Appendix C AIS Research Design

The archaeological identification efforts described in the AIS Research Design Section of the Airport (Section 3) archaeological inventory survey plan (AISP) (Hammatt and Shideler 2011) were accepted in the SHPD Section 106 review letter of December 2, 2011 (Log No. 2011.2167, Doc No 1211NN01). That section of the SHPD-approved AISP is included here for the reader's reference. Changes to the AISP sampling strategy—particularly the relocation and addition of excavation locations—are described in the main document.

1.3 Research Design

A research design is essentially a plan that clearly identifies:

1) what is currently known about the research subject
2) the research objective or objectives
3) the research investigation steps and methods that will collect the needed information to fulfill the research objective
4) how the results of the investigation will be interpreted and evaluated

This research design was developed in consideration of what is currently known about the archaeological record in the vicinity of the Airport Section 3 study area. It is also based on the specific engineering/construction requirements and footprint of the Airport Section 3 portion of the Honolulu High-Capacity Transit Corridor Project (HHCTCP). Important considerations in the development of this research design are: 1) the Airport Section 3 study area is completely developed and paved over; 2) there are unlikely to be surface indications of extant archaeological cultural resources; and relatedly, 3) all extant archaeological cultural resources are likely to be subsurface.

Construction Section 3 of the HHCTCP is an area of relatively low archaeological sensitivity based on historic background research and the results of past archaeological investigations in the vicinity. As discussed in the Historic Background section, the intensity of land use within the vicinity of the project corridor was relatively low prior to historic agricultural enterprises and twentieth century development. As outlined in the Previous Archaeological Research section, archaeological investigations within the vicinity of the project corridor have been somewhat sparse, however, based on these prior investigations, the likelihood of significant subsurface archaeological deposits or human burials is considered to be low. The background research presented in the main volume provides the historic/cultural information to make predictions regarding the types and locations of archaeological cultural resources that are likely within the study area. This background research, along with the detailed preliminary engineering information that delineates the actual project footprint, was used to develop the project's research design, including methods and sampling strategy.

The overall objective of the archaeological cultural resource identification activities described in the Airport AISP was to locate and document archaeological cultural resources that may be affected by the HHCTCP Airport Section 3 construction. The Airport Section 3 AIS was carried out as part of the HHCTCP's compliance with State and Federal historic preservation requirements. It identified archaeological deposits, including human burials, within the Section 3 corridor. Once identified, these archaeological deposits were investigated and recorded in sufficient detail so that their significance could be assessed and the Project's potential effect on significant archaeological deposits could be evaluated. Only then could appropriate mitigation decisions be made.

This AIS focuses exclusively on archaeological cultural resources; the identification, documentation, and treatment decisions for traditional cultural properties (TCP) and historic buildings and structures are not part of the current investigation. This AIS report for the Section 3 Airport uses available information currently generated as part of the City's on-going TCP and historic landscape studies.

The City is currently working with the SRI Foundation and Kumu Pono Associates to produce a comprehensive ethnographic and ethnohistoric investigation of the HHCTCP project corridor and its environs. These investigations, including historic research with Hawaiian language sources, place name and oral tradition research, and ethnographic interviews, will support and be incorporated into the project's TCP study. Additionally, the City is working with Mason Architects to produce historic context studies and cultural landscape reports for the HHCTCP corridor. Available information from these ongoing TCP and historic context and landscape studies were utilized to augment and inform the interpretations and recommendations of the Airport Section 3 AIS research. This additional background further augmented the archaeological/cultural context that was required to appropriately evaluate the significance of the archaeological cultural resources that were identified during the Airport Section 3 AIS.

AIS research methods investigations (described below in this section) were carried out to inform this research design. The proposed research strategy included the following roughly sequential steps:

AISP Preparation:

1. Conduct environmental, cultural, historical, and archaeological background research
2. Develop an archaeological predictive model/summary of past finds based on background research
3. Carry out methods investigations to evaluate appropriateness of potential investigation methods/techniques
4. Overlay the project's preliminary engineering plans on the predictive model
5. Develop a preliminary subsurface sampling strategy based on the overlay
6. Consult with NHOs, community members, project engineers, and the City regarding the proposed AIS methods and subsurface sampling strategy
7. Modify sampling strategy based on consultation comments
8. Prepare draft AISP for the SHPD and community review and comment
9. Prepare final AISP for SHPD approval based on comments received

AIS Fieldwork and Laboratory Work:

10. Implement field survey/sampling strategy
11. Augment/modify sampling strategy as needed to provide required cultural resource documentation and to facilitate avoidance of identified cultural resources
12. Process collected samples and conduct laboratory studies on selected materials as the AIS fieldwork continues

AIS Report Preparation and Consultation:

13. Through the PA’s consultation protocol regarding treatment of any *iwi kūpuna* (burials/human skeletal remains) identified during the AIS fieldwork (PA Stipulation III.B.4)—disseminate information to cultural descendants and interested parties to facilitate burial treatment decisions [This was not needed for the Airport Section 3 AIS].
14. Incorporate the results of the ongoing TCP and historic context and landscape studies into the write-up and interpretation of the AIS-identified archaeological cultural resources
15. Coordinate with Mason Architects, Kumu Pono Associates, and the SRI Foundation so that documentation from the on-going AIS investigation is available to be incorporated into the ongoing TCP and historic context and landscape studies
16. Consult with NHOs, community members, interested individuals, and the City regarding the AIS results, including cultural resource significance, project effect, and mitigation recommendations
17. Prepare draft AIS report for SHPD and community review
18. Prepare final AIS report based on review comments received
19. Disseminate copies of the final AIS report to interested consulting parties, the City, and per the requirements of HAR Chapter 275-5(e)(3) (with copies submitted to SHPD, University of Hawai’i at Mānoa’s Hamilton Library Pacific Collection, Bishop Museum Library, University of Hawai‘i Hilo Library, Maui Community College Library, and the Kaua‘i Community College Library)

The AISP was submitted to the SHPD for review and approval prior to the commencement of the AIS investigation.

1.4 Research Focus

Where possible, archaeological research designs should include specific research questions that can be answered by the proposed research. With inventory/identification-type investigations such as the Airport Section 3 AIS, however, conducting research to answer specific research questions is usually not appropriate.

The development of specific archaeological research questions should be based on review of existing contextual themes (cultural/historic contexts), a synthesis of pertinent prior research results, and a relatively detailed understanding of the types of information available from the archaeological site or sites to be investigated. Based on a synthesis of this information, specific research questions that can inform on the site's or sites' contextual theme(s) are identified. Research methods are outlined and justified that will adequately gather from the site or sites the specific classes of data required to investigate the proposed research questions. Appropriate analytic methods are described that will turn field observations and analytic results into meaningful evidence in terms of answering the stated research questions.

The Airport AISP described an archaeological inventory survey investigation. The purpose was to identify archaeological cultural resources in the project APE, then document them sufficiently so that their significance could be assessed and the project's effect on these cultural resources could be evaluated. Although portions of the AIS study area had been previously studied, the vast majority of the study area had yet to be inventoried for archaeological resources. For the current AIS investigation, we simply did not have the necessary information regarding the archaeological resources in the APE to formulate specific archaeological research questions. Conducting the AIS research to address specific research questions would have required assumptions regarding the types of data classes that were present within the APE. Formal research questions would have transformed what should have been an identification phase investigation into a data recovery or mitigation phase investigation.

Accordingly, the AIS does not address specific research questions. Instead, it has a broader, more general research focus. Based on the background research conducted as part of the AISP, this AIS investigation has the potential to inform on a wide range of archaeological topics, several of which are briefly summarized below [Taken from Airport AISP]:

1. Settlement Transect—The proposed AIS investigation is an opportunity to identify and document archaeological resources within a narrow but continuous transect through modern O‘ahu's densely developed coastal south shore. The results of the AIS investigation will likely inform on differences in the distribution of pre-Contact human settlement and activity across this broad area. Change related to post-Contact Western acculturation may be apparent in the distribution of archaeological site and feature types.
2. Ground Penetrating Radar (GPR) Utility—In general, GPR's use in archaeological research has become fairly well established over the last decade. In Hawai‘i, the technology has been somewhat slower to be utilized. The AIS investigation will provide a means to evaluate the GPR method's strengths and weaknesses in terms of archaeological research, particularly in fully developed urban landscapes.
3. Pre-Contact Landforms and Shorelines—The coastal location of the Airport Segment 3 portion of the HHCTCP has been subjected to intensive modification throughout the post-contact period. The AIS investigation will provide direct data on pre- and post-Contact change to the landforms and shorelines. Potential AIS data collection could include the pre-Contact cultural landscape of shoreline fishponds, *lo‘i (*irrigated pond fields), and houselots, and the expansion of post-Contact fill lands for residential and commercial usage.
4. Human-Induced Environmental Change—Research into diachronic human-induced environmental change within the Airport Segment 3 portion of the HHCTCP would be augmented by the results of such research methods as pollen analysis, wood taxa identification, and Carbon 14 analysis.

5. Burials—One of the primary foci of the proposed AIS investigation will be the identification of burials (*iwi kūpuna*). The AIS would inform on distribution, age (pre- vs. post-Contact), and burial practices over time. Additionally, the AIS research would allow for evaluation of remote sensing methods, such as GPR, specific to burial finds.

1.5 Environmental and Cultural/Historical/Archaeological Background Research

Background research for this AISP included, and additional research for the preparation of the AIS report include: a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawaiʻi; the Hawaiʻi State Archives; the Mission Houses Museum Library; the Hawaiʻi Public Library; and the Archives of the Bishop Museum; study of historic photographs at the Hawaiʻi State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources; as well as study of Hawaiʻi Department of Transportation engineering plan maps of the development of Kamehameha Highway and roads along the route of the Airport Construction Segment 3. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the *Waihona ʻAina* database (<www.waihona.com>). LCA and Royal Patent records for the land areas immediately along the Airport Section 3corridor were copied from *Waihona ʻAina* and the Hawaiʻi State Archives; these records are included in Appendix A (of the AISP—Appendix B of this volume).

This research provided the environmental, cultural, historic, and archaeological background for the study area. The sources studied were used to formulate a predictive model regarding the expected types and locations of cultural resources in the project area.

As noted previously, the City is currently working with the SRI Foundation and Kumu Pono Associates to produce a comprehensive ethnographic and ethnohistoric investigation of the HHCTCP project corridor and its environs. The results of this research, including historic research with Hawaiian language sources, place name and oral tradition research, and ethnographic interviews, will be available to augment the cultural and historical background sections of the Airport AIS report. This additional contextual information will inform the interpretations, significance evaluations, and mitigation recommendations of the archaeological cultural resources that will be subject of the Airport AIS report.

1.6 Methods Investigation as Part of AISP Preparation: GPR Technology

As part of the AISP preparation, CSH investigated the efficacy and cost benefit of a suite of different ground penetrating radar (GPR) antennae and techniques for the identification of human burial remains and other types of subsurface archaeological features. A summary of the investigation and its results is provided below.

1.6.1 GPR Methods Investigation

In 2010, at the request of CSH, TAG Research by Sturm, Inc. conducted a GPR methods investigation within select areas of Honolulu to test this remote sensing technology's efficacy in the identification and mapping of subsurface cultural deposits, including human burials (see Sturm 2010). This investigation sought to evaluate which antenna frequencies (270 MHz, 400

MHz, or 900 MHz), data collection parameters, and data processing procedures would be the most effective for potentially identifying and mapping subsurface cultural deposits within an urban setting dominated by extensive subsurface modifications including backfilled excavations, utility lines, and land filling.

GPR surveys were conducted at six locations: the ATC/JTMC, St. Augustine-by-the-Sea Church, a portion of Halekauwila Street, the proposed location of the Civic Center Station, and two discrete areas at the Kaka'ako Fire Station (Figure 9). The GPR survey areas within the proposed location of the Civic Center Station and Halekauwila Street are both situated within the project corridor. The remaining four survey areas had been previously investigated via subsurface testing and/or archaeological monitoring by CSH (Pammer et al. 2009; Pfeffer et al. 1993; Yucha et al. 2011). During these prior archaeological investigations, subsurface cultural deposits, including human burials, were identified within stratigraphic contexts that are similar to those that are anticipated to be present within the project corridor. Thus, the four survey areas located outside the project corridor were investigated in an attempt to model how subsurface cultural deposits, including human burials, are recorded via GPR and then apply these models to GPR data collected within the project corridor. The results would address the efficacy of using GPR to identify the presence of subsurface cultural deposits, including human burials, prior to subsurface testing.

The results of the GPR methods investigation were promising, although with some restrictions and limitations. TAG Research was able to confirm the locations of known human burials within all of the survey areas in which burials were previously recorded. Burial pits were represented in GPR depth profiles as ephemeral hyperbolic reflections. These hyperbolic reflections were associated with stratigraphic irregularities caused by burial pit excavation (i.e., burial shafts and associated backfill material) rather than by the burials themselves (Sturm 2010), which was likely due to a number of factors, including the sediment mineralogy and deterioration of the burial and/or casket, if one was present. The hyperbolic reflections corresponding to the known locations of previously recorded burials were the only GPR anomalies that could be confidently determined to be associated with human burials.

Other subsurface features that were able to be identified and mapped via GPR were fill deposits and utility lines. In general, both of these features were represented in GPR imagery (i.e., depth profiles and amplitude slice maps) as high amplitude reflections of large size. Anomalies associated with utility lines were linear and tended to be narrower than the large amorphous masses associated with fill deposits.

These results led to the determination that "the overall potential for using the GPR method to map archaeological features and burials in this urban Honolulu setting is considered very good up to about 1.5 meters in depth" (Sturm 2010:35). Of note, however, were several limitations, including the inadequate resolution of GPR readings below 1.5 meters and the fact that the association of subsurface anomalies with possible burials could only be accomplished with confidence in areas where burials have already been confirmed to be present (i.e., through previous archaeological subsurface testing or historic land use research).

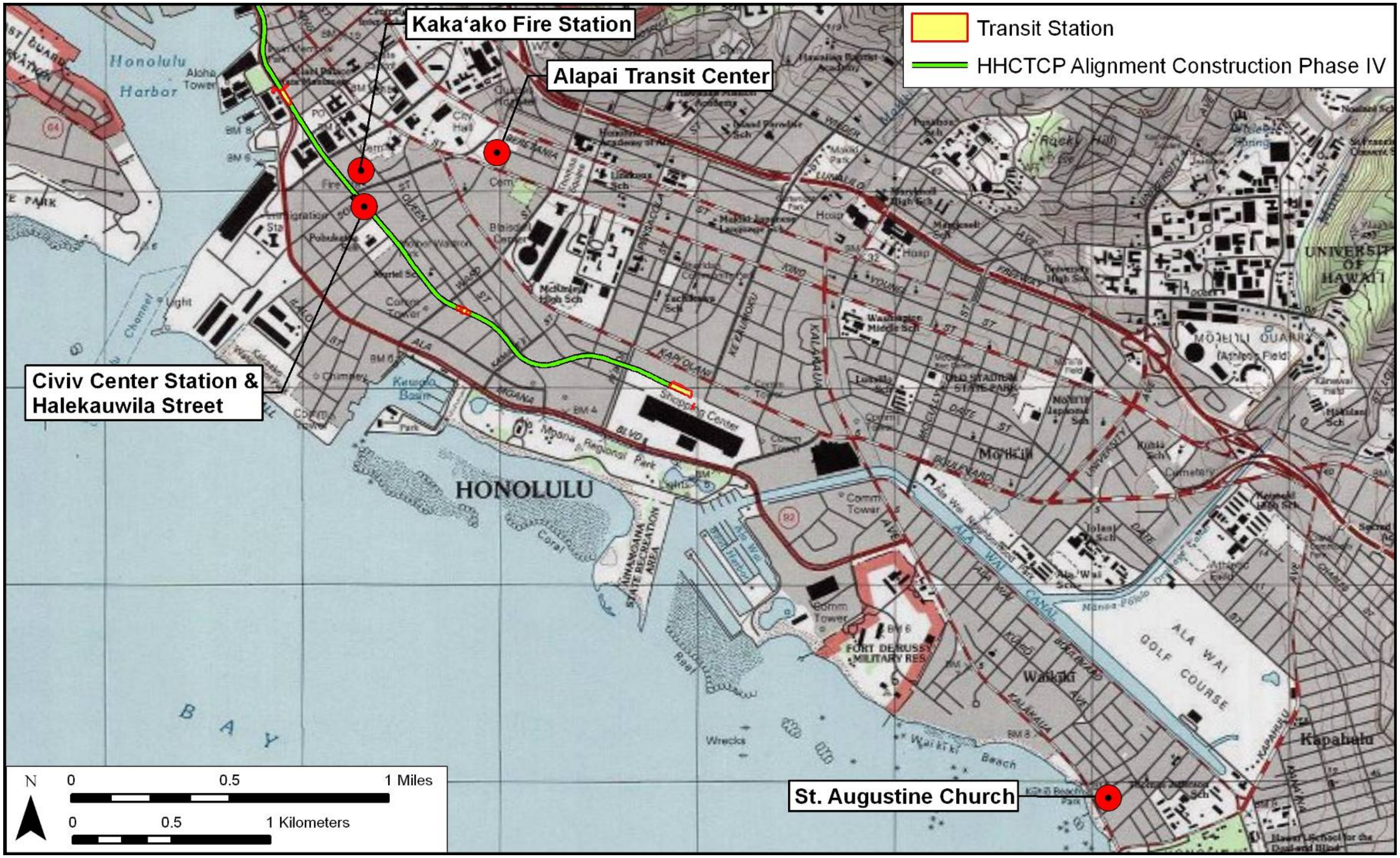

Figure 9.U.S. Geological Survey 7.5-Minute Series Topographic Map, Honolulu (1998) Quadrangle, showing the locations of GPR survey areas

One of the goals of this method investigation was to address the question of depth penetration and resolution in relation to various GPR antenna frequencies (270 MHz, 400 MHz, and 900 MHz). Based on the results of the GPR surveys, the 400 MHz antenna was determined to provide the best overall quality data, allowing high resolution mapping of target features of interest (including burials) to a depth of approximately 1 to 1.5 meters. While the 270 MHz antenna achieved the overall greatest depth at each location surveyed, it was unable to provide adequate resolution to target features of interest, including burials. Conversely, the 900 MHz antenna provided the best resolution of subsurface features but was limited to an average depth penetration of half a meter, which in a majority of Honolulu is a stratigraphic zone dominated by imported fill deposits

Recommended data collection parameters for conducting future GPR surveys within the project corridor include conducting surveys within wider areas or blocks, as opposed to single narrow transects, using a transect spacing of 50 centimeters (cm) or less, and having a high number of scans per meter (e.g., 40). All of these factors will ensure the collection of high-resolution data and subsequent mapping of potential archaeological features of interest, which are typically small or subtle and could be easily missed by using wide transect spacing or coarser resolution collection (Sturm 2010:36).

Recommended GPR data post-processing involves the creation of GPR reflection profiles and amplitude slice maps for the analysis of collected data. Reflection profiles illustrate the shape, geometry, and depth of the radar reflections recorded during data collection. An analysis of these profiles can determine whether radar energy is reflecting from a flat stratigraphic layer (seen as a distinct horizontal band), a discrete buried object (seen as a hyperbola), or from stratigraphic irregularities such as subsurface disturbances associated with utility installation or human interment (also seen as hyperbolas, but usually are more ephemeral and consist of clustered reflections).

Amplitude slice maps are a three-dimensional tool for viewing differences in radar reflection amplitudes across a given surface at various depths. Amplitude slice maps can be thought of as plan view maps or excavation level records that display GPR data at user-defined depth intervals. Reflected radar amplitudes are of interest because they measure the degree of physical and chemical differences in buried materials, which in turn can indicate the presence of stratigraphic interfaces, discrete buried objects (e.g., basalt boulders, utility lines, burial caskets, etc.), or stratigraphic irregularities (i.e., subsurface anomalies associated with burial pits, fire pits, buried irrigation ditches, etc.). Amplitude slice maps are important because they allow the visulization of radar reflections throughout the entire dataset collected at a survey area at a given depth. This gives size and shape to collected radar reflections, which can aid in the interpretation of identified subsurface anomalies.

Finally, while this GPR methods investigation was successful at mapping many features of interest, including several previously recorded burials, many of the feature interpretations were based on knowledge gained from previous archaeological investigations that involved extensive background research and subsurface testing. It is thus recommended that future GPR surveys be correlated with site-specific historic research and subsurface testing (i.e., excavation) wherever possible (Sturm 2010:29, 36). A detailed report of the findings of the GPR methods investigation can be found in Appendix D of the AISP for Airport (Hammatt and Shideler 2011)—not included in the current Airport AIS report.

1.7 Consultation

As part of the preparation of the Airport Section 3 AISP, CSH contacted a wide range of state agencies, Native Hawaiian Organizations, lineal and cultural descendants, and other interested individuals and groups in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the study area and the surrounding vicinity (refer to Appendix D of this volume). Organizations consulted include the SHPD/DLNR, the Office of Hawaiian Affairs (OHA), and the O'ahu Island Burial Council (OIBC). In accordance with Stipulation III of the HHCTCP Programmatic Agreement, CSH pursued consultation in order to gain input and comment on the scope and design of the Airport Section 3 AISP, and in order to create a draft protocol for consultation regarding the treatment of any *iwi kūpuna* identified during the AIS.

During the Airport Section 3 AIS fieldwork, and subsequently during the preparation of this AIS report, CSH consulted frequently with the OIBC and SHPD throughout late 2012 and early 2013 regarding the progress and results of the AIS investigation. This consultation included status summaries of the AIS Airport Section 3 fieldwork and AIS report preparation at each OIBC monthly meeting and at least twice monthly meetings with SHPD. On February 20th 2013, CSH met with OHA and updated their archaeological and cultural staff on the Airport Section 3 AIS results. Additionally, CSH presented updates of the Airport Section 3 AIS investigation at several public meetings (November 8th and 27th, December 17th, 2012, and February 7th, 2013) arranged to consult with potential lineal or cultural descendants to the HHCTCP project.

