch milled lumber posts 6 ft 4 inches in height. The backboard is lying on the surface and has one low voltage electrical junction box on the surface side of the backboard.

Feature 168

Feature 168 (Figures 327 and 338) is a pit at UTM coordinates 569222 E, 4118182 N. The pit is 92 ft east-west, 75 ft north-south, approximately 7 ft deep, and encompasses 1.7 acres (0.7 hectares). The pit contained drilling mud during the drilling of the U12n.10A EMP cable hole. Associated artifacts are insulated cable, metal straps, and galvanized conduit.

Feature 169

Feature 169 (Figures 327 and 339) is the U-12n.10 PS #1 postshot drill hole at UTM coordinates 569882 E, 4118151 N, at an elevation of elevation of 7,368 ft (2,245.8 m), and drilled to a depth of 544 ft (169 m) (Bennett 1991). It is on the U-12n.10A EMP CH cable hole pad and consists of 4 1/2-inch casing extending 2 ft 6 inches above the surface and capped with a hinged flat metal plate. A metal sign, on the surface, identifies the drill hole number, coordinates, and surface elevation.

Feature 170

Feature 170 (Figure 340) is the UE-12n #3 exploratory drill hole at UTM coordinates 569970 E, 4118359 N, at an elevation of 7,479 ft (2,279.6 m), and drilled to a depth of 1,409 ft (429 m) (Bennett 1991). The drill hole is near the middle of an irregular-shaped dirt pad that is 200 ft (61 m) east-west by 80 ft (24.4 m) north-south, encompasses 0.37 acres (0.15 hectare), and accessed by a road that enters from the west. The drill hole consists of a piece of 6 inch diameter pipe that is 4 inches (17.8 cm) tall and sealed with a welded metal plate. A white metal sign identifies the drill hole number, coordinates, and surface elevation. Associated artifacts are communication wire, milled lumber fragments, metal fragments, various sized cable, crushed cans, and broken glass.

Feature 171

Feature 171 (Figure 341) is an aluminum antenna at UTM coordinates 569953 E, 4118405 N, at an elevation of 7,480 ft (2,279.9 m), and is 161 ft (49.1 m) northwest of the UE-12n #3 drill hole. The antenna consists of 1-inch aluminum shaft that is 6 ft 8 inches (2 m) in length with ten 2 ft 4 inch rods attached perpendicular to the shaft (above and below). The shaft is attached horizontally at 3



Figure 336. Feature 166, concrete pad at the U-12n.10A EMP CH, U12n Tunnel, view northeast (2008).



Figure 337. Feature 167, electrical panel backboard at the U-12n.10A EMP CH, U12n Tunnel, view west (2008).



Figure 338. Feature 168, drilling mud pit for the U-12n.10A EMP CH, U12n Tunnel, view southeast (2008).



Figure 339. Feature 169, U-12n.10 PS #1 postshot drill hole, U12n Tunnel, view north (2008).

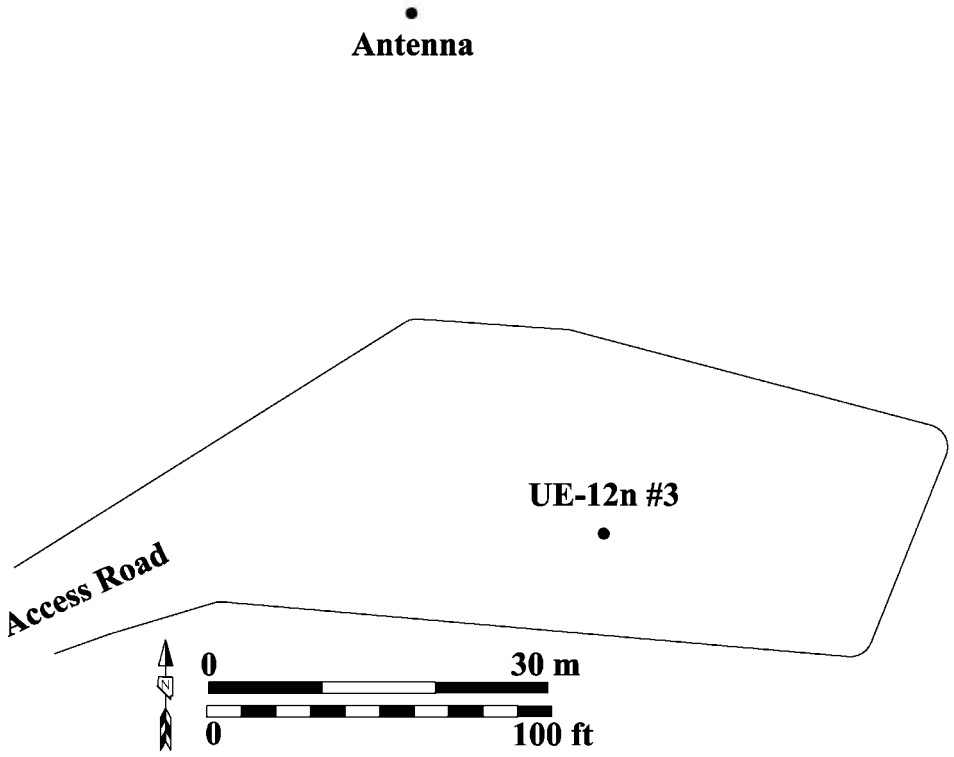





Figure 340. Plan map of Feature 170, UE-12n #3 exploratory drill hole, and Feature 171, antenna, and photograph of Feature 170, view northwest (2008).



Figure 341. Feature 171, antenna, U12n Tunnel, view northeast (2008).

ft to a 1 1/2-inch galvanized pipe that is 6 ft in height. The pipe is supported by a 1 ft 2 inch triangular metal base attached to the exposed bedrock.

Feature 172

Feature 172 (Figure 342) is the U-12n.10 CH#1 cable hole at UTM coordinates 569904 E, 4118280 N, at an elevation of 7,425 ft (2,263.1 m), and drilled to a depth of 1,375 ft (419 m) (Bennett 1991). The cable hole is near the center of a rectangular dirt pad that is 165 ft (50.3 m) east-west by 70 ft (21.3 m) north-south and encompasses 0.3 acres (0.1 hectares). Features 173 and 174 are also on or near the dirt pad. The cable hole consists of a 13 ft north-south by 10 ft east-west concrete pad with 30 inch diameter pipe extending 6 inches above the surface of the concrete. Roughly centered within the 30 inch pipe is a 15 7/8 inch (40.3 cm) diameter casing that is 3 inches in height and sealed with a welded metal plate. On the north and south sides of the 30 inch pipe are 1 f square metal plates. A white metal sign on the west side of the concrete pad identifies the cable hole number, coordinates, and surface elevation.

Feature 173

Feature 173 (Figures 342 and 343) is two electrical panel boxes at UTM coordinates 569896E, 4118269 N. The boxes measure 2 ft 6 inches x 1 ft 8 inches x 6 inches and are mounted on a 1 1/2-inch channel iron (Unistrut) frame that is 4 ft east-west and 5 ft 2 inches in height. They are 30 ft southwest of the concrete pad surrounding the U12n.10 CH#1 cable hole.

Feature 174

Feature 174 (Figures 342 and 344) is a pit at UTM coordinates 569904 E, 4118260 N and at an elevation of 7,380 ft. The pit is 35 ft (10.7 m) north-south, 70 ft east-west, 4 ft deep, and encompasses 0.07 acres (0.03 hectares). It is 65 ft south of the U12n.10 CH#1 Cable Hole pad and down a steep slope. The pit contained drilling mud during the drilling of the U12n.10 CH#1 cable hole. Associated artifacts are wood fragments, cable spools, an air filter, concrete fragments, metal fragments, galvanized pipe, hose fragments, and a metal bucket.

Feature 175

Feature 175 (Figure 345) is the UE-12n #8 exploratory drill hole at UTM coordinates 570080 E, 4118200 N, at an elevation of 7,395 ft (2,254 m), and drilled to a depth of 1,784 ft (544 m) (Bennett 1991). The drill hole is near the south edge of an irregular shaped dirt pad that is 230 ft (70.1 m) east-west by 100 ft (30.5 m) north-south, encompasses 0.38 acres (0.15 hectare), and accessed by a road that enters the pad from both the east and west ends. The drill hole consists of a piece of 6-inch diameter pipe that is 7 inches tall and is collapsed on one side roughly forming a crescent shape. The top of the pipe is sealed with a welded metal plate. A metal sign with welded lettering identifies and marks the drill hole location. Associated artifacts are communication wire, milled lumber fragments, metal fragments, various sized cable, crushed cans, and broken glass.

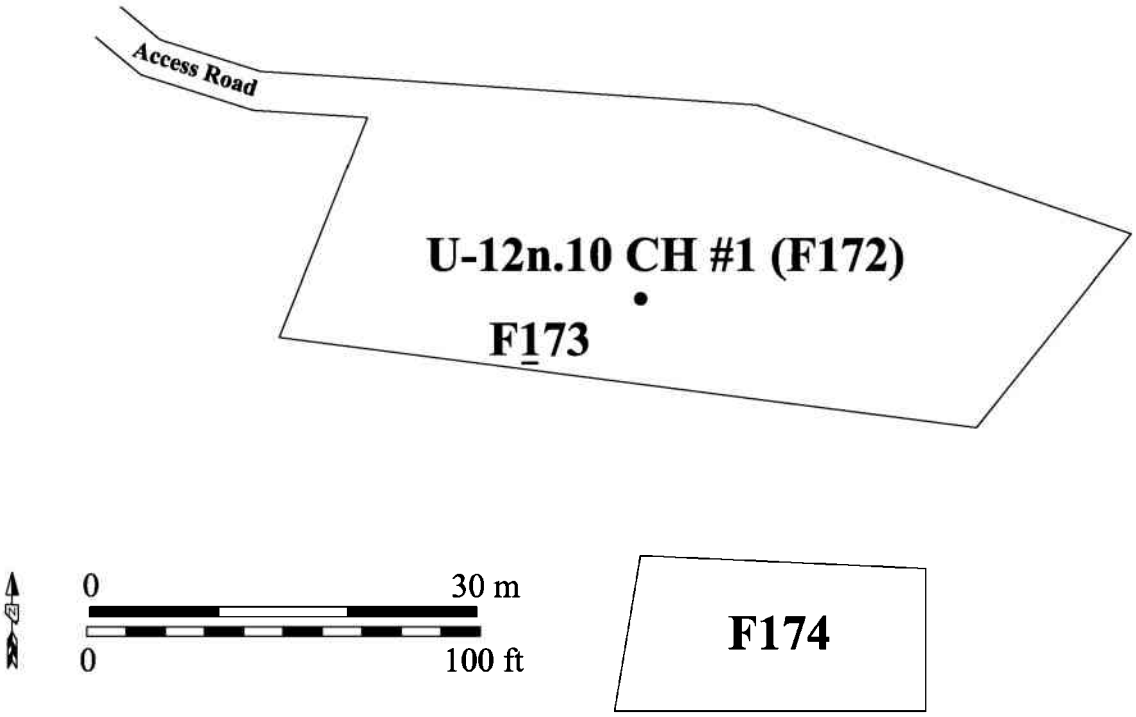






Figure 342. Plan map of Feature 172, the U-12n.10 CH #1 cable hole dirt pad ,and location of Features 172-174, photograph of Feature 172, U12n Tunnel, view east (2008).



Figure 343. Feature 173, electrical panels at the U12n.10 CH#1, U12n Tunnel, view southwest (2008).



Figure 344. Feature 174, drilling mud pit for the U-12n.10 CH #1, U12n Tunnel, view southeast (2008).

