HYDRAULICS SECTION

PLANNING DIVISION — MAZER

SAVAN GUT

ST. THOMAS, U.S. VIRGIN ISLANDS

DETAILED PROJECT REPORT

15

IMPROVEMENTS TO REDUCE FLOOD DAMAGES

MARCH 1982

US Army Corps of Engineers
Jacksonville District

31

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232

SAJEN-HH

31 March 1982

SUBJECT: Detailed Project Report on Savan Gut, St. Thomas, U.S. Virgin Islands

Commander, South Atlantic Division
ATTN: SADPD-P

1. Inclosed for your review are 10 copies of the subject report which has been prepared under the authority of Section 205 of the Flood Control Act of 1948, as amended.

2. The report has been recently revised where deemed necessary or appropriate in accordance with comments of local agencies subsequent to the 25 February 1982 public workshop conducted in Charlotte Amalie, U.S. Virgin Islands, and incorporation of SAD comments on the draft report. The selected plan varies from the initial plan previously presented to SAD with the inclusion of a velocity check dam upstream of Jane E. Tuitt school, complete diversion of the SPF around the school, and elimination of the supercritical junction, stilling basin and lift station. The revised design with reduced hydraulic complexity precludes the need for a previously considered model study.

3. The report has been fully coordinated with Federal agencies and appropriate agencies of the U.S. Virgin Islands. Water Quality Certification is being obtained and will be forwarded when available. A letter of intent is provided in the Coordination Appendix. This study now has a B/C ratio of 11.4 to 1.

4. It is requested that this project be given a high priority. Funding in the amount of $125,000 for plans and specifications is requested as soon as possible in order to complete plans and specifications by 1 July 1982. It is presently scheduled to advertise by 1 August 1982 and award a contract for construction by 1 September 1982. If funds are available in FY 82, a contract can be awarded with initial funds of $50,000, followed with funding of $2,000,000 in FY 83 and $1,564,000 in FY 84.

1 Incl (10 cys)
as

ALFRED B. DEVEREAUX, JR.
Colonel, Corps of Engineers
Commanding

DETAILED PROJECT REPORT
SAVAN GUT AT CHARLOTTE AMALIE, ST. THOMAS, U.S. VIRGIN ISLANDS

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DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232

March 1982

DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE, ST. THOMAS, U.S. VIRGIN ISLANDS

THE STUDY AND REPORT

A. INTRODUCTION

1. Purpose and Authority. Section 205 of the 1948 Flood Control Act, as amended, provides authority to the Chief of Engineers to construct small flood control projects that have not already been specifically authorized by Congress. Each project selected must be complete-within-itself and be economically justified and environmentally sound. In addition, each project is limited to a Federal cost of not more than $4 million. This Federal cost limitation includes all project-related costs for investigations, inspections, engineering, preparation of plans and specifications, supervision and administration, and construction.

A project planned and constructed under Section 205 is designed to provide the same complete project and same adequate degree of protection as would be provided under specific congressional authorization. Flood control projects under Section 205 are not limited to any particular type of improvement and a project may include features for other purposes, such as water supply, when local interests indicate the need as well as the willingness and ability to contribute the project cost representing the cost assigned to that purpose.

Due to frequent damages experienced by flood conditions of Savan Gut in Charlotte Amalie, St. Thomas, the government of the U.S. Virgin Islands requested a study under authority contained in Section 205 of the Flood Control Act of 1948 as amended. The purpose of this study is to determine the need for and to address the feasibility of improvements to reduce flood damages in Charlotte Amalie caused by excessive runoff along the drainage course (or "gut") in the "Savan" part of town.

This study focuses on the flood damages impacting residential land use, a public school, and the central business district (CBD) of Charlotte Amalie. Other water resource related problems were also investigated in connection with the development of alternatives which address the flood protection needs. All reasonable alternative plans were considered in detail to determine their feasibility in meeting the overall study objectives. The selection of the recommended plan was made after careful consideration was given to the costs and benefits (both economic and social) and to the environmental impacts associated with the alternative measures.

2. Local cooperation. Formal assurances of local cooperation similar to those required for regularly authorized projects must be furnished by a local sponsoring agency. The local sponsor must be fully authorized under Commonwealth laws to give such assurances and be financially capable of fulfilling all measures of local cooperation. As a project is dependent upon local cooperation and participation, the basic importance of the existence of a legally authorized and financially capable local sponsoring agency cannot be overemphasized. The sponsoring agency must agree to:

a. Provide without cost to the United States all lands, easements, rights-of-way, including suitable borrow and disposal areas as determined by the Chief of Engineers necessary for the construction of the Project.

b. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements made necessary by the construction.

c. Hold and save the United States free from damages due to the construction works except damages due to the fault or negligence of the United States or its contractors.

d. Provide a cash contribution, prior to initiation of construction, equal to the cost of all outside project scope work, presently estimated at $344,000.

e. Assume all project costs in excess of the Government limitation of $4,000,000.

A letter of intent is inclosed to the letter dated 12 March 1982 from the Department of Public Works (see appendix D).

A draft 221 Agreement is provided as appendix G.

3. Study Participants and Coordination. The U.S. Army Corps of Engineers, Jacksonville District, had the primary responsibility for conducting and coordinating the study and for the preparation of the final report. The government of the Virgin Islands of the United States was represented by the Office of Planning and Development within the Department of Public Works which cooperated throughout the planning process.

Coordination with various Federal, territorial, and local agencies as well as interested groups and individuals was maintained during the study. Comments received are presented in appendix D.

4. The Report. The results of this study are presented in two parts, the main report and seven appendices. The main report is a nontechnical document which presents a broad view of the overall study. The main report also contains the conclusions, recommendations, and an Environmental Assessment of the study's selected plan.

The appendices present supporting data and details of various aspects of the study including hydrology-hydraulics, detailed design, geotechnical, coordination, environmental assessment, Section 404, and concrete materials investigation.

5. Prior Studies and Reports. The Jacksonville District prepared a Flood Plain Information Report on the tidal areas of St. Thomas, St. Croix, and St. John, U.S. Virgin Islands in June 1975. An urban renewal plan was prepared on the Savan Area of St. Thomas by Robert de Jongh and associates in November 1976 for the Virgin Islands Urban Renewal Board. In April 1977 the U.S. Army Corps of Engineers issued a Reconnaissance Report on Savan Gut which recommended that a detailed study be made under Section 205 of the 1948 Flood Control Act. This study is a result of that report. A study entitled "Draft Report of a Phase Ia Cultural Resources Survey of the Savan Gut Flood Control Project Area, Charlotte Amalie, St. Thomas, U.S. Virgin Islands" was completed in April 1981 by WAPORA, Inc.

B. RESOURCES AND ECONOMY OF THE STUDY AREA

The natural and human resources, and the economy of the study area comprise a profile of existing conditions which provide a background for the formulation of a plan to meet the needs of the study area.

6. Natural Resources. The U.S. Virgin Islands which lie some 1,075 miles from Miami, Florida, and 60 miles east of Puerto Rico consists of some 50 islands and cays of volcanic origin. St. Thomas, 28 square miles in area, is the capital of the U.S. Virgin Islands, and as such is the center for government and commerce. St. Thomas is the busiest and most intensely developed of the three major islands (see plate 1).

7. Topography. The volcanic origin of the island formed rugged mountains that rise sharply from the sea to heights of up to 1,500 feet. The topography of Savan Gut varies from steep mountains with dense vegetation to moderate slopes with rock-lined channels and urban development. Elevations vary from the upper watershed near Signal Hill, which is above 1,480 feet above sea level, to sea level at St. Thomas Harbor. Slopes of the natural stream bottom of Savan Gut averages about 1,100 feet per mile over the length of the watershed.

8. Flora and Fauna. There is an abundant variety of tropical flora ranging from the well-known hibiscus, oleander, flamboyant, and wild orchid, to the less common African tulip tree. Exotic fruits include sugar apple, avocado, and papaya. Land animals consist primarily of reptiles and amphibians although the mongoose and white-tail deer are known to exist on the island. Over 200 species of birds are known in the U.S. Virgin Islands although most are migratory or seasonal inhabitants.

9. Climate. The climate of the U.S. Virgin Islands is tropical with a mean annual temperature of 79°F. Temperatures range between 70° and 90° as

proximity to the sea moderates temperatures during summer months. Humidity ranges from 65 to 81 percent; prevailing winds are from the east. Rainfall is seasonal with almost 50 percent of the rainfall occurring during the period May to December.

10. Human and Cultural Resources. The U.S. Virgin Islands have more than tripled in population in the past two decades, with substantial growth expected for the next two decades. Population growth is expected mainly from the influx of immigrants from nearby islands and to a lesser extent from the continental U.S.

The population of St. Thomas has shown a rapid growth over the past 20 years from 16,200 in 1960 to an estimated 56,560 in 1978. Projections for St. Thomas indicate population growth to 84,000 in 2035, a 49 percent increase.

A portion of the study area is included within the Charlotte Amalie Historic District. The District is listed in the National Register of Historic Places. Additional properties within or adjacent to the study area are considered eligible for designation.

11. Development and the Economy. Tourism remains the most significant economic activity in the U.S. Virgin Islands, accounting for some 40 percent of all employment on the islands. The unincorporated U.S. Territory is the number one cruise ship and tourist destination in the Carribbean, hosting over 1.5 million tourists annually.

In St. Thomas, land use reflects the nature of the island's diverse development as a center city, suburbia, and tourist resort, all in one. Almost half of the entire island (47.5 percent) is developed in some form of land use. The remainder, 52.5 percent, under tremendous pressure for development, is in the category woodlands or open space land. The main barrier against development of the woodland is the severity of the slopes. These areas are very mountainous and in most cases construction is very costly.

On St. Thomas, 31 percent or 5,540 acres are in low and high density residential use. Residential stock in St. Thomas consists of 13,717 dwelling units. A variety of residential types exist, including single family homes, apartment buildings, condominiums and hotels. Very high density housing, including many public low and moderate income housing projects, is located in low lying, flood prone areas such as Savan Gut.

Agricultural use on St. Thomas represents only 8.1 percent or 1,489 acres of St. Thomas's land. Of this total 1,412 acres are used for grazing and pasture land. One of the major deterrents to the development of agriculture on St. Thomas in addition to small supply of suitable land, has been the rapid pace of development which has brought about the demand to develop once agricultural land for residential as well as commercial use.

Although St. Thomas is the commercial center of the U.S. Virgin Islands, commercial land use for both retail, wholesale and resort use occupy only 461 acres or 2.6 percent of the land area. The largest portion of this land use is located within the urban center of Charlotte Amalie where numerous stores and restaurants are found. Industrial and manufacturing activities are almost nonexistent on St. Thomas. Due to the nature of the island's commerce, which is basically tourism, and the island's environmental sensitivity industrial activity is not expected to grow in the future.

12. Recreation. St. Thomas is endowed with numerous beaches, both developed and undeveloped, parks and recreation areas. There are 348 acres of beaches, parks and recreation. These represent 1.9 percent of all land uses. Of this number beaches make up 2/3 of the acreage. St. Thomas beaches are sandy and unpolluted. The island's coast is excellent for snorkeling and deep sea fishing.

13. Public Facilities. The government of the Virgin Islands is also competing for the use of St. Thomas's lands. Provision of adequate public facilities and utilities necessitates acquisition of very large tracts of land. In St. Thomas, there is high demand for public facilities such as schools, medical facilities, public housing, etc. One factor preventing development of public facilities is the scarcity of publicly owned lands. In most cases, expensive land acquisition or negotiation with private land owners have acted as barriers to the development of adequate public facilities.

C. PROBLEMS AND NEEDS

The problem discussed in this report is concerned primarily with the flood damages that occur along Savan Gut in Charlotte Amalie. Those damages are discussed in subsequent pages along with a description of improvements desired by the local sponsor.

14. Flood Control. An investigation by USGS in 1977 showed that at least five severe floods have occurred in the Charlotte Amalie area since 1867 when a tidal wave reportedly caused a major disaster along the south coast of St. Thomas. These floods occurred in October 1916, May 1960, March 1969, October 1970, and November 1974. The flood of November 12, 1974 was one of the largest recorded flood events in the area and had a recurrence interval of about 60 years. Little historical information is available regarding dollar damages, type of structure affected or number of structures affected by floods on St. Thomas. However, an investigation by the USGS reported the 1960 flood caused $700,000 in damages to public property with no estimate for damage to private property, although many homes and businesses in the Charlotte Amalie area were flooded with considerable losses resulting. A delineation of this flood event within the study area is shown on plate 1.

According to the USGS report, intense rainfall (over 6 inches) in 3 to 4 hours resulted in extremely heavy runoff and severe flooding in the 1974

event. Property damage as estimated by the government of the U.S. Virgin Islands was in excess of $3 million. The island of St. Thomas was declared a major disaster area. The island was again declared a disaster area in September 1979 as a result of damage inflicted by Hurricane David and Tropical Storm Frederic. These storms caused winds of up to 70 mph through the Virgin Islands and had rainfall of ±20 inches within 24 hours. Damage again was excessive.

The Savan section of Charlotte Amalie, which lies in the 100-year flood plain, has a recurring flood problem. Runoff rates are extremely high due to flash flooding, with flood durations measured in hours rather than days.

The 260-acre Savan Gut watershed is located on the southern shore of central St. Thomas, U.S. Virgin Islands, and encompasses a portion of the town of Charlotte Amalie. From its source in the high mountains of central St. Thomas, the poorly defined watercourse travels in a southeasterly direction for approximately 0.7 mile. A more defined channel continues in the southeasterly direction for 0.4 mile. The stream then enters an underground box culvert and flows south for approximately 0.2 miles, where the outflow discharges into St. Thomas Harbor.

Flooding problems occur primarily at the Jane E. Tuitt Elementary School and within the central business district (CBD) of Charlotte Amalie. The school, built in 1959, is located astride the gut about 1,800 feet upstream from the mouth, at elevation 40 feet, mean sea level.

Flow passes underneath the school through a 4-foot by 8-foot box culvert before exiting to a stone-paved open channel. Retarding effects of the restriction allow debris to settle and partially block the culvert. Consequently the school, built about 1959, and several adjacent houses were severely flooded in 1970 and 1974.

Located in the flood plain are 91 residential structures with an approximate value of $4,200,000. These residential structures consist of single family homes, and multi-family units. There are also 288 commercial and public structures valued at approximately $63,200,000 located in the flood plain. The commercial and public structures consist of all nonresidential structures.

Savan Gut is fully culverted through the CBD to the harbor to form a paved cross street (Guttets Gade). Heavy or protracted rainfall which exceeds the flow capacity of the closed conduit under Guttets Gade results in frequent flooding that has required major repairs as well as clean up of mud and debris.

Tidal flooding is also a problem in Charlotte Amalie. Information on these floods is presented in a Flood Plain Information Report entitled Tidal Areas, St. Thomas, St. Croix, and St. John, U.S. Virgin Islands dated June 1975. A technical discussion of the hydrologic and hydraulic investigations conducted for this report are included in appendix A.

15. Recreation Needs. Additional community outdoor recreational facilities is an objective expressed by the local sponsor. A potential recreational site is that area east of the Jane E. Tuitt Elementary School and within the boundary of the study area.

The Virgin Islands Urban Renewal Board, through an ongoing renewal program, is to acquire and clear lands in this area with the transfer of this land to the Virgin Islands Department of Conservation and Cultural Affairs for the design and construction of the recreation facility. The provision of any flood damage prevention measure at the school by the Corps of Engineers will be accomplished in conjunction with the proposed recreation facility.

16. Social and Economic Concerns. Social and economic concerns within the residential area of Savan Gut are acute. Population density is approximately 97 people per residential acre in this the oldest neighborhood on St. Thomas. The Savan area has existed more than 200 years. A large number of the residential structures in the Savan area are in deteriorated condition with overcrowding and poor dwelling unit quality a common occurrence.

There remains however, a strong sense of community cohesion which has been retained by both current and former residents. It is expected that this strong sense of association and feeling of kinship would be severely disrupted in the event residents were relocated as a result of a Federal project.

In the Charlotte Amalie business district, which is listed in the National Register of Historic Places, the closing of shops, restaurants, and other establishments during periods of flooding has substantially reduced business income. In recent years there has been an increased level of tourism from Puerto Rico and the many cruise ships calling in the islands. This growth in tourism has led to a substantial increase in retail trade, construction, and employment on the island.

D. STUDY OBJECTIVES

In order to address the water resource and related problems, needs, and concerns of the Savan Gut and Charlotte Amalie study area, the following planning objectives have been formulated:

a. Provide flood damage reduction measures to lessen danger to life and property, along 2,300 feet of Savan Gut, between Jane E. Tuitt School and St. Thomas Harbor for the period of analysis;

b. Maintain and preserve the social unity of the Savan area;

c. Minimize adverse impacts on historical and cultural resources of Charlotte Amalie;

d. Improve existing recreational facilities and provide additional recreational opportunities to meet projected demands;

e. Preserve and enhance the natural environment within the study area.

E. PLAN FORMULATION

The formulation of a plan to solve the flooding and related problems and needs of Savan Gut and Charlotte Amalie involves consideration of all possible alternative measures, including both structural and nonstructural solutions or combinations thereof. Each alternative was evaluated on the basis of its technical and economic feasibility as well as its social and environmental effects.

Structural alternatives which are designed to reduce or eliminate flood stages include such measures as flow diversion and several types of channel improvements or modifications. Nonstructural measures are those which reduce the susceptibility of flood damage and consists of actions including flood proofing, zoning, early warning, relocation, and evacuation.

17. Formulation and Evaluation Criteria. Overall criteria for this process is provided by the Principles and Standards for Planning Water and Related Land Resources. These principles and standards are supplemented by certain established technical, economic, environmental and social criteria including the National Environmental Policy Act of 1969. Alternative plans for this study were developed consistent with the two primary national objectives of National Economic Development (NED) and Environmental Quality (EQ). Throughout the planning process the impacts of the considered actions were measured in terms of contributions to four accounts: NED, EQ, Regional Economic Development (RED), and Other Social Effects (OSE).

18. Alternative Plans Considered. A broad range of flood control alternatives were formulated and evaluated to address the problem on Savan Gut. Consideration was given to "no action" as an alternative course of action.

It appears that the most practical solution for minimizing flood damages along Savan Gut is a combination of structural and nonstructural measures. Nonstructural measures such as zoning of the flood plain and building code regualtions would prohibit further construction or rebuilding which would be exposed to flood damage. Because the floodway is essentially obstructed by the number and configuration of existing homes, bridges, and buildings within the CBD, some structural measures must be undertaken.

The individual measures were investigated in various combinations to form six viable plans that would meet the specific criteria established for this study. Viable alternatives to reduce the susceptibility of flood damage along the gut appear to be limited primarily because of the steep terrain encountered and the density of development within the area. A discussion of these alternatives follows.

a. Diversion. Diversion of flood flows is a viable alternative at the Jane E. Tuitt School. This measure calls for the construction of an enclosed concrete chute some 410 feet in length. An alinement along the eastern side of the school would require the relocation of two structures. Diversion of flood water within the high damage areas of the CBD of Charlotte Amalie does not appear feasible because of the absence of alternative flowage routes.

b. Levees were considered in the early stages of plan formulation but further studies indicated that this alternative was not technically or socially feasible. Existing land use practices precludes this alternative as the walls of several residential and business structures actually abut the present Savan Gut Channel. Levee construction would require purchase of easement land adjacent to the gut. The costs of rights-of-way and relocation of structures would result in extremely high costs and would not be economically justified.

c. Relocation of existing residential and business structures and the Jane E. Tuitt School out of the flood prone areas was not regarded as a feasible alternative. Lack of suitable relocation areas and the high costs involved in relocation precluded use of this alternative. Social impact associated with relocation was also a factor. Reluctance of the majority of residents to leave the Savan area because of the close community ties negated this alternative measure.

d. Flood forecasting, warning, and evacuation are nonstructural mea- which would reduce flood losses. Use of these measures within the study area would reduce the extent of flood damage within Savan Gut. The susceptibility of flooding will likely continue however. The short response time associated with the small watershed and steep terrain makes a warning system difficult. Damage reduced with this alternative is particularly difficult to measure because of the many variables involved including the types of actions taken and the impacts associated with those actions.

e. Zoning and building codes, if adopted and enforced, could prove effective in reducing the flood damage potential of any new construction in the study area. Those measures provide no protection for existing land use activities, however, and their applicability to the existing flood problems in Savan Gut are considered negligible. Such regulations and restrictions are encouraged in future developmental activities.

f. Flood proofing of existing structures by elevating out of the base flood level or water proofing was addressed as a possible alternative. However, residential structures generally consist of low cost frame housing which is difficult to flood proof and would be more expensive than could be economically justified.

The structural alternative of channel conveyance improvement was addressed which resulted in an increased flood flow capacity. Modifications

associated with this alternative included: cleaning, deepening, and channel realinement. The channel modification alternative is the most feasible structural measure to address flood conditions in Savan Gut.

19. Development of Detailed Plans. As a result of reconnaissance studies and preliminary estimates, potential solutions to the flood problems which were clearly impractical or unfeasible were eliminated early in the course of study in order to concentrate on feasible alternative measures.

It was determined that channel modifications, including deepening of the existing channel and the construction of a short diversion channel, offer the most practical method of reducing flood damages along Savan Gut in Charlotte Amalie.

In the early stages of this study the original plan was based on providing minimal facilities for 10-year protection. However, more detailed studies indicated that more remote frequency flood protection would be justified, up to and including Standard Project Flood (SPF) protection.

In order to formulate the most feasible channelization alternative, five channel designs were prepared and analyzed. All 5 plans are similar in that they begin upstream of the Jane E. Tuitt School, flow through the CBD of Charlotte Amalie and empty into a stilling basin adjacent to St. Thomas Harbor.

The major features within each of the five channel design frequencies include a new 750-foot-long box culvert to replace the existing culvert through the CBD, a covered diversion chute around Jane E. Tuitt School and a stilling basin adjacent to St. Thomas Harbor. Table 2 provides a preliminary summary of costs for the preliminary detailed plans considered for this alternative. These costs are based on 1981 prices.

TABLE 1

COMPARISON OF COSTS FOR PLANS CONSIDERED
(in 1981 dollars)

Design Condition	Total Initial Cost
SPF Design	$ 4,899,000
100-year Design	4,757,000
50-year Design	4,651,000
25-year Design	4,547,000
10-year Design	4,398,000

TABLE 2

COMPARISON OF ALTERNATIVE PLANS

	Relocation	SPF Design Channel Modification	No Action
A. Significant Impacts			
1. Community Growth	Affords growth in new area	None	None
2. Community Cohesion	Destroys community cohesion	Maintains cohesion of study area	No change
3. Loss of Homes	Total removal of homes	Some structures lost	None
4. Transportation	Requires new road network	Short term impact during construction of project	None
5. Recreation	Requires new facilities	None	None
6. Health	Improved conditions	Modifies somewhat existing conditions along Savan Gut	Health hazards of existing situation remain
7. Cultural Resources	Preserves resources	May have adverse impact requiring mitigation	Continued damage from flooding; resources remain intact
B. Study Objectives			
1. Flood Control	Affords residential protection but none for CBD	Provides SPF protection for residential & commercial structures	No flood control benefits
2. Recreation	Requires new facilities	Benefits only in conjunction with plans of others	None
3. Community Cohesion	Addressed above	Addressed above	No change
4. Cultural Resources	No effect	May have adverse impact requiring mitigation	Continued damage from flooding; resources remain intact
5. Environmental Quality	May create new areas of wildlife habitat in former residential area although debris in channel remains without clearing.	Removes debris from existing channel bottom; may be short term impacts with air quality and noise pollution, and transporting of excavated materials.	No change from debris laden channel. Existing habitat remains intact.

TABLE 2 (continued)

	Relocation	SPF Design Channel Modification	No Action
C. System of Accounts			
1. NED	Relocation barely feasible for residences, and is not feasible for commercial structures which are the principal damaged areas	$4.8 million in annual benefits in annual costs	No flood control benefits, damages and loss of business in CBD of Charlotte Amalie continues
2. Environmental Quality			
threat to endangered species	None	None	None
destroys cultural resources	None	May have adverse impact requiring mitigation	Continued damage from flooding; resources remain intact
disrupts riparian habitat	None	May have short term impact on habitat. That portion lost is of marginal value	None
Fish and Wildlife	May benefit existing wildlife	May have short term adverse impact on wildlife such as birds and other small animals until habitat is reestablished	None
3. Regional Economic Development	Temporary employment of local personnel during construction of residential structures; provides no benefit to CBD.	Temporary employment of local personnel during construction is anticipated; provides beneficial impact of flood protection within CBD.	Continued disruption in CBD caused by flooding
4. Other Social Effects	Destroys social fabric within residential areas; improved health conditions possible with relocation out of existing flood prone residential area.	Reduced threat to life and property with flood protection; maintains community cohesion; likely improvement of health conditions within former flood prone areas.	Flooding continues threat to life, property.

TABLE 2 (continued)

	Relocation	SPF Design Channel Modification	No Action
C. System of Accounts			
1. NED	Relocation barely feasible for residences, and is not feasible for commercial structures which are the principal damaged areas	$4.8 million in annual benefits in annual costs	No flood control benefits, damages and loss of business in CBD of Charlotte Amalie continues
2. Environmental Quality			
threat to endangered species	None	None	None
destroys cultural resources	None	May have adverse impact requiring mitigation	Continued damage from flooding; resources remain intact
disrupts riparian habitat	None	May have short term impact on habitat. That portion lost is of marginal value	None
Fish and Wildlife	May benefit existing wildlife	May have short term adverse impact on wildlife such as birds and other small animals until habitat is reestablished	None
3. Regional Economic Development	Temporary employment of local personnel during construction of residential structures; provides no benefit to CBD.	Temporary employment of local personnel during construction is anticipated; provides beneficial impact of flood protection within CBD.	Continued disruption in CBD caused by flooding
4. Other Social Effects	Destroys social fabric within residential areas; improved health conditions possible with relocation out of existing flood prone residential area.	Reduced threat to life and property with flood protection; maintains community cohesion; likely improvement of health conditions within former flood prone areas.	Flooding continues threat to life, property.

The Savan Gut project would include a rapid flow channel for its entire length through the downtown and urban areas of Charlotte Amalie. Floods exceeding the level of protection that would be provided by this channel would be considered a catastrophe. Consequently, in accordance with ER 1105-2-111, the SPF level of protection should be provided by the project.

The flood proofing or relocation of existing structures, while maximizing the environmental quality (EQ) within the study area, would not be a feasible alternative to address existing flood damages being experienced. A summary comparison of these alternative plans is provided in table 2.

F. THE SELECTED PLAN

The preceding section summarized plan formulation and identified the plans which appeared to offer the greatest potential for resolving the problems and needs of the study area. The area protected is an urban area where damages from large floods would result in a catastrophe. The selected plan incorporates a rapid flow channel. SPF level of protection is the goal for projects formulated in this category. There is no rationale for not achieving the SPF protection goal; therefore, for this analysis the development of an NED evaluation was not considered appropriate. The following pages present a description of the selected plan, including its accomplishments and effects as well as its significant impacts. The selected plan is a refinement and improvement over the plan shown in paragraph 19. The selected plan varies from the plan in paragraph 19 by the inclusion of a velocity check dam upstream of Jane E. Tuitt School, complete SPF diversion around the school and deletion of the stilling basin and lift station near the harbor.

20. Plan Description. The selected plan for the reduction of flood damages within Savan Gut and the CBD of Charlotte Amalie is a structural measure, the main features of which are as follows:

a. Construction of a 2,300-foot-long covered concrete channel extending from St. Thomas Harbor, upstream to and around Jane E. Tuitt School, terminating at a velocity check dam about 150 feet upstream of the school.

b. Replacement of three highway bridges with sections of covered channel.

c. Construction of a velocity check dam upstream of Jane E. Tuitt School.

d. Construction of a barrier in the velocity check dam area to trap floating debris.

21. Plan Accomplishments. The major benefits that will result from the proposed plan is the elimination of existing and future flood damages to the Jane E. Tuitt School and the affected central business district of Charlotte

Amalie. Average annual benefits of $5,252,000 are estimated for the reduction of flood damages to existing structures. No monetary benefits are claimed for reduction of damages to new future development.

The implementation and enforcement of local controls to restrict further development within flood prone areas, and the use of incentives and other measures to lessen flood damages on existing structures, is encouraged.

22. Design and Construction. The selected channel conveyance improvement plan for Savan Gut and the CBD of Charlotte Amalie will pass the SPF event with little or no damage to existing commercial, residential, and public facilities. Major features of the proposed plan are shown on plate 1. Construction of a debris barrier upstream of the Jane E. Tuitt School would lessen any potential damage to the proposed concrete channel. This barrier would control floating debris from possibly blocking canal culverts and thus restricting design flow capacities.

The channel alinement as proposed does not conform exactly to the existing gut alinement. Criteria used in the design for the flood control channel prescribe certain limitations which necessitate a deviation from the existing channel alinement. Using these design criteria, the proposed alinement would require the removal or relocation of eight structures as shown in appendix B, plates B-3 through B-5. The relocation aspect is of major concern because these structures are located within the limits of the Charlotte Amalie Historic District as listed on the National Register of Historic Places. The local Archeological and Historic Preservation Officer would be involved in the determination of relocation or removal.

During construction only the areas required for construction and disposal of excavated materials shall be cleared. All efforts shall be made to disturb as little natural cover as possible. Excess excavated material will be removed from the construction site and placed in an upland disposal site yet to be determined.

A cultural resources survey completed in August 1981 revealed seven cultural resource sites in the project area none being significant enough to warrent an alinement change. A qualified archeologist may be assigned to the site during construction to monitor the excavation. Construction may be temporarily halted should a significant find be determined. If there is no alternative to disruption of the site, then the project must be designed to mitigate any adverse impact the project has on the resource.

23. Environmental Effects. The selected plan which calls for a modification of the existing channel and associated new works, is not expected to adversely affect the study area environment. The project area is a narrow strip which is impinged upon on both sides by residential and commercial development and provides only marginal habitat for birds and other small animals accustomed to an urban environment. There are no fish in Savan Gut as the Gut carries water only during periods of heavy rainfall. The complete Environmental Assessment is provided in chapter H.

The proposed plan calls for the construction of a new cutoff wall 5 feet seaward of the existing bulkhead extending 55 feet east and west of Guttet's Gade to elevation -25.0 feet. A Section 404(b) evaluation, as part of the Federal Water Pollution Control Act of 1972, is presented in appendix E.

24. Social Effects. The selected plan will maintain both the identity of the CBD of Charlotte Amalie and the community spirit and close-knit relationships within the Savan area. There should be no significant additional financial burden placed on the residents as a result of these flood damage reduction measures. There should be no significant change in land use activities within the study area, with residents and shop owners being afforded the assurance of lessened flood damage. Along with a reduction of health hazards, the flood control project should lower the risk of displacement as a result of flooding conditions.

25. Other Effects. The flood control plan as proposed can be made compatible with plans of both the Virgin Islands Urban Renewal Board and the Public Works Departments. The Urban Renewal Board is to relocate several residences and proposes street modifications within the study area. The Public Works Department has proposed a project along Veterans Drive at the harbor to include street widening and complementary parks, open space, shopping and parking facilities.

26. Economics of Selected Plan. The tangible economic justification of the selected plan can be determined by comparing average annual costs (including interests, amortization, operation, and maintenance) with an equivalent average annual benefit which would be realized for the plan over a 50-year period of analysis. The average annual benefits should equal or exceed the annual cost if the Federal Government is to contribute toward the project. The depth-damage relationships used in this study were determined by analyzing the damages from flooding to similarly constructed structures and activities on the mainland. The relationships are considered representative of the losses to be expected from this type flooding to the structures and contents of the buildings and enterprises located in the flood plain. All costs and benefits presented in this section are based on 1981 prices and the prevailing Federal interest rate of 7 5/8 percent was used to determine annual benefits and costs. The beneficial impacts of the proposed project upon the study area include inundation reduction benefits. The area impacted by the flooding is the central business district of Charlotte Amalie which is the commercial center of the island of St. Thomas. This area consists of residential and commercial structures. Potential damage to development includes damage to the physical structure and personal property or contents. Five frequency floods were examined under without project conditions. These floods include the 10-, 25-, 50-, 100-year and Standard Project Flood (SPF).

The Savan Gut study area was outlined on a topographic map at a scale of 1:1200. The existing development in the study area was surveyed to determine structure type, value, size location, and commercial content value. Content values for residential structures were determined to be a percent of

structure value (40 percent for single family and 30 percent for apartments). All lateral drainage will be accommodated with the selected plan of improvement. However, there may be isolated cases of ponded water, but the overall effect is insignificant.

The study area was divided into 44 blocks and 379 structures were identified. These structures were then located on an aerial photo having a scale of 1:1200. The flood lines for five without project flood frequencies were then overlayed over the aerial photographs which identified the development within the study area.

Ground elevations and all flood frequency elevations were interpolated for each structure. Flood depths were calculated for each structure, for all flood frequencies. The structures were separated into 41 commercial and two residential damage relationship classifications. Damages were estimated by applying depth damage relationships to each structures' content and physical value for all flood frequencies. Damages were aggregated into commercial and residential classifications for each flood frequency. The flooding tabulation summarizes existing damages for five storm events without protective works.

TABLE 3

DAMAGES AND STRUCTURES AFFECTED BY FLOODING
(In October 1981 dollars)

Storm Event	Residential	Commercial	Total	Structures Affected
10 year	$ 152,718	$10,530,469	$10,683,187	281
25 year	212,987	11,601,581	11,814,567	299
50 year	305,057	12,735,339	13,040,396	306
100 year	353,017	14,197,018	14,590,035	319
SPF	507,794	15,966,732	16,474,526	338

Flood damages for all flood frequencies analyzed are converted to an average annual value. Average annual damages is a statistical expected value and is calculated by summing the results of the dollar damage of any given magnitude flood multiplied by the probability of its occurrence measured as being equaled or exceeded in a given year. Average annual flood damages to existing development without project conditions is estimated to be $5,252,000. Since all damage is prevented with the selected plan of improvement, the average annual equivalent inundation reduction benefit is estimated to be $5,252,000. The study area has limited land available for new development; therefore, future development in the study area is expected to be similar to existing development. The total initial costs and average annual costs for the selected plan are shown on tables 4 and 5. Using October 1981 costs and 7 5/8 percent interest rate.

TABLE 4

SUMMARY OF SELECTED PLAN INITIAL COSTS (2)
TOTAL INITIAL COSTS
(Date of estimate October 1981)

Item	Federal Cost	Non-Federal Cost	Total
Concrete Channel Improvements	$4,000,000 (1)	$ 371,000	$4,371,000
Outside Project Scope Work	-	477,000	477,000
Relocation and Alteration	-	712,000	712,000
Lands and Damages	-	700,000	700,000
TOTAL	$4,000,000	$2,260,000	$6,260,000

NOTE: 1. Federal participation limited to $4,000,000 in Section 205 projects.
2. For more details on initial cost see tables B-1, B-2, and B-3.

TABLE 5

SUMMARY OF SELECTED PLAN ANNUAL COSTS
(Date of estimate October 1981)

Item	Federal Cost	Non-Federal Cost	Total
Interest and Amortization	$313,000	$139,500	$452,500
Operation and Maintenance	-	8,500	8,500
TOTAL	$313,000	$148,000	$461,000

NOTE: For more details on annual costs see table B-3.

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27. Benefits. Average annual benefits and costs are shown in the tabulation below for the selected flood damage reduction plan.

TABLE 6

SUMMARY OF ANNUAL BENEFITS
(In October 1981 dollars)

Residential	$ 47,000
Commercial and Public	5,205,000
Total Annual Benefits	$5,252,000

Benefit/Cost Ratio of Existing Development: $5,252,000/$461,000 = 11.4

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28. Economic Feasibility. The magnitude of the benefit/cost ratio is such that the economic feasibility of a Federally sponsored project is clearly indicated.

G. COST SHARING AND PLAN IMPLEMENTATION

29. General. Sharing of costs between Federal and non-Federal interests for the Savan Gut project is based on the standard requirements established as Federal policy for "local protection" works. Under this policy, non-Federal interests are required to furnish all lands, easements, and rights-of-way required for project construction and proper project maintenance. Non-Federal interests are also required to bear the costs of modifications to all utilities and highway crossings required for project construction. In addition, the local sponsor must operate and maintain the project after construction in accordance with Federal requirements. The Federal government is responsible for all flood control construction costs including costs incurred in preparing the DPR and reconnaissance report. Appendix G is a draft of the local assurances required for this project.

Under the continuing authority of Section 205, under which this project is proposed, Federal costs are limited to $4 million. Costs in excess of the $4 million limit, established by law, is the responsibility of the local sponsor.

30. Federal Costs. The total initial cost of the project is estimated to be $6,260,000 (see table 4). The Federal share of this cost would be $4 million under authority of section 205 of the Flood Control Act of 1948 as amended.

31. Non-Federal Costs. Non-Federal interests must bear all costs in excess of the Federal limitation contained in the statutes. These local costs are estimated to be $2,260,000.

H. ENVIRONMENTAL ASSESSMENT

32. Need for the Proposed Action

a. Authority. This assessment is made pursuant to Section 205 of the Flood Control Act of 1948, as amended.

b. Location. Savan Gut is a natural drainage channel, draining from north to south, in the city of Charlotte Amalie, situated on the south shore of St. Thomas, U.S. Virgin Islands. Savan Gut drains an area of approximately 262 acres of surface runoff in northern Charlotte Amalie, which falls in elevation about 1,400 feet to sea level in a horizontal distance of 1 mile.

c. Problem to be addressed. Heavy rainfall in the upland catchment basin of Savan Gut causes rocks and other debris to be washed down the channel toward the sea. Two constrictions reduce flood flows so that flood waters overflow the channel banks and flood a school (Jane E. Tuitt Elementary School) and the business district south of Back Street, in downtown Charlotte Amalie. The school, located about 1,800 feet upstream from the mouth at elevation 40 feet, m.s.l., has a tributary area of nearly 175 acres. Problem flooding occurs mainly at the school and in the business section below the school due to constrictions as a result of narrow culverts at both locations.

At the school, flow passes underneath the building for 220 feet through a 4-foot by 8-foot stone masonry box culvert, thence 70 feet through a 7 1/2-foot by 8-foot box culvert under a basketball court before exiting to a stone-paved channel. Savan Gut is a covered culvert from Back Street to the harbor, forming a paved cross street (Guttets Gade). The culvert narrows from about 4-feet-high by 14-feet-wide at the entrance to only 2 1/2-feet-high by 6-feet-wide for the last few hundred feet. The open channel is in generally poor repair; there are two bridges across the channel with additional obstructions such as sidewalks and sewer and utility lines through the flow area.

Heavy rainfall results in frequent flooding that has required major repairs as well as cleanup of debris from the business district in 1953, 1960, 1970, and 1974. The plan of action as proposed includes:

a. Construction of a 2,300-foot-long covered concrete channel extending from St. Thomas Harbor, upstream to and around Jane E. Tuitt School, terminating at a velocity check dam about 150 feet upstream of the school.

b. Replacement of three highway bridges with sections of covered channel.

c. Construction of a velocity check dam upstream of Jane E. Tuitt School.

d. Construction of a barrier in the velocity check dam area to trap floating debris.

33. Environmental Impacts. The upper one-half of the basin consists of densely vegetated (shrubs, trees, and vines), steeply sloping mountain sides with some residental development. The open channel is vegetated by a weedy-ruderal herbaceous flora; open areas also serve as a refuse dumping and sewage site for nearby residents. No important vegetation communities are present in the project area which would be affected by the plan. Due to intense development having occurred in the project area, little natural habitat remains below the school for use by the natural fauna; no negative impacts on the fauna are expected from the proposed action (USF&WS letter, 17 December 1980). No species on the list of threatened or endangered species as republished in the "Federal Register" of 20 May 1980 are expected to occur in the project area. The National Register of Historic Places includes two areas in Charlotte Amalie. The Charlotte Amalie Historic District encompasses the project area together with most of the downtown business district below Back Street. The office of the Hamburg-American Shipping Line is located within this vicinity. A cultural resources survey of the project area was conducted and the report is available for review at the District office. No structures listed, or proposed for listing, on the National Register of Historic Places were located. As most of the project area containing possible significant resources is under pavement or debris a subsurface survey was not feasible. An archeologist will be assigned to the project to observe actual construction activities as they progress and to temporarily stop these activities should any cultural resources be located for evaluation and proper disposition as required by NHPA.

34. Alternatives to the Proposed Action. Several structural and non-structural alternatives to the proposed action were formulated. Projected costs of relocation are very high on the islands. In addition, the highly developed nature of the project area limits the number of feasible alternative plans. The "no-action plan" would allow continued flooding and property damage to occur as a result of heavy rainfall, plus the possible loss of human life under extreme circumstances. The Corps of Engineers has determined that the proposed plan is the most suitable plan for accomplishing the flood relief objective.

35. Agencies and Groups Consulted in Preparation of this Assessment.

U.S. Fish and Wildlife Service - Jacksonville, Florida

U.S. Fish and Wildlife Service - Mayaguez, Puerto Rico

U.S. Fish and Wildlife Service - Atlanta, Georgia

Division of Archeological and Historical Preservation, Office of Archeological Services, Virgin Islands Planning Office - Charlotte Amalie, U.S. Virgin Islands

Heritage Conservation and Recreation Service, Interagency Archeological Services, U.S. Department of the Interior - Atlanta, Georgia

National Marine Fisheries Service, N.O.A.A., U.S. Department of Commerce - St. Petersburg, Florida

Department of Conservation and Cultural Affairs, State Historic Preservation Officer - St. Thomas, U.S. Virgin Islands

36. Environmental Compliance and Regulations Pertaining to the Project.

Archeological Recovery Act of 1974. National Historic Preservation Act of 1966 as amended. Executive Order 11593 - Protection & Enhancement of the Cultural Environment - 13 May 1971.	A preliminary cultural resources survey was undertaken to locate historic and cultural resources in the project area. Seven resources, neither listed nor considered eligible for listing on the National Register of Historic Places, were identified as to be destroyed by the project. These will be documented to standards of the Historic American Building Survey. Depending upon any further findings and with concurrence of the State Historic Preservation Office, an archeologist may be assigned to the project during construction to monitor any cultural resources found and to temporarily stop the project subject to possible excavation of the site.
Clean Air Act, as amended.	In compliance.

Clean Water Act of 1977.	In compliance.
Coastal Zone Management Act of 1972, as amended.	Local sponsor to obtain permit.
Endangered Species Act of 1973, as amended.	In compliance.
Estuary Protection Act.	Not applicable to this project.
Federal Water Project Recreation Act.	Not applicable to this project.
Fish & Wildlife Coordination Act.	In compliance.
Land & Water Conservation Fund Act.	Not applicable to this project.
Marine Protection Research & Sanctuaries Act of 1972, as amended.	Not applicable to this project.
National Environmental Policy Act.	In compliance.
Wild & Scenic Rivers Act.	Not applicable to this project.
Executive Order 11988. Flood Plain Management, 24 May 1977	Not applicable to this project.
Executive Order 11990. Protection of Wetlands, 24 May 1977	Not applicable to this project.
Executive Order 12114. Environmental Effects Abroad of Major Federal Actions, 4 January 1979.	Not applicable to this project.
Executive Memorandum Analysis of Impacts on Prime and Unique Farmlands.	Not applicable to this project.

31 March 1982

SAVAN GUT FLOOD CONTROL PROJECT
CHARLOTTE AMALIE, ST. THOMAS, U.S. VIRGIN ISLANDS

PRELIMINARY FINDING OF NO SIGNIFICANT IMPACT

I have reviewed the planning document and the Environmental Assessment of the considered action. Based on information analyzed in the Environmental Assessment (EA), reflecting pertinent data obtained from cooperating Federal agencies having jurisdiction by law and/or special expertise, and from the interested public, I conclude that the considered action will have no significant impact on the quality of the human environment. Reasons for this conclusion are, in summary:

a. The proposed work will be performed so as to minimize disturbance to any valuable animals or plants. The Gut is a disturbed, partially channelized, irregularly-flowing stream; thus no species of significant biological value are expected.

b. Construction will occur primarily in uplands except for minor excavation near the seawall at St. Thomas Harbor. No long-term water quality impacts are expected as a result of the excavation.

c. The proposed construction will require demolition of seven existing structures. All known and unknown cultural resources will be protected according to professional standards and with the concurrence of the State Historic Preservation Officer.

d. Construction of the flood control project will assist in reducing flooding potential and resulting losses due to flooding in the Savan Gut area of Charlotte Amalie.

In consideration of the information summarized, I find that the considered action does not require an Environmental Impact Statement.

ALFRED B. DEVEREAUX, JR.
Colonel, Corps of Engineers
District Engineer

I. CONCLUSIONS

37. A flood problem was found to exist along the drainage course (or "gut") in the Savan area within Charlotte Amalie, St. Thomas, Virgin Islands. The flood problem begins at Jane E. Tuitt elementary school located about 1,800 feet upstream of St. Thomas Harbor. The school was built in 1959 astride the gut with a box culvert under the school being the only means of safely passing flood flows. Consequently, the school and several adjacent houses were seriously flooded in 1970 and 1974. The flood problem also exists to houses bordering the gut from the school downstream to the business district. The business area is heavily developed for tourist trade with shops and restaurants, but also includes homes, churches, banks, other businesses, and public utilities. Floods have caused severe financial losses and created sociological problems for the inhabitants and businesses employed within the affected area. It is concluded that the most practicable plan for reducing flood losses and other related impacts along the gut would be through channel diversion around the school and conveyance improvements from the school to St. Thomas Harbor. Nonstructural measures were studied but were found to be impractical for alleviating existing damages.

The estimated total initial cost of the channel improvements is $6,260,000 with total annual cost of $461,000. Annual benefits are estimated to be $5,252,000 yielding a benefit-to-cost ratio of 11.4.

J. RECOMMENDATIONS

38. It is recommended that the selected plan for the flood reduction in Charlotte Amalie, St. Thomas, U.S. Virgin Islands be approved under authority of Section 205 of the 1948 Flood Control Act, as amended, and as described in this report. Construction of the project is recommended provided local interests agree to the following:

a. Provide without cost to the United States all lands, easements, rights-of-way, including suitable borrow and disposal areas as determined by the Chief of Engineers necessary for the construction of the Project.

b. Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements made necessary by the construction.

c. Hold and save the United States free from damages due to the construction works except damages due to the fault or negligence of the United States or its contractors;

d. Provide a cash contribution, prior to initiation of construction, equal to the cost of all outside project scope work, presently estimated at $477,000.

e. Assume all project costs in excess of the Government limitation of $4,000,000.

ALFRED B. DEVEREAUX, JR.
Colonel, Corps of Engineers
District Engineer

SAJEN-HH

March 1982

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX A

HYDROLOGY-HYDRAULICS

SECTION 205 DETAILED PROJECT REPORT
SAVAN GUT AT CHARLOTTE AMALIE
ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX A

HYDROLOGY-HYDRAULICS

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A. HYDROLOGY

1. Watershed Description. The Savan Gut watershed drains 0.41 square miles and is located on the southern shore of central St. Thomas, U.S. Virgin Islands and encompasses a portion of the town of Charlotte Amalie. From its source in the high mountains of central St. Thomas, the poorly defined watercourse travels in a southeasterly direction for approximately 0.7 mile. A more defined channel continues in the southeasterly direction for 0.4 mile. The stream then enters an underground box culvert and flows south for approximately 0.2 mile, where the outflow discharges into St. Thomas Harbor. A watershed map is presented on Plate A-1.

2. Precipitation and Storm Characteristics. A National Oceanic and Atmospheric Administration (NOAA) gaging station is located in Charlotte Amalie at latitude 18°21' north and longitude 64°56' west with an elevation of 15 feet m.s.l. Daily rainfall amounts are available from this non-recording gage since 1926. The mean annual rainfall for the area averages about 43 inches with the maximum rainfall expectancy occurring from May through December. The mountainous nature of the basin and steep slopes of the watercourse result in flash flood situations with high runoff velocities. A majority of the rainfall in this area is caused by orographic cooling of moisture laden air, resulting in usually brief rainfall. However, large amounts of rainfall can occur during these brief rainfall periods. Hurricanes and tropical storms are another source of intense rainfall during the May through November hurricane season. Representative of this tropical depression-type storm was the rainfall occurring during the 7-day period of October 4-9, 1980 which recorded a peak 24-hour total rainfall of 6.7 inches and was preceded and followed by several days of rainfall which averaged over 1 inch per day.

3. Unit Hydrograph Analysis. There are no records of stream gage data, sediment data, or historical flood flow estimates for Savan Gut. To determine flow rates for project analysis and design, it was necessary to use synthetic methods. Synthetic unit hydrographs were computed at several locations along the Savan Gut watercourse using the "Unit Graph and Hydrograph Computation" portion of HEC-1DB in conjunction with the Soil Conservation Service (SCS) runoff curve numbers. A weighted curve number of CN-79 was selected as best describing the combination of wooded areas, hard surfaced roads, and high density urban development present within the drainage areas. The watershed is very sensitive to high antecedent moisture conditions which are prevalent during hurricane conditions. Therefore, a high moisture condition of AMC III = 91 was used to compute design discharges. Weighted CN techniques were applied in determining curve numbers. The respective curve numbers were: 78.8, 79.3, and 80.0 for each of the watersheds, which, when converted to AMC III, produced the CN = 91. During the hydrologic analysis two alternative methods were used to determine the sensitivity of the SCS method. Snyder unit hydrographs

were computed using coefficients (640 cp = 600, Ct = 0.6) that were developed in Puerto Rico. The Rational method was also applied using coefficients between .7 and .8. The discharges for the Standard Project Flood are presented below.

TABLE A-1

STANDARD PROJECT FLOOD DISCHARGES IN C.F.S.

	DA mi^2	SCS	Snyder	Rational
Antoni St.	.24	1570	1120	1078
Jane E. Tuitt School	.27	1647	1192	1272
Business District	.41	2076	1593	1824

The reasons for the differences in the computed discharges are primarily due to the ability of the SCS method to account for high antecedent moisture and dramatic slope of the watershed. Lack of gage data and historical records prompted acceptance of the data derived from the SCS method, since it was felt that this method best described the watershed characteristics.

Since a measured flood of record was not available to verify the unit hydrograph, the comparison of methods outlined above was used to test sensitivity of the chosen method. Routing techniques were not used in the analysis. Each subbasin was computed separately and included all contributing areas above the point of concern. Watershed characteristics are presented below.

TABLE A-2

WATERSHED CHARACTERISTICS

Drainage Area Sq. Miles (acres)	Lagtime Hours (Minutes)	Basin Slope	Watercourse Length Miles
.24 (154)	0.12 (7.2)	36%	0.83
.27 (173)	0.14 (8.4)	29%	0.94
.41 (262)	0.22 (13.2)	21%	1.33

The hydrologic impact of future land use changes was not calculated. A large portion of the watershed is very steep and developed to a high degree. Using a curve number of 91 produced conservative discharge estimates indicative of a highly developed area.

Basin lag, the time from the center of incremental rainfall to the time of peak, was also computed and varied from 7 to 13 minutes. Due to the quick response time, unit rainfall durations and unit hydrograph increments were computed in 5-minute intervals.

Flood discharges were calculated at three locations along the watercourse; Antoni Street bridge with a 0.24 square mile drainage area, a basin slope of 36 percent and stream length of 0.83 mile; Jane E. Tuitt School with 0.27 square mile drainage area, basin slope of 29 percent and stream length of 0.94 miles; and St. Thomas Harbor, at the stream mouth, with 0.41 square mile drainage area, 21 percent basin slope and stream length of 1.33 miles. Table A-3 presents the synthetic unit hydrographs for each location.

TABLE A-3

SYNTHETIC UNIT HYDROGRAPHS

Time in Minutes	Antoni Street (csf)	Jane E. Tuitt School (csf)	St. Thomas Harbor (csf)
5	361	291	161
10	720	715	546
15	451	576	755
20	186	266	666
25	81	129	432
30	35	61	246
35	15	28	150
40	7	14	89
45	3	7	53
50	0	3	31
	1,859	2,090	19
			11
			7
			4
			2
			3,172

4. Rainfall. Over 50 years of rainfall records are available at Charlotte Amalie. However, rainfall is collected only once in 24 hours, which is not adequate to define rainfall critical to this small watershed. Basin average 1- to 24-hour point rainfalls for 2- to 100-year return frequencies were estimated from isohyetal maps in Weather Bureau Technical Paper No. 42, "Generalized Estimates of Probable Maximum Precipitation and Rainfall Frequency Data for Puerto Rico and Virgin Islands." The published 1-hour point rainfall depths were determined to be of excessive duration to define flood peaks within the Savan Gut basin. A methodology to develop shorter duration rainfalls is presented in the following paragraph.

5. Rainfall Distribution. The 1-hour storm rainfall distributed in 5-minute increments was computed by plotting the TP-42 point rainfall amounts on log-log paper and extrapolating the 5- to 55-minute point rainfall values. A linear distribution was found to exist on log-log paper and the various return frequencies had similar distributions. For this reason, the 10-year rainfall distribution was applied to the 1-hour point rainfall for the 2- to 100-year return periods. The 5-minute rainfall increments were then critically arranged to conform to the Standard Project Storm (SPS) distribution of maximum 1-hour rainfall as presented in HEC-1 DB (and NWS HYDRO-35). Rainfall losses were computed internally by HEC-1 DB by the SCS equations:

$$\text{Initial loss} = .2S \qquad \text{CN} = \text{SCS curve number}$$

$$\text{Incremental loss} = P - \frac{(P-.2S)^2}{(P+.8S)} \qquad P = \text{incremental rainfall}$$

$$S = \frac{1{,}000}{CN} - 10$$

The same methodology was used to compute rainfall losses for all designs.

6. Probable Maximum and Standard Project Rainfall. Theoretically, the probable maximum precipitation (PMP) is an estimate of the greatest rainfall that might reasonably be expected under the most severe conditions. Estimates of the PMP for the Savan Gut study were developed from TP-42 similar to the 2- to 100-year frequencies. The 5- to 55-minute rainfall amounts were extrapolated from TP-42 data on log-log graph paper and critically arranged according to the SPS distribution.

The Standard Project Flood is defined as the most severe combination of meteorological and hydrological conditions considered reasonably characteristic for the area, excluding extremely rare combinations. The rainfall for this storm was developed by plotting one-half the PMP 1-hour rainfall and extrapolating to 5- to 55-minute rainfalls as done previously. The SPF peak discharges produced by this method varied between 62 to 73 percent of the probable maximum peak discharges and were 24 to 28 percent greater than the 100-year discharges. Plate A-2 presents the SPF discharge hydrographs at the three locations. Table A-4 lists the peak rainfall and discharge rates for various return periods.

TABLE A-4

PEAK RAINFALL AND DISCHARGES

Return Period		2	5	10	25	50	100	SPF	PMF
One-Hour Rainfall	(inches)	1.9	2.3	2.6	3.0	3.3	3.6	5.0	10.0
Antoni Street	(cfs)	517	684	819	991	1,129	1,268	1,570	2,537
Jane E. Tuitt School	(cfs)	534	704	843	1,019	1,161	1,303	1,647	2,729
Business District	(cfs)	732	931	1,092	1,296	1,460	1,625	2,076	3,590

B. HYDRAULICS

7. Existing Profiles. Water surface profiles for existing conditions were computed using the Hydrologic Engineering Center's HEC-2 Computer Program "Water Surface Profiles." Cross sectional data for the analysis was completed in December 1978 using a 50-foot section interval.

a. Starting conditions. Because of the steep slope of the existing channel, critical depth was used as the starting elevation for supercritical flow analysis. A terminal condition of 0.8 feet m.s.l would be a control point at the entrance into St. Thomas Harbor.

b. Manning's Roughness Coefficient "n". The initial values used for Mannings "n" were based on field observations and correlation with past experiences in similar stone-paved open channels. The initially selected values were then adjusted until water surface profiles matched the November 1974 flood profile defined on USGS flood atlases. The USGS estimated the recurrence interval of the November 1974 flood to be once in 60 years. This model then was used to predict floods of greater recurrence intervals. The final value of channel "n" was 0.02 and overbank "n" was .035.

c. Velocities. Velocity damage was noted on the stone paved vertical face of the open channel because changes in alinement were extremely abrupt. No radii of curvature were noted at any bends.

d. Side slopes. All existing side slopes are vertical.

e. Freeboard. The existing height of channel walls is about 3 to 4 feet. The reach of the gut between bridges #2 and #3 has wall heights less than 1 foot.

f. Flood areas. Existing water surface profile data has been incorporated in the Flooded Area Map shown as Plate A-3

8. Hydraulic Design Criteria.

a. General. Hydraulic design criterial and procedures used herein are in accordance with standard engineering practice and applicable provisions of the Corps' Engineering Manuals and the Waterways Experiment Station "Hydraulic Design Criteria" relative to design and construction of Civil Works Projects. Engineering criteria adopted to meet special local conditions are in accordance with that previously approved for similar projects.

b. Starting conditions. Because of the steep slope of the terrain in the project area, a canal design was considered which would incorporate both slope control and velocity control. The canal system was designed to flow supercirtically from the upstream end of the project to St. Thomas Harbor.

c. Water surface elevations.