1.8 Field Methods

In general, fieldwork included 100 percent pedestrian inspection of the study area; global positioning system (GPS) data collection; GPR survey; and subsurface testing. All areas selected for subsurface testing were surveyed with a Geophysical Survey Systems, Inc. SIR-3000 GPR unit equipped with a 400 MHz antenna. The planned subsurface testing program was backhoe-assisted. In general, linear test excavations measuring approximately 3 m or 6 m (10 feet or 20 feet) long and 0.6 or 0.9 m (2 feet or 3 feet) wide were excavated within the project footprint (based on preliminary engineering) at selected station locations, guideway column locations and utility relocation areas. Forty (40) test excavations were proposed, with the potential for additional testing to refine the boundaries of subsurface deposits. Forty-seven test excavations in total were completed.

1.8.1 Personnel and Scheduling

Airport Section 3AIS fieldwork proceeded under the direction of CSH principal investigator Matt McDermott, M.A. A field crew of eight to ten archaeologists, including one field director, two GPS/GIS specialists, and two GPR specialists, completed the AIS investigation under the direction of the principal investigator.

1.8.2 Pedestrian Survey

Pedestrian inspection of the study area was completed at 100 percent coverage. The pedestrian inspection was accomplished through systematic sweeps. As the study area is generally located in the median or shoulder of existing roadways, archaeologists traversed the medians and shoulders of the active thoroughfare. The pedestrian inspection included identification and documentation of surface archaeological cultural resources [none were found]. Identification and documentation of the project area's architectural cultural resources, including historic roads, bridges, and structures, was conducted by historic architectural firm Mason Architects, Inc., in association with the project's Final Environmental Impact Statement (FEIS) (USDOT/FTA and C&C/DTS 2010). [No surface archaeological cultural resources were found]

1.8.3 GPR Survey

GPR use is specifically dictated in the HHCTCP Programmatic Agreement. The GPR focus evaluated the GPR effectiveness, and strove to make observations that could at least, and potentially improve GPR effectiveness through "ground truthing" (comparison of GPR results with actual excavation results).

All areas selected for subsurface testing were surveyed with GPR prior to excavation. GPR field data were post processed and used to inform the subsurface testing results. The GPR survey were performed using a Geophysical Survey Systems, Inc. (GSSI) SIR-3000 system equipped with a 400 MHz antenna. This is a bistatic system in which electromagnetic energy in the radar frequency range is transmitted into the ground via a sending antenna. Radar energy is reflected off of the subsurface matrix and is then received by a paired antenna. Reflected energy is sampled, and the travel time (in nanoseconds) of the reflected waves is recorded. Wave propagation speed varies depending on the nature of the subsurface medium. Any changes in density or electromagnetic properties within the stratigraphic column may cause observable variations in reflection intensity. Reflection features may include discrete objects, stratigraphic layering, or other subsurface anomalies.

GPR surveys were conducted in blocks centered on the subsurface testing area. The GPR survey results generated two-dimensional (2D) depth profiles to prospect for subsurface anomalies and stratigraphic interfaces prior to excavation, as these could correspond to isolated archaeological features or sediments that are more likely to contain cultural deposits. Following the completion of subsurface testing, the documented stratigraphy was referenced against the GPR profiles to establish if there were patterns in the GPR data that may be associated with stratigraphic interfaces, sediment types, and subsurface features (e.g. trash pits, construction debris).

The GPR surveys were also conducted to assess the ability of GPR in determining stratigraphy and locating cultural deposits in the study area (i.e., urban Honolulu). The effectiveness of GPR is highly dependent on local soil conditions. The high signal attenuation rate of many soil types restricts the depth of radar penetration and therefore limits the effectiveness of GPR surveys. The National Resource Conservation Service (NRCS) produced maps indicating the relative suitability of GPR applications throughout the U.S. based on U.S. Department of Agriculture (USDA) soil survey data. Figure 10 shows the study area on the NRCS GPR Suitability Map for Hawaiʻi. The study area is shown to traverse lands in the moderate ("# 3") and very low ("# 5") suitability categories.

1.8.4 Excavation Methods

The subsurface testing program was backhoe-assisted. In general, linear test excavations measuring approximately 3 m or 6 m (10 feet or 20 feet) in length and 0.6 or 0.9 m (2 feet or 3 feet) in width were excavated within the project footprint (based on preliminary engineering) at selected station locations, guideway column locations, and utility relocation areas. To the extent

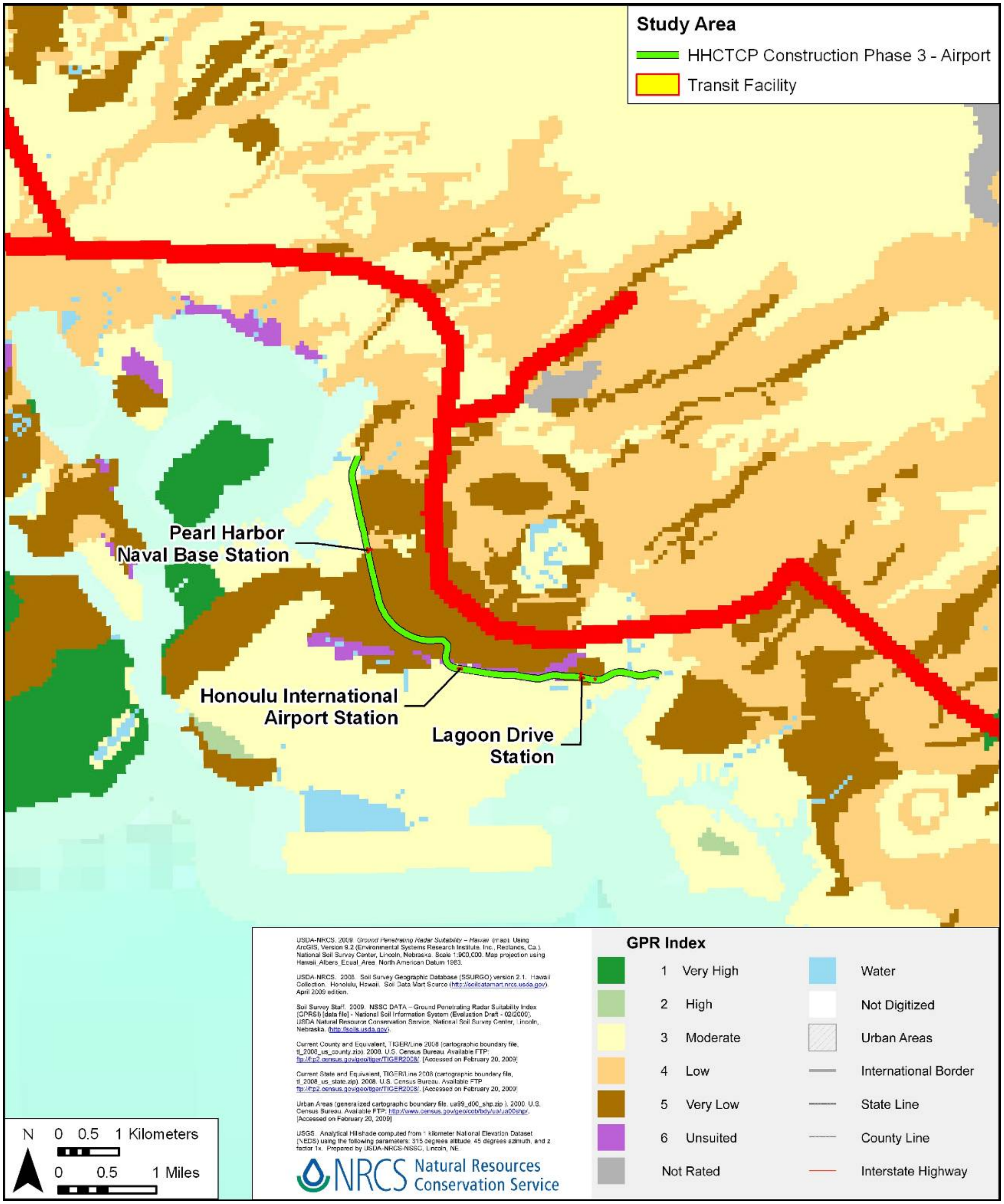

Figure 10. NRCS GPR Suitability Map for Hawai‘i showing the study area

feasible, test excavations were excavated at the precise location of the proposed guideway column foundations/utility relocation areas, as currently shown on the Project's preliminary engineering plans; however, it was clear that considerable conflicts existed between the proposed AIS testing locations and existing subsurface utilities. In cases where subsurface testing at the precise location of the proposed guideway column foundation/utility relocation area was prohibitively problematic due to existing subsurface utilities or other constraints, an alternate test area was selected, or the test excavation was slightly offset from the column foundation location. Excavations were made to depths of culturally sterile sediments, bedrock, or just below the water table (excepting where safety concerns came into play).

The testing program also focused on characterizing the remnants of the project area's buried natural land surface that predates the historic and modern fill layers. These remnants of the former land surface are more likely to be associated with significant cultural deposits.

CSH personnel closely monitored all backhoe excavation activity. Archaeologists watched as the backhoe excavated at a normal pace, as well as inspected the sediment as it was removed from the ground and dumped into a backfill pile adjacent to the test excavation. A standard backhoe with a 2-foot-wide bucket was used to excavate, at a minimum, portions of each test excavation. Working within safety constraints, and based on the type of sediments exposed, the archaeological crew members stopped mechanized excavation and entered the test excavation to clean off the test excavation sidewalls and base to inspect for cultural deposits.

The mechanized excavation extended through the fill layers to any underlying natural sand deposits (i.e., naturally-deposited sand layers, not imported land reclamation or construction fill layers). In non-sand deposits, mechanized excavation continued through these natural sediments until the water table or cultural sterile sediments were found. Where appropriate and feasible, archaeological features and/or deposits exposed in plan view during the mechanized excavation of the test excavation were documented in plan view and excavated by hand. The feasibility of this plan view documentation and hand excavation was dictated by: 1) whether or not the feature/deposit was exposed in plan view in the test excavation profile; 2) the type of sediment the feature/deposit was in, for example sediments comprised of large amounts of rubble were not hand excavated; and, 3) the size of the feature—for example, massive trash pits were not hand excavated.

Natural sand deposits were not encountered in the Airport AIS study area

Each test excavation was documented with a scale section profile, photographs, and sediment descriptions, and located using a Trimble ProXH mapping-grade GPS unit (sub-foot accuracy). Sediment descriptions, using standard USDA soil description observations/ terminology, included: Munsell color designations; texture; consistency; structure; plasticity; cementation; origin of sediments; descriptions of any inclusions, such as cultural material and/or roots; lower boundary distinctiveness and topography; and other general observations.

No human skeletal remains are encountered during subsurface testing for the Airport Section 3 AIS.

1.8.5 Sampling

Sampling of subsurface cultural layers and/or A horizons was carried out to characterize the cultural content of these layers. Sampling also helped to establish the spatial extent of the layers and the general time frame of their deposition (prehistoric/traditional Hawaiian and/or historic and/or modern). The sampling was undertaken on both pit features associated with the stratigraphic layer and sample areas taken from the portion of the stratigraphic layer that was not part of a particular cultural feature. The distinction between samples from pit features and samples from sample areas potentially reflected the difference in cultural material content between sediment from specific events, such as the excavation and use of a pit, and the more general accumulation of sediment as part of a culturally-enriched stratigraphic layer.

The samples from pit features and sample areas were excavated out of the sidewall or from the base of the excavation into 5 gallon buckets. The sediment then was screened through 1/8-inch wire mesh and all cultural materials were collected, bagged by provenience, and taken to the CSH laboratory. During the collection of cultural materials from the screen, careful attention was made to distinguish between water-rounded, bleached, natural marine, sedimentary shell, and the unbleached, un-rounded, often relatively freshly-broken shell derived from human activity. The volume of each screened sample was recorded so that comparisons can be made between samples.

Where appropriate, column sediment samples of discrete strata, or series of strata, were taken directly from the cleaned sidewall of the test excavation. Depending on the type of sediment to be sampled and the analytic purpose of the column samples to be collected, column samples were collected in 5, 10, or 20 cm depth intervals. For example, column samples from low energy alluvial sediments that could inform on environmental conditions and environmental change were be collected at 5 cm intervals. These samples were available for radiocarbon dating, pollen analysis, and micro charcoal particle quantification.

Where additional documentation of a particular sediment was desired, bulk sediment samples of 1 to 5 liters were collected from the cleaned sidewall of the test excavation for further analysis in the laboratory. These samples were used to better characterize a sediment and for further analysis, including wet screening through 1/16-inch mesh to better inspect the sediment’s contents. All sediment sample collection locations were recorded on test excavation profiles and the sediment samples were labeled with provenience information.

Background research indicated the possibility of encountering historic trash pits, privies, and other historic pit features in the AIS test excavations. These types of historic features typically contain substantial numbers of individual artifacts, ranging from building materials, metal fragments, household refuse, and industrial refuse. Artifact material types include brick, stone, wood, glass, metal, ceramic, bone, and plastic. Documentation of these historic, generally artifact-rich, features focused on recording these features’ dimensions and locations so that their distribution could be considered in relation to historic land use of the study area. Recordation of these features focused on collecting sufficient information to characterize the features’ age, and possibly the feature’s duration of use, and to characterize the feature’s function (e.g., residential versus commercial or industrial refuse disposal). Much of the artifact documentation, for example with redundant bottle types, faunal remains, etc., was done in the field with photographs, written descriptions, and detailed quantification. The collection of historic artifacts was often limited to diagnostic and/or interpretive items, or items that could not be readily identified in the field that required further analysis in the laboratory. Large numbers of redundant diagnostic historic artifacts from the same features were documented with photographs and written descriptions and systematically quantified in the field, but were not collected. Non-diagnostic glass, metal, wood, stone, plastic, and ceramic fragments were quantified and photographed but were not collected. Of course, appropriate collections of new classes of artifacts or other archaeological materials not readily identified in the field were collected in the field for laboratory analysis. This historic feature sampling focused on recovering useful archaeological information without unnecessarily increasing the volume of redundant artifacts and faunal remains from the study area.

1.8.6 Photography

Photographs were taken of the general project area and in-progress work, recording on-the-job procedures, personnel, work conditions, and the area’s natural and/or built environment. Additionally, all subsurface features, cultural layers, profiles, and artifacts were photographed. A photographic scale and north arrow, as appropriate, were included in each photograph.

1.9 Excavation Sampling Strategy

The original AISP sampling strategy consisted of forty (40) test excavations within the 9.06-acre project footprint (Figure 11 to Figure 40, which show the original AISP excavation locations). In general, the archaeological subsurface test excavations were distributed throughout the study area to provide representative coverage and assess the stratigraphy and potential for subsurface cultural resources for the entire area of Airport Construction Section 3. The sampling strategy as outlined in the Airport AISP (Hammatt and Shideler 2011) was developed in consideration of the following:

- Sediment types
- Natural geographic features
- Background research, including information from historic maps and Land Commission Awards (LCA) documents
- Results of previous archaeological studies in the vicinity
- Results of consultation with the Native Hawaiian community
- Assessment of the impact of prior land development
- Consideration of safety concerns for actually carrying out the archaeological work

During the Airport AIS fieldwork, HART indicated there may be a need to shift the location of the Airport Transit Station approximately 60 m south (*makai*) of the Honolulu International Airport station location addressed in the Hammatt and Shideler (2011) AISP. This potential slight shift in the project cooridor, to provide access to the shifted station location, and the new station location itself, increased the project APE for archaeological cultural resources (defined as the area of direct project ground disturbance in the project PA). Accordingly, this possible

Alternate A Station site was addressed in an Addendum AISP (Hammatt and Shideler 2013) submitted to the SHPD for their review and approval.

As a result of consultation with SHPD, it was agreed that an additional seven test excavations would be added at the location of the Alternative A at the Airport Trasit Station. Two additional excavations were in the footprint of the guideway columns and five were in the footprint of the shifted station. These additions increased the total Airport Section 3 AIS testing locations from 40 to 47.

Of the total 47 Airport Section 3 test excavations, the majority were located within the footprint of proposed column foundations. A total of twenty-six (26) column foundation test excavations were spread throughout the project area. Additionally, one test excavation is located in the area of utility relocation within the vicinity of the Pearl Harbor Naval Base Station (Figure 16).

Subsurface testing is also focused on the three transit station locations within Construction Section 3 due to the relatively high density of subsurface impacts related to the stations' construction and also because the stations would be problematic to relocate owing to geographical and engineering constraints (see Figure 17, Figure 28, and Figure 35). A total of twenty (20) proposed test excavations were completed within the footprints of the three transit stations: Pearl Harbor Naval Base Station (five excavations); Honolulu International Airport Station (ten excavations—five each for the two proposed station locations); and Lagoon Drive Station (five excavations). Table 5 below is a comparison describing the original AISP testing locations from the Airport Section 3 AISP, to the actual testing locations, and it also lists the seven added testing locations for the Airport Alterative A, that are described in this AIS report. Table 5 includes figure references for AISP-described original test excavation locations (Figure 11 to Figure 40 in this Appendix C), and figure references for the actual excavation locations that are shown in figures in the main excavation summary Section 7.2 of the main AIS volume).

The need for any additional testing that might have been warranted was worked out in consultation with SHPD.

The greatest factors limiting the survey effort were:

- The survey area's large (9.06 acres), dispersed (4.8 miles) area
- The survey area's highly developed and highly active setting (in-use city streets, sidewalks, and buildings)
- The dense, complex array of existing subsurface utilities in the survey area

Table 5. Comparison Table of Where Test Excavations Were Intended (According to the Hammatt and Shideler 2011 AISP) in Comparison to Where They Were Actually Excavated

Test Excavation #	Comment
1	Excavated at Kalaoa Street/Kamehameha Hwy as indicated (compare Figure 11 in Appendix C to Figure 62 in Section 7 of the main document)

Test Excavation #	Comment
2	Excavated just north of Hālawa Stream as indicated (compare Figure 11 in Appendix C to Figure 62 in Section 7 of the main document)
3	Excavated just south of Hālawa Drive/Arizona Road as indicated but offset slightly (< 3m) to the south and re-oriented east/west (compare Figure 12 in Appendix C to Figure 69 in Section 7 of the main document)
4	Excavated just south of Hālawa Drive/Arizona Road as indicated (compare Figure 12 in Appendix C to Figure 69 in Section 7 of the main document)
5	Relocated just slightly from the east side of Kamehameha Hwy. to center of Hwy as column location was re-designed (compare Figure 15 in Appendix C to Figure 78 in Section 7 of the main document)
6	Excavated at NE corner of Kamehameha Highway and Radford Drive as indicated but shifted approx. 20 m to the NW (compare Figure 16 in Appendix C to Figure 82 in Section 7 of the main document)
7	Same location at Pearl Harbor Naval Base footprint, (compare Figure 17 in Appendix C to Figure 86 in Section 7 of the main document)
8	Same location at Pearl Harbor Naval Base footprint (compare Figure 17 in Appendix C to Figure 86 in Section 7 of the main document)
9	Same location at Pearl Harbor Naval Base footprint (compare Figure 17 in Appendix C to Figure 86 in Section 7 of the main document)
10	Same location at Pearl Harbor Naval Base footprint (compare Figure 17 in Appendix C to Figure 86 in Section 7 of the main document)
11	Same location at Pearl Harbor Naval Base footprint (compare Figure 17 in Appendix C to Figure 86 in Section 7 of the main document)
12	Same location on Kamehameha Highway just north of Center Drive (compare Figure 18 in Appendix C to Figure 103 in Section 7 of the main document)
13	Same location along Makai Frontage Road (compare Figure 19 in Appendix C to Figure 107 in Section 7 of the main document)
14	Same location along Makai Frontage Road, just rotated 90^{o} (compare Figure 20 in Appendix C to Figure 111 in Section 7 of the main document)
15	Same location southwest of the H-1 Freeway (compare Figure 21 in Appendix C to Figure 115 in Section 7 of the main document)
16	Same location southwest of the H-1 Freeway (compare Figure 21 in Appendix C to Figure 115 in Section 7 of the main document)
17	Same location south of the H-1 Freeway and just east of Valkenburgh Street (compare Figure 22 in Appendix C to Figure 122 in Section 7 of the

Test Excavation #	Comment
	main document)
18	Off-set 40 m to next column foundation to the east on the south (*makai*) side of the H-1 Freeway, east of Main Street and west of Elliott Street (compare Figure 23 in Appendix C to Figure 126 in Section 7 of the main document)
19	Same location south of the H-1 Freeway (compare Figure 24 in Appendix C to Figure 130 in Section 7 of the main document)
20	Off-set 40 m to the south (*makai*) on Aolele Street (compare Figure 25 in Appendix C to Figure 134 in Section 7 of the main document)
21	Off-set 70 m to the south side of Rodgers Blvd. (compare Figure 26 in Appendix C to Figure 137 in Section 7 of the main document)
22	Repositioned slightly within refined Honolulu International Airport Station footprint (compare Figures 27 and 28 in Appendix C to Figures 141 and 143 in Section 7 of the main document)
23	Repositioned slightly within refined Honolulu International Airport Station footprint (compare Figures 27 and 28 in Appendix C to Figures 141 and 143 in Section 7 of the main document)
24	Repositioned slightly within refined Honolulu International Airport Station footprint (compare Figures 27 and 28 in Appendix C to Figures 141 and 143 in Section 7 of the main document)
25	Repositioned slightly within refined Honolulu International Airport Station footprint (compare Figures 27 and 28 in Appendix C to Figures 141 and 143 in Section 7 of the main document)
26	Repositioned slightly within refined Honolulu International Airport Station footprint (compare Figures 27 and 28 in Appendix C to Figures 141 and 143 in Section 7 of the main document)
27	Same location on Ala Onaona Street (compare Figure 29 in Appendix C to Figure 159 in Section 7 of the main document)
28	Additional trench just east of Aolele Street/Aolewa Place (compare Figure 30 in Appendix C to Figure 163 in Section 7 of the main document)
29	Off-set 40 m east on Aolele Street towards Aolewa Place (compare Figure 30 in Appendix C to Figure 163 in Section 7 of the main document)
30	Off-set 50 m to the NE along Aolele Street (compare Figure 32 in Appendix C to Figure 171 in Section 7 of the main document)
31	Same location on Ualena Street (compare Figure 33 in Appendix C to Figure 175 in Section 7 of the main document)

Test Excavation #	Comment
32	Off-set 25 m north within Makai Station Entrance Building (compare Figures 34 and 35 in Appendix C to Figure 179 in Section 7 of the main document)
33	Moved 3 m north within Mauka Station Entrance Building (compare Figures 34 and 35 in Appendix C to Figure 179 in Section 7 of the main document)
34	Slightly angled within Makai Station Entrance Building (compare Figures 34 and 35 in Appendix C to Figure 179 in Section 7 of the main document)
35	Moved 7 m south within Lagoon Drive Station footprint (compare Figures 34 and 35 in Appendix C to Figure 179 in Section 7 of the main document)
36	Same location within Lagoon Drive Station (compare Figures 34 and 35 in Appendix C to Figure 179 in Section 7 of the main document)
37	Same location SE of Waiwai Loop (compare Figure 36 in Appendix C to Figure 198 in Section 7 of the main document)
38	Same location at Keʻehi Lagoon Park (compare Figure 36 in Appendix C to Figure 198 in Section 7 of the main document)
39	Same location at Keʻehi Lagoon Park (compare Figure 37 in Appendix C to Figure 205 in Section 7 of the main document)
40	Off-set 70 m west at the Nimitz/Kamehameha Hwy./Middle Street interchange (compare Figure 39 in Appendix C to Figure 210 in Section 7 of the main document)
41	New Test Excavation added on the south side of Rodgers Blvd. (compare Figure 26 in Appendix C to Figure 137 in Section 7 of the main document)
42	Additional Test Excavation *makai* of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (compare Figure 27 in Appendix C to Figures 141 and 142 in Section 7 of the main document)
43	Additional Test Excavation *makai* of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (compare Figure 27 in Appendix C to Figures 141 and 142 in Section 7 of the main document)
44	Additional Test Excavation *makai* of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (compare Figure 27 in Appendix C to Figures 141 and 142 in Section 7 of the main document)
45	Additional Test Excavation *makai* of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (compare

Test Excavation #	Comment
	Figure 27 in Appendix C to Figures 141 and 142 in Section 7 of the main document)
46	Additional Test Excavation *makai* of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (compare Figure 27 in Appendix C to Figures 141 and 142 in Section 7 of the main document)
47	Additional Test Excavation *makai* of Honolulu International Airport Station at Honolulu International Airport Station Alt. A footprint (compare Figure 27 in Appendix C to Figure 141 in Section 7 of the main document)

1.10 Decisions for Additional AIS Testing

The overall objective of the archaeological cultural resource identification activities described in this AISP was to locate and document archaeological cultural resources that could be affected by project construction. Once identified, these archaeological deposits were investigated and recorded in sufficient detail so that their significance could be assessed and the project's potential effect on significant archaeological deposits could be evaluated.