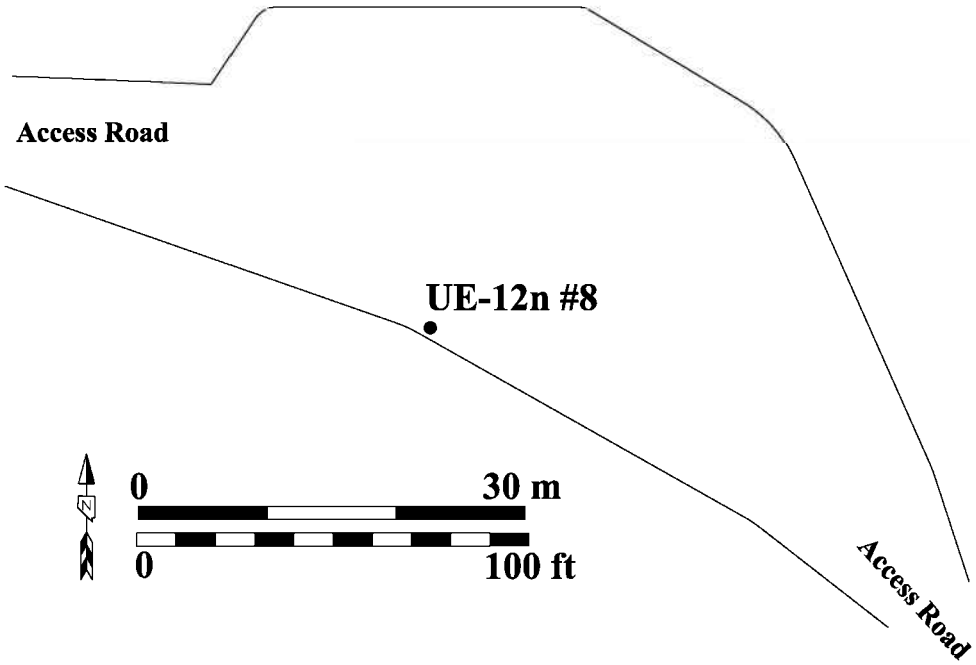






Figure 345. Plan map and photograph of Feature 175, UE-12n #8 exploratory drill hole, view southeast (2008).

Feature 176

Feature 176 (Figure 346) is an electrical panel backboard at UTM coordinates 570188 E, 4118147 N at an elevation of 7,360 ft. The feature consists of three 2 ft 6 inch x 1 ft 8 inch x 8 inch electrical panels mounted to a metal frame. The frame is 1 1/2-inch channel iron (Unistrut) that is 6 ft east-west by 6 ft in height. Associated artifacts are insulated wire, milled lumber fragments, and plywood.

Feature 177

Feature 177 (Figure 347) is an anemometer at UTM coordinates 570275 E, 4118136 N and an elevation of 7,340 ft. The anemometer is lying on the ground surface. It is on a large dirt pad that is 330 ft east-west by 130 ft north-south and encompasses 0.8 acres (0.3 hectares). The anemometer is three hemispherical aluminum cups (attached at 120 degrees) around a plastic pipe. The plastic pipe is attached to the end of a 1-inch metal pipe that is 9 ft in length. The metal pipe is attached to a 6 x 6 inch metal base plate with four 2 1/2 x 48 inch aluminum rails, attached with hinges, that are the horizontal supports for the pipe.

Feature 178

Feature 178 (Figures 348 and 349) is the U-12n.08 PS #1 postshot drill hole on an irregular-shaped dirt pad that is 450 ft (137.2 m) north-south and 300 ft east-west, encompasses 2.1 acres (0.9 hectare), and at an elevation of 7,349 ft (2,240 m). Features 179-182 also are on or near the dirt pad. One access road enters the pad from the south and a second road exists the pad from the northeast corner and provides access to drill holes UE-12n #10, UE-12n #11, and UE-12n #12. Artifacts found on the drill pad are communications wire, broken glass, rubber fragments, milled lumber fragments, metal fragments, and welding rods.

The U-12n.08 PS #1 postshot drill hole is at UTM coordinates 570345 E, 4118289 N and drilled to a depth of 525 ft (160m) (Bennett 1991). The drill hole consists of a 92 inch (2.3 m) diameter casing that is 1-inch thick and extends 1 ft above the surface and is filled with soil. Centered in the casing is a 4 1/2-inch diameter pipe that extends 8 inches above the surface. The pipe is sealed with a welded metal cap. A white metal sign within the casing identifies and marks the location of the drill hole.

Feature 179

Feature 179 (Figures 348 and 350) is the U-12n.18 PS #1A, #1AA, and #1AAB postshot drill hole at UTM coordinates 570354 E, 4118310 N, at and elevation of 7,344 ft (2,238.5 m) and drilled to a depth of 1,568 ft (478 m) (Bennett 1991). The drill hole consists of a 10 3/4-inch (27.3 cm) diameter pipe extending 3 ft above the surface at approximately 70 degrees. The end of the pipe is covered with a flat metal plate that is hinged to the end of the pipe. An oxidized metal sign with welded lettering (lying on the surface) and a white painted metal sign identify and mark the location of the drill hole.



Figure 346. Feature 176, electrical panels, U12n Tunnel, view southeast (2008).

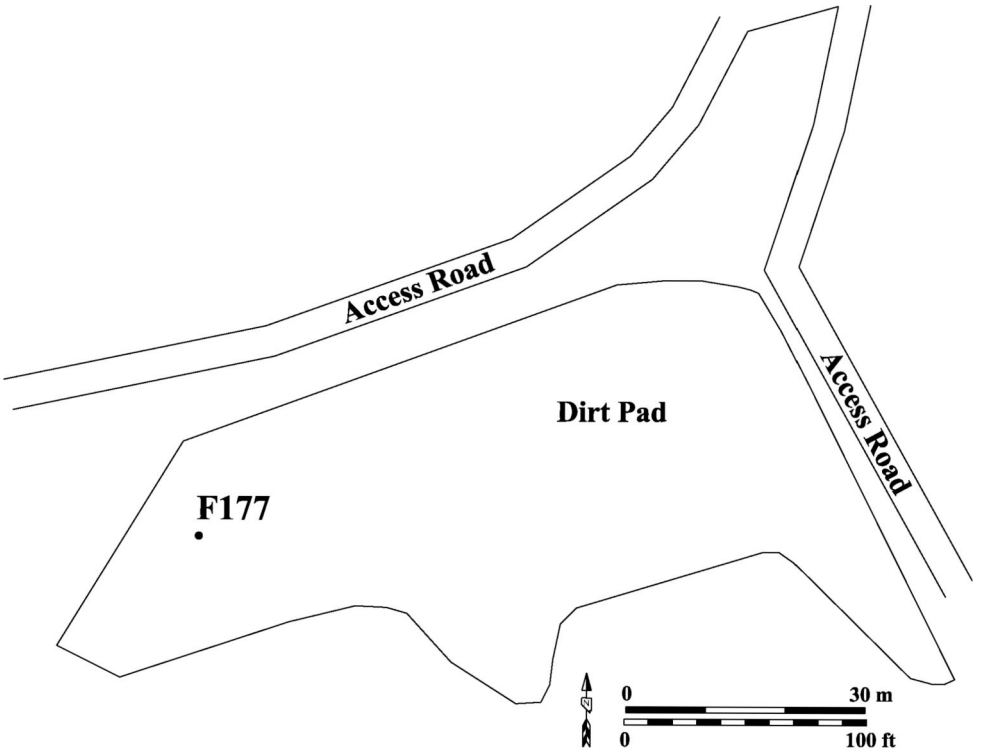





Figure 347. Plan view of dirt pad and photograph of Feature 177, anemometer, U12n Tunnel, view west (2008).

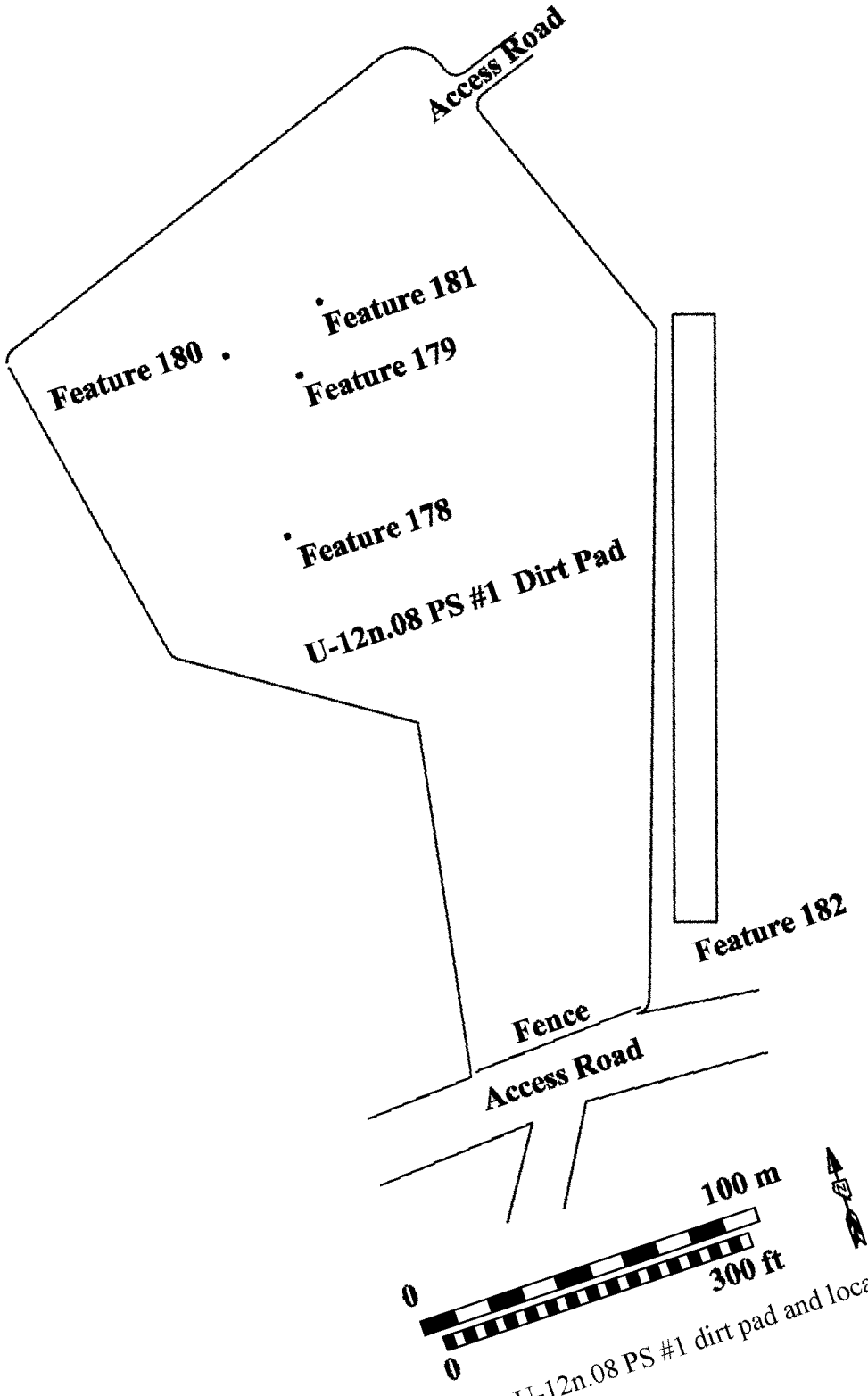



Figure 348. Plan map of the U-12n.08 PS #1 dirt pad and location of Features 178-182.



Figure 349. Feature 178, U12-n.08 PS #1 drill hole, U12n Tunnel, view west (2008).



Figure 350. Feature 179, U-12n.18 PS #1A, #1AA, and #1AAB postshot drill hole, U12n Tunnel, view northeast (2008).