(1) The National Ocean Survey lists mean higher high water (MHHW) as 0.46 feet m.s.l, mean lower low water as -0.46 feet m.s.l., and mean water level (MWL) as 0.00 feet m.s.l.

(2) Design water surface. A review of the published tidal records (1975-1978) indicates that the highest recorded tide elevation in St. Thomas Harbor was 1.1 feet, m.s.l. The design harbor water surface elevation was assumed to be midway between MMHW (el. 0.46 feet, m.s.l.) and the highest recorded tide (1.1 feet, m.s.l.), or 0.8 feet m.s.l., consistent with a proposed project to widen Veterans Drive 35 feet seawall. To achieve this, a slightly higher water surface of 0.84 feet, m.s.l., was assumed for this design at the existing bulkhead. The starting water surface at the crest of the check dam was assumed to be critical depth. This is a supercritical flow design from the upstream end of the project to the harbor. Water surface profiles were computed using the computer program (HEC-2 Water Surface Profiles) developed by the Hydrologic Engineering Center, Corps of Engineers, 609 Second Street, Davis, California.

(3) Channel characteristics. The steep slopes of streambed and congested residential and commercial areas having restricted right-of-way dictated the use of a covered rectangular concrete open channel. Supercritical flow was maintained at depths less than 90 percent critical depth. A Mannings "n" value of 0.013 was used for the design channel. All flow would be in the channel prisms, therefore no overbank conditions are considered.

(4) Channel wall height. Top of the concrete wall will be at least 1 foot above the design water surface. This freeboard is deemed adequate because the channel dimensions are small. In the covered open channel the bottom of the cover will be at least 1 foot above the SPF water surface profile.

9. Hydraulic Design.

a. Channel Design. The channel design is based on conveying the Standard Project Flood within the banks of a new concrete rectangular open channel. The recommended plan provides for 2,300 feet of concrete channel. The existing channel would not be incorporated into the new design since it was found to be unstable. The hydraulic profile is shown on plate A-4. A summary of hydraulic design data for the channel improvement is shown in table A-5.

The alinement of the new channel varies from that used for the existing channel by the incorporation of minimal radius criteria prescribed in Engineer Manual 1110-2-1601, "Hydraulic Design of Flood Control Channels." The same manual and hydraulic design criteria charts developed by the Waterway Experiment Station also recommends that spiral curves be used for superelevated sections where the flow is rapid and surface distrubances

TABLE A-5

SUMMARY OF HYDRAULIC DESIGN DATA FOR CHANNELS

Station	Location	Flow (c.f.s.)	Water Surface Elevation West	Water Surface Elevation East	Minimum Wall Elevation West	Minimum Wall Elevation East	Bottom Elevation West	Bottom Elevation East	Bottom Width	Average Vel ft/s	Side Slope
0+00	Harbor Bulkhead	2,076	0.84	0.84	1.84	1.84	-4.42	-4.42	16.20	24.37	1 on 0
0+40		2,076	0.90	0.90	1.90	1.90	-4.24	-4.24	16.20	24.92	
0+85	Centerline Sewer	2,076	0.98	0.98	2.00	2.00	-4.03	-4.03	16.20	25.56	
1+15	Transition Width	2,076	1.09	1.09	2.09	2.09	-3.89	-3.89	16.20	25.97	
1+20	"	2,076	1.19	1.19	2.19	2.19	-3.82	-3.82	16.00	25.88	
3+80	"	2,076	2.06	2.06	3.06	3.06	-2.28	-2.28	16.00	29.85	
4+00	Change Bottom Slope	2,076	2.89	2.89	3.89	3.89	-2.16	-2.16	14.00	29.35	
5+00	Change Bottom Slope	2,076	3.82	3.82	4.82	4.82	-1.07	-1.07	14.00	30.30	
5+34.38	Curve 1 TS	2,076	3.92	3.92	4.92	4.92	-0.86	-0.86	14.00	30.97	
5+50	St Transition	2,076	4.32	3.64	5.32	4.64	-.43	-1.11	14.00	31.26	
5+59.38	Curve 1 SC	2,076	4.68	3.60	5.68	4.60	-.17	-1.25	13.69	31.26	
6+00	Change Bottom Slope	2,076	5.46	4.38	6.46	5.38	.07	-1.01	12.33	31.27	
6+10	St Transition	2,076	5.79	4.71	6.79	5.71	.24	-.84	12.00	31.13	
6+70.21	Curve 1 CS	2,076	6.81	5.73	7.81	6.73	1.27	.19	12.00	31.22	
6+80	Change Bottom Slope	2,076	6.78	6.12	7.78	7.12	1.23	.57	12.00	31.22	
6+95.21	Curve 1 ST	2,076	6.80	6.80	7.80	7.80	1.24	1.24	12.00	31.15	
6+95.88	Curve 2 TS	2,076	6.82	6.82	7.82	7.82	1.26	1.26	12.00	31.15	
7+20.88	Curve 2 SC	2,076	6.91	7.91	7.91	8.91	1.32	2.32	12.00	30.64	
7+92	U/S Pavement Back St	2,076	8.56	9.56	9.56	10.56	2.91	3.91	12.00	30.64	
10+47.07	Curve 2 CS	1,935	14.06	15.06	15.06	16.06	8.58	9.58	12.00	29.43	1 on 0
10+61.50	D/S Edge Gamle Gade	1,935	14.75	15.16	15.75	16.16	9.24	9.64	12.00	29.31	
10+70.07	Curve 2 ST	1,935	15.15	15.15	16.15	16.15	9.64	9.64	12.00	29.25	
10+72.5	U/S Edge Bridge Gamle Gade	1,935	15.21	15.21	16.21	16.21	9.70	9.70	12.00	29.33	
10+80	Change Bottom Slope	1,935	15.39	15.39	16.39	16.39	9.86	9.86	12.00	29.17	
10+90	Curve Lat Trans	1,913	15.74	15.74	16.74	16.74	10.28	10.28	12.08	28.97	
11+00	Curve Lat Trans	1,913	16.11	16.11	17.11	17.11	10.71	10.71	12.36	28.76	
11+10	Curve Lat Trans	1,913	16.37	16.37	17.37	17.37	11.13	11.13	12.72	28.65	
11+20	Curve Lat Trans	1,913	16.60	16.60	17.60	17.60	11.56	11.56	13.28	28.57	
11+30	End Curved Lateral Transition	1,913	16.76	16.76	17.76	17.76	11.98	11.98	14.00	28.56	
12+50	Slope Change	1,834	18.26	18.26	19.26	19.26	13.77	13.77	14.00	29.19	
12+87.78	Curve 3 TS	1,834	18.94	18.94	19.94	19.94	14.49	14.49	14.00	29.15	
13+12.78	Curve 3 SC	1,804	20.27	19.31	21.27	20.31	15.86	14.90	14.00	29.25	
14+48.22	Curve 3 CS	1,750	22.54	21.58	23.54	22.58	18.29	17.34	14.00	29.43	
14+50	Slope Change	1,750	22.50	21.61	23.50	22.61	18.26	17.37	14.00	29.43	
14+73.22	Curve 3 ST	1,725	22.03	22.03	23.03	23.03	17.84	17.84	14.00	29.43	
14+97.93	Curve 4 TS	1,725	22.55	22.55	23.55	23.55	18.35	18.35	14.00	29.38	
15+22.93	Curve 4 SC	1,701	22.99	24.03	23.99	25.03	18.86	19.90	14.00	29.42	
16+00	Slope Change	1,676	24.52	25.56	25.52	26.54	20.44	21.48	14.00	29.3	1 on 0
16+03.78	Curve 4 CS	1,676	24.63	25.67	25.63	26.67	20.54	21.58	14.00	29.3	
16+28.78	Curve 4 ST	1,647	24.90	24.90	26.30	26.30	21.23	21.23	14.00	29.05	
16+38	Slope & Width Trans	1,647	25.33	25.33	26.50	26.50	21.58	21.58	13.63	28.82	
16+48	"	1,647	25.81	25.81	26.81	26.81	21.93	21.93	13.26	28.97	
16+58	"	1,647	26.29	26.29	27.29	27.29	22.28	22.28	12.89	28.31	
16+68	"	1,647	26.79	26.79	27.79	27.79	22.64	22.64	12.52	28.02	
16+78	"	1,647	27.29	27.29	28.29	28.29	22.99	22.99	12.15	27.72	
16+88	"	1,647	27.81	27.81	28.81	28.81	23.34	23.34	11.78	27.40	
16+98	"	1,647	28.33	28.33	29.33	29.33	23.69	23.69	11.41	27.06	
17+08	"	1,647	28.87	28.87	29.87	29.87	24.04	24.04	11.04	26.69	
17+16	"	1,647	29.33	29.33	30.33	30.33	24.33	24.33	10.74	26.36	
17+20	Inlet Culvert	1,647	29.56	29.56	30.56	30.56	24.47	24.47	10.59	26.19	
17+36.30	End SVP TS Curve #6	1,647	30.50	30.50	31.50	31.50	25.03	25.03	10.00	25.46	
17+61.30	CS Curve #6	1,647	32.43	31.50	33.43	32.50	26.86	25.93	10.00	29.59	
18+27.41	SC Curve #6	1,647	35.01	34.08	36.01	35.08	29.23	28.31	10.00	28.54	
18+52.41	ST Curve #6	1,647	35.07	35.07	36.07	36.07	29.21	29.21	10.00	28.10	
19+20.63	TS Curve #7	1,647	37.81	37.81	38.81	38.81	31.66	31.66	10.00	26.77	
19+45.63	CS Curve #7	1,647	38.85	39.30	39.85	40.30	32.45	32.90	10.00	26.20	
19+53.70	CS Curve #7	1,647	39.17	39.62	40.17	40.62	32.85	33.37	10.00	26.02	
19+78.70	ST Curve #7	1,647	40.23	40.23	41.23	41.23	33.75	33.75	10.00	25.41	
20+38.50	TS Curve #8	1,647	45.67	45.67	46.67	46.67	38.04	38.04	10.00	21.64	
21+23.50	SC Curve #8	1,647	45.88	47.73	46.88	48.73	38.24	40.09	10.00	21.56	
21+68.46	CS Curve #8	1,647	46.18	48.05	47.18	49.05	38.60	40.45	10.00	21.70	
21+93.46	ST Curve #8	1,647	46.38	46.38	47.38	47.38	38.80	38.80	10.00	21.71	
22+00		1,647	46.28	46.28	47.28	47.28	38.81	38.81	10.00	22.05	
22+20		1,647	46.04	46.04	47.04	47.04	38.85	38.85	10.00	22.91	
22+40		1,647	45.84	45.84	46.84	46.84	38.89	38.89	10.00	23.69	
22+43.50	ST Vertical Curve	1,647	45.81	45.81	47.81	47.81	38.90	38.90	10.00	23.82	
22+46		1,647	45.87	45.87	47.87	47.87	38.95	38.95	10.00	23.79	
22+48		1,647	46.01	46.01	48.01	48.01	39.05	39.05	10.00	23.69	
22+50		1,647	46.23	46.23	48.23	48.23	39.22	39.22	10.00	23.50	
22+52		1,647	46.47	46.47	48.47	48.47	39.40	39.40	10.00	23.31	
22+54		1,647	46.88	46.88	48.88	48.88	39.70	39.70	10.00	22.94	
22+56	End Vertical Curve	1,647	47.30	47.30	49.30	49.30	40.00	40.00	10.00	22.56	
22+66	Bottom Width Trans	1,647	49.58	49.58	51.58	51.58	41.80	41.80	10.40	20.37	
22+76		1,647	51.21	51.21	53.21	53.21	43.60	43.60	11.60	18.63	
22+86		1,647	52.42	52.42	54.42	54.42	45.40	45.40	13.60	17.24	
22+96		1,647	53.54	53.54	55.54	55.54	47.20	47.20	16.40	15.95	
22+98		1,647	53.76	53.76	55.76	55.76	47.56	47.56	17.06	15.55	
23+00		1,647	54.03	54.03	56.03	56.03	47.92	47.92	17.74	15.13	
23+02		1,647	54.31	54.31	56.31	56.31	48.28	48.28	18.46	14.79	
23+04		1,647	54.60	54.60	56.60	56.60	48.64	48.64	19.22	14.37	
23+06	Crest of Check Dam	1,647	54.94	54.94	56.94	56.94	49.00	49.00	20.00	13.87	

* All elevations in feet m.s.l.

* All elevations refer to National Geodetic Vertical Datum (NGVD), formerly sea level datum of 1929 unless otherwise indicated.

need to be minimized. Accordingly, extrance and exist spirals where used along with central circular curves. Superelevation was provided for all curves with the transition to superelevation accomplished in the spiral sections. The channel wall heights were set 1-foot above the superelevation requirements.

This design is in compliance with ER 1165-2-118 "Federal Participation in Covered Flood Control Channels." Three-foot gratings will be provided across the fill width of the channel at location corresponding to 2 foot rise in design water surface elevation. The gratings provide for pressure release, air venting, inspection, and maintenance as well as serving to minimize any reduction in discharge if the channel entrance becomes submerged.

b. Velocity Check Dam. This feature was designed to insure that super critical flow in the in the gut would go through a hydraulic jump prior to entering the super critical concrete channel. The check dam basin was designed to have sheet pile walls extending 3 feet above the SPF water surface elevation. This design considers passing all SPF flow around Jane E. Tuitt School. The exit chute from the check dam was designed in accordance with ETL 1110-2-158 "Design Guidance-Converging Spillway Chutes." Because of the conveyance the chute spillway was designed with 2 feet of freeboard rather than the 1 foot used elsewhere in the project. The reach of covered channel immediately downstream of the chute spillway was designed to have a flatter slope in order to increase the depth, and thus, mean minimum radius criteria around the school. A 36-inch corrugated metal pipe culvert would extend from the check dam flow to the entrance of the existing culvert under the school, then tie into the channel at a downstream inlet. This would serve to drain flood waters from the check dam area as flood waters recede. The bottom of the sheet piling would be protected from scour with a concrete slab. The resulting velocities in the check dam basin would reach a minimum of 1.6 feet per second, thus, in survey that abrasive rocks and boulders would not enter and scour concrete channel. No storm attenuation was accounted for at the velocity check dam.

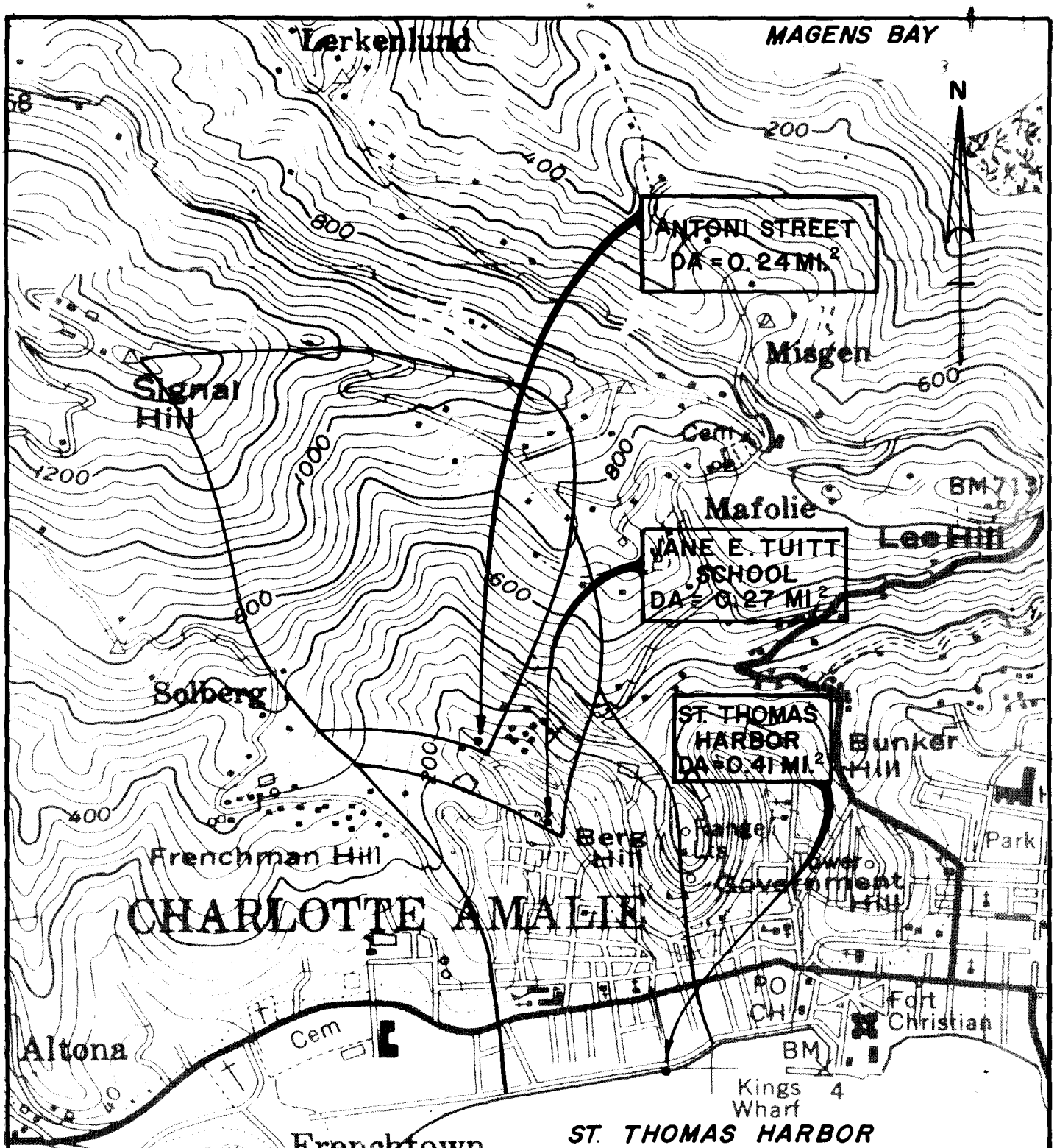
c. Debris Barrier. A debris barrier is provided upstream of the velocity check dam crest to trap floating debris and washed down the stream. Drainage areas contributing debris are approximately .27 square mile.

d. Channel Crossings. All crossings over the covered concrete channels will be designed for highway loading. Channel widths are not excessive so that complete spanning is feasible.

e. Design Complications in the Tourist Area. At the request of local agencies, a channel design was developed to pass above an existing sewer line crossing the project alinement at about Sta. 0+85. In order to accomplish this objective, the downstream 400 feet of the channel was designed to have a flatter slope and increased width. Even so, a practical design could not be developed without considering a monolithic incorporation of an equivalent section of sewer line passing under the floor slab and the channel.

f. Potential Erosion Below Covered Channel Exit Portal. The maximum potential erosion caused by the super critical flow issuing from the channel exit portal is shown on plate A-5. The depth, length and width of scour were determined in accordance with Technical Report No. H-74-9 (Oct 79) based on (1) Cohesionless soil, (2) Rectangular outlet, (3) 85 minute time duration of flow, and (4) 2076 CFS discharge. As recommended, a 110-foot-long sheet pile cutoff wall as provided 5 feet seaward of the existing bulkhead and extending from elevation -4.4 elevation to -25 feet m.s.l. Maximum depth of scour was computed to be elevation -21.6 feet m.s.l. The cutoff will extend slightly deeper to insure embedment in substantially firm material. Tremie concrete along the top 2 feet of the cutoff will provide a seal between the cutoff wall and the existing bulkhead.

g. Side Drainage. Details of side drainage will be developed when additional local surveys are available. Channel capacity was designed conservatively where inflow data was limited.



SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS

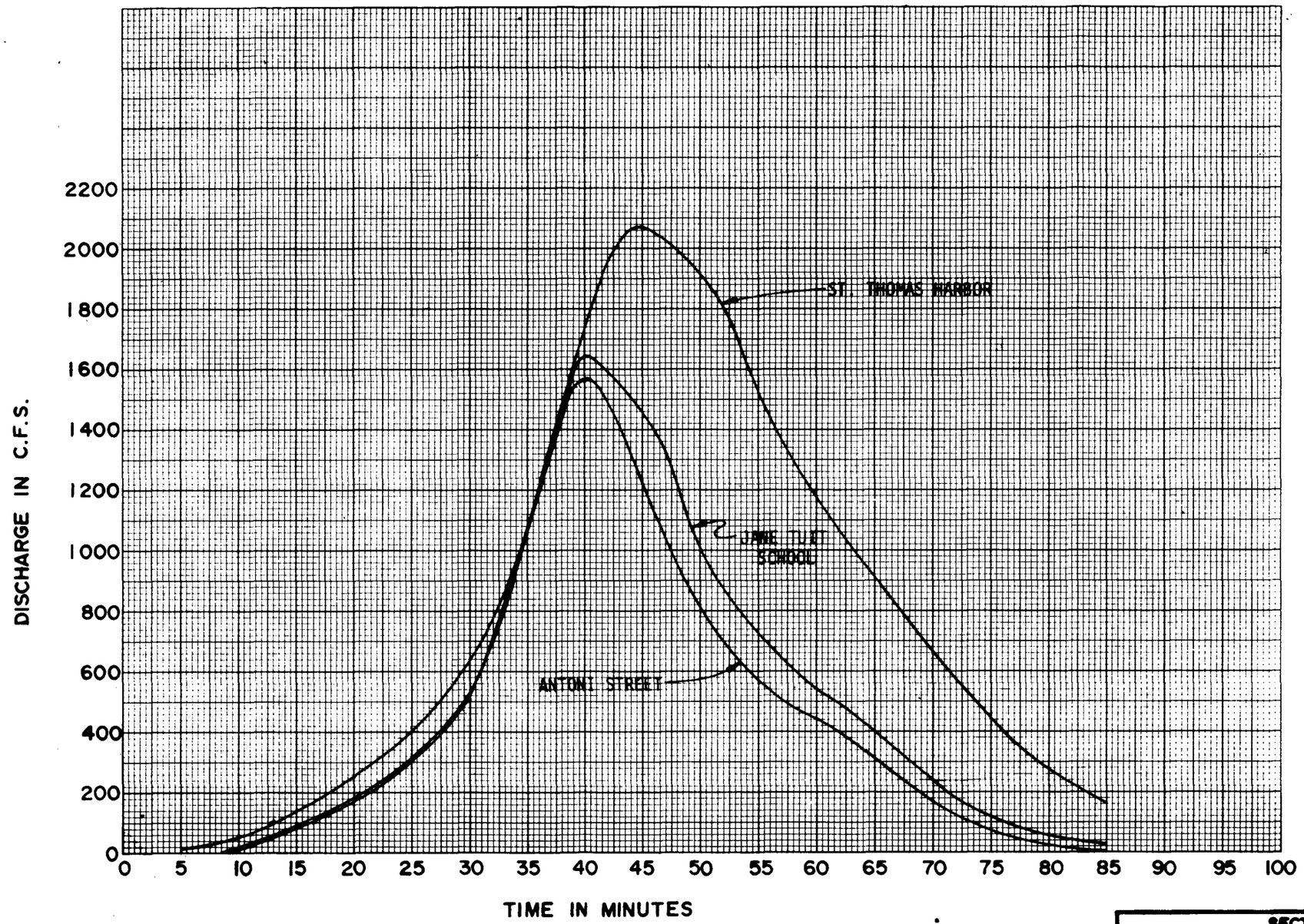
SAVAN GUT

WATERSHED MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

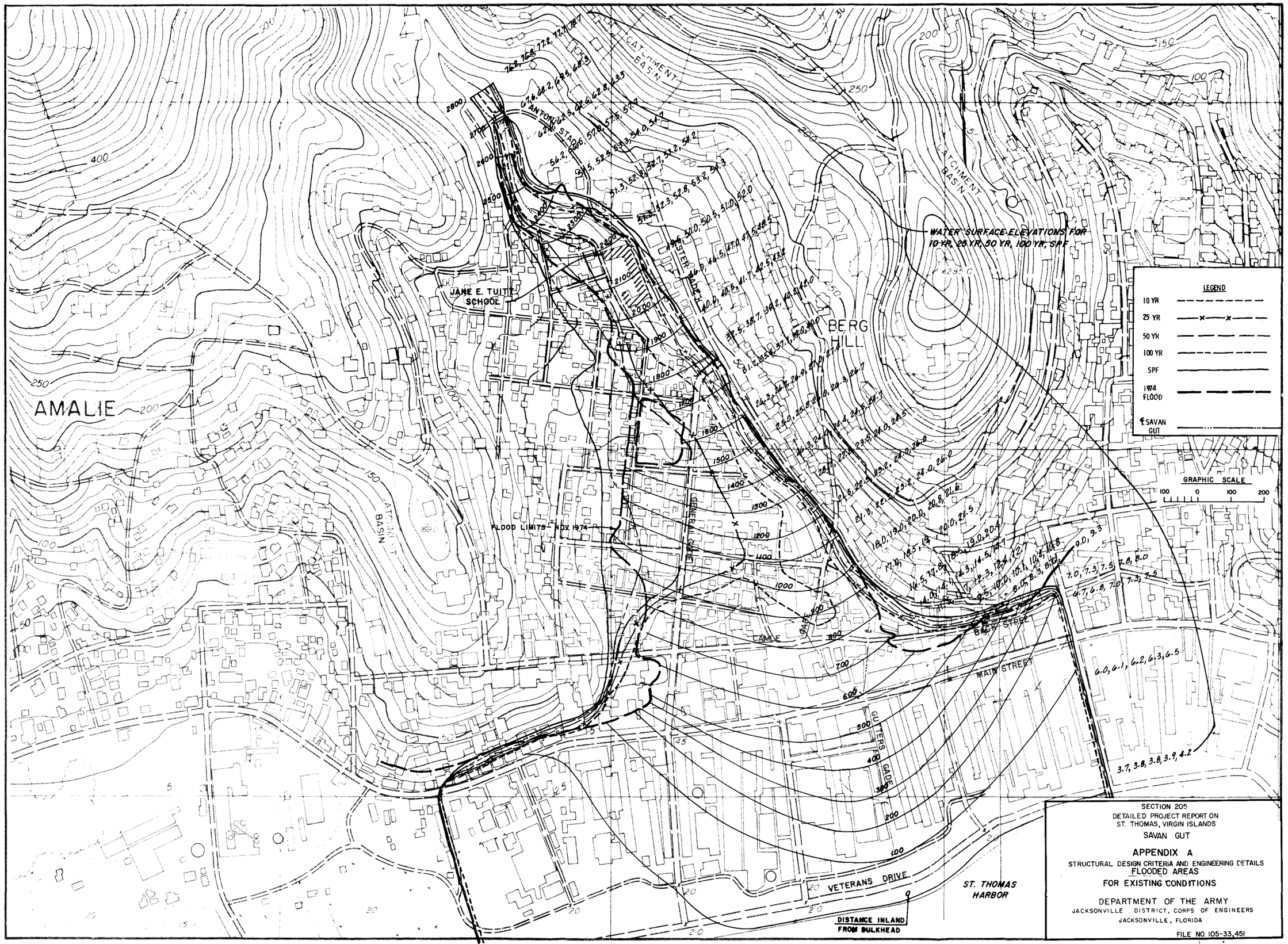
D.O. FILE NO. 105-33,461

PLATE A-1



SECTION 208
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT
STANDARD PROJECT FLOODS
HYDROGRAPHS
SCALES AS SHOWN
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 199-33.481


AMALIE
BERG HILL
JANE E. TUITT SCHOOL
CATCHMENT BASIN
ANTONIO STADIUM
WATER SURFACE ELEVATIONS FOR 10 YR, 25 YR, 50 YR, 100 YR, SPF
FLOOD LIMITS - NOV. 1974
LEGEND
10 YR
25 YR
50 YR
100 YR
SPF
1974 FLOOD
℄ SAVAN GUT
GRAPHIC SCALE
100 0 100 200
GENERAL DE GAULLE
CAMILE
BACK STREET
MAIN STREET
GUTTERS GADE
VETERANS DRIVE
ST. THOMAS HARBOR
DISTANCE INLAND FROM BULKHEAD
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT
APPENDIX A
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS
FLOODED AREAS
FOR EXISTING CONDITIONS
DEPARTMENT OF THE ARMY
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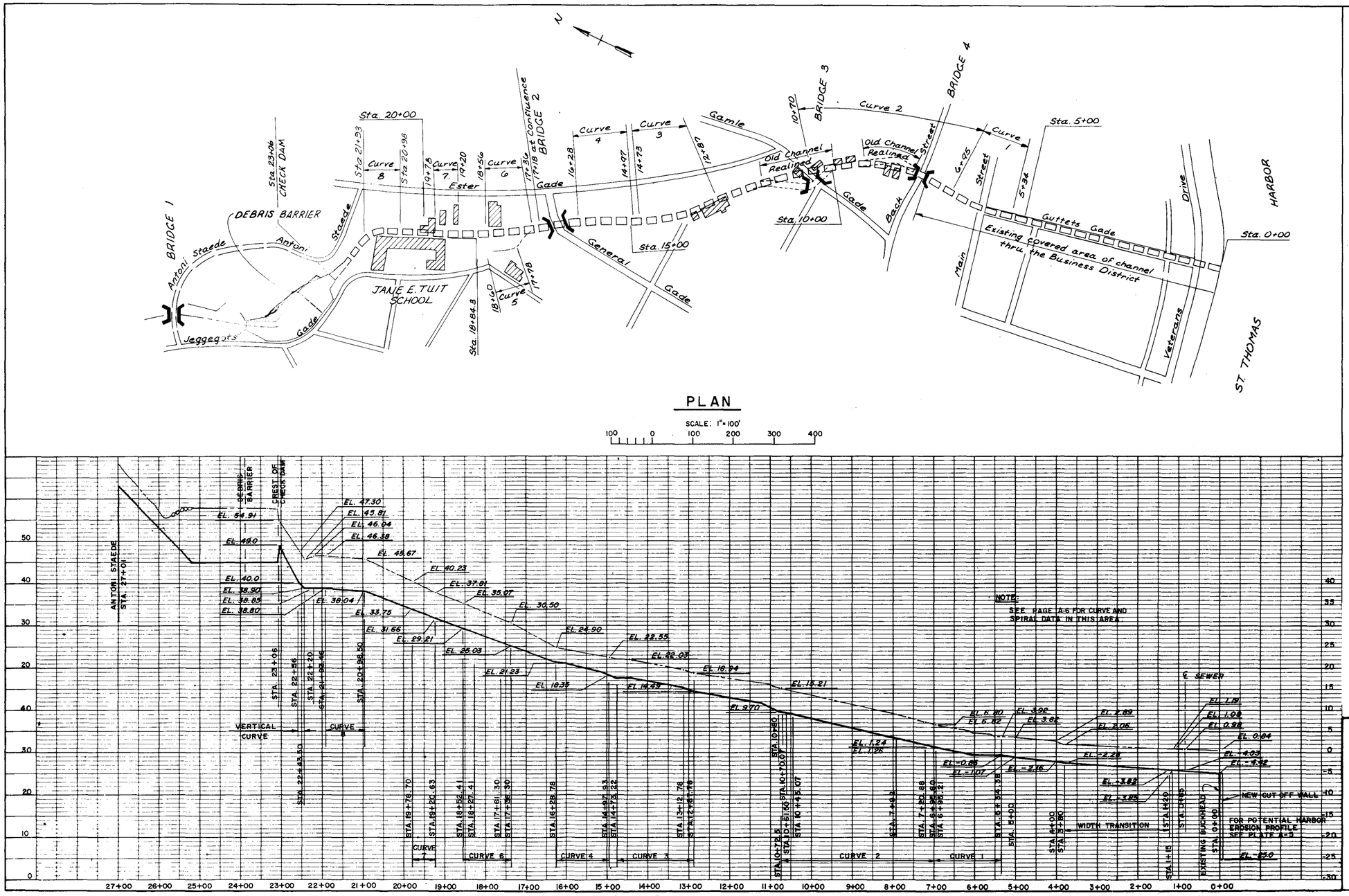
JACKSONVILLE, FLORIDA
FILE NO. 105-33,451

PLATE A-3



SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS

SAVAN GUT

HYDRAULIC PROFILE

DEPARTMENT OF THE ARMY
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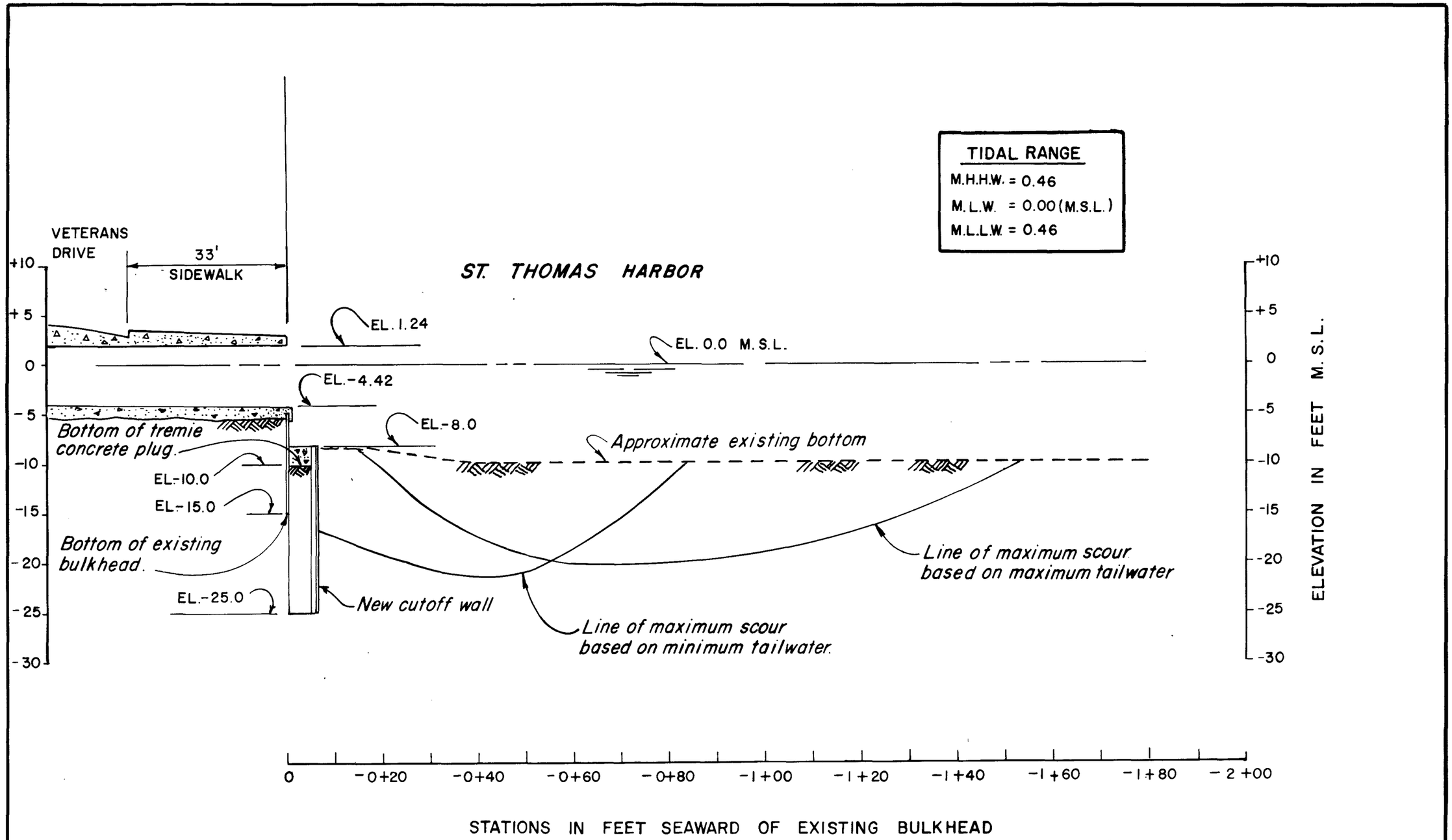
JACKSONVILLE, FLORIDA

D.O. FILE NO. 105-33,451



SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS

SAVAN GUT

POTENTIAL HARBOR EROSION PROFILE

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

D.O FILE NO. 105-33,451

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Mar 1982

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, VIRGIN ISLANDS

APPENDIX B

STRUCTURAL DESIGN CRITERIA

AND ENGINEERING DETAILS

SECTION 205 DETAILED PROJECT REPORT
SAVAN GUT AT CHARLOTTE AMALIE
ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

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APPENDIX B

A. DESCRIPTION OF PROPOSED IMPROVEMENTS

1. General. Proposed construction consists primarily of improving and increasing the conveyance capacity of the existing Savan Gut. Improvements proposed consist of construction of a reinforced concrete box culvert starting at the seawall bordering St. Thomas Harbor (Station 0+00) and extending northward to Jane E. Tuitt Elementary School (Station 23+06). An existing concrete box culvert under the school would remain part of the conveyance system and would tie-in with the new box culvert just upstream and downstream of the school. These connections would be made with 36-inch diameter corrugated metal pipe and would provide for passage of low flows through the existing box culvert under the school. A velocity check dam and basin would be constructed immediately upstream of the proposed box culvert. Just upstream of the entrance to the proposed box culvert a debris barrier would be constructed, as shown on plate B-5A, to prevent debris from entering the proposed culverts. At the discharge end of the proposed box culvert a retaining wall would be constructed along the base of the existing seawall to prevent undermining during flood discharges.

2. Velocity check dam and basin. The weir of the velocity check dam would be at elevation 49.0 with the approach apron at elevation 45.0 as shown on plate B-5. The check dam serves as the entrance to the proposed box culvert and would be of reinforced concrete construction. Bottom elevation of the basin upstream of the velocity check dam would be at elevation 45.0. Flows would be directed into the basin through an approach channel which slopes 1V:10H from existing ground elevation 65.0 immediately downstream of Antoni Straede bridge to the proposed basin. Due to the existing streets and residential housing immediately adjacent to the proposed basin, vertical steel sheet pile retaining walls are proposed around the basin to reduce limits of required excavation. Piling would be capped with a steel channel section. Chain link fence would be installed along the entire limits of the retaining walls as a safety measure due to the close proximity of Jane E. Tuitt Elementary School. Where the retaining walls parallel existing streets, guard rails would be installed along the pavement edge. A general plan of the velocity check dam and basin is shown on plate B-5A.

3. Concrete box culvert. The box culvert would be of reinforced concrete construction. For plan and centerline profile, refer to plates B-2 through B-5A. Because of right-of-way restrictions the alinement of the box culvert would include seven curves of various radii. Each curve would incorporate entrance and exit spirals and banked bottoms. For curve data and culvert alinement, refer to plate B-1. Hydraulic design data, which includes culvert invert elevations, banked bottom requirements, width and minimum height of culvert and other pertinent data, are shown in table A-5 of appendix A. The box culvert would be designed for highway loading through the central business district (Sta. 0+00 - Sta. 7+84) as part of project construction. In addition, at the request of the local sponsor, the reach

of box culvert between Bridge No. 4 (Sta. 7+84) and Jane E. Tuitt School (Sta. 18+50) would also be designed for highway loading as part of outside project scope work (see paragraph 5).

4. Approach channel slope protection. It is proposed that a gabion mattress be used as bank protection for the approach channel to the velocity check basin. For limits of required gabion protection, see plate B-5A. For gabion design requirements, refer to paragraph 9.d. of appendix C.

5. Outside project scope work. For a reach of approximately 1,100 feet, between the school and the business district, an open concrete channel would have provided an adequate design to meet project requirements for conveyance of flood flows along this portion of the proposed system. However, at the request of the local sponsor, a covered box culvert designed for highway loading is proposed for this reach. The local sponsor has agreed to pay all additional costs for construction of a box culvert, in lieu of an open channel, along this reach. Reasons expressed by the local sponsor for their preference for a box culvert included the following.

a. Due to past experience related to the existing open channel along the reach, there has been a continuing problem of area residents using the channel as a disposal area for garbage and other debris. In addition to creating a very unsightly appearance, objectionable odors from the garbage and refuse are also a continuing complaint.

b. The Virgin Islands Urban Renewal Board is currently planning new street construction over the previously proposed open channel. Construction of a box culvert designed for highway loading along this section would reduce substantially the cost of future street construction.

c. Even though the previously proposed open channel would have had chain link fence installed along each side of the channel as a safety measure, a covered box culvert was considered safer and would have a less adverse effect on the general appearance of the historic area.

B. STRUCTURAL DESIGN CRITERIA

6. General Design Criteria.

a. Scope. This section covers the design criteria and stability analyses of the concrete structures of this report. In general, the design of each important feature is described in the following text or on the plates. The work proposed consists of approximately 2,300 feet of box culvert with an approach channel with steel sheet pile walls.

b. General. The structural design is based on standard practice as set forth by the Engineering and Design Manuals (EM 1110 series), Corps of Engineers, U.S. Army, and Building Code requirements for Reinforced Concrete

(A.C.I. Code), subject to modifications indicated by engineering judgement and experience.

c. Working stressses.

(1) General. The allowable working stresses are in accordance with EM 1110-1-2101, "Working Stresses for Structural Design," and applicable codes and standards of other agencies.

(2) Concrete. Working stresses for concrete are in accordance with above references using a minimum specified compressive strength (f'c) of 4,000 p.s.i., and modular ratio (n) of 8.

(3) Reinforcing steel. Working stresses for reinforcing steel are in accordance with above references for billet-steel of intermediate grade.

(4) Structural steel. Working stresses are in accordance with above references based on appropriate stresses.

d. Unit weights and soil properties. Unless shown otherwise on the stability plates, the unit values of the soil and rock to be used in the design of the structures are listed below.

GRANULAR MATERIAL (STA. 0+00 to STA. 10+00)

Wt. of moist earth = 110 #/CF
Wt. of submerged earth = 62.5 #/CF
Angle of internal friction of backfill = 30°
Active lateral pressure (moist earth) = 37 #/SF/F
Active lateral pressure (submerged earth) = 21 #/SF/F
At rest lateral pressure (moist earth) = 53 #/SF/F
At rest lateral pressure (submerged earth) = 30 #/SF/F
Passive lateral pressure (submerged earth) = 188 #/SF/F

CLAY MATERIAL (STA. 10+00 to STA. 19+00 and STA. 19+00 to STA. 26+00)

Wt. of moist clay = 105 #/CF
Wt. of saturated clay = 115 #/CF
Lateral pressure (moist) = .6 x 105 = 63 #/SF/F
Lateral pressure (saturated) = .6 x 52.5 + 62.5 = 94 #/SF/F

CLAYEY GRAVEL (STA. 19+00 to STA. 22+00)

Wt. of moist material = 115 #/CF
Wt. of submerged material = 62.5 #/CF
Angle of internal friction = 35°
Active lateral pressure (moist) = 31.1 #/SF/FT
Active lateral pressure (submerged) = 17 #/SF/FT
At-Rest lateral pressure (moist) = 49.5 #/SF/FT
At-Rest lateral pressure (submerged) = 26.9 #/SF/FT
Passive lateral pressure (moist) = 424.4 #/SF/FT
Passive lateral pressure (submerged) = 230.6 #/SF/FT

ROCK AT APPROACH CHANNEL (STA. 22+00 to STA. 26+00)

Cracked by blasting, assume $\emptyset = 35°$
Wt. of moist cracked rock = 110 #/CF
Lateral active pr. (moist) = 110 x .271 = 30 #/SF/F

Natural Rock (Uncracked by blasting)

Assume 2.0 ft. below channel cracked
Assume next 5.0' resistance = 4 K/SF
Assume below 7.0' resistance = 8 K/SF

7. Box Culvert.

a. General. The box culvert is a continuous structure with various widths and heights. A portion of the culvert will support road traffic and a portion will not. A portion has no backfill over the culvert with the majority having from 2 to 6 feet of fill. The wall components are designed for at-rest lateral pressures and using the loading conditions producing the largest moments and shears. The stability and design analysis results for typical sections of the culvert are shown on plates B-14 and B-15. The continuous culvert is separated by contraction joints. The location of these joints is based on providing monoliths of reasonable lengths to prevent cracking and at changes in size or at changes in scope of the culvert. Typical sections of the steel sheet pile walls are also shown on the design analysis plates.

b. Uplift. The majority of the box culvert portion of the project is above the water table. No uplift is assumed for the box culvert monoliths when ground water is well below the base elevation. The portion of the culvert near the harbor (discharge end) is below the water table. Uplift at this area is assumed at or near the ground line; however, this uplift is offset by water at or near this level within the culvert for all conditions except construction conditions.

c. Base pressures. The base pressures for the entire culvert length are low for the soils at this structure.

d. Truck loading and construction loading. The culvert is designed for A.A.S.H.T.O. truck loading at all areas which trucks could have access.

8. Steel Sheet Pile Walls.

a. General. All steel sheet piles on this job shall be PZ-27.

b. Retaining walls in harbor. These walls are low walls to protect the existing seawall from the scour from the discharge. The cantilever in the clay below the silt.

c. Training walls at approach basin. A special design is used for these walls due to the hard rock which must be penetrated. To prevent a requirement of continuous drilling or punching to provide bottom support for this wall, king piles placed in drilled holes will provide bottom support for 10 to 25 feet of wall. Steel sheet piles driven to a small penetration provides the surface area to retain the embankment. A concrete slab placed on the channel bottom prevents loss on loose or broken rock at the wall. The slab also is tied to the king piles and provides the bottom support for the sheet piling. A wale is used near the top to provide top support for the sheet piling and is tied to king piles. The top of the king piles is supported by 45° anchors which are grouted into drilled holes into firm rock. These anchors will be load tested to verify capacity.

d. Cofferdams. In the downstream area, sheet piles are used to construct the concrete monoliths in the dry. Struts are used above the roof of the structure to support the piling. The stability analysis results for this wall are shown on plate B-14. In the area by the church, the sheet pile walls are designed to support the clayey gravel with the use of struts between walls. Driving shoes may be required due to the presence of rock fragments and boulders in this area. The strut may be removed once the box culvert has been placed and backfill placed behind the walls and compacted. The concrete retaining wall above the box culvert can then be completed with the remaining exposed sheet pile walls in a cantilevered condition. The stability analysis results for the highest wall are shown on plate B-15. Most of the culvert will require sheet piling to allow excavation for concrete placement in the relatively close space between buildings.

C. DESIGN CONSIDERATIONS

9. Access roads. Numerous existing streets would provide construction access along the alinement of proposed construction. Primary access points would be from Vester Gade at north limit of work (see plate B-5), Rosen Gade and Brodranes Gade between Jane E. Tuitt School and business district (see plate B-4), and from various streets within the business district. Rosen Gade and Brodranes Gade dead-end at junction with proposed construction alinement and would provide excellent points of access. Existing streets would also provide suitable access for future maintenance of the culvert system.

10. Traffic control during construction. The most congested intersection along the proposed construction alinement is at Veteran's Drive and Guttet's Gade. Veteran's Drive is a major four-lane road running east and west along St. Thomas Harbor. In order to keep disruption of traffic to a minimum, construction in this area would be accomplished in two stages, as shown on plate B-11. This would provide for two-way traffic along Veteran's Drive around ongoing construction at all times. At other streets crossing

construction alinement, traffic would be rerouted to adjacent streets during construction of the box culvert through the intersection. Construction of the box culvert through Main Street and Back Street would be accomplished during the summer months (120 days) to reduce impact on traffic congestion. Only one street would be closed to traffic during any one period.

11. Dewatering. Construction of all proposed work would be accomplished in the dry with the exception of placement of tremie concrete plug and steel sheet pile retaining wall at end of proposed culvert. Dewatering would be required from Station 0+00 to Station 9+50±. Cofferdam would be constructed of steel sheet piling with lateral bracing provided at the top. For design details of steel sheet pile cofferdam, see plate B-14. Cofferdam plan for construction at Veteran's Drive is shown on plate B-11. Dewatering would be accomplished by methods described in paragraph 9.f of appendix C.

12. Construction procedure.

a. Construction methods. Excavation could be accomplished by dragline or backhoe. Excavation throughout the proposed construction alinement would generally require installation of steel sheet pile retaining walls or timber shoring due to the limited right-of-way available. Since installation of steel sheet piling would be required in heavily built-up areas, installation of piles would be restricted to daylight hours to reduce impact of noise level on the public. Where right-of-way permits, contractor would be allowed to reduce height of required piling or shoring by excavating construction slopes (one vertical on two horizontal), as shown on plates B-7, B-8, and B-10. Materials from required excavation, which are suitable for use as fill and backfill, could be placed within designated areas along the construction alinement until needed. Primary storage areas would be Work Area "A" shown on plate B-3 and Work Area "B" shown on plate B-5. Unsuitable and excess materials would be placed in disposal area discussed in paragraph 20. Placement of concrete materials could generally be accomplished by conventional methods. However, due to restricted access at some points along the construction alinement, pumping of concrete materials would be permitted.

b. Construction sequence. For discussion of construction sequence, proposed construction is divided into four reaches as indicated below:

Reach A - Sta. 0+00 - Sta. 9+00
Reach B - Sta. 9+00 - Sta. 17+65
Reach C - Sta. 17+65 - Sta. 23+06
Reach D - Sta. 17+65 - To school

As much latitude as possible would be given the contractor regarding phasing of construction operations due to the complexity of work and the need to complete construction within a reasonable period of time. The contractor would be permitted to have construction in progress simultaneously in Reaches A, B, and C. Construction of Reach D would follow construction of

October 16, 1986

Environmental Resources Branch
Planning Division

Ms. Claudette C. Lewis, Assistant Director
Division for Archaeology & Historic Preservation
Virgin Islands Planning Office
Post Office Box 2606
Charlotte Amalie, St. Thomas, VI. 00801

Dear Ms. Lewis:

Enclosed is a copy of the Detailed Project Report for the Savan Gut flood control project, as requested at our September 12th meeting with your office.

At that same meeting, Dr. Rona Mazer gave you a "Memorandum of Agreement" (MOA) regarding cultural resources for your review and the State Historic Preservation Officer's signature. A copy of that MOA was also sent to the Advisory Council on Historic Preservation. Please contact Dr. Mazer (904/791-1686) with your comments or any questions you may have.

Sincerely,

A. J. Salem
Chief, Planning Division

Enclosure

CF: DDE for PR & VI

Reach C (see paragraph 12.b(4)(a). The contractor would be required to submit a plan of construction phasing for approval and to conform to the conditions and restrictions indicated below.

(1) Reach A.

(a) Provide for channel bypass flow around or through construction areas at all times (see paragraph 13).

(b) Maintain existing utility services (sanitary sewage and water supply) with a minimum of interruptions during construction operations (see paragraph 26.d).

(c) Construction at Veteran's Drive would be accomplished in two stages as shown on plate B-11. Due to the highly congested traffic in this area, construction of Stages I and II would be limited to a period of 5 months.

(d) Two-way traffic would be maintained along Veteran's Drive around on-going construction at all times (see plate B-11).

(e) While Guttet's Gade could be closed to thru-traffic during construction of Reach A, only one street crossing Guttet's Gade could be closed to traffic during any one period. This does not include Veteran's Drive as discussed above. Construction of the box culvert through Main Street and Back Street would be accomplished during the summer months (120 days) to reduce impact on traffic congestion.

(f) Construction of sections of the box culvert through the business district would be limited to a combined total of 300 feet at any one time. Maximum length of sections under construction would be limited to 100 feet. During the "wet season" (August through November), placement of concrete would be limited to only one construction area along Reach A at any one time. Upon completion of backfill placement along the completed culvert walls to a point midway up the sides of the walls, concrete placement could proceed at the next work area. During December through July, there would be no restrictions on concrete placement.

(2) Reach B.

(a) Provide for channel bypass flow through construction areas at all times (refer to paragraph 13).

(b) Maintain existing utility services (sanitary sewage and water supply) with a minimum of interruptions during construction operations (see paragraph 25.d).

(c) Only one of the two existing streets crossing proposed construction alinement could be closed to traffic during any one period.

(d) There would be no restriction on limits of proposed box culvert under construction at any one time. However, during the "wet season" (August through November), placement of concrete would be limited to only one section, not to exceed 100 feet, at any one time. Upon completion of backfill placement along the completed culvert walls to a point midway up the sides of the walls, concrete placement could proceed for the next section of concrete. During December through July, there would be no restrictions on concrete placement.

(3) Reach C.

(a) No provision for channel bypass flow would be needed for this reach. Construction of this portion of the proposed box culvert is outside the existing Savan Gut Channel.

(b) Maintain existing utility services (sanitary sewage and water supply) with a minimum of interruptions during construction operations (see paragraph 26.d).

(c) There would be no restrictions on limits of proposed box culvert under construction at any one time or placement of concrete along this reach.

(4) Reach D - (Construct 36" dia. CMP low flow culvert).

(a) Construction of Reach C would be required prior to commencing construction of Reach D. Bypass flow would then be diverted around Reach D through Reach C.

(b) Maintain existing utility services (sanitary sewage and water supply) with a minimum of interruptions during construction operations (see paragraph 25.d).

(c) There would be no restrictions on limits of proposed 36-inch diameter culvert under construction at any one time.

13. Channel bypass requirements. The largest portion of proposed construction lies within the existing Savan Gut Channel and along the alinement of an existing covered gutter through the business district. While generally this reach is completely dry, provision would have to be made to bypass flows around or through construction areas during periods of heavy rainfall and flash floods. Construction of a separate bypass channel adjacent to proposed construction is not economically feasible due to the numerous residential and commercial buildings existing adjacent the proposed alinement. Flow through the existing conveyance system is restricted by a 6-foot by 2- foot by 6 inch-culvert section which controls flow at the outlet section near the harbor. It is proposed to provide bypass capacity equivalent to the capacity of the existing conveyance system by installing three 36-inch-diameter corrugated metal pipes through the construction area or

around the construction area, as shown on plate B-11. For those construction areas, which require bypass pipes through the construction area, the contractor would be allowed to remove sections of the bypass pipes during dry periods or periods of low flow in order to provide access for construction operations. During flood flows and periods when no construction activities are in progress, all bypass pipes would be in place. In the event the capacity of the existing channel and bypass system is exceeded, some damage to work in progress would occur. Additional estimated costs for cleanup, repairs, or replacement of damaged form work, erosion, and repairs to damaged construction are included in "Dewatering and temporary construction" costs. To reduce potential for excessive damages during a severe flood, certain restrictions would be placed on construction activities during the "wet season" (August through November). For discussion of these restrictions and location of the reaches referenced below, refer to paragraph 12.b. Bypass pipes would only be required through work areas in Reaches A and B of proposed construction. No provision for bypass flow would be needed for Reach C since construction would be outside the existing Savan Gut Channel. Reach C would be completed prior to construction of Reach D and would be used to bypass flows around Reach D construction.

14. Restoration of natural values. All disturbed areas would be restored as nearly as possible to their original state and seeded, as necessary, to secure grass establishment. Damaged areas of existing pavement adjacent to construction would be repaired or replaced, as necessary.

15. Interference with local activities. Construction of the improvements proposed herein is expected to cause some interference with movement of pedestrian and vehicular traffic through and around proposed construction. While the construction contractor would be required to maintain pedestrian access to and from affected buildings during construction, Guttet's Gade, which runs through the Central Business District, would be closed to thru-traffic during construction of that section of the proposed box culvert. For more detailed discussion of construction phasing which would be required to reduce interference with local activities, refer to paragraph 12.b. In regard to relocation of utilities, some interruptions in service would occur. While the contractor would be required to maintain flow in sanitary sewer lines and water supply lines through or around construction areas, some interruptions in service would occur for brief periods while transfering service from existing lines to temporary bypass lines (refer to paragraph 25.d).

