US Army Corps of Engineers®
Honolulu District

Appendix D – Civil Engineering

Tafuna, Tutuila, American Samoa

Draft Integrated Feasibility Report and Environmental Assessment

January 2022

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Appendix D

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1 Introduction

American Samoa is the southernmost territory of the United States. It is comprised of five main islands and two coral atolls. The total land area is approximately 76 square miles. Tutuila is the largest of the volcanic islands, with a total land area of 53 square miles. It is approximately 18 miles long and varies in width from one to six miles. The mountainous terrain is characterized by steep slopes dipping to the sea, narrow valleys, and coastal plains. The mountains are of volcanic origin and have been eroded by rainfall and stream flow. The highest elevation is at Matafao Peak, which is 2,142 feet above mean sea level (MSL). A broad coral reef surrounds the island in several areas.

Tutuila's population of over 54,000 resides along the coastal areas and on the Tafuna-Leone Plain. The most populated coastal area borders Pago Pago Harbor, which is a central location for business activities, government facilities, and employment opportunities. Pago Pago Harbor, a natural embayment, nearly bisects the island and extends almost three miles inland. Pago Pago is the capital of American Samoa and is located in the northwest corner of Pago Pago Harbor. The study area for this analysis is specifically focused on the Tafuna plain, refer to Figure 1-1, which is comprised of many drainageways and streams. The Leaveave Drainageway is the focus area of this study. Refer to Figure 1-2 for the location map.

