



Figure 74. Near east end of Feature 3, Site 2270, where it is open and clear, view east; vehicle for scale



Figure 75. Feature 4, Site 2270, view southwest; tape measure is 2.0 m long



Figure 76. Feature 5, Site 2270, overview from southeast side of the main access road entering the upper project area, view northwest; vertical scale is 80 cm high; horizontal scale is 120 cm long



Figure 77. Feature 5, Site 2270, overview from northwest side of the main access road entering the upper project area, view southeast; same scale as above

Feature 6 is an earthen road from the upper entrance (off the paved road to the correctional facility) to a historic road/ railroad right-of-way (Feature 10). Like other roads in the project area, Feature 6 has no defining structural features such as curbing or alignments along its sides. We identified two sub-features.

Sub-feature A, the main road, has a low, modern (non-historic-age) berm on portions of the east side, where the road was recently re-graded or scraped. Some portions of the west side of the road have a modern (non-historic-age), earthen erosional gully. The road is approximately 1.2 km long. Compared with other roads in the project area, Feature 6 is relatively wide, ranging from 3.5–4.0 m (Figure 78). This is an actively used road in fair to good physical condition. Portions of it are partially washed out.

Sub-feature B, is a small bridge/ culvert under which a cut basalt and mortar ditch (Feature 13, Site 2273) passes (Figure 79). Sub-feature B is constructed of two rectangular concrete slabs atop the ditch rock work, grading laterally into the earthen road on both sides, one of either side of the road. Each slab measures approximately 3.0 m (N/S) by 2.0 m (E/W) by 15 cm (thickness). Including the 3.5-m wide earthen road at this point, the entire Sub-feature B occupies an area of some 7.5 m (E/W) by 3.0 m (N/S). This culvert is in good physical condition.

Feature 7 is a mostly abandoned earthen road that once entered the project area from the north and followed a cross-slope cut basalt and mortar ditch (Feature 13, Site 2273) to the east, eventually running along beneath (downslope of) Reservoir 1-A ending at a historic-age mauka-makai road (Feature 13). The Feature 7 road was used to access, build, and maintain the cross-slope ditch and reservoir. Most of the road is not observable and cannot be found or followed even on foot; vegetation is extremely dense and this road has been abandoned for many years. Where it can be seen on the ground, and where it correlates with historic (1930s) maps—from the west side of the reservoir to the east side and the intersection with Feature 13—the road is approximately 250 m long (Figure 80). Based on inspection of the historic maps, it was once 3–4 times this length. Its width is approximately 2.25 m. Parts of the surviving 250-m portion of Feature 7 have been heavily impacted by the recent flood-control work at the reservoir area (Figure 81). Thus, this historic earthen road is in relatively poor to fair physical condition.

Feature 8 is an overgrown earthen road paralleling and following to the west the same cut basalt and mortar ditch (Feature 13, Site 2273) followed by Feature 7. Feature 8 is in good to fair physical condition. It consists of two sub-features.

Sub-feature A, the road, originally branched off the portion of Feature 7 oriented north to south, although this old portion of Feature 7 is no longer identifiable. Measuring along its meandering path to the west, as it follows along the upslope side of the irrigation ditch, Feature 8 is 950 m long (within the project area); it then continues out of the project area to the northwest. Its width is approximately 2.25 m (Figure 82). This road is in fair physical condition.

Sub-feature B, a small bridge/ concrete slab culvert under which a cut basalt and mortar ditch (Feature 13, Site 2273) passes (Figure 83), is identical in terms of its constituent construction, design and dimensions to Sub-feature B at Feature 6, described above.

Feature 9 is two short remnants (each defined as a sub-feature) of east to west-oriented earthen road near a historic plantation camp (Site 2271, Feature 1). According to historic maps from the 1930s, the two remnant portions were once part of a larger rectangular road through the camp area. This road connects with a mauka-makai road (Feature 13) heading south, and a cross-slope road heading west, currently the paved road leading up to the correctional facility. Compared with historic maps from the 1930s, the southern segment of Feature 9—designated Sub-feature A, has been extended to the east and west beyond its original lateral limits; its original length was approximately 70 m. Today, it is part of a narrow, 2-track earthen road, approximately 2.0 wide, used to maintain power lines. It is in fair physical condition. The northern segment of Feature 9—designated Sub-feature B (Figure 84), is a barely recognizable and abandoned earthen road in poor physical condition. It was also once approximately 70 m long, but today it is hard to tell how much of it remains intact. We could not determine its current length or width.



Figure 78. Lower (southern) portion of Feature 6, Sub-feature A, Site 2270, view north; tape measure is 3.0 m long



Figure 79. East side portion of Feature 6, Sub-feature B, Site 2270, concrete slab bridge/ culvert over irrigation ditch (Feature 13, Site 2273), view southwest; vertical scale bar is 80 cm high



Figure 80. East end of Feature 7, Site 2270, view west, just east of Reservoir 1-A; road is 2.25 meters wide



Figure 81. Detail of the recent flood-control alteration of the drainage just below (south of) Reservoir 1-A; Feature 7 (Site 2270) crosses this area from left to right in the background, view north



Figure 82. Feature 8, Sub-feature A, Site 2270 (cross-slope earthen road) heading west-southwest from the main mauka-makai road (Feature 6, Site 2270), view southwest; tape measure is 2.0 m long



Figure 83. Feature 8, Sub-feature B, Site 2270, concrete slab bridge/ culvert over irrigation ditch (Feature 13, Site 2273) at intersection with road Feature 6, view southwest; vertical scale bar is 120 cm high



Figure 84. Northern portion of Feature 9, Site 2270, earthen road remnant, view west

Feature 10, a cross-slope earthen road that also lines up with a railroad right-of-way, is approximately 590 m long from its west end, where it exits the project area, to its east end, arbitrarily defined as the center of the road passing below Reservoir 3. Feature 10 once connected Reservoir 3 with western portions of the project area. This feature consists of two sub-features.

Sub-feature A, from its intersection with the mauka-makai Feature 6 road to the reservoir area, is an actively used road. Near the reservoir area, which has been completely remodeled and impacted by a recent flood-control project, the road has been widened far beyond its original width, which was once approximately 2.5 m (Figure 85). The recently-widened portion is up to 4.0 m wide.

Sub-feature B, a mostly filled in culvert under the road, is constructed of cut basalt and mortar with a 80-cm (diameter) concrete pipe underneath serving as the culvert (Figure 86). A short section of cut basalt and mortar ditch connected this culvert to the reservoir once located immediately to the north.

Feature 11 is two sections of railroad rights-of-way (each defined as a sub-feature), one of which (Sub-feature A) was converted into an earthen road (Figure 87). The road, which is mostly straight and oriented SW/NE, connects two mauka-makai roads (Features 26 and 27). Feature 11 appears on historic maps as part of a railroad right-of-way, which suggests it was converted into a road after the temporary railroad was removed in the 1940s. Patches of remnant asphalt on Sub-feature A suggest it was used by the military, which paved some roads during the 1940s to withstand heavy vehicle traffic used in training. At the northeast end of the long, straight section of Feature 11, just past its intersection with road Feature 26, the road (converted railroad right-of-way) curves around to the east-southeast for a short distance, still following the old railroad right-of-way, before it diverges from it and heads more to the southeast. From its southwest end, near its intersection with Feature 27, to its northeast end, where it diverges from the old railroad right-of-way, Feature 11 is approximately 870 m long. It is 2.0–2.25 m wide. It is in fair physical condition. A second, short section of Feature 11, designated Sub-feature B, a portion of railroad right-of-way that was not converted into an earthen road and can barely be seen on the ground, is located between the northeast end of Sub-feature A and a mauka-makai road (Feature 1). This abandoned railroad right-of-way (Sub-feature B) is approximately 220 m long, and is in poor physical condition.

Feature 12 is an abandoned cross-slope earthen road that follows most of the western two-thirds of a cross-slope ditch (Feature 16, Site 2273) just below Gulch A. This road was used to build, access and maintain the cross-slope irrigation ditch. This road is not currently used, and parts of it are difficult to identify and follow on the ground. From its west end (Figure 88), at its intersection with road Feature 13, to its east end, where it becomes totally unidentifiable in heavy vegetation near Gulch A, it is approximately 620 m long. According to historic maps from the 1930s, it originally continued to the east where it connected with road Feature 28. Relatively recently, a modern, cross-slope earthen road was cut through the area just north of Feature 12, which is in poor physical condition. Where it can be identified, Feature 12 is 2.0–2.5 m wide.

Feature 13, a mauka-makai earthen road heading from the old pineapple cannery (Site 2271, Feature 1) in the north all the way down to Reservoir 3 in the south, is approximately 1.5 km long. The northern portion of the road is overgrown, no longer used on a regular basis, but drivable (Figure 89); the lower two-thirds, from its intersection with another old road (Feature 7), is open and actively used (Figure 90). Comparison of the current alignment of this road with historic maps from the 1930s shows it has changed slightly over time. It appears that most of this road has lost its physical integrity, because it has been moved somewhat. Parts of the middle portion of this road, which are eroded and partially washed out in places, are in poor physical condition. The rest of Feature 13 is in fair to good physical condition. In most places, this road is approximately 2.5 m wide.