16. Protection of existing buildings. Most of the existing structures along the proposed construction alinement are small buildings consisting primarily of one- and two-story structures. Many are of timber frame construction. Where the depth of excavation requires placement of steel sheet piling for dewatering and protection of adjacent buildings, such as through the Central Business District, the steel sheet pile system is based on a non-yielding design to prevent any lateral movement or settlement of the existing buildings. In regard to determining type of foundation system and limits for major buildings adjacent to new work, the local sponsor has

been requested to furnish this information. However, due to the age of the structures, only limited details can be expected. Coordinates (x and y) are being obtained for all building corners which are in very close proximity to proposed construction.

D. CONSTRUCTION MATERIALS

17. Concrete. A Concrete Materials Investigation Report was prepared in accordance with Appendix A of EM 1110-2-2000, "Standard Practice for Concrete," and is presented as appendix F. Approximately 3,700 cubic yards of concrete would be required for project construction.

18. Stone protection. All gabion stone would be local stone which can be obtained from nearby quarries.

19. Fill and backfill. Suitable materials from required excavation would be used for fill and backfill. All fill and backfill material would consist of selected material free from peat, and with no rock particles larger than 3 inches graded uniformly down to fines.

20. Disposal area. Excess material and material unsuitable for fill and backfill would be hauled to inland disposal area yet to be determined.

E. REAL ESTATE REQUIREMENTS

21. Real estate requirements. The project sponsor is required to assume the cost of all lands, easements, including disposal areas and rights-of-way required for the construction and operation of the project. With exception of the disposal area, approximate land requirements are shown on plates B-2 through B-5A.

F. RELOCATIONS

22. General. The project sponsor is required to assume the costs for all relocations and alterations. Costs relating to Public Law 91-646 requirements are also borne by the local sponsor. Relocation of some families would be required due to construction of this project. All residents involved would be compensated under Public Law 91-646. Facilities to be relocated or altered include streets, highway bridges, homes, buildings, electric transmission lines, utilities, and local drainage structures. While generally it is standard practice for the local sponsor to relocate all affected facilities in advance of construction activities, this is not practical or economically feasible for the proposed project. With exception

of relocation or temporary relocation of electric transmission lines and relocation of homes, all other relocation and alteration items would be accomplished under the project construction contract. All costs related to these items would still be paid by the local sponsor. For affected utilities, which cannot be relocated by the local sponsor in advance of construction activities, some interruption in utility services would occur. To keep these interruptions to a minimum, close coordination and cooperation would be necessary between the Corps of Engineers, Virgin Islands Department of Public Works, and the construction contractor.

23. Streets. The primary street requiring replacement due to proposed construction is Guttet's Gade which runs through the business district along the proposed alinement. There are two other streets crossing the proposed alinement north of the business district which would also be affected. Guttet's Gade is 784 feet long and is constructed of rigid concrete pavement. However, it is proposed to replace all pavement with a bituminous concrete pavement for reasons indicated below. For typical pavement section and pavement design, see plate B-13.

a. The existing streets intersecting or crossing Guttet's Gade, including 4-lane Veteran's Drive, are constructed of asphaltic pavement. The proposed pavement design would provide for smoother transitions between existing and new construction and would blend more easily with intersecting streets.

b. The bituminous concrete pavement would provide less costly access to the numerous buried utilities beneath the streets during future maintenance and replacement operations.

c. For the proposed construction, cost of bituminous concrete pavement should be competitive with rigid concrete pavement.

24. Bridges. There are four existing bridges within the study area, as shown on plate B-1. Following discussion presents scope of proposed relocations or alterations for each bridge.

a. Bridge No. 1. This bridge is outside the limits of proposed improvements. No replacement or alteration is proposed.

b. Bridge No. 2. Proposed construction would require removal of this bridge. The proposed box culvert would be designed for highway loading at this former bridge crossing which would eliminate the need for a separate bridge structure. The additional costs of this covered box culvert compared to an open concrete channel through this crossing would be included under relocations cost. Other features required to provide a suitable crossing for vehicular traffic include construction of concrete retaining walls adjacent to the roadway, placement of earth fill between the walls, and construction of bituminous concrete pavement along the disturbed area. For details, see section P-P on plate B-8.

c. Bridge No. 3. This bridge is outside the limits of proposed construction and would not require replacement or alteration. Due to hydraulic restrictions the proposed alinement was unable to conform to the sharp bends of the existing paved channel at this location. Relocations cost would be limited to reconstruction of that section of street which crosses the proposed box culvert and the additional costs of providing a box culvert designed for highway loading compared to an open concrete channel through this crossing. The existing paved channel under Bridge No. 3, and other areas where its removal would not be required by proposed construction, would be backfilled to top of existing ground. This would prevent formation of undrained areas which would be undesirable esthetically and a possible hazard to health.

d. Bridge No. 4. This bridge would be replaced by proposed construction. The proposed box culvert would be designed for highway loading at this crossing and for the entire reach through the business district. Relocations cost would be limited to reconstructon of the street which crosses the proposed box culvert. For details, see section G-G on plate B-7.

25. Utilities.

a. General. Proposed relocation of major utilities are shown on plates B-2 through B-5 and on plate B-12. The proposed relocation plan and details are based on a 1978 topographic survey made by the Corps, utility layout drawings furnished by the local sponsor, and site investigations made by Corps personnel. Sufficient information pertaining to relocation of existing utilities has been obtained on which to base a reasonably accurate cost estimate. However, more detailed information will be needed for preparation of contract plans. This additional information has been requested and the local sponsor has assured the Corps it will be provided prior to preparation of contract plans.

b. Relocation of sanitary sewer line along proposed alinement. It is proposed to provide a sanitary sewer line along each side of the box culvert, as shown on plates B-2 through B-5, in order to make connection with residential and other building laterals along the alinement. The existing design consists of only one sanitary sewer line along the alinement. This provides a suitable design for present conditions since the existing concrete channel is very shallow and permits laterals to run under the channel to intercept the sewer line on the other side. The depth of the proposed box culvert precludes running laterals under the culvert.

c. Relocation of utilities - Veteran's Drive and Guttet's Gade. Proposed construction through this area would require relocation and alteration of primary sanitary sewer and water supply lines running along Veteran's Drive, as shown on plate B-12. This includes existing 15-inch and 30-inch gravity sewer lines, a 10-inch water supply line, and a 24-inch water supply line. The existing 10-inch water supply line and the 30-inch sanitary sewer line would be relocated under the proposed box culvert. The

existing 24-inch water supply line, which presently is not in use, would be reinstalled above the proposed box culvert through the rebuilt planter box. There would be only minor change in the alinement and grade for this pipe. For relocation plan, see plate B-12.

d. Maintenance of service during construction. The construction contractor would be required to maintain existing utility services (sanitary sewage and water suppply) with a minimum of interruptions during construction operations. Interrruptions would be limited primarily to brief periods during transfer of service from existing lines to temporary bypass lines. Service would be maintained during relocation of water supply lines by installing temporary supply lines over the areas under construction. No additional pumping would be required for these installations. Service would be maintained during relocation of sanitary sewer lines by installing temporary sewer lines over the areas under construction. Installation of temporary package lift stations would be required to maintain flow through the temporary sewer lines. To maintain service to buildings and homes immediately adjacent to areas under construction, a temporary gravity line would be installed along both sides of the construction area. These lines would intercept individual laterals and discharge collected flow into sewer line downstream of work area. These temporary lines would be located just deep enough to provide gravity flow along the collection area.

26. Local drainage structures. Guttet's Gade is a paved street running along the proposed channel alinement through the business district. This street has numerous drop inlets which collect local drainage. These drop inlets currently discharge collected flow directly into a covered gutter which runs along Guttet's Gade. The covered gutter conveys all collected flow directly to St. Thomas Harbor. Proposed construction would replace the covered gutter with a much larger box culvert beneath Guttet's Gade. The existing street and drop inlets would be replaced with new construction. Drop inlets would be connected to the proposed box culvert and local drainage would be conveyed directly to St. Thomas Harbor. Upstream of the business district local drainage currently is collected in concrete gutters and storm drains along the existing streets which parallel the proposed alinement. The collected flow is then discharged into an existing open concrete channel, running along the proposed alinement, at various points along the channel. Primary points where collected flow enters the existing open channel are at Bridges Nos. 2, 3, and 4. All existing gutters and storm drains, currently discharging into the open channel, would be connected to the proposed box culvert. While all major drainage is collected and discharged into the existing open channel, as described above, some local drainage enters the open channel between collection points from areas immediately adjacent to the channel. Construction of the proposed box culvert would require that provision be made to intercept this additional flow and discharge it into the box culvert. This would be accomplished by construction of small V-ditches along the proposed alinement and installing inlet drains to the box culvert where required. In a few restricted areas adjacent to buildings, a small concrete flume may be required.

G. OPERATION AND MAINTENANCE

27. Operation and maintenance. The local sponsor would be responsible for the maintenance of the improvements proposed in this report upon completion of the construction contract. The contractor would be responsible for all maintenance during the construction contract.

H. CONSTRUCTION SCHEDULE

28. Construction schedule. It is planned to award two construction contracts to accomplish the construction of the improvements proposed in this report. The first contract is scheduled to be advertised in the 4th Quarter of FY-82 pending approval of this report and appropriation of funds. Contract price for the first contract would be between $2 million and $2.5 million and the estimated construction time would be 14 months. Limits of construction would be from Sta. 0+00 to Sta. 9+00±. The remaining work would be advertised in FY-83 with an estimated construction time of 12 months.

I. QUANTITIES AND COST ESTIMATES

29. Cost estimates presented. Contract price estimates for the improvements proposed herein showing quantities and unit price costs are presented in table B-1. Also included in table B-1 are contract price estimates for ouside project scope work and relocation and alteration items which would be part of the contruction contract. Summary of total initial costs are presented in tale B-2 and summary of Federal and non-Federal costs are presented in table B-3.

30. Concrete channel improvements. Estimates of cost presented in table B-1 for concrete channel improvements are based on project design requirements and do not include the additional costs of construction requested by the local sponsor. This additional construction is considered to be outside project scope and the estimated cost for this work is presented as a separate item in table B-1.

31. Outside project scope work. The additional improvements requested by the local sponsor consists primarily of providing a covered box culvert in lieu of the previousy proposed open concrete channel between Jane E. Tuitt School and the business district. The local sponsor has agreed to pay all additional costs related to covering the open concrete channel. A savings of approximately $40,000 would be realized in project costs due to covering the open channel. Extensive fencing along the previously proposed open channel would no longer be required. For further discussion pertaining to outside project scope work, refer to paragraph 5.

TABLE B-1

SAVAN GUT PROJECT

CONTRACT PRICE
Quantities and Cost Estimates
(Date of Estimate: Oct 1981)

Item	Unit	Unit Price	Quantity	Total
Concrete Channel Improvements				
Mobilization and demobilization of equipment	Job	L.S.	1	$180,000
Dewatering and temporary construction	Job	L.S.	1	925,000
Remove existing concrete structures (excludes relocation items)	Job	L.S.	1	55,000
Excavation, rock	C.Y.	9.00	4,600	41,400
Excavation, unclassified	C.Y.	5.50	18,800	103,400
Fill and backfill	C.Y.	8.75	9,200	80,500
Gabions (20" thick)	C.Y.	70.00	410	28,700
Concrete (standard construction)	C.Y.	305.00	1,800	549,000
Concrete (spiral construction)	C.Y.	360.00	1,200	432,000
Cement	CWT	5.30	15,800	83,700
Reinforcing steel	Lbs.	0.53	418,400	221,800
Steel sheet piling (permanent)	S.F.	21.00	19,900	417,900
Steel king piles	L.F.	35.00	912	31,900
Pre-drill for king piles	L.F.	30.00	308	9,200
Rock anchors	L.F.	50.00	450	22,500
Steel grating	S.F.	24.00	690	16,600
Miscellaneous structural steel	Lbs.	1.30	44,800	58,200
Guardrail	L.F.	21.00	200	4,200
Fencing	L.F.	20.00	600	12,000
36-inch dia. CMP	L.F.	45.00	300	13,500
Debris barrier	Job	L.S.	1	12,000
Grassing/sodding	Job	L.S.	1	6,500
Subtotal				$3,305,000
Contingencies (15%±)				496,000
Contract price				$3,801,000

TABLE B-1 (Continued)

Subtotal contract price (cont'd)				$3,801,000

Outside Project Scope Work (see para. 31)

Fill and backfill	C.Y.	8.75	1,510	13,200
Concrete	C.Y.	360.00	700	252,000
Cement	CWT	5.30	3,700	19,600
Reinforcing steel	Lbs.	0.53	119,600	63,400
Local drainage structures	Job	L.S.	1	10,000
Grassing/sodding	Job	L.S.	1	2,800
Subtotal				$ 361,000
Contingencies (15%±)				54,000
Contract price				$ 415,000

Relocations and Alterations

Bridges	Job	L.S.	1	66,000
Streets	Job	L.S.	1	52,000
Utilities				
Sanitary sewer lines	Job	L.S.	1	67,000
Sanitary sewer manholes	Job	L.S.	1	45,000
Water supply lines	Job	L.S.	1	28,000
Maintain service during construction	Job	L.S.	1	128,000
Miscellaneous (unknown utilities, etc.)	Job	L.S.	1	100,000
Local drainage structures	Job	L.S.	1	26,000
Subtotal				$ 512,000
Contingencies (15%±)				77,000
Contract price				$ 589,000

TOTAL CONTRACT PRICE $4,805,000

TABLE B-2

SAVAN GUT PROJECT

SUMMARY OF TOTAL INITIAL COSTS
(Date of Estimate: Oct 1981)

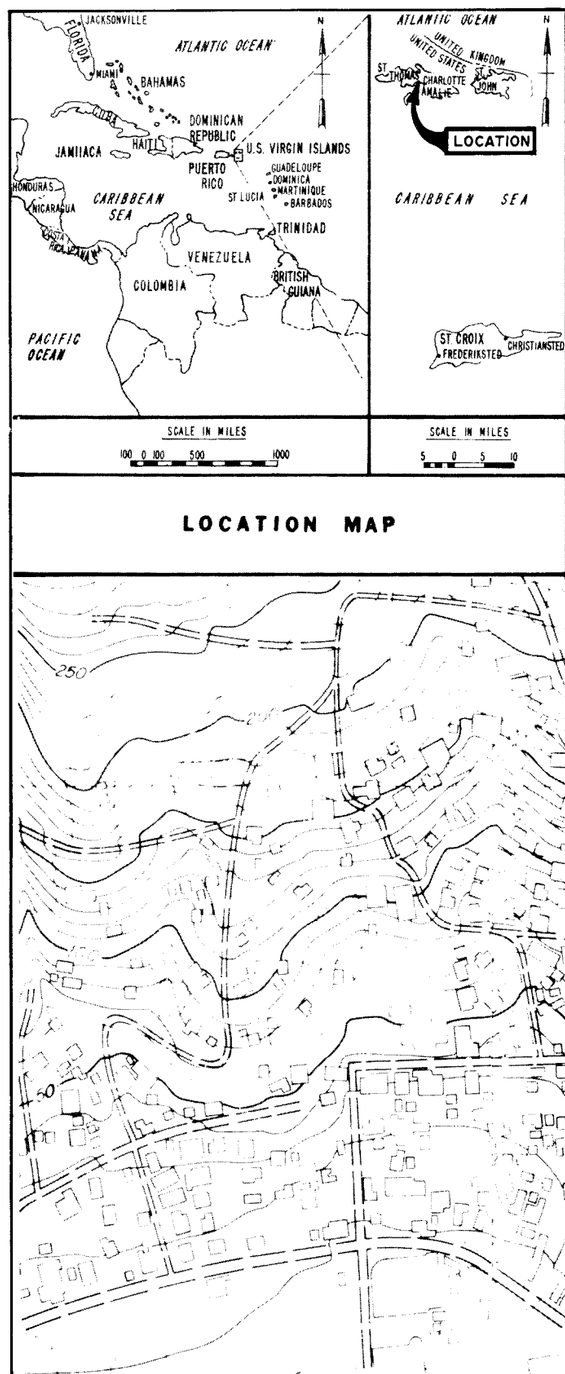
Item	Amount	Total
Concrete Channel Improvements		
Contract price	$3,801,000	
Supervision and administration (7%±)	266,000	
Construction costs	$4,067,000	
Engineering and design (8%±)	304,000	
Initial costs		$4,371,000
Outside Project Scope Work		
Contract price	$ 415,000	
Supervision and administration (7%±)	29,000	
Construction costs	$ 440,000	
Engineering and design (8%±)	33,000	
Initial costs		$ 477,000
Relocations and Alterations		
Contract price (included in construction contract)	$ 589,000	
Relocate electric transmission lines (by locals)	30,000	
Contract price	$ 619,000	
Supervision and administration (7%±)	43,000	
Construction costs	$ 662,000	
Engineering and design (8%±)	50,000	
Inital costs		$ 712,000
Lands and Damages		
Right-of-way	$ 199,000	
Disposal area	37,000	
Acquisition costs (5%±)	12,000	
Private dwellings (8)	256,000	
P. L. 91-646	105,000	
Contingencies (15%±)	91,000	
Initial costs		$ 700,000
TOTAL INITIAL COSTS		$6,260,000

TABLE B-3

SAVAN GUT PROJECT

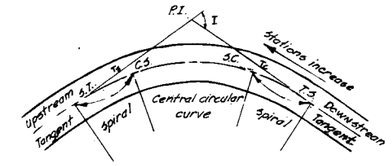
SUMMARY OF FEDERAL AND NON-FEDERAL COSTS
(Date of Estimate: Oct 1981)

Item	Amount	Total
FEDERAL COSTS		
Initial		
Concrete Channel Improvements	$4,000,000 (1)	
(1) Maximum Federal share under authority of Section 205 of the Flood Control Act of 1948, as amended.		
Total Initial Federal Costs		$4,000,000
Annual		
Federal investment subject to interest and amortization		($4,000,000)
Interest at 7 5/8%	$ 305,000	
Amortization at 7 5/8% for 50 years	8,000	
Annual Federal Costs		$ 313,000
NON-FEDERAL COSTS		
Initial		
Total initial costs less Federal share ($6,260,000 - $4,000,000)	$2,260,000	
Total Initial Non-Federal Costs		$2,260,000
Annual		
Non-Federal investment subject to interest and amortization (project costs only)		($1,783,000)
Interest at 7 5/8%	$ 136,000	
Amortization at 7 5/8% for 50 years	3,500	
Operation and maintenance	8,500	
Annual Non-Federal Costs		$ 148,000
Grand Total-Initial Federal and Non-Federal Costs		$6,260,000
Grand Total-Annual Federal and Non-Federal Costs		$ 461,000

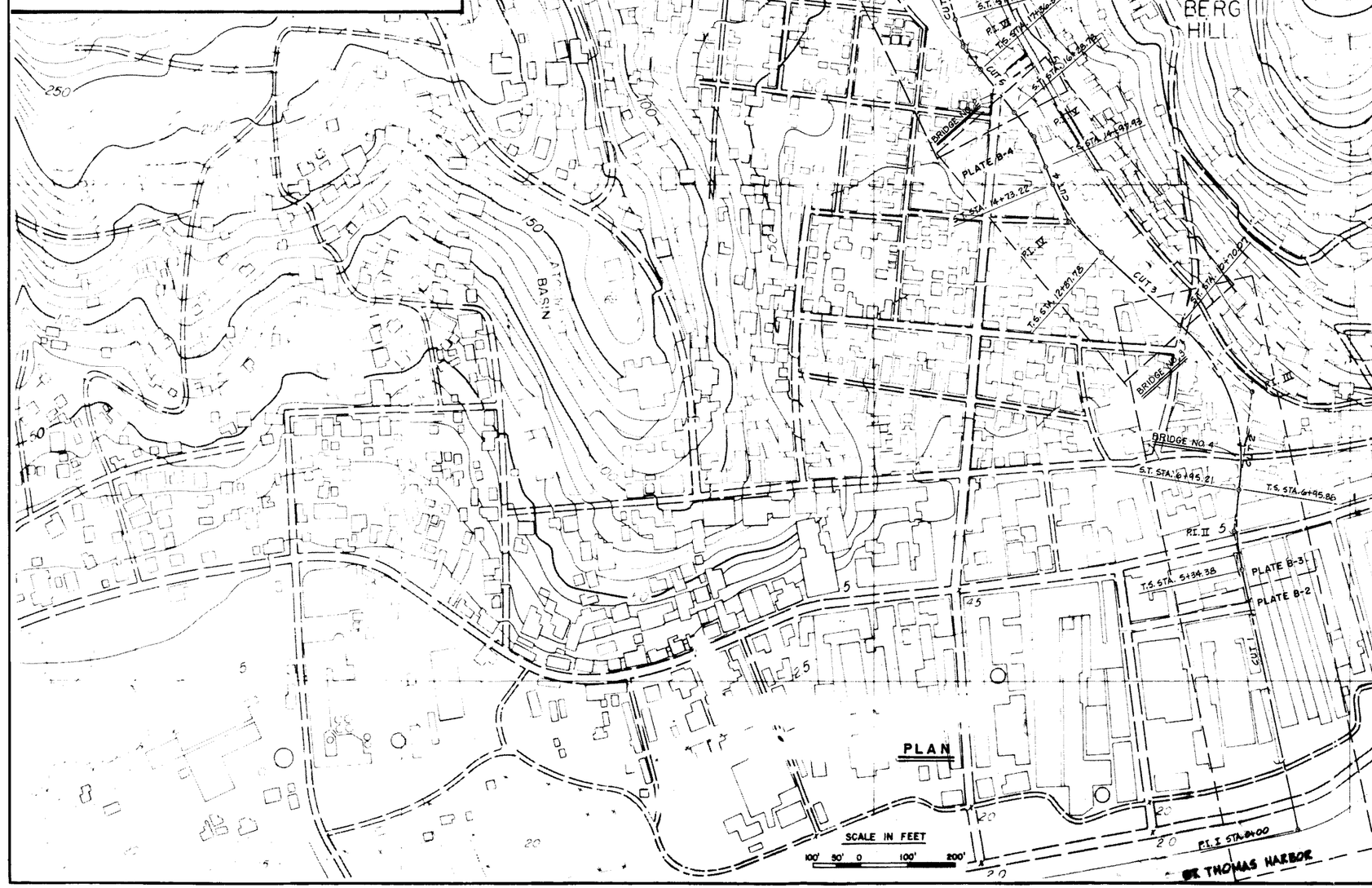


LOCATION MAP

MAIN CHANNEL	P. I. NO.	PLANE COORDINATES X	PLANE COORDINATES Y	CUT	PI/PI	I	CURVE DATA RADIUS	L_s	T_s	TS/ST	SC/CS
	I	1,019,893	186,702	1	0+00						
	II	1,019,755.5	187,302	1	6+15.55	20° 28' 56"	380'	25.0'	81.7'	TS= 5+34.38	SC= 5+59.38
				2	6+14.04			25.0'	81.7'	ST= 6+95.21	CS= 6+70.21
	III	1,019,793	187,584	2	8+98.52	-56° 12' 01"	356'	25.0'	202.64'	TS= 6+95.88	SC= 7+20.88
				3	8+67.43			25.0'	202.64'	ST=10+70.07	CS=10+45.07
	IV	1,019,407	187,924	3	13+81.82	24° 58' 42"	368'	25.0'	94.04'	TS=12+87.78	SC=13+12.78
				4	13+79.18			25.0'	94.04'	ST=14+73.22	CS=14+48.22
	V	1,019,333	188,093	4	15+63.67	-15° 00' 45"	404'	25.0'	65.74'	TS=14+97.93	SC=15+22.93
				5	15+63.04			25.0'	65.74'	ST=16+28.78	CS=16+03.78
	VI	1,019,188	188,274	5	17+94.96	22° 07' 20"	236'	25.0'	58.66'	TS=17+36.30	SC=17+61.30
				6	17+93.75			25.0'	58.66'	ST=18+52.41	CS=18+27.41
	VII	1,019,143.5	188,423.5	6	19+49.71	-8° 14' 28"	230'	25.0'	29.08'	TS=19+20.63	SC=19+45.63
				7	19+49.62			25.0'	29.08'	ST=19+78.70	CS=19+53.70
	VIII	1,019,059.97	188,604.14	7	21+48.64	-51° 00' 00"	78.6'	25.0'	50.14'	TS=20+98.50	SC=21+73.64
				8	21+43.32				50.14'	ST=21+93.46	CS=21+68.46
	IX	1,018,740.85	188,684.79	8	24+72.47	61° 45' 00"	45.94'	L = 49.51	T=27.47'	PC=24+45	PT=24+94.51
				9	24+67.04				T=27.47'		
	X	1,018,677.66	188,936.95	9	27+27.00						



CHANNEL WITH EQUAL SPIRAL CURVES



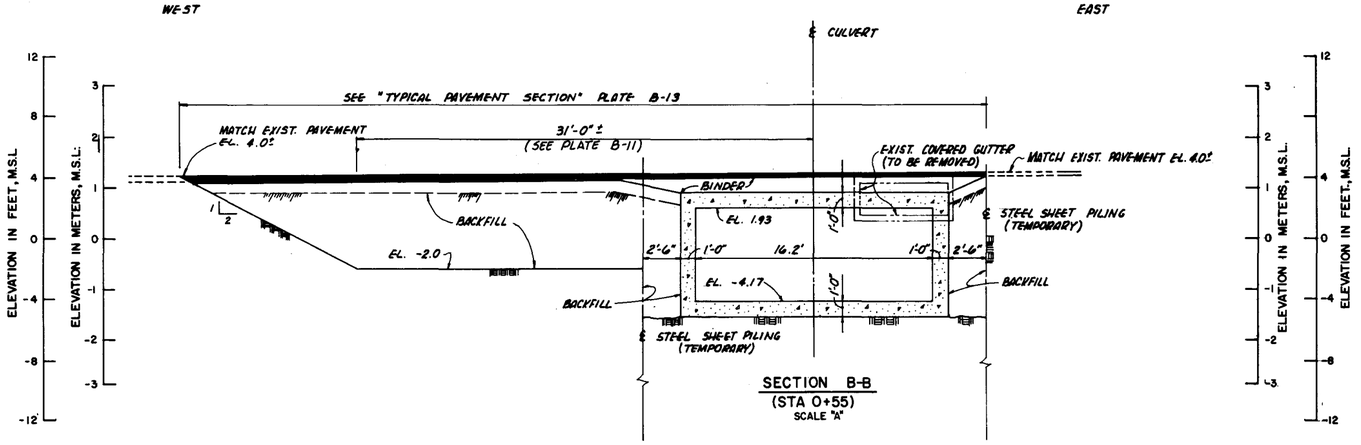
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

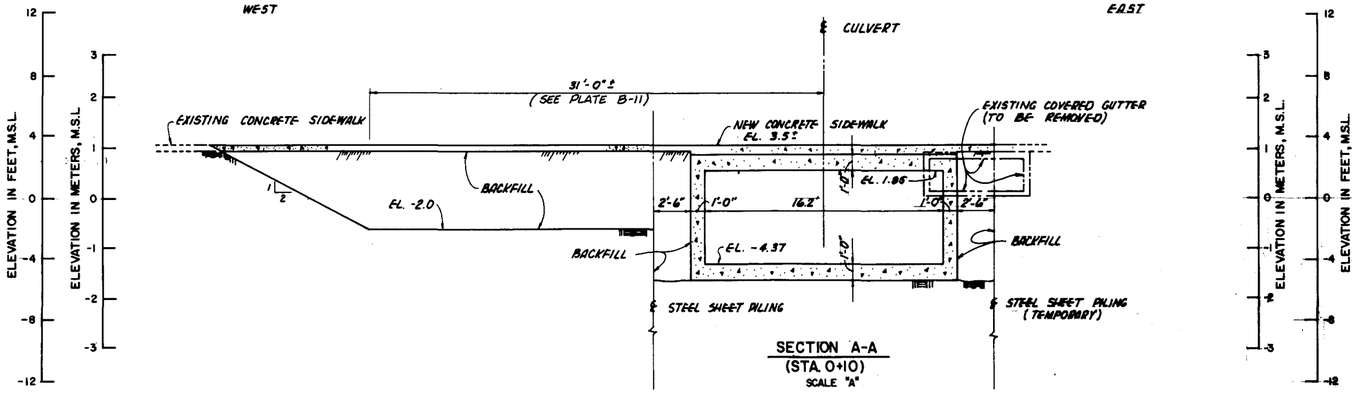
AERIAL, CONTROL, AND KEY PLAN

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451



SECTION B-B
(STA 0+55)
SCALE "A"



SECTION A-A
(STA 0+10)
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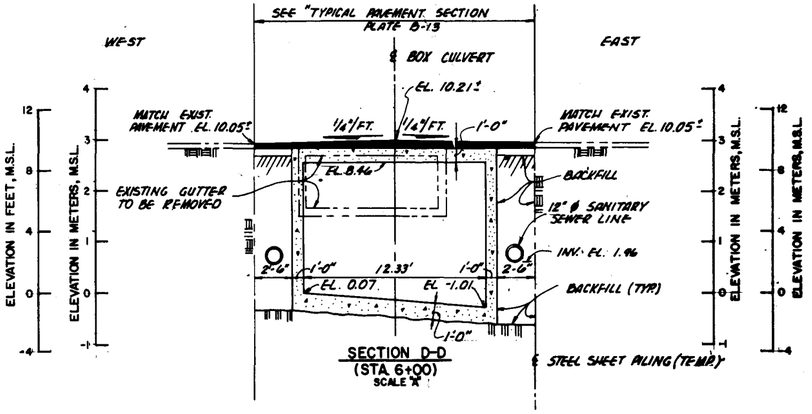

SECTION D-D
(STA 6+00)
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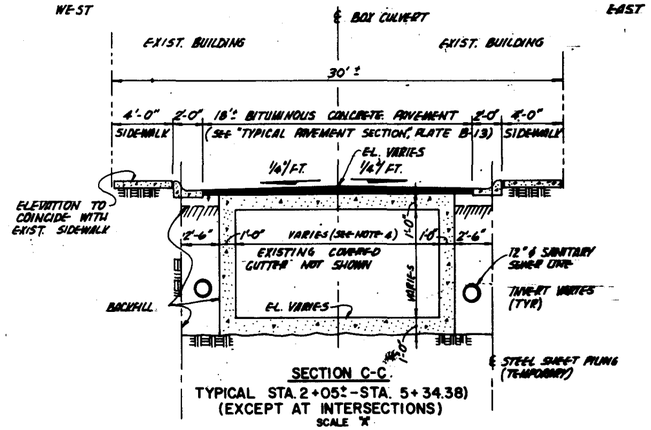


SECTION C-C
TYPICAL STA. 2+05± - STA. 5+34.38)
(EXCEPT AT INTERSECTIONS)
SCALE "A"

NOTES:

1. FOR LOCATION OF SECTIONS, SEE PLATES B-2 AND B-3.
2. FOR PLAN AND SECTIONS OF TYPICAL CONSTRUCTION DETAILS, SEE PLATE B-11.
3. FOR STEEL SHEET PILE COFFERDAM DESIGN, SEE PLATE B-14.
4. CULVERT WIDTH VARIES FROM 16'-0" (STA. 2+05± - STA. 3+80) TO 14'-0" (STA. 4+00 - STA. 5+34.38).

GRAPHIC SCALE
"A" 4' 2' 0 4' 8'

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

SECTIONS - STA. 0+10 THRU STA. 6+00

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

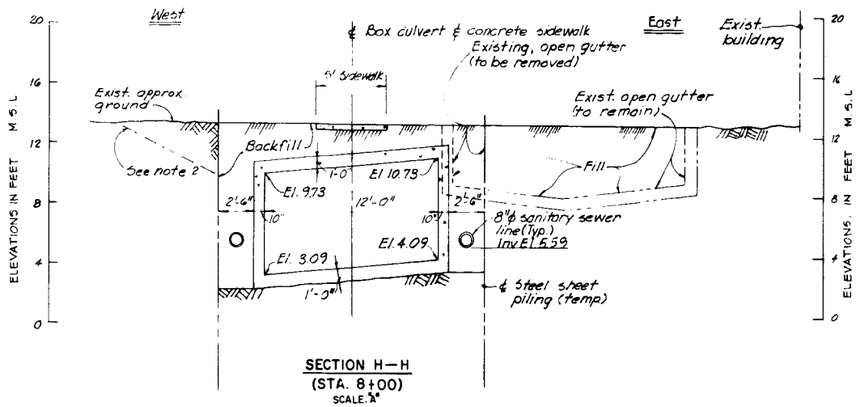
FILE NO. 105-33.491

SAFETY ON THIS JOB DEPENDS ON YOU

REVISIONS					
NO.	SYM	ZONE	DESCRIPTION	DATE	APPROVED

NOTES:

1. FOR LOCATION OF SECTIONS, SEE PLATES B-3 AND B-4.
2. AT THE OPTION OF THE CONTRACTOR, HEIGHT OF REQUIRED SHORING MAY BE REDUCED BY EXCAVATING CONSTRUCTION SLOPES AS SHOWN IN THE SECTIONS. TOP OF SLOPE WILL BE CONFINED TO LIMITS OF RIGHT-OF-WAY.
3. ALL DISTURBED AREAS WILL BE GRASSED.



SECTION H—H
(STA. 8+00)
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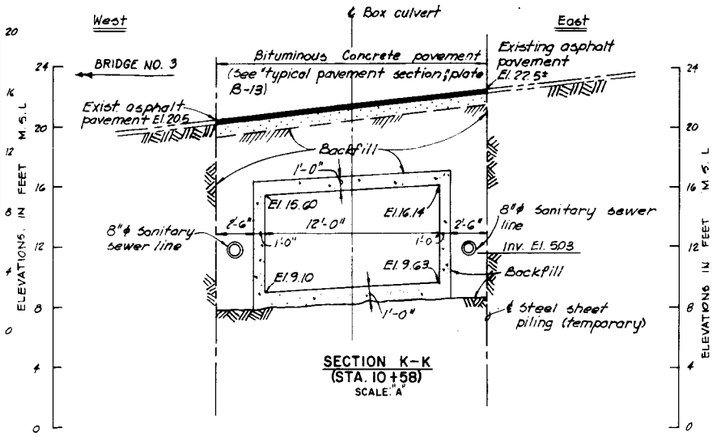

SECTION K—K
(STA. 10+58)
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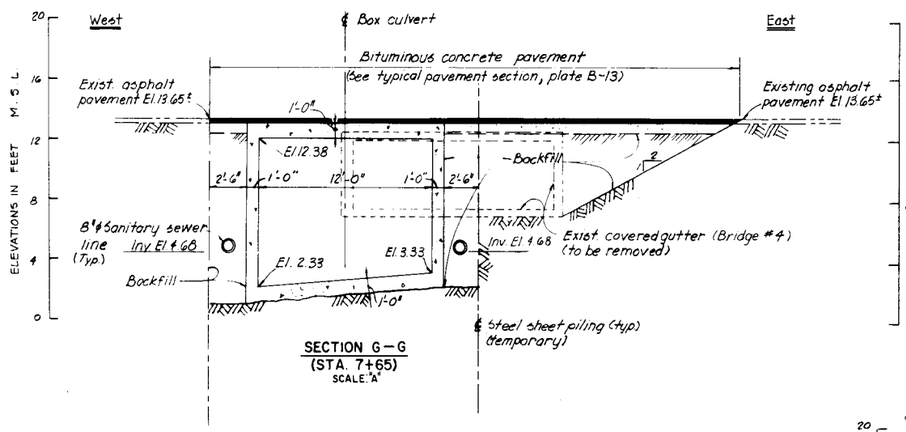

SECTION G—G
(STA. 7+65)
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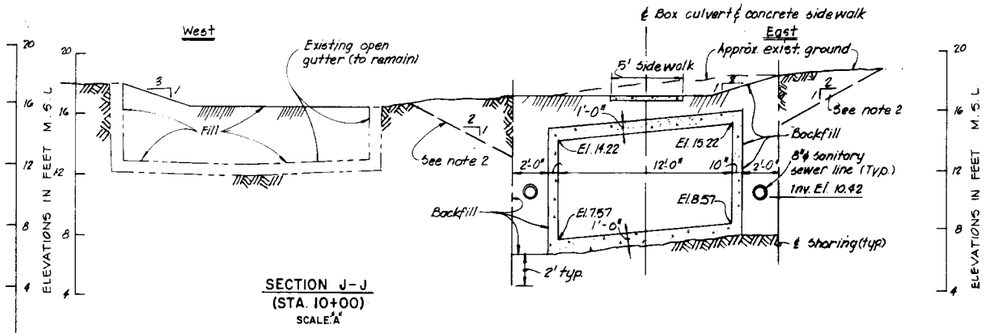

SECTION J—J
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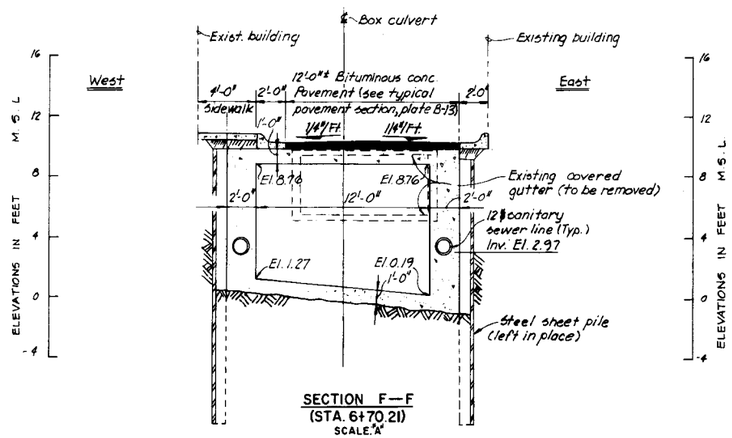

SECTION F—F
(STA. 6+70.21)
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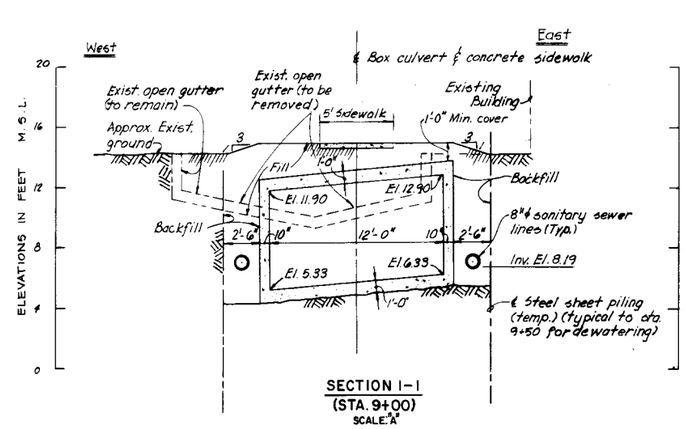
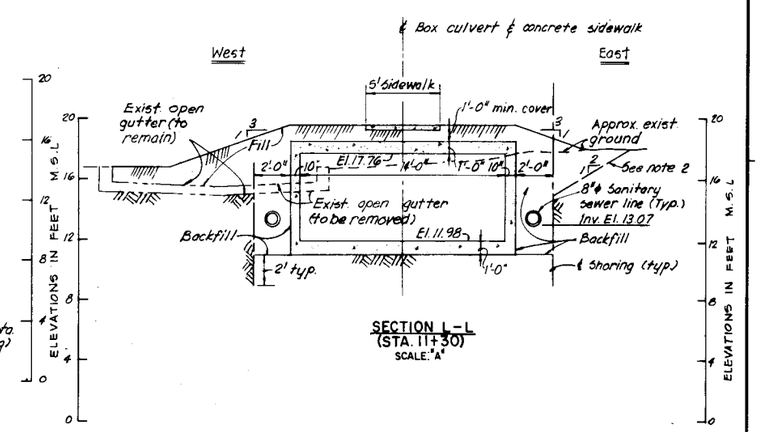


SECTION I—I
(STA. 9+00)
SCALE: "A"



SECTION L—L
(STA. 11+30)
SCALE: "A"

GRAPHIC SCALE
"A" 4' 0 4' 8'

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B

STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

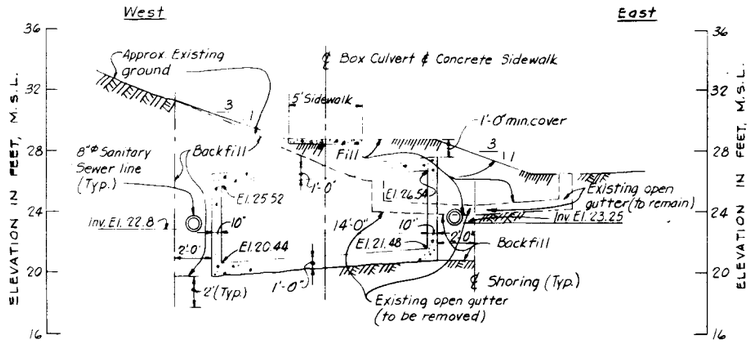
SECTIONS- STA. 6+70.21 THRU STA. 11+30

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451

SAFETY ON THIS JOB DEPENDS ON YOU

REVISIONS					
NO.	SYM	ZONE	DESCRIPTION	DATE	APPROVED



SECTION O–O
(STA. 16+00)
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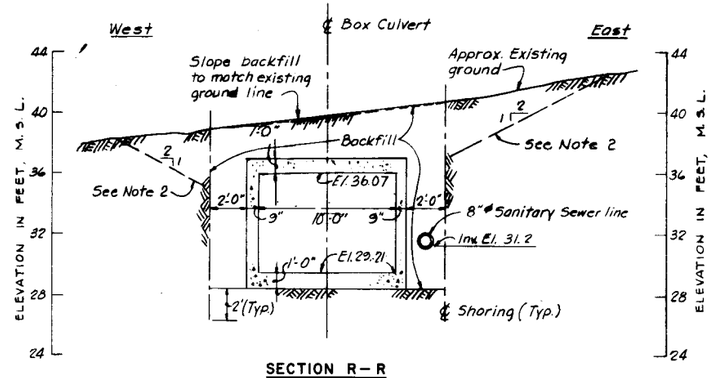

SECTION R–R
STA. 18+52.41
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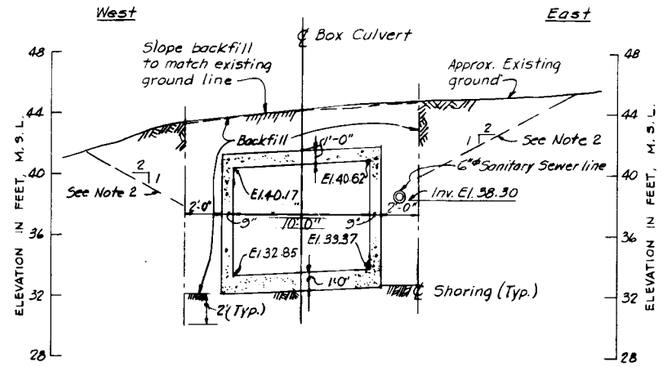

SECTION S–S
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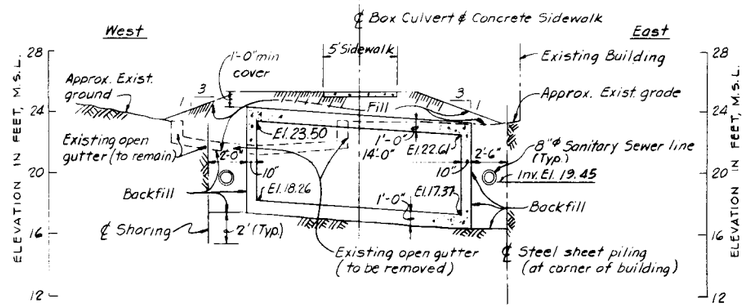

SECTION N–N
(STA. 14+50)
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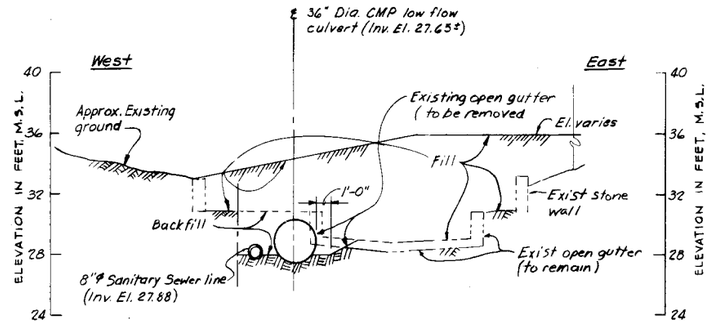
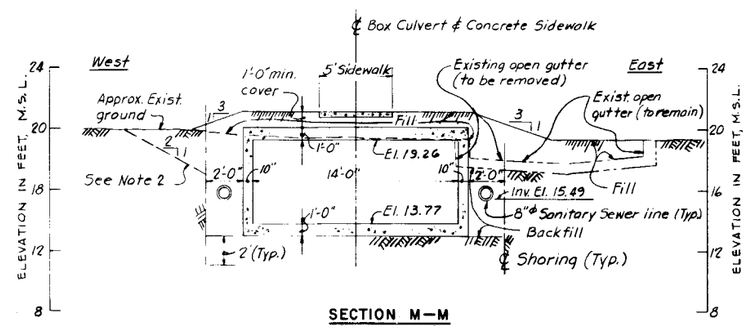


SECTION Q–Q
(FOR LOCATION, SEE PLATE B-5)
SCALE "A"

NOTES:

1. FOR LOCATION OF SECTIONS, SEE PLATES B-4 AND B-5.
2. AT THE OPTION OF THE CONTRACTOR, HEIGHT OF REQUIRED SHORING MAY BE REDUCED BY EXCAVATING CONSTRUCTION SLOPES AS SHOWN IN THE SECTIONS. TOP OF SLOPE WILL BE CONFINED TO LIMITS OF RIGHT-OF-WAY.
3. ALL DISTURBED AREAS WILL BE GRASSED.



SECTION M–M
(STA. 12+50)
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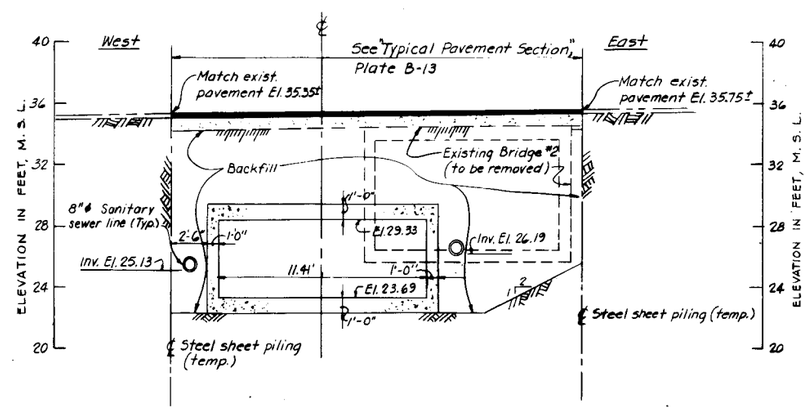


SECTION P–P
(STA. 16+98)
SCALE "A"

GRAPHIC SCALE
"A" 4' 0 4' 8'

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

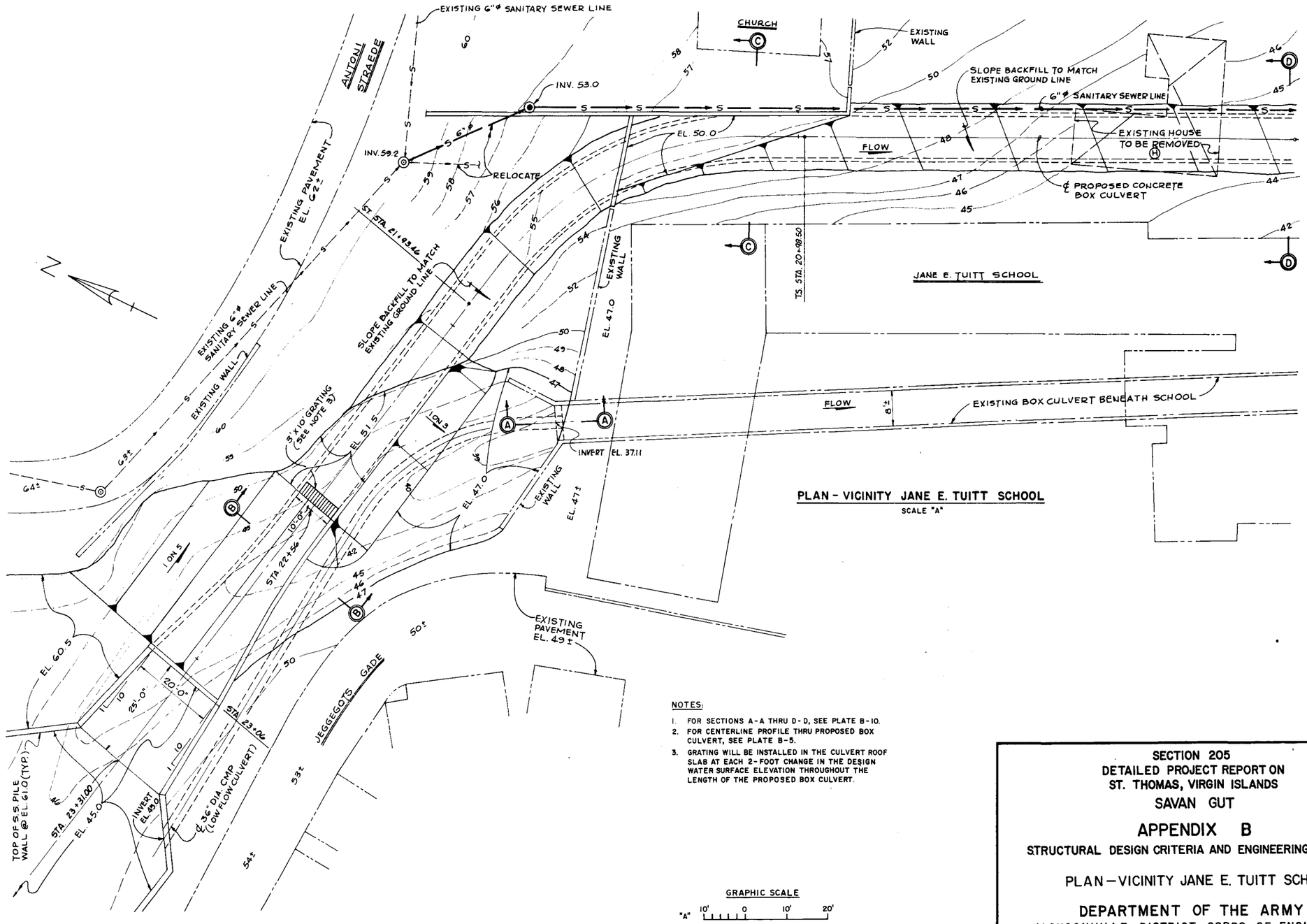
APPENDIX B

STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

SECTIONS-STA. 12+50 THRU STA. 19+53.70

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451



PLAN - VICINITY JANE E. TUITT SCHOOL

SCALE "A"

NOTES:

1. FOR SECTIONS A-A THRU D-D, SEE PLATE B-10.
2. FOR CENTERLINE PROFILE THRU PROPOSED BOX CULVERT, SEE PLATE B-5.
3. GRATING WILL BE INSTALLED IN THE CULVERT ROOF SLAB AT EACH 2-FOOT CHANGE IN THE DESIGN WATER SURFACE ELEVATION THROUGHOUT THE LENGTH OF THE PROPOSED BOX CULVERT.

GRAPHIC SCALE

"A" 10' 0 10' 20'

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

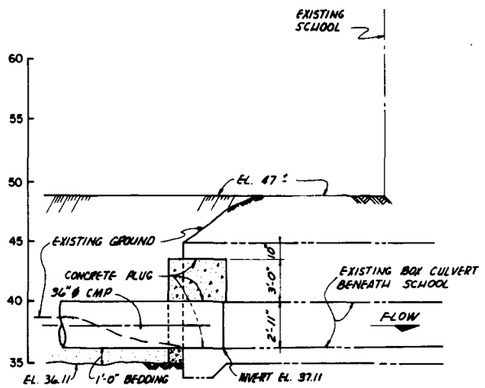
APPENDIX B

STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

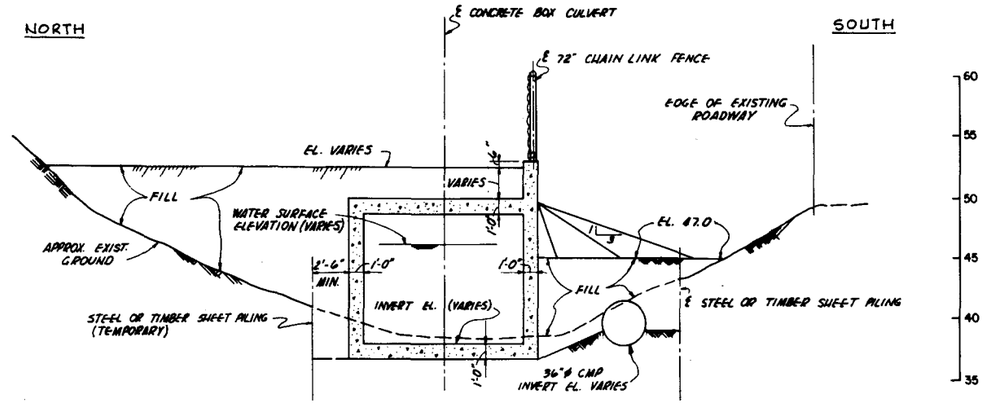
PLAN—VICINITY JANE E. TUITT SCHOOL

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

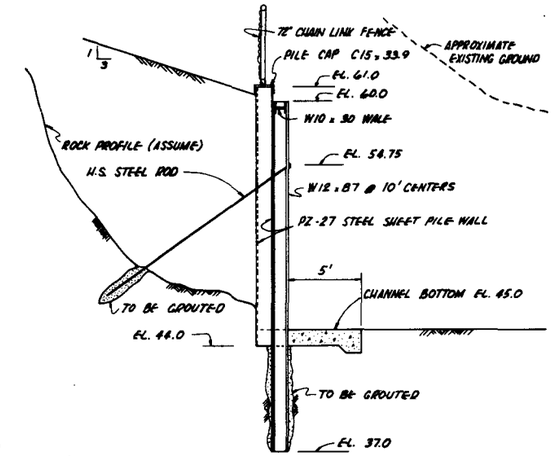
FILE NO. 105-33,451



SECTION A-A
SCALE "A"

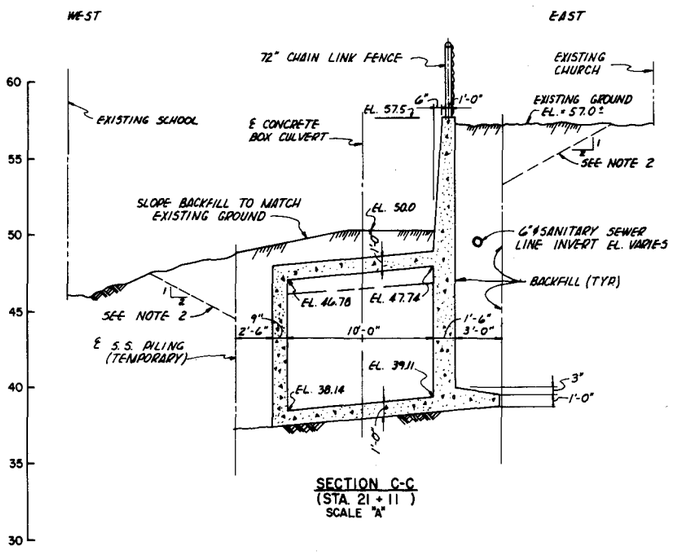


SECTION B-B
(STA. 22 + 70)
SCALE "A"

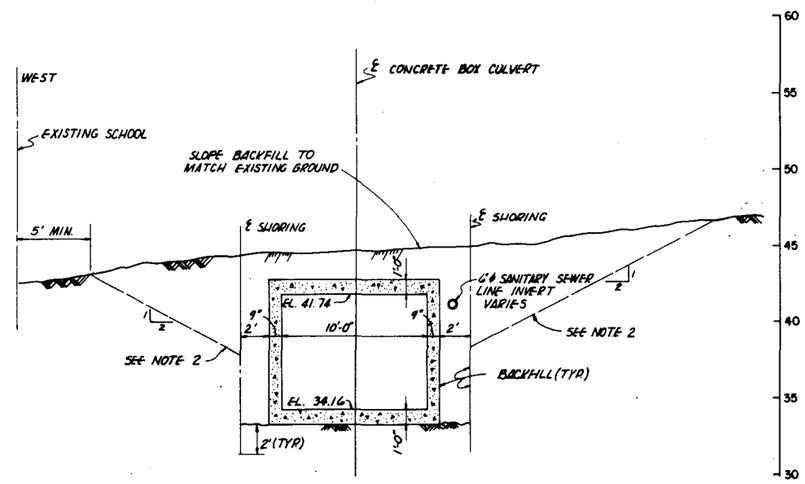


SECTION X-X
SCALE "A"
(FOR LOCATION SEE PLATE B-5A)

NOTES:
1. FOR LOCATION OF SECTIONS A-A THRU D-D, SEE PLATE B-9.
2. AT THE OPTION OF THE CONTRACTOR, HEIGHT OF REQUIRED SHORING MAY BE REDUCED BY EXCAVATING CONSTRUCTION SLOPES AS SHOWN IN SECTIONS. TOP OF SLOPE WILL BE CONFINED TO LIMITS OF RIGHT-OF-WAY.
3. ALL DISTURBED AREAS WILL BE GRASSED.
4. FOR DESIGN OF STEEL SHEET PILE TRAINING WALLS, SEE PLATE B-15.