The AIS investigation also strove to provide information to project engineers that would allow for the avoidance of significant archaeological deposits, particularly burials, during the Airport Segment 3 construction. The current sampling strategy was based on preliminary engineering, and the results of this Airport AIS will help inform the interim and final engineering. There is some flexibility in the placement of the project's construction components, for example support columns can be shifted up to 30 feet parallel to the HHCTCP corridor alignment. Using this limited engineering flexibility for certain construction components, and the information from the AIS, the project engineers will attempt to find a design and engineering solution whereby project construction will avoid significant archaeological deposits. Only if no solution is possible will mitigation measures, such as archaeological data recovery, archaeological monitoring, and burial relocation, be considered.

The survey area for the Airport AIS (and the APE) was confined to the area of direct, project-related ground disturbance. The AIS investigation was limited to that area. Accordingly, additional testing beyond the initial 40 test excavations, where determined appropriate, were located within the project footprint. Test excavations were not expanded outside of that footprint.

1.10.1 Additional AIS Testing at the Location of Archaeological Discovery

The actual number and location of additional testing locations in the vicinity of a find depended on various factors, including the type of archaeological resource found, the surrounding existing built environment, and the location—based on preliminary engineering—of project infrastructure that is planned for the location of the find. The actual number and location of additional testing locations was decided on a case-by-case basis, based on these factors and in consultation with the City and SHPD.

1.11 Sampling Strategy Summary

The AISP served as a framework to guide the archaeological inventory survey work. This section details the subsurface sampling strategy that was the primary means of archaeological cultural resource inventory.

Some 47 specific locations for archaeological test excavations were sampled within the Airport Section 3 corridor. All 47 excavations could be carried out, with only minor deviations based on built environment constraints (e.g. existing utilities). The SHPD was kept in close consultation regarding the need to excavation location shifts and the need for additional AIS testing locations.

The proposed 40 specific locations for archaeological test excavations described in the AISP were regarded as an initial systematic sampling strategy. As described above, finds of human skeletal remains, and /or any other significant archaeological finds, and/or specific types of sediments were to lead to consultation regarding the need for additional testing. The anticipation was that additional test excavations needed would have been undertaken within the project preliminary engineering footprint in the vicinity of areas that require additional investigation. Specific additional testing strategies were to be developed, if needed, in consultation with SHPD, the City, and project engineers. The only need for additional testing was related to the Airport Station Alternative A, described above.

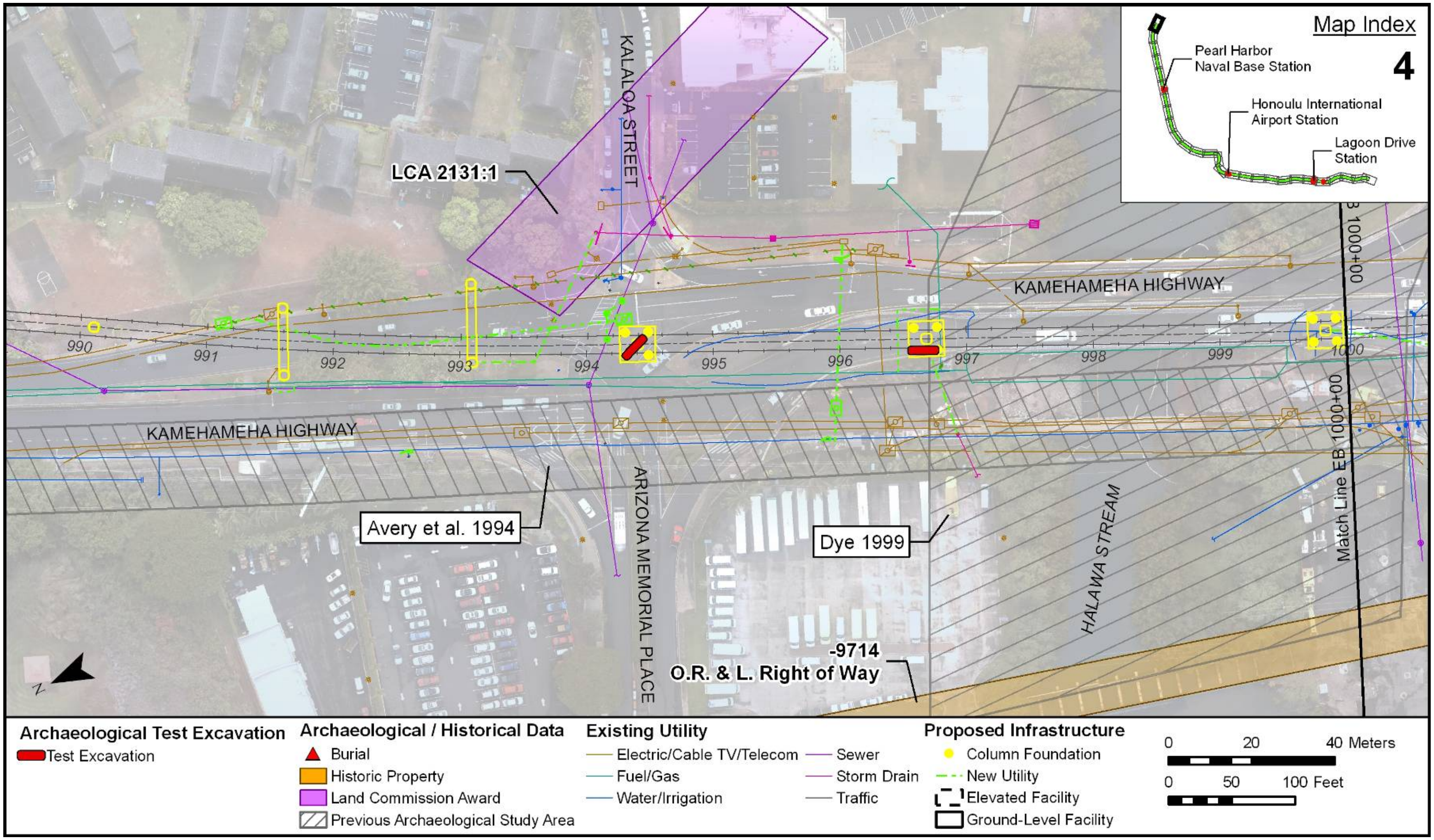

Figure 11. Map Sheet J 4 (near Kalaloa Street), two 20x2 excavations at column foundations @ 994+40 & 996+70

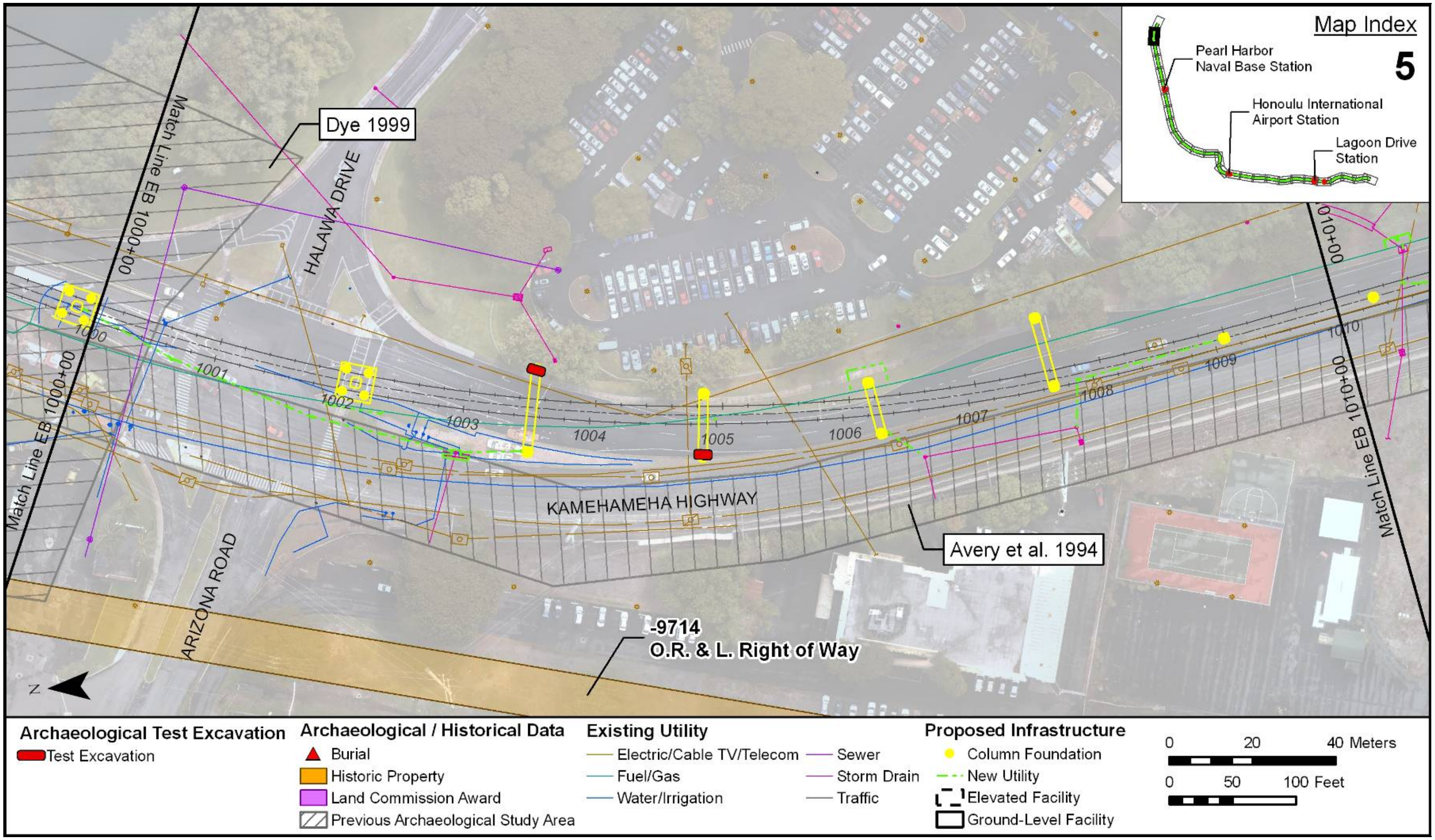

Figure 12. Map Sheet J 5 (near Hālawa Drive), two 10x3 excavations at column foundations @ 1003+60 *mauka* of two & 1004+90

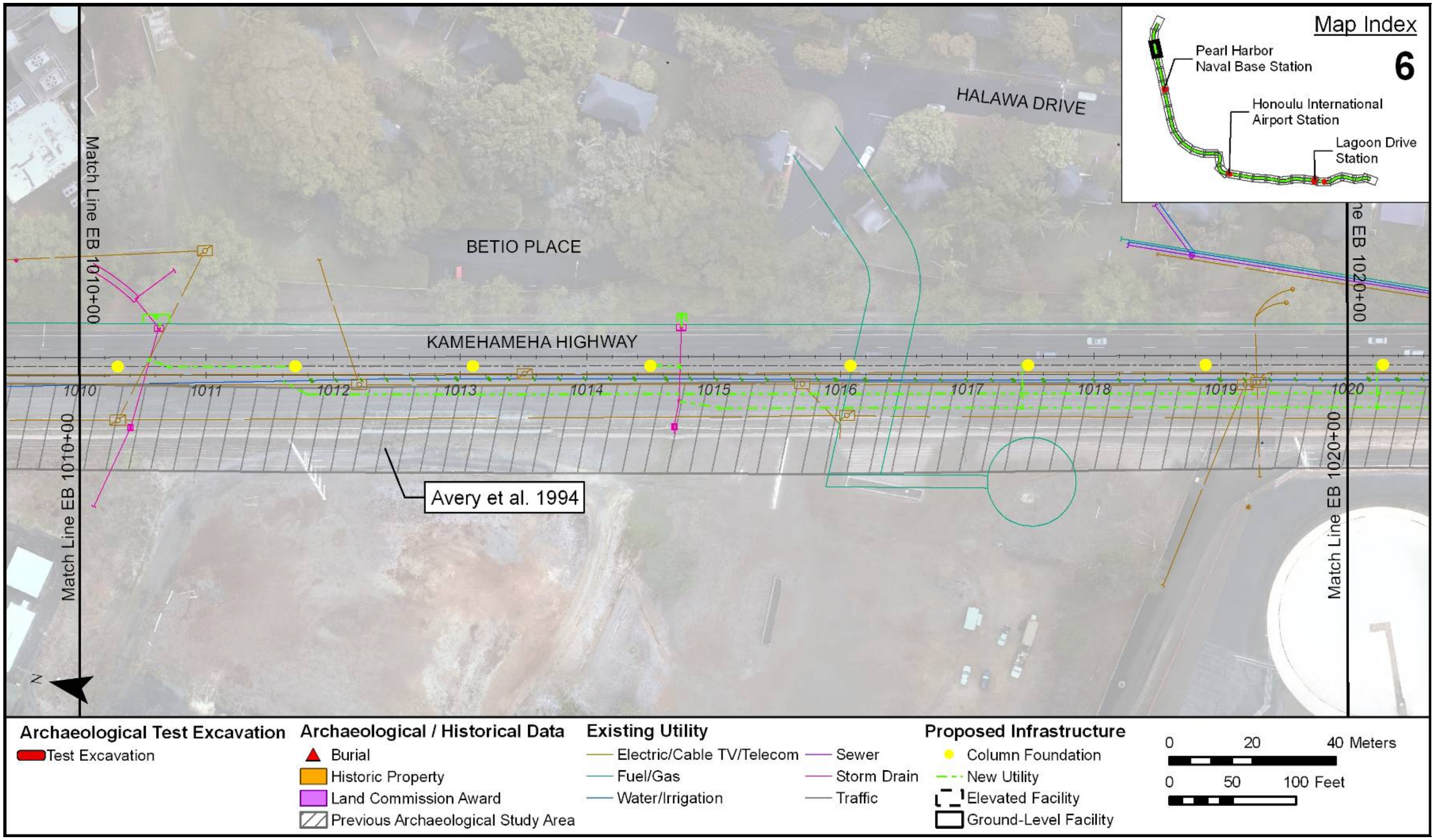

Figure 13. Map Sheet J 6, no testing (traffic constraints)

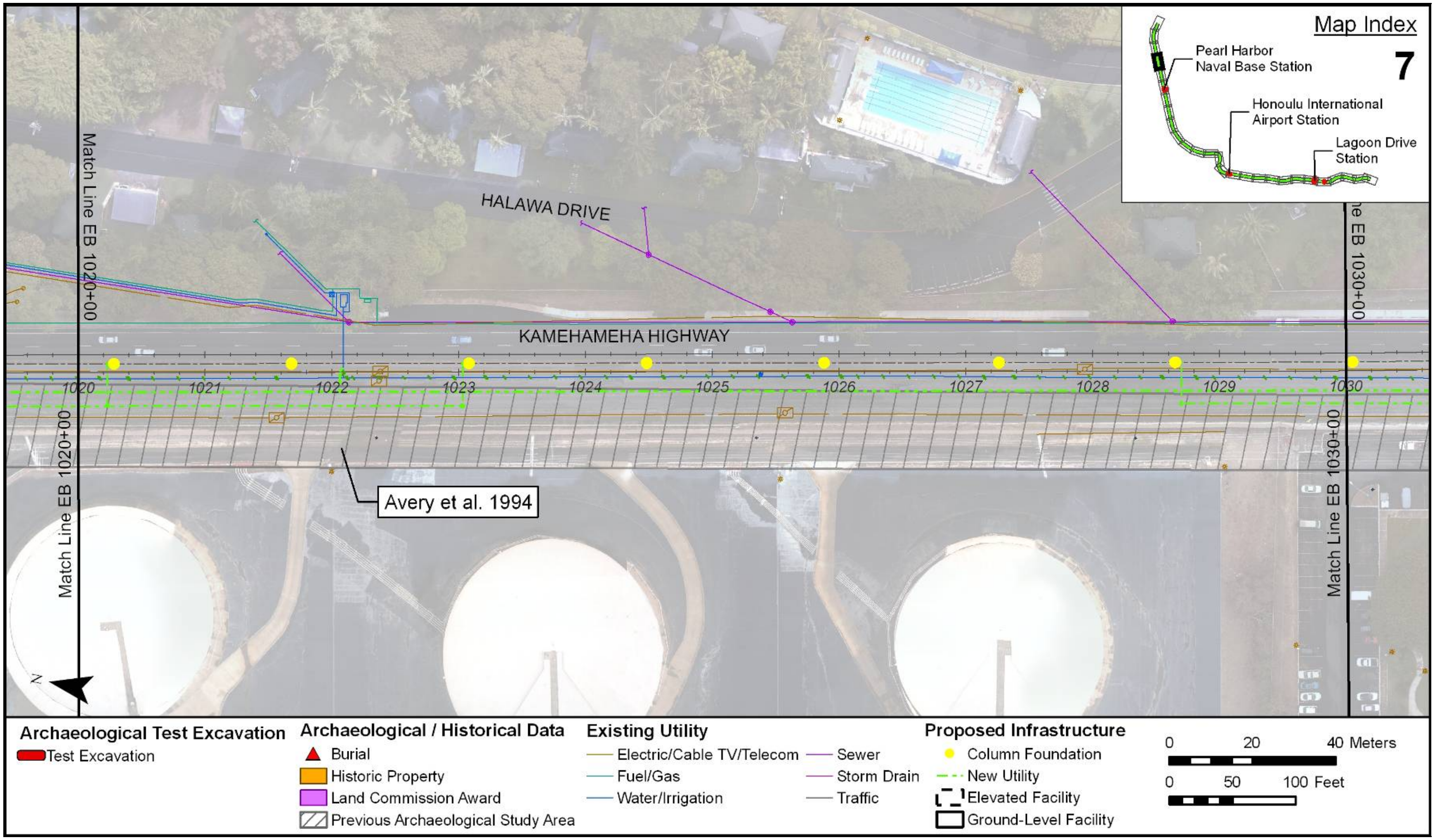

Figure 14. Map Sheet J 7, no testing (traffic constraints)