Figure 85. Feature 10, Sub-feature A, Site 2270, view west, as it exits the project area to the west; horizontal scale bar is 2.0 m long



Figure 86. Culvert under earthen road Feature 10, Sub-feature B, Site 2270; view southeast from the north (upslope) side of the road; scale bar is 120 cm high



Figure 87. South end of Feature 11, Sub-feature A, Site 2270, view north; tape measure is 2.0 m long; note, behind the tape measure there are patches of remnant asphalt



Figure 88. West end of Feature 12, Site 2270, at its intersection with road Feature 13, view east; note the road is straight into the tall grass in this image



Figure 89. Northern portion of Feature 13, Site 2270 (earthen road), from its intersection with road Feature 7, Site 2270, view north; this is the route up to the old pineapple cannery (Site 2271, Feature 1)



Figure 90. Middle portion of Feature 13, Site 2270, view south with Pearl Harbor (East Loch) in background

Feature 14 is a long, dry-stacked rock retaining wall supporting an earthen road with an associated stock pile of boulders built and used by plantation workers to transport shaped basalt blocks out of Gulch C to the surrounding upper plateau area. Like the other plantation-era features in Gulch C, Feature 14 is located along the east bank of the gulch, near the toe of slope. This feature, which occupies an area of approximately 90.0 m (N/S) by 10.0 m (E/W), consists of three sub-features (Figure 91). In general, this feature is in fair physical condition with many naturally-collapsed sections along the main retaining structure that likely would have required regular maintenance to keep up. The earthen road is all but invisible under extremely dense ground vegetation including California grass and koa haole. At the bottom (south) end of the retaining wall and earthen road, where it starts right next to the drainage bottom, it appears the road may have once continued *into* the gulch itself, heading downstream to other plantation features. Natural disturbance including flooding, however, make this interpretation impossible to verify. Today, while there do appear to be artificially flattened areas in the gulch bottom at this location, there are also erosional channels and humped up soil from flooding.

Sub-feature A, a dry-stacked retaining wall constructed primarily with boulders but also with some cobbles, measures approximately 60.0 m (N/S) by 0.30–0.50 m (E/W) by 0.15–2.50 m high (Figure 92). Large, naturally-occurring boulder outcrops are incorporated into this sub-feature in a few places. The height of this sub-feature increases from south to north as the earthen road it supports along its east side rises up and out of the gulch bottom. At its south end, this structure begins as a simple rock alignment then changes into a low (1–2 courses high) structure, gradually increasing to a maximum of 5–6 courses at the north end. This sub-feature's constituent material is a mixture of natural, sub-angular to sub-rounded clasts and humanly-modified angular blocks. Portions of the retaining wall exhibit formal, vertical facing.

Sub-feature B, a bulldozed earthen road that cuts into the east-side toe of slope, measures approximately 60.0 m (N/S) by 4.0–5.0 m (E/S) (Figure 93). The road begins near the east bank of Gulch C and rises up to the north where it is eventually unrecognizable in extremely dense vegetation. Based on analysis of historic maps from the 1930s, we believe this earthen road once linked up with a road/ railroad right-of-way (oriented NE/SW) that ran along the eastern edge of Gulch C on the plateau top. This upper road, part of Goodman and Nees' (1991) Feature 34, is no longer identifiable. The area we believe the road Sub-feature B once intersected the upper road is extremely overgrown and dense in ground cover.

Sub-feature C, a large pile of boulders with some cobbles on a moderate slope just above the toe of slope, measures approximately 30.0 m (N/S) by 3.0–6.0 m (E/W) by 1.0–2.0 m high. This sub-feature, which consists of a mixture of natural, sub-angular to sub-rounded clasts and humanly-modified angular blocks, appears to be a stock pile of basalt for plantation-worker activities (e.g., more road building) (Figure 94). Its north end begins at the south end of the earthen road and retaining wall, just upslope of these.

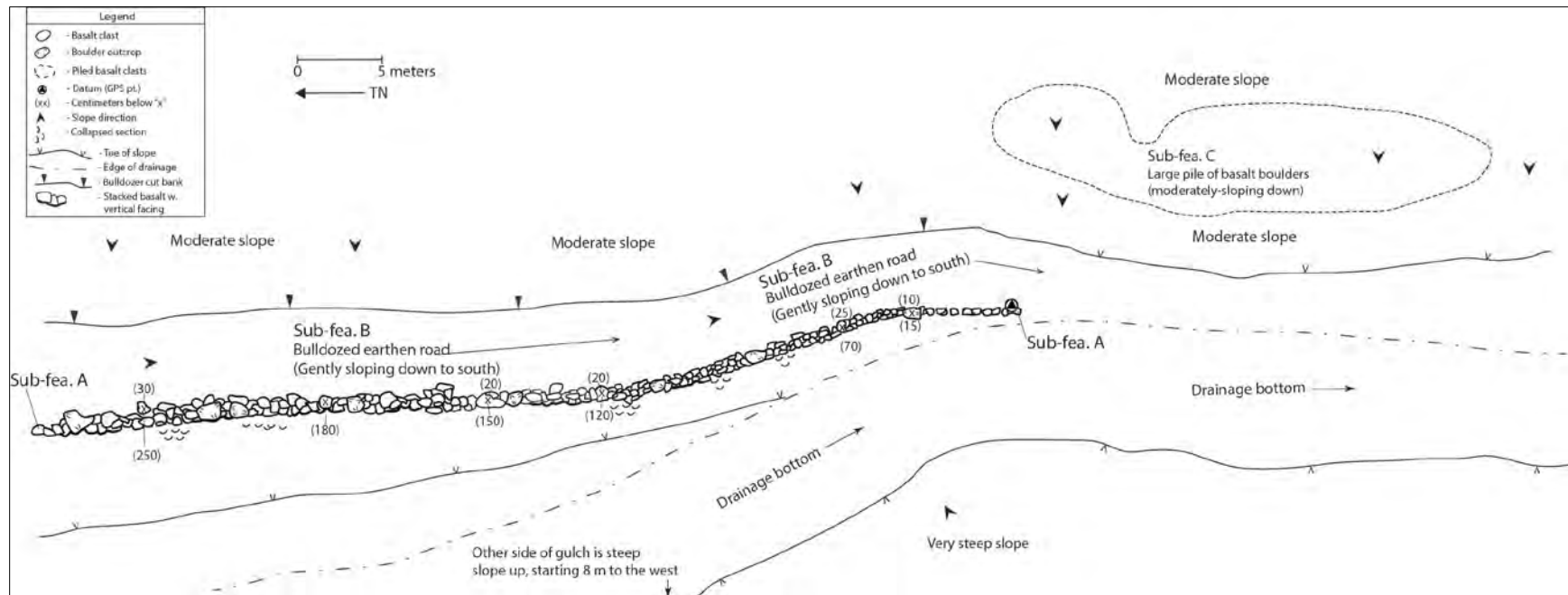


Figure 91. Plan view Feature 14, Site 2270



Figure 92. Feature 14, middle portion of Sub-feature A (dry-stacked rock retaining wall supporting earthen road), Site 2270, view southeast; scale bar is 120 cm high; earthen road (Sub-feature B) is behind the wall



Figure 93. Feature 14, lower portion of Sub-features A (retaining wall) and B (elevated earthen road to the right), Site 2270, view north; vertical scale bar is 80 cm high



Figure 94. Feature 14, middle portion of Sub-feature C (boulder stock pile at south end of feature), Site 2270, view east; vertical scale bar is 120 cm high

Feature 15 is four rock piles incorporating natural boulder outcrops along the banks of Gulch C. Three of these piles (Sub-features A–C) are along the east bank of the gulch, while the fourth (Sub-feature D) is on the opposite (west) bank. These are clearing piles of basalt removed from the gulch bottom, including natural (unmodified) clasts as well as humanly-modified blocks and waste flakes from plantation-era lithic processing. The portable rocks have been placed atop and against large, immovable boulder outcrops, creating a level ground surface in the gulch bottom that is free from large rocks and would have been drivable by plantation trucks. Feature 15 occupies an area measuring approximately 16.0 m (N/S) by 8.0 m (E/W) (Figure 95). In general, this feature is in good physical condition with only a few naturally-collapsed sections. Extremely dense ground vegetation including California grass and koa haole cover the entire area in and around Feature 15. It appears an earthen road within and through the gulch bottom may have once passed between Sub-features C and D (see plan map). Natural disturbance including flooding events, however, make this interpretation impossible to verify. Today, while there do appear to be artificially flattened areas in the gulch bottom at this location, there are also erosional channels and humped up soil from flooding.

Sub-feature A, a rock pile constructed primarily with boulders but also with some cobbles, measures approximately 4.0 m (NW/SE) by 2.0 m (NE/SW) by 0.50–0.75 m high (Figure 96). The pile is built around a large, naturally-occurring boulder outcrop. This sub-feature retains a high degree of formal structure with 3–4 courses of stacking and piling. This sub-feature’s constituent material is a mixture of natural, sub-angular to sub-rounded clasts and humanly-modified angular blocks and waste flakes.

Sub-feature B, another rock pile constructed primarily with boulders but also with some cobbles, measures approximately 4.0 m (N/S) by 3.0 m (E/S) by 0.25–0.95 m high (Figure 97). This pile is built around a few large, naturally-occurring boulder outcrops. It retains a high degree of formal structure with 3–4 courses of stacking and piling. Its constituent material is a mixture of natural, sub-angular to sub-rounded clasts and humanly-modified angular blocks and waste flakes.

Sub-feature C, two large boulder outcrops with low piles of rocks around the west and north sides, measures approximately 5.0 m (N/S) by 3.5 m (E/W) by 0.30–1.20 m high (Figure 98). Unlike Sub-features A and B, this pile is relatively informal with limited evidence of piling and stacking. Like the others, the piled material is both natural and humanly-modified.

Sub-feature D, a large boulder outcrop with low piles of rocks around its south and north sides, measures approximately 5.0 m (N/S) by 4.0 m (E/W) by 0.30–1.15 m high. This is the least formal of the piles at Feature 15 (Figure 99), and humanly-modified piling and stacking is minimal.