SECTION C-C
(STA. 21 + 11)
SCALE "A"



SECTION D-D
(STA. 19 + 90)
SCALE "A"

GRAPHIC SCALE
"A" 4' 2' 0 4' 8'
HORIZ. AND VERT.

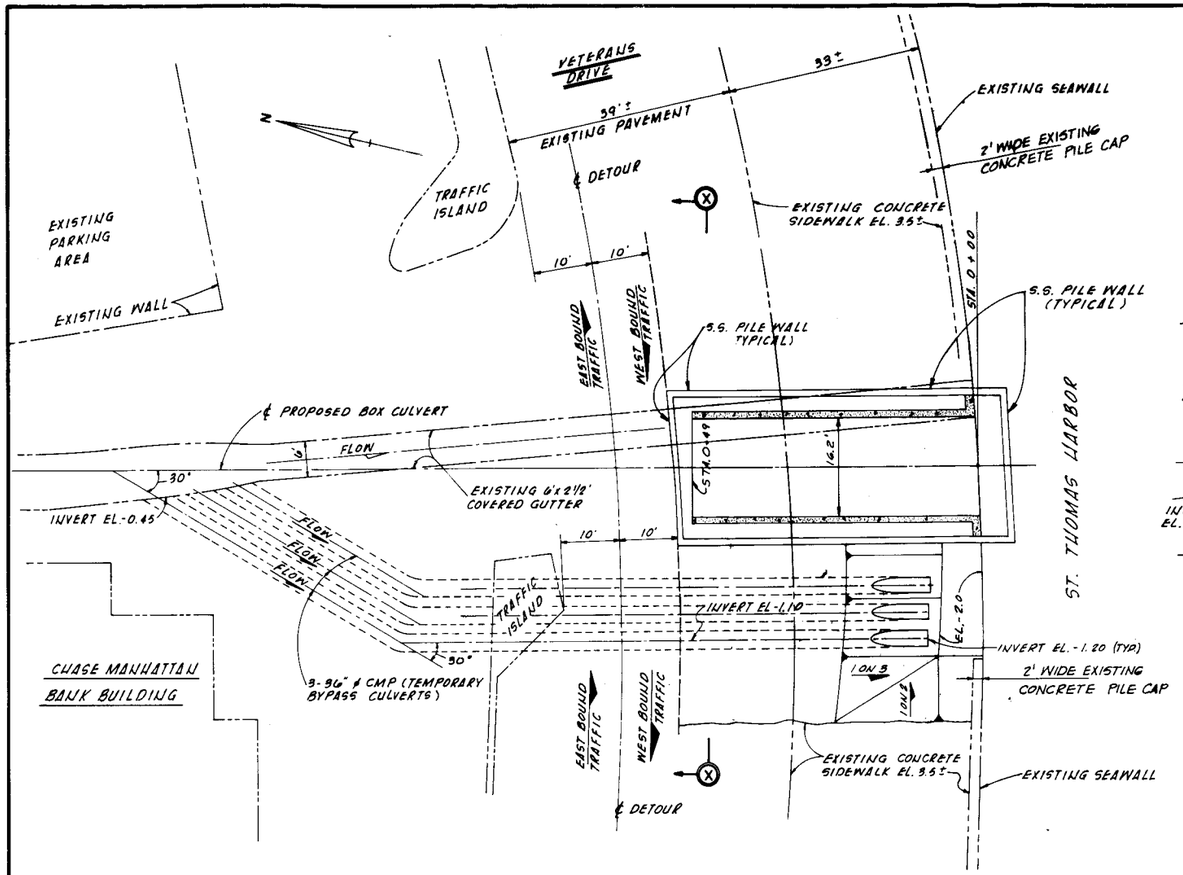
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

SECTIONS – VICINITY JANE E. TUITT SCHOOL

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

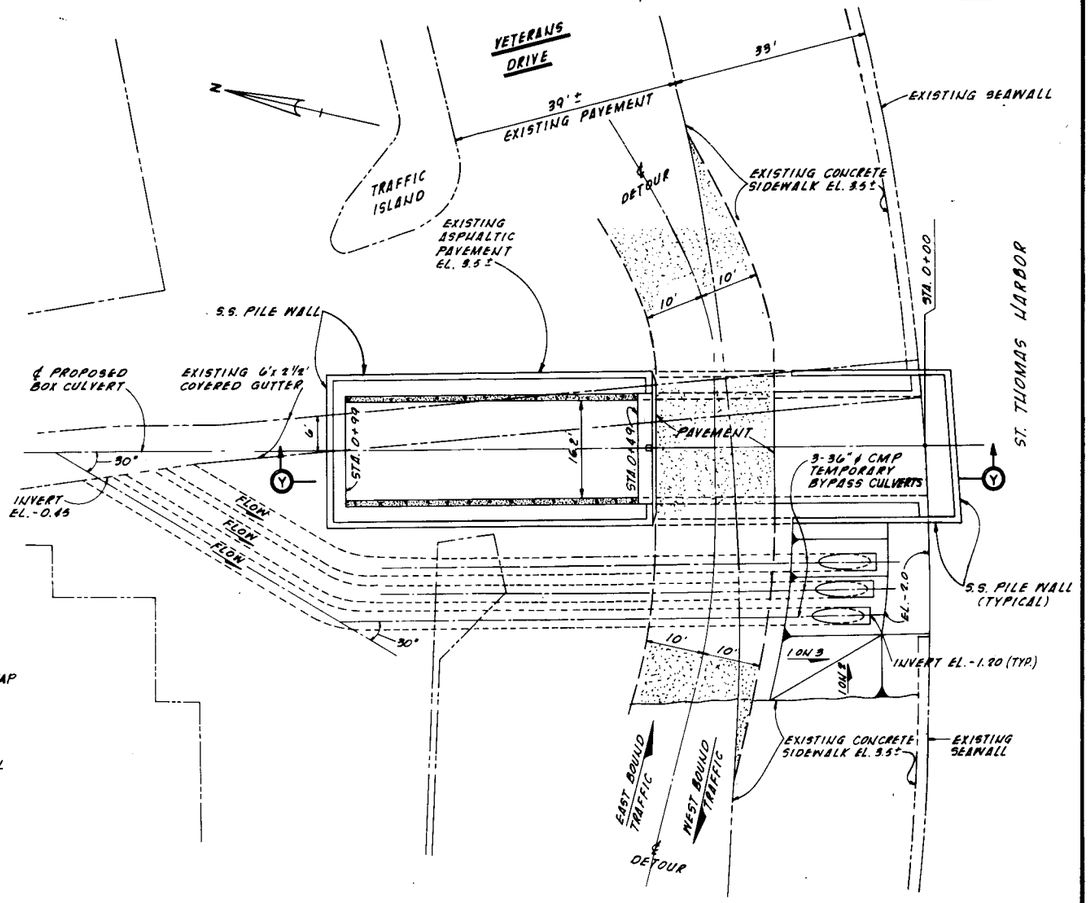
FILE NO. 105-33,451



STILLING BASIN PLAN

SCALE : "A"

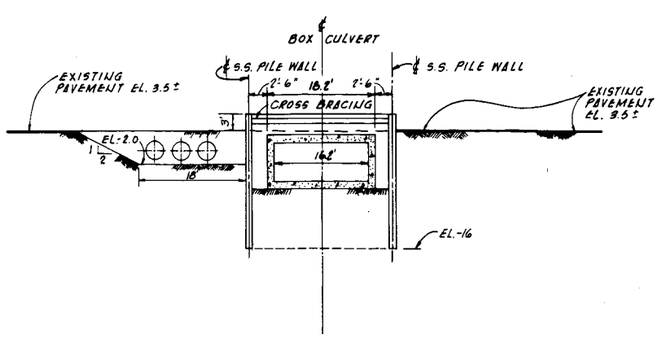
STAGE I CONSTRUCTION



STILLING BASIN PLAN

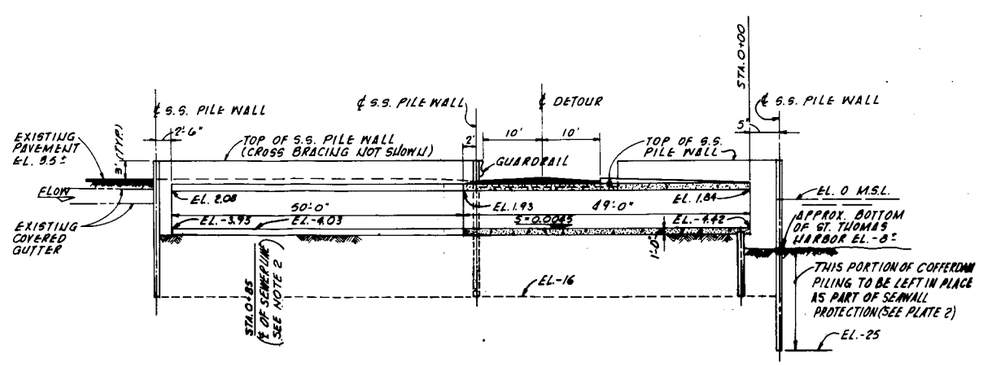
SCALE : "A"

STAGE II CONSTRUCTION



SECTION X-X

SCALE : "A"



SECTION Y-Y

SCALE : "A"

GRAPHIC SCALE

"A" 10' 0' 10' 20'

NOTES:

1. FOR STEEL SHEET PILE COFFERDAM DESIGN, SEE PLATE B-14.
2. RELOCATION OF UTILITIES NOT SHOWN ON THIS DRAWING. SEE PLATE B-12.
3. FOR PLAN AND PROFILE, SEE PLATE B-2.

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

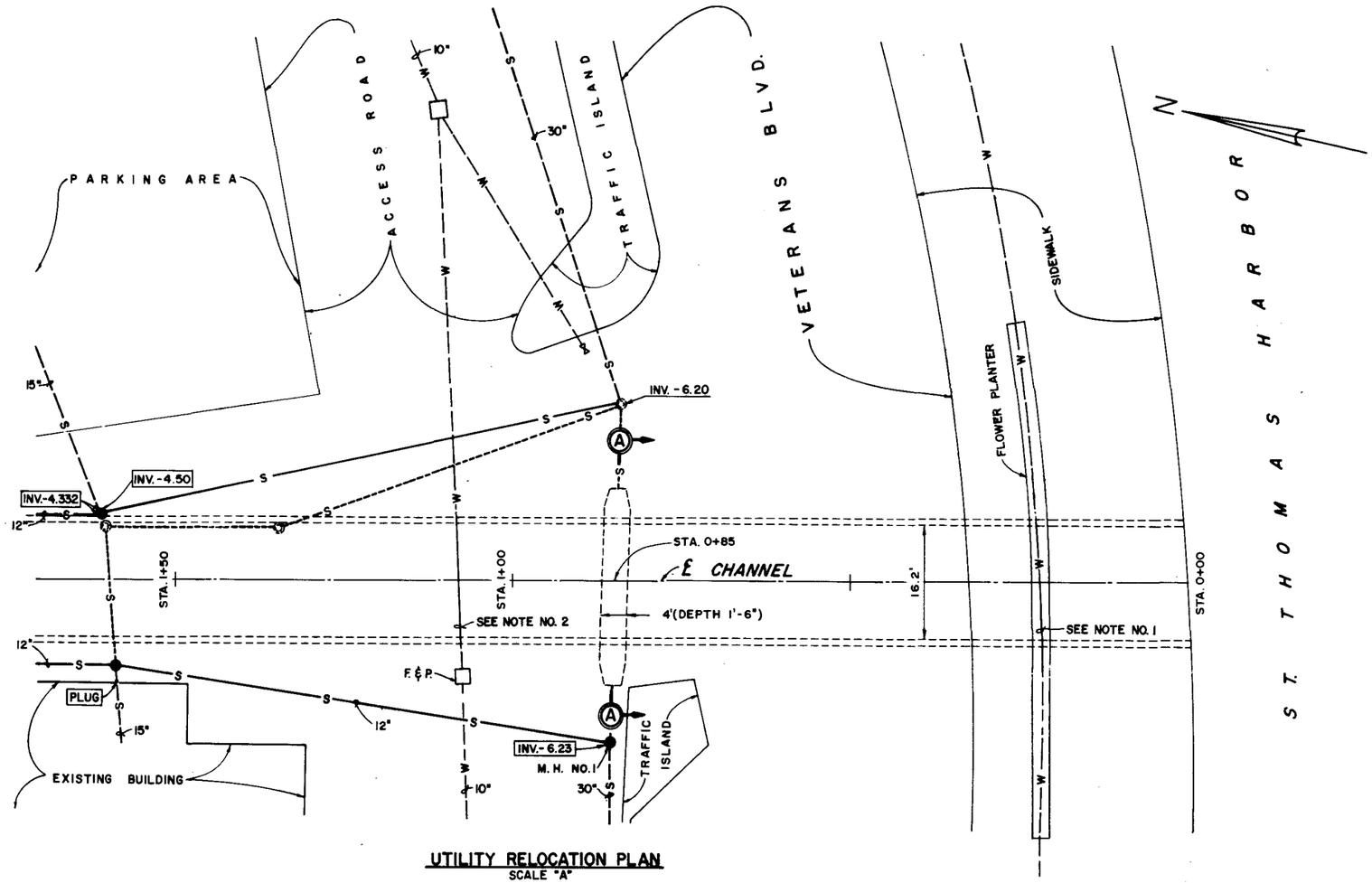
APPENDIX B

STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

LOWER END-CONSTRUCTION PLAN AND SECTIONS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451



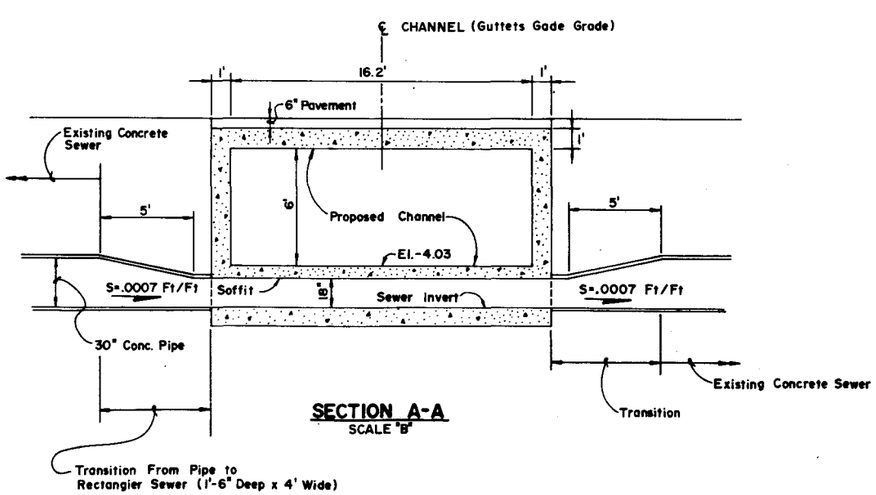
UTILITY RELOCATION PLAN
SCALE "A"

LEGEND

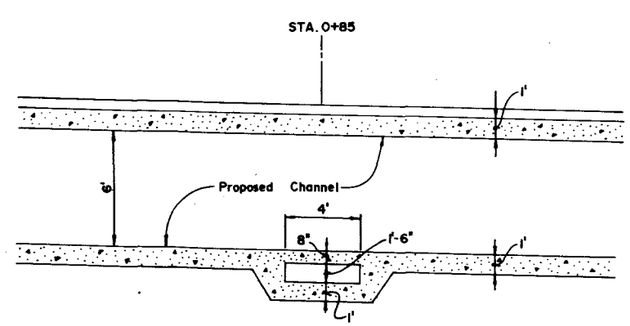
- RELOCATED WATER LINE
- EXISTING WATER LINE
- PROPOSED SEWER LINE
- EXISTING SEWER LINE
- EXISTING MANHOLE
- PROPOSED MANHOLE
- EXISTING MANHOLE, TO BE REMOVED
- EXISTING SEWER TO BE REMOVED OR ABANDONED
- EXISTING WATER LINE TO BE REMOVED OR ABANDONED
- INV. -6.20 — INVERT ELEVATION OF EXISTING SANITARY SEWER LINES
- INV.-9.00 — INVERT ELEVATIONS OF PROPOSED SANITARY SEWER LINE
- F.&P. — FLOAT AND POPPET AIR VALVE
- PROPOSED CONCRETE CHANNEL

NOTES:

1. 24" WATER LINE NOT IN USE. RELOCATED WATER LINE WILL BE INSTALLED IN THE REBUILT PLANTER BOX.
2. RELOCATE 10" WATER LINE UNDER NEW CONCRETE CHANNEL.



SECTION A-A
SCALE "B"



PROFILE
SCALE "B"

GRAPHIC SCALES

"A" 10' 0 10' 20'

"B" 4' 0 5' 10'

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

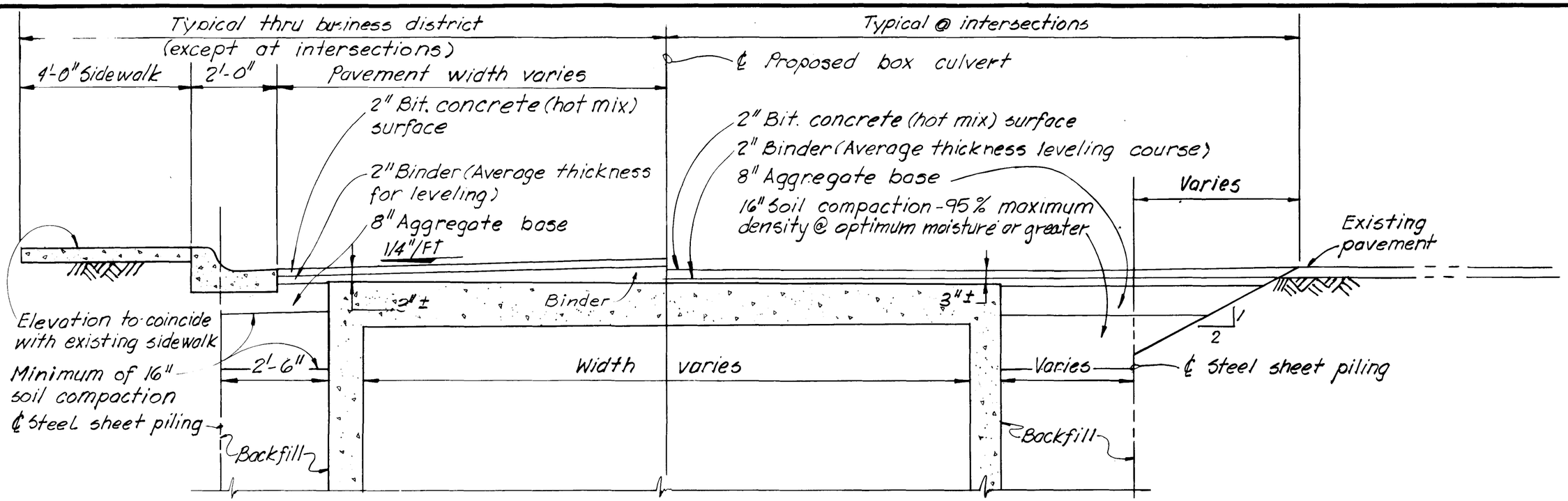
APPENDIX B

STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

UTILITY RELOCATION PLAN-VETERAN'S DRIVE AND GUTTET'S GADE

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33451



TYPICAL PAVEMENT SECTION

SCALE: "A"

FILL MATERIAL

G, SM, GS

TRAFFIC COUNT

D.H.V. 900

T = 30%

CLASS "C" STREET

C.B.R. = 10 (ESTIMATE, FIELD C.B.R. IS REQUIRED AND WILL PROBABLY BE HIGHER THAN 10 - ALSO NEED ATTERBURG LIMITS)

CATEGORY IV (TM 5-822-5)

CLASS 6 ROAD PAVEMENT DESIGN

2" BITUMINOUS CONCRETE (HOT MIX)

* 2" BINDER COURSE

8" AGGREGATE BASE

16" MINIMUM OF SOIL COMPACTION TO 95% DENSITY AT OPTIMUM MOISTURE.

* AVERAGE THICKNESS NEEDED FOR LEVELING.

IF FIELD C.B.R. INDICATES HIGHER C.B.R. THAN THE ABOVE, THICKNESSES COULD BE REDUCED SOME.

GRAPHIC SCALE

2' 0 2' 4'

SECTION 205
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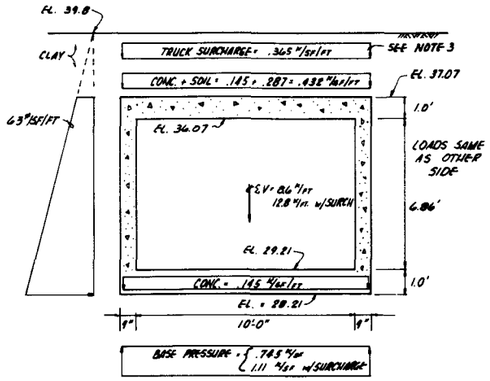
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

TYPICAL PAVEMENT SECTION

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451



TYPICAL BOX CULVERT SECTION
STA. 18+52.4

SECTION		MOMENT (k-FT/FT)	d REQ'D = $\sqrt{M/k_c b}$ k = .221 k = .277 w/SURCHARGE	"d" USED	A_s REQ'D = $\frac{M}{1.44d}$ (in^2/FT)	A_s USED (in^2/FT)	V_c MAX = $\frac{V}{bwd}$
TOP SLAB	ENDS	3.1	3.8"	9"	A_s = .39	.44	41 PSI
		5.1	4.3" w/SURCH	9"			
	CENTER	3.5	4.0"	9"	A_s = .53	.60	
		6.9	5.0" w/SURCH	9"			
BOTTOM SLAB	ENDS	5.2	4.8"	9"	A_s = .48	.59	49 PSI
		6.2	4.7" w/SURCH	9"			
	CENTER	3.9	3.5"	9"	A_s = .58	.60	
		7.5	5.2" w/SURCH	9"			
SIDE WALL	TOP	3.1	3.8"	6"	A_s = .39	.64	33 PSI
		5.1	4.3" w/SURCH	6"			
	MIDDLE	.7	1.8"	6"	A_s = .25	.31	
		2.2	2.7" w/SURCH	6"			
	BOTTOM	5.2	4.9"	6"	A_s = .72	.85	
		6.2	4.7" w/SURCH	6"			

BOX CULVERT AT STA. 18+52.4
DESIGN ANALYSIS

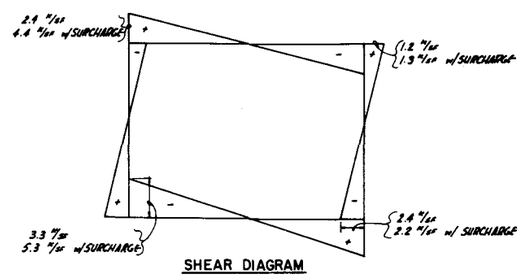
NOTES

A. BOX CULVERT - STA. 18+52.4

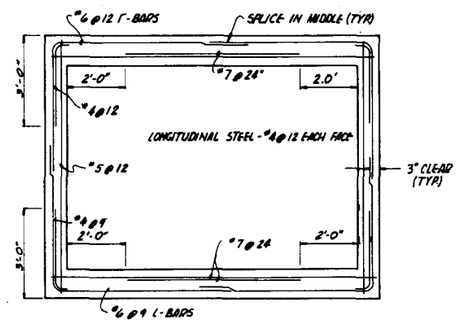
1. LOADING CASES SHOWN ARE NORMAL LOADING CASE WITHOUT FLOW AND NORMAL LOADING CASE WITH SURCHARGE. THE LOADING CASE WITH WATER FLOW IS SIMILAR WITH A SMALL INCREASE IN BASE PRESSURE AND SLIGHT DECREASE IN WALL MOMENTS AND SHEARS.
2. NO UPLIFT IN THIS AREA DUE TO LOW WATER TABLE.
3. SURCHARGE LOAD IS BASED ON 2 HS-20-44 TRUCKS ON THE ROAD WAY. THE WHEEL LOADS ARE UNIFORMLY DISTRIBUTED OVER AN AREA ACCORDING TO AASHTO SPEC 1.3.3. THIS IS TYPICAL OF BOX CULVERT SECTIONS WHEN DEPTH OF FILL IS 2 FEET OR GREATER.
4. FOR SURCHARGE LOADS, THE WORKING STRESS IN THE CONCRETE AND REINFORCEMENT IS INCREASED BY ONE-THIRD DUE TO THE INFREQUENCY OF THIS OCCURANCE. IMPACT IS NOT CONSIDERED DUE TO THE SLOW MOVEMENT OF VEHICLES IN THIS AREA. THIS MAKES THE NORMAL CONDITIONS GOVERN THE DESIGN ANALYSIS.
5. ANALYSIS OF CONCRETE BOX CULVERT ASSUMED SLAB MOMENT OF INERTIA AS ½ I_G AND FULL I_G FOR VERTICAL SECTIONS.

B. BOX CULVERT STA. 0+10

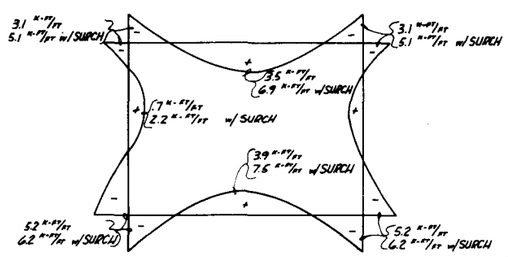
1. EACH 16K WHEEL LOAD IS SPREAD OVER A 5' LENGTH OF BOX CULVERT.
2. RECTANGULAR BASE PRESSURE IS SHOWN FOR THIS PLATE. FOR FINAL DESIGN, A TRAPEZODIAL BASE PRESSURE WILL ALSO BE INVESTIGATED.



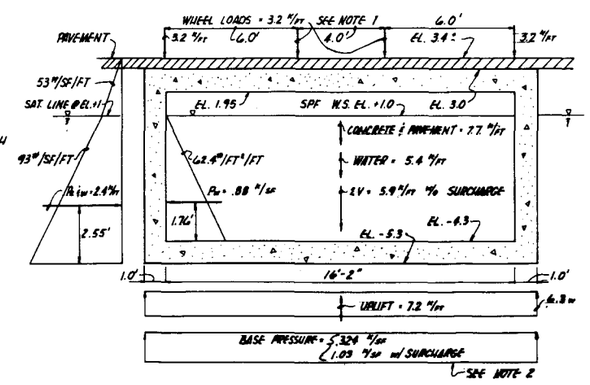
SHEAR DIAGRAM



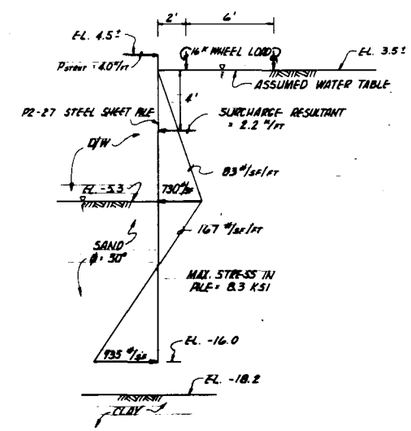
TYPICAL REINFORCING



MOMENT DIAGRAM



TYPICAL BOX CULVERT (STA. 0+00 TO 3+80)
STA 0+10
CASE II SHOWN
CASE I SIMILAR EXCEPT WATER SURFACE
@ EL. 0.0



COFFERDAM LOADING DIAGRAM
(STA. 0+10 SHOWN)

LOADING CONDITIONS

CASE I STRUCTURE COMPLETE. NO WATER FLOW. SECTIONS OF BOX CULVERT IN DOWNTOWN AREA SUBJECT TO TIDAL FLOW

CASE II STANDARD PROJECT FLOOD. WATER IN CULVERT TO ELEVATION PROVIDED BY HYDRAULICS.

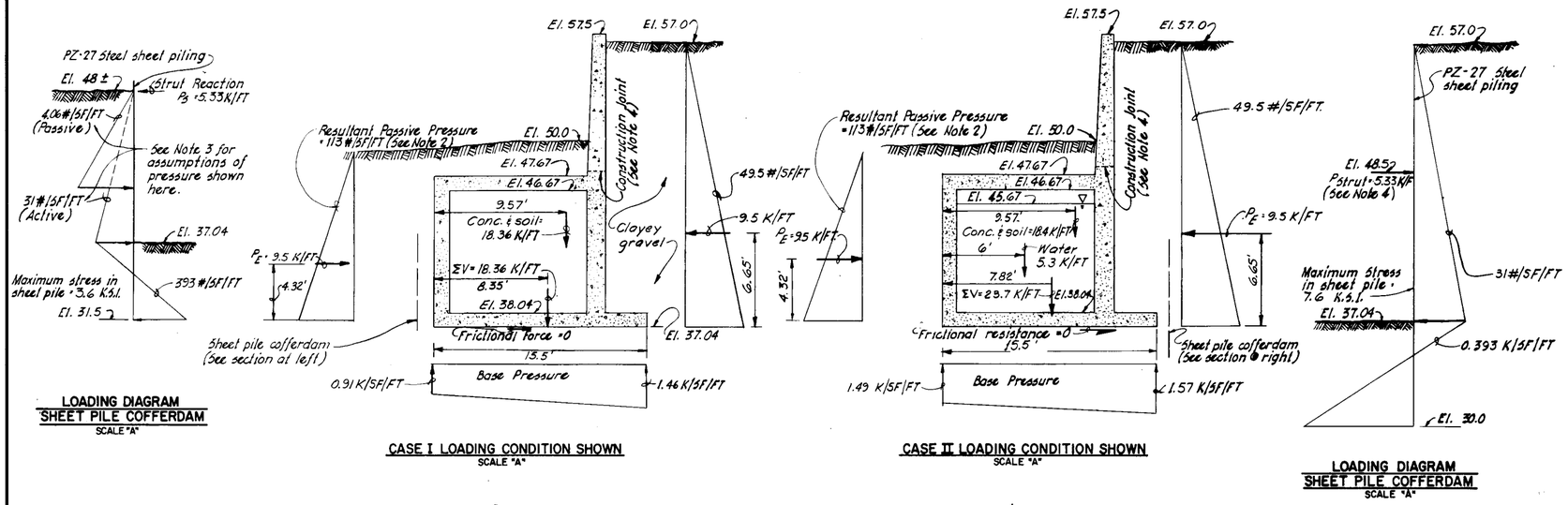
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

DESIGN ANALYSIS - MIDDLE
AND DOWNSTREAM AREAS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451



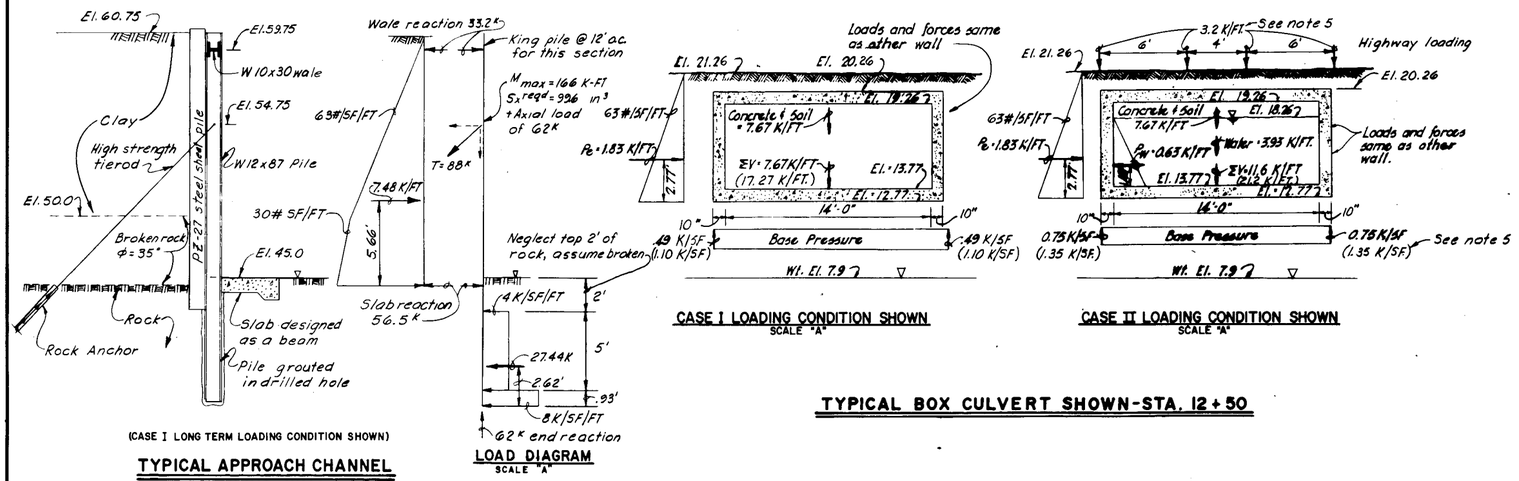
LOADING DIAGRAM
SHEET PILE COFFERDAM
SCALE "A"

CASE I LOADING CONDITION SHOWN
SCALE "A"

CASE II LOADING CONDITION SHOWN
SCALE "A"

LOADING DIAGRAM
SHEET PILE COFFERDAM
SCALE "A"

BOX CULVERT AND RETAINING WALL ADJACENT TO JANE TUITT SCHOOL - STA. 20 + 98



(CASE I LONG TERM LOADING CONDITION SHOWN)

TYPICAL APPROACH CHANNEL TRAINING WALL

LOAD DIAGRAM
SCALE "A"

CASE I LOADING CONDITION SHOWN
SCALE "A"

CASE II LOADING CONDITION SHOWN
SCALE "A"

TYPICAL BOX CULVERT SHOWN-STA. 12 + 50

NOTES:

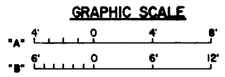
1. NO UPLIFT FORCES ARE INCLUDED IN THE ANALYSIS OF THE CULVERT FROM STA. 8+90 TO 21+40.24 DUE TO THE GROUND WATER TABLE BEING BELOW THE BOTTOM SLAB, THE STEEP SLOPE OF THE LAND, AND THE PROBABLE SHORT DURATION OF THE STANDARD PROJECT FLOOD.
2. THE STRUCTURE ANALYSIS AT STA. 20+98 ASSUMES PASSIVE PRESSURE ON THE LOW SIDE (LEFT) EQUALS THE PRESSURE ON THE HIGH SIDE (RIGHT). FRICTIONAL RESISTANCE AT THE BASE MAY DEVELOP TO PARTIALLY RESIST THE HIGH SIDE PRESSURE.
3. THE PASSIVE AND ACTIVE PRESSURE ASSUMPTIONS FOR THE COFFERDAM ON THE LEFT SIDE OF THE STRUCTURE ASSUMES THAT PASSIVE PRESSURE ACTS TO A DEPTH NECESSARY TO PROVIDE RESISTANCE OF THE STRUT REACTION AND THE OTHER PRESSURES ARE THOSE NECESSARY TO OBTAIN A STABLE WALL.
4. THE CULVERT WITHOUT THE RETAINING WALL PORTION WILL BE CONSTRUCTED FIRST WITH THE COFFERDAM STRUTS IN PLACE. THE RETAINING WALL WILL BE CONSTRUCTED ONLY AFTER THE CULVERT HAS BEEN BACKFILLED TO THE UPPER SLAB AND THE COFFERDAM STRUTS REMOVED. THE STEEL SHEET PILE COFFERDAM WILL THEN BE ACTING AS A CANTILEVER WITH A MAXIMUM STRESS OF 4.2 KSI.
5. BOX CULVERT, STA. 12+50:
FORCES AND PRESSURES SHOWN IN PARENTHESES ARE FOR HIGHWAY LOADING CONSISTING OF 2 HS-20-44 TRUCKS OVER THE BOX CULVERT. EACH 16K WHEEL LOAD IS DIVIDED OVER A 5 FT. LENGTH OF CULVERT.

LOADING CONDITIONS

CASE I - STRUCTURE COMPLETE - NO WATER FLOW.

CASE II - STANDARD PROJECT FLOOD, WATER IN CULVERT TO ELEVATION PROVIDED BY HYDRAULICS. SEE NOTE 1 FOR UPLIFT ASSUMPTION.

GRAPHIC SCALE



SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX B
STRUCTURAL DESIGN CRITERIA AND ENGINEERING DETAILS

STABILITY ANALYSIS UPPER PORTION

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33451

SAJEN-G March 1982

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, U.S. VIRGIN ISLANDS

APENDIX C

GEOTECHNICAL ENGINEERING DATA

ST. THOMAS, U.S. VIRGIN ISLANDS

SAVAN GUT

DETAILED PROJECT REPORT

APPENDIX C

GEOTECHNICAL ENGINEERING DATA

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Station 25+06	C-17
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Soil Test Data (Visual Classification, Moisture Content and Atterberg Limits.)

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SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE
ST. THOMAS, U.S. VIRGIN ISLANDS

APENDIX C

GEOTECHNICAL ENGINEERING DATA

1. Introduction. The Savan Gut area includes a natural channel and culvert, covering roughly 3/4 of a mile, which draws from north to south, crossing the city of Charlotte Amalie just west of Berg Hill and discharging into St. Thomas Harbor. The Jane E. Tuitt Elementary School and the business district south of Back Street are highly susceptible to flooding from this channel.

2. Purpose and Scope. This appendix presents in detail the results of all the geotechnical investigations performed at Savan Gut in St. Thomas, U.S. Virgin Islands. The purpose of the appendix is to define the geologic features and the engineering characteristics of the surface and subsurface materials.

3. Location & Physiography. St. Thomas, one of the three U.S. Virgin Islands, lies approximately 40 miles due east of Puerto Rico and is part of the curving Greater Antilles Chain of major subtropical islands that separates the Caribbean Sea and the Atlantic Ocean. St. Thomas, which is only 13 miles long and 3 miles wide, lies 18-20 degrees north latitude and 60 degrees west longitude.

The Savan Gut project site is located on the south side of the island starting on the St. Thomas Harbor water front at Guttets Gade (street) in downtown Charlotte Amalie and extending approximately 3/4 of a mile. The extreme upper channel is flanked on both sides by steep mountain slopes rising to elevation +800 on the east and elevation +1,400 on the west. The lower channel and culvert are characterized by more gentle slopes. The channel flow is normally intermittent, but it is subject to flash floods during storms and hurricanes.

4. Geologic History. The geologic history of the St. Thomas and St. John area was compiled from Virgin Islands National Park - The Story Behind The Scenery, by Alan H. Robinson.

The first events in the development of St. Thomas and St. John took place as a series of volcanic flows erupted slowly onto a deep ocean floor and solidified. These layers, subsequently uplifted and still recognizable as separate flows, are collectively known as the Water Island Formation. Beneath this volcanic material lies a soft, sticky clay similar to sediments found elsewhere only on the deep ocean floor.

Following a period of generalized uplifting of the whole area there was a time of explosive shallow water and subaerial (above-water) volcanism. The resulting material, the Louisenhoj Formation, contains extensive explosive volcanic products such as andesite and tuff (solidified ash), and even cobbles and fragments of the older Water Island rock.

The thickness and appearance of the Louisenhoj Formation in St. John and St. Thomas indicate that the volcanic center was under what is presently known as Pillsbury Sound, the shallow channel now separating the two sister islands. Over the many thousands of years during which subaerial volcanic activity occurred, the material on the slopes of the resulting cone was extensively weathered and was eventually redeposited as relatively fine-grained rock in the shallow surrounding seas.

The close of the fiery second phase of the island's development was followed by a period of relative serenity during which organically derived sediments (from corals and the skeletons of planktonic creatures) slowly accumulated on the slopes of the emerging island. The first layer over the older volcanics is a dark-colored limestone known as the Outer Brass Formation. This thin-bedded limestone was deposited over many thousands of years by a continuous rain of the skeletons of planktonic algae to the ocean floor in shallow seas. Only a few hundred feet thick, the Outer Brass Formation has been tilted considerably.

The Outer Brass Formation is overlain by a much more substantial formation of relatively impure sediments (wackes) composed of debris of the Louisenhoj and Outer Brass Formations. This formation, known as Tutu, was probably laid down underwater during periods of active earthquakes and tremors, for it appears to have resulted from submarine landslides and watery flows of suspended sediment.

The volcanism, uplift, and subsequent sedimentary deposition which formed the fundamental rock types of the islands were essentially complete by the end of the Cretaceous Period, some 60 million years ago. There is no evidence that the islands were ever completely submerged again, but occasional changes in sea level did take place, especially during the worldwide fluctuations associated with recent ice ages.

Debris which eroded from the upland and coasts during low sea level is responsible for the extensive insular shelf surrounding Puerto Rico and the northern Virgin Islands. At one time the whole of the Puerto Rican plateau, which includes St. Thomas and St. John, may have been exposed as one continuous land ridge.

5. Investigations Performed.

a. Core Borings. Twenty-one (21) core borings totaling 605.7 feet were drilled along the Savan Gut channel and culvert to provide subsurface geologic and engineering data for design. The unconsolidated materials and softer rock were sampled using a 1 3/8-inch I.D. x 2-inch O.D. split spoon with a

140-pound hammer falling 30 inches. Hard rock was sampled using 4 x 5 1/2-inch diamond bits and 2 1/8 x 3-inch "NX" diamond bits. All materials recovered from core borings were placed in core boxes, sealed, and stored at the Corps of Engineers' San Juan Area Office. Any removal or testing of soil samples will have to comply with the United States Department of Agriculture Regulations. Seals can be broken only by a U.S.D.A. inspector. Core boring locations are shown on plates C-5 thru C-9. Photographs of the cores were taken and are included with the core logs shown on plates C-19 thru C-76.

Twenty (20) additional borings, using a "Milwaukee Electric" drill, were obtained within the culvert from Station 17+73 to Station 28+78 to determine the thickness of the culvert floor and the presence of any cavities or voids. Four (4) of the borings were angle holes intersecting the contact between the floor and the culvert wall. These borings are designated as DH-1 through DH-22 in the drawings. Locations of the DH borings are plotted on plates C-5 thru C-9 and included on cross sections shown on plates C-14 thru C-18.

b. Probings. Nine (9) wash probings were taken at the proposed outlet structure location in St. Thomas Harbor to determine the top of the clay and the thickness of the sand layer. These are designated as P-1 through P-9. Location and results of the probings are shown on plate C-9.

c. Mapping. Detailed mapping was performed every 50 feet between Stations 17+73 and 28+78. Particular attention was given to the type of construction material; thickness of walls; presence of voids, cavities, washouts and cracks; and general condition of the culvert. Cross sections are shown on plates C-14 thru C-18.

d. Laboratory Testing, Soil. Laboratory tests (visual classification, moisture content, and Atterberg limits) were performed on representative samples of the clay overburden. Laboratory test results are shown on plate C-77.

6. Site Geology. The Savan Gut is primarily founded on a clayey overburden that overlies either a tuff or tuffaceous breccia bedrock.

a. Overburden. The clayey residual overburden varies from 1.0 to 30.0 feet in thickness in the upper channel. However, the thickness of the clay formation along the shore line is not known as borings were terminated at a depth of 35 feet. The overburden consists of a lean clay (CL), a fat clay (CH), or a clayey gravel (GC). All these layers contain many hard rock fragments (tuff or tuffaceaous breccia) ranging in size from pebbles to boulders, randomly scattered throughout the formation. Additional tuff and tuffaceous breccia boulders are concentrated in a layer at the contact between overburden and bedrock.

The area between Stations 25+50 and 37+10 has a sand and silt layer overlying the clay. This sand and silt zone ranges in depth from 3.0 feet thick inland to 24.0 feet thick along the shore line.

b. Bedrock. The bedrock along the Savan Gut center line is predominantly tuff and/or tuffaceous breccia. These rocks of volcanic origin were largely deposited in a marine environment. These pyroclastic rocks are hard to very hard, siliceous, crystalline (interlocking grains), and fine to coarse grained with abundant pebble sized inclusions. The bedrock is generally massive and solid, with scattered joints and fractures. Some highly broken zones are common with shallow weathering and staining along joints and fractures.

7. Culvert Condition. The present strip of land between the Chase Manhattan Bank and the existing bulkhead along St. Thomas Harbor (Station 35+75 to Station 37+10) is comprised of fill. The original shore line was located near Station 35+75. The reach between Station 29+23 and Station 37+10 of Savan Gut is a box culvert constructed under Guttets Gade, while the reach between Station 17+73 and Station 29+23 is open. The open portion of the culvert runs through a densely populated area with many drains and raw sewage lines emptying into it.

The culvert was originally constructed with stone, but many areas along the culvert have been repaired with concrete or concrete block. The width of the stone walls varies from 1.0 to 2.0 feet in thickness. The stone floor varies from 0.4 to 0.7 feet in thickness. Nearly the entire length of the culvert between Station 17+73 and Station 28+78 has one or more concrete filled trenches which probably cover water and/or sewer lines, as shown on plates C-14 thru C-18. The actual existence, number, and location of all these lines is not known due to inadequate records.

The culvert contains numerous potholes and washouts. Pothole locations are shown on plates C-5 thru C-9. At two locations (Stations 18+51 to 18+87 and Stations 22+05 to 22+34) large sections of concrete, up to 35 feet long, have been eroded.

The northern portion of the Savan Gut, from Station 15+00 to Station 0+00, is a natural channel. The channel is very thickly vegetated and contains many boulders up to 3 feet in diameter.

8. Foundation Conditions.

a. Outlet Structure Site. Probings, described in paragraph 5b, were washed through sand and silt layers to the top of the stiff clay. These probings indicate 3 to 5 feet of sand overlying a silt which varies considerable in thickness. The area along the structure center line appears to have a layer of trash and debris overlying the clay, which has probably accumulated over the years during intermittent flooding of Savan Gut.

b. Boulders. Numerous large boulders up to 5 feet in diameter were encountered during the subsurface investigations. They are, in all probability, embedded throughout the clay and sand beds. The presence of these hard tuffaceous breccia boulders will most likely create some problems in pile driving and channel excavation.

c. Ground Water. The water table in the lower channel gradually increases from elevation +0.4 feet MSL along the bay to elevation +5.0 feet MSL near Station 26+00. The sandy and silty material in this area is supersaturated. Ground water was not observed in the core borings along the upper channel between 0+00 and 26+00, except in CB-SG-2 (elevation +65.7 feet MSL) and CB-SG-16 (elevation +15.0 feet MSL).

d. Cavities and Voids. Borings DH-1 through DH-22 indicate that neither cavities or voids were found beneath the culvert at these locations. However, this does not preclude the existence of small, isolated zones of erosion below sections of the culvert not investigated.

9. Soils Engineering Analyses and Considerations.

a. Excavation. Types of materials to be excavated are shown on geologic section A-A (plates C-5 thru C-9). According to the proposed channel bottom grade, these materials vary from a stiff to hard, fat clay approximately at Stations 20+00 to 26+50, to a firm silty sand at Stations 26+00 to 32+00. A layer of fat clay and a layer of silty gravel appear to be at Stations 30+50 and 32+50 respectively. From Stations 33+00 to 37+00, the overburden at channel grade is essentially fill material made up of sand and silt with some clay, and shell and rock fragments. This fill is mostly firm and dense, and becomes looser in density at the seawall discharge. Materials around Jane E. Tuitt Elementary School consist mostly of clayey gravel with scattered cobblestones throughout the strata. Although the materials encountered are stiff and hard, or firm, excavation could be accomplished by conventional methods. However, large boulders, as mentioned in paragraph 8b, were encountered in the clay and silty sand beds at different locations. The presence of these boulders can create some problems in the excavation. A velocity check dam and basin with an approach channel is proposed for the reach immediately upstream of Jane E. Tuitt Elementary School. Bottom elevation of the basin will be +45.0 feet m.s.l. The approach channel slopes 1V:10H downstream from existing ground elevation +65.0 feet m.s.l., immediately south of Antoni Straede bridge, to proposed basin. Subsurface information along this reach is very limited. Two core borings were drilled on the Antoni Straede bridge, and two other borings were drilled on the southern end of the basin. The geologic profile of this area, shown on plate C-6, indicates residual clayey materials overlying a very hard tuffaceous breccia. Based on estimates, it appears that a sufficient amount of rock will be encountered in the excavation of both approach channel and basin. Depending on the amount of joints and factures, and the actual weathering of the tuffaceous breccia, blasting might be necessary to carry on the excavation. Additional core borings will be needed to define clearly the materials to be excavated along this area, and choose the most convenient excavation methods.

b. Structural Foundations. Most of the channel is to be built as a concrete box culvert. The foundation for this structure consists predominantly of fat clay, silty sand, and mixed fill materials. Foundation materials along the reach around Jane E. Tuitt Elementary School connecting

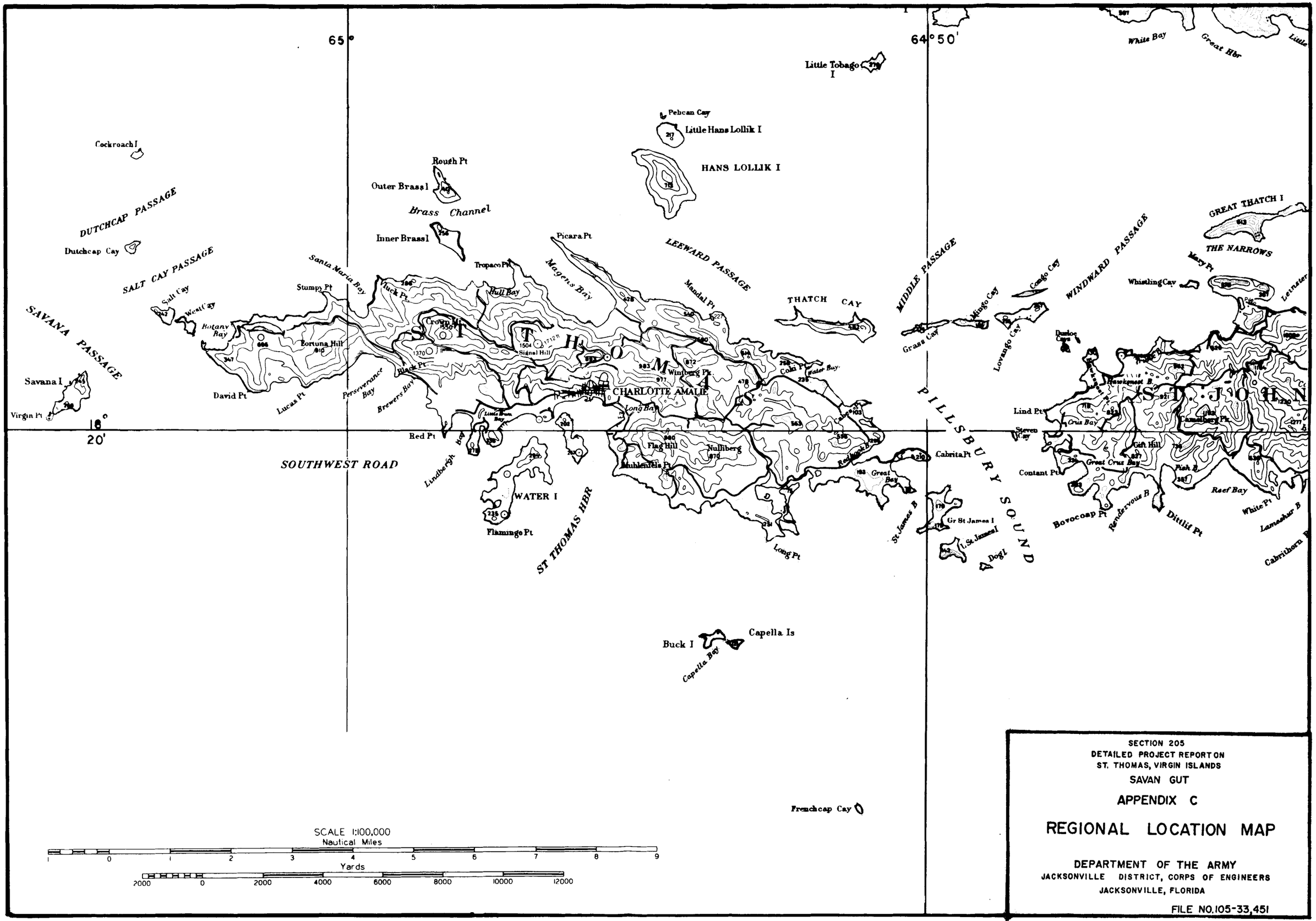
with the upstream velocity check dam and basin are composed of gravel-sand-clay mixtures interbedded with cobbles, and underlain by very hard tuffaceous breccia. According to Standard Penetration Tests performed during drilling, all these materials have adequate bearing capacity. A layer of organic silt (elev. -12 to -18 feet m.s.l.) underlies the foundation materials under the proposed culvert at the seawall. No settlement is expected on this layer due to the weight of the structure.

c. Side Slopes. For the construction of the box culvert from Tuitt School to Back Street, side slopes above the shored and braced vertical cut would be 1 vertical on 2 horizontal. The trench vertical wall for this reach is anticipated to be within 2 to 3 feet from the ground surface. Sections of the culvert where backfill above the structure is necessary, side slopes would be 1 vertical on 3 horizontal. The cut at the approach channel upstream of the velocity check dam and basin should be stable with 1 vertical on 3 horizontal side slopes. Due to the water velocity at this reach, side slopes will need protection against erosion.

d. Channel Lining. Side slope protection is to be provided at the approach channel upstream of the velocity check dam and basin. According to hydraulic data, the maximum velocity and depth of water expected at this reach are approximately 17.85 feet per second and 3.5 feet, respectively. A riprap-type revetment was first considered; however, stone sizes would be too large for this relatively small channel. It is proposed that a gabion mattress be used as bank protection for the approach channel. Based on the above-mentioned velocity, the mattress thickness would be approximately 20 inches. This thickness could be reduced if a filter layer or cloth is placed under the mattress. At its upper end, the mattress is to be extended 24 inches above maximum water level. The toe of the bank should be protected against scour by continuing the mattress over the channel bed to form an apron. The size of stone filling should be in the range of 6-9 inches. Stone conforming with design requirements should be available on the island. However, it should be tested prior to construction to guarantee that it meets Corps of Engineers standards. Protection of the channel bottom would not be necessary if rock is encountered in the excavation as assumed. Additional subsurface investigations mentioned in paragraph 9a should provide information for final design.

e. Steel Sheet Piling. Sheet piles would be embedded in very stiff to hard, fat clay along the business district from Stations 27+50 to 37+00. At the Tuitt School surroundings, sheet piles would be embedded in hard, clayey gravels, and tuffaceous breccia. Since boulders are encountered at different depths all along the channel alinement and hard rock is expected especially at the velocity check dam and basin, punching and drilling may be necessary for convenient and economical pile installation. Piles shall be driven by approved methods in such a manner as not to subject the piles to serious injury and to insure proper interlocking throughout the length of the piles.

f. Dewatering. Dewatering will be required for construction of the box culvert through the business district from Stations 27+50 to 37+00. Foundation grade varies from elevation +5.6 feet m.s.l. at Station 27+50 to elevation -5.42 feet m.s.l. at Station 37+00. According to geologic data, ground water varies from elevation +4.6 to +0.4 feet m.s.l. at this reach. Dewatering would be performed by the open sump method. Two ditches of approximately 2 feet deep, filled with selected material on both sides of the excavation bottom, should provide good drainage. Water would be collected at the end of each excavated section and removed by lift pumps. Ditches would be constructed after sheet piling installation. Silty and sandy materials occur within ground water level in some reaches. Although sheet piling will provide protection for these materials, care shall be taken to hold surface and subsurface erosion to a minimum during construction. Ground water table shall be maintained at least 1 foot below excavation grade until foundation work has been completed and the first lift of concrete in the structure has been in place at least 24 hours. Water stages and ground water elevations are subject to fluctuations and to the effect of hurricanes.