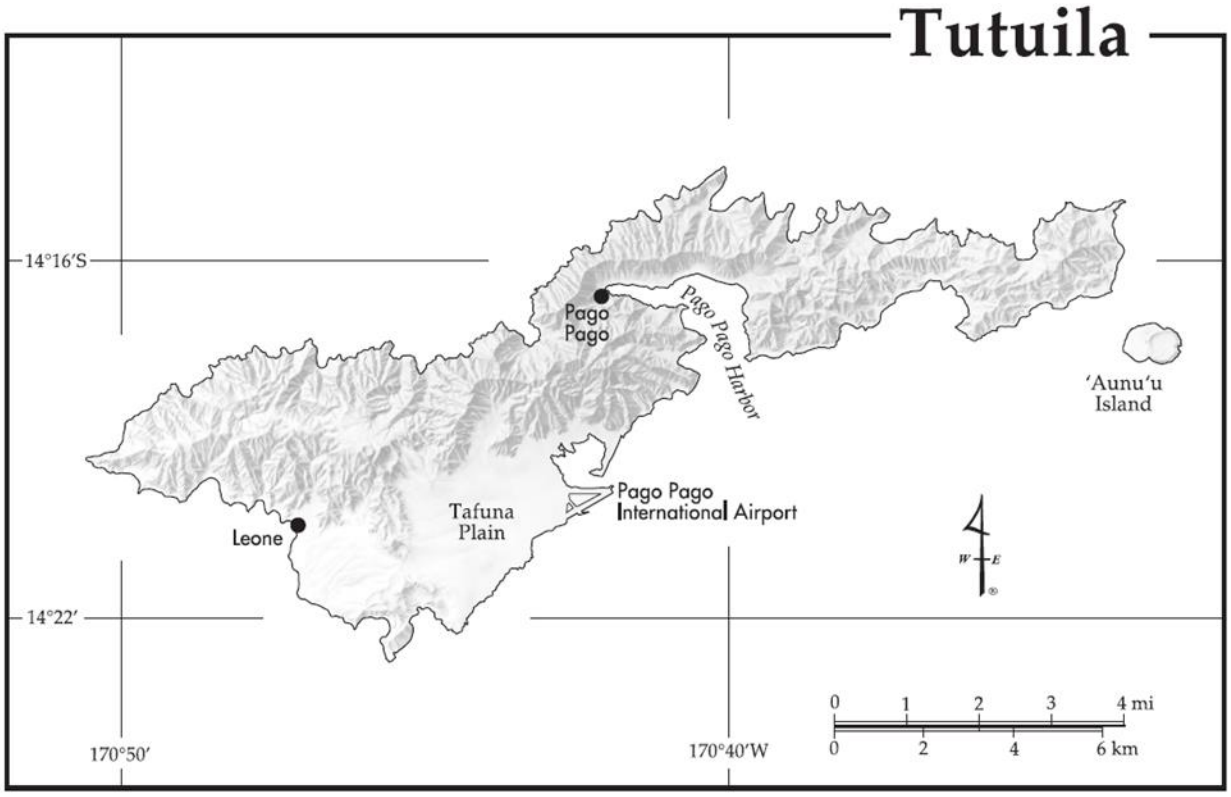

Figure 1-1. Study Area

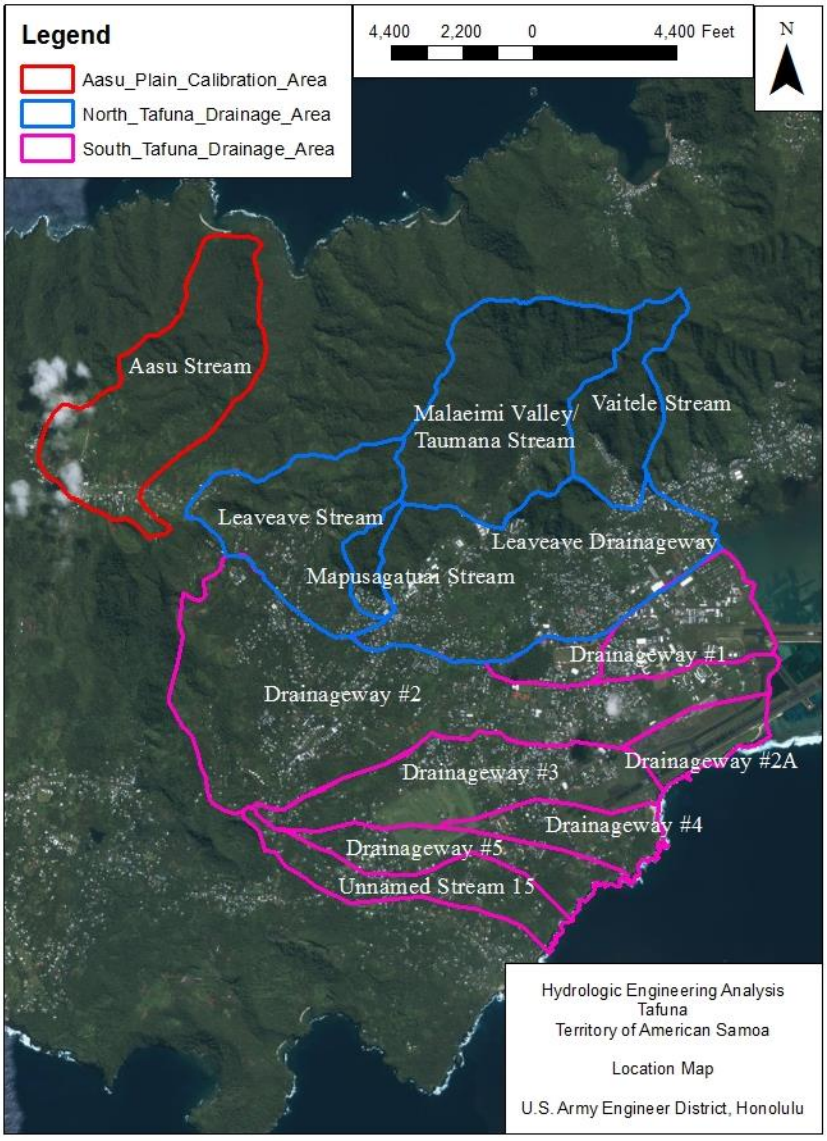

Figure 1-2. Location Map

A detailed discussion of the plan formulation for this study is provided in the main report. Once an initial list of possible flood risk reduction measures was assembled, each measure was then considered in the context of the study area. From this, the initial alternatives array was developed. Three structural measures, Alternatives B, B_1, and C from the initial alternatives array were evaluated as part of the hydraulic model and economics analysis. The purpose of this appendix is to evaluate the design considerations, quantities development and related construction considerations for Alternative C, which is the tentatively selected plan.

2 Tentatively Selected Plan

As stated in the previous section three structural measures, Alternatives B, B_1, and C from the initial alternatives array were evaluated in the hydraulic model and economic analysis. Based on the initial results, Alternative C was further refined to optimize benefits as part of the final array and is presented as the tentatively selected plan.

This alternative, refer to Figure 2-1, includes construction of an approximately 2,400-foot long barrier (floodwall or levee) along the Taumata Stream. In addition, it includes a nonstructural component which includes dry floodproofing of 38 nonresidential buildings and elevation of 242 residential structures (assuming 100% participation rate) as these structures will not receive flood protection from the flood barrier. No bridge improvements are proposed as part of the plan. Interior drainage requirements will need to be considered after TSP as the design is further developed.