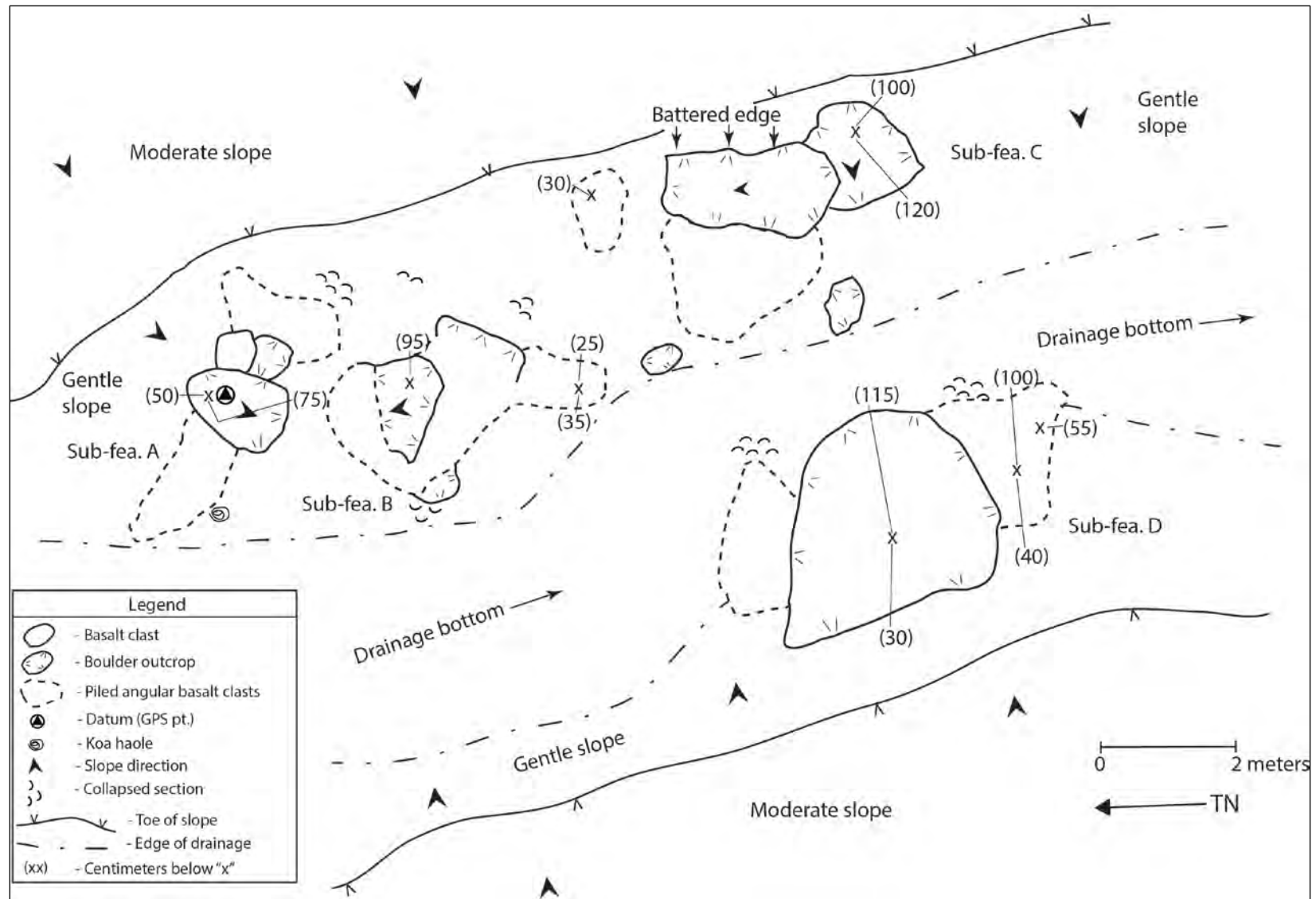


Figure 95. Plan view Feature 15, Site 2270



Figure 96. Feature 15, Sub-feature A, Site 2270, view northwest; scale bar is 80 cm high



Figure 97. Feature 15, Sub-feature B, Site 2270, view east; scale bar is 120 cm high



Figure 98. Feature 15, Sub-feature C, Site 2270, view southeast; scale bar is 120 cm



Figure 99. Feature 15, Sub-feature D, Site 2270, view southwest; scale bar is 120 cm high

Feature 16 is a long, dry-stacked rock retaining wall along the east bank of Gulch C, just below (west of) the toe of slope. Unlike Feature 14, which supports and defines an earthen road on its east (upslope) side, leading up and out of the gulch bottom, Feature 16 does not have a continuous level soil area on its east side. Rather, along most of its length, the ground surface on its east side slopes gently up to the nearby toe of slope. As depicted in the plan view (Figure 100), there are two, discontinuous level soil areas behind (east of) this retaining wall, near its middle portion and north end, that appear to be discrete activity areas rather than parts of an earthen road. Feature 16 appears to represent an effort by plantation workers to reinforce and stabilize a long section of the east bank of Gulch C, which we interpret as yet another example of efforts to keep the gulch bottom open and drivable by plantation trucks. We believe this gulch was exploited along most of its length for boulders used to build the extensive dressed basalt and mortar ditch system found throughout the upper plateau areas. Feature 16 is part of the road and transportation network needed to accomplish this objective.

This feature, which occupies an area of approximately 70.0 m (NW/SE) by 0.3–5.0 m (NE/SW), consists of three sub-features (see plan view). In general, this feature is in good physical condition with only a few naturally-collapsed sections along the main retaining structure that likely would have required regular maintenance to keep up. Like nearly all of the features within Gulch C, Feature 16 is covered and surrounded in extremely dense California grass and koa haole.

Sub-feature A, a dry-stacked retaining wall constructed primarily with boulders but also with some cobbles, measures approximately 70.0 m (NW/SE) by 0.30–0.50 m (NE/SW) by 0.20–1.15 m high, averaging approximately 0.75 m high (Figure 101). Large, naturally-occurring boulder outcrops are incorporated into this sub-feature in several places. Throughout most of its length, this wall is 2–3 courses high. Its constituent material is a mixture of natural, sub-angular to sub-rounded clasts and humanly-modified angular blocks with numerous examples of well-shaped blocks and other angular pieces (Figure 102).

Sub-feature B, a small level soil area on the upslope (northeast) side of the middle portion of the retaining wall (Figure 103), measures approximately 6.0 m (NW/SE) by 3.0 m (NE/SW), and is partially defined by large naturally-occurring boulder outcrops. This level soil area appears to be an activity area (work or resting space) for plantation workers who built and maintained the retaining wall.

Sub-feature C, a larger level soil area on the upslope (northeast) side of the north end of the retaining wall (Figure 104), measures approximately 16.0 m (NW/SE) by 3.0–5.0 m (NE/SW), and is also partially formed by large naturally-occurring boulder outcrops. The function of this level soil area is the same as Sub-feature B.

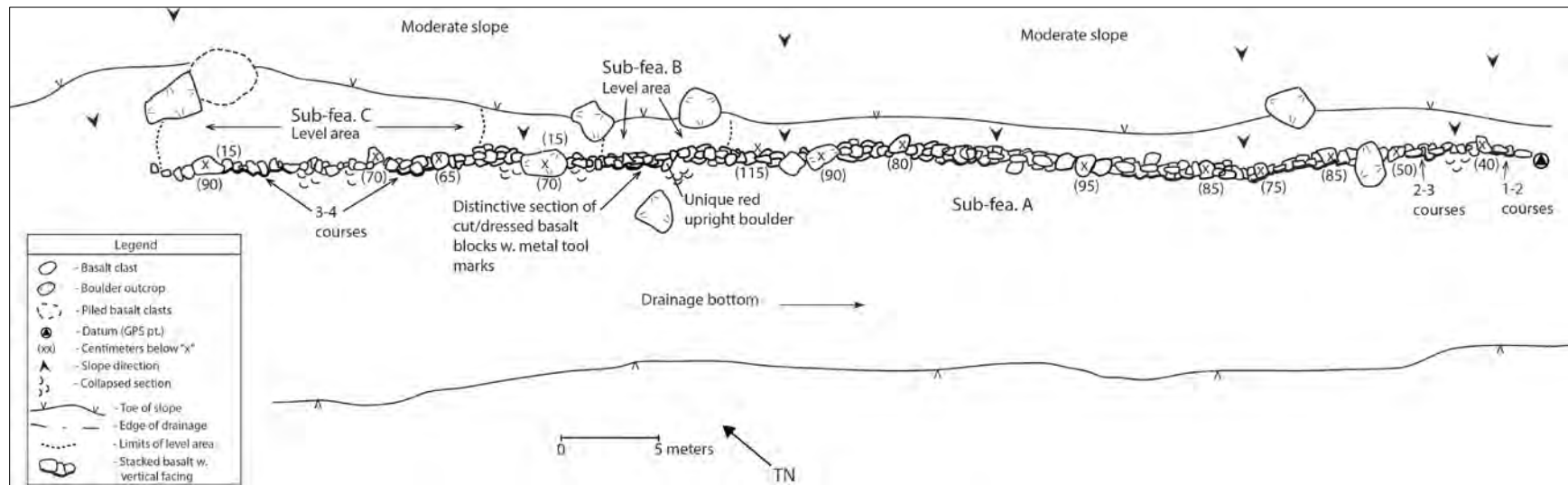


Figure 100. Plan view Feature 16, Site 2270



Figure 101. South end of Feature 16, Sub-feature A (rock retaining wall), view east; vertical scale bar is 80 cm high



Figure 102. Detail of south end of Feature 16, Sub-feature A (rock retaining wall), illustrating angular cut basalt blocks in addition to natural (unmodified) sub-rounded boulders, view northeast; vertical scale bar is 80 cm high



Figure 103. Middle portion of Feature 16, Sub-feature A (rock retaining wall), showing part of level soil area designated Sub-feature B (behind retaining structure), view east; vertical scale bar is 80 cm high



Figure 104. North end of Feature 16, Sub-feature A (rock retaining wall), showing part of level soil area designated Sub-feature C (behind retaining structure), view north; vertical scale bar is 40 cm high

Feature 17 is a short section of dry-stacked rock retaining wall along the south bank of Gulch C, right at the toe of an extremely steep (near vertical) slope (Figure 105). A small bedrock outcrop is located just upslope of the west end of the retaining wall. As depicted in the plan view (Figure 106), there is no level soil area behind (south of) this retaining wall, whose sole function appears to have been stabilization and retention of downslope soil erosion into the gulch. As with Feature 16, Feature 17 appears to represent an effort by plantation workers to keep the gulch bottom open and drivable by plantation trucks. Feature 17 is part of the road and transportation network needed to accomplish this objective. Like nearly all of the features in Gulch C, this feature is located within an extremely dense ground cover of California grass and koa haole. The physical condition of this feature varies from good, at its east end, to poor, at its west end, where it has mostly collapsed into the drainage bottom.