Feature 180

Feature 180 (Figures 348 and 351) is the U-12n.15 PS #1A, PS #1AA, PS# 1AB, PS# 1AC, and #1AD postshot drill hole at UTM coordinates 570345 E, 4118316 N, at an elevation of 7,347 ft (2,239.4 m) drilled to a depth of 1,568 ft (478 m), 1,584 ft (482.8 m), 1,599 ft (487.4 m), 1,631 ft (497.1 m), and 901 ft (274.6 m) respectively (Bennett 1991). U-12n.15 PS# 1A consists of a 10 3/4-inch diameter pipe extending 2 ft 3 inches (0. 68 m) from the surface. The end of the pipe is covered with a flat metal plate that is hinged to the end of the pipe. The remaining holes were cased with 9 7/8-inch (25 cm) pipe. A white metal sign identifies the drill hole number, coordinates, and surface elevation. Associated artifacts are broken glass, communications wire, and metal fragments.

Feature 181

Feature 181 (Figures 348 and 352) is the UE-12n #2 exploratory drill hole at UTM coordinates 570360 E, 4118319 N, at an elevation of 7,344 ft (2,238.5 m) and drilled to a depth of 1,779 ft (542 m) (Bennett 1991). The drill hole consists of a 6-inch diameter pipe extending 3 ft 2 inches above the surface at approximately 75 degrees. The end of the pipe is covered with a flat metal plate that is hinged to the end of the pipe. An oxidized metal sign with welded lettering identifies the drill hole number. No artifacts were found near the drill hole.

Feature 182

Feature 182 (Figure s 348 and 353) is a borrow pit at UTM coordinates 570413 E, 4118298 N. It is 65 ft (19.8 m) east-west by 1,000 ft (304.8 m) north-south. The pit supplied gravel for the construction of the U12n.08 PS#1 pad and supported features (178-181).

Feature 183

Feature 183 (Figure 354) is the UE-12n #12 exploratory drill hole at UTM coordinates 570408 E, 4118521 N, at an elevation of 7,412 ft (2,259.2 m), and drilled to a depth of 1,733 ft (528 m) (Bennett 1991). The drill hole is on an irregular shaped dirt pad that is 135 ft (41.1 m) north-south by 85 ft east-west and encompasses 0.24 acres (0.1 hectares) with access roads that enters the pad from both the north and south ends. No pipe or casing is visible above the surface, however three metal signs (two welded letters and one white) identify and mark the drill hole location. One welded sign is on a post that is 3 ft 6 inches in height and has welded lettering identifying the drill hole number. The second welded sign has the drill hole number, an August 1980 plug-back date, and the depth of the plug back to the surface. The white metal sign is lying on the surface and identifies the drill hole number, coordinates, and surface elevation. Associated artifacts are milled lumber fragments, plastic fragments, communication wire, broken glass, and metal fragments.

Feature 184

Feature 184 (Figure 355) is the UE-12n #10 exploratory drill hole at UTM coordinates 570516 E, 4118538 N, at an elevation of 7,378 ft (2,248.8 m), and drilled to a depth of 1,877 ft (572 m) (Bennett 1991). The drill hole is on an irregular shaped dirt pad that is 131 ft (39.8 m) east-west and 105 ft north-south and encompasses 0.26 acres (0.11 hectares) with access roads that enters the pad



Figure 351. Feature 180, U-12n.15 PS #1, PS #1AA, PS #1AB, PS #1AC, and PS #1AD, U12n Tunnel, view southwest (2008).



Figure 352. Feature 181, UE-12n #2 exploratory drill hole, U12n Tunnel, view northeast (2008).



Figure 353. Feature 182, pit, U12n Tunnel, view northeast (2009).

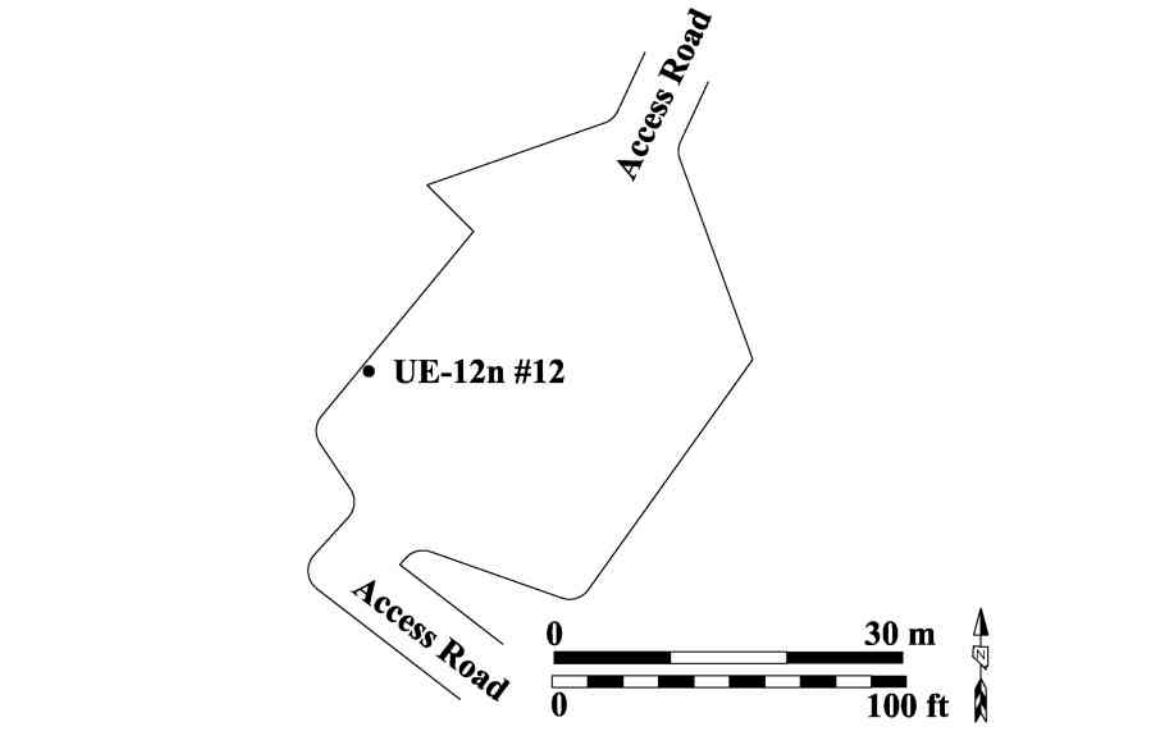






Figure 354. Plan map and photograph of Feature 183, UE-12n #12 exploratory drill hole, view northwest (2008).

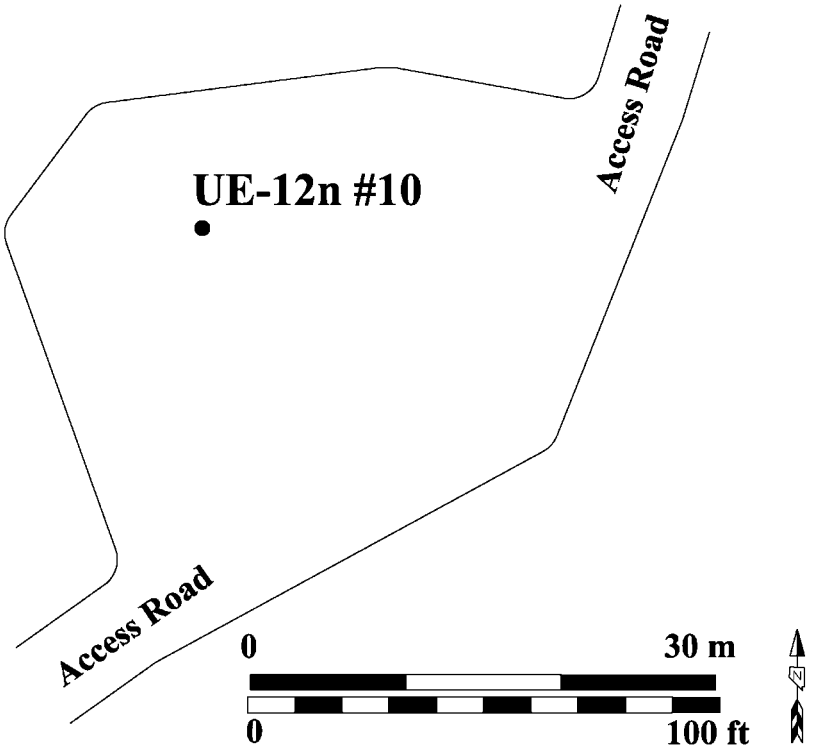





Figure 355. Plan map and photograph of Feature 184, UE-12n #10 exploratory drill hole, view northeast (2008).

from both the north and south ends. No pipe or casing is visible above the surface; however, a white metal sign marks and identifies the drill hole number, coordinates, and surface elevation. Associated artifacts are milled lumber fragments, welding rods, communication wire, crushed cans, plastic fragments, broken glass, a saw blade, buss fuses, and rubber fragments.

Feature 185

Feature 185 (Figure 356) is a metal pole tower at UTM coordinates 570505E, 4118400N. It is at an elevation of 7,340 ft and near drill holes UE-12n #10 and UE-12n #11. The tower consists of a 6-inch diameter pipe (base) that extends 6 inches above the surface. Centered in the base is a 2 1/2 inch diameter pipe (tower) that is approximately 20 ft tall. The 2 1/2-inch pipe is secured in the base by three bolts (set bolts) screwed through the side of the base and against the exterior of the pipe. Three 1/4-inch braided wire cables are attached approximately 5 ft below the top of the tower and are secured to the surface with metal stanchions. Along the north side near the top of the tower is a 6 inch wide by 2 ft long metal plate. Three bolts are welded to the side of the plate probably for attachment of equipment. Associated artifacts are 2x2 milled lumber and a piece of 3/4-inch plywood that may have been a sign (no lettering remains).

Feature 186

Feature 186 (Figure 357) is the UE-12n #11exploratory drill hole at UTM coordinates 570586 E, 4118361N, at an elevation of 7,309 ft (2,227.8 m), and drilled to a depth of 1,882 ft (574 m) (Bennett 1991). The drill hole is near the east edge of a roughly rectangular-shaped dirt pad that is 150 ft north-south by 125 ft (38.1 m) east-west and encompasses 0.37 acres (0.15 hectares) with an access road that enters from the west. The drill hole consists of a 4 1/2-inch diameter pipe that extends 1 ft above the surface and is capped with a metal plate. A piece of 1 1/2-inch angle iron is welded across the top of the pipe with lettering CMT 1882 TO GL (cemented 1,882 ft to ground level). Near the pipe is an oxidized metal sign that identifies the drill hole number. Extending south from the drill hole is a 70 ft long by 10 ft wide trench that empties into an area south of the pad. Along the edge of the trench are metal T posts and a single yellow coated wire. Associated artifacts are metal fragments, plastic fragments, communication wire, crushed cans, and a 55 gal metal barrel.

Feature 187

Feature 187 (Figure 358) is the U-12n.03 #1 CH cable hole at UTM coordinates 570521 E, 4118215 N, at an elevation of 7,304 ft (2,226.3), and drilled to a depth of 1,248 ft (380 m) (Bennett 1991). The drill hole is near the south edge of an irregular-shaped dirt pad that is 233 ft (71 m) east-west by 141 ft (43 m) north-south and encompasses 0.46 acres (0.19 hectares) with an access road that enters from the west. Level with the surface is the top edge of a 20 3/8-inch (51.8 cm) diameter pipe (surface casing). A 13 3/8-inch (34 cm) diameter casing, centered inside the 20 3/8-inch pipe, extends 2 ft 9 inches above the surface and is capped with a 1 ft 7 inch diameter, 12 bolt flange and plate. Near the pipe and casing is a galvanized metal post and white sign that identifies cable hole number, coordinates, and surface elevation.



Figure 356. Feature 185, pole tower, U12n Tunnel, view southeast (2008).