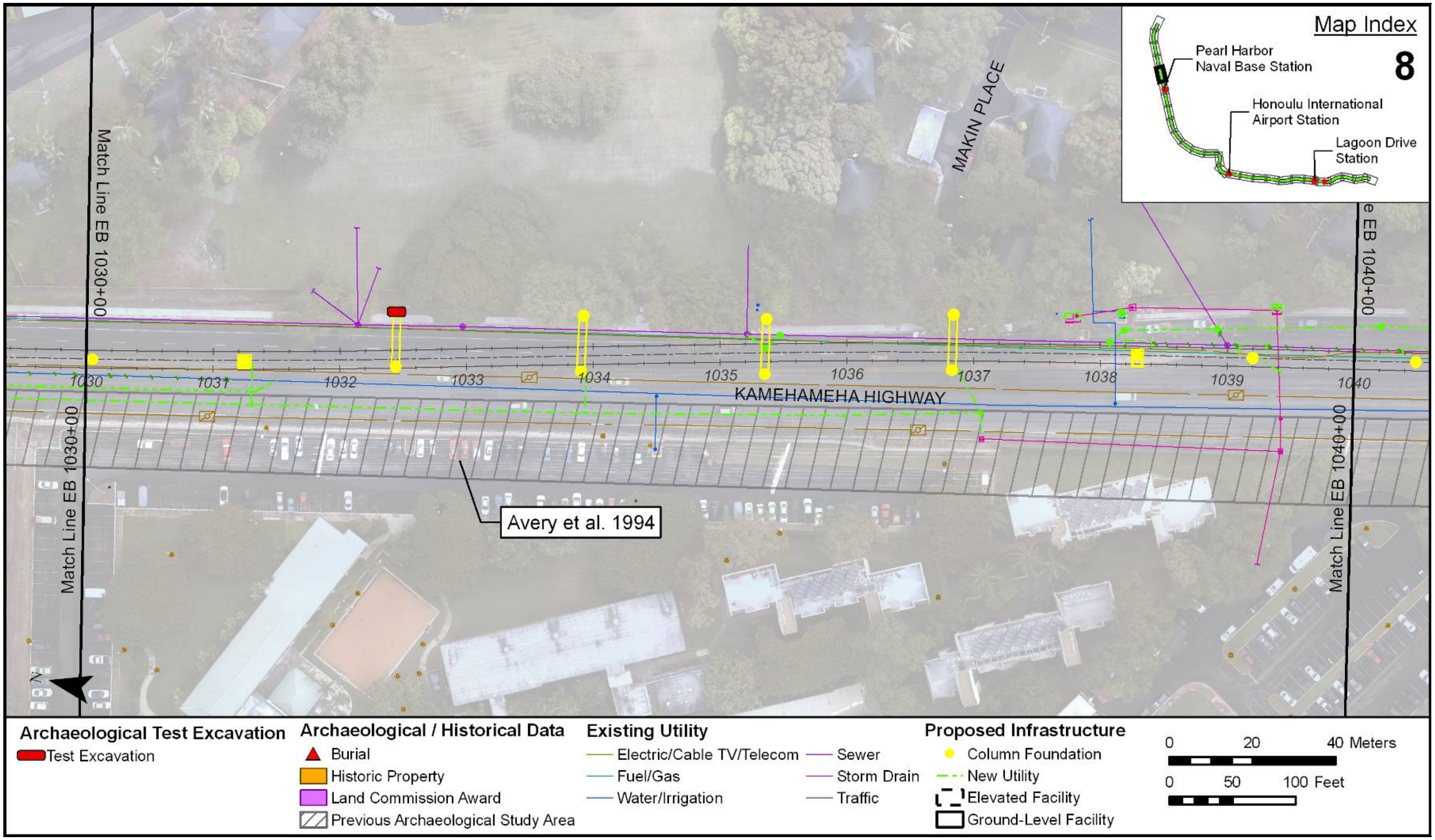

Figure 15. Map Sheet J 8, one 10x3 excavations at *mauka* Column foundation @ 1032+40

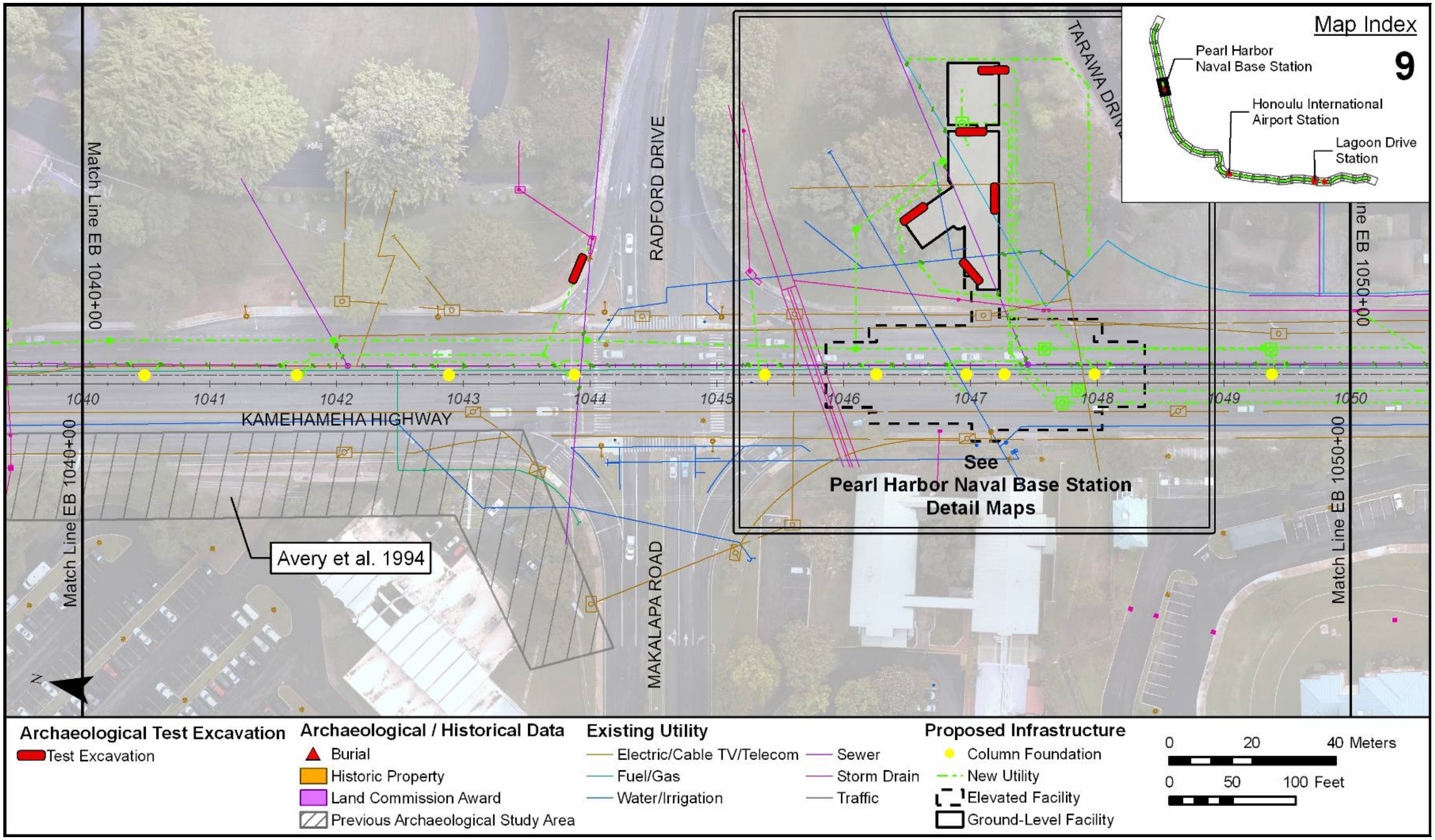

Figure 16. Map Sheet J 9 (near Radford Drive), one 20x2 excavation at utility relocation (24” storm drain) @ 1043+90 (see Station testing layout on following figure)

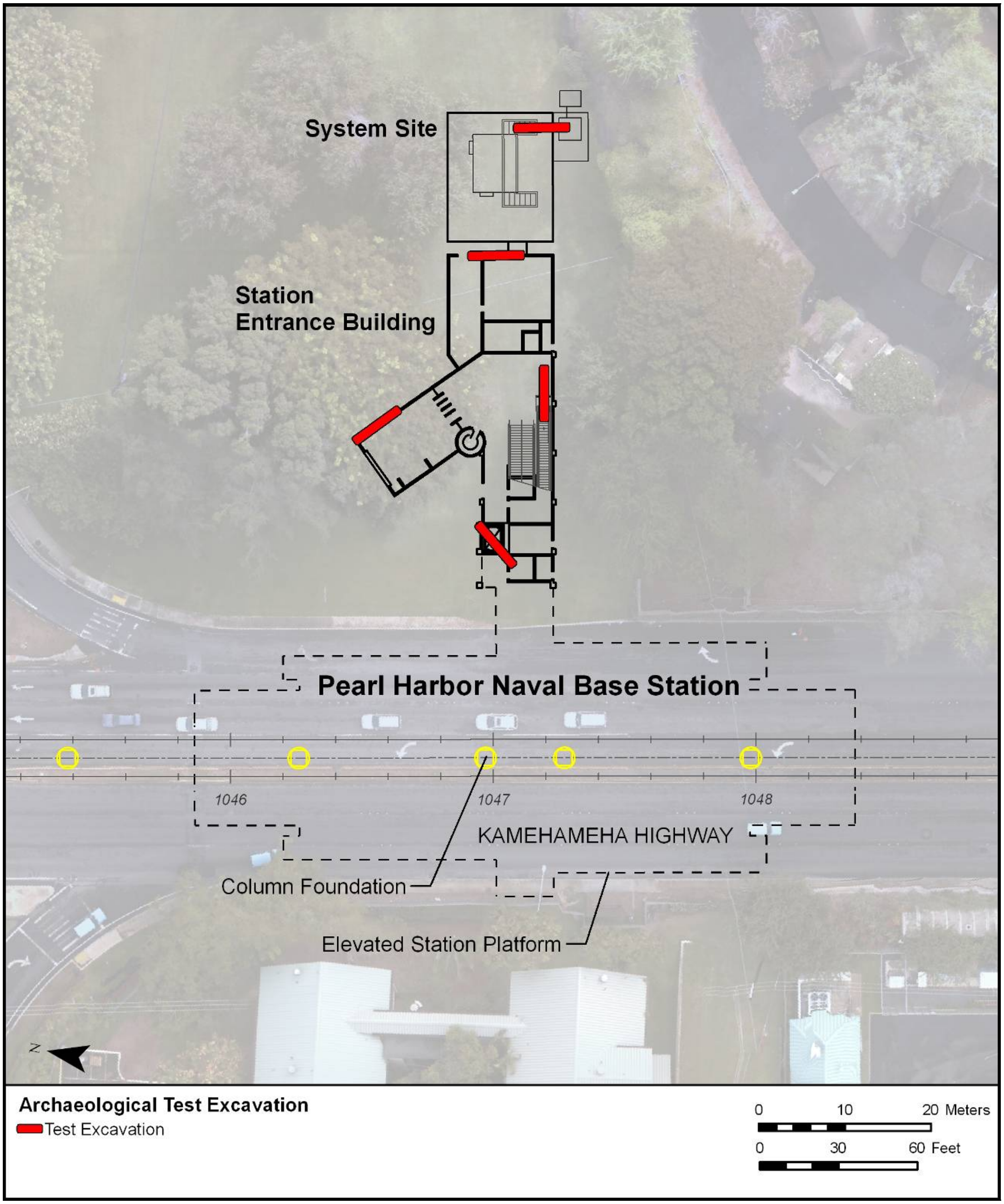

Figure 17. Map Sheet J 9, Pearl Harbor Naval Base Station, east of Radford Drive (five 20x2 test excavations proposed)

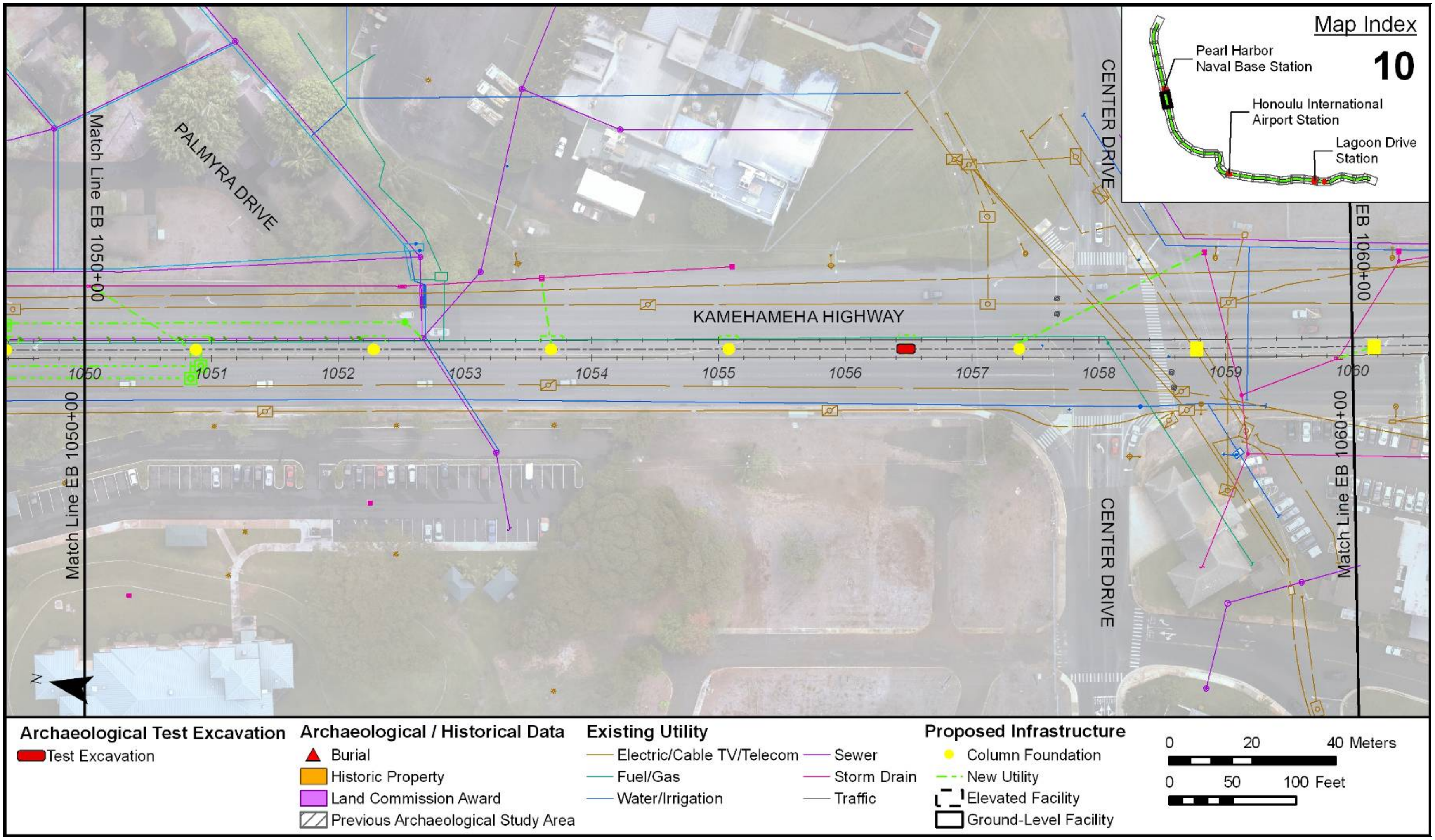

Figure 18. Map Sheet J 10 (near Center Drive), one 10x3 excavation at column foundation @ 1056+50

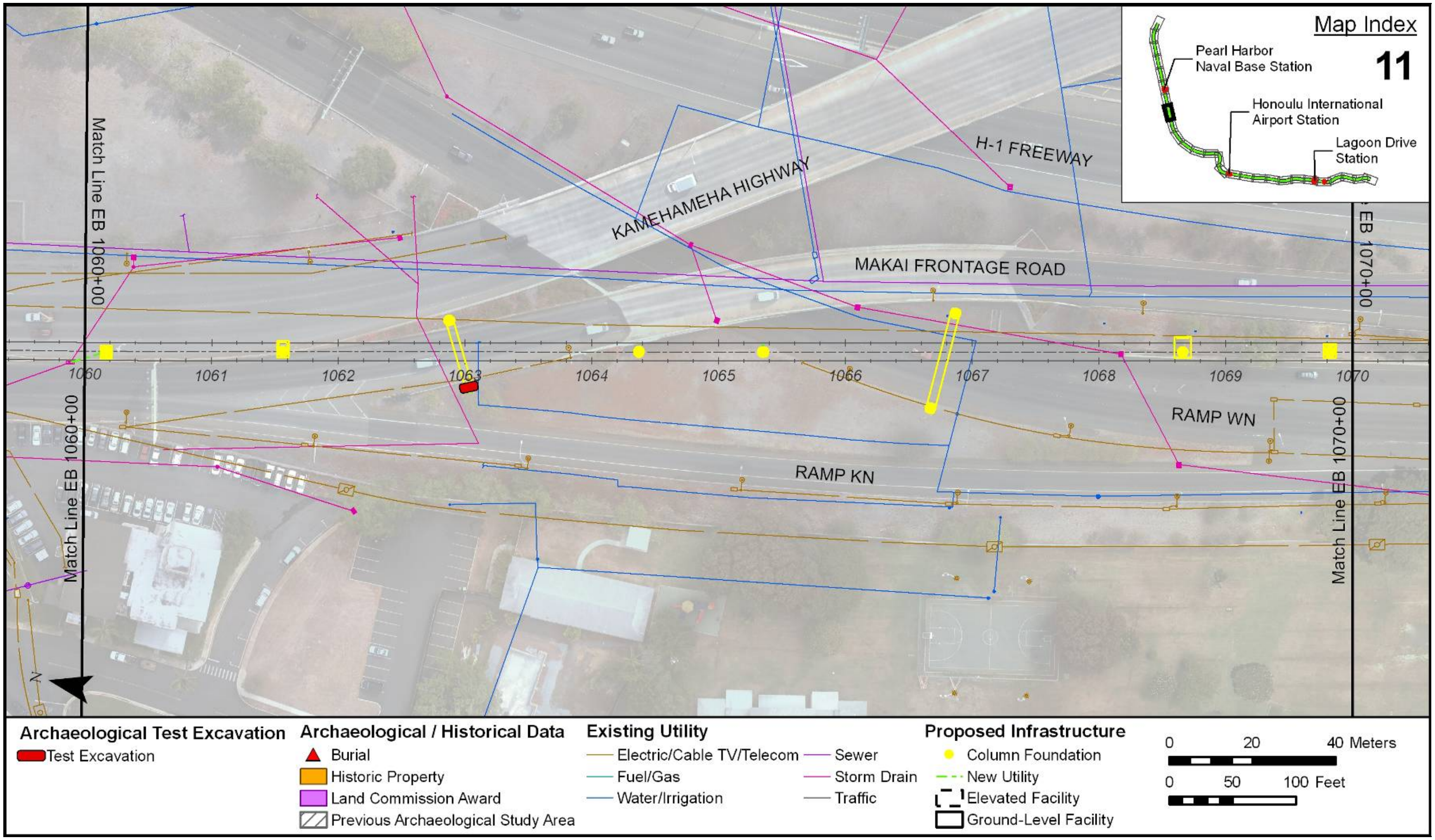

Figure 19. Map Sheet J 11 (near Makai Frontage Road), one 10x3 excavation at *makai* column foundation @ 1063+00

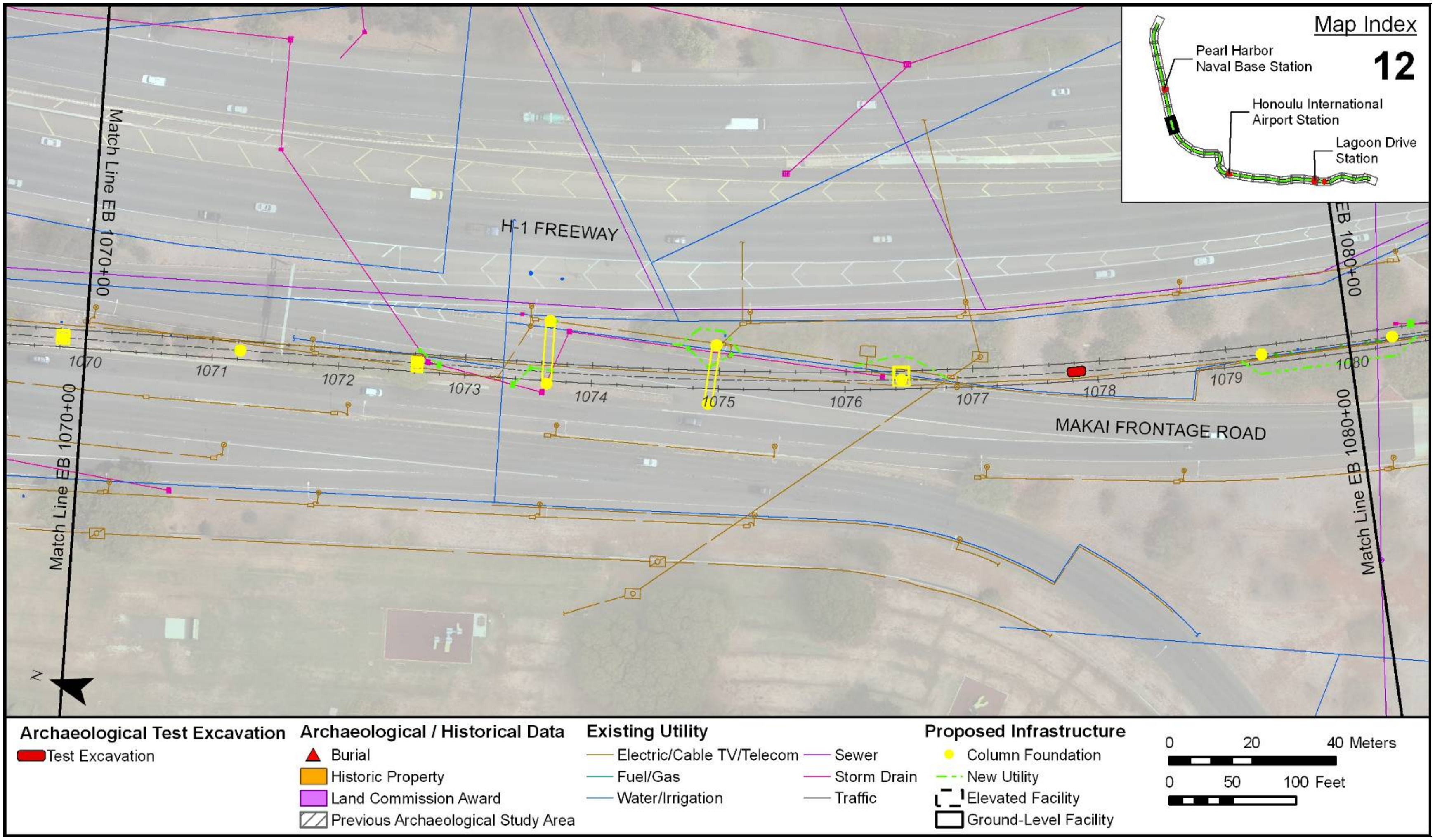

Figure 20. Map Sheet J 12, one 10x3 excavation at column foundation @ 1077+80

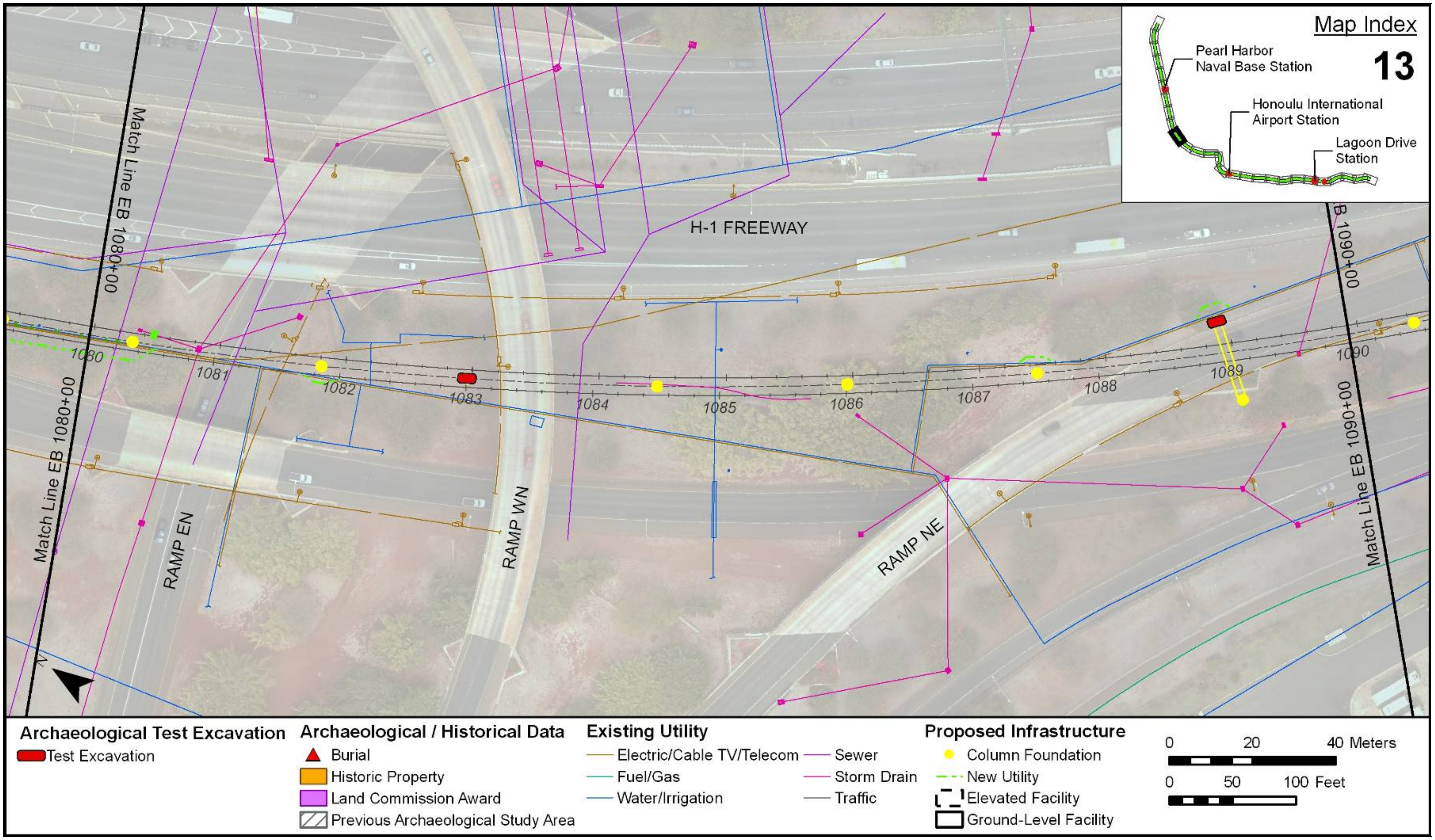

Figure 21. Map Sheet J 13, two 10x3 column foundation excavations @ 1083+00 & (*mauka)* 1089+00