Including the collapsed section at the west end, and, thus, reflecting its original dimensions, the retaining wall is approximately 8.5 m (E/W) long. Its intact portion is 0.3–0.5 m (N/S) wide; where it has collapsed, it is up to 1.5 m (N/S) wide. Height above the drainage bottom ground surface varies from approximately 0.45 m (collapsed end) to 0.85 m (intact end). The intact portion of the retaining wall is stacked 2–3 courses high.

There are several prominent quarrying and shaping marks on this feature's constituent rock material consistent with use of metal tools such as iron bars and chisels (Figure 107 and Figure 108), leaving no doubt this is a plantation-era construction. This sub-feature's constituent material is a mixture of natural, sub-angular to sub-rounded clasts and humanly-modified angular blocks.



Figure 105. Feature 17, Site 2270, view southwest; vertical scale bar is 120 cm high; collapsed section is to the right, just below a small bedrock outcrop (upper right in this image)

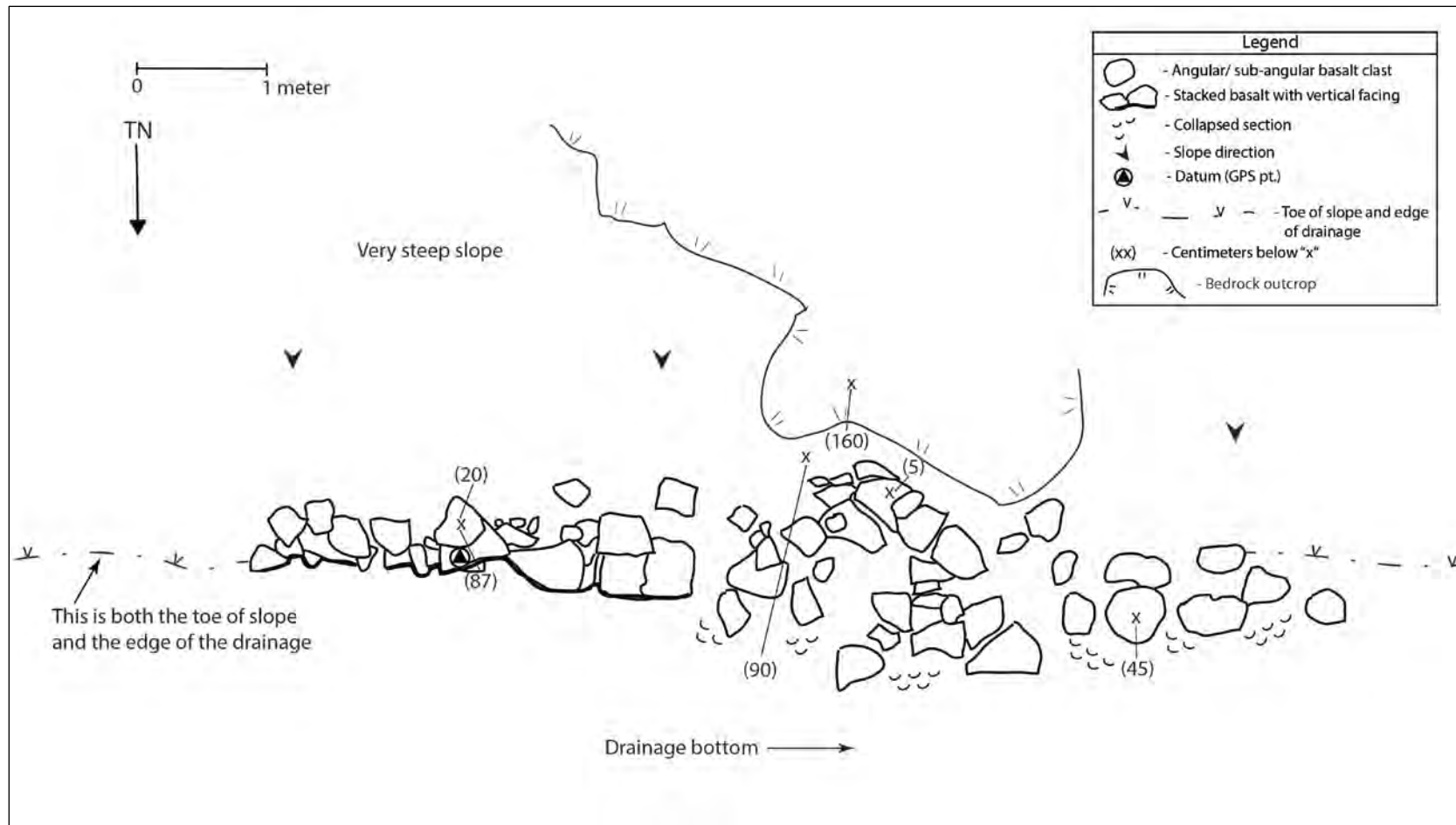


Figure 106. Plan view Feature 17, Site 2270



Figure 107. Quarrying/ shaping mark on constituent rocks at Feature 17, Site 2270; scale is 10 cm long



Figure 108. Detail of a different type of quarrying/ shaping mark on constituent rocks at Feature 17, Site 2270; scale is 10 cm long

Feature 18 is a large pile of predominantly natural (unmodified) boulders with some cobbles just above the toe of slope along the east bank of Gulch C (Figure 109). This feature, and two others more or less identical to it along this same stretch of the gulch (Feature 19 and 20), was created by plantation workers to clear the gulch bottom for driving and to stock pile basalt for processing into blocks for irrigation-ditch building. This feature is included in Site 2270 as a component of the plantation road system. It measures approximately 55.0 m (N/S) by 4.0–6.0 m (E/W) by 1.0–2.0 m high, and consists of sub-angular to sub-rounded clasts with a few angular pieces that were fractured by plantation workers (Figure 110). Most of the piling appears to have been done by hand, but there is some evidence of bulldozing at the north end of the pile, where soil is intermixed with the boulders, a few of which exhibit mechanical scarring (Figure 111). In general, the feature lacks formal structure; the clasts are piled 1–2 layers deep in some places. The feature is in good physical condition, has not been impacted or disturbed by modern activities, and, like nearly all other features in Gulch C, is completely covered in California grass and koa haole.

Feature 19 is another large pile of predominantly natural (unmodified) boulders with some cobbles just above the toe of slope along the east bank of Gulch C, and a level soil area adjacent to (immediately upslope to the east of) the pile (Figure 112). This feature, and two others more or less identical to it along this same stretch of the gulch (Feature 18 and 20), was created by plantation workers to clear the gulch bottom for driving and to stock pile basalt for processing into blocks for irrigation-ditch building. This feature is included in Site 2270 as a component of the plantation road system. Feature 19 consists of two sub-features, the pile (Sub-feature A) and the level soil area (Sub-feature B). Overall, the entire feature measures approximately 35.0 m (N/S) by 7.5–9.5 m (E/W). The feature is in good physical condition, has not been impacted or disturbed by modern activities, and, like nearly all other features in Gulch C, is completely covered in California grass and koa haole.

Sub-feature A, the large rock pile, measures approximately 35.0 m (N/S) by 3.5–4.5 m (E/W) by 0.40–1.0 m high, and consists of sub-angular to sub-rounded clasts with a few angular pieces that were fractured by plantation workers. Most of the piling appears to have been done by hand (Figure 113 and Figure 114). In general, the feature lacks formal structure; the clasts are piled 1–2 layers deep in some places.

Sub-feature B, the level soil area adjacent to the rock pile, measures approximately 35.0 m (N/S) by 4.0–5.0 m (E/W). This area appears to have been created by a bulldozer.

Feature 20 is another pile of predominately natural (unmodified) boulders with some cobbles along the toe of slope on the east bank of Gulch C (Figure 115). Two short sections of bedrock outcrop are located on a very steep slope immediately east of this feature. This feature, and two others more or less identical to it along this same stretch of the gulch (Feature 18 and 19), was created by plantation workers to clear the gulch bottom for driving and to stock pile basalt for processing into blocks for irrigation-ditch building. This feature is included in Site 2270 as a component of the plantation road system. It measures approximately 20.0 m (N/S) by 2.0–3.0 m (E/W) by 0.50–0.70 m high, and consists of sub-angular to sub-rounded clasts with a few angular pieces that were fractured by plantation workers. Most of the piling appears to have been done by hand. In general, the feature lacks formal structure; the clasts are piled 1–2 layers deep in some places (Figure 116 and Figure 117). The feature is in fair physical condition, and may have been impacted by flooding through the drainage bottom. Like nearly all other features in Gulch C, is completely covered in California grass and koa haole.