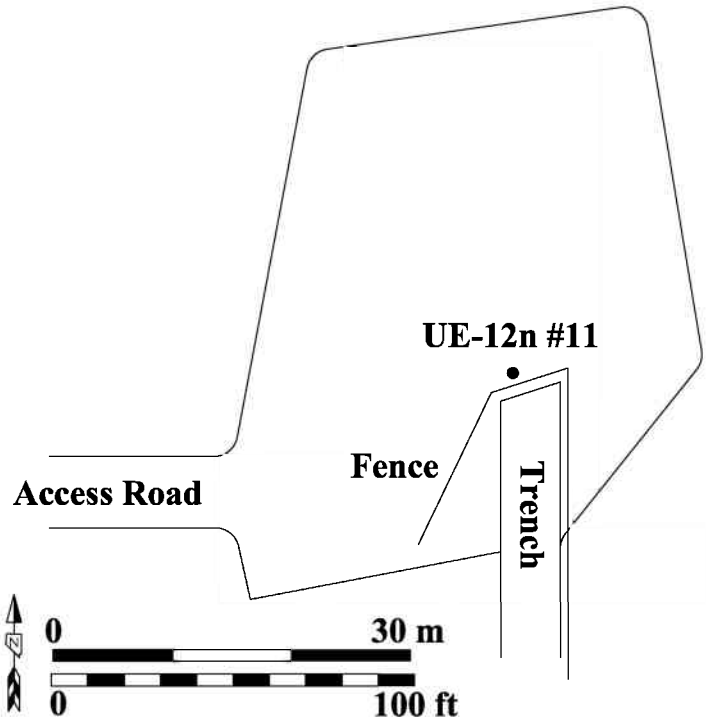





Figure 357. Plan map and photograph of Feature 186, UE-12n #11 exploratory drill hole, U12n Tunnel, view southeast (2008).

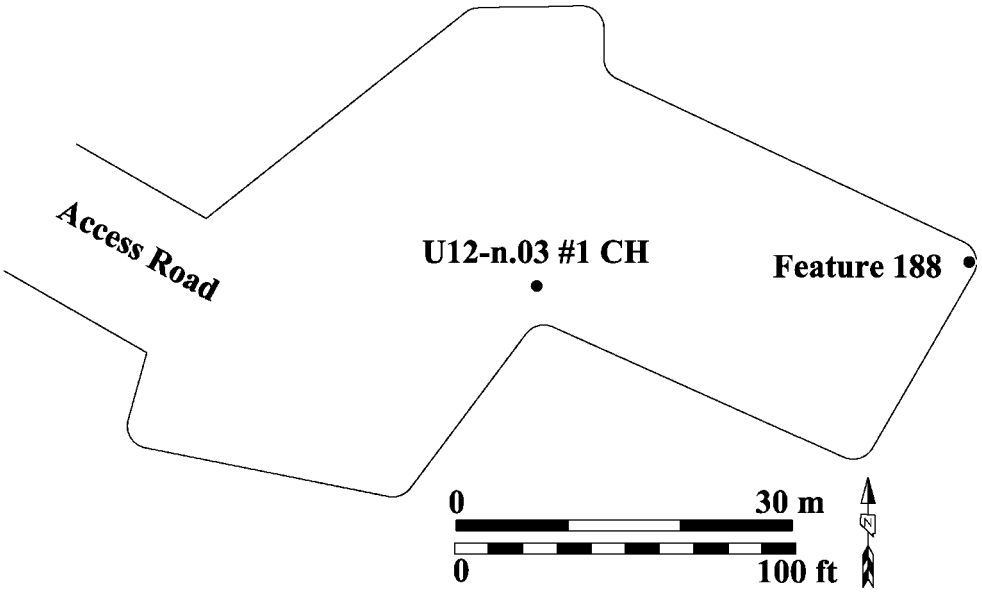





Figure 358. Plan map of Features 187 and 188 and photograph of Feature 187, U-12n.03 #1 CH cable hole, view north (2008).

Feature 188

Feature 188 (Figure 359) is four casing centering sleeves at UTM coordinates 570561 E, 4118218 N. The feature is along the northeast edge of the U-12n.03 #1 CH dirt pad. The sleeves (insulators or centralizers) are cylindrical and measure 13 3/8 inches (33 cm) outside diameter, 7 5/8 inches (19.4 cm) inside diameter, and 1 ft 4 inches tall. One sleeve is 20 3/8 inches in outside diameter, 7 5/8 inches inside diameter, and 1 ft 4 inches tall. There are four longitudinal ridges approximately 3 inches wide, spaced 90 degrees, and tapered to a point on each end that extend the length of the sleeve. The sleeves are an orange (probably red faded by sunlight) rubberized material and are significantly weathered. Other associated artifacts are rope, milled lumber fragments, crushed cans, and broken bottles.

Feature 189

Feature 189 (Figure 360) is the U-12n.20 PH #1 peep hole at UTM coordinates 570534 E, 4118168 N, at an elevation of 7,317 ft (2,230.2 m), and drilled to a depth of 1,250 ft (381 m) (Bennett 1991). The drill hole is near the center of a square dirt pad that is 180 x 180 ft and encompasses 0.73 acres (0.29 hectares) with an access road that enters from the west. Features 190 and 191 are on or near the dirt pad. The drill hole consists of a 33 inch diameter pipe (surface casing) that extends 1 ft 2 inches above the surface and is capped with a welded metal plate (slightly larger in diameter than the pipe). Welded to the top of the plate are two 1-inch nipples sealed with 1-inch threaded plugs. Four 3-inch (7.6 cm) rectangular metal lugs are welded to the exterior sides of the pipe at 90 degree intervals. Extending through and slightly off-center of the plate is a piece of 13 3/8 inch casing that is 1 ft 9 inches long. The casing is capped by a 2 ft diameter, 3/4-inch (1.9 cm) thick, flange with 10 holes around the perimeter that is welded to the casing. A second metal plate has been welded to the interior of the flange sealing the end of the casing. Extending through the interior plate are two 1 1/2-inch nipples 2 inches (5.1 cm) in length and plugged. Between the two nipples is a 2 1/2-inch wide by 4 inch tall metal plate with a 1-inch diameter hole. Extending out the east side of the casing is a 2 1/2-inch nipple that is 1 1/2 inches in length and sealed with a welded metal plate. Extending out the north side of the casing is a 6-inch pipe, 1 ft 3 inches in length, and ending with a Victaulic grooved connection. The end of the pipe is sealed with a welded metal plate. Associated artifacts are communications wire, crushed and oxidized cans, milled lumber fragments, welding rods, and broken glass. Also, near the southwest corner of the pad (near pipe) are several fragments of white concrete (grout) that was probably used to cement the large diameter pipe to the subsurface rock strata.

Feature 190

Feature 190 (Figures 360 and 361) is pipe, pipe fittings, and concrete at UTM coordinates 570512 E, 4118154 N at the U-12n.20 PH #1. The feature consists of 12 joints of 6-inch diameter by 20 ft long Victaulic pipe stacked on two pieces of 4 x 4 inch milled lumber. A 6-inch butterfly valve is attached to the end of one pipe. Near the pipe on a wood pallet are three 90 degree, two 45 degree, four T connections, and twelve clamps and rubber gaskets (all 6 inch Victaulic). Near the pipe is concrete that was used to grout pipe to the surface or within a larger pipe.



Figure 359. Feature 188, casing centering sleeves (insulators) at the U-12n.03 #1 CH, U12n Tunnel, view east (2008).

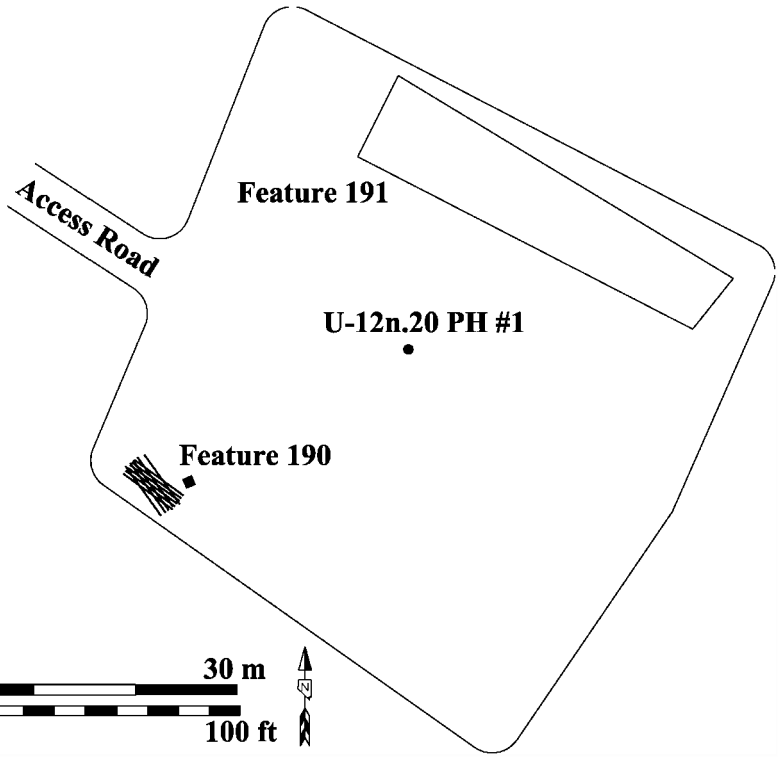





Figure 360. Plan map of Features 189-191, and photograph of Feature 189, U-12n.20 PH #1 peep hole, view west (2008).



Figure 361. Feature 190, Victaulic pipe, fittings, and concrete at the U-12n.20 PH #1, U12n Tunnel, view west (2008).

Feature 191

Feature 191 (Figures 360 and 362) is a drill hole mud pit at UTM coordinates 570566 E, 4118175 N. The feature is 125 ft east-west by 26 ft north-south and is 4 ft deep with three metal T posts that once supported a fence.

Feature 192

Feature 192 (Figures 363-368) is the U12n.10 Vent Hole at UTM coordinates 570501 E, 4118008, at an elevation of 7,280 ft, and drilled to a depth of 1,240 ft (378 m) (Bennett 1991). It is on a dirt pad that is 215 ft (65.5 m) east-west by 130 ft north-south and encompasses 0.56 acres (0.23 hectares). Also on the pad are Features 193-202.

The vent hole consists of the vent hole casing, turn-tube containment door, concrete pad, crane, stand, metal vent lines, Buffalo Blowers, electric motors, electrical panel boxes, and an aluminum box. The 30 inch diameter vent hole casing is centered on a 13 ft north-south by 7 ft east-west concrete pad. It is capped with a slightly domed 30 inch diameter metal turn-tube containment door and attached to the casing with a hinge mechanism and secured with two clamps. The vent hole is in readiness configuration (i.e., surface piping and ventilation fans disconnected and turn-tube containment door closed). Both the pipe and containment door have rims that fit into the clamps. The semicircular clamps are grooved around the interior and extend around the vent hole and cap rims. The clamps are attached to long 1 1/4-inch bolts that, unlike Vent Hole #2 (Feature 131), are manually operated. Welded to the outside of the vent hole casing are two 4-inch and two 2-inch pipes. Centered on the vent hole and 7 ft to the south is a 7 ft east-west by 5 ft north south concrete pad. Centered on the east and west sides, 4 inches from the edges, are two 8 x 8 inch metal plates.

An overhead crane is 7 ft west and centered on the vent hole. The crane was used to remove and install the 90 degree elbow which connected the vent hole to the ventilation fans. The vertical riser for the crane is a 3 ft 4 inch diameter pipe that is 15 ft in height. Attached horizontally to the riser is a 1-ft I-beam arm that is 14 ft in length. The riser and arm are braced on two sides with rectangular metal plates. At the end of the arm is a four wheeled trolley that rides on bottom plate of the I-beam. Stenciled on the I-beam is CONTRN INDUSTRIES INC. APPELTON WIS.