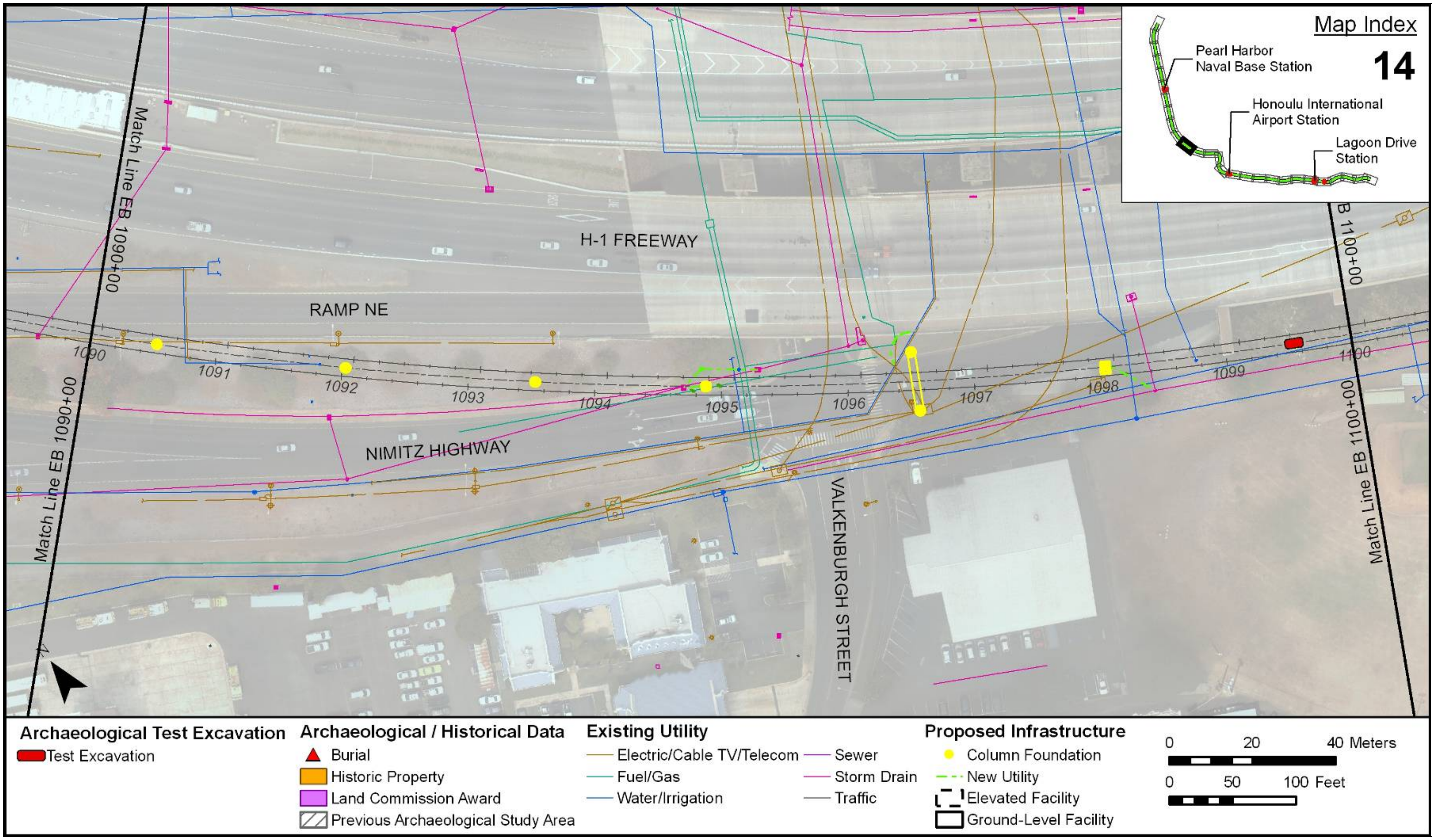

Figure 22. Map Sheet J 14, one 10x3 excavation at column foundation @ 1099+50

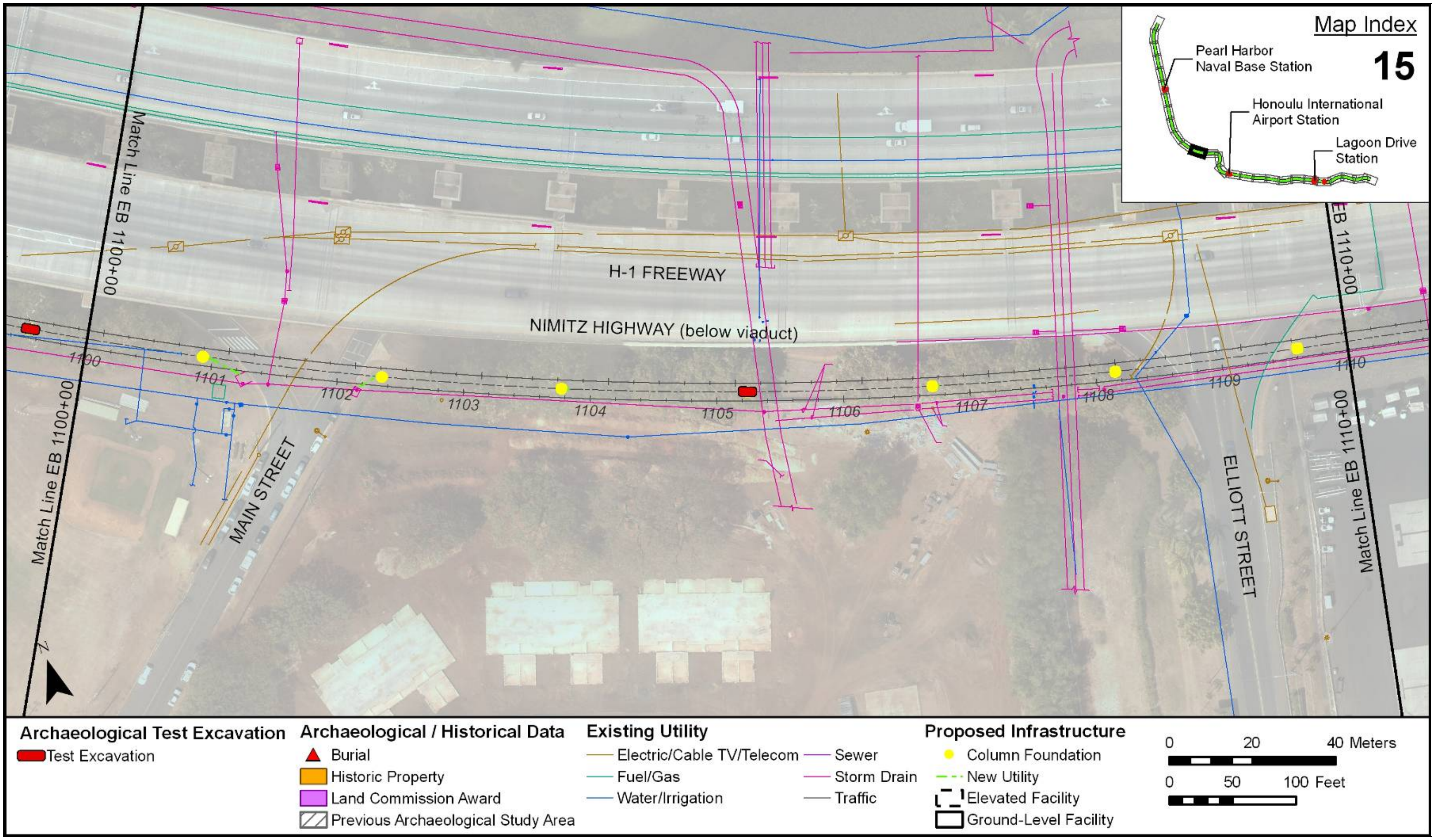

Figure 23. Map Sheet J-15, one 10x3 excavation at column foundation @ 1105+20

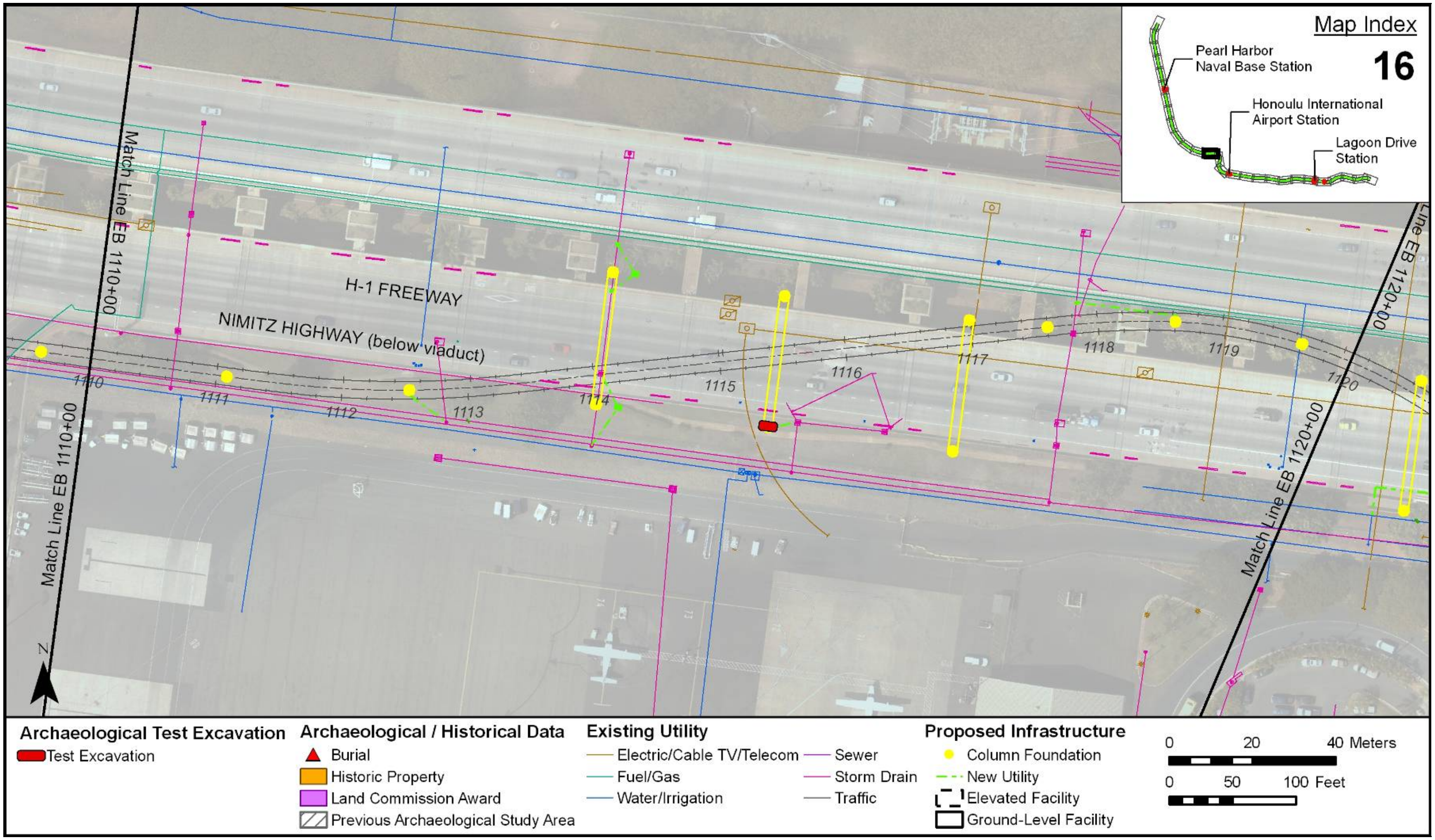

Figure 24. Map Sheet J 16, one 10x3 excavation at (*makai*) column foundation @ 1115+30