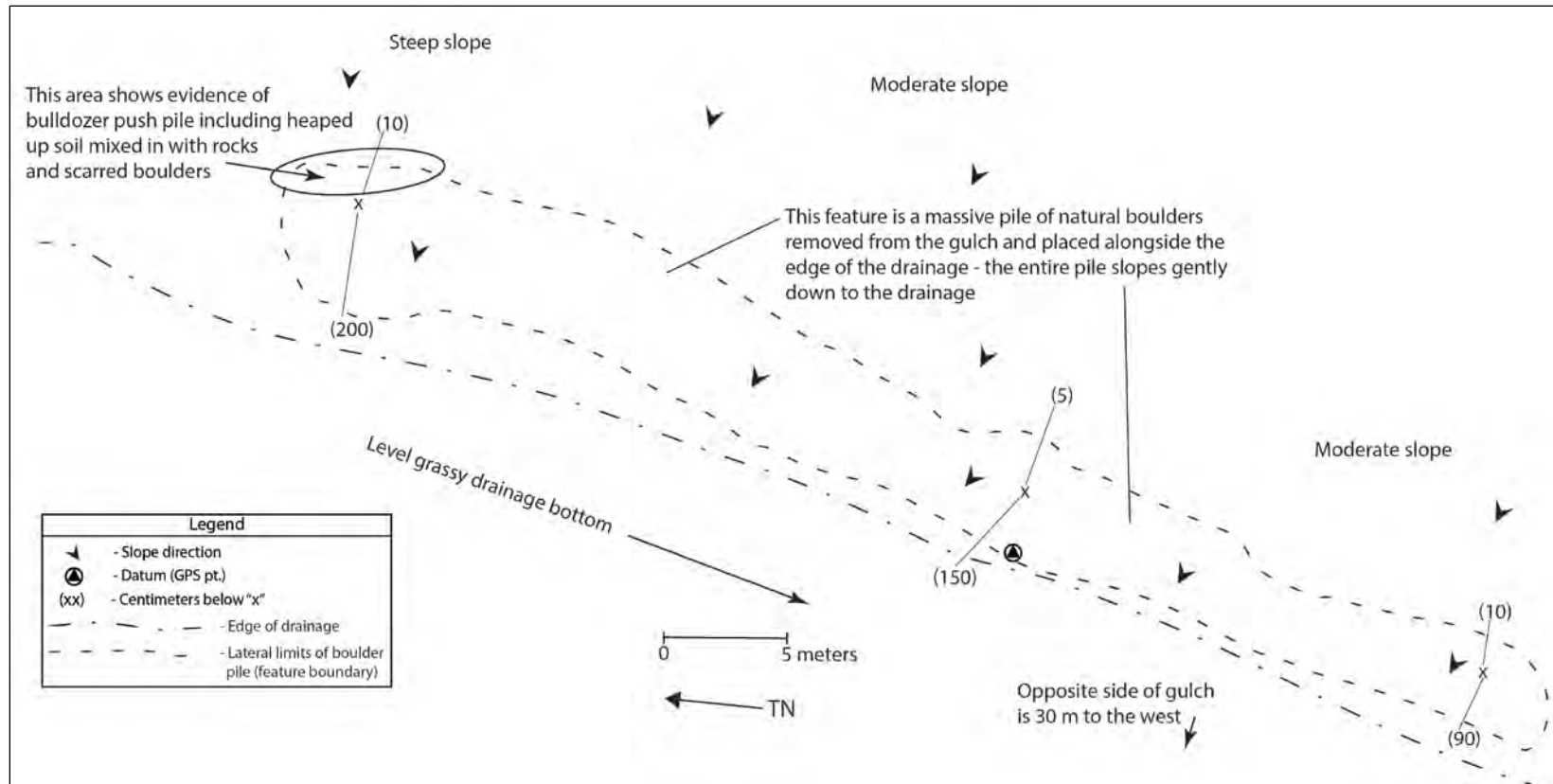


Figure 109. Plan view Feature 18, Site 2270



Figure 110. Middle portion of Feature 18, Site 2270, view west; scale (yellow tape measure) is 100 cm long



Figure 111. North end of Feature 18, Site 2270, view west; scale (yellow tape measure) is 100 cm long

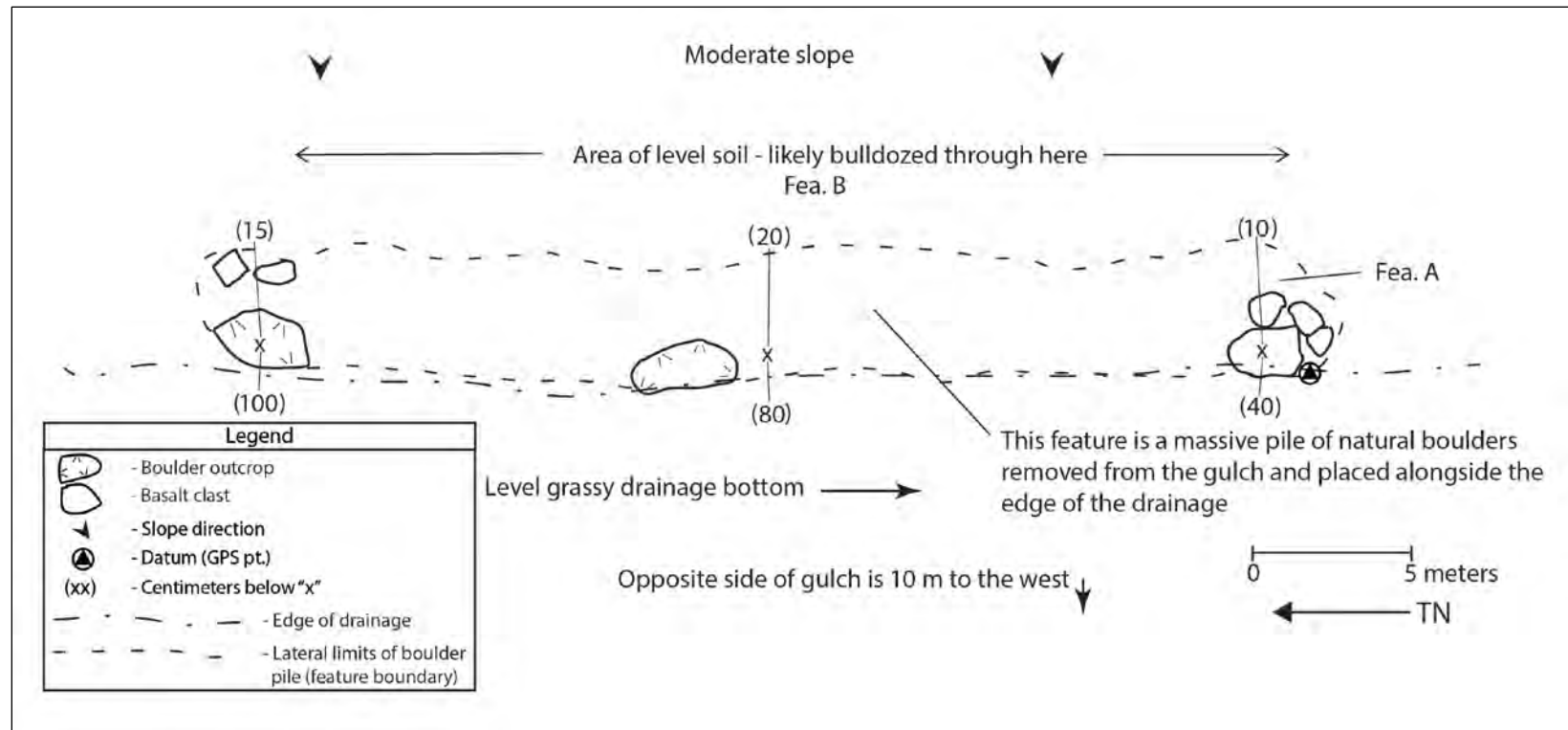


Figure 112. Plan view Feature 19, Site 2270



Figure 113. Feature 19, south end of Sub-feature A, Site 2270, view northeast; scale bar is 80 cm high



Figure 114. Feature 19, north end of Sub-feature A, Site 2270, view north; scale bar is 80 cm high; level soil area designated Sub-feature B is located to the upper right (in the grass)

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Figure 116. North end of Feature 20, Site 2270, view south; scale bar is 80 cm high



Figure 117. North end of Feature 20, Site 2270, view northeast; scale bar is 80 cm high

Feature 21 is a small, dry-stacked rock terrace retaining a level soil area filled with pebbles and cobbles along the east toe of slope of Gulch C (Figure 118). Unlike the other formally-constructed features in Gulch C, which consist mainly of angular basalt clasts that were intentionally shaped by plantation workers, Feature 21 is constructed predominantly of sub-rounded and sub-angular basalt that has a more natural (unmodified) appearance (Figure 119 and Figure 120). For this reason, we conducted subsurface testing (excavation) at Feature 21 in order to determine if it was a traditional Hawaiian site. As described below, testing proved conclusively that this feature, too, dates from plantation times and is functionally related to road-building activities in Gulch C. As such, this feature is included in Site 2270 as a component of the plantation road system.

Including both the formal rock structure (terrace) and the level area behind it (to the east), Feature 21 occupies an overall area of approximately 8.0 m (NW/SE) by 2.5 m (NE/SW). The rock terrace was once up to 5.0 m in length, but its south end is no longer intact, having partially collapsed. The intact section is now approximately 3.0 m long. The stacked rocks range in height above the base of the drainage bottom from approximately 0.35–0.60 m. The level soil area covered by pebbles and cobbles to the east of the rock work is approximately 40–50 cm above the base of the drainage, and it grades laterally (to the northwest and southeast) into a gently-sloping ground surface between the toe of slope and the drainage bank. As stated above, the south end of the feature has collapsed into the drainage bottom. Overall, the feature is in good (north half) to poor (south half) physical condition, has not been impacted or disturbed by modern activities, and, like nearly all other features in Gulch C, is completely covered in California grass and koa haole.