East of and centered on the vent hole is an L-shaped metal platform (overhead walkway). It measures 8 ft 6 inches north-south by 2 ft 6 inches east-west on the south end, 4 ft 6 inches east-west on the north end, and 5 ft 8 inches in height. Attached to the east side of the base of the platform is a 3 ft 1 inch (94 cm) north-south by 2 ft 1 inch east-west by 2 ft 8 inch tall metal box. The platform provides access to the west end of the vent line.

Above the platform and at the east end of the 2 ft diameter vent line is a 2 ft 6 inch diameter flange that is open and not connected to the vent hole. It is 10 ft above the surface, extends 5 ft 8 inches to the east, and splits into two identical 2 ft sections. Each 2 ft section extends 26 ft, is spiral welded, and is supported by two triangular-shaped metal frames. The sections turn 45 degrees toward the surface, extend 9 ft 8 inches (2.9 m), and ends in a second 45 degree turn that places the vent lines parallel to and 4 ft above the surface. At this point automatic valves are attached to the west end of the 2 ft vent line and to 3-ft vent line that exit the east end of the valves. The automatic valves were



Figure 362. Feature 191, drill hole mud pit at U-12n.20 PH #1, view west, (2008).

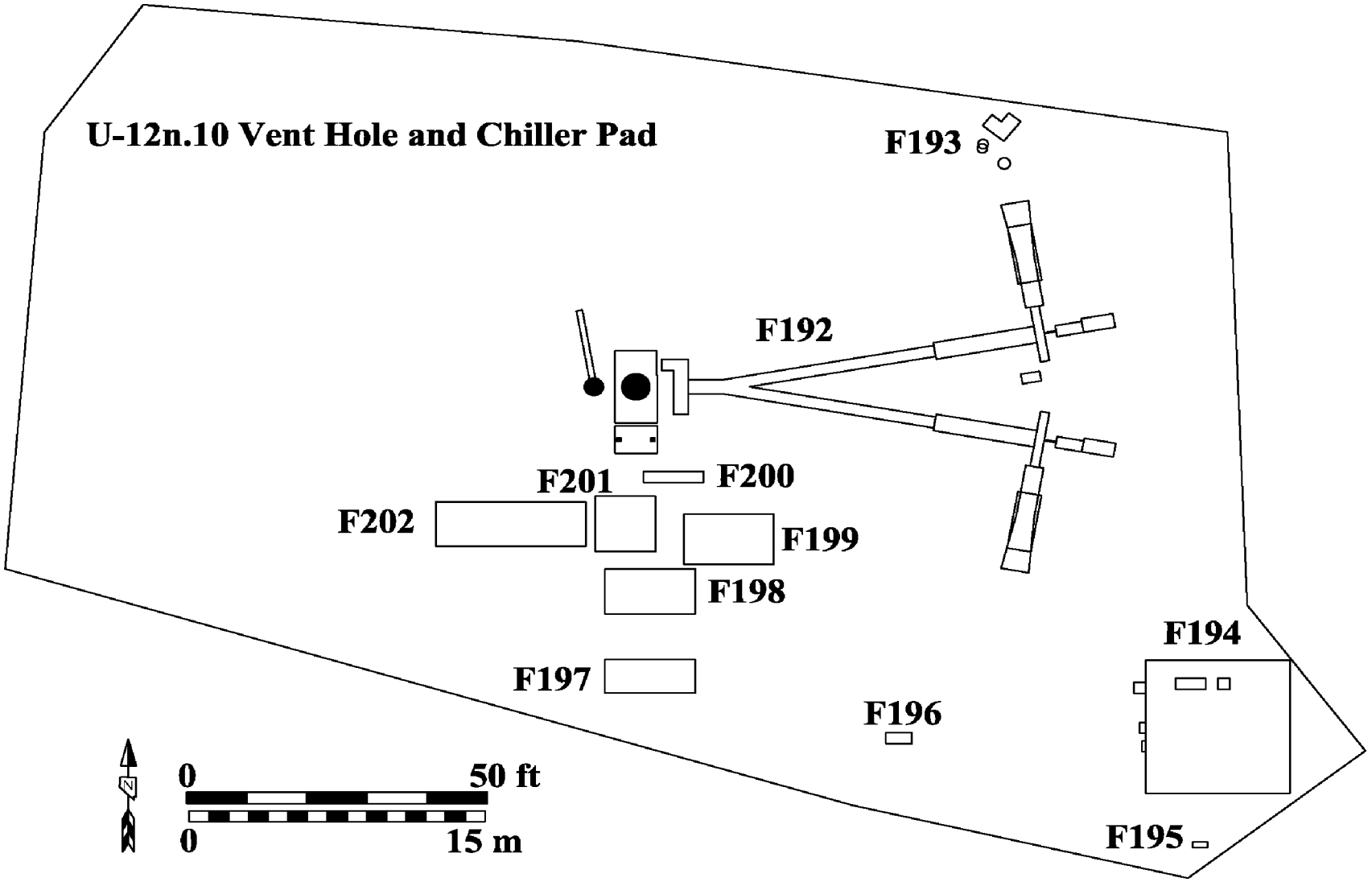



Figure 363. Plan map of U-12n.10 Vent Hole and chiller pad and Features 192-202.

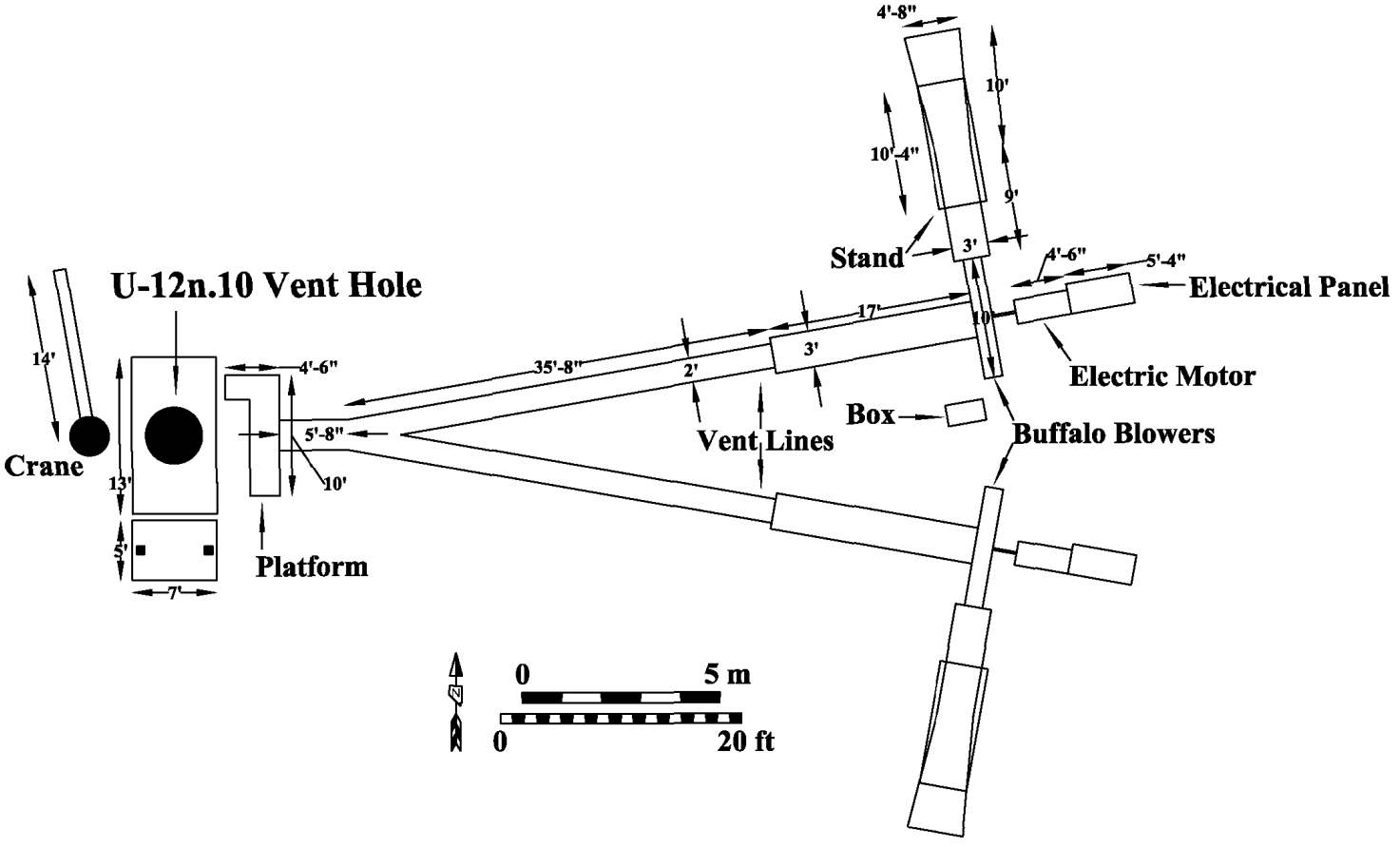



Figure 364. Plan map of Feature 192, U-12n.10 Vent Hole and Buffalo Blowers, U12n Tunnel.

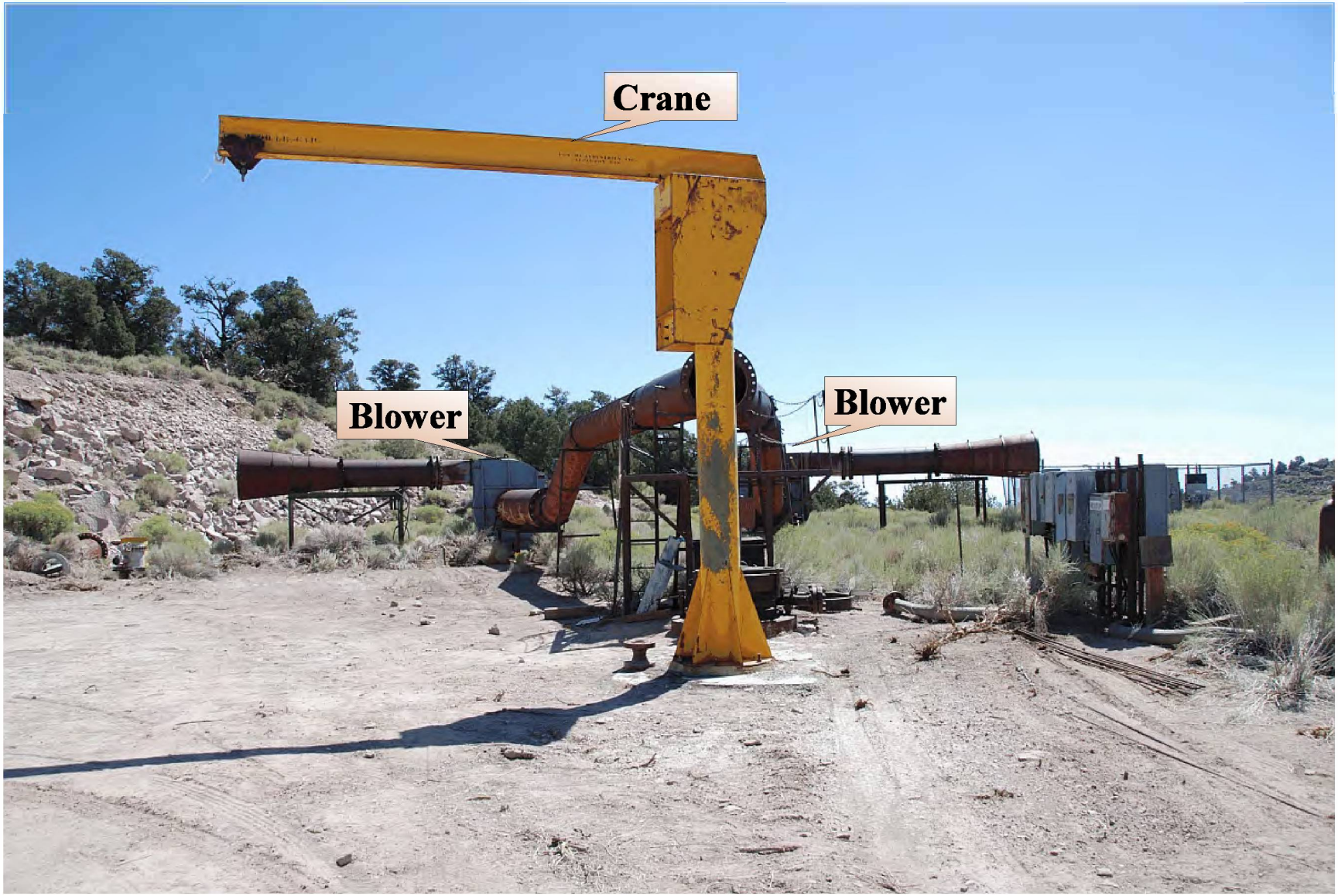


Figure 365. Feature 192, U-12n.10 Vent Hole, vent lines, crane, and Buffalo Blowers, U12n Tunnel, view east (2008).