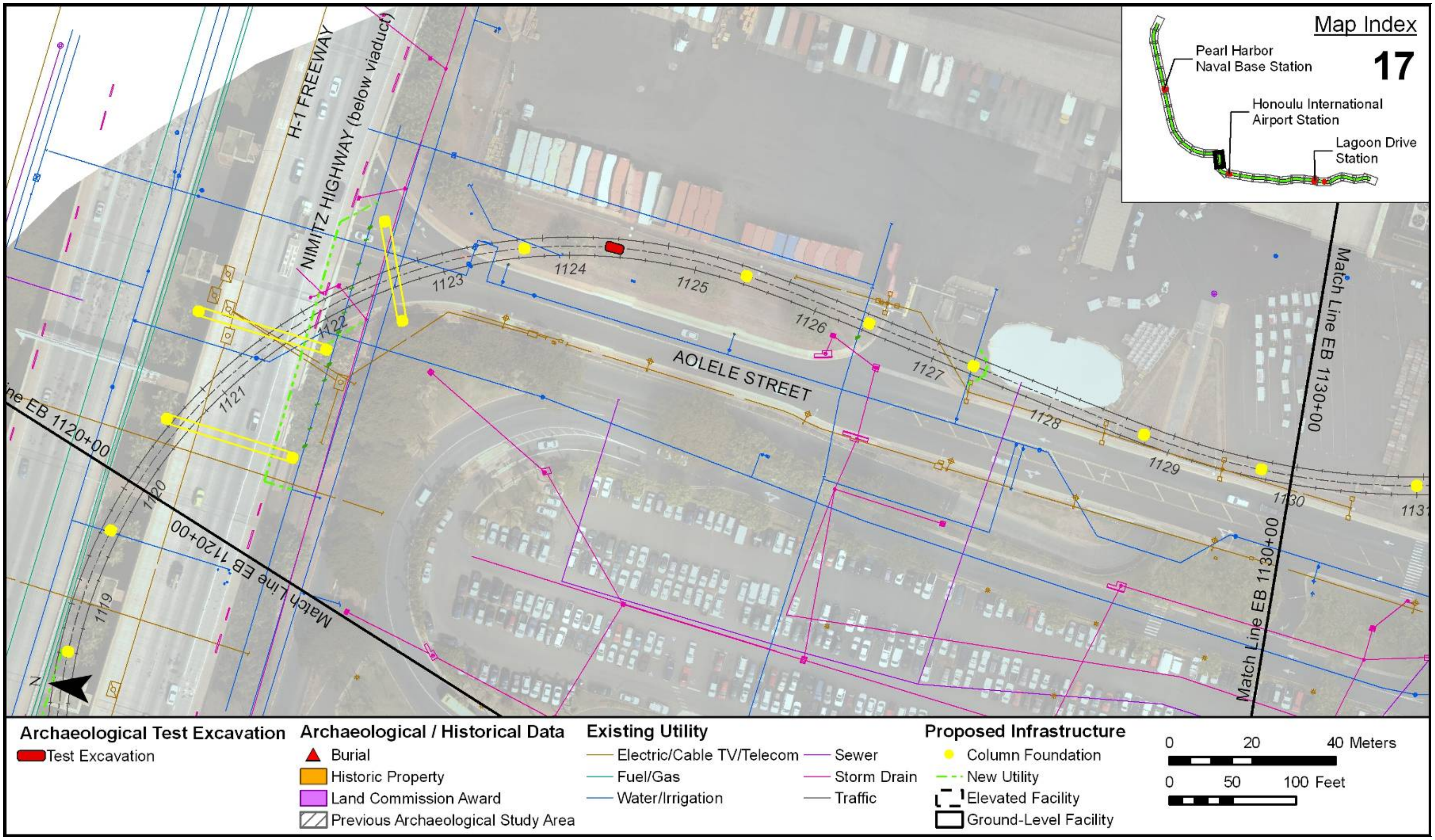

Figure 25. Map Sheet J 17, one 10x3 excavation at column foundation @ 1124+ 30

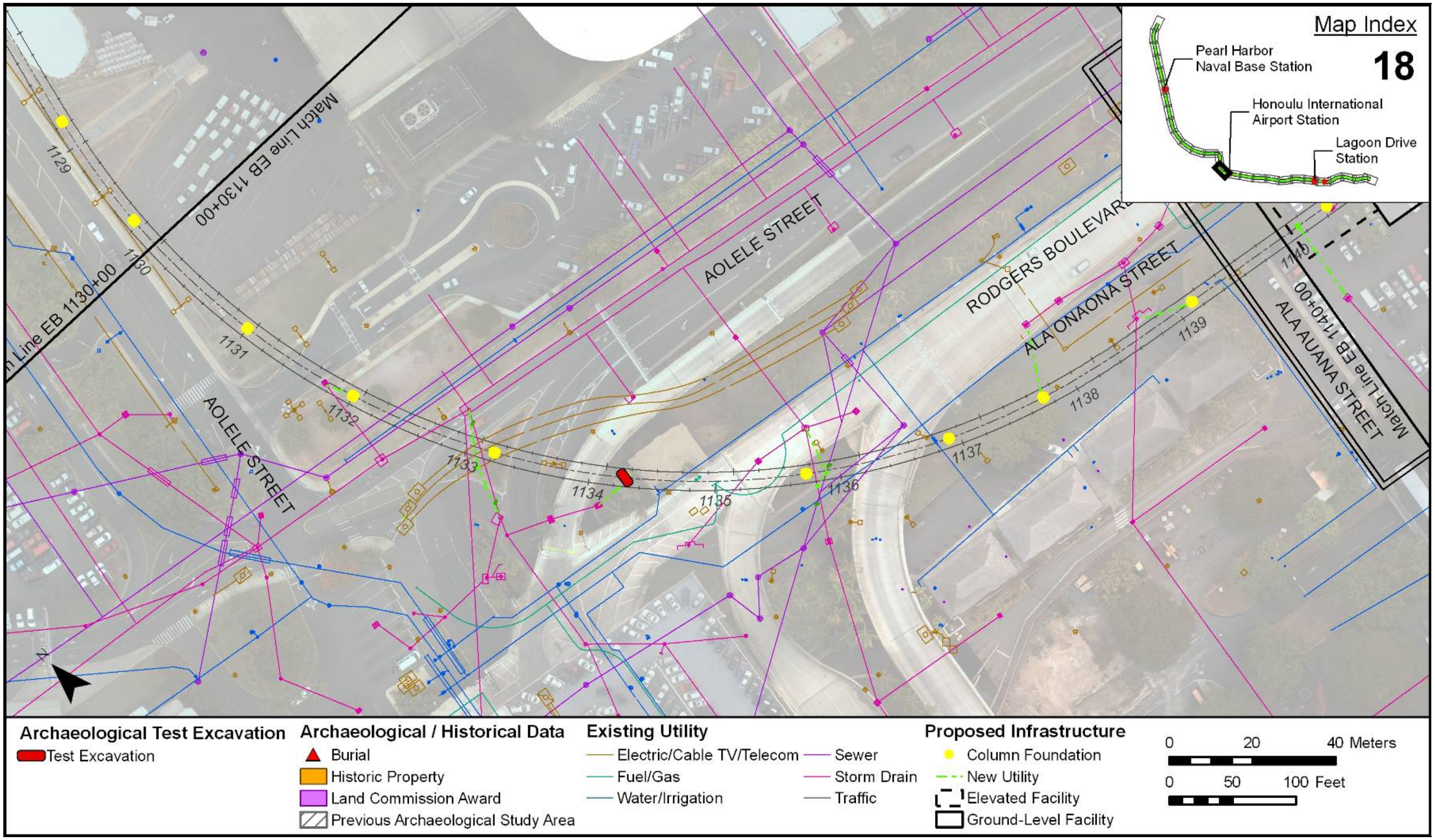

Figure 26. Map Sheet J 18, one 10x3 excavation at column foundation @ 1134+ 30

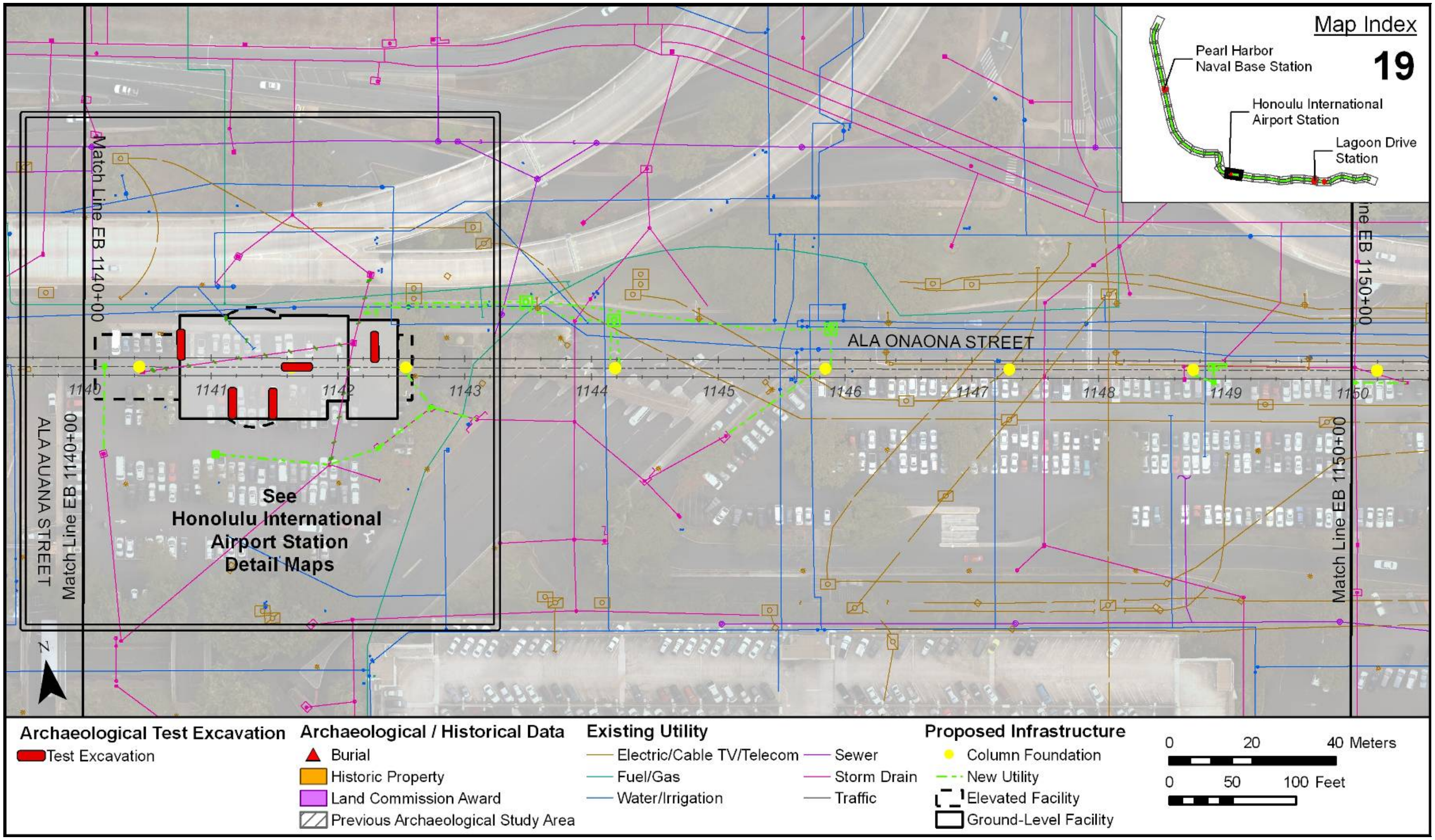

Figure 27. Map Sheet J 19, none (see Station discussion below)

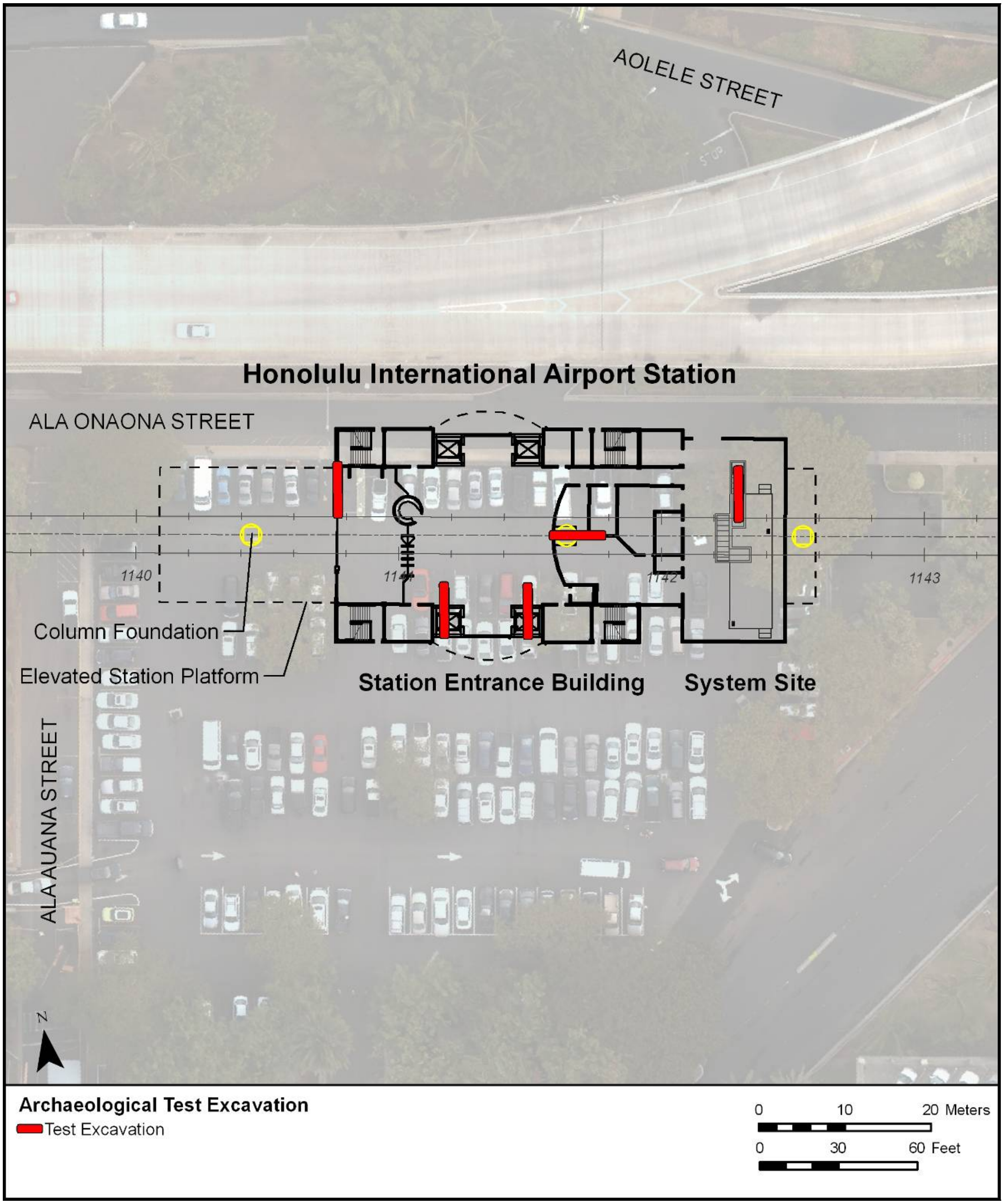

Figure 28. Map Sheet J-19, Honolulu International Airport Station (5 test excavations)

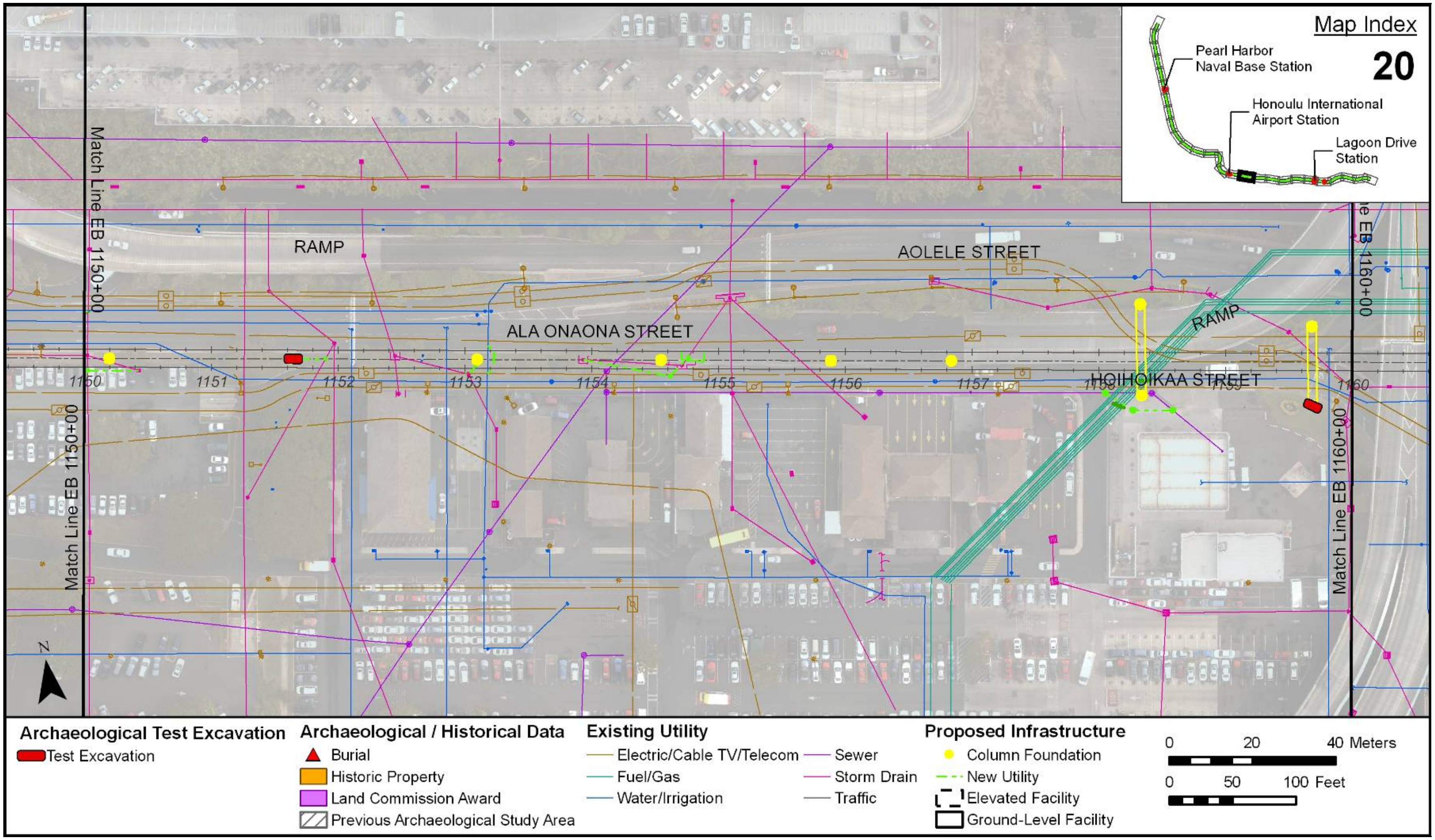

Figure 29. Map Sheet J 20, two 10x3 column foundation excavations @ 1151+60 & 1159+ 70 (*makai*)

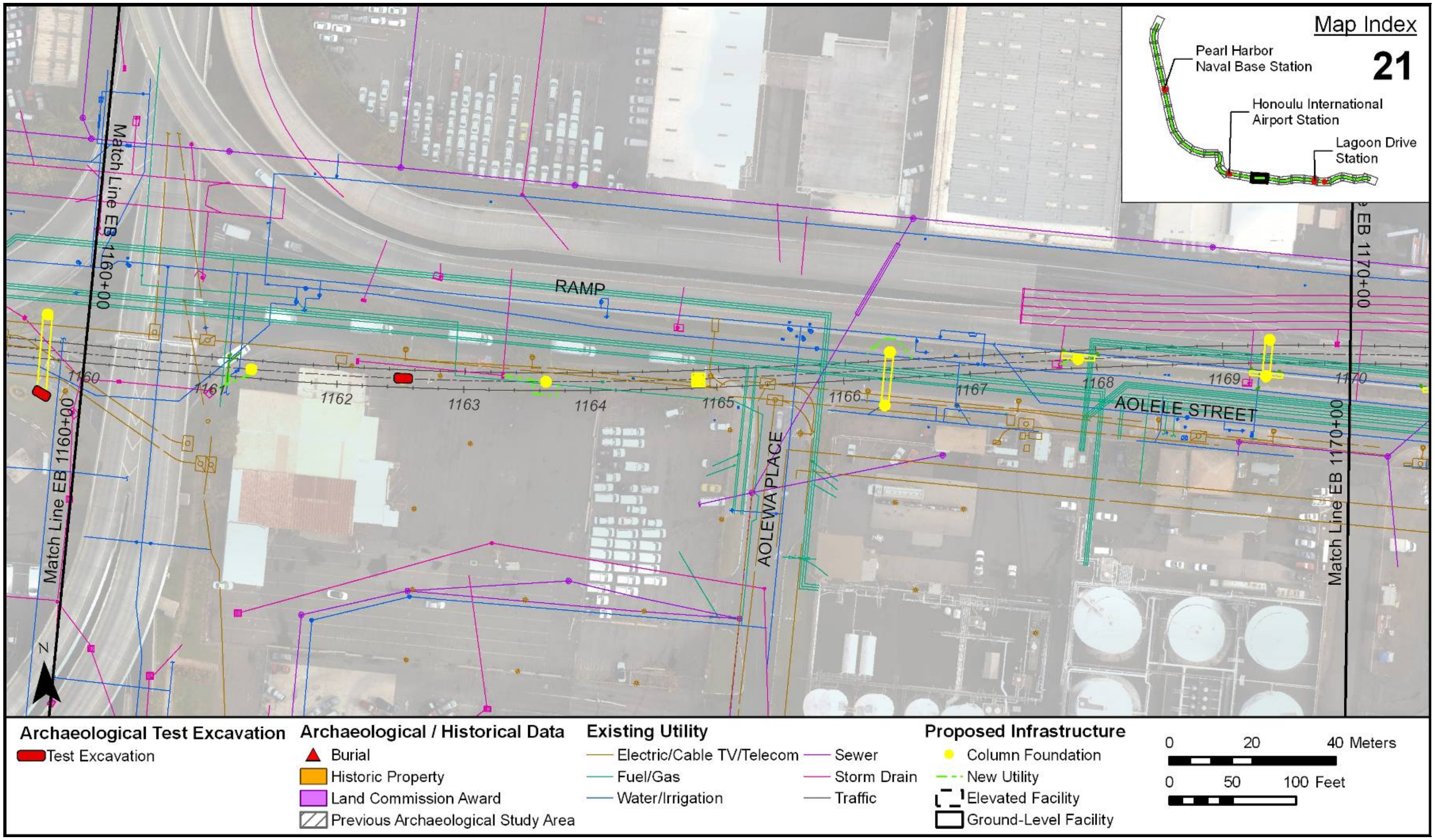

Figure 30. Map Sheet J 21, one 10x3 excavation at (*makai*) column foundation @ 1162+50

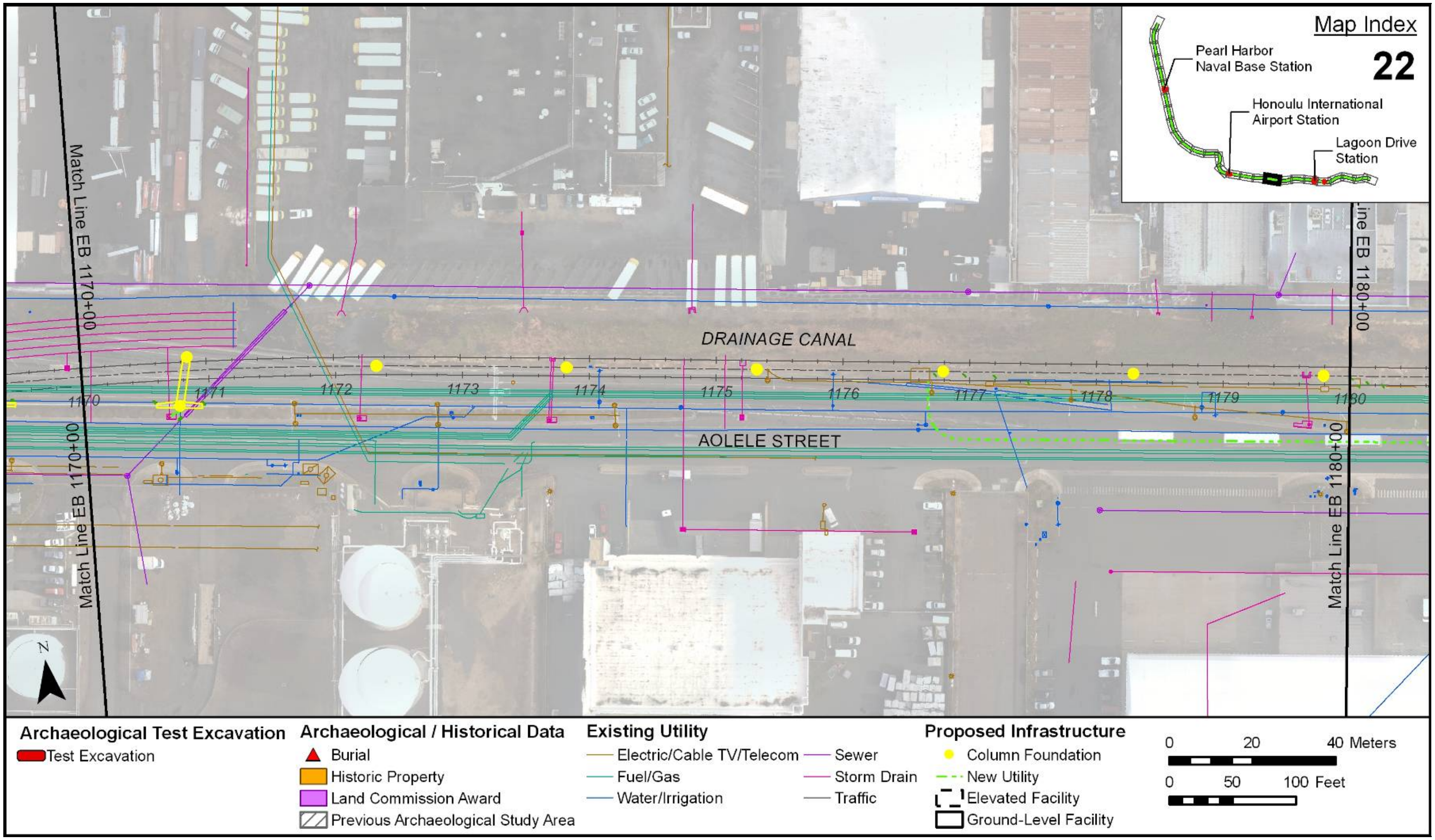

Figure 31. Map Sheet J 22, none

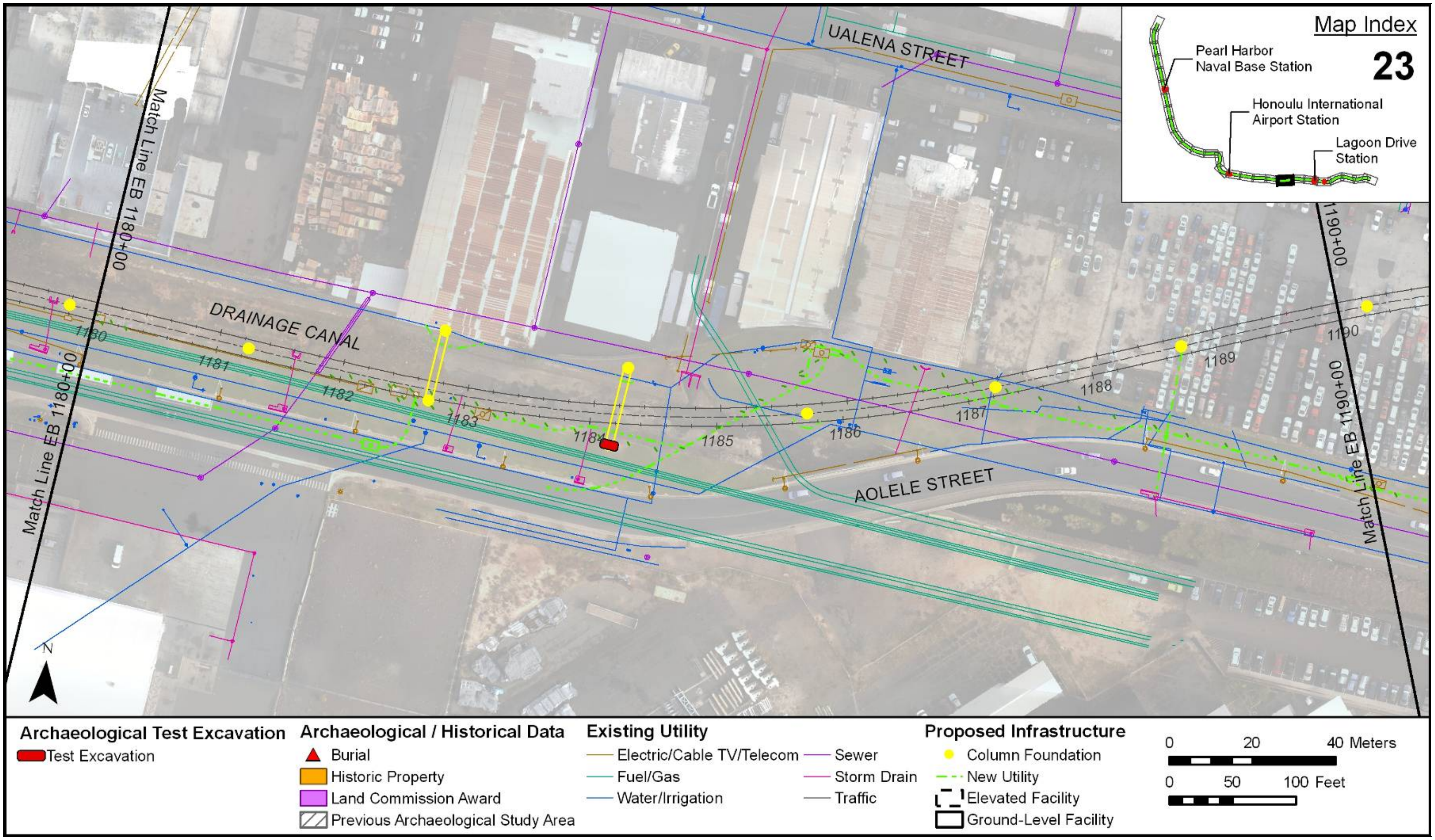

Figure 32. Map Sheet J 23, one 10x3 excavation at (*makai*) column foundation @ 1184+20