Subsurface testing

Hand excavation of one test unit (TU-1) was conducted at Feature 21 to determine its construction methods and constituent materials; and to recover physical evidence of its age. TU-1 was placed just inside (east of) the formal rock-retaining structure, near the center of its most intact portion. A 50 cm by 50 cm unit was excavated in arbitrary 10-cm levels to 65 cm below the ground surface (base of excavation) using a trowel (Figure 121). All excavated sediments were passed through a standard 1/8-inch metal screen to recover any diagnostic material.

Two stratigraphic layers were observed: Layer I, the upper 52–53 cm of sediment, a dark brown (7.5YR 3/3) sandy silt with abundant angular and sub-angular basalt pebbles and cobbles, represents an artificially-introduced fill. This fill layer, which had a very loose consistency and a crumbly structure, contained three ferrous-metal nails at 42–46 cm below the ground surface (Figure 122). These historic artifacts help explain the abundance of angular and sub-angular basalt, many of which superficially resemble traditional lithic-processing waste and debitage, found throughout the layer. The nails indicate the fill consists, by and large, of lithic-processing waste from historic basalt-shaping activities by plantation workers. Layer II, which begins at 52–53 cm below the ground surface and continues below the base of excavation (65 cm below surface) to an unknown depth, a dark reddish brown (5YR 3/3) clayey silt with very few small basalt clasts but occasional small boulders, represents the natural alluvium. This sterile layer had a very compact (hard) consistency and a well-sorted (homogeneous) structure and contained no cultural materials (Figure 123).

The subsurface testing proves this feature is not a traditional Hawaiian construction, but rather, another plantation feature related to clearing away basalt from the drainage bottom and organizing it along the edges of the gulch. We interpret this as another road-related feature in Gulch C, and believe it was constructed as a dumping spot for depositing lithic-processing debitage and waste but also functioned to retain and formalize the east gulch bank to keep the gulch bottom open and drivable.

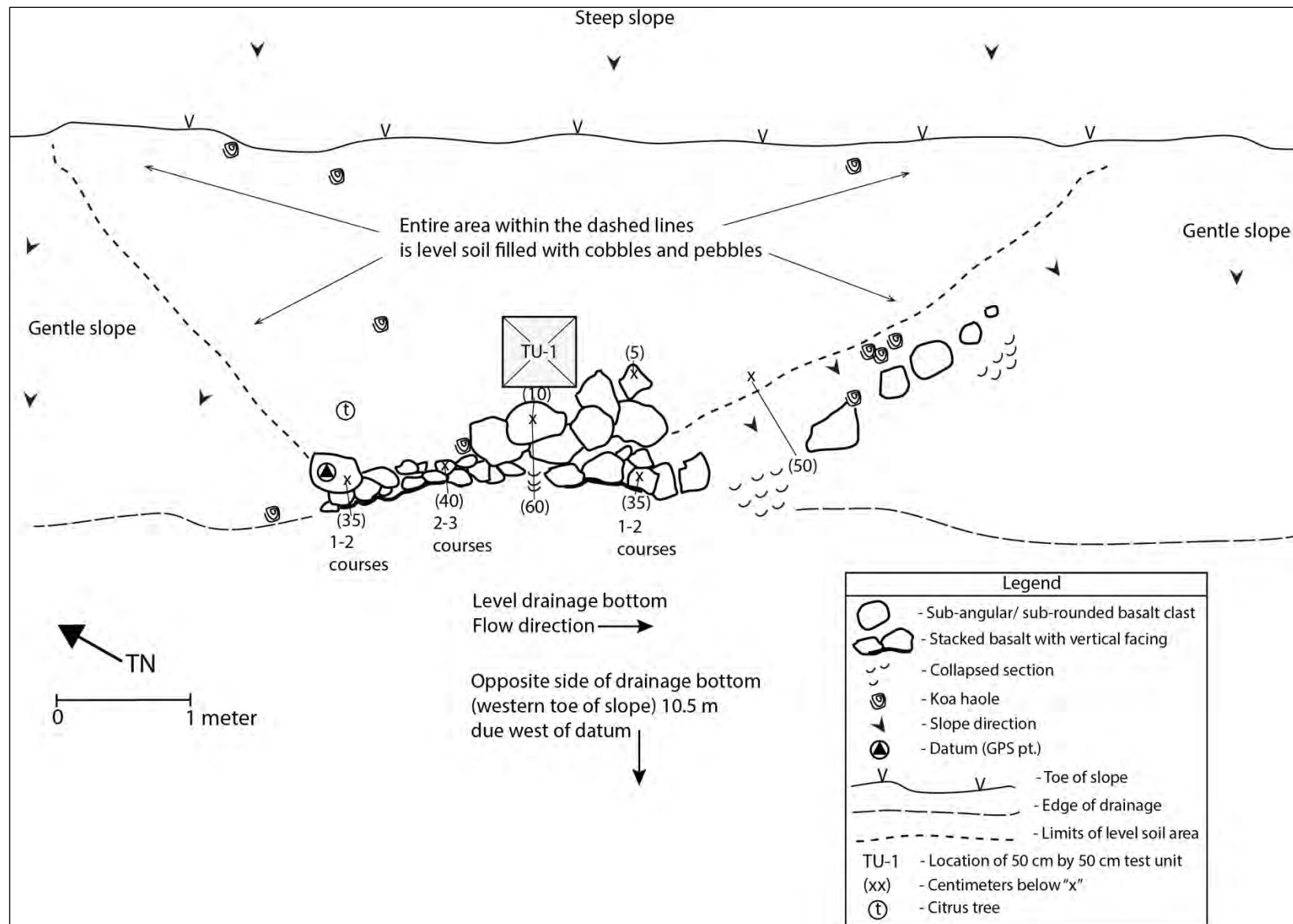


Figure 118. Plan view Feature 21, Site 2270, depicting location of test unit (TU-1)



Figure 119. Feature 21, Site 2270, view east; vertical scale bar is 80 cm high; horizontal scale bar (120 cm long) is on level soil area filled with cobbles and pebbles



Figure 120. Feature 21, Site 2270, view southeast; same scale bars as above; in this view, the natural drainage bottom is to the right of the feature, while the built-up (filled-in) area behind the terrace is to the left of the terrace front



Figure 121. TU-1, base of excavation at 65 cm below surface, view southeast; scale bar is 80 cm high



Figure 122. Three ferrous-metal nails recovered in situ from 42–46 cm below surface, TU-1, Feature 21, Site 2270; scale bar is 10 cm long