Figure 366. Feature 192, U-12n.10 Vent Hole, U12n Tunnel, view south (2008).



Figure 367. Feature 192, Buffalo Blower and vent lines at the U-12n.10 Vent Hole, U12n Tunnel, view east (2008).



Figure 368. Feature 192, electrical panel and Buffalo Blower at the U-12n.10 Vent Hole, U12n Tunnel, view southwest (2008).

remote controlled dampers used to control the cubic feet per minute of tunnel ventilation. The 3-ft vent lines extends 17 ft east and is attached to Buffalo Blowers. Exiting the top of the blowers are rectangular to round couplings that are attached to flexible 3 ft diameter vibration dampeners and then to 3 ft diameter vent lines that are 9 ft in length. The vent lines then expand to 4 ft 8 inches in diameter over the last 10 ft. The ends is sealed with expanded metal. The vent lines exiting the blowers are supported by rectangular metal frames that are 10 ft long, 4 ft wide, and 6 ft 4 inches in height. The legs of the frames are set in 3 ft square concrete pads.

The Buffalo Blowers are Type R, Size 96. The blowers are attached to electric motors with a 2 ft long drive shaft and anti-vibration couplings. The 400 hp, 1,785 rpm electric motors are 4 ft 6 inches in length and 2 ft in diameter. At the east end of the electric motors are 5 ft 4 inch x 2 ft 6 inch electrical panels. The north one is 8 ft and the south is 7 ft 6 inches in height. The north panel is labeled B#1 and the south is B#2. The motors and electrical panels are on 16 ft east-west by 6 ft north-south concrete pads. Near the north blower is a 3 ft 2 inch x 1 ft 9 inch x 1 ft 10 inch aluminum box attached to a 6 x 6 inch milled lumber base. Associated artifacts are wood fragments, rebar, lath, metal flanges, braided wire cable, insulated cable, nuts, bolts, hose fragments, galvanized stanchions, and cans.

Feature 193

Feature 193 (Figures 363 and 369) is equipment at UTM coordinates 570524 E, 4118011 N. The equipment is two pieces of vent line and two butterfly valves. The vent line is a 2 ft 6 inch diameter 90 degree elbow that is 9 ft in length and a 2 ft 6 inch to 2 ft (end diameter) straight reducer vent line that is 2 ft 10 inches in length. Both were attached to the west end of the vent line and to the vent hole casing during normal operations. The butterfly valves are 1 ft 8 in diameter and manually operated. After removal of the 90 degree elbow, a butterfly valve was connected to the vent hole casing to facilitate pressurization, leak checking, and depressurization of the tunnel prior to each nuclear test.

Feature 194

Feature 194 (Figures 363 and 370) is the electrical substation for the U12.10 Vent Hole at UTM coordinates 570526 E, 4117992 N. It consists of a chain link fence, electrical transformer, automatic switches, and electrical panel. The chain link fence is 24 ft east-west by 24 ft north-south by 7 ft 8 inches in height. On the north side at the east corner is a 5 ft wide locked gate. Entry into the fenced area is not allowed. Inside is an electrical transformer 5 ft from the north fence and 3 ft 4 inches from the west fence. It is approximately 5 x 3 x 6 ft and supported by a concrete pad. Two feet east of the transformer is a set of 2 x 3 ft automatic oil filled switches. On the exterior of the west fence 5 ft from the north corner is a 4 ft x 1 ft 10 inch x 2 inch electrical panel box supported by two 3-inch angle iron legs that are 6 ft in height. A second panel box is 5 ft 6 inches x 1 ft 10 inches x 1 ft and is 5 ft 4 inches to the south of the first box. It is supported by two pieces of 2-inch channel iron 5 ft 8 inches in length. A third panel box is 2 ft 3 inches x 2 ft 1 inch x 8 inches and is 1 ft 4 inches south of the second box. The panel box is 4 ft above the surface attached to two 1 1/2-inch angle iron legs that are 6 ft in height. Attached to the bottom of the box are five 110 v electrical plug boxes.



Figure 369. Feature 193, stored equipment at the U-12n.10 Vent Hole, U12n Tunnel, view northeast (2009).

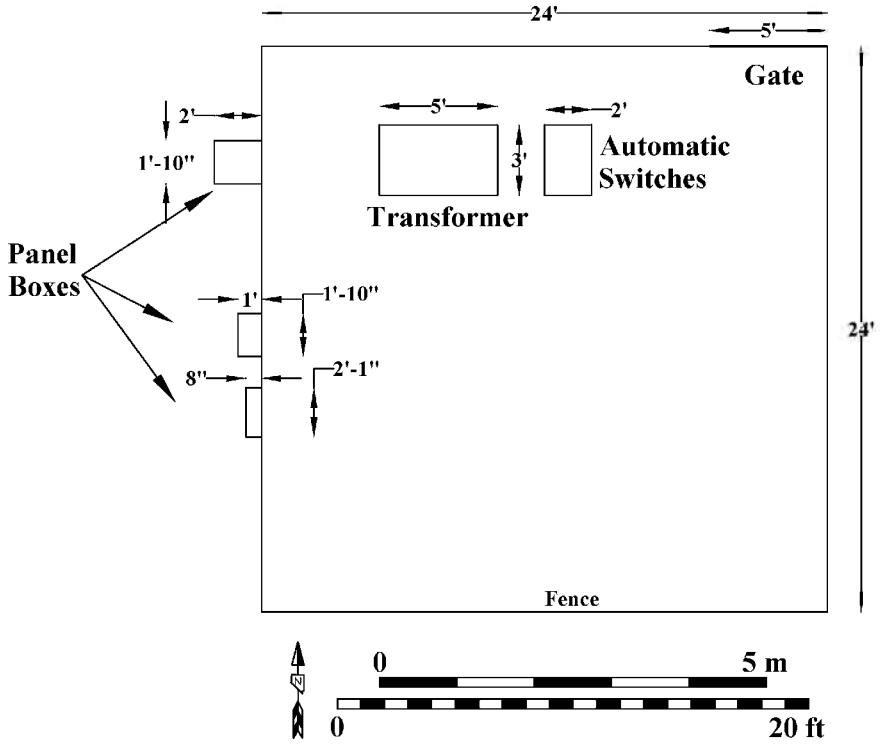





Figure 370. Plan map and photograph of Feature 194, electrical substation for the U12n.10 Vent Hole, U12n Tunnel, view east (2008).

Feature 195

Feature 195 (Figures 363 and 371) is an electrical panel at UTM coordinates 570530 E, 4117983 N. The panel is 2 ft 6 inches x 1 ft x 3 ft and attached to two 4-inch channel iron legs that are 4 ft 8 inches in height. It is labeled DANGER HIGH VOLTAGE on the door panel.

Feature 196

Feature 196 (Figures 363 and 372) is an electrical panel at UTM coordinates 570515 E, 4117989 N. The panel is 2 ft x 10 inches x 54 inches and supported by two 3-inch channel iron legs that are 6 ft in height. Two 3-inch and one 4- inch conduits extends from the bottom of the panel to the substation (Feature 194). It is labeled 23-A2 on the door panel.

Feature 197

Feature 197 (Figures 363 and 373) is a concrete pad at UTM coordinates 570504 E, 4117993 N. The pad is 15 ft east-west by 6 ft north-south. Along the north and south edges, 1/2-inch galvanized bolts extend through the rough surface of the concrete.

Feature 198

Feature 198 (Figures 363 and 374) is a concrete pad at UTM coordinates 570504 E, 4118001 N. The rough surface pad is 15 ft east-west by 8 ft 2 inches (2.5 m) north-south. Near the south-east corner is a section of 4-inch hose.

Feature 199

Feature 199 (Figures 363 and 375) is a concrete pad at UTM coordinates 570508 E, 4118001 N. The pad is 15 ft east-west by 9 ft north-south. Along the north and south edges, 1/2-inch galvanized bolts extend through the rough surface of the concrete. Also, a 2-inch hose and a metal plate are lying on the pad.

Feature 200

Feature 200 (Figures 363 and 376) is an electrical panel backboard at UTM coordinates 570504 E, 4118003 N. The backboard is constructed of 1 1/2-inch channel iron and is 15 ft east-west and 6 ft in height. There are 14 various sized electrical panels on the south side and 9 on the north side. One panel on the north side is labeled MONITOR.

Feature 201

Feature 201 (Figures 363 and 377) is the tunnel chill water system pump skid at UTM coordinates 570502 E, 4118002 N. The chiller has been removed. The skid consists of various sized pipes, hoses, valves, three pumps, and three electric motors. The pump skid is at the east end of the metal tank (Feature 202).



Figure 371. Feature 195, electrical panel for the U12n.10 Vent Hole, U12n Tunnel, view northwest (2009).



Figure 372. Feature 196, electrical panel, U12n Tunnel, view northeast (2009).



Figure 373. Feature 197, concrete pad at the U-12n.10 Vent Hole, U12n Tunnel, view northwest (2009).



Figure 374. Feature 198, concrete pad at the U-12n.10 Vent Hole, U12n Tunnel, view northwest (2010).



Figure 375. Feature 199, concrete pad at the U-12n.10 Vent Hole, U12n Tunnel, view northwest (2009).



Figure 376. Feature 200, electrical panel backboard at the U-12n.10 Vent Hole, U12n Tunnel, view north (2009).



Figure 377. Feature 201, chill water pump skid at the U-12n.10 Vent Hole, U12n Tunnel, view southeast (2008).

Feature 202

Feature 202 (Figures 363 and 378) is a metal tank at UTM coordinates 570498 E, 4118001 N. The horizontal cylindrical tank is 25 ft east-west by 8 ft in diameter and mounted to a metal skid. A 2 ft 6 inch diameter flanged access is centered in the top and 5 ft from the west end. The tank supplied makeup water to the chill water system through the pump skid (Feature 201).

### *Cultural Features Summary*

A total of 202 features were recorded, mapped, and photographed for the U12n Tunnel complex. The project area encompassed 600.8 acres (243.1 hectares) at the portal and mesa areas. At the U12n portal area are ten sub-areas containing features related to the construction, testing, and general everyday activities within the tunnel. These include concrete foundations for buildings, communications equipment, mining equipment, rail lines, retention ponds, storage containers, and access control facilities. Only a telephone trailer remains on the telephone pad as all of the other buildings have been removed from the portal area. The microwave tower, portions of the rail lines, the muck car dump, rotary dump, and wash rack are still in place. Also, the traffic control point and powder magazines along N Tunnel Road are intact. At the mesa area are four sub-areas containing features generally related to pre- and post-shot drilling, recording facilities, and ventilation equipment. These include concrete foundations, instrument cable holes, and drill holes. The concrete foundations were for buildings and small equipment. Concrete pads and various equipment remain at the cable hole locations but only pipe and signage remain at the drill hole locations. Ventilation equipment for the tunnel is still in place at two locations. Some of the removed equipment was reused at other tunnel complexes and facilities at the NNSS.