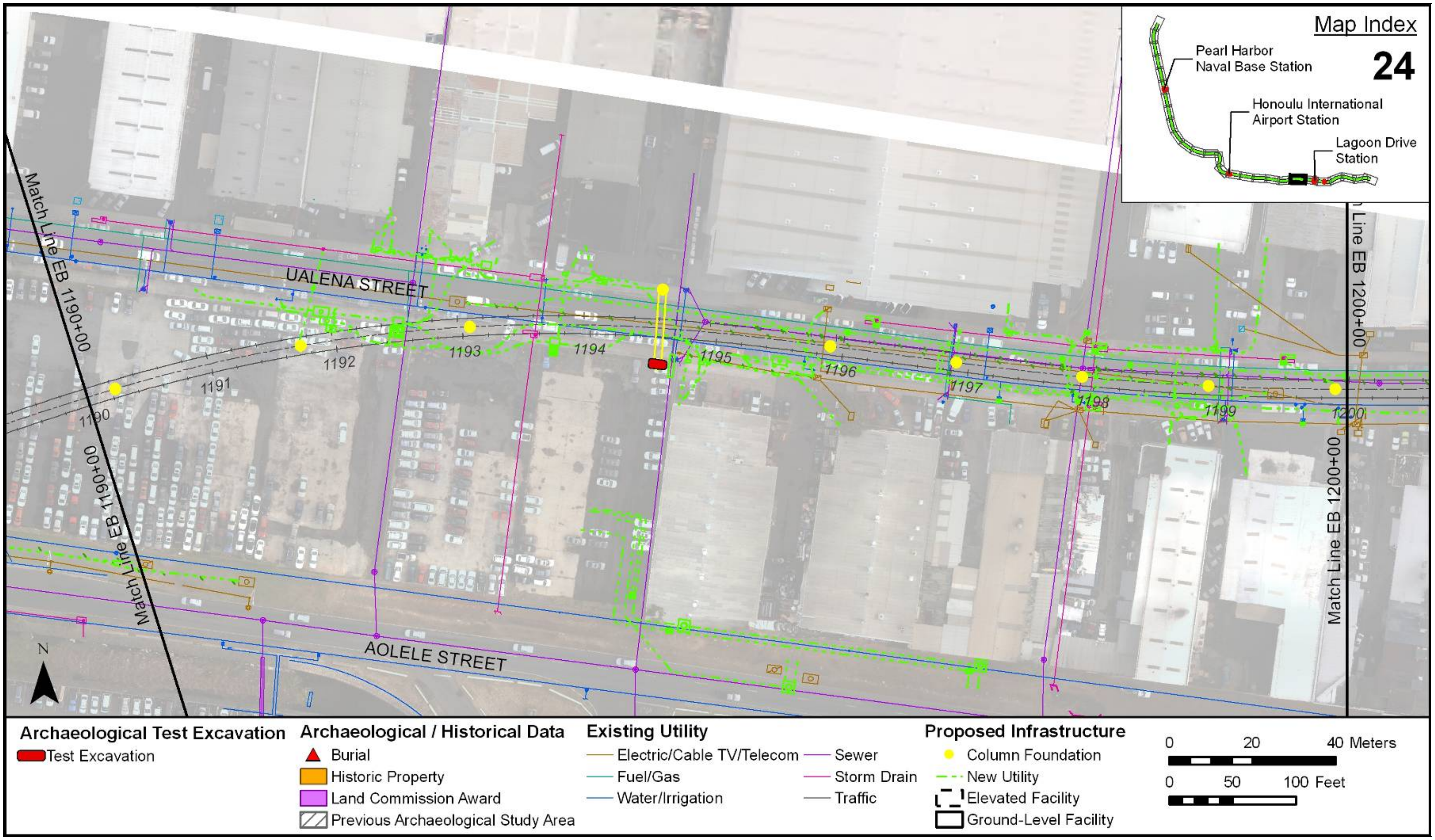

Figure 33. Map Sheet J 24, one 10x3 excavation at (*makai*) column foundation @ 1194+50

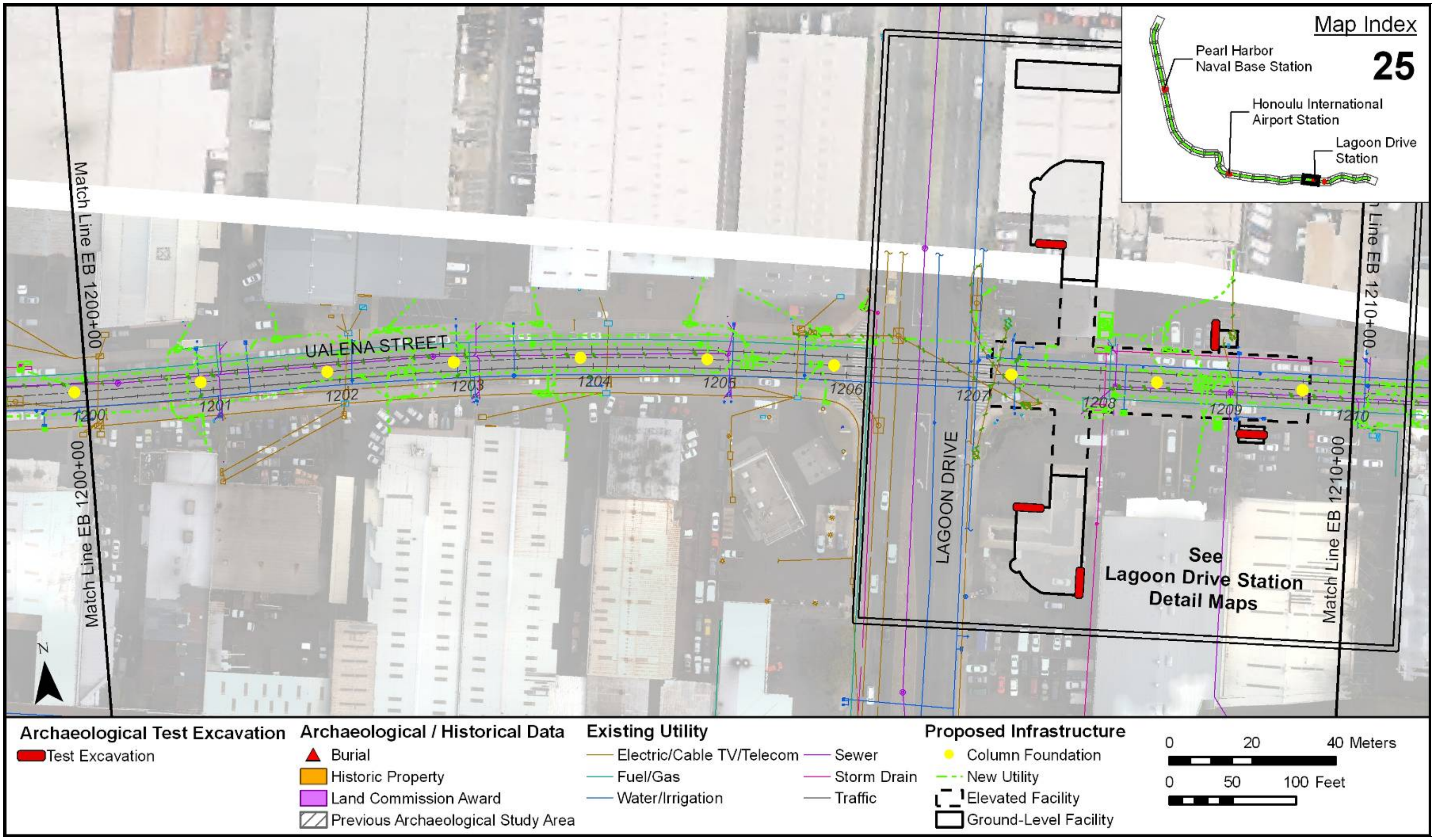

Figure 34. Map Sheet J 25, none (see Station discussion below)

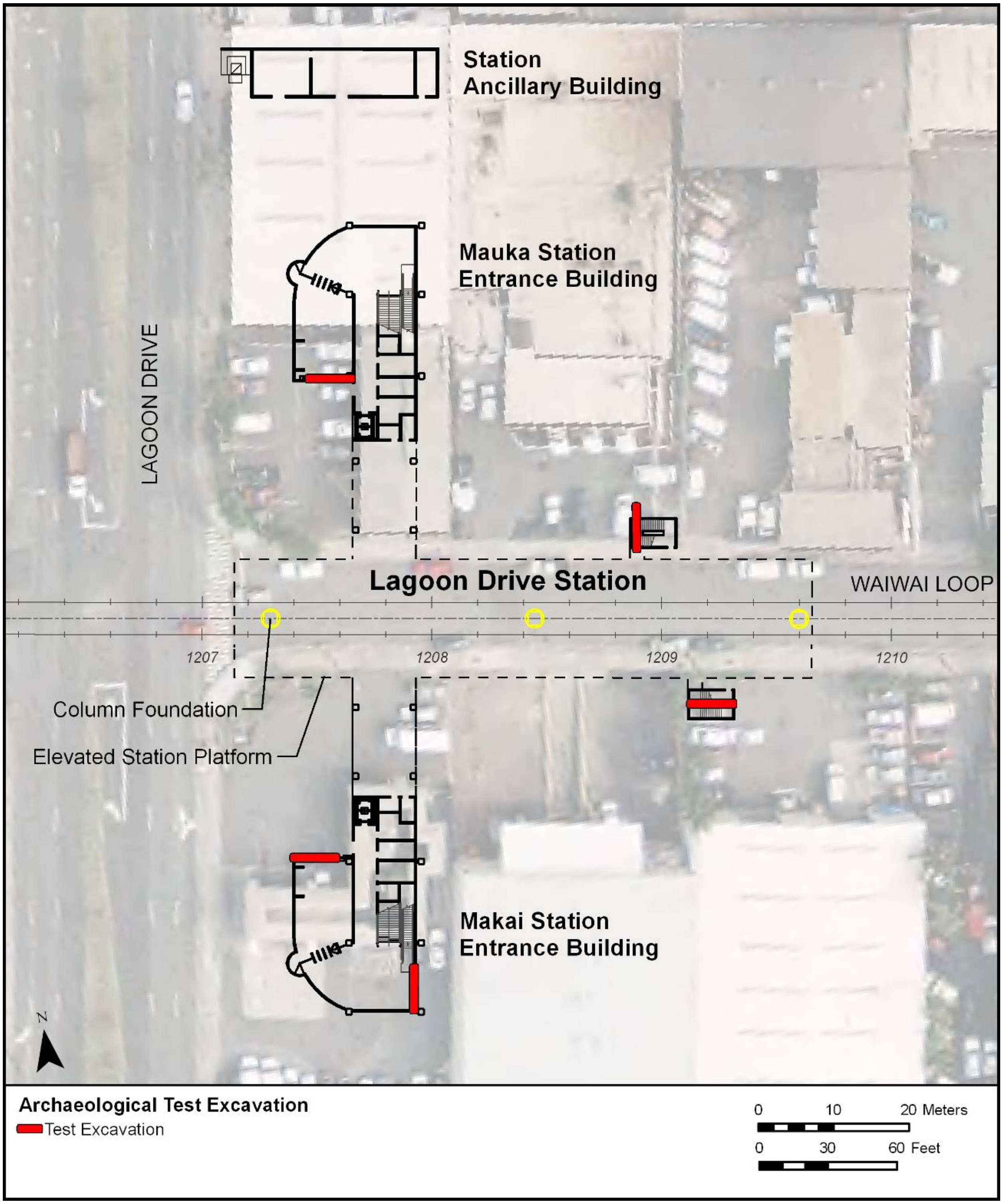

Figure 35. Lagoon Drive Station, 5 20x2 test excavations (2 at Mauka Station Entrance Building, one at *mauka* access and 2 at Makai Station Entrance Building)

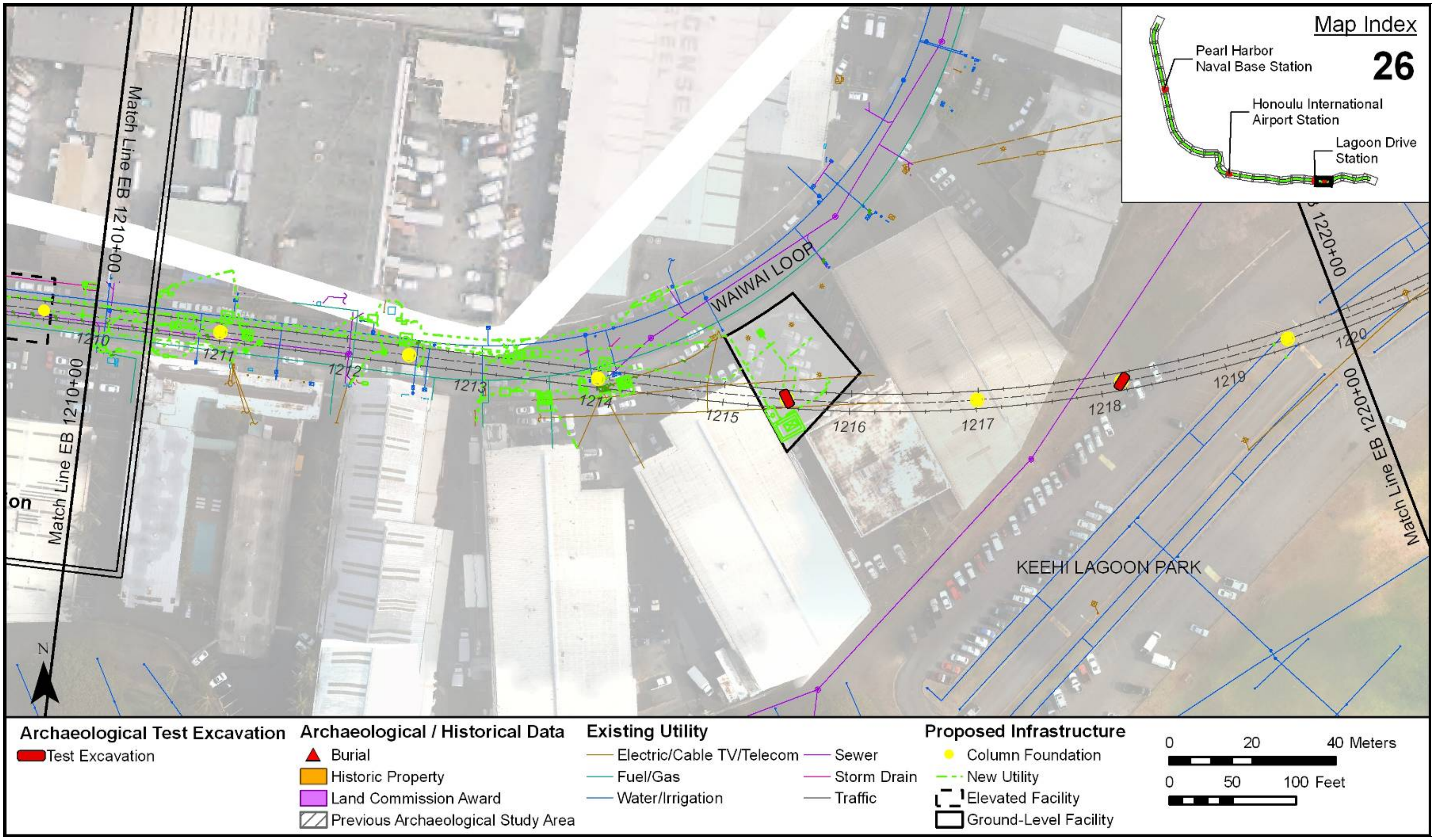

Figure 36. Map Sheet J 26, two 10x3 excavations at column foundations @ 1215+50 & 1218+20