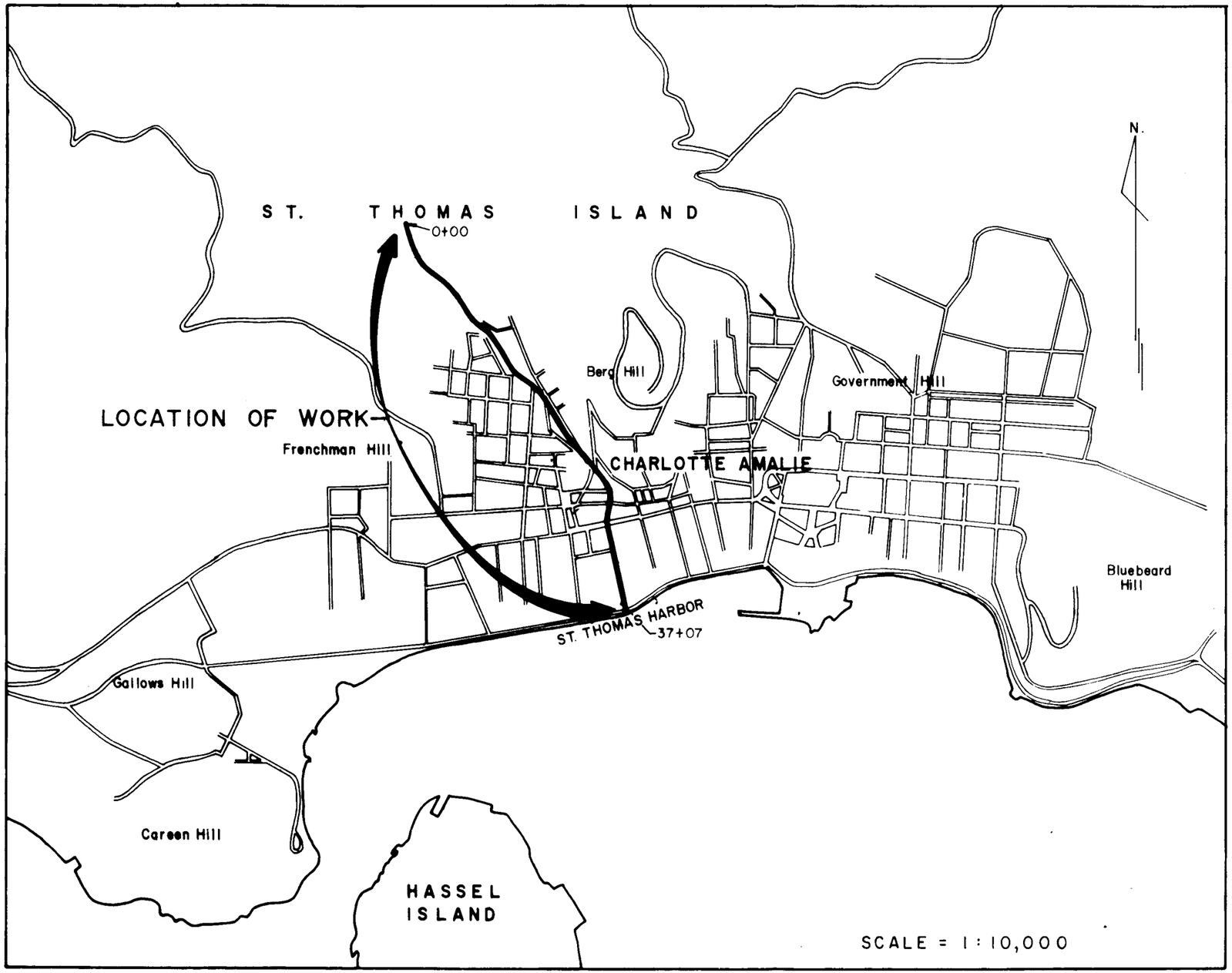
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

REGIONAL LOCATION MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO.105-33,451



PROJECT LOCATION

SECTION 205
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SAVAN GUT

APPENDIX C

PROJECT LOCATION MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

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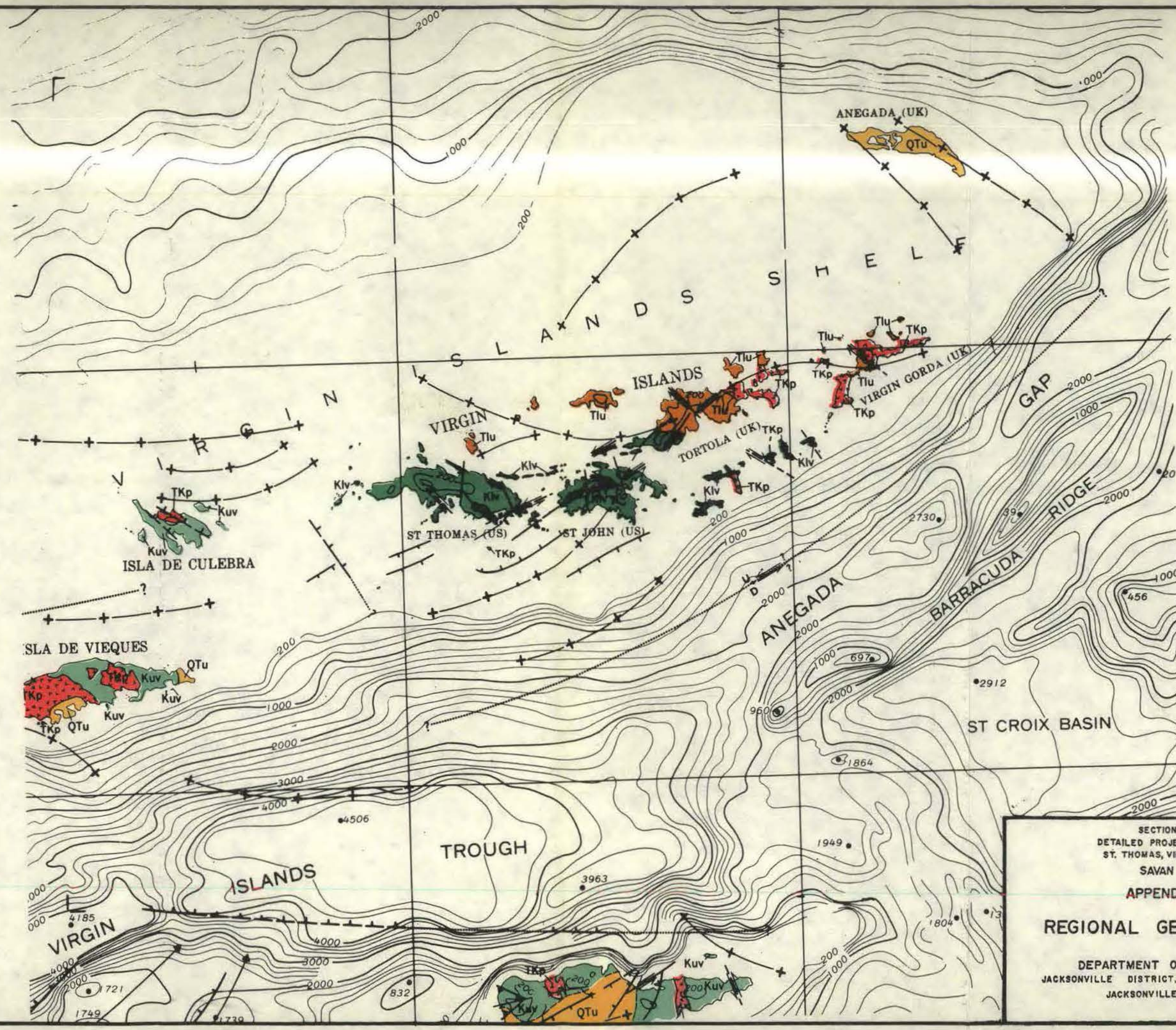

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

REGIONAL GEOLOGIC MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO.105-33,451

PLATE C-3

EXPLANATION

TERTIARY AND QUATERNARY

Oligocene to Holocene

QTu

Sedimentary deposits, undivided

Marine limestone, calcarenite, sandstone, shale, marl, chalk, sand, and clay; and alluvial, landslide, beach, dune, swamp, marsh, and reef deposits

TERTIARY

Paleocene to Eocene

Tlu

Sedimentary and volcanic rocks, undivided

In Puerto Rico; siltstone, sandstone, conglomerate, algal limestone, lava, tuff, largely deposited in a marine environment, may include some plutonic and hydrothermally altered rocks and some strata of Cretaceous age; in Virgin Islands, mainly quartz-andesite and augite-andesite breccia and tuffaceous sandstone and breccia

CRETACEOUS

Upper Cretaceous

TKp

Plutonic rocks

In Puerto Rico, Vieques, and Culebra, largely granodiorite and quartz diorite, some diorite, quartz porphyry, gabbro, and some amphibolite; in Virgin Islands, predominantly tonalite, some welded tuff, pegmatite, lamprophyre dikes, and diabase; believed to have been emplaced during Late Cretaceous, Paleocene, and Eocene

Kuv

Volcanic and sedimentary rocks, undivided

Tuffaceous sandstone, siltstone, breccia, and conglomerate, lava, tuff, some limestone and mudstone; largely deposited in a marine environment; may include some hydrothermally altered rocks and some strata of Paleocene and (or) Eocene age

Lower Cretaceous

Ks

Serpentinite

Serpentinized peridotite (?); probably emplaced during the Early or early Late Cretaceous

Klv

Volcanic and sedimentary rocks, undivided

Tuff, tuffaceous breccia, some sandstone, siltstone, and limestone; in Puerto Rico, lava, lava breccia, some amphibolite and hydrothermally altered rocks; in Virgin Islands, keratophyre and spilite flows, volcanic wackes, augite-andesite breccia, radiolarite, and some conglomerate; largely deposited in a marine environment; may include some strata of Late Cretaceous age

Contact

Dashed where uncertain

U D ?

Major fault involving basement movement

Solid in submarine areas based on seismic data. Dashed where extrapolated; dotted where speculated based on topography and magnetic gradients and trends; queried where doubtful or inferred. D *or ticks, indicate downthrown side;* U, *upthrown side; arrows show direction of apparent strike-slip movement; teeth on upper plate of thrust fault*

?

Minor fault in sedimentary cover

Not believed to involve basement. Solid in submarine areas based on seismic data. Dashed where extrapolated; dotted where speculated; queried where doubtful or inferred. Ticks indicate downthrown side

Fault zone

Zone of numerous down-to-basin faults along insular margin of Muertos Trough; fault pattern uncertain

Axial trace of fold

Dashed where extrapolated; direction of plunge indicated where known; arrows denote dip of sedimentary horizons away from crest

Monoclinal flexure

Inferred trend of monocline involving sub-bottom horizons of Venezuelan basin along south margin of Muertos Trough

Positive magnetic anomaly

Trend of residual magnetic anomaly greater than +150 gammas

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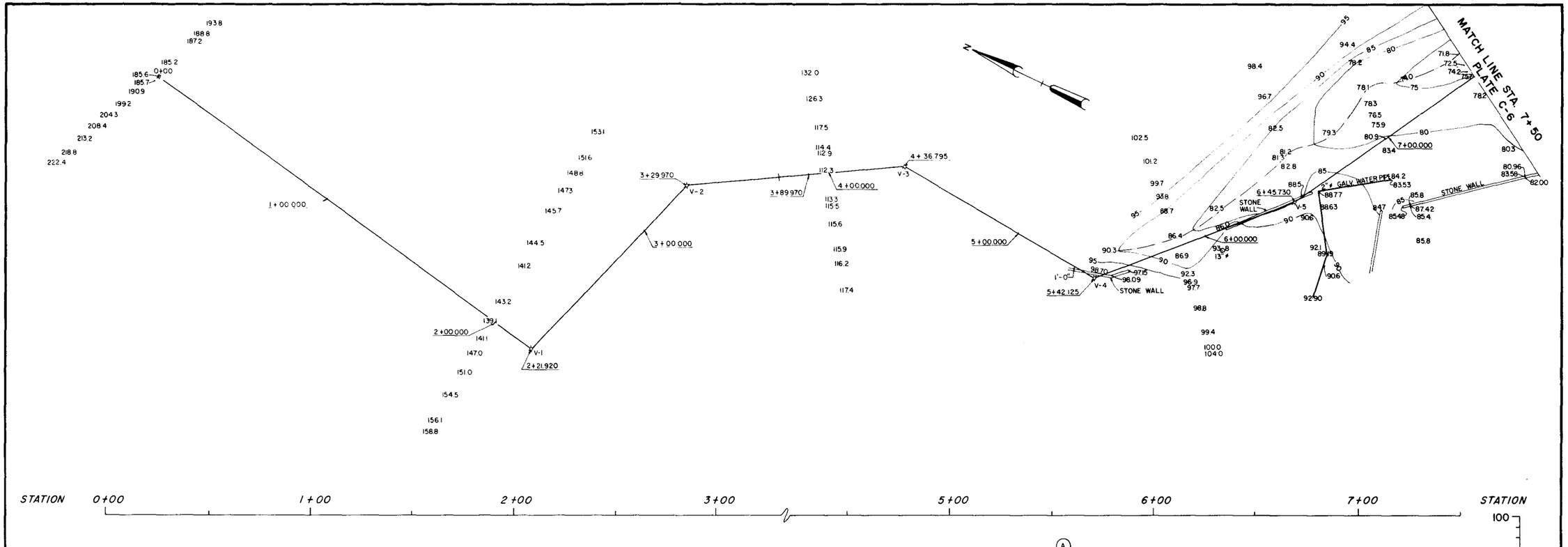
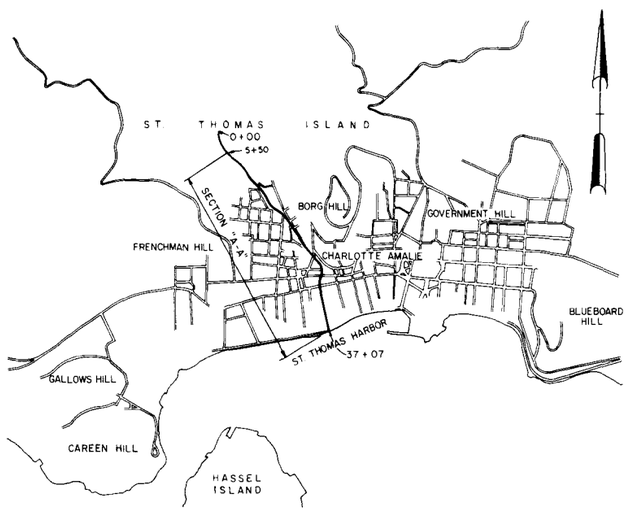
LEGEND REGIONAL GEOLOGIC MAP

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451





LEGEND:

FILL	FILL
	SILTY GRAVELS, GRAVEL - SAND SILT MIXTURES. (GM)
	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES. (GC)
	WELL - GRADED OR POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES. (SW) OR (SP).
	SILTY SANDS, SAND - SILT MIXTURES. (SM)
	CLAYEY SANDS, SAND - CLAY MIXTURES. (SC)
	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY. (ML)
	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS. (CL)
	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY. (OL)
	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS. (CH)
	TUFF OR TUFF BRECCIA
I I I I I I	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE ROCK FRAGMENTS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL.
	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE COBBLE STONE AND FIELD STONE SIZE FRAGMENTS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL.

(SP) AND (SM) ETC., REFERS TO THE CORPS OF ENGINEERS UNIFIED SOIL CLASSIFICATION SYSTEM. CLASSIFICATION OF MATERIALS IS BASED ON VISUAL EXAMINATION.

ROCK HARDNESS IS DEFINED BY THE FOLLOWING:

SOFT - CAN BE SCRATCHED WITH FINGERNAIL.

MEDIUM HARD - CAN BE SCRATCHED EASILY WITH KNIFE, CANNOT BE SCRATCHED WITH FINGERNAIL.

HARD - DIFFICULT TO SCATCH WITH KNIFE.

VERY HARD - CANNOT BE SCRATCHED WITH KNIFE.

3 NUMBER OF HAMMER BLOWS (140 LB. HAMMER FALLING 30-INCHES) REQUIRED TO ADVANCE A STANDARD 2-INCH O.D.

DRILLING LEGEND:

12, 37, 84 — NUMBER OF HAMMER BLOWS REQUIRED TO ADVANCE A 1 3/8-INCH I.D. SAMPLING SPOON 1.5 FT. USING A 140# HAMMER FALLING 30-INCH

DIA — SAMPLED MATERIALS WITH A SIZE "NX", "R", OR 4 x 5 1/2-INCH DIAMOND BIT AND DOUBLE TUBE CORE BARREL

CB-7 — CORE HOLE LOCATION, PROFILE VIEW

CB-7 — CORE HOLE LOCATION, PLAN VIEW

DH-2 — ELECTRIC CORE BORING (VERTICAL)

DH-4 — ELECTRIC CORE BORING (ANGLE)

GRAPHIC SCALE

20' 10' 0 20' 40'

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APPENDIX C

CORE BORING LOCATION MAP AND GEOLOGIC SECTION A-A

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

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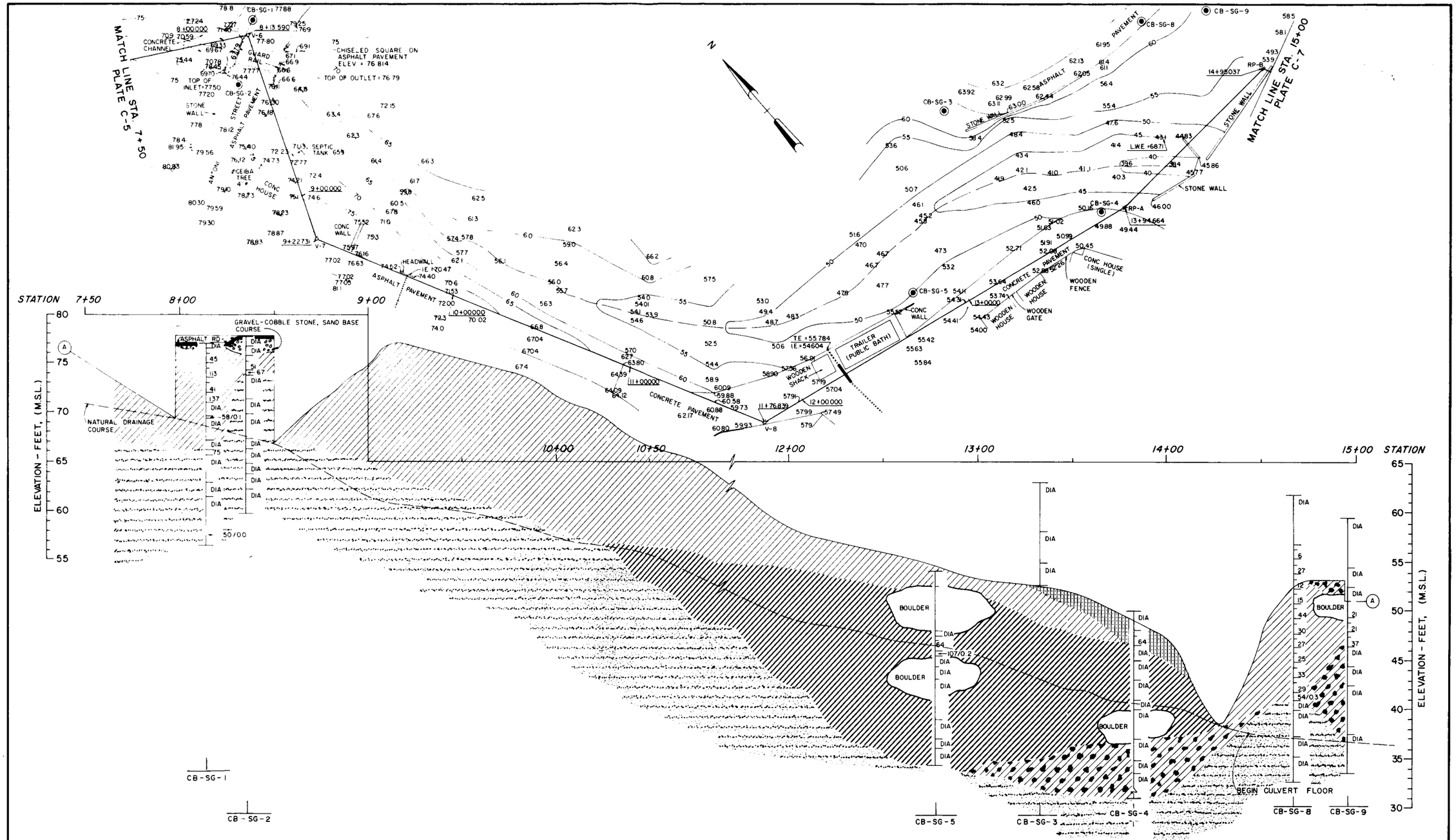

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CORE BORING LOCATION MAP
AND
GEOLOGIC SECTION A-A

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

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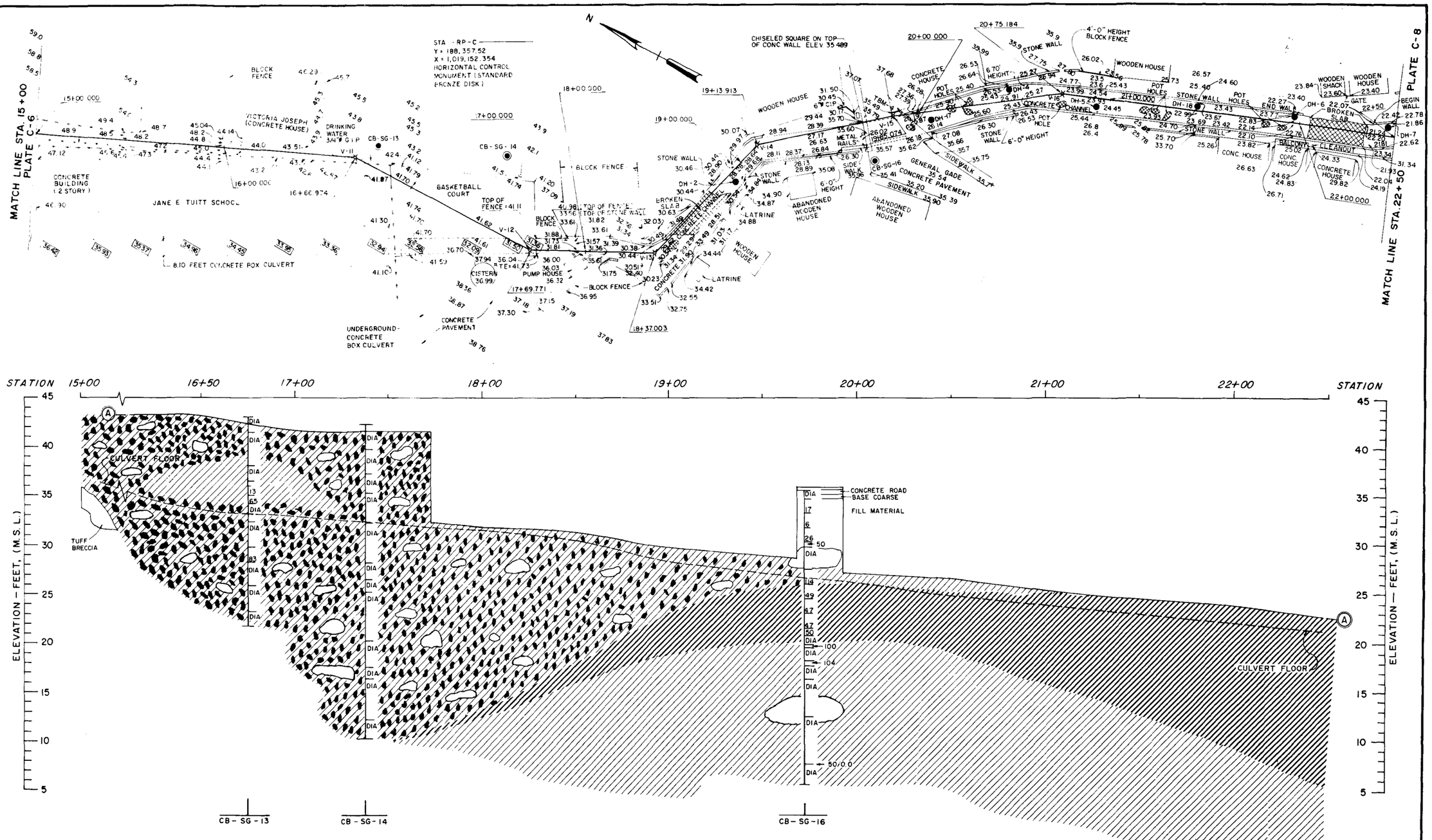

GRAPHIC SCALE
20' 0 20' 40'

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SAVAN GUT

APPENDIX C

CORE BORING LOCATION MAP
AND
GEOLOGIC SECTION A-A

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

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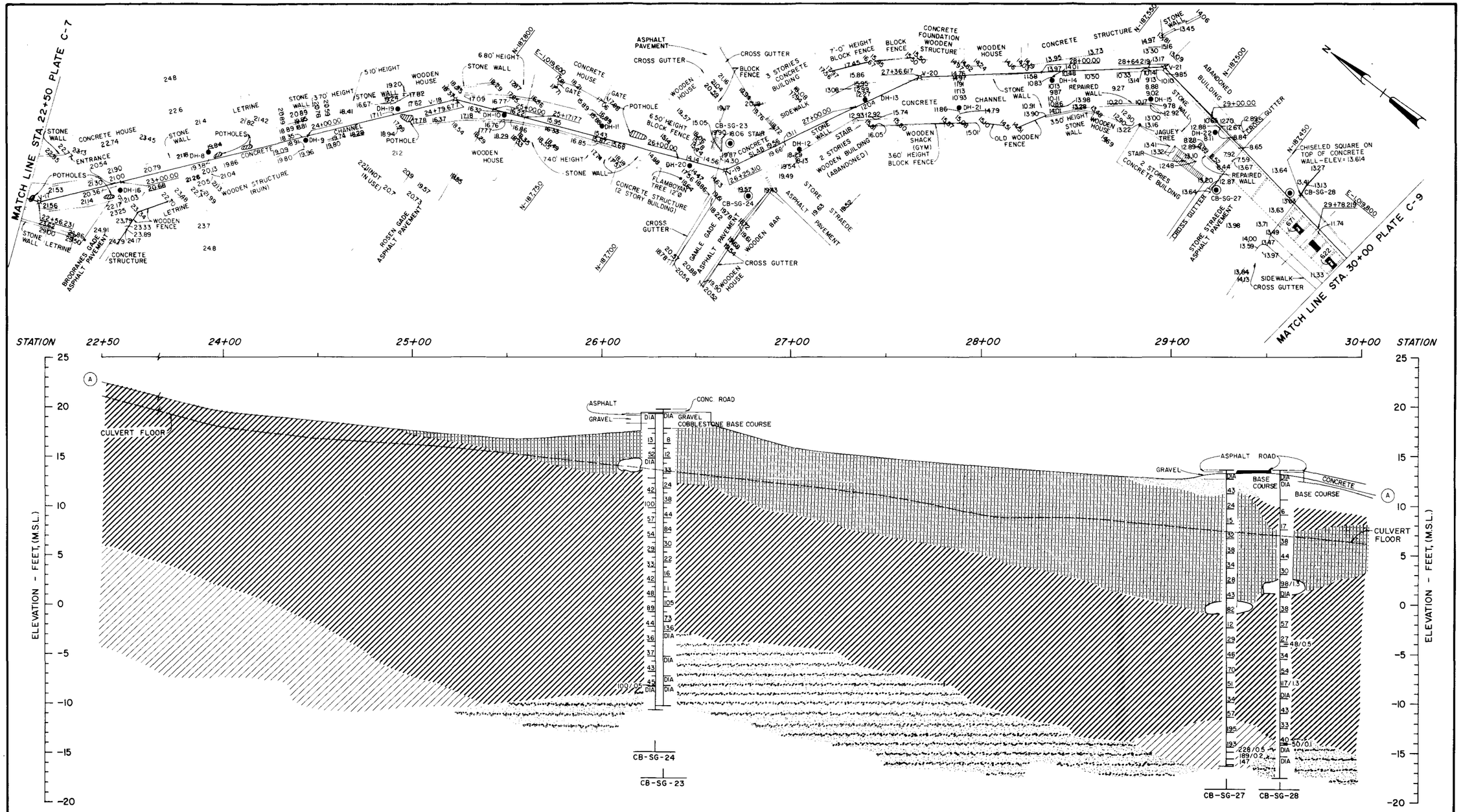

GRAPHIC SCALE

20' 10' 0 20' 40'

SECTION 205
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ST. THOMAS, VIRGIN ISLANDS

SAVAN GUT

APPENDIX C

CORE BORING LOCATION MAP
AND
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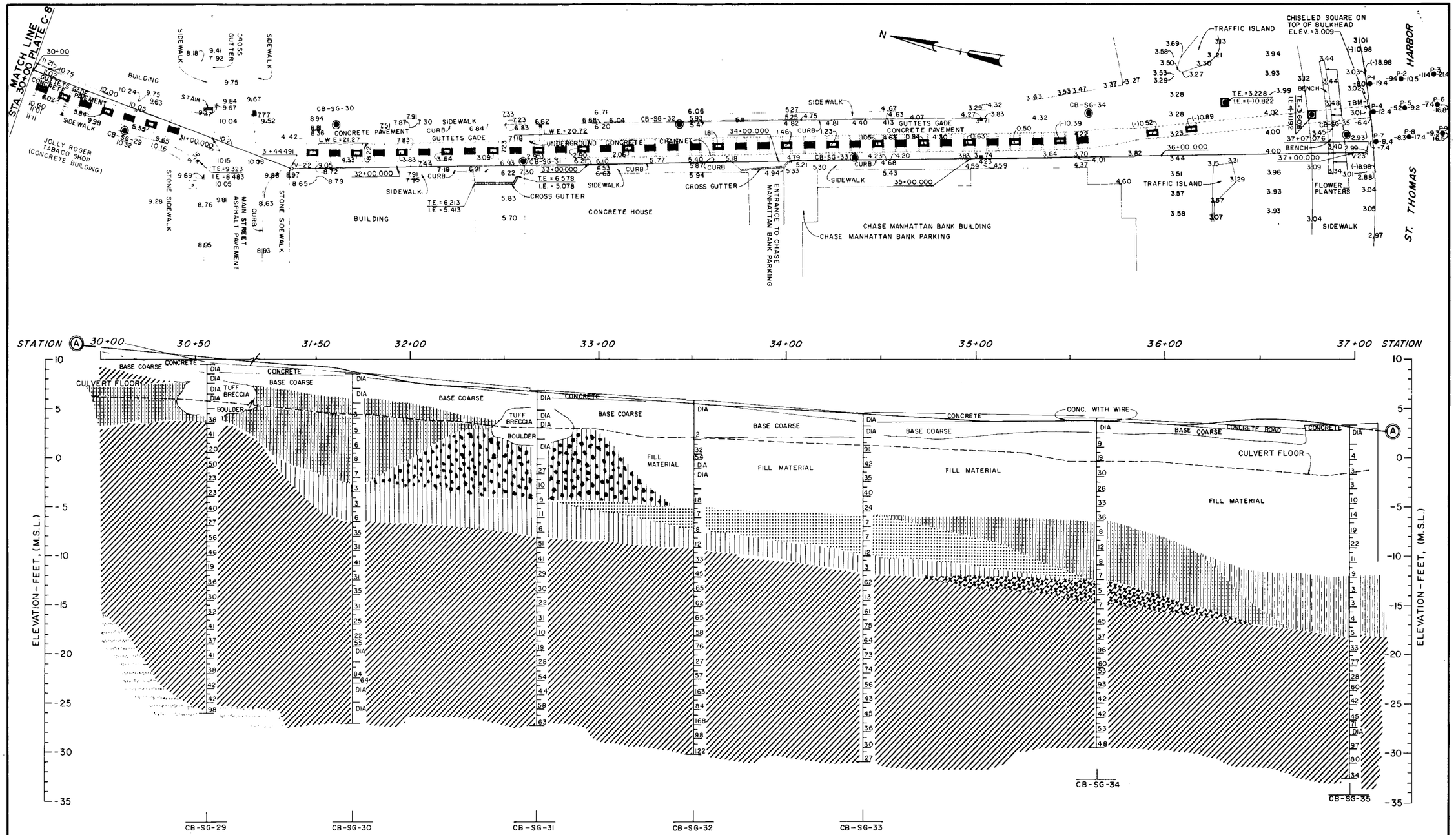

GRAPHIC SCALE

20' 10' 0 20' 40'

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CORE BORING LOCATION MAP
AND
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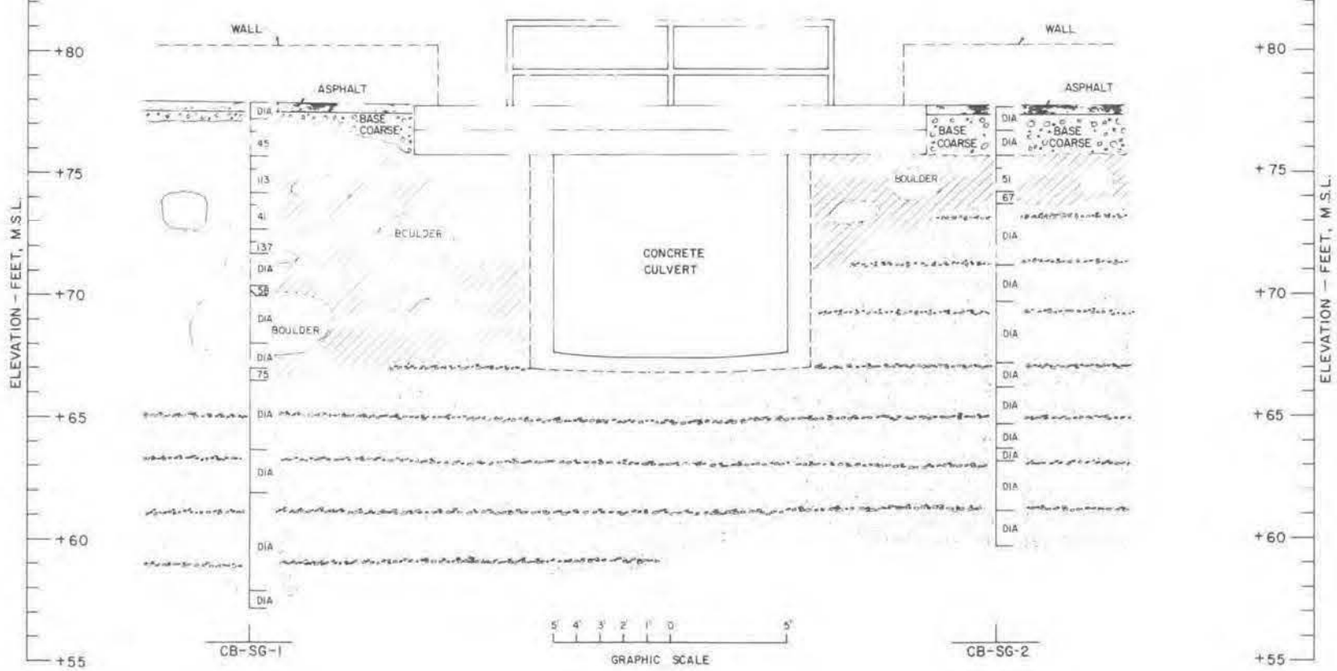
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

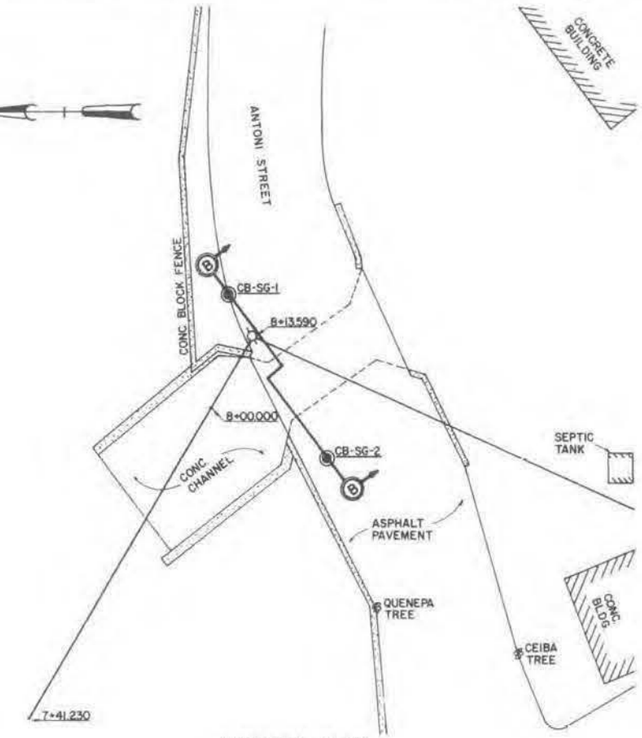
FILE NO. 105-33,451

DRILLING LEGEND

12 / 37 / 84	NUMBER OF HAMMER BLOWS REQUIRED TO ADVANCE A 1-3/8-INCH I.D. SAMPLE SPOON 15 FT. USING A 140# HAMMER FALLING 30-INCHES
DIA	SAMPLED MATERIAL WITH A SIZE "NX", "R" OR 4 X 5-1/2-INCH DIAMOND BIT AND DOUBLE TUBE CORE BARREL
DH-4	ELECTRIC CORE BORING (ANGLE)
CB-SG-26	CORE HOLE LOCATION, PROFILE VIEW
CB-SG-26	CORE HOLE LOCATION, PLAN VIEW
DH-2	ELECTRIC CORE BORING (VERTICAL)



BRIDGE NO. 1
STA. 8+14
SECTION B-B



LOCATION PLAN

LEGEND

SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
SM	SILTY SANDS, SAND-SILT MIXTURES
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE ROCK FRAGMENTS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL
	TUFF OR TUFF BRECCIA
	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE BOULDERS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL
FILL	FILL MATERIAL
	ASPHALT
	CONCRETE

NOTE: (SP) AND (SM), ETC. REFERS TO THE CORPS OF ENGINEERS UNIFIED SOILS CLASSIFICATION SYSTEM. CLASSIFICATION OF MATERIALS IS BASED ON VISUAL EXAMINATION.

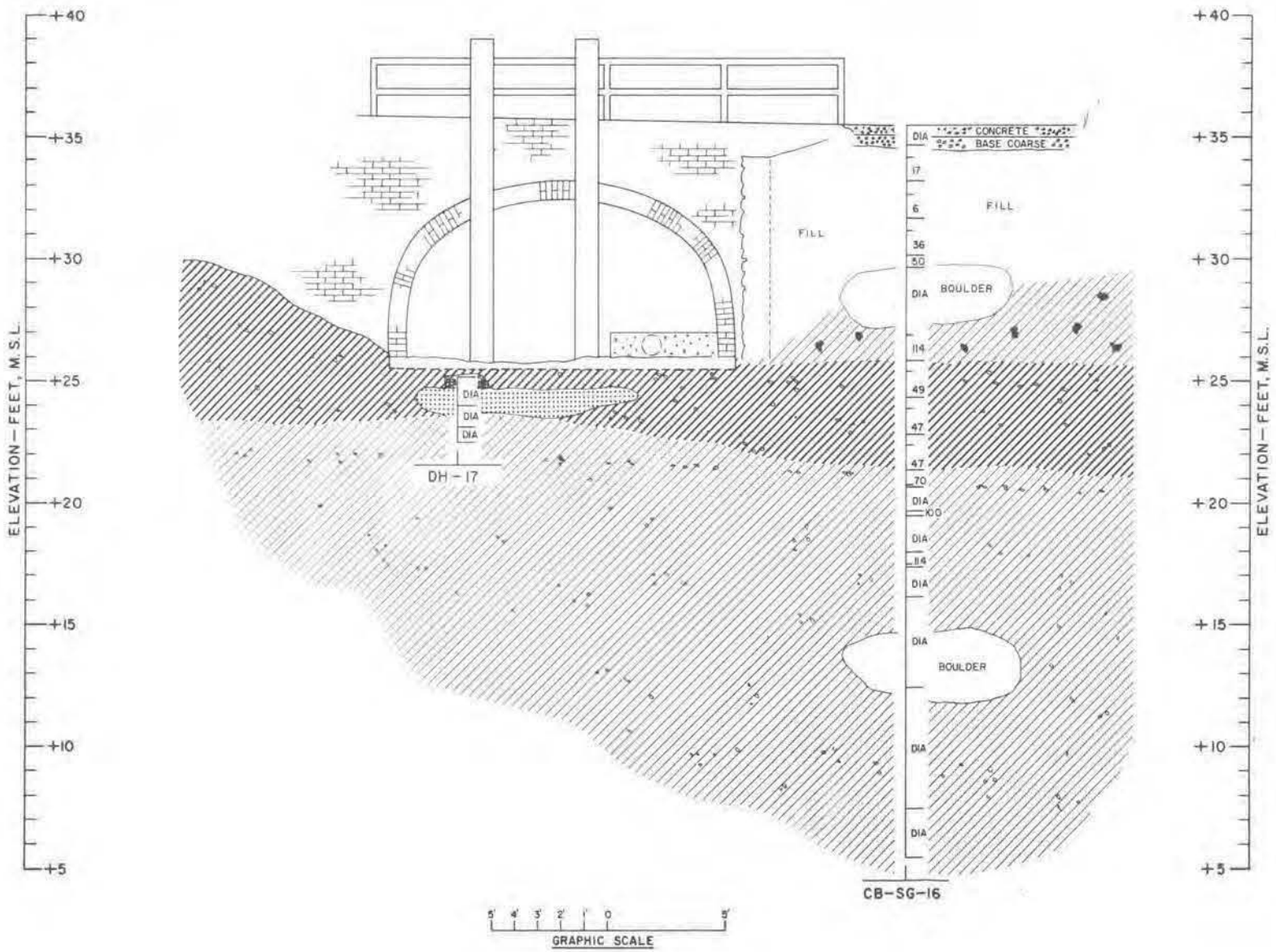
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

BRIDGE NO. 1
GEOLOGIC SECTION B-B

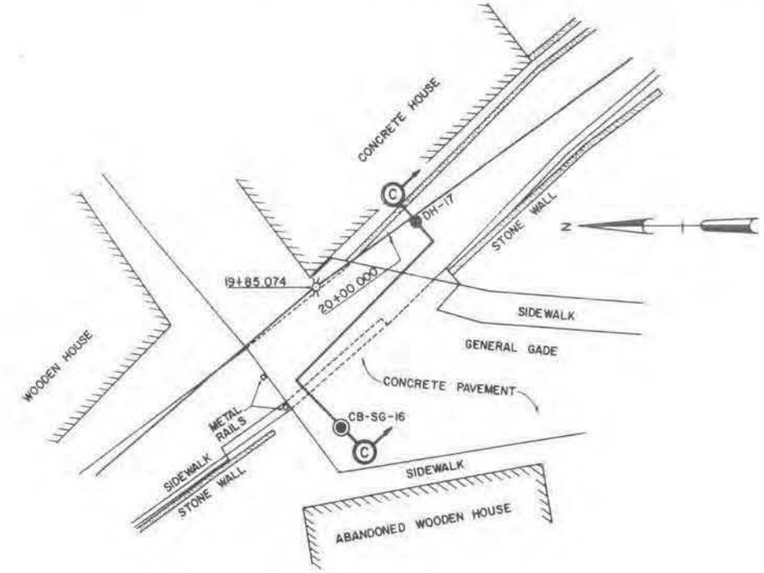
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451



BRIDGE NO. 2

SECTION C-C



LOCATION PLAN

LEGEND

- SP — POORLY-GRADED SANDS, GRAVELLY SANDS LITTLE OR NO FINES.
- CL — INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
- GC — CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.
- CH — INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
- USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE ROCK FRAGMENTS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL.
- TUFF OR TUFF BRECCIA
- USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE BOULDERS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL.
- FILL — FILL MATERIAL
- ASPHALT
- CONCRETE

DRILLING LEGEND

- 12 / 37 / 84 — NUMBER OF HAMMER BLOWS REQUIRED TO ADVANCE A 1-3/8-INCH I.D. SAMPLE SPOON 15 FT. USING A 140# HAMMER FALLING 30-INCHES.
- DIA — SAMPLED MATERIAL WITH A SIZE "NX", "R" OR 4 X 5-1/2-INCH DIAMOND BIT AND DOUBLE TUBE CORE BARREL.
- DH-4 — ELECTRIC CORE BORING (ANGLE).
- CB-SG-26 — CORE HOLE LOCATION, PROFILE VIEW
- CB-SG-26 — CORE HOLE LOCATION, PLAN VIEW.
- DH-2 — ELECTRIC CORE BORING (VERTICAL)

NOTES: (SP) AND (SM) ETC., REFERS TO THE CORPS OF ENGINEERS UNIFIED SOILS CLASSIFICATION SYSTEM. CLASSIFICATION OF MATERIALS IS BASED ON VISUAL EXAMINATION.

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

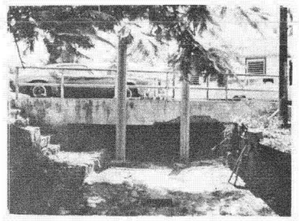
BRIDGE NO. 2
GEOLOGIC SECTION C-C

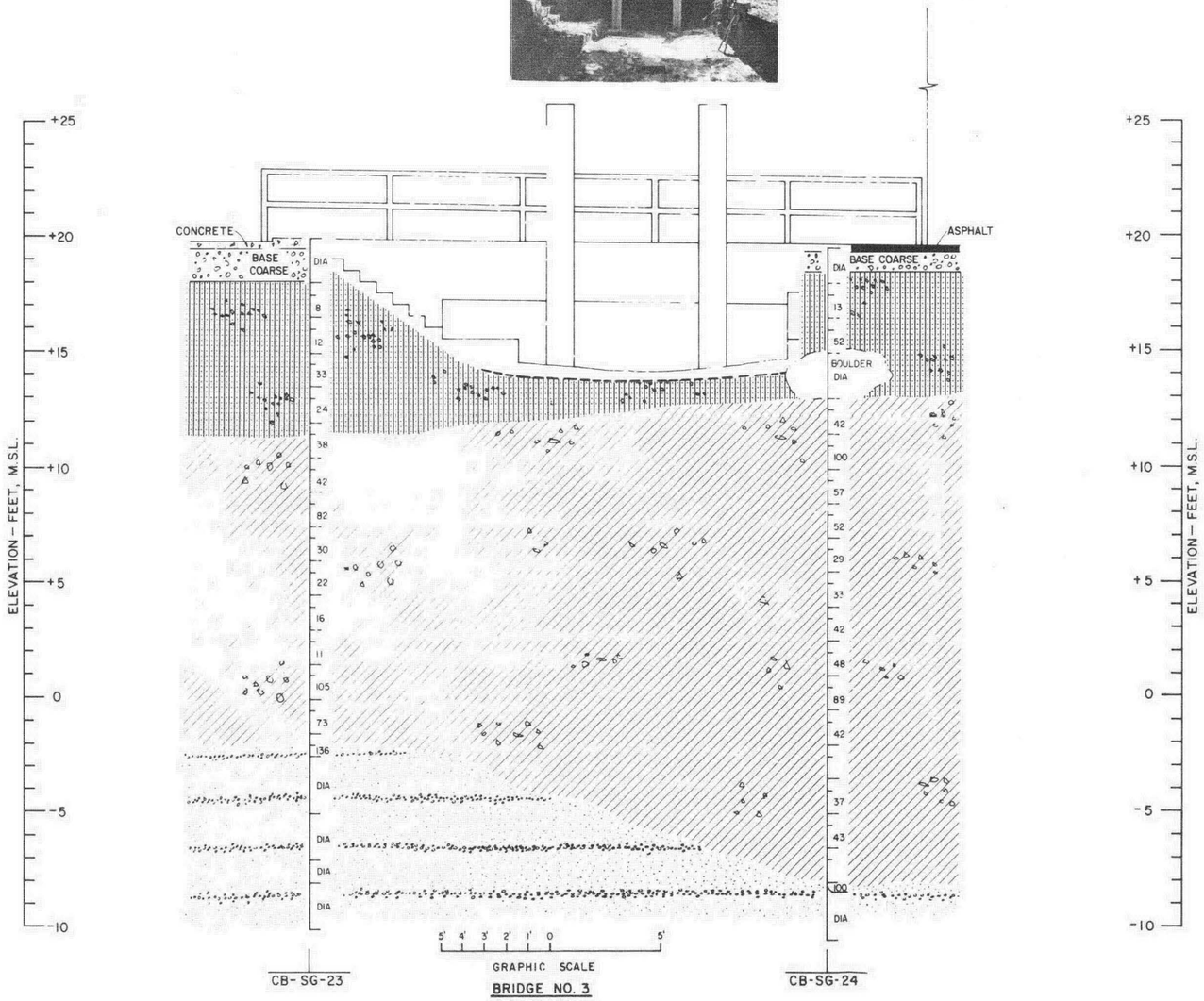
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451

DRILLING LEGEND

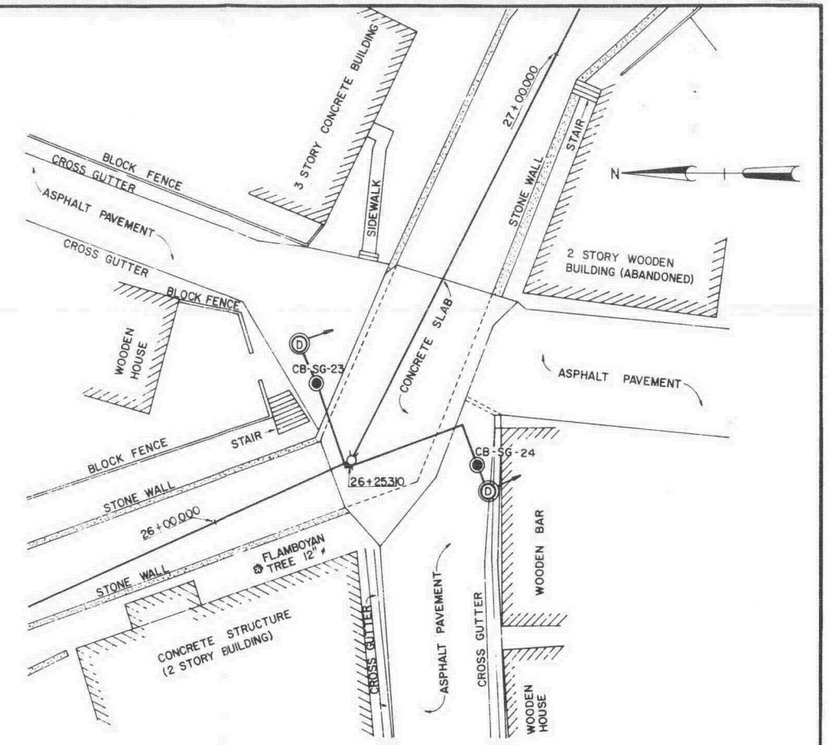
12 / 37 / 84	NUMBER OF HAMMER BLOWS REQUIRED TO ADVANCE A 1-3/8-INCH I.D. SAMPLE SPOON 15 FT. USING A 140# HAMMER FALLING 30-INCHES.
DIA	SAMPLED MATERIAL WITH A SIZE "NX", "R" OR 4 X 5-1/2-INCH DIAMOND BIT AND DOUBLE TUBE CORE BARREL.
DH-4	ELECTRIC CORE BORING (ANGLE).
CB-SG-26	CORE HOLE LOCATION, PROFILE VIEW.
CB-SG-26	CORE HOLE LOCATION, PLAN VIEW.
DH-2	ELECTRIC CORE BORING (VERTICAL)





BRIDGE NO. 3
STA. 26+25

SECTION D-D



LOCATION PLAN

LEGEND

SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.		TUFF OR TUFF BRECCIA
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.		USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE BOULDERS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL
SM	SILTY SANDS, SAND-SILT MIXTURES.	FILL	FILL MATERIAL
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.		ASPHALT
	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE ROCK FRAGMENTS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL.		CONCRETE

NOTE: (SP) AND (SM), ETC. REFERS TO THE CORPS OF ENGINEERS UNIFIED SOILS CLASSIFICATION SYSTEM. CLASSIFICATION OF MATERIALS IS BASED ON VISUAL EXAMINATION.