Figure 378. Feature 202, water tank at the U-12n.10 Vent Hole, view south, (2009).

# SUMMARY AND RECOMMENDATIONS

The U12n Tunnel is located toward the north edge of the NNSS in southern Nye County, Nevada. It was one of a series of mined tunnels in Rainier and Aqueduct Mesas that were used specifically for underground nuclear tests. Like the other tunnels, U12n Tunnel provided a testing arena where military weapons systems, e.g., missiles or satellites, could be exposed and evaluated under actual conditions of a nuclear explosion. It was also the largest tunnel complex at the NNSS with nearly 16 miles mined. Construction of the tunnel began in 1962 by LLNL shortly after the testing moratorium ended between the United States and the former Soviet Union. LLNL mined the main drift and the first test drift, but did not conduct a nuclear test. DTRA took over the tunnel in 1965 and over the next 30 plus years mined 24 test drifts and successfully executed 22 nuclear tests and 11 high explosive tests. Twenty of the nuclear tests were sponsored by DTRA, with LLNL sponsoring the other two nuclear tests. LLNL provided 12 of the nuclear devices and LANL 10 of them. Configurations of the tests varied between straight horizontal line-of-sight tests and excavated cavities. The overall goals of these tests were for weapons effects, but several also attempted to prove the feasibility of low-yield test beds in order to cut costs, and a few investigated the phenomenology of ground shock and cratering. The line-of-sight pipes in the earlier tests tended to be greater than 1,000 ft in length with a couple reaching 1,800 ft in length. In the later tests, the pipes tended to be shorter, less than 1,000 ft in length, with one only 250 ft in length. In other innovative attempts to cut costs, on two occasions two nuclear tests were conducted on the same day in the same drift complex; on another occasion two nuclear tests were conducted on the same day, but in different drift complexes; and two tests were conducted in the same drift complex, but in different years.

The first nuclear test in the U12n Tunnel was in 1967 and for the first time used a containment system to protect experiments against debris which flowed down the test drift after detonation. In 1983, the Midnight Zephyr experiment with the Tomme test was the first to be fully recorded underground by way of fiber optic lines. The Middle Note test in 1987 was the first horizontal line-of-sight low-yield effects test. The Misty Echo test in 1988, with a yield of less than 150 kilotons, was conducted in a hemispherical cavity; all the other tests in the tunnel had yields of less than 20 kilotons. The last nuclear test in the U12n Tunnel in 1992 was also the last one conducted in any of the tunnel complexes and was the second to last nuclear test conducted on the NNSS to date. The last large test in the U12n Tunnel in 1993 was a high explosive, designated Chemical Kiloton, and was a Non-Proliferation Experiment involving a seismic study to differentiate between a nuclear and non-nuclear underground explosion. Subsequently, smaller high explosive tests were conducted in the tunnel for the Hard Target Defeat Program to determine the damage effects of various explosive materials against deeply buried and hardened targets.

Modifications to the landscape surrounding the U12n Tunnel have resulted from four principal activities: road construction and maintenance, mining activities related to development of the tunnel, site preparation for activities related to experiments and testing at the tunnel, and construction of retention ponds in the alluvial valley. The U12n Tunnel complex encompasses 600.8 acres (243.1 hectares) with 52.6 acres (21.3 hectares) for the portal area and 548.2 acres (221.8 hectares) for the mesa area. A total of 202 cultural features, 83 for the portal area and 119 for the mesa area, were described, mapped, and photographed. At the U12n portal area, features relate to the construction, testing, and general everyday support of activities within the tunnel. These include concrete

foundations for buildings, communications equipment, mining equipment, rail lines, catchment ponds, storage containers, and security facilities. Features at the U12n mesa area generally relate to pre- and post-shot drilling, data recording facilities, and ventilation equipment. These are concrete foundations, instrument cable holes, and drill holes.

## National Register Eligibility Recommendation

Nuclear testing is one of the study units stated in the Nevada Comprehensive Preservation Plan provided by the Nevada State Historic Preservation Office (White et al. 1991). Accordingly, the major sites and structures associated with nuclear testing are considered to have intrinsic significance in the history of Nevada and the nation and are eligible to the National Register of Historic Places. The U12n Tunnel used from 1962 to 1992 for underground nuclear tests by DTRA and LLNL is eligible to the National Register of Historic Places under criteria a and c, consideration g of 36 CFR Part 60.4 as a historic landscape. It does not qualify under criteria b and d. Consideration g refers to those cultural resources achieving significance within the past 50 years if they are of exceptional importance.

Criterion a refers to events that have made significant contributions to the broad patterns of our history. Research at the U12n Tunnel was conducted in the defense of the United States during the Cold War, a war characterized by competing social, economic, and political ideologies between two superpowers - the former Soviet Union and the United States. Atomic weaponry was central to this ongoing struggle in order to gain military advantage and deter aggression from the other side. The purpose of the U12n Tunnel was to provide an underground testing environment for the development of nuclear weapons and to assess the effects of a nuclear explosion on materials and equipment.

Criterion b applies to properties associated with individuals whose specific contributions to history can be identified and documented. No such person has been identified with the U12n Tunnel.

Criterion c applies to properties significant for their physical design or construction, including architecture, landscape architecture, and engineering. The U12n Tunnel embodies a distinctive characteristics of a type and method of construction and engineering for conducting underground nuclear tests. It also provided a context for innovating and improving on the containment and costs of such tests by way of engineering and technology.

Criterion d refers to important research questions about human history or prehistory that can only be answered by the actual physical material of a cultural resource. The U12n Tunnel does not meet this criterion.

## Management Recommendations

As a historic landscape eligible to the National Register of Historic Places, Desert Research Institute recommends that the U12n Tunnel area be left in place in its current condition. It is also recommended that the U12n Tunnel historic landscape be included in the NNSS monitoring program and monitored for disturbances or alterations on a regular basis.

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# APPENDIX A

## BEDROCK DESCRIPTIONS FOR OLDER GEOLOGIC UNITS IN RAINIER MESA

# BEDROCK DESCRIPTIONS FOR OLDER GEOLOGIC UNITS IN RAINIER MESA

Over a period of several decades, the geology of the region surrounding the U12n Tunnel has been mapped at various levels of detail depending on the purpose of the mapping and when and where the mapping was undertaken. Some of the most detailed surface and subsurface geologic mapping was carried out in and around the U12b, U12e, and U12t tunnel complexes. Because of the proximity of U12n Tunnel to these other tunnels, the basic geologic framework is applicable at each site along the south and east flanks of Rainier Mesa and Aqueduct Mesa. Table 1 presents the general stratigraphy of Rainier Mesa.

## INDIAN TRAIL FORMATION, GROUSE CANYON MEMBER (TIG)

The Grouse Canyon Member of the Indian Trail Formation (Tertiary) is a simple cooling unit with an underlying ash-fall tuff.

### Lower Part (Tertiary)

Tertiary ash-fall tuff. About 46 to 121 ft (14 to 37 m) of ash-fall tuff; probably genetically related to an overlying welded tuff; greenish-yellow and bluish-gray; conspicuous fragments of black glass; zeolitic alteration is locally intense. This unit overlies the Lower member of the Indian Trail Formation.

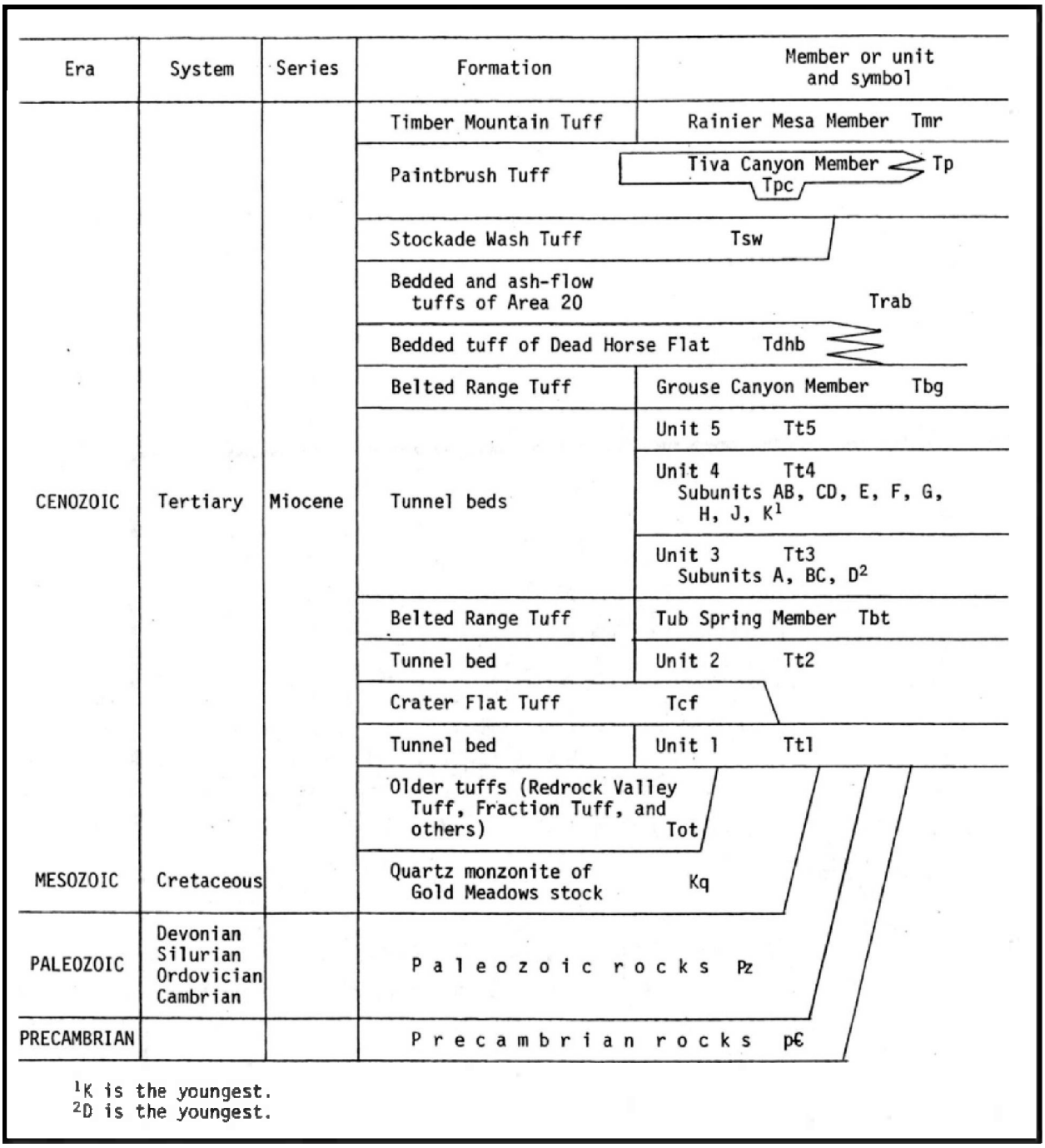
## INDIAN TRAIL FORMATION, LOWER (TIL) - TERTIARY

The Lower Member of the Indian Trail Formation consists of 131 to 590 ft (40 to 180 m) of bedded tuff, pale-gray, fine to lapilli-size; zeolitic; locally divided into Tunnel Beds and informal units at Grouse Canyon, Captain Jack Spring, and Whiterock Spring areas.