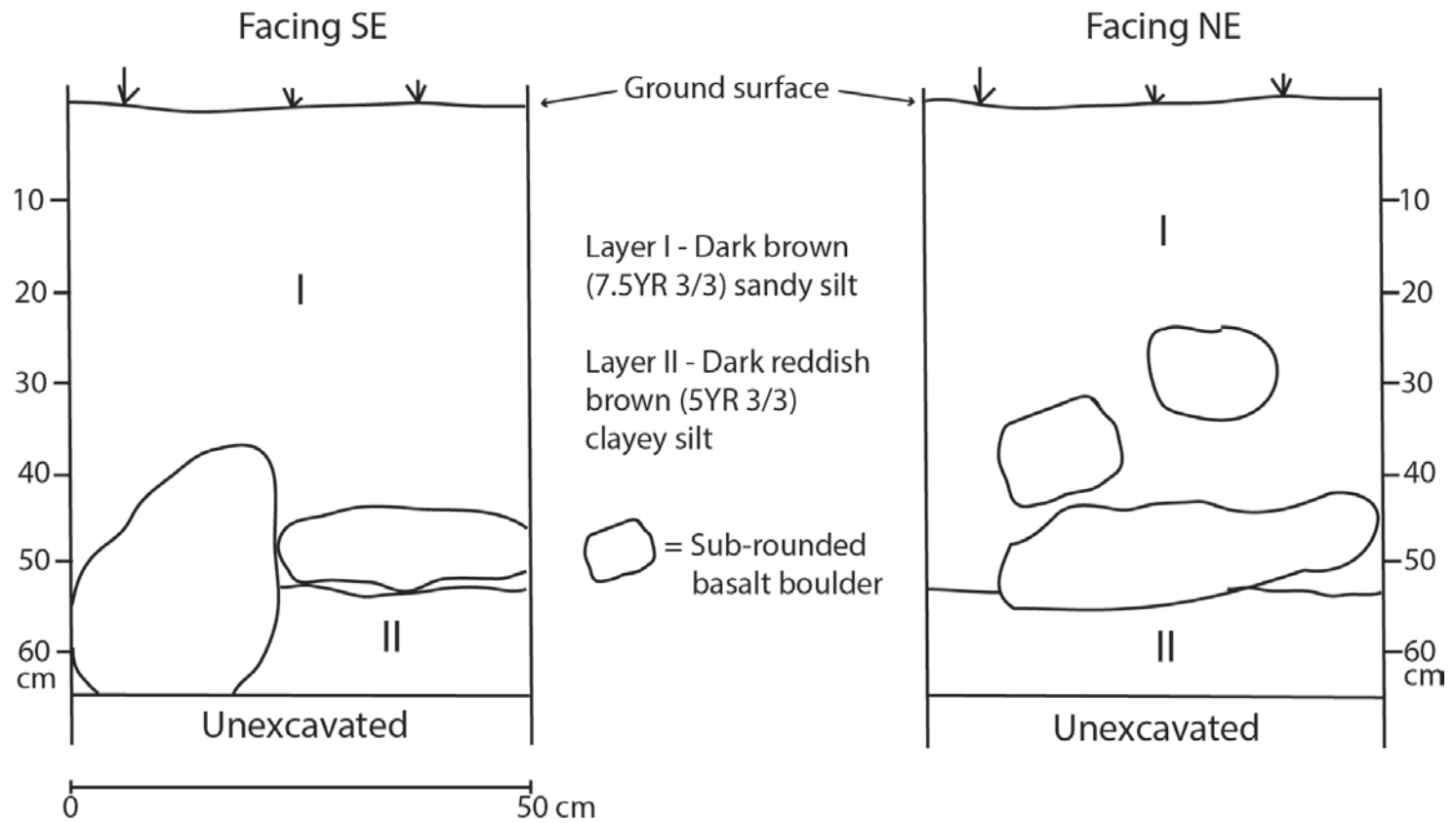


Figure 123. Stratigraphic profile TU-1, Feature 21, Site 2270

Feature 22 is a large pile of predominantly natural (unmodified) boulders with some cobbles just above the toe of slope along the east bank of Gulch A (Figure 124). Some of the boulders have mechanical scarring on them. This feature was created by plantation workers to clear the gulch bottom for driving and, possibly, to stock pile basalt for processing into blocks for irrigation-ditch building. This feature is included in Site 2270 as a component of the plantation road system. It measures approximately 62.0 m (N/S) by 5.0–10.0 m (E/W) by 0.40–1.80 m high, and consists of sub-angular to sub-rounded clasts with a few angular clasts (Figure 125). Most of the piling appears to have been done by hand, but there is some evidence of bulldozing along the east (upslope) side of the pile, where soil is intermixed with the boulders, a few of which exhibit mechanical scarring. There is a flattened area along the east side of this feature; and we also discovered an old ferrous-metal “backhoe tooth” wedged between two large boulders in the pile (Figure 126). Historic maps from the 1930s indicate an earthen road once passed through this part of the gulch. At the location of Feature 22, the road is no longer recognizable as such, due to flooding damage in the drainage bottom that has altered this area. The historic road, described below as Feature 28, can be recognized and followed south of Gulch A. In general, the feature lacks formal structure; the clasts are piled 1–2 layers deep in some places. The feature is in good to fair physical condition, has not been impacted or disturbed by modern activities, and, like most other features in the project area, is mostly covered in California grass and koa haole.

Feature 23 is a low, dry-stacked rock retaining terrace next to an area that once was an earthen road traversing the bottom of the eastern arm of Gulch A (Figure 127 and Figure 128). The feature is clearly a plantation-era structure, given the characteristic angular-basalt clasts with metal-tool shaping marks that comprise part of its base construction (Figure 129). The feature also includes natural (unmodified) basalt boulders and cobbles, most of which are sub-rounded. The middle portion and east end of this feature have been damaged by flooding. A recent channel runs right through the middle of the structure from the southeast to northwest. When originally constructed, Feature 23 functioned to divert water from an old earthen road once located north of the feature. This road, which can no longer be observed in the gulch bottom due to extensive flooding damage, is described below as Feature 28. The natural drainage channel in this portion of Gulch A runs south of Feature 23, which was built to keep the flowing water below (south of) the old road. When the plantation features were no longer maintained, flooding destroyed the middle portion of this feature, which is how it appears today. Feature 23 measures approximately 11.5 m (E/W) by 0.75–1.5 m (N/S). The maximum height of stacked rocks, which are up to 2–3 courses high, ranges from 0.45–0.60 m above the ground surface. Overall, the feature varies from good (west end) to poor (middle section) to fair (east end) physical condition, has not been impacted or disturbed by modern activities, but has been damaged by flooding. Although there is abundant California grass, especially at the east end of the feature, vegetation and ground cover is somewhat more open compared with other places in the project area. This is partially due to the presence of large Christmas berry trees that contribute to a slightly more visible ground surface than usual.

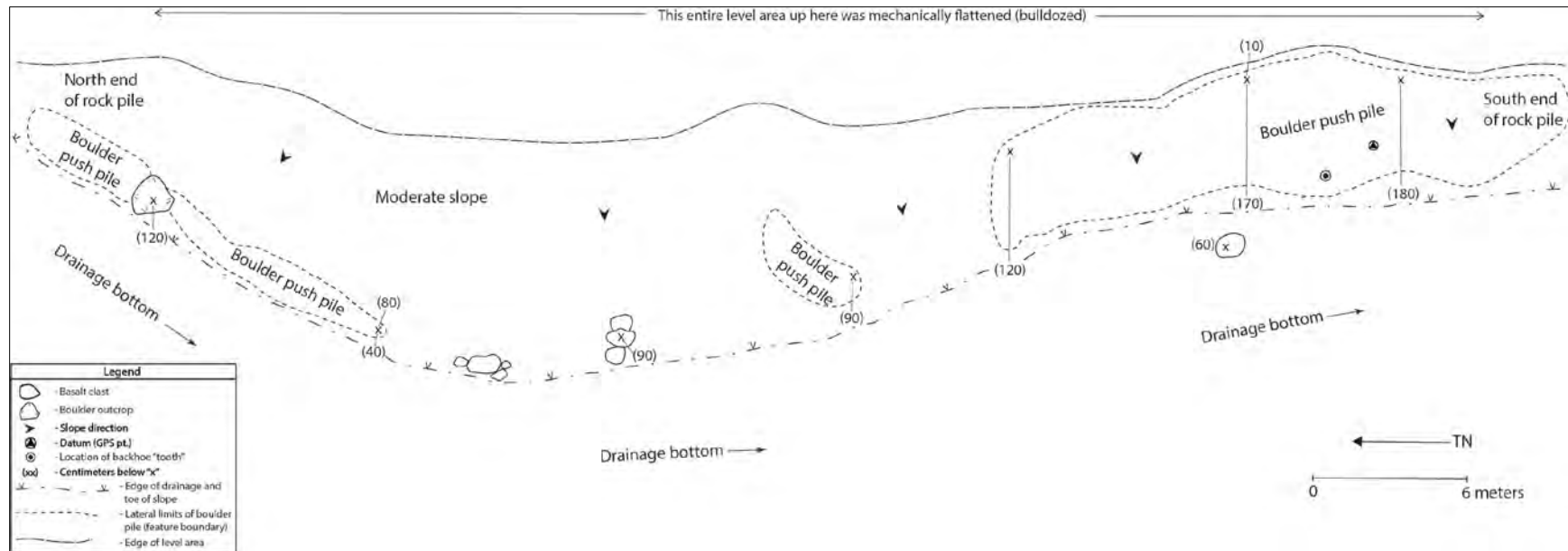


Figure 124. Plan view Feature 22, Site 2270



Figure 125. Portion of south end of Feature 22, Site 2270, where “backhoe tooth” was found, view east; scale bar is 120 cm high



Figure 126. “Backhoe tooth” found wedged between boulders at Feature 22, Site 2270; scale bar is 10 cm long

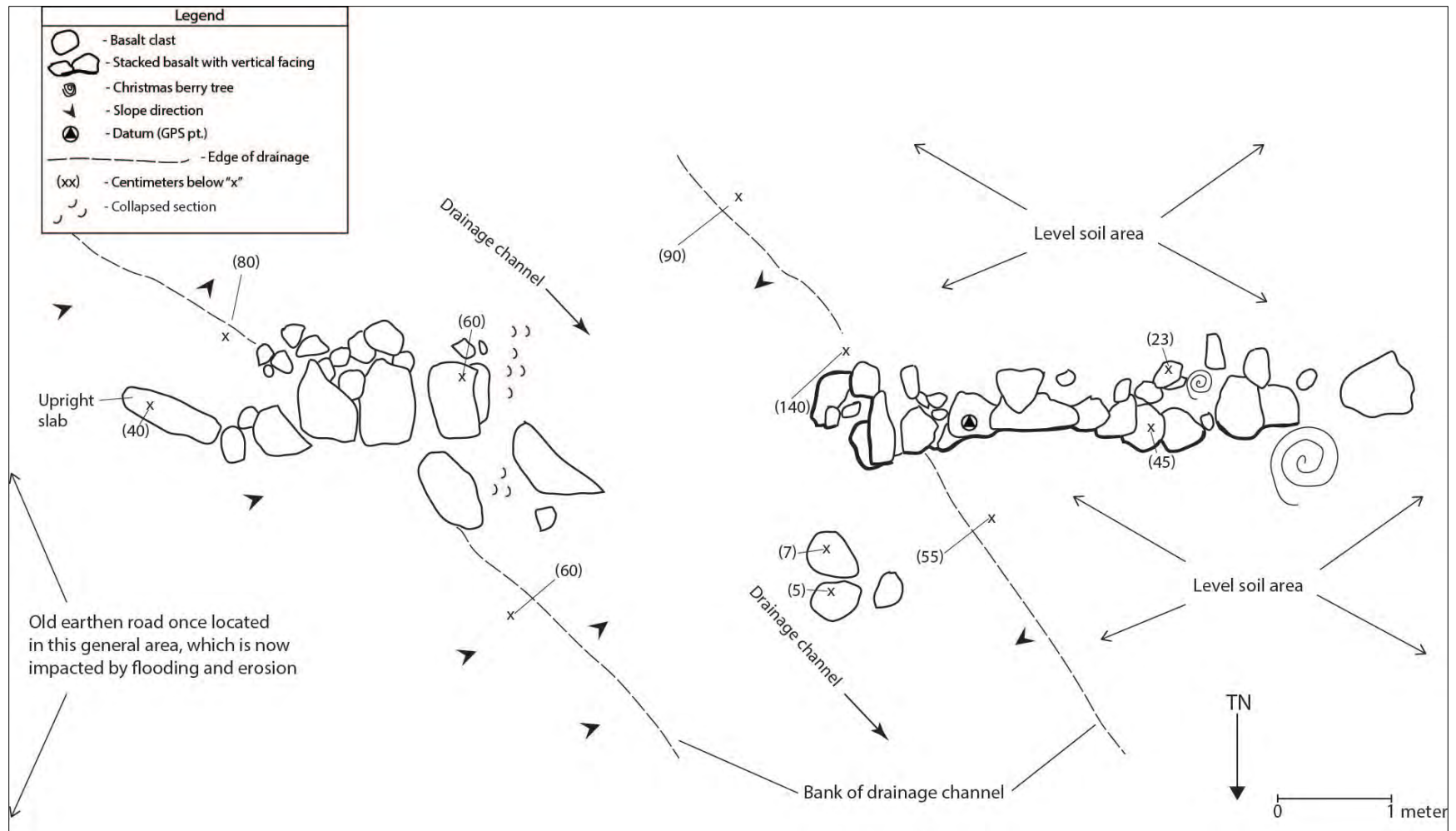


Figure 127. Plan view Feature 23, Site 2270



Figure 128. Overview of Feature 23, Site 2270, view east; vertical scale bar is 80 cm high; intact portion of this feature is to the right (location of the scale bars); damaged portion is in the center-left area