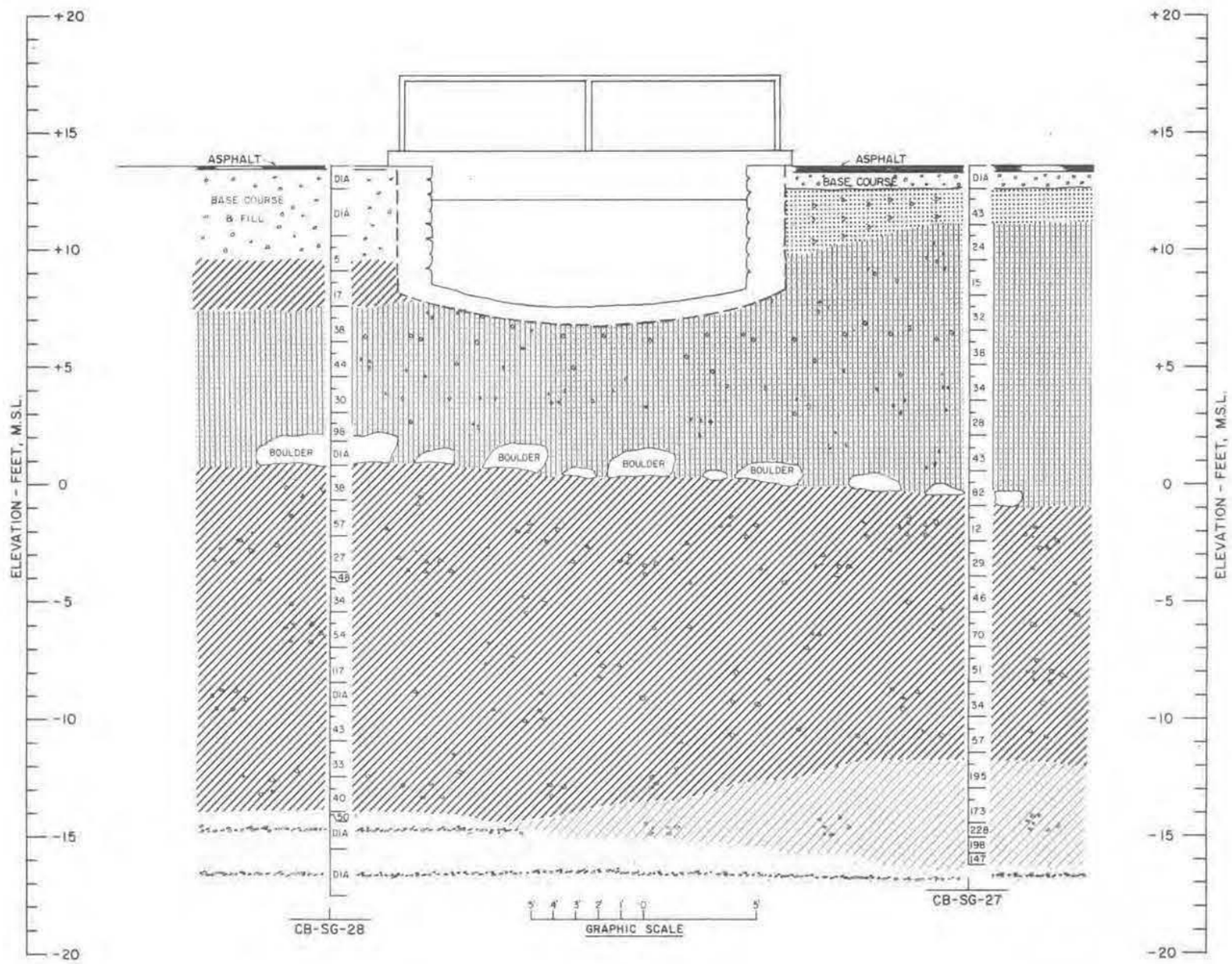
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

BRIDGE NO. 3
GEOLOGIC SECTION D-D

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

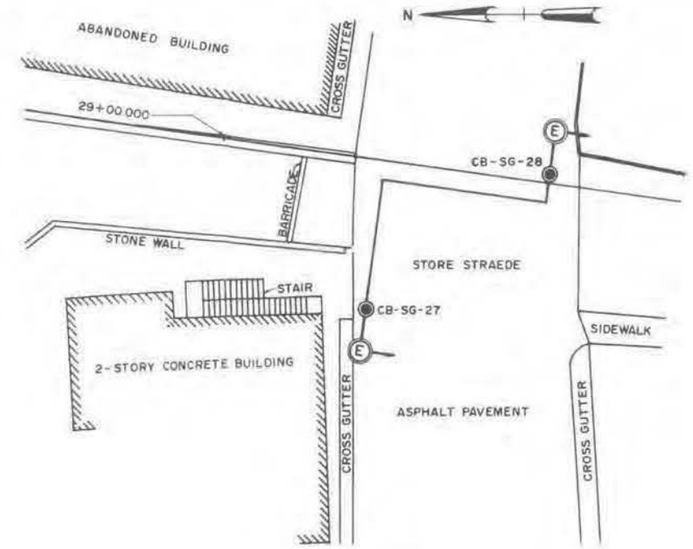
FILE NO. 105-33,451



BRIDGE NO. 4

STA. 29+22

SECTION E-E



LOCATION PLAN

LEGEND

SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
SM	SILTY SANDS, SAND-SILT MIXTURES
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE ROCK FRAGMENTS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL
	TUFF OR TUFF BRECCIA
	USED IN COMBINATION WITH OTHER SYMBOLS TO INDICATE BOULDERS WITHIN UNCONSOLIDATED MATERIAL OR PARTIAL CONSOLIDATION OF THE MATERIAL.
FILL	FILL MATERIAL
	ASPHALT
	CONCRETE

DRILLING LEGEND

12 / 37 / 84	NUMBER OF HAMMER BLOWS REQUIRED TO ADVANCE A 1-3/8-INCH I.D. SAMPLE SPOON 15 FT USING A 140# HAMMER FALLING 30-INCHES.
DIA	SAMPLED MATERIAL WITH A SIZE "NX", "R" OR 4 X 5-1/2-INCH DIAMOND BIT AND DOUBLE TUBE CORE BARREL.
DH-4	ELECTRIC CORE BORING (ANGLE)
CB-SG-26	CORE HOLE LOCATION, PROFILE VIEW
CB-SG-26	CORE HOLE LOCATION, PLAN VIEW
DH-2	ELECTRIC CORE BORING (VERTICAL)

NOTES: (SP) AND (SM) ETC., REFERS TO THE CORPS OF ENGINEERS UNIFIED SOILS CLASSIFICATION SYSTEM. CLASSIFICATION OF MATERIALS IS BASED ON VISUAL EXAMINATION.

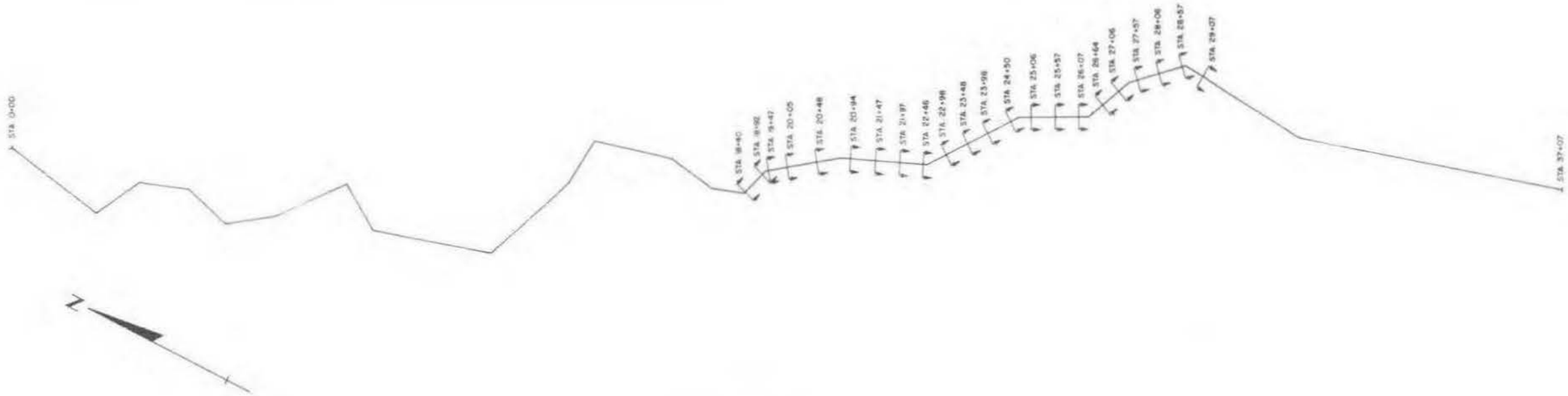
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

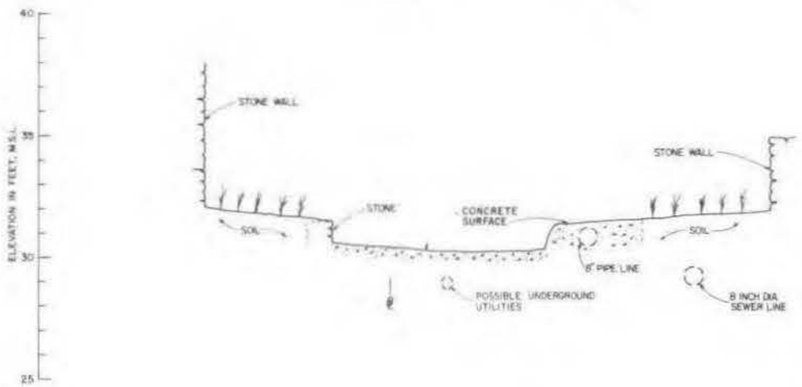
BRIDGE NO. 4
GEOLOGIC SECTION E-E

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

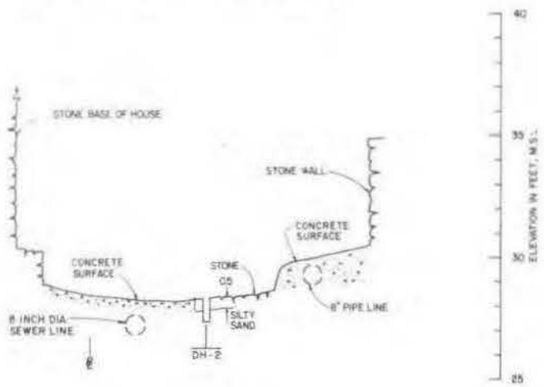
FILE NO. 105-33,451



ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT
SCALE "B"

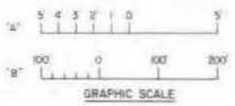


STA. 18+40
SCALE "A"



STA. 18+92
SCALE "A"

DH-2 ELECTRIC CORE BORING (VERTICAL)
DH-4 ELECTRIC CORE BORING (ANGLE)



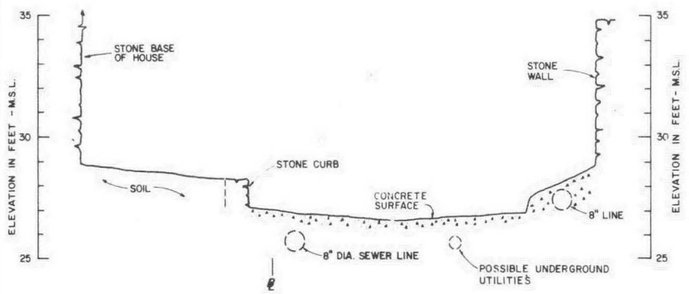
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C
CULVERT CROSS SECTIONS

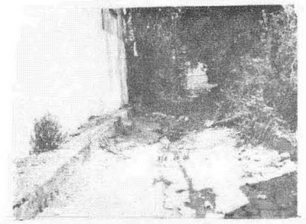
STATIONS 18+40 AND 18+92

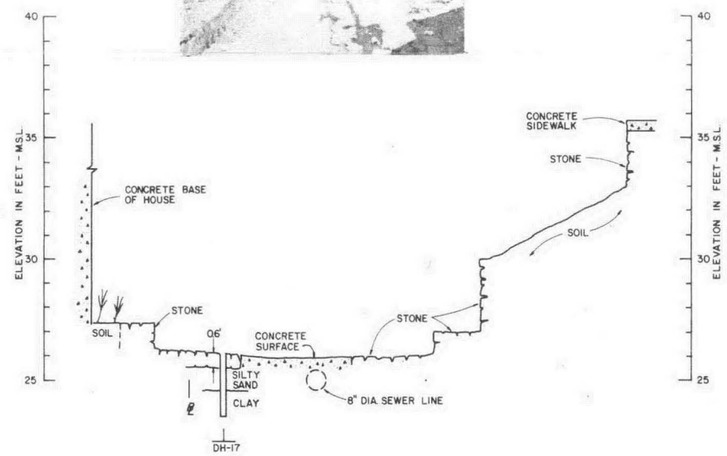
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451

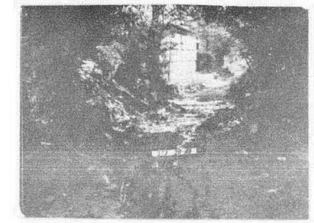


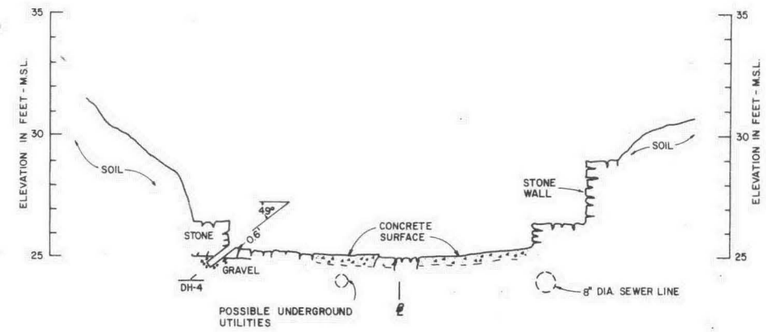
STA. 19+47



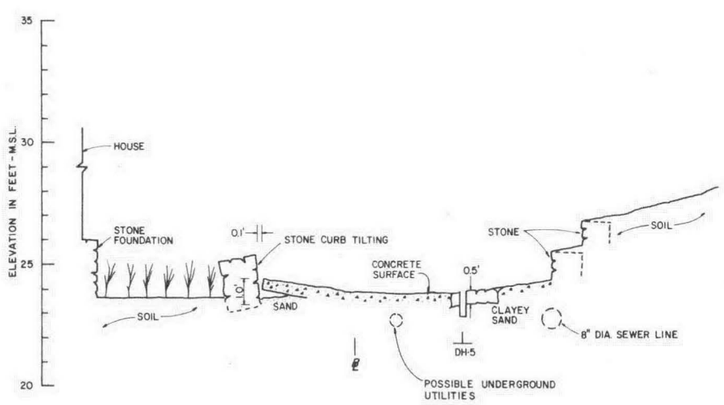


STA. 20+05

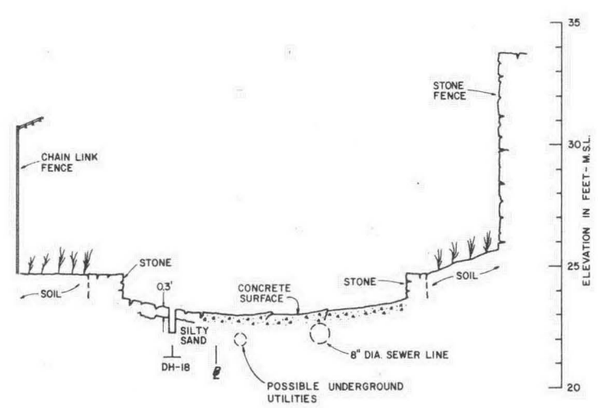




STA. 20+48



STA. 20+94



STA. 21+47

NOTE: CROSS SECTION LOCATIONS SHOWN ON PLATE C-14.

5' 4' 3' 2' 1' 0 5'

GRAPHIC SCALE

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

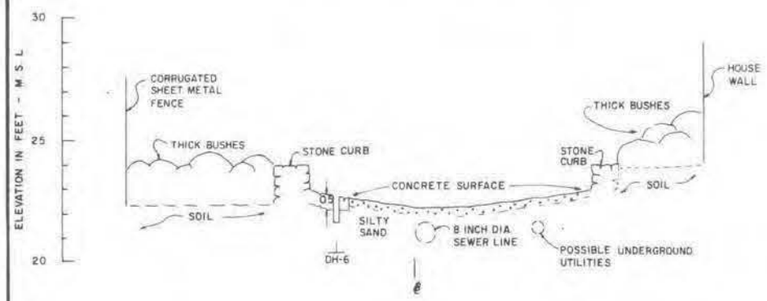
APPENDIX C

CULVERT CROSS SECTIONS

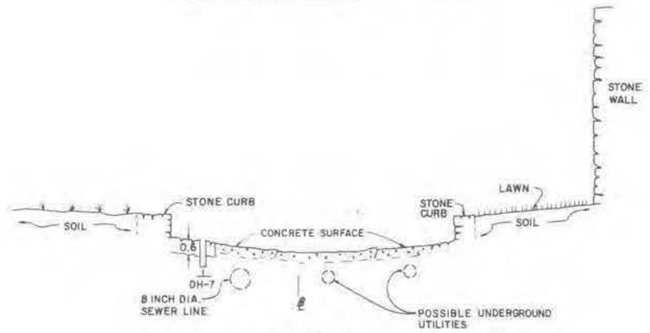
STATIONS 19+47, 20+05, 20+48
20+94 AND 21+47

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

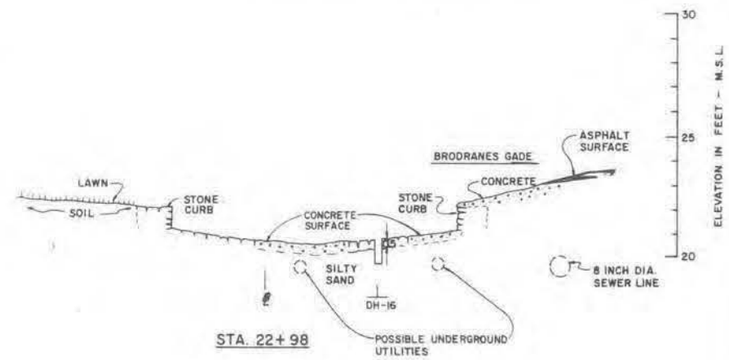
FILE NO. 105-33,451



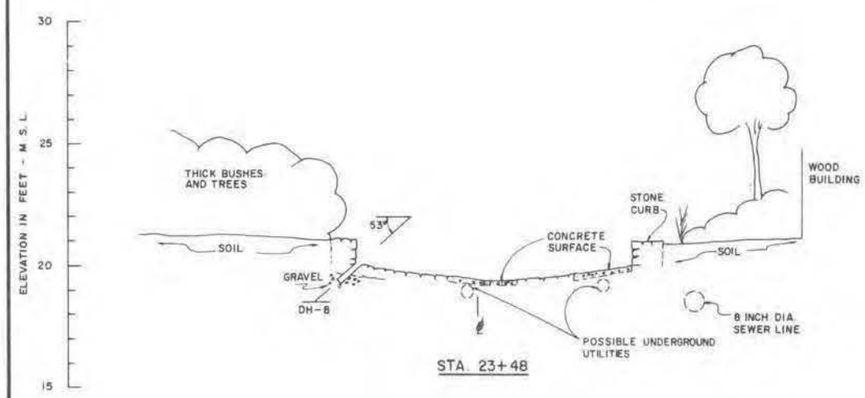
STA. 21+97



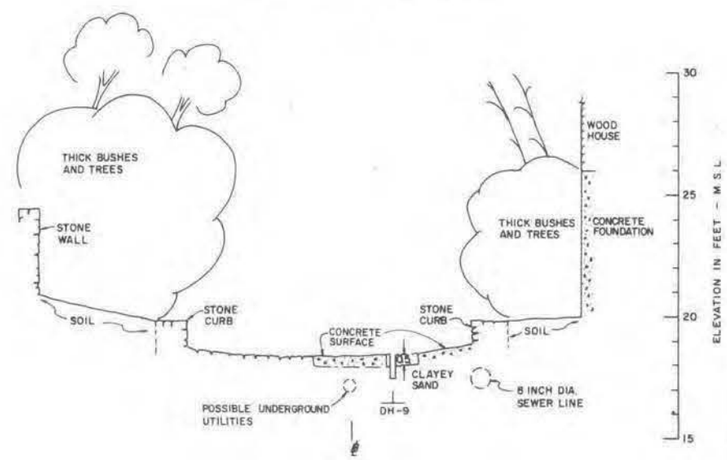
STA. 22+46



STA. 22+98



STA. 23+48



STA. 23+98

NOTE: CROSS SECTION LOCATIONS SHOWN ON PLATE C-14.

5' 4' 3' 2' 1' 0 5'

GRAPHIC SCALE

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS

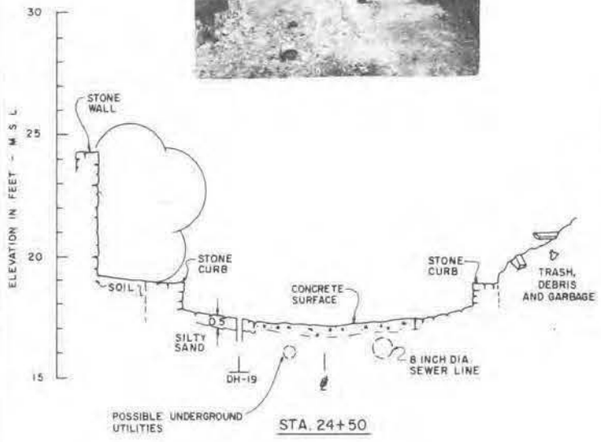
SAVAN GUT

APPENDIX C

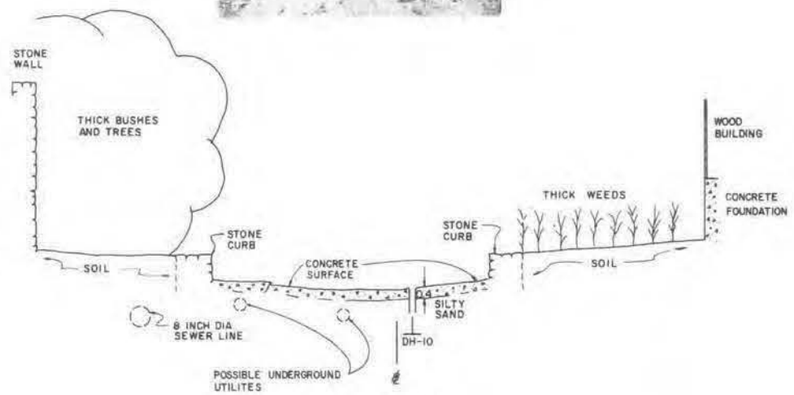
CULVERT CROSS SECTIONS
STATIONS 21+97, 22+46, 22+98
23+48 AND 23+98

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

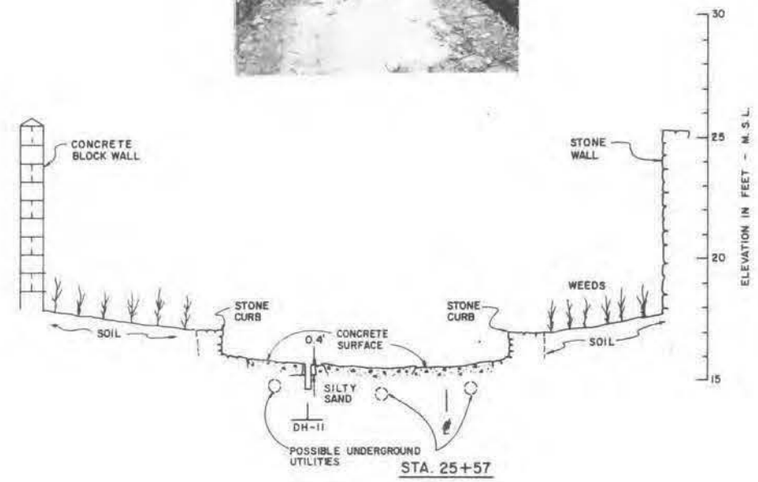
FILE NO. 105-33,451



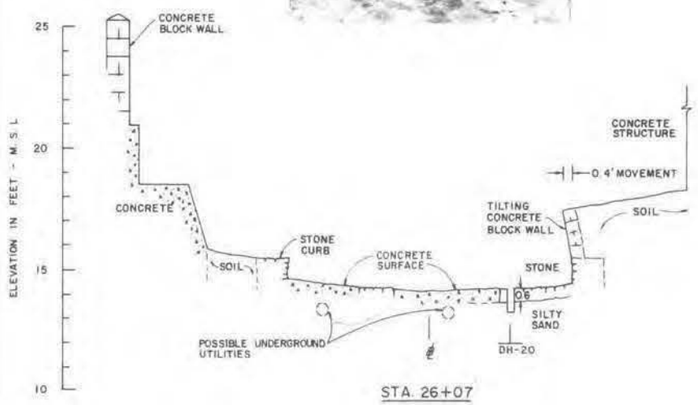
STA. 24+50



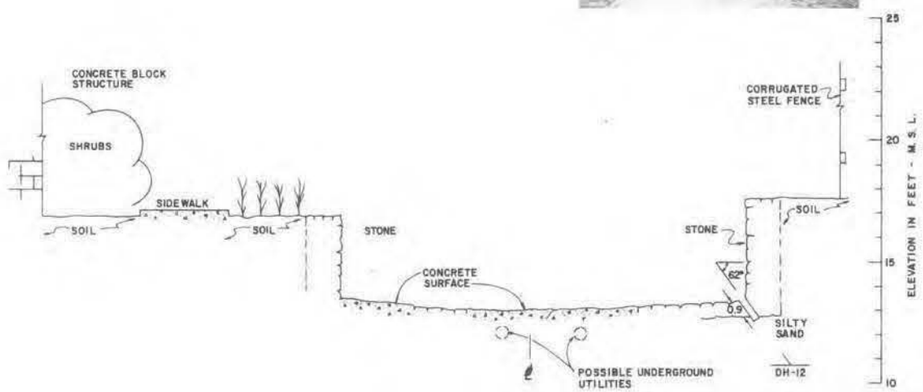
STA. 25+06



STA. 25+57



STA. 26+07



STA. 26+64

NOTE: CROSS SECTION LOCATIONS SHOWN ON PLATE C-14.

5 4 3 2 1 0 5

GRAPHIC SCALE

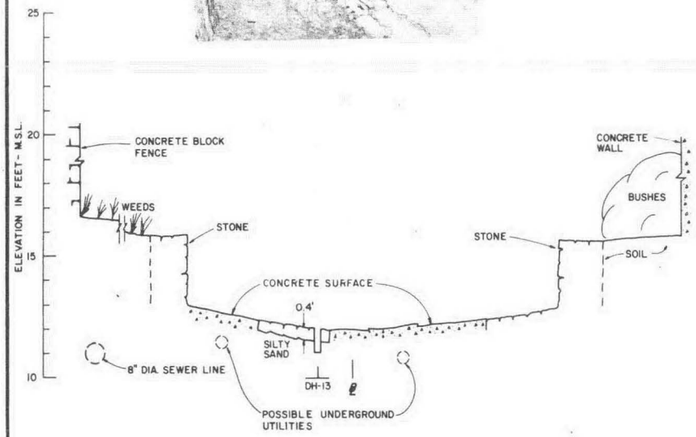
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

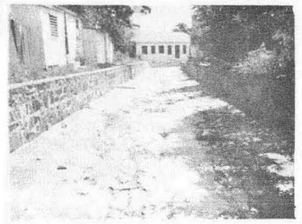
CULVERT CROSS SECTIONS
STATIONS 24+50, 25+06, 25+57
26+07 AND 26+64

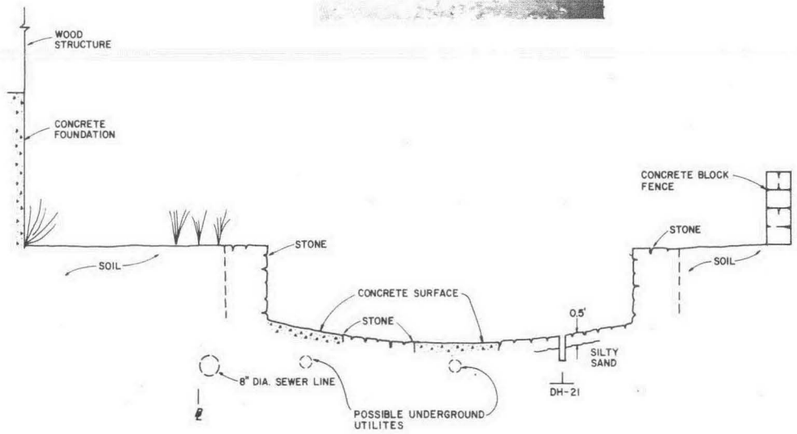
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451

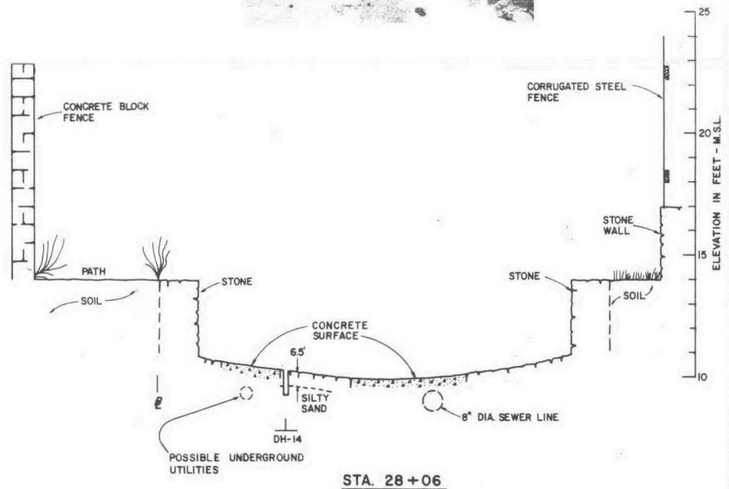


STA. 27+06

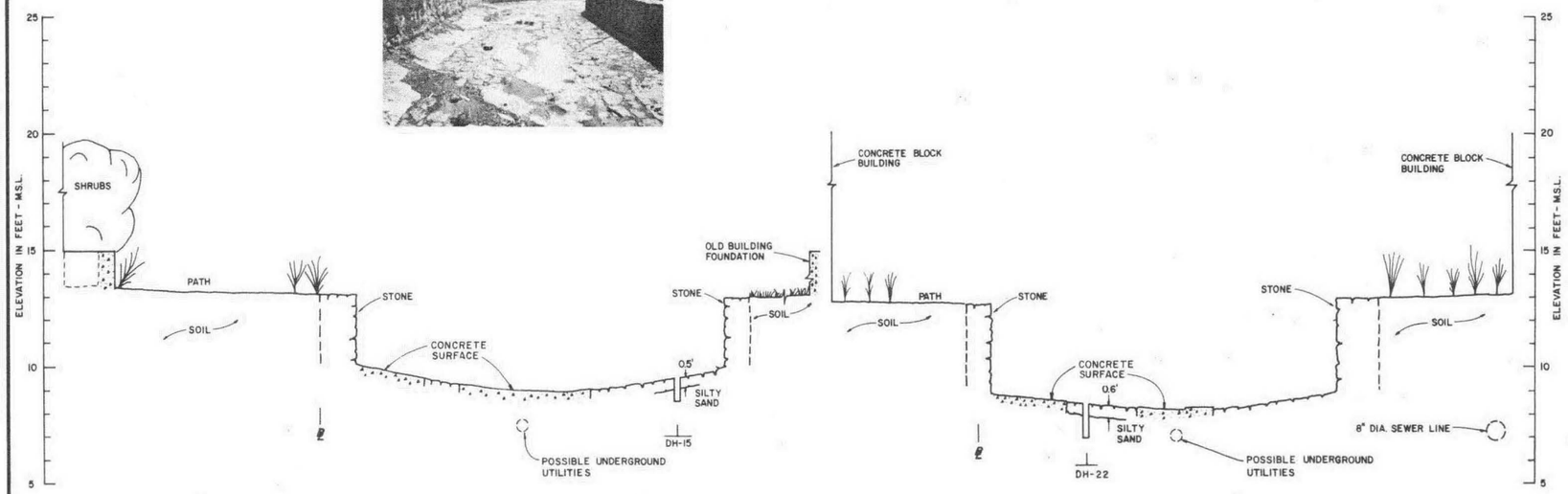




STA. 27+57



STA. 28+06



STA. 28+57

STA. 29+07

NOTE: CROSS SECTION LOCATIONS SHOWN ON PLATE C-14.

5' 4' 3' 2' 1' 0 5'

GRAPHIC SCALE

SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT

APPENDIX C

CULVERT CROSS SECTIONS
STATIONS 27+06, 27+57, 28+06
28+57 AND 29+07

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

FILE NO. 105-33,451

Hole No. CB-SG-1

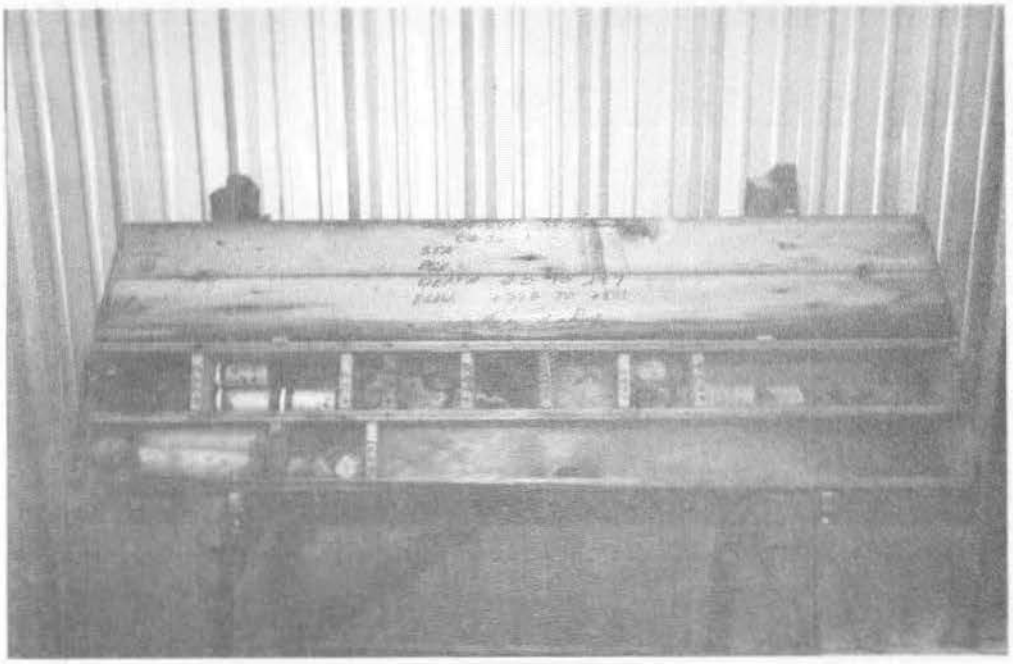
DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,018,653 (scaled) Y=188,971	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-1	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 20 Aug 80 — COMPLETED 22 Aug 80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +77.8
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 57 %
9. TOTAL DEPTH OF HOLE 20.7 ft.	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+77.8	0.0					+77.8 Blows/0.5 Ft.
+77.5	0.3		ASPHALT, road	83		+77.2 DIAMOND 4x5-1/2 DT 7 min HP 100 psi
+77.2	0.6		GRAVEL-COBBLE STONES-SAND -Base Coarse-	93	1	SPLIT SPOON 19 21 24
			CLAY, lean, low plasticity, well consolidated with many rock fragments, reddish-brown (CL)			+75.7
				80	2	" " 38 77 36
						+74.2
				67	3	" " 28 20 21
						+72.7
+71.7	6.1			60	4	+71.7 " " 45 91
+71.3	6.5		TUFFACEOUS BRECCIA, hard, light gray - BOULDERS - from +71.7 to +71.3	21		DIAMOND NX DT 17 min HP 100 psi
+70.2	7.6			0		+70.3 58/0.1 +70.2 SPLIT SPOON
				41		DIAMOND NX DT 47 min HP 100 psi
						+68.0
+67.6	10.2			60		DIAMOND NX DT 21 min HP 100 psi
						+67.0
+66.5	11.3			40	5	+66.5 SPLIT SPOON 75
			TUFFACEOUS BRECCIA, very hard, light gray	31		DIAMOND NX DT 38 min HP 100 psi
						+63.6
				89		DIAMOND NX DT 21 min HP 100 psi
						+61.8
				55		DIAMOND NX DT 57 min HP 100 psi
			CLAY seam +58.0/+57.8			+57.8
+57.1	20.7			0		+57.8 SPLIT SPOON 50/0.0 +57.1 DIAMOND NX DT 18 min HP 100 psi

NOTES:
1. Set NX casing to +67.0
2. 100% water loss between +62.0 to +61.8
3. Grouted hole with cement upon completion.

140# Hammer with 30" drop used on 2.0' split spoon (1-3/8" I.D. x 2.0" O.D.)



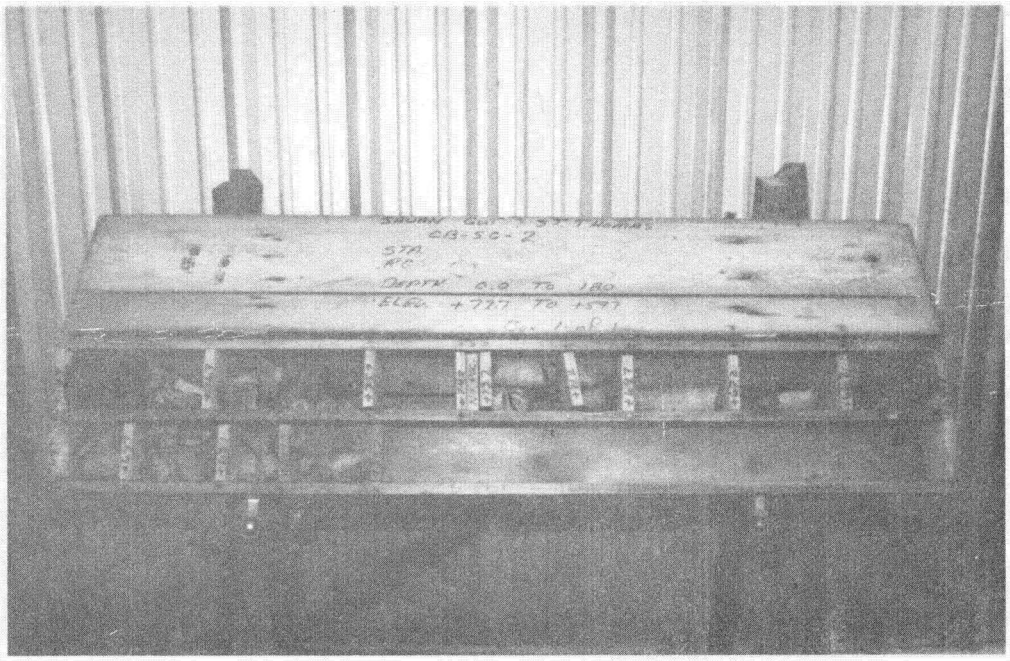
CB-SG-1
Box 1, from elevation +77.8 to +57.1

Hole No. CB-SG-2

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT Savan Gut, St. Thomas, V.I.	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,018,653 Y-188,954 (scaled)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-2	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +65.7
	16. DATE HOLE: STARTED 8-22-80 / COMPLETED 8-25-80
7. THICKNESS OF OVERBURDEN —	17. ELEVATION TOP OF HOLE +77.7
8. DEPTH DRILLED INTO ROCK —	18. TOTAL CORE RECOVERY FOR BORING 45 %
9. TOTAL DEPTH OF HOLE 18.0	19. SIGNATURE OF INSPECTOR GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+77.7	0.0					+77.7 BLOWS PER 0.5 FEET
+77.3	0.4		ASPHALT, ROAD	80		D.T. 18 min
			GRAVEL, cobblestone, sand, base coarse			+76.7 4x5-1/2 Diamond
+75.7	2.0			80		D.T. 17 min. +75.7 4x5-1/2 Diamond
			CLAY, lean, low plasticity, well-consolidated, with many rock fragments, brown (CL)	67	1	Split Spoon 23 25 26 +74.2
+73.7	4.0			0		+73.7 Split Spoon 67
			TUFFACEOUS BRECCIA, very hard, light gray, highly stained along the many joints and fractures. Some clay seams.	60		D.T. 26 min. NX Diamond HP 100 psi +71.2
				33		D.T. 18 min NX Diamond HP 100 psi +69.7
				20		D.T. 18 min NX Diamond HP 100 psi +67.2
				70		DT 16 min NX Diamond +66.2
				47		DT 23 min NX Diamond +64.7 HP 100 psi
				50		DT 18 min +63.7 NX Diamond
				38		DT 31 min NX Diamond +62.1 HP 100 psi
				40		DT 16 min NX Diamond +61.1
+59.7	18.0			50		DT 22 min NX Diamond HP 100 psi +59.7
			NOTE: 1. Set NX casing to +73.7 2. No noticeable water loss 3. Grouted hole with cement upon completion 4. H.P. 100 p.s.i. was used throughout coring.			140# Hammer with 30" drop used on 2.0' Split Spoon (1-3/8" I.D. x 2" O.D.)



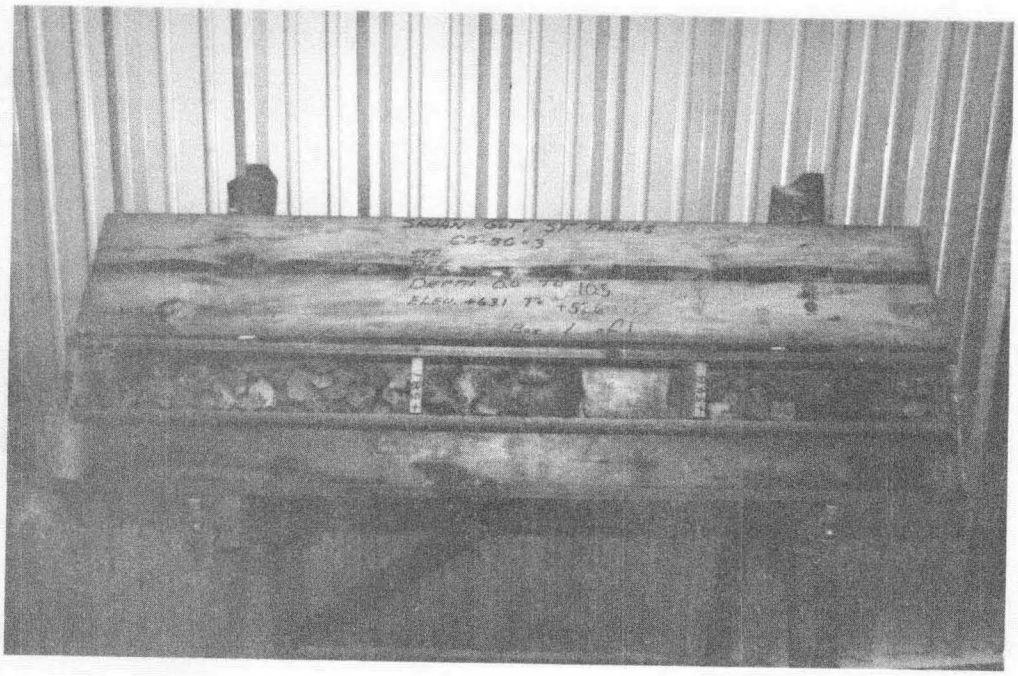
CB-SG-2
Box 1, from elevation +77.7 to +59.7

Hole No. CB-SG-3

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT SAVAN GUT, St. Thomas, VI	10. SIZE AND TYPE OF BIT SEE REMARKS
2. LOCATION (Coordinates or Station) X=1,018,915 Y=180,693 (Scaled)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 9-8-80 — COMPLETED 9-10-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +63.1
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 45 %
9. TOTAL DEPTH OF HOLE +63.1	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+63.1	0.0					+63.1
			CLAYEY SAND with mixture of gravel, cobble stone and field stone size rock fragments, well consolidated. Brown.	38		DT 42 min 6" casing HP 100 psi +58.1
				48		DT 1 hour 4x5-1/2 Diamond HP 100 psi +54.8
				55		DT 2 hours 4x5-1/2 Diamond HP 100 psi
+52.6	10.5					+52.6
			NOTE: 1. 6" casing set to +58.1. 2. Backfilled hole upon completion.			



CB-SG-3
Box 1, from elevation +63.1 to +52.6

Hole No. CB-SG-4

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, V.I.	10. SIZE AND TYPE OF BIT SEE REMARKS
2. LOCATION (Coordinates or Station) X=1,018,943 Y=188,599 (Scaled)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-4	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 2
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER Not Observed
	16. DATE HOLE: STARTED 9-2-80; COMPLETED 9-5-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +50.0
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 67 %
9. TOTAL DEPTH OF HOLE 23.1'	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+50.0	0.0					BIT OR BARREL BLOWS PER 0.5 FT. +50.0
+49.5	0.5		CONCRETE, ROAD	60		DT 37 min. 4x5-1/2 Diamond HP 100 psi
+48.0	2.0		GRAVEL-Cobble Stone - Base Coarse			+48.0
+46.5	3.5		SAND, silty, with rock fragments, brown (SM)	27	1	Split Spoon 1-3/8x2 14 30 34 +46.5
+45.9	4.1		CLAY, fat, medium stiff, high plasticity, contains many hard rock fragments. Reddish-brown (CH)	40		DT 28 min 4x5-1/2 Diamond HP 100 psi
+45.0	5.0					+45.0
+44.1	5.8			40		DT 54 min 4x5-1/2 Diamond HP 100 psi
+43.0	7.0					+43.0
+42.6	7.4		Many very hard, tuffaceous boulders scattered throughout clay.	20		DT 47 min 4x5-1/2 Diamond HP 100 psi
						+41.0
+40.3	9.7			60		DT 21 min 4x5-1/2 Diamond
						+40.0
				100		DT 1 hr 16 min 4x5-1/2 Diamond HP 100 psi
						+37.0
				100		DT 17 min 4x5-1/2 Diamond HP 100 psi
+34.8	15.2					+34.8
				100		DT 46 min 4x5-1/2 Diamond HP 100 psi
						+33.4

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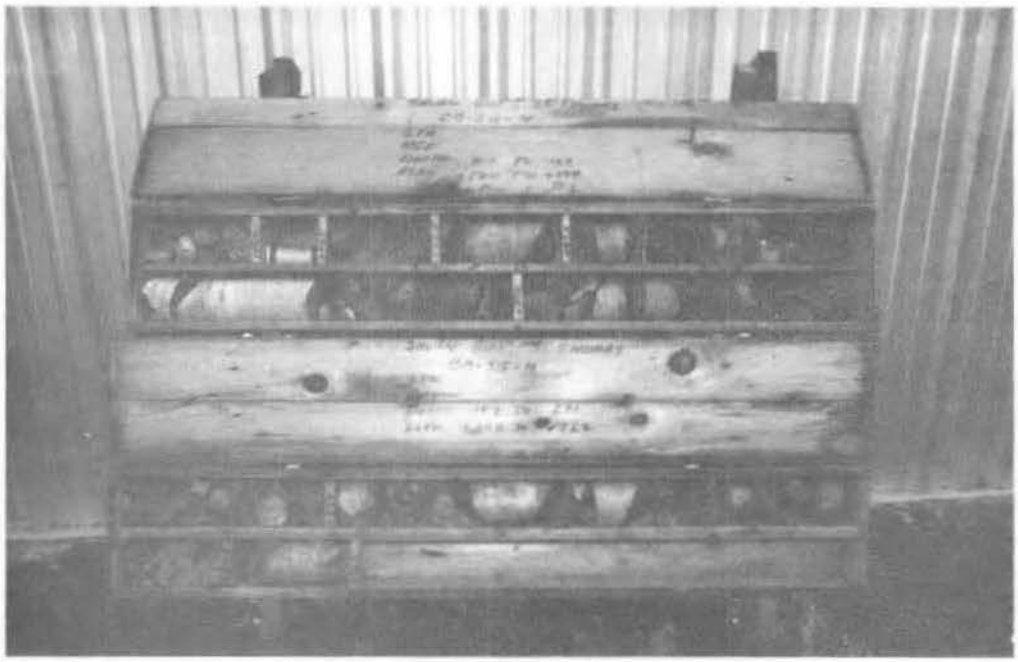
PROJECT SAVAN GUT, ST. THOMAS, VI | HOLE NO. CB-SG-4

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE +50.0 **Hole No.** CB-SG-4

PROJECT Savan Gut, St. Thomas, V.I. | INSTALLATION Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						+33.4
			CLAYEY GRAVEL, with many cobble stone and field stone size rock fragments. Reddish brown (GC)	86		DT 1 hr. 18 min. 4x5-1/2 Diamond HP 100 psi +30.5
+29.5	20.5			65		DT 59 min. 4x5-1/2 Diamond HP 100 psi +27.9
			TUFFACEOUS BRECCIA, hard, weathered, light brown			
+26.9	23.1			70		DT 31 min. 4x5-1/2 Diamond +26.9
			NOTE: 1. Set 6" casing to +40.0 2. Grouted hole with concrete upon completion.			140# Hammer with 30" drop used on 2.0' split spoon 1-3/8" I.D. x 2" O.D.



CB-SG-4
Box 1, from elevation +50.0 to +34.8
Box 2, from elevation +34.8 to +26.9

Hole No. CB-SG-5

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,018,842 (Scaled) Y=188,636	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-5	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE — STARTED 8-28-80 — COMPLETED 8-28-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +54.0'
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 64 %
9. TOTAL DEPTH OF HOLE 19.8 ft.	19. ~~TOTAL NUMBER OF CORE BOXES~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	~~TYPE OF~~ SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+54.0	0.0					+54.0 Blows/0.5 Ft.
+52.5	1.5		CLAY, lean, with rock fragments, well consolidated, brown (CL)	47	1	SPLIT SPOON 23 29 20 +52.5
+48.0	6.0		TUFFACEOUS BRECCIA, very hard, light gray -BOULDER-	82		DIAMOND 4 x 5-1/2 DT 1 hr. 43 min HP 100 psi +48.0
+45.3	8.7		CLAY, fat, medium stiff, high plasticity, contains many hard rock fragments, reddish-brown (CH)	0		DIAMOND 4x5-1/2 DT 6min +47.5 HP 100 psi
				47	2	SPLIT SPOON 6 15 49 57 +46.0
				71	3	+45.3 " " 50/0.2
+40.2	13.8		TUFFACEOUS BRECCIA, very hard, stained along the many joints and fractures, some clay seams, light gray - BOULDERS -	80		DIAMOND 4x5-1/2 DT36min +44.3 HP 100 psi
				80		DIAMOND 4x5-1/2 DT28min +43.3 HP 100 psi
				100		DIAMOND 4x5-1/2 DT13min +42.3 HP 100 psi
+38.8	15.2			60		DIAMOND 4x5-1/2 DT 42 min HP 100 psi +38.8
+37.4	16.6			70		DIAMOND 4x5-1/2 DT 46 min HP 100 psi +36.8
+36.7	17.3			70		NX DIAMOND +35.8 DT 18min HP 100psi
+34.2	19.8			19		NX DIAMOND DT 31 min HP 100 psi +34.2
			NOTES: 1. Set 6-inch casing to +46.9 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)

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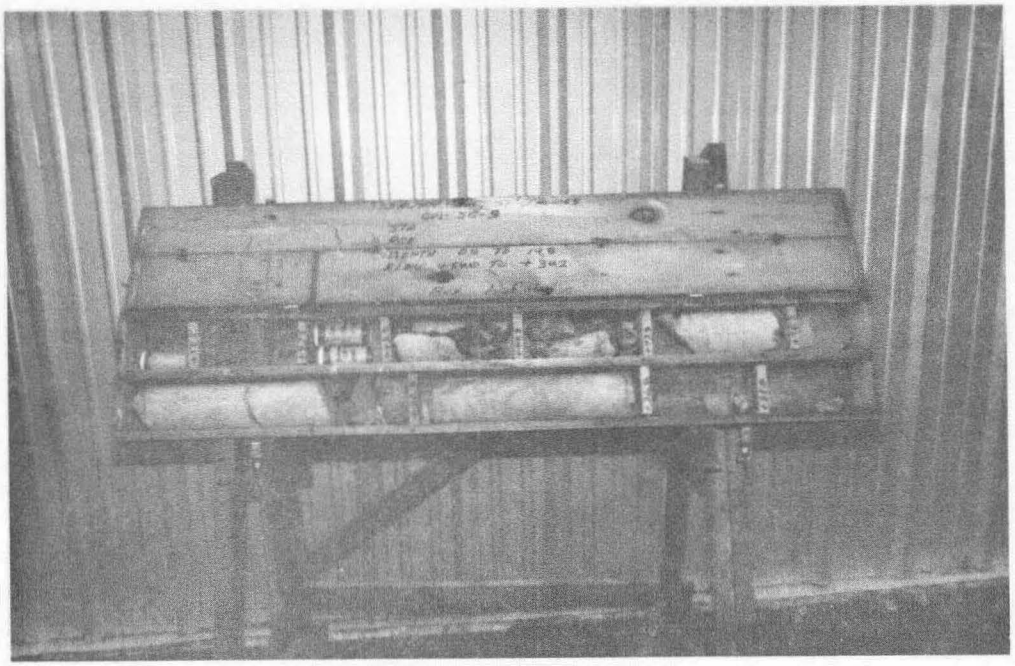
PLATE C-28

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-5



CB-SG-5
Box 1, from elevation +54.0 to +34.2

Hole No. CB-SG-8

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X-1,019,024 (scaled) Y=188,658	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-8	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 2
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER Not observed
	16. DATE HOLE: STARTED 9-11-80 / COMPLETED 9-18-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +61.9
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 66 %
9. TOTAL DEPTH OF HOLE 29.3'	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+61.9	0.0					+61.9 Blows/0.5 Ft.
+61.7	0.2		ASPHALT ROAD			DIAMOND 4X5-1/2 DT 82 min HP 100 psi
			CLAYEY SAND, with mixture of gravel, cobblestone and field stone size rock fragments, well consolidated, brown	42		
+56.9	5.0					+56.9
			CLAY, lean, medium stiff low plasticity, with many small rock lenses, reddish brown (CL)	87	1	SPLIT SPOON 9 3 3
						+55.4
				87	2	" 8 13 14
						+53.9
				53	3	" 8 7 5
						+52.4
				42	4	" 6 6 9
						+50.9
				47	5	" 7 12 32
						+49.4
				42	6	" 20 16 14
						+47.9
				42	7	" 10 12 15
						+46.4
				67	8	" 12 9 16
						+44.9
				40	9	" 13 15 18
						+43.4

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE +61.9 **Hole No.** CB-SG-8

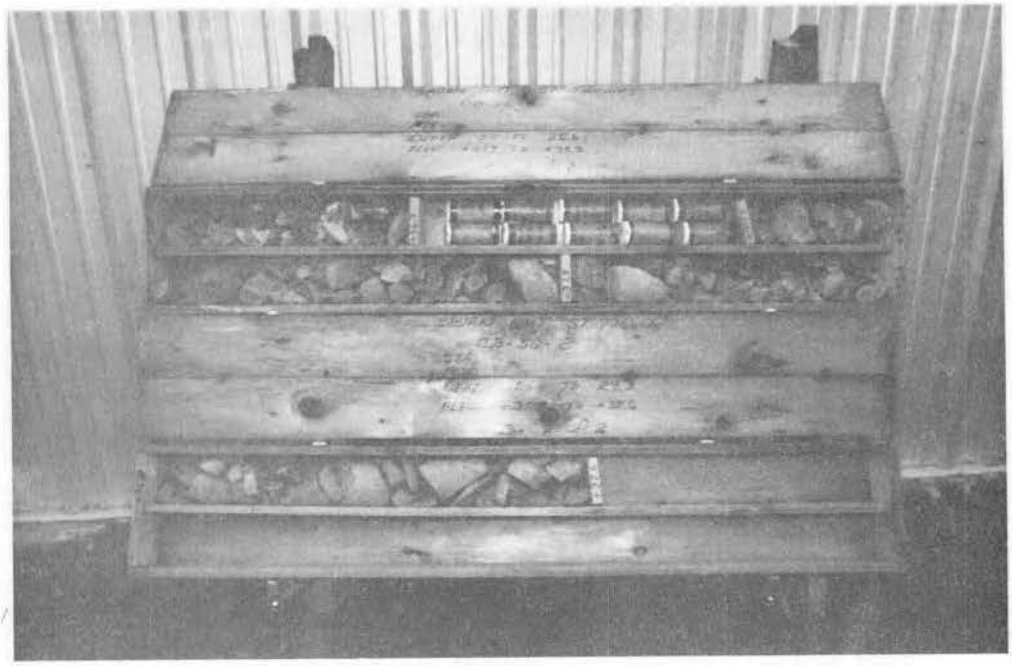
PROJECT Savan Gut, St. Thomas, Virgin Isl. INSTALLATION Jacksonville District SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						+43.4 Blows/0.5 Ft.
				73	10	SPLIT SPOON 18 15 14
						+41.9
				0		" 4 507.3
+41.1	20.8					+41.1
+40.1	21.8		TUFFACEOUS BRECCIA, very hard, light gray - Boulder -	100		DIAMOND 4x5-1/2 DT 31 min HP 100 psi +40.1
			Hard, with medium hard zones, badly broken and fractured, highly stained along fractures, weathered brown and gray, from +40.1 to +32.6	100		DIAMOND 4x5-1/2 DT 1 hour HP 100 psi +37.3
				100		DIAMOND 4x5-1/2 DT 38 min HP 100 psi +35.3
				100		DIAMOND 4x5-1/2 DT 58 min HP 100 psi
+32.6	29.3					+32.6
			NOTES: 1. Set 6" casing to +41.9 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)

ENG FORM 1836-A JUN 67

PLATE C-31

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-8



CB-SG-8
Box 1, from elevation +61.9 to +35.3
Box 2, from elevation +35.3 to +32.6

Hole No. CB-SG-9

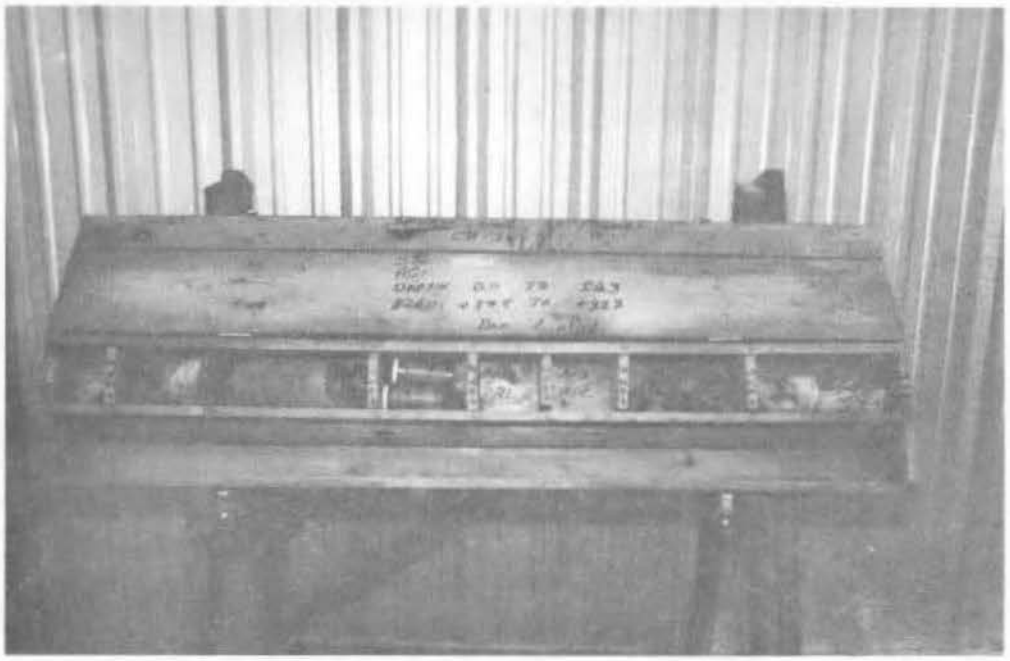
DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,059 (scaled) Y=188,639	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER Not observed
	16. DATE HOLE — STARTED 10-07-80 — COMPLETED 10-10-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +59.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 16 %
9. TOTAL DEPTH OF HOLE 26.3 Ft.	19. SIGNATURE OF INSPECTOR GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+59.5	0.0					+59.5 Blows/0.5 Ft.
			CLAYEY GRAVEL, GRAVEL-SAND-CLAY mixture, reddish brown (GC)	6		DIAMOND 4X5-1/2 DT 1 Hr HP 100 psi +54.5
+53.0	6.7			25		DIAMOND 4X5-1/2 DT 47 min HP 100 psi +52.5
			TUFFACEOUS BRECCIA, hard, light gray, from +53.0 to +49.5	30		DIAMOND 4X5-1/2 DT 1 Hr HP 100 psi
+49.5	10.0					+49.5
			CLAY, lean, medium stiff, low plasticity, many small rock fragments, reddish brown (CL)	40	1	SPLIT SPOON 7 8 13 +48.0
+46.5	13.0			47	2	SPLIT SPOON 20 20 17 +46.5
			CLAYEY GRAVEL, GRAVEL-SAND-CLAY mixture, with many cobble stone and field stone size fragments, reddish brown (GC)	0		DIAMOND 4X5-1/2 DT 52 min HP 100 psi +44.5
				0		DIAMOND 4X5-1/2 DT 39 min HP 100 psi +42.5

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE +59.5	Hole No. CB-SG-9
PROJECT Savan Gut, St. Thomas, V. I.	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						+42.5
				10		DIAMOND 4X5-1/2 DT 1 Hr 10 Min HP 100 psi
						+37.5
				16		DIAMOND 4X5-1/2 DT 1 Hr 47 Min HP 100 psi
+35.9	23.6					
			TUFFACEOUS BRECCIA, hard with medium hard zones, broken and fractured, light green and gray			
+33.5	26.2					+33.5
			NOTES: 1. Set 6-inch casing to +59.5. 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon (1-3/8" I.D. X 2" O.D.)