### Tunnel Bed 4 ($Tilt_4$)

This is the uppermost unit of the Lower Member of the Indian Trail Formation. It consists of about 262 to 377 ft (80 to 115 m) of pale-gray and red bedded tuff; red beds are continuous for several miles; several thin but conspicuous dark-gray beds of lithic tuff; zeolitic; forms resistant round ledges. Sargent and Orkild (1973) included this unit and Tunnel Bed 3 within the Upper Bedded Tuff (Miocene) unit (Tabu) of their Bedded Tuff, which is described as white to pale-brown thin- to thick-bedded commonly zeolitized tuffaceous sediments and ash-fall tuff; locally may include nonwelded to partially welded ash-flow tuffs; in places the ash-fall tuffs contain abundant pumice averaging 1 cm in length; some beds are reworked and conglomeratic; locally they are rich in dacite lithic fragments; intercalated with units from the Grouse Canyon Member of the Belted Range Tuff down to the Monotony Tuff; thickness 0 to greater than 4,265 ft (1,300 m). Tunnel Bed 4 and Tunnel Bed 3 are roughly equivalent to the Ash-Fall Tuff (Tba; Miocene) of Frizzell of the Belted Range Tuff, Grouse Canyon Formation. Tba is described as massive to well-bedded ash-fall and tuffaceous sandstone; tuff partially to completely zeolitized; cogenetic with the Belted Range Tuff, as much as 1,640 ft (500 m) thick.

Table 1. General stratigraphy of Rainier Mesa (USGS 1978).



| Era | System | Series | Formation | Member or unit and symbol |
|---|---|---|---|---|
| CENOZOIC | Tertiary | Miocene | Timber Mountain Tuff | Rainier Mesa Member Tmr |
| | | | Paintbrush Tuff | Tiva Canyon Member Tp / Tpc |
| | | | Stockade Wash Tuff | Tsw |
| | | | Bedded and ash-flow tuffs of Area 20 | Trab |
| | | | Bedded tuff of Dead Horse Flat | Tdhb |
| | | | Belted Range Tuff | Grouse Canyon Member Tbg |
| | | | Tunnel beds | Unit 5 Tt5 |
| | | | | Unit 4 Tt4 Subunits AB, CD, E, F, G, H, J, K[1] |
| | | | | Unit 3 Tt3 Subunits A, BC, D[2] |
| | | | Belted Range Tuff | Tub Spring Member Tbt |
| | | | Tunnel bed | Unit 2 Tt2 |
| | | | Crater Flat Tuff | Tcf |
| | | | Tunnel bed | Unit 1 Ttl |
| | | | Older tuffs (Redrock Valley Tuff, Fraction Tuff, and others) | Tot |
| MESOZOIC | Cretaceous | | Quartz monzonite of Gold Meadows stock | Kq |
| PALEOZOIC | Devonian Silurian Ordovician Cambrian | | Paleozoic rocks | Pz |
| PRECAMBRIAN | | | Precambrian rocks | p€ |

[1]K is the youngest.
[2]D is the youngest.

**Tunnel Bed 3 ($Tilt_3$)**

This unit consists of about 100 to 200 ft (30 to 60 m) of pink and pale-gray tuff; beds and color are discontinuous; prominent red beds at top and bottom; zeolitized. Tunnel Bed 3 as included in the Upper Bedded Tuff of Sargent and Orkild (1973) is described in the Tunnel Bed 4 description above. Tunnel Bed 3 as included in the Belted Range Tuff, Grouse Canyon Formation of Frizzell and Shulters (1990) is described in the Tunnel Bed 4 description above.

**Tunnel Bed 2 ($Tilt_2$)**

This unit consists of about 100 ft (30 m) of pale-gray with subordinate red and purple tuff; two zones with pisolite beds, one about 40 ft (12 m) and the other about 80 ft (24 m) above the base; zeolitic; thin welded tuff is found locally at the top of the unit. Sargent and Orkild (1973) included this unit and Tunnel Bed 1 within the Lower Bedded Tuff (Miocene to Oligocene) unit (Tabl) of their Bedded Tuff, which is described as white to pale-brown thin- to thick-bedded commonly zeolitized tuffaceous sediments and ash-fall tuff; locally may include nonwelded to partially welded ash-flow tuffs; in places the ash-fall tuffs contain abundant pumice averaging 0.4 inches (1 cm) in length; some beds are reworked and conglomeratic; locally they are rich in dacite lithic fragments; intercalated with units from the Grouse Canyon Member of the Belted Range Tuff down to the Monotony Tuff; thickness 0 to greater than 4,265 ft (1,300 m). Tunnel Bed 2 and Tunnel Bed 1 are roughly equivalent to the Ash-Fall Tuff (Ta1; Miocene) of the Belted Range Tuff, Grouse Canyon Formation of Frizzell and Shulters (1990) and is described as laminated to thick-bedded ash-fall tuff, reworked tuffaceous sandstone and conglomerate, and nonwelded ash-flow tuff; locally zeolitized; local quartzofeldspathic sandstone is argillic and zeolitized; as much as 2,297 ft (700 m) thick.

**Tunnel Bed 1 ($Tilt_1$)**

This is the basal unit of the Lower Member of the Indian Trail Formation. It consists of about 200 ft (60 m) of purplish- to pinkish-red and minor gray bedded tuff; prominent red beds at top and about 50 ft (15 m) below top; zeolitic. Tunnel Bed 1 as included in the Bedded Tuff of Sargent and Orkild (1973) is described in the Tunnel Bed 2 description above. Tunnel Bed 1 as included in the Ash-Fall Tuff of Frizzell and Shulters (1990) is described in the Tunnel Bed 2 description above. Tunnel Bed 1 is unconformable on the Paleozoic Dolomite – Unit C.

**Dolomite – Unit C (Ddc)**

This unit is described as Devonian in age, gray and very dark gray finely crystalline dolomite interbedded with thinner light-gray dolomite; beds of rounded masses of white breccia in a matrix of dark-gray dolomite. The beds pinch and swell and weather to pit and point surfaces. Thickness of the unit is greater than 1,476 ft (450 m). Sargent and Orkild (1973) map this same unit as Devonian dolomite and limestone (Ddl) that consists of interbedded light-to dark-gray dolomite and limestone, laminated to thick bedded; locally includes sandy dolomite and zones rich in silt, chert, and clay, and is largely equivalent to the Devils Gate Limestone and Nevada Formation, thickness about 2,297 ft (700 m). Frizzell and Shulters (1990) map the same unit as Carbonate rock, undivided Devonian, Silurian, and Ordovician (Doc) and describe the unit as predominantly dolomite in the Specter and Spotted Ranges, generally light colored, thickness about 1,706 ft (520 m); interbedded

dolomite and fossiliferous dolomitic limestone along the west margin of Yucca Flat, thickness about 2,165 ft (660 m); and crinoidal limestone and dolomite in the Calico Hills, thickness about 100 ft (30 m).

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# APPENDIX B

# CONTRACTORS AND OTHER GOVERNMENT AGENCIES

# Contractors and other Government Agencies

## Department of Energy Contractors

The DOE employed many contractors and several other government agencies to conduct nuclear tests at the NTS. DTRA, through a memorandum of understanding with DOE, was obligated to use the DOE contractors for engineering design, construction, mining and drilling, operation, and maintenance of the facilities it used to conduct its test programs at the NTS. DTRA employed their own contractors to design, assemble, install, and recover experiments fielded on each of their tests. The National Laboratories, under contract to the DOE, provided the nuclear devices for all tests including those sponsored by DTRA.

The following identifies the principle DOE contractors and government agencies employed at the NTS:

Lawrence Livermore National Laboratory (LLNL), Livermore, California - provided nuclear device design and testing

Los Alamos National Laboratory (LANL), Los Alamos, New Mexico - provided nuclear device design and testing

Sandia National Laboratories (SNL), Albuquerque, New Mexico - provided nuclear device design, line-of-sight pipe closure systems design and operation oversight, rock mechanics research, and health physics support

Reynolds Electrical and Engineering Co., Inc. (REECo), Las Vegas, Nevada - responsible for NTS operations and maintenance; mining, drilling, and construction; environmental, safety, and health services; housing and cafeterias; motor pool; and medical services.

Holmes and Narver, Inc. (H&N), Los Angeles, California and Las Vegas, Nevada - provided architectural and engineering (A&E) support for civil, mechanical, and electrical design services; construction quality control and materials testing

Fenix and Scisson, Inc. (F&S), Tulsa, Oklahoma - provided architectural and engineering support for mining and drilling services; geological support services; and contract administration for cementing services contractors

Raytheon Services Nevada (RSN), Waltham, Massachusetts - contractor for A&E services formerly provided by H&N and F&S

Edgerton, Germerhausen, and Grier, Inc. (EG&G), Las Vegas, Nevada and Cambridge, Massachusetts - provided electronic measurements and high speed photography; instrumentation support for DOE laboratories (i.e., LLNL, LANL, and SNL); operated the monitor room at the Control Point for all DTRA tests, including the monitoring of real time health and well fair of all experiments on a test and provided command and control for all non-device related mechanical and

electrical systems in the tunnel complex; and designed the instrumentation cable plant and provided oversight during installation of cables and connectors

Dowell Corp., Tulsa, Oklahoma, Halliburton Co., Tulsa, Oklahoma, and B.J. Titan Services Co. - provided cementing services, including bulk storage, blending, hauling, and pumping of all cementitious materials used on the NTS

Bell Telephone Co. and Central Telephone Co. - provided telephonic communication services throughout the NTS:

Wackenhut Security, Inc. (WSI) - provided site-wide security services

**Other Government Agencies**

Nye County Sheriff - provided traffic and law enforcement services throughout the NTS

United States Post Office - operated a full service post office in Mercury and a satellite post office in Area 12 of the NTS

United States Geological Survey, Denver Office - provided geological mapping and logging services and containment support for the NTS

National Oceanic and Atmospheric Administration, Air Resources Laboratory, Special Operations and Research Division, Las Vegas, Nevada - provided complete weather research, air dispersion, atmospheric sciences, and forecast support for all NTS operations

U.S. Environmental Protection Agency, Nuclear Radiation Assessment Division, Las Vegas, Nevada - provided downwind and cloud tracking services

U.S. Air Force, Nellis Air Force Base, Nevada - provided helicopters for aerial photography and downwind cloud tracking support

**Defense Threat Reduction Agency Contractors**

Lockheed Missile and Space Co. (LMSC) Sunnyvale, California - provided horizontal line-of-site (HLOS) pipe and vacuum systems design, manufacturing, installation, and operational oversight

Bendix Corporation (BC) Las Vegas, Nevada - provided instrumentation services including inventory, maintenance and repair, configuration, and assembly of recording equipment and racks of equipment for agencies that fielded experiments on DTRA tests

Pan American World Airways (PanAm), Cocoa Beach, Florida - provided still, motion, and video photography and archive documentation services

Los Alamos National Laboratory (LANL), Los Alamos, New Mexico - provided the design, procurement, and installation support for vertical line-of-site (VLOS) pipe systems

Waterways Experiment Station (WES), Vicksburg, MS - provided rock mechanics, rock core testing and analysis, concrete and grout mix design, development, quality control, and placement oversight

Terra Tech Corporation, Salt Lake City, UT - provided rock mechanics, rock core testing, and containment design support.

Systems, Science, and Software, Inc. (S-Cubed), La Jolla, California - provided containment calculations, predictions, and design support.

Pacifica Technology (PacTec), La Jolla, California - provided containment calculation support

**Agencies and Organizations that Fielded Experiments on DTRA Tunnel Tests**:

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Atomic Weapons Research Establishment
AVCO Corporation
Ballistic Missile Office
Ballistics Research Laboratory
Bell Telephone Laboratories
Bendix Corporation
Boeing Technical and Management Services, Inc.
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