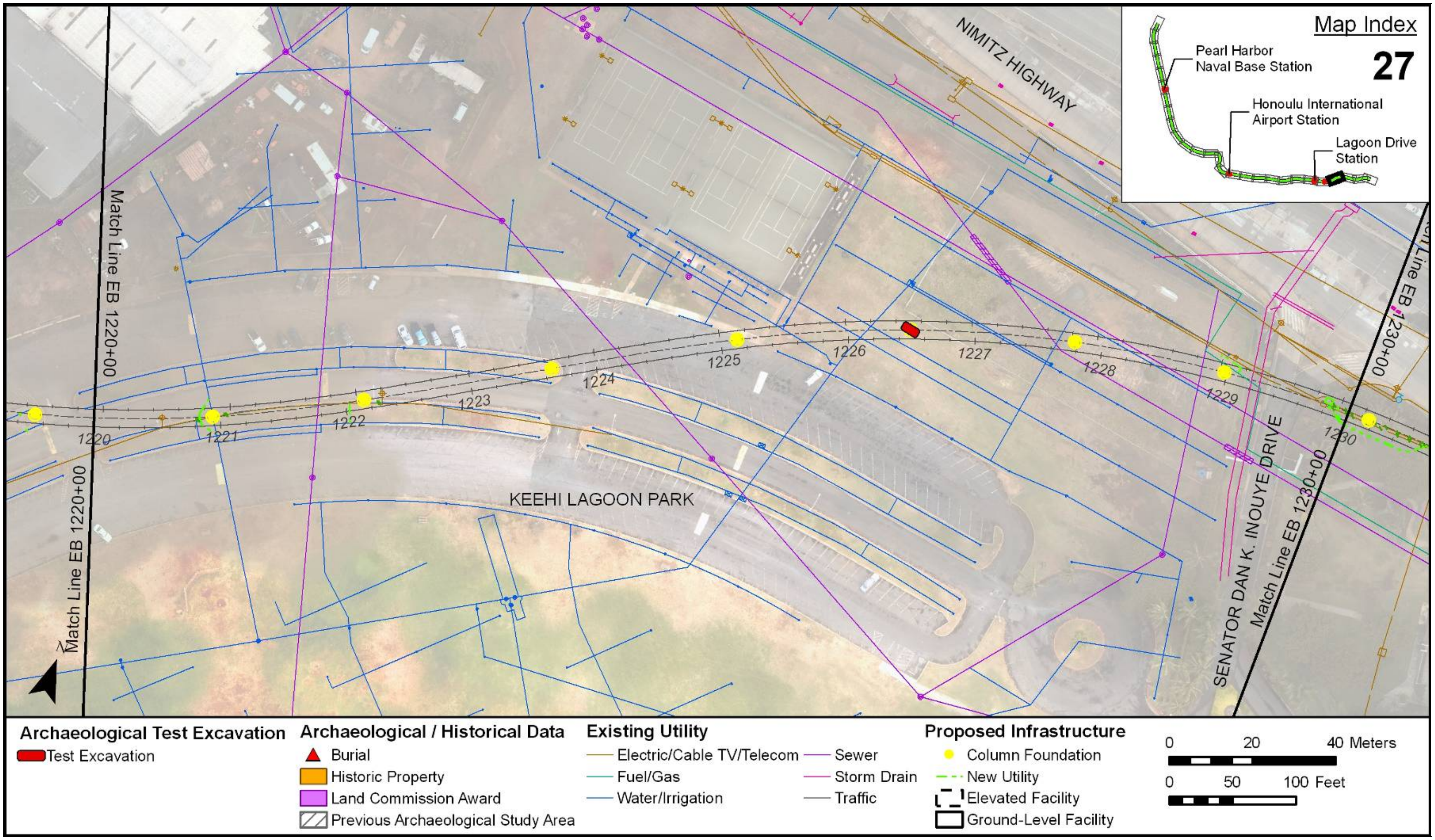

Figure 37. Map Sheet J 27, one 10x3 excavation at column foundation @ 1226+50

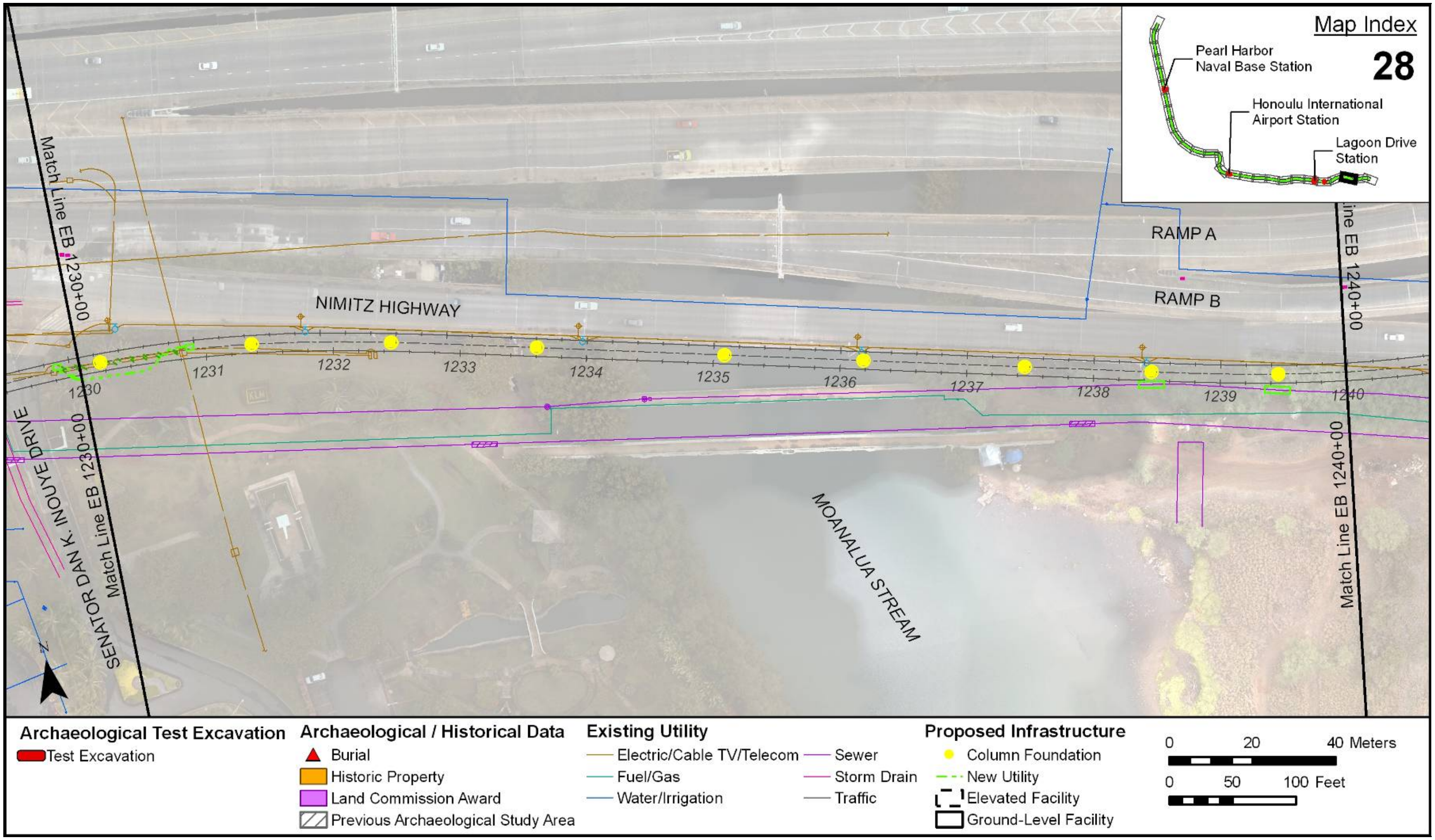

Figure 38. Map Sheet J 28, none

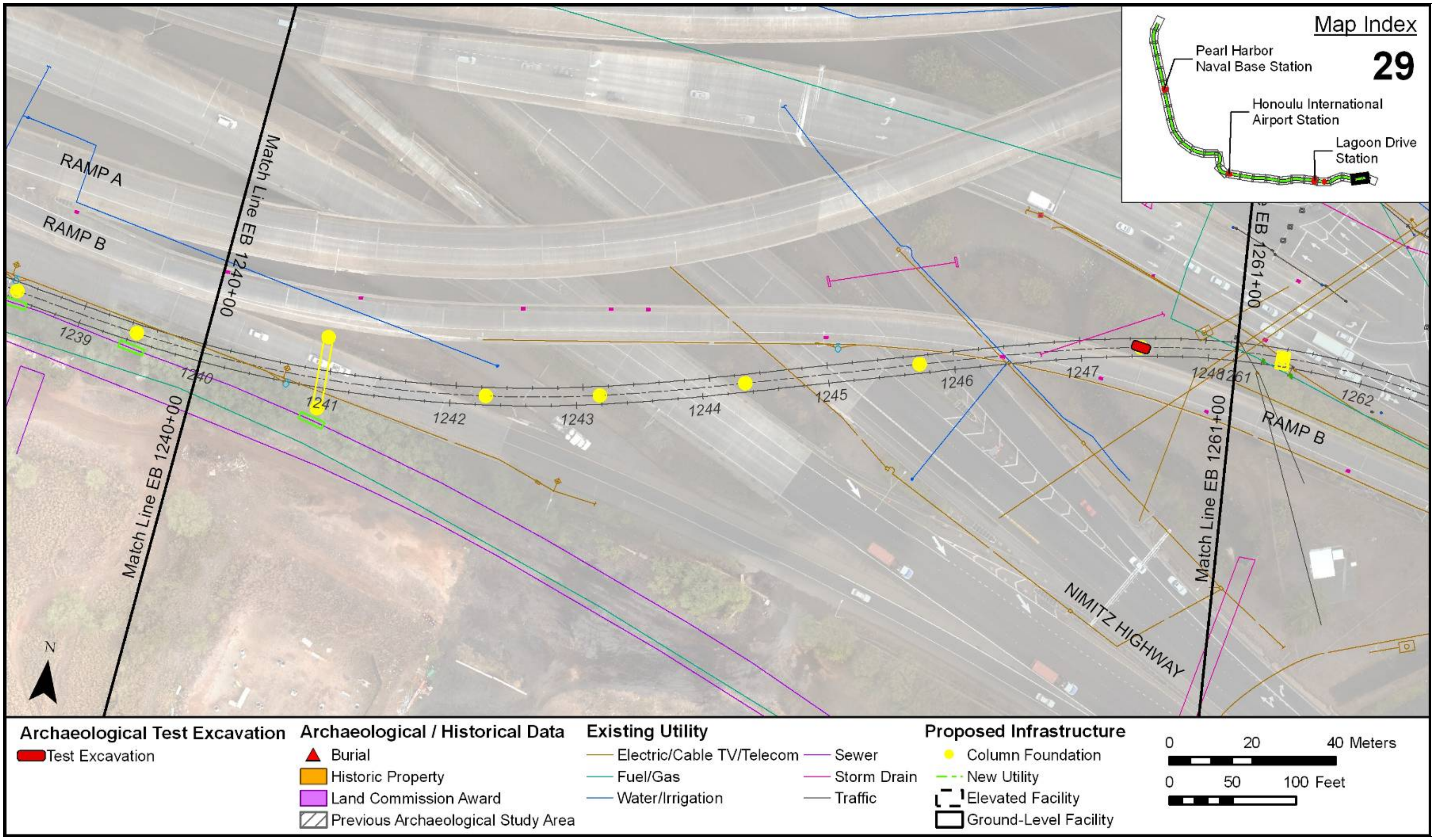

Figure 39. Map Sheet J 29, one 10x3 excavation at column foundation @ 1247+50

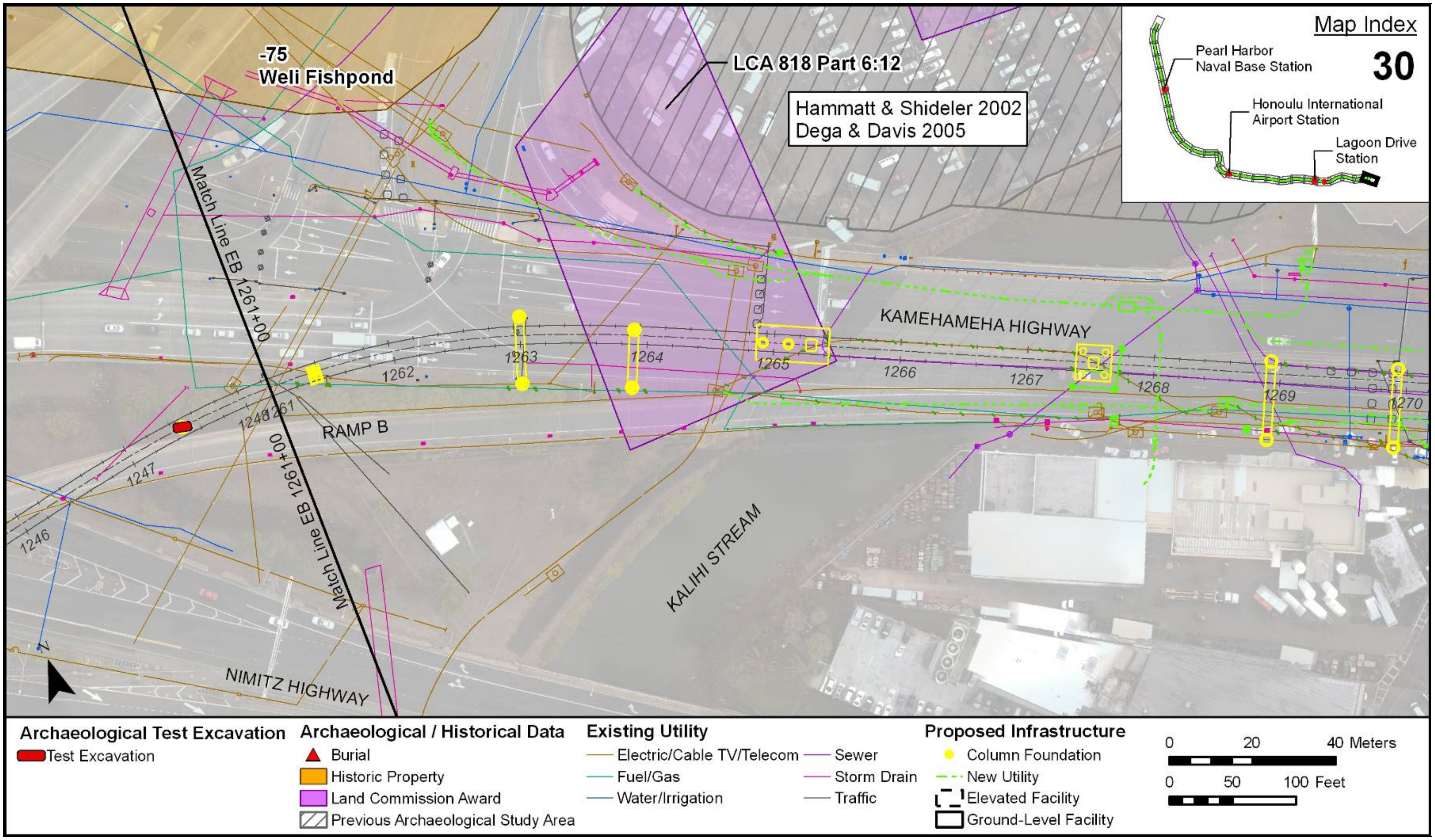

Figure 40. Map Sheet J 30 connecting to the AISP for Construction Section 4 by Kalihi Stream

FID	Excavation Type	Dimensions (in ft.)	Location	Map Sheet	Area_sq_ft	Setting	Prop_Type	Street	Owner
0	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
1	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	State Highway / Federal (TMK 9-9-002:004)	Kamehameha Highway	STATE DOT / USA
2	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
3	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
4	Station Building	20x2	Pearl Harbor Station	J9	40	Paved/Landscaped Area	Federal (TMK 9-9-002:004)	Kamehameha Highway	USA
5	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
6	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
7	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
8	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
9	Station Building	20x2	Airport Station	J19	40	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
10	Station Building	20x2	Lagoon Dr Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:014)	Waiwai Loop	CHEVRON USA INC
11	Station Building	20x2	Lagoon Dr Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:014)	Waiwai Loop	CHEVRON USA INC
12	Station Building	20x2	Lagoon Dr Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:015)	Waiwai Loop	BREWER, JOHN V TR
13	Station Building	20x2	Lagoon Dr Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:016)	Waiwai Loop	INTERNATIONAL EXPRESS INC
14	Station Building	20x2	Lagoon Dr Station	J25	40	Paved/Landscaped Area	Private (TMK 1-1-016:012)	Waiwai Loop	WINDOW WORLD INC
15	Guideway Column	20x2	EB 994+40	J4	40	Paved/Landscaped Area	State Highway / Private (TMK 9-9-003:066)	Kamehameha Highway	STATE DOT / KRONICK, HARRY B TRUST
16	Guideway Column	20x2	EB 996+70	J4	40	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
17	Guideway Column	10x3	EB 1003+60	J5	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
18	Guideway Column	10x3	EB 1004+90	J5	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
19	Guideway Column	10x3	EB 1032+40	J8	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
20	Guideway Column	10x3	EB 1056+50	J10	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
21	Utility Relocation (24" Storm Drain)	20x2	EB 1043+90	J9	40	Paved/Landscaped Area	State Street	Radford Drive	USA
22	Guideway Column	10x3	EB 1063+00	J11	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT
23	Guideway Column	10x3	EB 1077+80	J12	30	Paved/Landscaped Area	State Highway	H-1 Freeway	STATE DOT
24	Guideway Column	10x3	EB 1083+00	J13	30	Paved/Landscaped Area	State Highway	H-1 Freeway	STATE DOT
25	Guideway Column	10x3	EB 1089+00	J13	30	Paved/Landscaped Area	State Highway	H-1 Freeway	STATE DOT
26	Guideway Column	10x3	EB 1099+50	J14	30	Paved/Landscaped Area	State Highway	Nimitz Highway	STATE DOT
27	Guideway Column	10x3	EB 1105+20	J15	30	Paved/Landscaped Area	State Highway	Nimitz Highway	STATE DOT
28	Guideway Column	10x3	EB 1115+30	J16	30	Paved/Landscaped Area	State Highway	Nimitz Highway	STATE DOT

FID	Excavation Type	Dimensions (in ft.)	Location	Map Sheet	Area_sq_ft	Setting	Prop_Type	Street	Owner
29	Guideway Column	10x3	EB 1124+30	J17	30	Paved/Landscaped Area	Federal (TMK 1-1-002:001)	Aolele Street	US POSTAL SERVICE
30	Guideway Column	10x3	EB 1134+30	J18	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Aolele Street	STATE DOT AIRPORTS DIVISION
31	Guideway Column	10x3	EB 1151+60	J20	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Ala Onaona Street	STATE DOT AIRPORTS DIVISION
32	Guideway Column	10x3	EB 1159+70	J20	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Hoihoikaa Street	STATE DOT AIRPORTS DIVISION
33	Guideway Column	10x3	EB 1162+50	J21	30	Paved/Landscaped Area	State (TMK 1-1-003:017)	Aolele Street	STATE DOT AIRPORTS DIVISION
34	Guideway Column	10x3	EB 1184+20	J23	30	Paved/Landscaped Area	State (TMK 1-1-003:001)	Aolele Street	STATE DOT AIRPORTS DIVISION
35	Guideway Column	10x3	EB 1194+50	J24	30	Paved/Landscaped Area	State (TMK 1-1-004:012)	Ualena Street	STATE DOT AIRPORTS DIVISION
36	Guideway Column	10x3	EB 1215+50	J26	30	Paved/Landscaped Area	Private (TMK 1-1-016:006)	Waiwai Loop	ALERT HOLDINGS GROUP INC
37	Guideway Column	10x3	EB 1218+20	J26	30	Paved/Landscaped Area	State (TMK 1-1-003:006)	Ke‘ehi Lagoon Park Road	STATE DOT AIRPORTS DIVISION
38	Guideway Column	10x3	EB 1226+50	J27	30	Paved/Landscaped Area	State (TMK 1-1-003:006)	Ke‘ehi Lagoon Park Road	STATE DOT AIRPORTS DIVISION
39	Guideway Column	10x3	EB 1247+50	J29	30	Paved/Landscaped Area	State Highway	Kamehameha Highway	STATE DOT

1.12 Laboratory Methods

Materials collected during AIS fieldwork were identified and catalogued at CSH's laboratory facilities on Oʻahu. Analysis of collected materials were undertaken using standard archaeological laboratory techniques. Artifacts were washed, sorted, measured, weighed, described, photographed, and catalogued. In general, artifact analysis focused on establishing, to the greatest extent possible, material type, function, cultural affiliation, and/or age of manufacture. Diagnostic (dateable) attributes of artifacts were researched.

1.12.1 Traditional Hawaiian Artifacts

Traditional Hawaiian artifactual material were identified, and forms and functions determined using standard reference material (e.g. Barrera and Kirch 1973; Brigham 1974; Buck 2003; and Emory et al. 1968).

1.12.2 Historic Artifacts

Historic artifacts were identified using standard reference materials and resources available on the internet (e.g., Elliott and Gould 1988; Fike 1987; Kovel 1986; Lehner 1988; Lindsey 2010; Lockhart 2004-2010; Millar 1988; Toulouse 1971; Whitten 2009; and Zumwalt 1980). Analyzed materials were tabulated into chart form and a master catalogue is presented within the AIS report. As noted above, the results of the historic artifact analysis were used to better characterize the age, function, and potentially the cultural affiliation of the associated archaeological deposits and/or features

1.12.3 Bulk Sediment Samples

The AIS identified and characterized the archaeological resource found. Detailed sample analyses, including the results from processing bulk sediment samples, are well established AIS laboratory methods to accomplish this. For example, identifying buried former agricultural sediments and/or wet land sediments may hold important paleoenvironmental information. To provide additional information on the content of selected sediments, the collected bulk sediment samples (varying from 1 to 5 liters) were wet screened through 1/16-inch mesh. The remnant were dried and inspected for faunal, floral, and artifact remains. These results were included in the description of the sediment.

1.12.4 Vertebrate Material

Non-human skeletal material was identified to the lowest possible taxa at the CSH laboratory using an in-house comparative collection and reference texts (e.g., Olsen 1964; Schmid 1972; and Sisson 1953).

1.12.5 Invertebrate Material

Invertebrate remains were identified to genus and species, weighed, and analyzed. Common marine shells were identified and analyzed at the CSH laboratory using an in-house comparative collection and reference texts (e.g., Abbott and Dance 1990; Eisenberg 1981; Kay 1979; and Titcomb 1979).

1.12.6 Wood Taxa Identification

Appropriate charcoal samples were prepared, weighed, and submitted for taxa/species identification. Samples were sent to the International Archaeological Research Institute, Inc. (IARII) for taxa identification. The samples were viewed under magnification of a dissecting microscope and then compared with anatomical characteristics of known woods in the Pacific Islands Wood Collection at the Department of Botany, University of Hawai‘i, as well as published descriptions. Taxa identification of wood samples provided useful information for interpreting the environmental and cultural history of the project area and helped determine a general time frame of land use. Analysis by IARII also identified short-lived plant species, which were used for radiocarbon dating. Following analysis, artifacts were returned to the CSH laboratory.

1.12.7 Radiocarbon Dating

Charcoal samples from short-lived plant species were submitted to Beta Analytic, Inc. of Miami, Florida, for radiocarbon dating analysis. The samples were analyzed using the Accelerator Mass Spectrometer method. The conventional radiocarbon age determined by Beta Analytic, Inc. was then calibrated to calendar ages using the OxCal calibration program, Version 4.1, developed by the University of Oxford Radiocarbon Accelerator Unit and available as share-ware over the internet. The use of short-lived plant species was preferred as it provides a tighter time-frame of possible radiocarbon dates.

1.12.8 Pollen/Micro Charcoal Particle Analysis

Palynology is the branch of science concerned with the study of pollen, spores, phytoliths, and other palynomorphs. Palynomorphs are often preserved in sediment samples and, following physical and chemical extraction, can be identified with a microscope. This information informs on the types of plants that made up the local environment, or the local watershed, at the time the sediment was deposited. A large amount of palynological research has been conducted on O‘ahu to examine human impacts on native vegetation. Micro charcoal particle quantification accompanied the palynological work. The size and amount of these charcoal particles within a sediment sample can inform on the level of human activity in the vicinity at the time the sediment was deposited. Samples were submitted to Paleo Research Institute, Inc. for pollen analysis/micro charcoal particle quantification to facilitate paleo-environmental reconstruction. Samples for these analyses were selected from the collected bulk sediment and sediment column samples that were collected from AIS test excavations.

1.13 AIS Report

1.13.1 Report Contents

The AIS report includes the following:

a. A project description

b. A section of a U.S. Geological Survey topographic map showing the study area boundaries and the location of all recorded cultural resources

c. Historical and archaeological background sections summarizing pre-Contact and post-Contact land use of the study area and its vicinity
d. Descriptions of all cultural resources, including selected photographs and scale drawings, and discussions of age, function, laboratory results, and significance
e. A section concerning cultural consultations (per the requirements of HAR 13-276-5[g] and HAR 13-275/284-8[a][2])
f. A summary of cultural resource categories, integrity, and significance based upon the National and Hawaiʻi Registers of Historic Places evaluation criteria
g. A project effect recommendation
h. Treatment recommendations to mitigate the Project's potential effect on any cultural resources identified in the study area that are recommended eligible to the National/Hawaiʻi Registers of Historic Places

1.13.2 Cultural Resource Numbers and Feature Designations

In consultation with SHPD, CSH assigned State Inventory of Historic Property (SIHP) numbers to archaeological cultural resources observed during the AIS. This included documenting previously unrecorded sites/features and assigning them new SIHP numbers

Different features were included within the same archaeological site based on several considerations, including: 1) general geographic proximity (features closer together are more likely to be included within the same site number than those farther apart); 2) similarity of features; and/or 3) interrelatedness of features (e.g. subsurface features of a continuous subsurface cultural layer). Horizontal boundaries of archaeological cultural resources were documented to the extent possible.

1.13.3 Cultural Resource Significance Assessments

To be considered eligible for listing on the Hawaiʻi and/or National Register of Historic Places, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following broad cultural/historic significance criteria: "A" reflects major trends or events in the history of the state or nation; "B" is associated with the lives of persons significant in our past; "C" is an excellent example of a site type/work of a master; "D" has yielded or may be likely to yield information important in prehistory or history; and, "E" (Hawaiʻi Register only) has traditional cultural significance to an ethnic group, including religious structures, traditional cultural properties, and/or burials. For this AIS investigation, cultural resource integrity and significance were assessed based on the guidance provided in National Register Bulletin # 15, "How to Apply the National Register Criteria for Evaluation." Cultural resource integrity and significance assessments were developed in consultation with the SHPD.

1.14 Disposition of Collections

In compliance with the project's PA, Stipulation III.F "Curation," the City will curate recovered materials in accordance with applicable laws, including HAR Chapter 13-278 and 36

C.F.R. 79. The City is currently developing a curation program and seeking a curation facility that will meet these requirements. Until these curation measures are in place, all collected materials and associated records generated by the Airport Section 3AIS fieldwork will be temporarily curated either at CSH's temporary field office specific to the Airport Section 3AIS or at CSH's main Oʻahu office in Waimānalo.