CB-SG-9
Box 1, from elevation +59.5 to +33.2

Hole No. CB-SG-13

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1 SHEETS

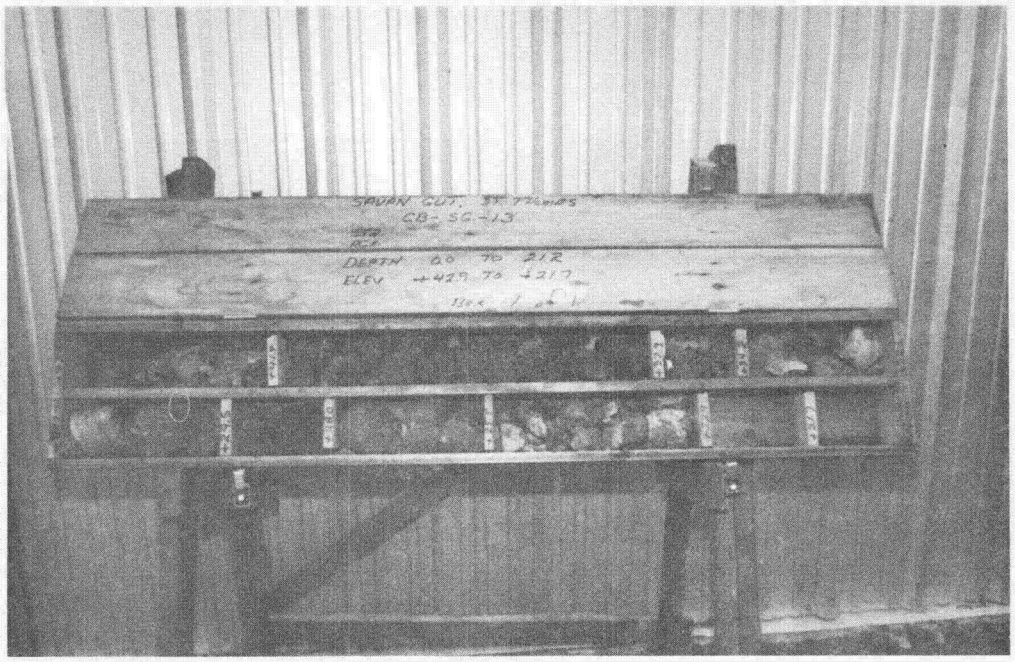
1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,132 Scaled Y=188,658	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-13	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED: —
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER Not observed
	16. DATE HOLE — STARTED 22 Sep 80 — COMPLETED 25 Sep 80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +42.9
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 51 %
9. TOTAL DEPTH OF HOLE 21.2 ft.	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	~~BOX~~ SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+42.9	0.0					BIT OR BARREL +42.9 Blows/0.5 Ft.
			CLAYEY GRAVEL, gravel-sand-clay mixture, clay is fat, high plasticity, medium stiff, reddish brown (GC)	80		DIAMOND 4X5-1/2 DT 10 min HP 100 psi +41.4
+37.4	4.5			66		DIAMOND 4X5-1/2 DT 21 min HP 100 psi 6" Casing to +37.9 +37.9
			CLAY, lean, low to medium plasticity, many small rock lenses, medium stiff, reddish brown (CL)	0		DIAMOND 4X5-1/2 DT 26 minHP100psi +36.4
				93	1	SPLIT SPOON 1 6 7 +34.9
+34.2	8.7			100	2	" 10 +34.2 50/0.2'
			CLAYEY GRAVEL, with many cobblestone and field stone size rock fragments, reddish brown (GC)	62		DIAMOND 4X5-1/2 DT 47 min HP 100 psi +32.1
				35		DIAMOND 4X5-1/2 DT 56 min HP 1-0 psi +29.5
				80	3	SPLIT SPOON 8 46 37 +28.0
				32		DIAMOND 4X5-1/2 DT 47 min HP 100 psi +25.5
			CLAY, light gray in color from +25.5 to +21.7	38		DIAMOND 4X5-1/2 DT 56 min HP 100 psi +22.9
+21.7	21.2			0		DIAMOND 4X5-1/2 DT 41 min HP 100 psi +21.7
			NOTES: 1. Set 6" casing to 2. Grouted hole with cement upon completion			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBS

PLATE C-36

PROJECT Savan Gut St Thomas V I — HOLE NO. CB-SG-13



CB-SG-13
Box 1, from elevation +42.9 to +21.7

Hole No. CB-SG-14

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,158 (Scaled) Y=188,367	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-14	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER J. Detloff	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER Not observed
	16. DATE HOLE: STARTED 9-29-80 / COMPLETED 10-03-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +42.1
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 15 %
9. TOTAL DEPTH OF HOLE 32.0 ft.	19. SIGNATURE OF INSPECTOR GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+42.1	0.0					+42.1
			CLAYEY GRAVEL, GRAVEL-SAND-CLAY mixture, clay is fat, high plasticity, medium stiff	0		DIAMOND 4X5-1/2 DT 37 min HP 100 psi
			reddish brown (GC) contains cobble stone and field stone size rock fragments from "37.1 to +10.1			+39.6
				0		DIAMOND 4X5-1/2 DT 42 min HP 100 psi
+37.1	5.0					+37.1
				0		DIAMOND 4X5-1/2 DT 52 min HP 100 psi
						+34.9
				20		DIAMOND 4X5-1/2 DT 1 Hr 21 min HP 100 psi
						+31.9
				0		DIAMOND 4X5-1/2 DT 2 Hrs HP 100 psi
						+27.9
				69		DIAMOND 4X5-1/2 DT 47 min HP 100 psi
						+26.3
				42		DT 51 min HP 100 psi DIAMOND 4X5-1/2
						+25.1

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +42.1 | **Hole No.** CB-SG-14

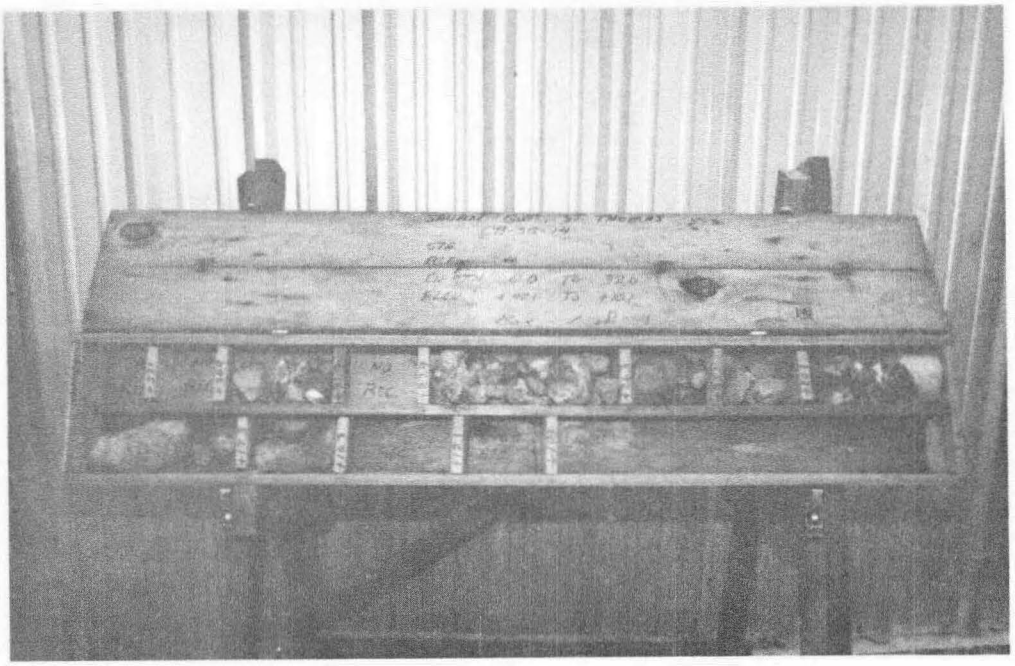
PROJECT: Savan Gut, St. Thomas, V.I. | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL +25.1
			CLAYEY GRAVEL	10		DIAMOND 4X5-1/2 DT 2 Hrs HP 100 psi +20.1
				61		DIAMOND 4X5-1/2 DT 1 Hr 37 min HP 100 psi +17.3
				50		DT 38 min HP 100 psi DIAMOND 4X5-1/2 +16.3
				0		DIAMOND 4X5-1/2 DT 1 Hr HP 100 psi +12.1
10.1	32.0			0		DT 42 min HP 100 psi DIAMOND 4X5-1/2 +10.1

NOTES:

1. Set 6-inch casing to +20.1.

2. Grouted hole with cement upon completion.



CB-SG-14
Box 1, from elevation +42.1 to +10.1

Hole No. CB-SG-16

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT: See remarks
2. LOCATION (Coordinates or Station): X=1,019245 (scaled) Y=188,194	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number): CB-SG-16	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER: J. Detloff	14. TOTAL NUMBER CORE BOXES: 1
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: +15.0
	16. DATE HOLE: STARTED 8-18-80 / COMPLETED 8-19-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE: +35.5
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 34 %
9. TOTAL DEPTH OF HOLE: 30.0 ft.	19. ~~MANUFACTURER'S NAME & TYPE~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+35.5	0.0					+35.5 Blows/0.5 Ft.
+35.1	0.4		CONCRETE ROAD			DIAMOND 4x5-1/2
+34.7	0.8		GRAVEL and COBBLE STONE - Base Coarse	88		+34.7
			- FILL MATERIAL - silty sands, gravel, broken glass and bottles, some clay, color gray, from dark brown to reddish-brown	67	1	SPLIT SPOON 6 9 8 +33.2
				67	2	" " 4 3 3 +31.7
				60	3	" " 3 10 26 +30.2
+29.7	5.8			0	4	+29.7 " " 50
			TUFFACEOUS BRECCIA, hard boulders in clay, gray	17		NX DIAMOND DT 52 min HP 100 psi
+27.3	8.3					+27.3
			CLAYEY GRAVELS, gravel, sand, clay mixture (GC)	60	5	SPLIT SPOON 31 52 62
+25.8	9.7					+25.8
			CLAY, fat, stiff, high plasticity, contains many small hard fragments, reddish brown (CH)	13	6	" " 20 18 31 +24.3
				20	7	" " 26 28 19 +22.8
				0		" " 10 20 27
+21.3	14.2					+21.3
			CLAY, lean, low plasticity, well consolidated, with rock fragments, brown (CL)	50	8	" " 50 0.1 +20.7
				0		NX DIAMOND +19.7 DT 7min HP 100 psi
				50	9	+19.5 SPLIT SPOON 100
				13		0.2 NX DIAMOND DT 13 min HP 100psi +18.0
				67	10	+17.4 14 100
				50		0.1 NX DIAMOND DT 19min HP 100psi +16.2

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBS

PROJECT: Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-16

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE +35.5 **Hole No.** CB-SG-16

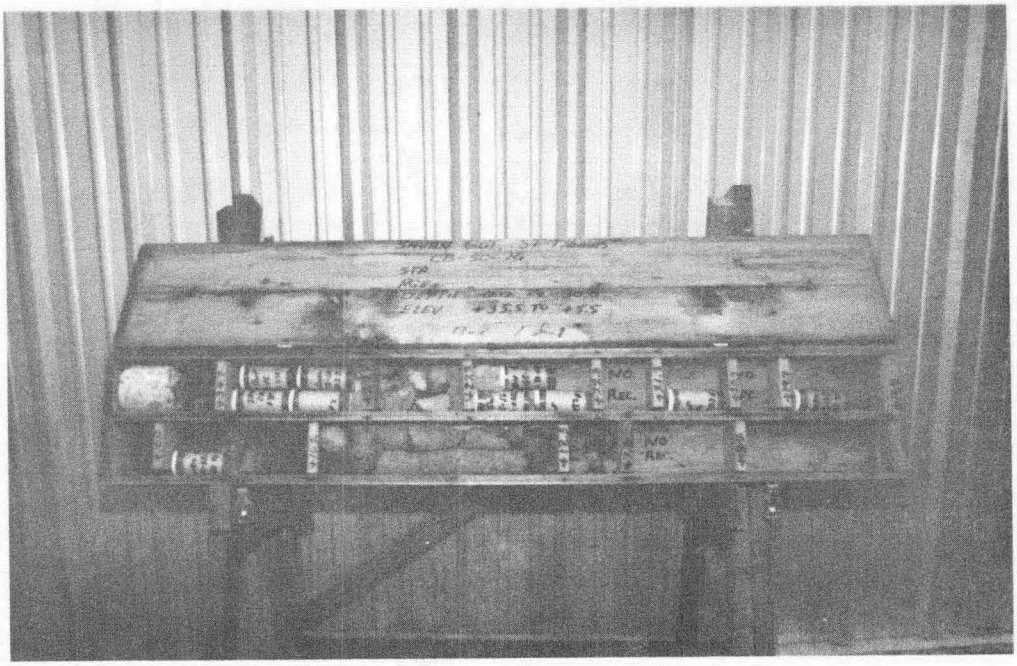
PROJECT Savan Gut, St. Thomas, V.I. INSTALLATION Jacksonville District SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						+16.2
+14.9	20.6		TUFFACEOUS BRECCIA, hard, weathered, highly stained brown from +14.9 to +12.0	76		NX DIAMOND DT 53 min HP 100 psi
						+12.5
+12.0	23.5			4		NX DIAMOND DT 1 hour 12 min HP 100 psi
						+7.5
						SPLIT SPOON 50 0.0
				0		NX DIAMOND DT 16 min HP 100 psi
+ 5.5	30.0					+5.5
			NOTES: 1. Set NX casing to +20.7. 2. No measurable water loss during drilling. 3. Grouted hole upon completion.			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)

ENG FORM 1836-A JUN 67

PLATE C-42

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-16



CB-SG-16
Box 1, from elevation +35.5 to +5.5

Hole No. CB-SG-23

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,628 (Scaled) Y=187,684	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-23	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER B. Randall	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER Not observed
	16. DATE HOLE — STARTED 8-11-30 — COMPLETED 8-13-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +19.9
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 50 %
9. TOTAL DEPTH OF HOLE 30.0 ft.	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+19.9	0.0					BIT OR BARREL +19.9 Blows/0.5 Ft.
+19.4	0.5		CONCRETE, Road			DIAMOND 4 X 5-1/2 DT 21 min HP 100 psi
+17.9	2.0		GRAVEL and COBBLE STONE - Base coarse-	65		+17.9
			SAND, silty, fine to medium grain, with some coarse sands and gravel, brown (SM)	40	1	SPLIT SPOON +16.4 — 4, 4, 4
				40	2	" " +14.9 — 3, 5, 7
				47	3	" " +13.4 — 11, 21, 12
+12.4	7.5			67	4	" " +11.9 — 29, 17, 7
			CLAY, fat, stiff, high plasticity, contains many small hard rock fragments, reddish brown (CH)	80	5	" " +10.4 — 9, 18, 20
				53	6	" " + 8.9 — 15, 16, 28
				47	7	" " + 7.4 — 14, 35, 49
				13	8	" " + 5.9 — 10, 17, 13
				13	9	" " + 4.5 — 5, 14, 8
				20	10	" " + 2.9 — 3, 5, 11
				40	11	" " + 1.4 — 13, 6, 5
				33	12	" " — 7, 39, 66

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE +19.9 ft. **Hole No.** CB-SG-23

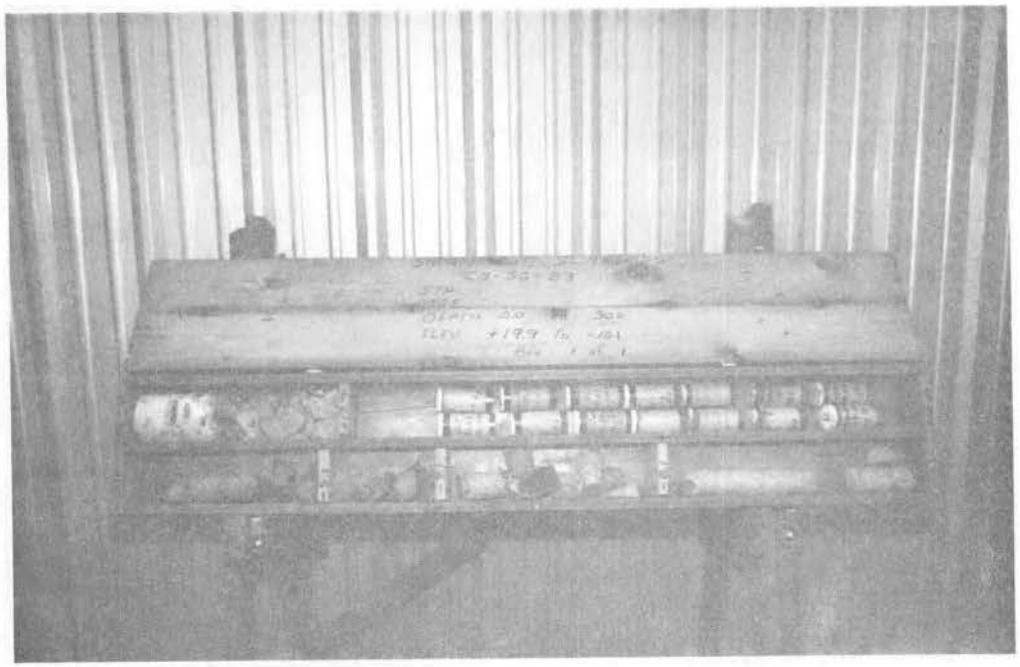
PROJECT Savan Gut, St. Thomas, Virgin Islands INSTALLATION Jacksonville District SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) R
						BIT OR BARREL
						- 0.1 Blows/0.5 Ft.
						SPLIT SPOON 19
				60	13	31
						- 1.6 42
				90	14	" " 20
- 2.6	22.5					- 2.6 116
			TUFFACEOUS BRECCIA, very hard, stained, gray and light gray	48		DIAMOND NX DT 57 min HP 100 psi
						- 5.1
				30		DIAMOND NX DT 53 min HP 100 psi
						- 7.1
				120		DIAMOND NX DT 36 min HP 100 psi
						- 8.1
				80		DIAMOND NX DT 41 min HP 100 psi
-10.1	30.0					-10.1
			NOTES: 1. Set NX casing to -2.1 ft. 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)

ENG FORM 1836-A JUN 67

PLATE C-45

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-23



CB-SG-23
Box 1, from elevation +19.9 to -10.1

Hole No. CB-SG-24

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X =1,019,615 (scaled) Y=187,658	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-24	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ; UNDISTURBED
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1 Box
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +4.2 ft.
	16. DATE HOLE: STARTED 8-5-80; COMPLETED 8-7-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +19.4 ft.
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 44 %
9. TOTAL DEPTH OF HOLE 30.0'	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+19.4	0.0					+19.4 Blows/0.5 Ft.
+19.3	0.1		ASPHALT, ROAD			DIAMOND 4 x 5-1/2 DT 10min HP 100psi
+18.4	1.0		GRAVEL and COBBLE STONE - Base Coarse)	40		+17.9
			SAND, silty, fine to medium grain, with some coarse sands and gravel, brown (SM)	40	1	SPLIT SPOON 4 8 5 +16.4
+14.9	4.5			47	2	" " 2 1 51 +14.9
+12.7	5.7		TUFFACEOUS BRECCIA, very hard, light gray--BOULDERS	60		DIAMOND 4 x 5-1/2 DT 36min HP 100psi +12.9
			CLAY, fat, stiff, high plasticity. Contains many small hard rock fragments, reddish-brown (CH)	47	3	SPLIT SPOON 15 17 25 +11.4
				53	4	" " 36 50 50 + 9.9
				67	5	" " 14 15 42 + 8.4
				53	6	" " 13 16 38 + 6.9
				47	7	" " 8 11 18 + 5.4
			slightly sandy from +5.4 to +2.4	53	8	" " 9 14 19 + 3.9
				53	9	" " 12 20 22 + 2.4
			yellowish in color from +2.4 to -2.1	53	10	" " 14 17 31 + 0.9
				67	11	" " 21 34 55 - 0.6

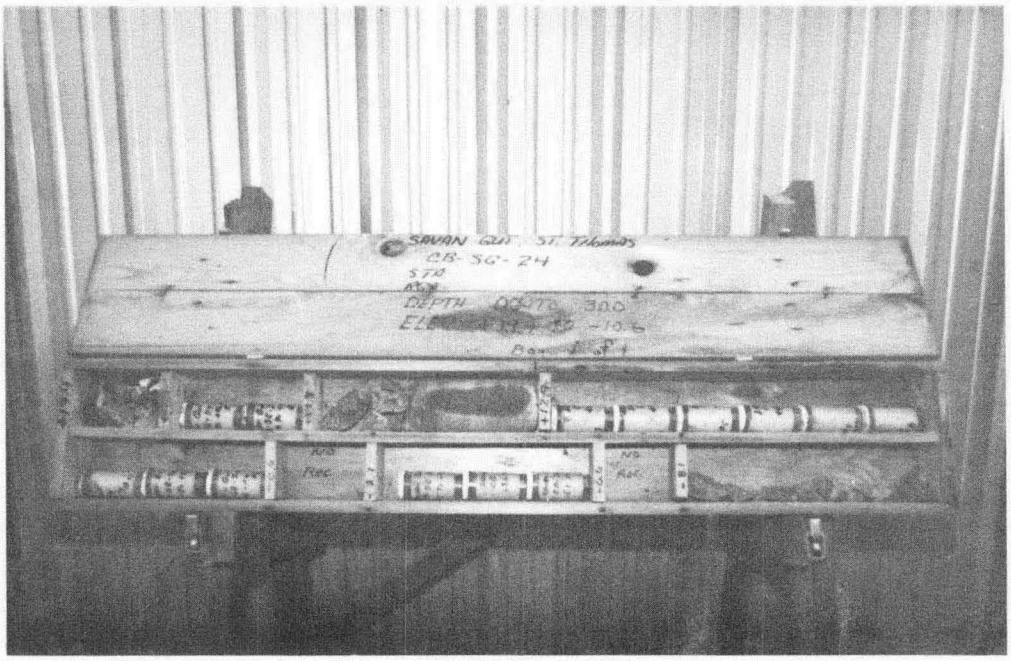
ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE (TRANSLUCENT)

PLATE C-47

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-24

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE +19.4 ft.	Hole No. CB-SG-24
PROJECT Savan Gut, St. Thomas, Virgin Islands	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
- 0.6	20.0					- 0.6 Blows/0.5 Ft.
				0		SPLIT SPOON 13 18 26
						- 2.1
				40	12	" " 12 12 24
						- 3.6
				33	13	" " 11 14 23
						- 5.1
				53	14	" " 8 15 28
						- 6.6
				0		" " 7 16 29
- 8.1	22.5					- 8.1
			TUFFACEOUS BRECCIA, hard, weathered, stained, light gray	0		- 8.2 100/0.5
				36		DIAMOND NX DT 47 min HP 100 psi
-10.6	30.0					-10.6
			NOTES: 1. Set 6" casing to +14.9 Set NX casing to - 8.1 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)



CB-SG-24
Box 1, from elevation +19.4 to -10.6

Hole No. CB-SG-27

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,762 (Scaled) Y=187,469	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-27	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +4.6
	16. DATE HOLE: STARTED 8-1-80 / COMPLETED 8-2-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +13.6
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 40 %
9. TOTAL DEPTH OF HOLE +13.6	19. SIGNATURE OF INSPECTOR XXXXXXXXXXXXXXXXXX GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+13.6	0.0					BIT OR BARREL +13.6 Blows/0.5 Ft.
+13.4 +12.6	0.2 1.0		Asphalt, road Gravel and cobble stone - Base Coarse -	90		DIAMOND 4x5-1/2 +12.6 DT 21min HP 100psi
+11.1	2.5		SAND, slightly silty, fine to medium grain, shelly, light gray (SP)	53	1	SPLIT SPOON +11.1 21 25 18
			SAND, silty, fine to medium grain, with some coarse sands and gravel, brown (SM)	60	2	" " + 9.6 11 12 12
				53	3	" " + 8.1 16 9 6
+7.1	6.5		+7.1 to +5.1 very gravelly	43	4	" " + 6.6 11 7 25
+5.1	8.5			33	5	" " + 5.1 25 24 14
				43	6	" " + 3.6 8 16 18
				27	7	" " + 2.1 21 12 16
				0		" " + 0.6 11 20 23
-0.3	13.9			0		" " - 0.9 25 44 38
-0.9	14.5		-0.3 to -0.9 Boulders			
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	33	8	" " - 2.4 4 5 7
				40	9	" " - 3.9 15 12 17
				47	10	" " - 5.4 21 22 24
				47	11	" " - 6.9 64 39 31

DRILLING LOG (Cont Sheet) ELEVATION TOP OF HOLE +13.6 **Hole No.** CB-SG-27

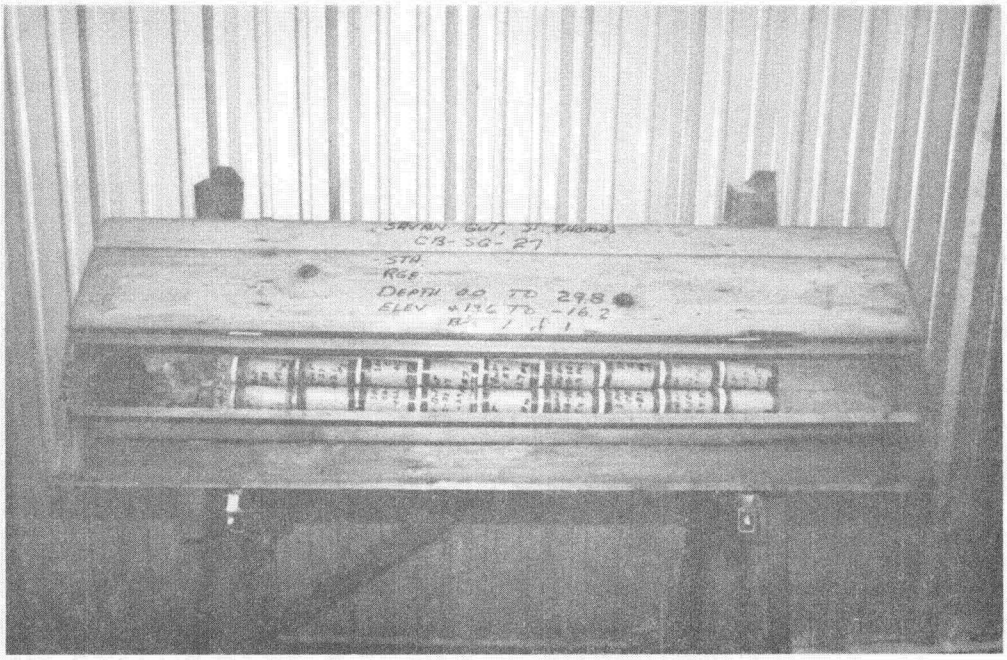
PROJECT Savan Gut, St. Thomas, Virgin Islands | INSTALLATION Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						- 6.9 Blows/0.5 Ft.
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	40	12	SPLIT SPOON 30 21 30 - 8.4
				47	13	" " 18 16 18 - 9.9
				0		" " 22 27 30 -11.4
-11.9	25.5			13	14	" " 37 83 112 -12.9
			CLAY, lean, dry, low plasticity, silty, well-packed, with many small hard rock fragments, reddish-brown and yellow (CL)	47	15	" " 19 55 118 -14.4
				100	16	" " 128 -15.0 100/0.5
				100	17	" " 89 -15.7 100/0.2
-16.2	29.8			100	18	-16.2 " " 147
			NOTES: 1. Set NX casing to -11.4 2. Grouted hole with cement upon completion			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. X 2" O.D.)

ENG FORM JUN 67 1836-A

PLATE C-51

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-27



CB-SG-27
Box 1, from elevation +13.6 to -16.2

Hole No. CB-SG-28

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT: Savan Gut, St. Thomas, Virgin Islands
2. LOCATION (Coordinates or Station): X=1,019,783 (Scaled) Y=187,438
3. DRILLING AGENCY: Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-SG-28
5. NAME OF DRILLER: C. Mason
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 31.1 ft.
10. SIZE AND TYPE OF BIT: See remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: Sprague & Henwood
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ; UNDISTURBED
14. TOTAL NUMBER CORE BOXES: 1
15. ELEVATION GROUND WATER: +4.6
16. DATE HOLE: STARTED 30 July 80; COMPLETED 31 July 80
17. ELEVATION TOP OF HOLE: +13.6
18. TOTAL CORE RECOVERY FOR BORING: 44 %
19. SIGNATURE OF INSPECTOR: GEOLOGIST: Wallace T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+13.6	0.0					BIT OR BARREL +13.6 Blows/0.5 Ft.
+13.5	0.1		Asphalt road	70		DIAMOND 4X5-1/2 DT 13min +12.6 HP 100 psi
			Gravel & cobble stone - Base coarse -	50		DIAMOND 4X5-1/2 DT 11 min HP 100 psi +10.6
+9.6	4.0			33	1	SPLIT SPOON 2/3/3 + 9.1
+7.6	6.0		CLAY, fat, soft, high plasticity, contains many small rock fragments, reddish brown (CH)	47	2	" " 5/9/8 + 7.6
			SAND, silty, fine to medium grain with some coarse sands and gravel, brown (SM)	26	3	" " 13/18/20 + 6.1
				33	4	" " 15/22/22 + 4.6
				33	5	" " 9/13/17 + 3.1
+2.1	11.5			13	6	" " 11/48/50/0.3 + 1.8
+0.9	12.2		Tuffaceous breccia-boulder	40		DIAMOND NX DT 7 min + 0.8 HP 100 psi
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	53	7	SPLIT SPOON 5/19/19 - 0.7
				53	8	" " 26/18/39 - 2.2
			slightly sandy from -2.2 to -4.2	80	9	" " 12/9/18 - 3.7
			yellowish in color from -5.4 to -13.9	0.0		-3.9 " " 48/0.5/26
				80	10	" " 15/19 - 5.4
				60	11	" " 18/23/31 - 6.9

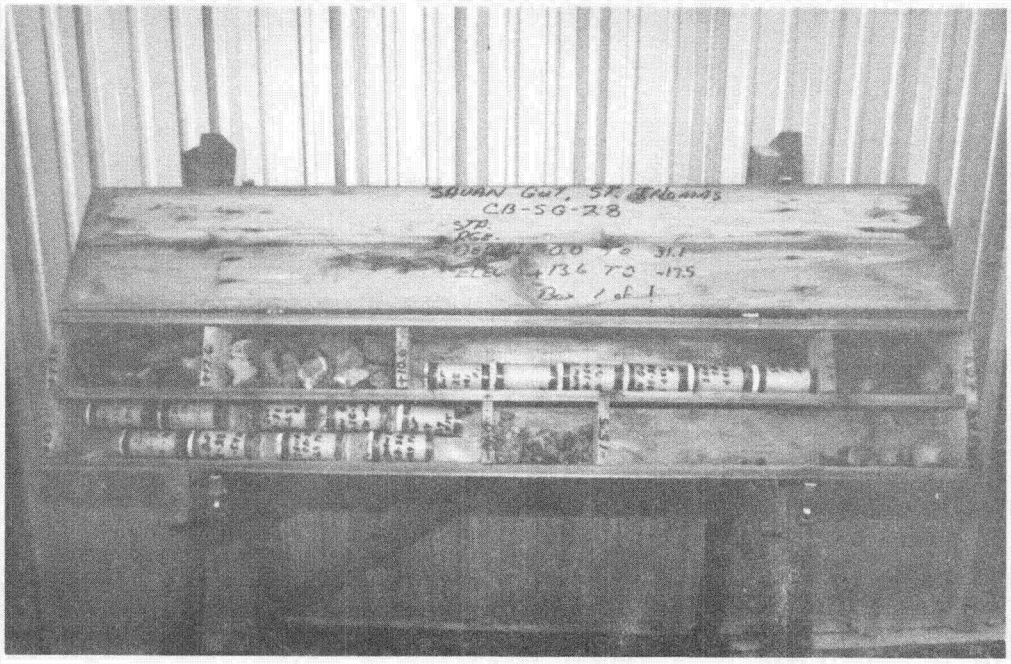
ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE O (TRANSLUCENT)

PLATE C-53

PROJECT: Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-28

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE +13.6	Hole No. CB-SG-28
PROJECT Savan Gut, St. Thomas, V.I.	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						- 6.9 Blows/0.5 Ft.
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	40	12	SPLIT SPOON 25 47 70/0.3
- 8.4	21.8					- 8.2
- 9.9	22.3		BOULDER at - 8.4	0		DIAMOND NX DT 12 min HP 100 psi
						- 9.4
			-10.9 to -13.9	60	13	SPLIT SPOON 14 13 30
						-10.9
				67	14	" " 9 9 24
						-12.4
				53	15	" " 10 13 27
-13.9	27.5					-13.9
			TUFF, very hard, gray	0		-14.0 50/0.1
				33		DIAMOND NX DT 32 min HP 100 psi
						-15.5
				30		DIAMOND NX DT 37 min HP 100 psi
-17.5	31.1					-17.5
			NOTES: 1. Set NX casing to -13.9 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon (1-3/8-inch I.D. X 2" O.D.)



CB-SG-28
Box 1, from elevation +13.6 to -17.5

Hole No. CB-SG-29

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,758 (scaled) Y=187,340	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-29	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +2.4
	16. DATE HOLE: STARTED 7-28-80 / COMPLETED 7-29-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +9.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 43 %
9. TOTAL DEPTH OF HOLE 35.5 ft.	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+ 9.4	0.0					+ 9.4 Blows/0.5 Ft.
+ 8.4	1.0		Concrete, gutter	100		DIAMOND 4x5-1/2 DT 35min + 8.4 HP 100 psi
+ 7.4	2.0		Gravel and cobble stone - Base Coarse -	80		DIAMOND 4x5-1/2 DT 13min + 7.4 HP 100 psi
			Tuffaceous breccia, hard, light green and white	50		DIAMOND 4x5-1/2 DT 21min + 6.4 HP 100 psi
			- Boulders -	73		DIAMOND 4x5-1/2 DT 42min HP 100 psi + 4.9
+ 4.2	5.7			53	1	SPLIT SPOON + 3.4 13 22 16
+ 3.4	6.0		SAND, silty, fine to medium grain, with some coarse grain sands and gravel, shelly, brown (SM).	47	2	" " + 1.9 9 18 23
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, gray (CH)	47	3	" " + 0.4 7 9 11
				43	4	" " - 1.1 8 21 29
				27	5	" " - 2.6 11 10 13
				47	6	" " - 4.1 6 12 11
				43	7	" " - 5.6 6 16 24
- 7.1	16.5		Reddish brown in color from -7. to -25.9	33	8	" " - 7.1 7 5 22
				47	9	" " - 8.6 9 19 37
				43	10	" " -10.1 9 20 26
				53	11	" " -11.6 8 7 12

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE (TRANSLUCENT)

PLATE C-56

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-29

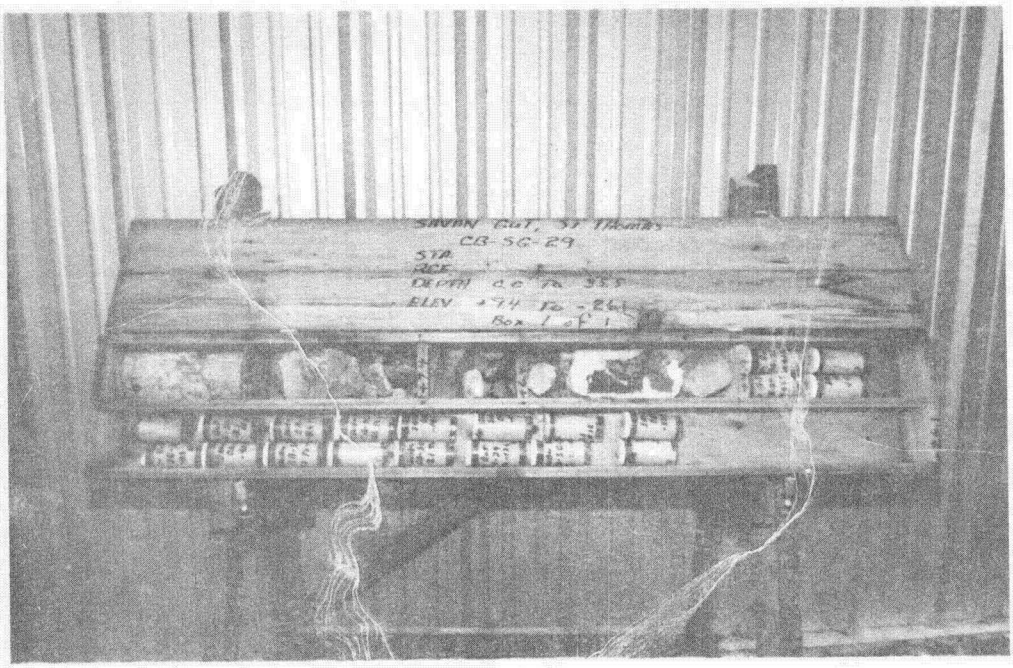
DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +9.4 | **Hole No.** CB-SG-29

PROJECT: Savan Gut, St. Thomas, Virgin Islands | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						-11.6 Blows/0.5 Ft.
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, from -7.1 to -25.9 reddish-brown in color (CH)	60	12	SPLIT SPOON 6 19 17 -13.1
				43	13	" " 6 12 18 -14.6
-14.6	24.0		-14.6 to -17.6 up to 50% rock fragments	33	14	6 13 19 -16.1
				33	15	" " 8 18 23 -17.6
-17.6	27.0			13	16	" " 7 15 22 -19.1
				20	17	" " 16 20 21 -20.6
				40	18	" " 9 15 23 -22.1
				40	19	" " 10 17 25 -23.6
				33	20	" " 11 16 26 -25.1
-25.9	35.3		Hard rock	0		" " 48 50/0.2' -26.1
-26.1	35.5		NOTES: 1. Set NX casing to -20.6 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon (1-3/8-inch I.D. a 2" O.D.)

ENG FORM 1836-A JUN 67

PROJECT: Savan Gut, St. Thomas, V.I. | HOLE NO. CB-SG-29



CB-SG-29
Box 1, from elevation +9.4 to -26.1

Hole No. CB-SG-30

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 1 SHEETS

PROJECT Savan Gut, St. Thomas, V.I.	10. SIZE AND TYPE OF BIT See remarks
LOCATION (Coordinates or Station) X-1,019,783 (Scaled) Y=187,236	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
HOLE NO. (As shown on drawing title and file number) CB-SG-30	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +2.1
	16. DATE HOLE: STARTED 7-25-80 / COMPLETED 7-26-80
THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +8.3
DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 41 %
TOTAL DEPTH OF HOLE 35.5 ft.	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+ 8.3	0.0					+ 8.3 Blows/0.5 Ft.
+ 7.8	0.5		Concrete, sidewalk			DIAMOND 4x5-1/2 DT 11 min HP 100 psi
			Gravel & cobble stone base coarse	86		+ 6.8
+ 5.8	2.5		-Fill material-	20		DIAMOND 4x5-1/2 DT 10 min HP 100 psi
			SAND, silty, fine to medium grain, with some coarse grain sands and gravel, shelly, dark brown (SM)			+ 5.3
				47	1	SPLIT SPOON 3 2 1
						+ 3.8
				47	2	" " 2 3 2
						+ 2.3
				43	3	" " 3 4 2
						+ 0.8
				47	4	" " 6 4 4
						- 0.7
				53	5	" " 2 3 4
- 2.7	11.0					- 2.2
			SILT, sandy, trace of plastic fines, black (ML)	33	6	" " 12 2 1
						- 3.7
				20	7	" " 1 2 1
						- 5.2
				20	8	" " 1 2 4
- 6.7	15.0					- 6.7
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	60	9	" " 12 12 23
						- 8.2
				67	10	" " 9 15 16
						- 9.7
				67	11	" " 12 17 24
						-11.2
				53	12	" " 9 12 19
						-12.7

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBS (TRANSLUCENT)

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-30

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +8.3 | **Hole No.** CB-SG-30

PROJECT: Savan Gut, St. Thomas, V.I. | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL -12.7 Blows/0.5 Ft.
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments. reddish brown (CH) -15.7 to -19.2 yellowish in color	60	13	SPLIT SPOON 13 14 -14.2 21
				20	14	" " 11 13 -15.7 18
				43	15	" " 5 9 -17.2 16
				0		" " 4 8 -18.7 14
-19.2	27.0			100	16	5 -19.4 50/0.2'
-20.7	29.0			33		DIAMOND NX DT 18 min HP 100psi -21.2
				67	17	SPLIT SPOON 25 20 -22.7 64
-23.2	31.5			0		-23.2 " " 64
				35		DIAMOND NX DT 16 min HP 100 psi -25.2
				15		DIAMOND NX DT 23 min HP 100 psi -27.2
-27.2	35.5					
			NOTES: 1. Set NX casing to -19.4 2. Grouted hole with cement upon completion			140# hammer with 30" drop used on 2.0' split spoon (1-3/8" I.D. x 2" O.D.)

CB-SG-30
Box 1, from elevation +8.3 to -27.2

Hole No. CB-SG-31

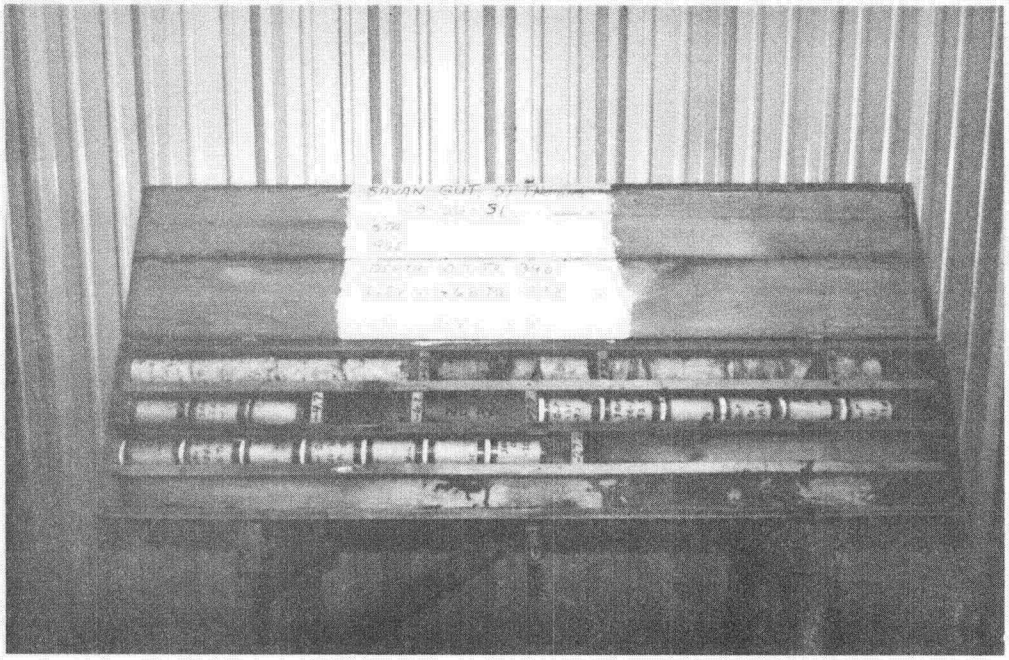
DRILLING LOG	DIVISION South	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
LOCATION (Coordinates or Station) X-1,019,784 (scaled) Y=187,132	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
HOLE NO. (As shown on drawing title and file number) CB-SG-31	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +3.7
	16. DATE HOLE: STARTED 7-23-80 / COMPLETED 7-24-80
THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +6.8
DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 46 %
TOTAL DEPTH OF HOLE 34.0 ft.	19. GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+ 6.8	0.0					+ 6.8
			Concrete, gutter			
+ 5.1	1.7			90		DIAMOND NX DT 13 min HP 100 psi
			Tuffaceous breccia, hard, solid, light green			+ 4.8
			- Boulder -	100		DIAMOND NX DT 18 min HP 100 psi
						+ 3.8
				65		DIAMOND NX DT 23 min HP 100 psi
						+ 1.8
+ 1.2	5.6			30		DIAMOND NX DT 31 min HP 100 psi
			Silty gravels, gravel-sand-silt mixture, saturated, brown (GM)			- 0.2 Blows/0.5 Ft.
				43	1	SPLIT SPOON 10 11 16
						- 1.7
				33	2	" " 6 6 4
						- 3.2
				33	3	" " 4 3 6
- 4.7	11.5					- 4.7
			SILT, sandy, trace of plastic fines, fibrous, black (ML)	0		" " 9 6 5
						- 6.2
				0		" " 3 2 4
						- 7.7
- 8.2	15.0			43	4	" " 6 16 35
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)			- 9.2
				47	5	" " 6 15 26
						-10.7
				47	6	" " 22 14 15
						-12.2
				53	7	" " 7 12 18
						-13.7

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE +6.8	Hole No. CB-SG-31
PROJECT Savan Gut, St. Thomas, Virgin Islands	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						-13.7 Blows/0.5 ft.
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	47	8	SPLIT SPOON 9 11 11
						-15.2
				33	9	" " 6 14 17
						-16.7
				60	10	" " 4 4 6
						-18.2
				67	11	" " 6 9 10
						-19.7
				53	12	" " 7 10 18
						-21.2
				67	13	" " 14 24 30
						-22.7
				14	14	" " 10 18 26
						-24.2
				33	15	" " 14 25 33
						-25.7
				67	16	" " 13 26 37
-27.2	34.0					-27.2
			NOTES: 1. Set NX casing to -22.7 2. 100% water loss while drilling through boulder (+5.1 to +1.2) 3. Grouted hole with cement upon completion			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. x 2" O.D.)



CB-SG-31
Box 1, from elevation +6.8 to -27.2

Hole No. CB-SG-32

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, Virgin Islands	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,822 (scaled) Y=187,056	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-32	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ; UNDISTURBED
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +1.0
	16. DATE HOLE: STARTED 7-21-80; COMPLETED 7-22-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +5.7
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 46 %
9. TOTAL DEPTH OF HOLE 36.0'	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. NOVAK

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
+ 5.7	0.0					+ 5.7
+ 5.2	0.5		Concrete, gutter			
			Gravel and cobble stone - Fill material -	40		DIAMOND 4x5-1/2 DT 16 min HP 100 psi
+ 1.7	4.0					+ 1.7 Blows/0.5 Ft.
			- Fill material -	60	1 2	SPLIT SPOON 25 18 14 + 0.2
-0.3	1.0		Mixture of sand, silt, shell and rock fragments, brown	80	3	- 0.3 " " 54
				80		DIAMOND NX DT 14 min HP 100 psi - 1.3
- 1.6	7.3		+1.2 to -0.3 black in color -0.3 to -1.6 breccia, boulder, hard, light green	15		DIAMOND NX DT 12 min HP 100 psi - 3.3
				33	4	SPLIT SPOON 8 8 10 - 4.8
- 5.3	11.0			53	5	" " 10 3 4 - 6.3
			SAND, fine to medium grain, predominantly fine, shelly, slightly silty, light gray (SP)	53	6	" " 4 4 4 - 7.8
- 7.8	13.5					
			SILT, sandy, trace of plastic fines, fiberous, dark gray (ML)	40	7	" " 4 4 8 - 9.3
- 9.8	17.5					
			CLAY, fat, stiff, high plasticity, containing many small rock fragments, reddish brown (CH)	53	8	" " 4 7 26 -10.8
				33	9	" " 13 19 26 -12.3
				47	10	" " 22 30 35 -13.8
				53	11	" " 20 29 33 -15.3

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBS (TRANSLUCENT)

PLATE C-65

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-32

DRILLING LOG (Cont Sheet)	ELEVATION TOP OF HOLE +5.7	Hole No. CB-SG-32
PROJECT Savan Gut, St. Thomas, Virgin Islands	INSTALLATION Jacksonville District	SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL -15.3 Blows/0.5 Ft.
			CLAY, fat, stiff, high plasticity, containing many small rock fragments, reddish brown (CH)	67	12	SPLIT SPOON -16.8 20 / 34 / 31
				27	13	" " -18.3 18 / 26 / 32
				20	14	" " -19.8 22 / 21 / 35
			-19.8 to -21.3 yellowish in color	47	15	" " -21.3 10 / 12 / 15
				67	16	" " -22.8 13 / 26 / 31
				60	17	" " -24.3 55 / 80 / 83
				53	18	" " -25.8 27 / 38 / 46
				67	19	" " -27.3 29 / 50 / 118
				33	20	" " -28.0 31 / 42 / 56
				20	21	" " -30.3 47 / 57 / 65
-30.3	36.0					

NOTES:

1. Set NX casing to -24.3
2. Grouted hole with cement upon completion.

140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" I.D. x 2" O.D.)

ENG FORM 1836-A JUN 67

PROJECT Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-32

CB-SG-32
Box 1, from elevation +5.7 to -30.3

Hole No. CB-SG-33

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, V.I.	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,829 (Scaled) Y=186,968	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-33	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +0.9
	16. DATE HOLE — STARTED 7-16-80 — COMPLETED 7-19-80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +4.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 52 %
9. TOTAL DEPTH OF HOLE 35.5 ft.	19. ~~SIGNATURE OF INSPECTOR~~ GEOLOGIST: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+ 4.4	0.0					BIT OR BARREL + 4.4 Blows/0.5 Ft.
+ 3.5	0.9		Concrete, gutter	85		DIAMOND 4x5-1/2 DT 15 min HP 100 psi + 3.1
+ 1.9	2.5		Gravel & cobble stone -Fill material-	83		DIAMOND 4x5-1/2 DT 14 min HP 100 psi + 1.9
			Sand and gravel material, slightly silty, slightly shelly -Fill material-	40		SPLIT SPOON + 0.4 25 52 39
				0		" " - 1.1 12 18 24
				27	1	" " - 2.6 10 20 15
				20	2	" " - 4.1 4 10 30
- 5.6	10.6			27	3	" " - 5.6 9 12 12
			SAND, fine to medium grain, predominantly fine, shelly, slightly silty, gray (SP)	53	4	" " - 7.1 6 4 3
				60	5	" " - 8.6 2 2 5
-10.1	14.5			53	6	" " -10.1 3 4 8
-12.1	16.5		SILT sandy, trace of plastic fines, fiberous, gray (ML)	53	7	" " -11.6 1 1 2
			CLAY, fat, stiff, high plasticity, contains many rock fragments, reddish brown (CH)	73	8	" " -13.1 9 24 38
				60	9	" " -14.6 8 8 5
				67	10	" " -16.1 9 27 34

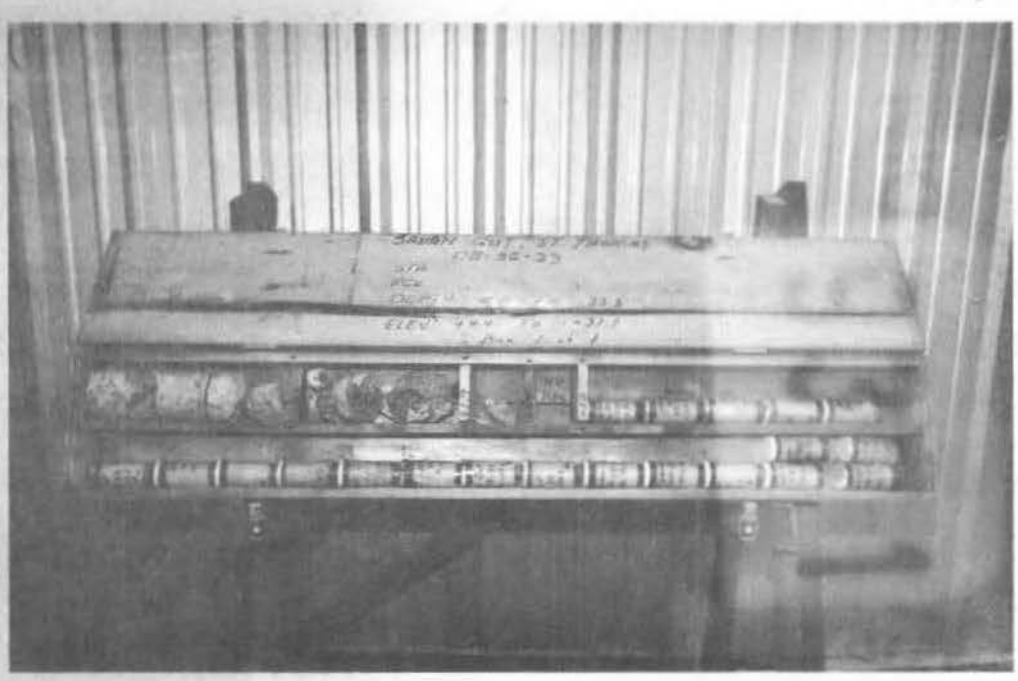
DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +4.4 | Hole No. CB-SG-33

PROJECT Gut, St. Thomas, V.I. | INSTALLATION Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						-16.1 Blows/0.5 Ft.
			CLAY, fat, medium stiff, high plasticity, contains many small rock fragments, reddish brown (CH)	53	11	SPLIT SPOON 11 28 47 -17.6
				67	12	" " 9 24 40 -19.1
				47	13	" " 11 29 44 -20.6
				60	14	" " 18 29 45 -22.1
				67	15	" " 13 24 32 -23.6
				60	16	" " 9 16 27 -25.1
				53	17	" " 8 17 28 -26.6
				53	18	" " 8 12 24 -28.1
				53	19	" " 7 12 18 -29.6
				40	20	" " 11 12 15 -31.1
-31.1	35.5					
			NOTES: 1. Set NX casing to -10.1 2. Grouted hole with cement upon completion			140# hammer with 30" drop used on 2.0' split spoon (1-3/8" I.D. x 2" O.D.)