Figure 129. Detail of the most intact portion of Feature 23, view south, showing angular basalt boulders and cobbles with metal-tool shaping marks; horizontal scale bar is 40 cm wide

Feature 24 is a boulder alignment with small sections of informal stacking 1–2 courses high along the west edge of the main drainage channel in the bottom of the western arm of Gulch A (Figure 130). This historic-age feature once defined the eastern edge of a bulldozed road that once traversed the gulch bottom along its western toe of slope. Currently, the earthen road cannot be identified over any appreciable distance due to damage caused by flooding; however, it appears there was once a level soil area just west of Feature 24 used as a road. Most of the boulders, which are natural, sub-rounded to sub-angular clasts, were placed/ stacked by hand, but there are a few examples of mechanically-scarred boulders, suggesting part of this feature was bulldozed (or pushed with some other type of heavy equipment) into place. Large Christmas berry trees at both the north and south ends have caused major damage to this feature, which is in poor physical condition (Figure 131 and Figure 132). Currently, it measures approximately 18 m (N/S) by 2.0 m (E/W) by 0.50–0.75 m high, but it was probably longer when originally built. This feature appears to be the same as Barrera's (1987) Site 1469, which was considered by Goodman and Nees (1991) to be a part of the project area-wide road system (Site 2270). We concur with Goodman and Nees' assessment. It is difficult to ascertain Goodman and Nees' feature number, but it is clear that our Feature 24 is Barrera's (1987) Site 1469. Barrera tested (excavated) this feature and recovered a glass bottle beneath the structural boulders, concluding it was a plantation-era structure.

Feature 25 is a concrete ford (partially submerged stream crossing) along the main access road into the lower (south end of the) project area (Figure 133 and Figure 134). This feature, which is in extremely poor physical condition, crosses Waiawa Stream. It consists of multiple layers of concrete and asphalt, added over time in numerous patch and repair jobs, capping a boulder foundation and core through which two 80-cm (diameter) concrete culvert pipes pass. This feature measures approximately 20.0 m (E/W) by 12.5 m (N/S) by 0.40–0.75 m high. This ford is impassable during times of high storm-water flow, but generally has only a few to several inches of water flowing across it.

Feature 26 is a mauka-makai earthen road that originally connected the lower end of another mauka-makai road (Feature 1) with Reservoir 3. Today, Feature 26 no longer extends all the way south to the road Feature 1 as it once did. Currently, Feature 26 is approximately 950 m long from its west end (i.e., the east end of road Feature 10, arbitrarily defined as the center of the road passing below Reservoir 3) to its east end, where it ends at a T-shaped intersection with road/ railroad right-of-way Feature 11. According to historic maps from the 1930s, Feature 26 once continued south-southeast past this intersection to the lower end of Feature 1, a distance of some 425 m. As with other roads in this part of the project area (e.g., Feature 11), Feature 26 has remnant patches of old asphalt consistent with its use as a military training road (Figure 135). The width of this road is 3.0–3.25 m. We documented a ferrous-metal pipe, partially exposed at the ground surface of the road, passing under the road near its upper (north) end. This culvert pipe is part of irrigation ditch Feature 7, Site 2273 (Figure 136). Feature 26 is in fair physical condition with some partially washed out/ eroded sections.

Feature 27 is an earthen road/ railroad right-of-way connecting Reservoir 2-A with the south end of the project area. The top half of this feature was once a railroad right-of-way, but at least part of it was converted into a road after the 1940s (when the temporary railroad was removed). Today, the portion of Feature 27 heading northeast from its intersection with road Feature 26 is not regularly used and can only be easily driven about 100 m (Figure 137). Beyond this point, it is difficult to follow or identify on the ground, but it is still there. The north end of Feature 27 no longer extends any further than road Feature 3, but it once continued (as a railroad right-of-way) another 200 m to the northeast. This old railroad right-of-way portion of Feature 27 is 2.25 m wide. From the intersection with road Feature 26 heading southwest, the road is actively used and open all the way to the south end of the project area (Figure 138). This portion of Feature 27 is generally 3.0–3.5 m wide. An earthen ditch runs along portions of the east side of Feature 27. Overall, from its far northeast end near Reservoir 2-A to the south end of the project area, this road covers a distance of some 2.4 km within the project area. Feature 27 is in good to fair physical condition.

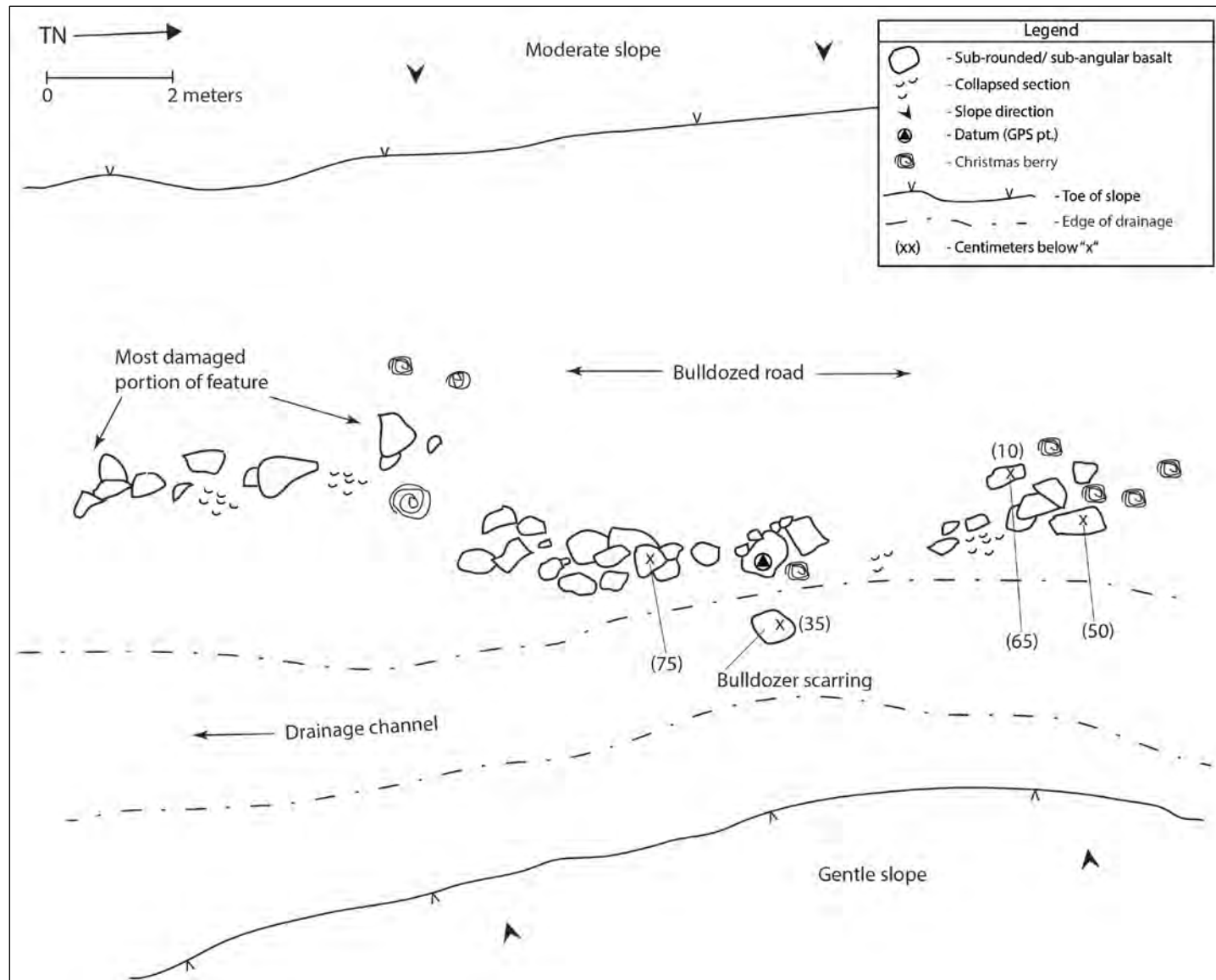


Figure 130. Plan view Feature 24, Site 2270



Figure 131. Overview of Feature 24, Site 2270, view west-southwest; vertical scale bar is 80 cm high



Figure 132. Overview of Feature 24, Site 2270, view north; same scale as above



Figure 133. Feature 25, Site 2270, overview, view east



Figure 134. Detail of Feature 25, Site 2270, view north-northwest; vertical scale bar is 1 m high