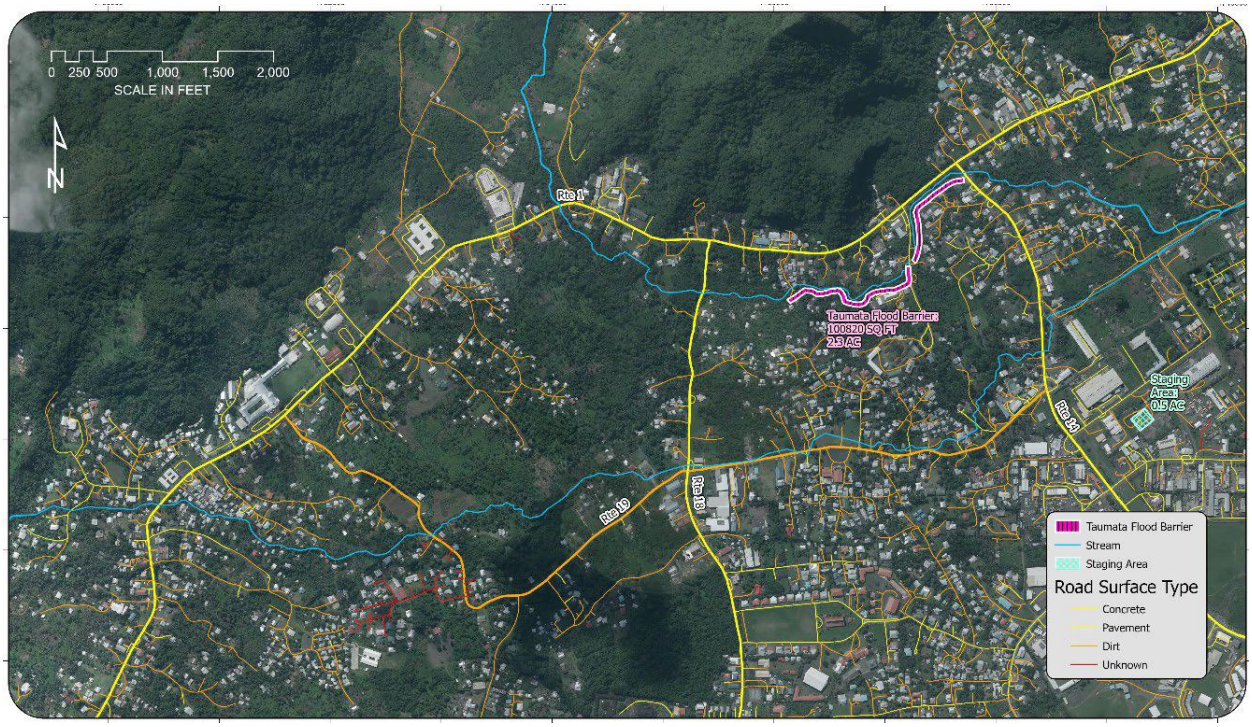

Figure 2-1. Tentatively Selected Plan

2.1 Levee and Floodwall

Once the PDT can conduct a site visit in early 2022, it will be determined whether a levee, floodwall and/or combination will be constructed based on site conditions. An average 7-foot-high flood barrier was simulated in the hydraulic modeling for the TSP analysis. Provided below are 2 typical details for a levee and floodwall that will be further refined after the site visit is conducted. Generally, the levee design would include a 12' top width and 3:1 side slope, refer to Figure 2-2. It is assumed that material would need to be imported for construction of a levee. The design will be further refined post TSP in consultation with a geotechnical engineer.

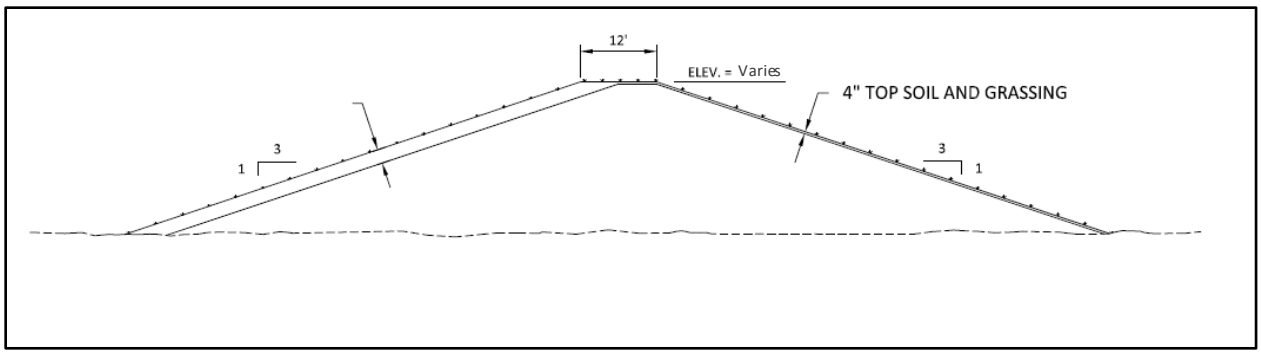

Figure 2-2. Typical Levee Section

Generally, a floodwall would be 1' wide and include a sheetpile cutoff wall, refer to Figure 2-3. Exact design of the floodwall will be determined after TSP using the most recent USACE guidance and in consultation with structural engineer.

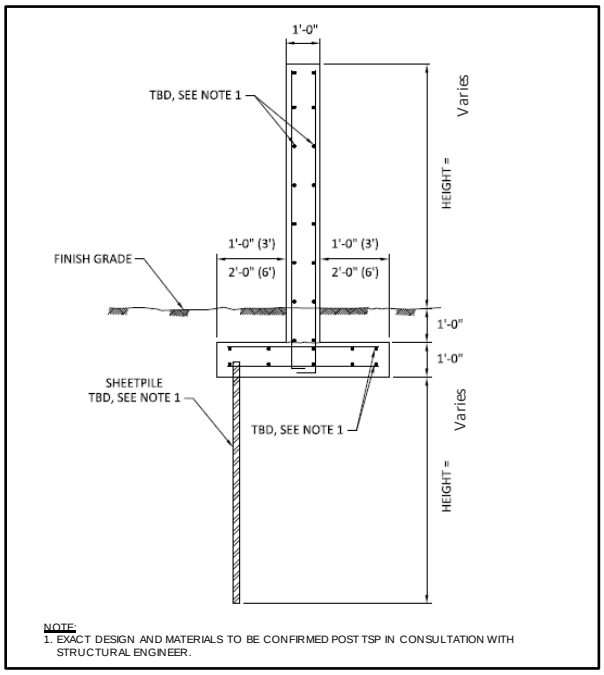

Figure 2-3. Typical Floodwall Section

3 Site Considerations

The following paragraphs discuss the various site design topics taken into consideration for the tentatively selected plan.

3.1 Utility Impacts

Currently within the TSP footprint, there is limited information available for potential utility impacts. Based on Google Earth we know that the flood barrier alignment is near the Route 1 corridor in a generally residential area; therefore, some utility impacts can be anticipated. Utility impacts will be an additional item reviewed during the 2022 site visit. If relocation of any utilities is required, it will be determined post TSP in coordination with the nonfederal sponsor.

3.2 Staging and Storage

Staging areas and site access must be established for the use and distribution of construction materials and equipment. The staging area generally contains contractor trailers, parking, fencing, and storage of equipment and materials.

A staging area has been identified on an existing site owned by the Department of Public Works which is about 0.5 mile south of Route 1 and just east of Route 14. The staging area is less than 1 mile from the proposed project site area. The staging area is generally flat and will be restored upon construction completion. Any material stored in the staging area will be covered to reduce loss of material due to erosion and avoid impacts to the adjacent environment.

3.3 Access Roads\Haul Routes

For most plan features, temporary haul roads will be built on site as necessary for levee and/or floodwall construction. These temporary access roads will be determined by the awarded construction contractor(s) based upon their own means and methods and within pre-determined work limits.

The project areas can be accessed from the major and local roads. The existing roads will be used as haul routes where necessary within the project areas. Construction damages to the roads will repaired or replaced upon construction completion.

3.4 Subsurface Work

This alternative may include an underground portion for construction of a floodwall footing. The soils of the valleys and coastal fringe vary from poorly drained to excessively drained and are classified as clayey to sandy. Exact design of the floodwall will be determined after TSP using the most recent USACE guidance and in consultation with a structural and geotechnical engineer.

3.5 Construction Methodology

For purposes of cost estimating, construction of a floodwall was assumed. Once site conditions can be assessed, the PDT will determine whether a levee, floodwall or combination should be proposed. Additional detailed design will be conducted during the PED phase of the project and quantities are subject to change based on a refined design after TSP. Refer to Cost Appendix for additional detail on quantities and assumptions.

Required equipment to construct this alternative could include, but not limited to, the use of a dozer(s), a pile driver and end loader. Storage of material and equipment will be required and a staging area for the alternative has been identified. The staging area is generally flat and will be restored upon construction completion. Any material stored in the staging area should be covered to reduce loss of material due to erosion and avoid impacts to the adjacent environment.

4 Summary

The engineering work completed for this report was at an appropriate level for a design comparison. Sufficient work was completed to create a base project cost estimate, with assumptions and unknowns documented. Further work to be completed for a complete project design post-TSP into PED includes, but is not limited to, construction methods and concept optimization including VE studies as necessary, design calculations for all components, site-specific survey, additional geotechnical exploration and analysis and further refinement of the hydraulic models developed. Full cost estimate information is included in the Appendix F: Cost Engineering. Also refer to the main report for an evaluation of the relative alternative costs, construction impacts, and operation and maintenance issues.