ENG FORM 1836-A JUN 67

PROJECT Savan Gut, St. Thomas, V.I. | HOLE NO. CB-SG-33



CB-SG-33
Box 1, from elevation +4.4 to -31.1

Hole No. CB-SG-34

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

1. PROJECT Savan Gut, St. Thomas, V.I.	10. SIZE AND TYPE OF BIT See remarks
2. LOCATION (Coordinates or Station) X=1,019,872 (Scaled) Y=186,847	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-34	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ; UNDISTURBED
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +0.8
	16. DATE HOLE: STARTED 7/14/80; COMPLETED 7/16/80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +3.9
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 58 %
9. TOTAL DEPTH OF HOLE 33.5 ft.	19. ~~XXXXXXXXXXXXXXXXXXXX~~ Geologist: T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+ 3.9	0.0					BIT OR BARREL + 3.9 Blows/0.5 Ft.
+ 3.5	0.4		Concrete with wire			DIAMOND 4x5-1/2
+ 2.4	1.5		Road gravel, base coarse	93		DT 12 min HP 100 psi + 2.4
			-FILL MATERIAL- mixture of sand, silt, shell and rock fragments, some clay and clayey sand pockets, dark gray	60	1	SPLIT SPOON + 0.9 3 3 6
				53	2	" " - 0.6 2 7 12
- 2.1	6.0		-2.1 to -5.1 wood fibers	53	3	" " - 2.1 6 12 18
			-2.1 to -6.6 very gravelly	47	4	" " - 3.6 7 14 12
- 5.1	9.0			40	5	" " - 5.1 6 12 11
- 6.6	10.5			40	6	" " - 6.6 4 17 19
			SAND, silty, fine to medium grain, slightly shelly, dark gray to black (SM)	47	7	" " - 8.1 6 4 4
				53	8	" " - 9.6 8 6 6
				47	9	" " -11.1 4 6 2
-12.6	16.5			53	10	" " -12.6 3 4 3
			SAND, clayey, soft, fine to medium grain slightly shelly, gray (SC)	53	11	" " -14.1 2 2 3
-15.1	19.0			67	12	" " -15.6 2 2 5
			CLAY, fat, stiff, high plasticity, small rock fragments, reddish brown (CH)	73	13	" " -17.1 10 25 20

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBS (TRANSLUCENT)

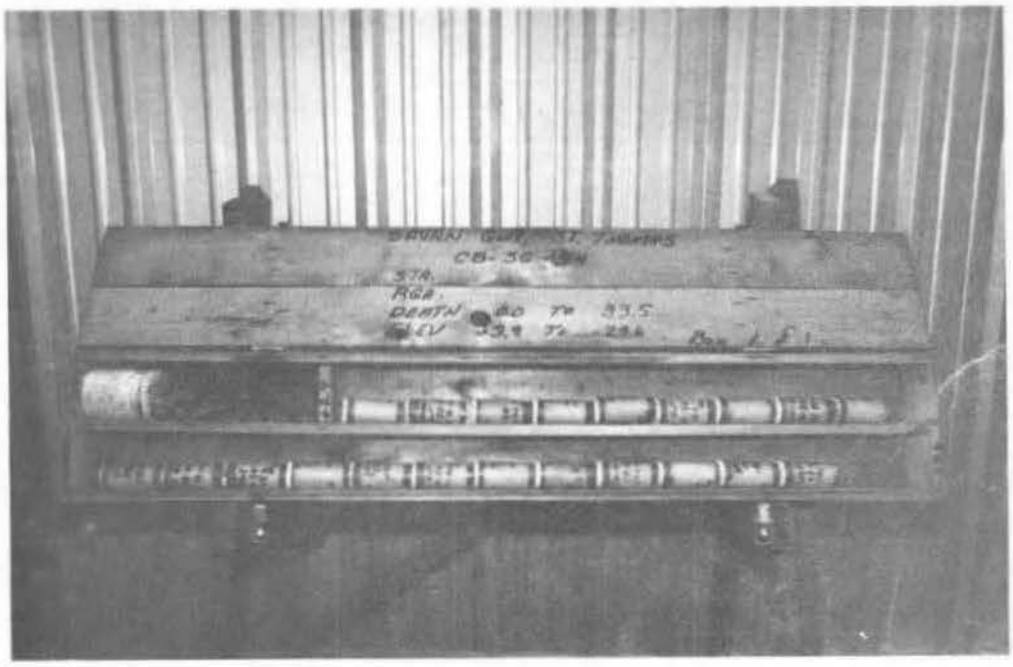
PLATE C-71

PROJECT: Savan Gut, St. Thomas, V.I. HOLE NO. CB-SG-34

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +3.9 | **Hole No.** CB-SG-34

PROJECT: Savan Gut, St. Thomas, V.I. | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						-17.1 Blows/0.5 Ft.
			CLAY, fat, stiff, high plasticity, small rock fragments, reddish brown (CH)	73	13	SPLIT SPOON -18.6 18 17 20
				73	14	" " -20.1 25 41 55
				60	15	" " -21.6 39 27 33
				0		-22.1 " " 53
				47	17	" " -23.6 16 34 59
				67	18	" " -25.1 13 16 26
-25.1	29.0		-25.1 to -29.6 yellowish in color			
				80	19	" " -26.6 20 17 25
				67	20	" " -28.1 11 22 31
				73	21	" " -29.6 15 19 29
-29.6	33.5					
			NOTES: 1. Set NX casing to -23.6 2. Grouted hole with cement upon completion.			140# hammer with 30" drop used on 2.0' split spoon (1-3/8" I.D. x 2" O.D.)



CB-SG-34
Box 1. from elevation +3.9 to -29.6

Hole No. CB-SG-35

DRILLING LOG	DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS

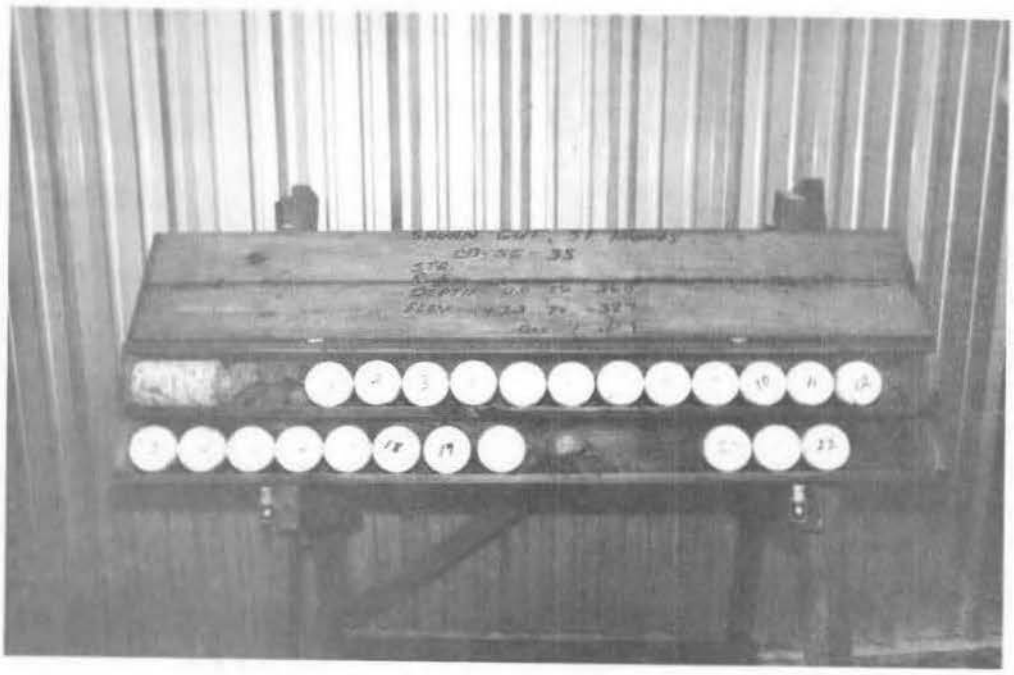
1. PROJECT Savan Gut, St. Thomas, V.I.	10. SIZE AND TYPE OF BIT SEE REMARKS
2. LOCATION (Coordinates or Station) X-1,019,889 Y=186,716 (Scaled)	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL Sprague & Henwood
4. HOLE NO. (As shown on drawing title and file number) CB-SG-35	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER C. Mason	14. TOTAL NUMBER CORE BOXES 1
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER +0.4
	16. DATE HOLE: STARTED 12 July 80 / COMPLETED 14 July 80
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE +3.3
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING 53 %
9. TOTAL DEPTH OF HOLE 36.0'	19. SIGNATURE OF INSPECTOR GEOLOGIST T. Novak

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
+3.3	0.0					BIT OR BARREL BLOWS PER +3.3 0.5 Ft.
+2.8	0.5		CONCRETE SIDEWALK			
			Fill Material, mixture of sand, silt, silty sand, clayey sand, clay and shell, dark gray to black	60		Diamond 4 x 5-1/2 DT 17 min HP 100 p.s.i. +1.3
				47	1	Split Spoon -0.2 1 2 2
				40	2	" " -1.7 1 1 2
				40	3	" " -3.2 1 2 1
				53	4	" " -4.7 1 2 8
				47	5	" " -6.2 4 9 5
				47	6	" " -7.7 5 11 8
-7.7	11.0		Very shelly, starting at -7.7			
				33	7	" " -9.2 10 12 10
				40	8	" " -10.7 6 5 6
				40	9	" " -12.2 5 5 4
-12.2	15.5					
			SILT, organic, slightly sandy, slightly fiberous, dark gray to black (OL)	40	10	" " -13.7 2 2 1
				33	11	" " -15.2 1 1 2

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE +3.3 | **Hole No.** CB-SG-35

PROJECT: SAVAN GUT, ST. THOMAS, V.I. | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						BIT OR BARREL
						BLOWS PER
						-15.2 0.5 Ft.
				33	12	Split Spoon 2 2 2
						-16.7
				67	13	" " 1 1 4
-18.2	21.5					-18.2
			CLAY, fat, stiff, high plasticity, contains small rock fragments, reddish brown (CH)	60	14	" " 7 14 19
						-19.7
				73	15	" " 10 35 42
						-21.2
					16	" " 14 16 12
						-22.7
					17	" " 8 52
						-23.7
					18	" " 3 19 23
						-25.2
					19	" " 7 21 24
						-26.7
-27.2	30.5			100		-27.4 " " 21 50/02
-28.2	31.5		BRECCIA BOULDER, hard gray and tan, from -27.2 to -28.2	75		Diamond 4 x 5-1/2 DI 13 min -28.2 HP 100 p.s.i.
			Contains up to 50% rock fragments, yellow from -28.2 to -31.2	100	20	Split Spoon 61 38 59
						-29.7
				60	21	" " 30 45 35
-31.2	34.5					-31.2
				100	22	" " 26 11 23
-32.7	36.0					-32.7
			NOTES: 1. Set NX casing to -31.2 2. Backfilled hole with cement upon completion.			140# Hammer with 30" drop used on 2.0' Split Spoon (1-3/8" I.D. x 2.0" O.D.)



CB-SG-35
Box 1, from elevation +3.3 to -32.7

Department of the Army, SO. Atlantic Division Laboratory, Corps of Engineers, 611 SO. Cobb Dr., Marietta, Ga. 30060

VISUAL CLASSIFICATION AND FIELD MOISTURE CONTENT OF SOIL SAMPLES

District Jacksonville	Project Savan Gut, St. Thomas, Virgin Islands	Requisition No. Ref Reqn GM 81-16 08-123-ENG-036-81
Date Received 10 November 1980		Work Order No. 2550
Location -		Date Reported 17 December 1980
Description Jar Samples of Disturbed Soil		

Lab No.	Hole No.	Elev.	% Moisture	LL PL PI	Visual Classification and/or Remarks
73/ 9364	CB-SG-8	+56.9/ +46.9	21.4	41 18 23	Reddish tan sandy lean clay (CL)
9365	CB-SG-8	+46.9/ +41.1	13.0	33 16 17	Tan and brown sandy lean clay (CL) w/trace of gravel
9366	CB-SG-13	+37.4/ +34.2	17.7	31 16 15	Tan and brown sandy lean clay (CL)
9367	CB-SG-18	1.5/ 2.6 FT.	16.4	34 18 16	Tan lean clay (CL)
9368	CB-SG-22	0.6/ 1.0 FT.	26.7	30 20 10	Tan clayey sand (SC)
9369	CB-SG-33	-3.6/ -10.1	43.4	NP NP NP	Gray silty sand (SM) with some shell fragments
9370	CB-SG-35	-18.2/ - 27.2	18.7	46 18 28	Brown lean clay (CL)

SAD Form 2012
1 Oct 79

Tested by ES; SL Checked by HDS Sheet 1 of 1

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX D

COORDINATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

MAR 18 1982

Mr. A. J. Salem
Planning Division
Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232

Dear Mr. Salem:

As requested in your letter of February 12, 1982, we have reviewed your draft Detailed Project Report on flood damage reduction measures for the Savan Gut, St. Thomas, U.S. Virgin Islands. Based upon the information provided in your report, we foresee no major environmental problems resulting from the proposed project. No wetlands, coral formations or seagrass beds will be impacted and any water quality disturbances appear to be minor and temporary. The project appears to be in compliance with the requirements of the section 404(b)(1) guidelines and, accordingly, we have no objection to its implementation.

Thank you for the opportunity to comment.

Sincerely yours,

Anne N. Miller

Anne Norton Miller, Chief
Environmental Impacts Branch

IN REPLY ADDRESS
COMMISSIONER OF PUBLIC WORKS
REFER_____

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES
CHARLOTTE AMALIE, ST. THOMAS, V. I. 00801

DEPARTMENT OF PUBLIC WORKS

March 12, 1982

Mr. A. J. Salem, P.E.
Chief, Project Planning Branch
Engineering Division
Corps of Engineers
Jacksonville District
P. O. Box 3970
Jacksonville, FL 32201

Dear Mr. Salem:

Please find enclosed the Letter of Intent between the Government of the Virgin Islands and the Corps of Engineers for flood control improvements to Savan Gut, Charlotte Amalie, St. Thomas, U.S. Virgin Islands.

I hope the language changes to the agreement meet with your approval so that we can proceed with the project schedule as identified at our February 25, 1982 meeting.

Should you have any problems, please contact my office at once.

Sincerely,

Arnold M. Golden
Commissioner

Enclosure

LETTER OF INTENT

The Government of the Virgin Islands hereby submits a Letter of Intent to enter into an agreement with the Corps of Engineers to implement the Savan Gut Flood Control Project located in the Savan district and the central business district in St. Thomas, Virgin Islands.

The Government of the Virgin Islands acting through its Department of Public Works has legal authority, and intends to seek legislative approval and funding to provide the following items of local cooperation:

a. Provide without cost to the United States all lands, easements and rights-of-way including suitable borrow and disposal areas as determined by the Chief of Engineers, necessary for the construction of the project;

b. Provide without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities and other structures and improvements made necessary by the construction;

c. Hold and save the United States free from damages due to the construction works and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its contractors;

d. Maintain and operate the project after completion without cost to the United States in accordance with regulations prescribed by the Secretary of the Army;

e. Provide a cash contribution, prior to initiation of construction, equal to the cost of all outside project scope work, presently estimated at $314,000;

f. Assume all project costs in excess of the Government limitation of $4,000,000, presently estimated at $2,600,000;

g. Prevent future encroachment which might interfere with proper functioning of the project for flood control;

h. Fulfill the requirements of non-Federal cooperation as specified in the terms and conditions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), approved 2 January 1971;

i. Publicize floodplain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the floodplain and in adopting such regulations as may be necessary to insure compatibility between future development and protection levels provided by the project.

It is hereby understood that this Letter of Intent is not a legally binding instrument between the parties and is subject to the approval of the Governor and the signing of a mutually agreeable contract by the parties.

The above items of local cooperation were approved by Arnold M. Golden, Commissioner of Public Works, Government of the Virgin Islands, on March 12, 1982.

WITNESS:

Arnold M. Golden

IN REPLY ADDRESS
COMMISSIONER OF PUBLIC WORK

Refer .....

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES
CHARLOTTE AMALIE. ST. THOMAS, V. I.
P. O. BOX 476
PUBLIC WORKS DEPARTMENT

March 9, 1982

Mr. A. J. Salem
Acting Chief Planning Div.
Corps of Engineers
P. O. Box 4970
Jacksonville, Fla. 32282

Dear Mr. Salem:

This is in response to your memorandum soliciting comments on the Detailed Project Report (DPR) for the proposed flood control work in Savan Gut, St. Thomas.

We reviewed the DPR and found that it clearly outlines the scope and procedures for the project. In addition, members of my staff attended the inter-agency meeting on February 25, 1982, and the following comments are based on the discussions taking place there:

We favor the covering of the gut between Bridge No. 2 and Bridge No. 3 with a slab capable of supporting vehicular traffic based on the considerable interest experienced at the meeting. This would make possible a new through road from the Mafolie area as well as the Jane E. Tuitt School to Back Street.

The relatively small additional funds required for this change would be cost effective for the resulting reduced traffic on narrow General Gade.

The installation of the stilling basin in the waterfront will make necessary the construction of a sewage lift station to allow bypassing the existing 30-inch intercepting sewer. We oppose this solution for the following reasons:

1. Aesthetically it locates a sewage pumping station in main business area of the town. Such a station, although located underground, would be difficult to maintain and operate because of the septic and corrosive qualities of the sewage pumped by the station.

2. The difficulty of locating space for a generator and fuel storage tanks to provide emergency power for the pumping station which must operate continuously.

3. The additional high energy cost of operating such a pumping station which must be fully automatic. The present main pumping station to which the proposed new pumping station would discharge is located 4,802 feet to the west. Present energy cost of this station is $10,985 per month with a yearly cost of $132,000. The proposed station would have the same energy cost as the volume of sewage handled would be essentially the same.

We suggest a re-design of the stilling basin with construction out into the harbor as a better alternative.

Every effort will be made by us to secure V. I. Government approval and funding for this project.

Sincerely yours,

Arnold M. Golden
Commissioner of Public Works

cc: Governor
Director of the Budget
Mr. Aloy W. Nielsen
Mr. Robert S. Mathes

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

February 26, 1982 F/SER613:DJT

Colonel Alfred B. Devereaux, Jr.
District Engineer, Jacksonville District
Department of the Army, Corps of Engineer
P.O. Box 4970
Jacksonville, FL 32201

Dear Colonel Devereaux:

The National Marine Fisheries Service has reviewed the draft Detailed Project Report (DPR) on Savan Cut, St. Thomas, U.S. Virgin Islands transmitted with the February 12, 1982 letter from A.J. Salem, Acting Chief, Planning Division.

We anticipate that any adverse effects that might occur on marine and anadromous fishery resources would be minimal. However, it appears that these resources may be of concern to the U.S. Fish and Wildlife Service. Accordingly, we refer you to FWS for their analysis and recommendations.

Sincerely yours,

W. Mark Thompson

/s/ W. Mark Thompson
for D.R. Ekberg
Chief, Environmental and
Technical Services Division

cc:
Area Mgr, FWS, JAX
Fld. Supv., FWS, Mayaguez
F/SER61

United States Department of the Interior

NATIONAL PARK SERVICE
Virgin Islands National Park
Box 7789 - St. Thomas, V.I. 00801

IN REPLY REFER TO
L7619

February 26, 1982

Chief Planning Division
Jacksonville District
Corps of Engineers
P. O. Box 4970
Jacksonville, Florida 32232

Dear Sirs:

This is in response to your memorandum soliciting comments on the Detailed Project Report (DPR) for the proposed flood control work in Savan Gut, St. Thomas.

We reviewed the DPR and believe it clearly outlines the project scope and procedures. In addition, a member of my staff attended the February 25 interagency meeting; the comments that follow are based on what was discussed there.

There was considerable interest expressed in covering the channel between bridge No. 2 and bridge No. 3 with a slab capable of supporting traffic. As this would make possible a new through road from the Jane E. Tuitt School to Back Street, it appears to be a feasible plan. The relatively small additional funds required for the suggested change would result in reduced traffic congestion in the Savan area.

The installation of the stilling basin in the waterfront will make necessary the construction of a sewage lift station to allow bypass of the existing sewer line. Pedrito Francois brought out the possible adverse impacts (primarily aesthetic) of a lift station on the waterfront. We agree that a redesign of the stilling basin, even to the extent of constructing out into the harbor, would be a better alternative. The existing bulkhead is an intrusion on the historic scene anyway, and we see no problem in extending it out in that area.

Colonel Burns and Mr. Salem repeatedly stressed the need for fast action on the part of the V. I. Government to approve this project, and to appropriate funds for it. As the Corps will be funding the first $4,000,000 (more than half of the total estimate), it appears to be quite advantageous to the Virgin Islands. The coordination of the V. I. Government's pre-contract responsibilities by Commissioner Golden would indicate that everything possible will be done in a timely manner. This only leaves approval by the Governor and by the V.I. Legislature; we hope it is forthcoming.

Sincerely yours,

Noel J. Pachta
Superintendent

Year of the Visitor

SAJEN-HH 22 March 1982

Mr. Amadeo I. D. Francis
Commissioner of Commerce
P.O. Box 6400
Charlotte Amalie
St. Thomas, V.I. 00801

Dear Mr. Francis:

This is in response to your letter dated 25 February 1982 concerning the Savan Gut Flood Control Project. The public workshop conducted on 25 February 1982 at the Public Works Department brought to light several areas of concern to representatives of local agencies.

As a result of recommendations made at the workshop, this office has since analyzed design changes in the project in order to provide necessary flood control capability within a framework of minimizing adverse effects to the residential, business, and tourist areas. In that regard, Commissioner Golden of the Public Works Department was notified last week that the flood control channel in the Veteran's Drive area had been redesigned to eliminate the stilling basin and lift station. Commissioner Golden was advised that details would be furnished in a letter at an early date. Also, as you requested, we have reviewed our design for construction activity in the Back Street and Main Street to be accomplished during the summer months. Construction activity is currently planned so that Main Street and Back Street will not be closed at the same time; however, each will be closed for about 60 days each. To meet your request for construction in these areas to be limited to the summer months, we could possibly complete construction at Back Street and Main Street during a 120 day period. It is accordingly requested that your agency coordinate with the local sponsor (the Public Works Department) and advise us of the 120 day period during the summer which would minimize local problems.

Your cooperative participation in our planning process serves to insure a project most responsive to the needs of the local people.

Sincerely,

JAMES L. GARLAND
Chief, Engineering Division

CF:
Commissioner Golden, VI PWD

The Virgin Islands of the United States

P. O. BOX 6400, CHARLOTTE AMALIE, ST. THOMAS, 00801 (809) 774-8784

February 25, 1982

OFFICE OF THE COMMISSIONER
DEPARTMENT OF COMMERCE

Mr. A. J. Salem, Acting Chief
Planning Division
Department of the Army
Jacksonville District, Corps of Engineers
P. O. Box 4970
Jacksonville, Florida 32232

Dear Mr. Salem:

At the February 25th meeting between representatives of the Virgin Islands Government and the Corps of Engineers, Colonel Burns requested comments on the proposed Savan Gut Flood Control Project. I concur with the general conclusion of the meeting, that this project is of vital importance in minimizing potential severe flood damage to the residential area of Savan and the business district of Charlotte Amalie.

Recognizing the tight schedule requiredto insure federal funding of this project, I expect that every effort will be made to minimize the negative impact on the St. Thomas tourism industry. In this regard, I would like to request that the necessary disruption of traffic on Main street, and Back street be scheduled for the summer months.

Also, every effort should be made to insure that the proposed lift station on Veteran's Drive will result in no significant odor problems, or alternatively, that the project be redesigned to eliminate the need for the lift station.

Sincerely,

for Amadeo I. D. Francis
Commissioner of Commerce

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232

SAJEN-HH 5 March 1982

MEMORANDUM FOR RECORD

SUBJECT: Public Workshop on Savan Gut Project

1. A public workshop was conducted on 25 February 1982 in the Conference Room of the Public Works Department in Charlotte Amalie for the purpose of presenting changes to the Savan Gut Project and insuring public involvement during the planning process. The meeting was brought to order at 9:00 a.m. A list of attendees is shown below:

1. Ashley A. Richards, P.W.D., 809-774-3870
2. James M. Robicki, V.I. Dept. of Commerce, 809-774-8784
3. Robert deJongh, deJongh Assoc., 809-774-8035
4. Milton A. Frett, V.I. Legislature, 809-774-0880
5. Leopoldo Gilliard, P.W.D., 809-774-6195
6. COL William C. Burns, COE, Jacksonville, 723-0133
7. Commissioner Arnold Golden, P.W.D., 809-774-1301
8. John Hashtak, COE, Jacksonville, 904-791-2107
9. Glen Lane, COE, Jacksonville, 904-791-2412
10. Rudy Cantarini, COE, Jacksonville, 904-791-2409
11. Ed Salem, COE, Jacksonville, 904-791-2238
12. Jim Riddle, Nat'l Park Service, 775-2050
13. Valerie Lane, Dept. of Law, 809-774-5666
14. Arthur Finch, Dept. of Law, 809-774-5666
15. Jose George, Budget Office, 809-774-0750
16. Franklin Douglas, V.I. Urban Renewal Board, 809-774-0019
17. Katina Coulianos, Dept. of Conservation, 809-774-8252
18. Robert P. VanEepoel, DCCA, 809-774-6420
19. Paul Berry, Supt. of Roads, 4844, Ext. 255
20. Bob Mathis, Public Works, 809-774-5718 or 1301
21. Ken Bragg, D.P.W., 809-774-2515
22. Claudette Lewis, V.I. Planning Office, 809-774-1730
23. Alphonse Nibbs, Dept. of Housing, 809-774-0255
24. Roy E. Adams, V.I. Planning Office, 809-774-1730
25. Pedrito Francois, D.P.W., 809-774-1301
26. Bill Chapman, V.I. Planning Office, 809-774-1730

2. Commissioner Golden opened the meeting with a brief description of the purpose of the meeting and then introduced COL Burns. COL Burns introduced the Corps staff and gave a briefing of the role of the Corps in this project and the current status of funding from the Section 205 program; then he introduced Mr. Salem. Mr. Salem gave a review of the current study effort, distributed the inclosed handout, then discussed the nature of the flooding problem and alternative plans, then introduced Mr. Hashtak for a discussion of major features of the selected plan. Mr. Salem then completed his presentation with a discussion of benefits, costs, environmental effects, local responsibilities and cost sharing. Mr. Salem then informed the local representatives that it was presently being considered to issue two separate contracts to handle the project. The first contract would be for the downtown area extending from the harbor to a point about 150 feet north of Back Street. The second contract would consider all remaining features. Commissioner Golden then noted that this two contract approach will be better from the standpoint of obtaining required real estate since most of the alinement in the lower portion of area is now in public right of way and that only one building would have to be relocated. Accordingly, Commissioner Golden then presented the following schedule of work required of local agencies:

March 15 - Letter of intent should be provided to Corps. This will require local legistrative approval. (Mr. Salem provided several example letters of intent.)

May 15 - Public works will provide information to questions itemized in page 10 of APP. D in the DPR.

June 15 - 221 agreement should be complete.

July 1 - Local share of cash contribution should be appropriated by V.I. government. (complete plans & specs).

Aug 1 - Right of way obtained & relocation complete for 1st contract. Corp to advertise for bids.

Sept 1 - Open bids

by 30 Sep -Construction start.

3. The meeting was then opened for comments.

4. The first issue that was raised concerned our design for the area from Bridge #2 to Back Street. Our design considered a culvert cover designed to support pedestrian traffic. It was suggested that this area would become a haven for criminal activity since it could not be policed very well, and that the culvert cover be re-designed to cover vehicular traffic at some later date. Mr. Lane responsed that this was one of the alternatives discussed at the February 1981 coordination meeting conducted by the Public Works Department and as a result we provided costs for alterations in our letter dated 24 April 1981 (APP. D).

The pedestrian cover alternative was recommended to us in the letter dated May 18, 1981, from the Public Works Department. The Corps thus made this design feature based on the recommendation of local representatives at that time. Mr. deJongh then requested that this part of the project be reconsidered for vehicular loading. Several others agreed that this would be a good modification in the design. No one showed support for the pedestrian cover design. It was noted by Mr. Salem that the additional cost would be local cost since it would be outside project scope and that this subject should be reevaluated at the local level and recommendation then brought forward by the Public Works Department.5.

5. The second issue was raised by Mr. vanEepoel, concerning the need for a sewerage lift station located along Gutters Gade across/near Veterans Drive. The location would be in the parking lot of Francois Hardware across Guttets Gade from Chase Manhattan Bank. Mr. vanEepoel was concerned that this would give off objectional odors in the heart of the Tourist area. Senator Frett and others also objected to the lift station concept and asked if a redesign were possible. Mr. Hashtak said a redesign could possibly be considered to remove the stilling basin and have the channel pass above the sewer line. This concept would possibly cause erosion in the harbor and that the harbor bulkhead may require additional sheet pile protection to safeguard against undermining. This concept was considered more acceptable than the present design. Commissioner Golden asked if the Corps could provide a teletype as soon as possible as to the workability of this concept.

6. The last major issue presented was Senator Frett. He felt that there had been insufficient public involvement and that a public meeting should be planned for those people who would be most effected. Commissioner Golden agreed that a public meeting or public hearing could be held possibly by the Virgin Island Legislator. COL Burns said he would be willing to attend such a meeting to answer questions about the project.

7. In conclusion, Commissioner Golden reiterated 3 major areas of work requiring immediate local attention; those were:

1) A letter of intent should be provided by 15 March.

   a. Corps would review lift station design and provide a telegram of initial findings (A letter with details would follow up)

   b. V.I. Legislature would have to have legislation authorizing participation and consider appropriations.

2) Scope of work for surveys

   a. Corps would provide 3 sets of plans on topographic maps (indicating (1) where additional surveys are needed, real estate survey would be initiated to determine right of ways, casements, relocations; (2) S.H.P.O. would assist in recording all known and unknown cultural resources; and (3) Urban renewal would look at new alinement with regard to urban renewal plans.

3) Utilities material requested in Corps letter dated 23 Feb 81 (APP. D, pg. 9, 10) would be provided by 15 May.

JOHN M. HASHTAK
H&H Branch
Engineering Division

SAJPD-F 25 February 1982

PUBLIC WORKSHOP INTERAGENCY MEETING

FOR

SECTION 205 DETAILED PROJECT REPORT

ON

SAVAN GUT, CHARLOTTE AMALIE, ST. THOMAS, VIRGIN ISLANDS

INTRODUCTION

The Jacksonville District, Corps of Engineers is currently conducting a study to reduce flood damages within the Savan Gut area of Charlotte Amalie. The purpose of the meeting today is to give all interested agencies, groups and individuals a brief review of the current study efforts and to solicit your comments concerning the draft report which was recently distributed. Your participation at every opportunity is encouraged.

PROBLEM

Due to frequent damages experienced by flood conditions at the Jane E. Tuitt School and in the Central Business District (CBD) of Charlotte Amalie, the government of the U. S. Virgin Islands requested the study under the authority contained in Section 205 of the Flood Control Act of 1948. The purpose of this study is to determine the need for and to address the feasibility of improvements to reduce flood damages caused by excessive runoff along the drainage course (or "gut") in the "Savan" area. (See attached study area map).

At least six severe floods have occurred in the Charlotte Amalie area since 1867 when a tidal wave reportedly caused a major disaster along the south coast of St. Thomas. These floods occurred in October 1916, May 1960, March 1969, October 1970, November 1974 and in September 1979. The latter event caused by Hurricane David and Tropical Storm Frederic caused the island to be declared a disaster area.

ALTERNATIVE PLANS

A broad range of both structural and non-structural flood damage reduction measures have been formulated and evaluated to address the problem along Savan Gut. These alternatives include:

- Flow diversion around the Jane E. Tuitt School;
- Channel modification;
- Levees and floodproofing;
- Relocation; and
- Flood forecasting, warning, and evacuation.

Consideration was also given to "no action" as an alternative measure. Through further study it was determined that channel modification, including enlarging the existing channel, and the construction of a short diversion channel around the school, offered the best plan to meet the study objectives.

Mr. John Hashtak, project manager of the study, will now provide a description of the selected plan.

SELECTED PLAN

The selected plan for the reduction of flood damages within Savan Gut and the CBD of Charlotte Amalie is a structural measure. The main features of the recommended plan are:

1. Construction of 2,300 feet of covered channel, including:

a. Construction of a new 750-foot-long covered channel under the CBD of Charlotte Amalie;

b. A new covered channel averaging 14 feet in width and 6 feet in depth from Jane E. Tuitt School to the CBD;

c. A buried concrete diversion chute bypassing the school;

d. A covered channel extending from the school 150 feet upstream to a velocity check dam.

e. Replacement of two highway bridges with sections of covered channel.

2. Construction of an underground stilling basin located near St. Thomas Harbor, and

3. Construction of a velocity check dam about 150 feet upstream of Jane E. Tuitt School.

Benefits:

- Elimination of flood damage at Jane E. Tuitt School and CBD of Charlotte Amalie.
- Average annual benefit of $5.3 million from flood damage reduction primarily within the CBD.
- Maintain identity of CBD and social cohesiveness of Savan residential area.
- Complement plans of Urban Renewal Board and proposed Veterans Drive project.

Costs:

- Total costs estimated to be $6.6 million. Of this total, the Federal share is $4.0 million with local costs estimated to be $2.6 million.

Environmental Effects:

- No adverse impacts expected.
- Documentation and recording of above ground historic structures will be accomplished.
- Excavations monitored for archaeological findings.
- No long-term water quality impacts.

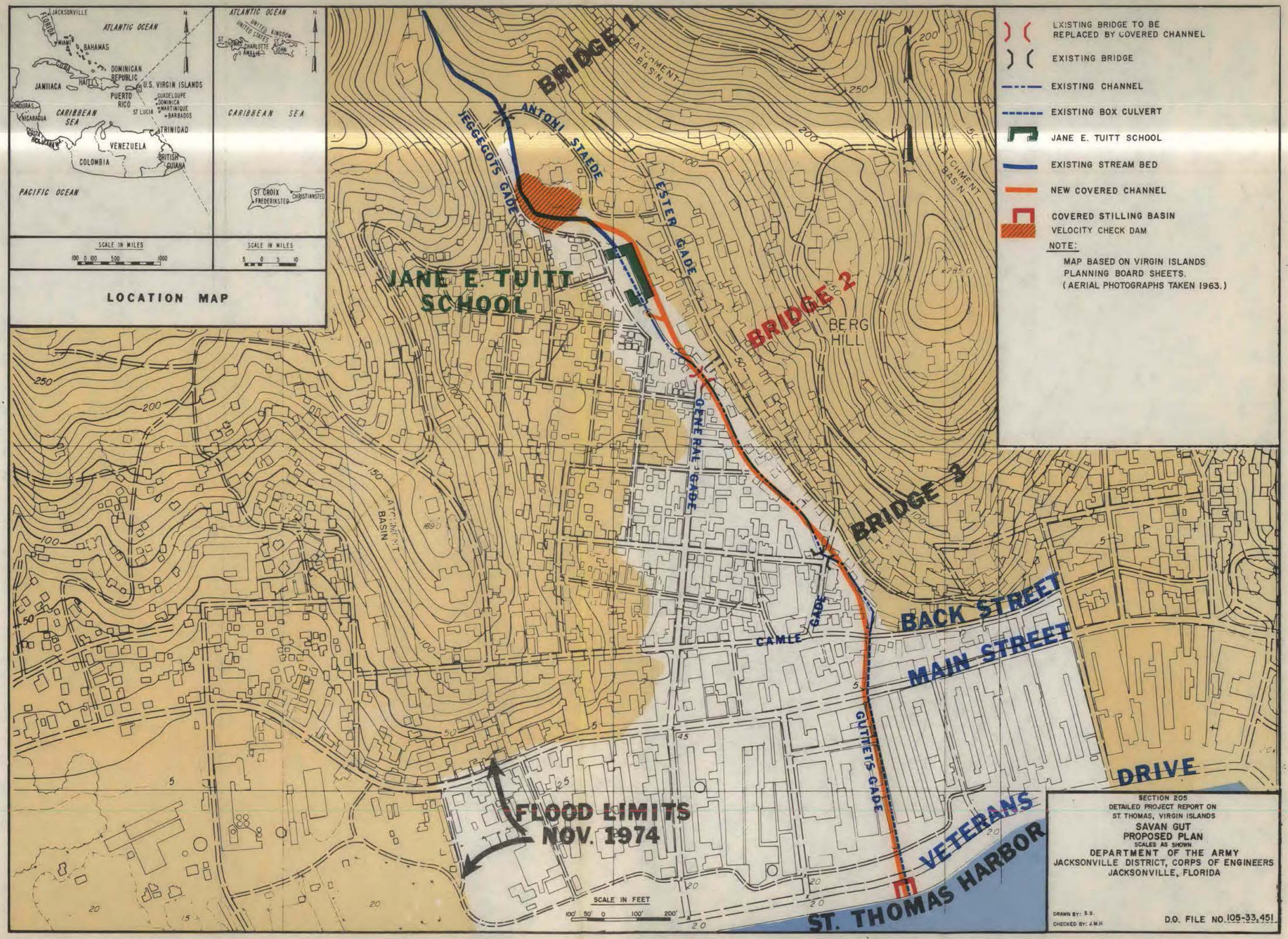
LOCAL RESPONSIBILITY/COST-SHARING

The local sponsor must have legal authority, financial capability, and willingness to provide items of local cooperation. These include briefly:

- Lands, easements, and relocations of buildings, highway bridges and utilities.
- Maintain and operate project after completion.
- Provide cost contribution prior to construction.
- Assume all costs in excess of Government limitation of $4,000,000.

CONCLUSIONS

Further completion of the study requires a written commitment by the local sponsor to agree to those items of cooperation as specified. Upon receipt of such assurances, funds will be requested for plans and specifications for the design of the project. Pending funding availability, and completion of relocation and other items of local cooperation, a contract would then be awarded for project construction.


LOCATION MAP
JACKSONVILLE
FLORIDA
MIAMI
ATLANTIC OCEAN
BAHAMAS
CUBA
DOMINICAN REPUBLIC
HAITI
JAMAICA
PUERTO RICO
U.S. VIRGIN ISLANDS
GUADELOUPE
DOMINICA
MARTINIQUE
BARBADOS
ST LUCIA
HONDURAS
NICARAGUA
CARIBBEAN SEA
TRINIDAD
VENEZUELA
COLOMBIA
BRITISH GUIANA
PACIFIC OCEAN
SCALE IN MILES
UNITED KINGDOM
UNITED STATES
ST THOMAS
CHARLOTTE AMALIE
ST JOHN
ST CROIX
FREDERIKSTED
CHRISTIANSTED
EXISTING BRIDGE TO BE REPLACED BY COVERED CHANNEL
EXISTING BRIDGE
EXISTING CHANNEL
EXISTING BOX CULVERT
JANE E. TUITT SCHOOL
EXISTING STREAM BED
NEW COVERED CHANNEL
COVERED STILLING BASIN
VELOCITY CHECK DAM
NOTE:
MAP BASED ON VIRGIN ISLANDS PLANNING BOARD SHEETS.
(AERIAL PHOTOGRAPHS TAKEN 1963.)
BRIDGE 1
BRIDGE 2
BRIDGE 3
CATCHMENT BASIN
JEGGEGOTS GADE
ANTONI STAEDE
ESTER GADE
JANE E. TUITT SCHOOL
BERG HILL
OLDE RAILROAD GADE
CAMLE GADE
GUTHETS GADE
BACK STREET
MAIN STREET
DRIVE
VETERANS
ST. THOMAS HARBOR
FLOOD LIMITS NOV. 1974
SCALE IN FEET
SECTION 205
DETAILED PROJECT REPORT ON
ST. THOMAS, VIRGIN ISLANDS
SAVAN GUT
PROPOSED PLAN
SCALES AS SHOWN
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA
DRAWN BY: S.S.
CHECKED BY: J.M.H.
D.O. FILE NO. 105-33,451

United States
Department of
Agriculture

Soil
Conservation
Service

Caribbean Area
GPO Box 4868
San Juan, PR 00936

February 24, 1982

A. J. Salem, Acting Chief
Planning Division, DOA
Jacksonville District, COE
Box 4970, Jacksonville, FL 32232

Re: Draft Detailed Project Report
Savan Gut, St. Thomas, U.S.V.I.

Dear Mr. Salem:

This will acknowledge receipt of one copy of the preliminary detailed project report for the above referenced project.

Upon reviewing the draft, we have concluded that no adverse effects to the environment will be caused by the proposed project, provided all measures are implemented as planned.

We suggest that an erosion and sediment control plan be prepared in order to safeguard nearby communities from pollution hazards. This plan should be part of the final specifications for the project.

If we can be of any further assistance, please do not hesitate to call on us again.

Sincerely,

Iván R. Emmanuelli/ACTING FOR
Director

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232

SAJPD-F

12 February 1982

TO ADDRESSEES ON ATTACHED LIST

Inclosed is the draft Detailed Project Report (DPR) on Savan Gut, St. Thomas, U. S. Virgin Islands for your review and comment. The study proposes flood damage reduction measures for the Charlotte Amalie area of St. Thomas.

A public workshop/interagency meeting is scheduled for Thursday morning, 9 A.M., 25 February 1982, in the Public Works Conference Room at the sub-base, Charlotte Amalie, St. Thomas, Virgin Islands. The purpose of the meeting is to solicit your ideas and comments concerning information contained in the draft report. Your comments, issues, and concerns are encouraged. If you are unable to attend the workshop, correspondence on the study should be received by this office no later than 19 March 1982.

Sincerely,

A. J. Salem

A. J. SALEM
Acting Chief
Planning Division

2 Incl
1. List of addressees
2. Cy of report

LIST OF ADDRESSEES

Mr. Thomas B. Blake
Director of Planning
Virgin Islands Planning Office
P. O. Box 2606
St. Thomas, Virgin Islands 00801

Archeological & Historic
Preservation Officer
Virgin Islands Planning Office
P. O. Box 2606
St. Thomas, Virgin Islands 00801

Field Supervisor
Division of Ecological Services
U. S. Fish & Wildlife Service
P. O. Box 3005 - Marina Station
Mayaguez, P. R. 00708

Chief, Environmental Impacts Branch
EPA, Region II
26 Federal Plaza, Room 400
New York, New York 10278

Regional Director
Insurance & Mitigation Division
Federal Emergency Management Agency
26 Federal Plaza
New York, New York 10007

Area Supervisor
National Marine Fisheries Service
Environmental Assessment Branch
P. O. Box 2505
Panama City, Florida 32401

Director, Caribbean Area
Soil Conservation Service, USDA
GPO Box 4868
San Juan, Puerto Rico 00936

Superintendent
Virgin Islands National Park
National Park Service
PO Box 806
St. Thomas, Virgin Islands 00801

Mr. Alphonse Nibbs, Sr.
Virgin Islands Housing
P. O. Box 979
St. Thomas, Virgin Islands 00801

Mr. Robert S. Mathes
Director of Planning & Development
Department of Public Works
Government of the Virgin Islands
St. Thomas, Virgin Islands 00801

Executive Director
Virgin Islands Urban Renewal Board
P. O. Box 2295
St. Thomas, Virgin Islands 00801

Mr. Donald J. Hankla
U. S. Fish and Wildlife Service
15 North Laura Street
Jacksonville, Florida 32202

Territorial Representative
Federal Highway Administration
U. S. Federal Building, Room 114
Veterans Drive
St. Thomas, Virgin Islands 00801

Executive Director
Virgin Islands Port Authority
P. O. Box 597
St. Thomas, Virgin Islands 00801

Office of the Commissioner
Department of Conservation and
Cultural Affairs
P. O. Box 4340
St. Thomas, Virgin Islands 00801

Director, Public Relations Office
Government of the U. S. Virgin Islands
St. Thomas, Virgin Islands 00801

Commissioner
Virgin Islands Department of Commerce
P. O. Box 1692
St. Thomas, Virgin Islands 00801

Mr. G. Robert Simmons
Director of Tourism
P. O. Box 1692
St. Thomas, Virgin Islands 00801

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232

SAJPD-F

11 February 1982

Honorable Arnold M. Golden
Commissioner
Department of Public Works
Charlotte Amalie
St. Thomas, Virgin Islands 00801

Dear Commissioner Golden:

This letter is intended to provide the current status of the Sec. 205 Detailed Project Report (DPR) on Savan Gut in Charlotte Amalie. Attached for your information and comments are two copies of the draft DPR. It should be brought to your attention that the selected plan is being slightly modified. This modification includes a redesign of the entrance channel at the upper extremity of the project, and grate emplacements over the stilling basin at the lower end near the harbor. These modifications should not have an adverse environmental impact.

As has been previously arranged, we will discuss these plans with you in your office on the afternoon of 24 February 1982. It would also be appropriate at that time to discuss a "letter of intent" for local sponsorship of the Savan Gut project. These discussions should be initiated as early as possible as the commitments required of the local sponsor should be included in the final report. An example of the items required for local sponsorship are included as inclosure 1.

This letter also confirms that a workshop will be held in Charlotte Amalie on the morning of 25 February 1982. This interagency meeting is necessary to provide a forum for discussion of the draft report. Copies of the draft DPR are also being forwarded to interested agencies and groups under separate correspondence for their comments.

In order to expedite arrangements for the meeting, please feel free to contact Col. Burns in Puerto Rico or the undersigned.

Sincerely,

A. J. SALEM
Acting Chief
Planning Division

2 Incl
As stated

Cy Furn w/Incl:
Deputy District Engineer
for PR & VI (SAJDS)

Cy Furn w/o Incl:
Mr. Robert Mathes, Govt. of V.I.

The Government of the Virgin Islands of the United States, Department of Public Works, has legal authority, financial capability, and willingness to provide the following items of local cooperation:

a. Provide without cost to the United States, all lands, easements and rights-of-way for the construction of the project;

b. Provide without cost to the United States all necessary relocations and alterations of buildings and utilities, highways and highway bridges, sewers, fences and other improvements;

c. Hold and save the United States free from damages due to the construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its contractors;

d. Maintain and operate the project after completion without cost to the United States in accordance with regulations prescribed by the Secretary of the Army;

e. Provide a cash contribution, prior to initiation of construction, equal to the cost of all outside project scope work, presently estimated at $344,000;

f. Assume all project costs in excess of the Government limitation of $4,000,000;

g. Prevent future encroachment which might interfere with proper functioning of the project for flood control;

h. Fulfill the requirements of non-Federal cooperation as specified in the terms and conditions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), approved 2 January 1971.

i. Publicize flood plain information in the areas concerned and provide this information to zoning and other regulatory agencies for their guidance and leadership in preventing unwise future development in the flood plain and in adopting such regulations as may be necessary to insure compatibility between future development and protection levels provided by the project.

INCL 1

SAJPD-F 11 February 1982

Honorable Milton A. Frett
District of St. Thomas - St. John
Legislature of the Virgin Islands
P.O. Box 477
Charlotte Amalie, Virgin Islands 00801

Dear Senator Frett:

In an effort to keep you informed on the status of the Section 205 Detailed Project Report (DPR) for Savan Gut in Charlotte Amalie, the following information is provided.

We have scheduled a meeting with Public Works Commissioner Arnold Golden in Charlotte Amalie on 24 February 1982. The purpose of the meeting is to discuss the draft report on the referenced study and to address the responsibilities of the local sponsor through a letter of intent. A copy of the draft report is attached for your information.

A public workshop/interagency meeting is scheduled for Thursday morning 25 February 1982 in Charlotte Amalie. The purpose of this meeting is to solicit ideas and comments concerning the draft report. Information gained through continued coordination will be incorporated into the final report.

Please feel free to contact this office for any additional information concerning the Savan Gut study.

Sincerely,

1 Incl
As stated

A. J. SALEM
Acting Chief
Planning Division

IN REPLY ADDRESS
COMMISSIONER OF PUBLIC WORKS
REFER_____

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES
CHARLOTTE AMALIE, ST. THOMAS, V. I. 00801

DEPARTMENT OF PUBLIC WORKS

May 18, 1981

Mr. James L. Garland
Chief, Engineering Division
Department of the Army
Jacksonville District, Corps of Engineers
P. O. Box 4970
Jacksonville, Florida 32232

Dear Mr. Garland:

In response to your letter of April 24, 1981 regarding the Savan Gut Flood Control Project, I am pleased to inform you that after discussions with the Savan Gut inter-agency committee, Alternative 1 was selected as the design option most complementary to the development and enhancement of the Savan community.

Additionally, after a telephone conversation with Messrs. Hashtak and Lane of your staff, I am please to forward the following engineering information:

(1) Exhibit 1 - showing the existing 15" sewer line as well as the "new" 30" sewer line with appropriate slope and invert elevations.

(2) Exhibit 2 - showing the existing 15" sewer line, including profile elevations and slope.

(3) Exhibit 3 - showing in plan and profile the "new" but never used 24" water main that runs parallel to the waterfront under the apron.

General information:

(4) Type of sewage treatment - primary with ocean outfall.

(5) Type of pipe for water lines - cast iron with cement casings for both the 10" and 24" lines.

(6) Seawall along Veterans Drive - steel sheet piling 1-1/2" thick was used to a depth of (-15') or driven below (-15') until refusal. The exact depth of the sheet piling at the terminus of the project is not known.

(7) There are approximately 2,000 people who utilize the sanitary sewer line north of Gutters Gade.

(8) It is the Government's desire to have all new bridges correspond in style and construction with existing bridges.

(9) There are approximately 7,500 vehicular movements per day on the General Gade thoroughfare, with vehicle sizes ranging from sub-compact automobiles to 14 cu. yd. general construction vehicles.

I hope that the above information is useful and will assist the Corps in expediting this long awaited project. Should you require any additional information, please contact my office at once.

Sincerely,

Robert S. Mathes
Director of Planning & Development

Enclosures (3)

cc: Commissioner of Public Works
Senator Milton Frett
Director, V. I. Planning Office
Executive Director, V. I. Urban Renewal Board
Area Engineer, San Juan

SAJEN-RH 24 April 1981

Mr. Robert Mathes
Director of Planning and Development
Department of Public Works
Government of the Virgin Islands
Charlotte Amalie, St. Thomas, V. I. 00801

Dear Mr. Mathes:

This is in response to your request for cost estimates for four alternative plans to cover the proposed flood control channel for Savan Gut. These alternatives were conceptualized at the very productive coordination meetings and field reconnaissance conducted on 25 and 26 February 1981.

The four alternatives that were discussed considered various degrees of covering the proposed Savan Gut open channel. These alternatives were described in our Memorandum for the Record dated 6 March 1981 and are summarized for convenient reference on Inclosure 1. For comparative purposes preliminary cost estimates have been developed for the four alternatives and are shown below:

Plan	Additional Initial Cost
Alternative No. 1	$ 268,000
Alternative No. 2	404,000
Alternative No. 3	311,000
Alternative No. 4	577,000

The following is a list of important points that should be considered prior to your providing us a letter of support for one of the alternatives:

a. Construction of a street between bridge No. 2 and the business district (Alternative No. 4) would create a very congested intersection at bridge No. 3. There are already three streets which intersect at this point. A new crossing would be certain to create problems in traffic control.

b. For the above alternatives, cost of street construction from Jane E. Tuitt School to bridge No. 2 was based on two 12-foot-wide lanes, curb and gutter, and 3-foot-wide sidewalks. Street construction from bridge No. 2 to the business district would consist of one 12-foot-wide lane, curb and gutter, and 3-foot-wide sidewalks. Right-of-way, in addition to the

limits furnished by Mr. Frank Douglas, Virgin Islands Urban Renewal Board, would be required for street construction from the school to bridge No. 2. If this additional street construction is included with project construction, submission of the Detailed Project Report could be delayed at least one month.

c. The utility drawings recently furnished by the local sponsor will be helpful in our planning and general layout of project features. However, for replacement of existing utility lines (sanitary sewer, storm sewer, water supply, etc., and other existing works, which are affected by project construction, the detailed information we requested at the February coordination meeting is urgently needed (see Inclosure 2).

d. Relocation of public utilities is a local sponsor responsibility and generally it is the practice for the local sponsor to relocate utilities in advance of construction activities. Where this is not possible or economically feasible, relocation of affected utilities can be included in the construction contract. All cost of relocations would still be paid by the local sponsor. For these affected utilities, which cannot be relocated by the local sponsor in advance of construction activities, some interruption in utility services would take place. To keep these utility interruptions to a minimum, close coordination and cooperation would be necessary between the Corps of Engineers, Virgin Islands Department of Public Works, and the construction contractor.

Under the Coastal Zone Management Act of 1972 when Federally assisted projects, such as the plan considered for Savan Gut, "affects the coastal zone" it must be consistent with the Coastal Management Program. In your capacity as local sponsor for this project, it is requested that your staff obtain assurance from Mrs. Sallie Adams of the Virgin Islands Department of Conservation and Cultural Affairs that the flood control plan currently envisioned, would be consistent with the Coastal Management Program. The only part of our project affecting the coastal area would be the riprap protected outlet. It is envisioned that the ripran would be at elevation -13.2 feet, m.s.l., and extend 20 feet into the harbor. A sheet pile cutoff wall would be required to a depth of -25.0 feet, m.s.l., at the existing face of the seawall in order to prevent erosion under the planned stilling basin.

It is extremely important that we receive your support for one of the alternatives by 8 May 1981 so as not to interfere with our present schedule for submitting the DPR to higher authority by 30 June. It is also extremely important that we also receive assurance that our plan is consistent with your Coastal Zone Management Plan.

Sincerely,

JAMES L. GARLAND
Chief, Engineering Division

2 Incl
1. Narrative of 4 alternatives
2. Utility information required

Copy Furn (w/incl):
LTC Burns, DDE for PR & VI

COVERED CHANNEL ALTERNATIVES

SAVAN GUT, ST. THOMAS, V. I.

a. Alternative No. 1 - Prepare preliminary cost estimate for the additional costs to provide a covered box culvert, in lieu of an open concrete channel, from Jane E. Tuitt School to the business district (approximately 1,100 ft.). For this alternative that portion of the box culvert from the school to bridge No. 2 would be designed to withstand additional loading from future street construction crossing the culvert which is being considered by the Virgin Islands government. That portion of the box culvert from bridge No. 2 to the business district would be designed for pedestrian traffic only.

b. Alternative No. 2 - Same as alternative No. 1 except that portion of the box culvert from bridge No. 2 to the business district would also be designed for highway loading.

c. Alternative No. 3 - Same as alternative No. 1 except street construction from Jane E. Tuitt School to bridge No. 2 would be included in the estimated costs.

d. Alternative No. 4 - Same as alternative No. 2 except street construction from school to bridge No. 2 and from bridge No. 2 to business district would be included in the estimated costs.

INCL 1

SAJEN-DS 23 February 1981

SAVAN GUT, ST. THOMAS, V. I.

Following information is requested in order to coordinate preparation of Detail Project Report and Contract Plans and Specifications for subject project:

1. Utility Services

a. Review survey sheets numbers 1 thru 10 as to accuracy and completeness as they relate to all existing utilities within the project area. Special attention should be given to underground utilities (sanitary sewer lines, water supply lines, storm sewer lines, electrical lines, telephone lines, etc.). Where utilities shown on survey sheets are inaccurately shown or are incomplete, please correct and/or furnish missing data. Information furnished should include the following:

(1) Show location and indicate type and size of all existing pipes and their purpose.

(2) Show pipe invert elevations at changes in grade and alinement and at each end.

(3) Locate the laterals (sanitary) from each building. Specify type of pipe and invert elevation at building.

(4) If available, furnish the year various utility pipe was installed.

(5) Furnish as-built drawings of the pump house shown on sheet 6 (southside of school) and indicate its purpose. If drawings are not available, furnish description of pump house including following information:

(a) Where does discharge line from pump house end?

(b) Is the 10" C.I.P. the discharge line?

(c) What year was the pump house constructed?

(d) Furnish information regarding operation of the pump house.

(e) Furnish pump capacity.

(6) At Bridges Nos. 2, 3, and 4 (sheets 6 & 8) show further routing of waterlines on each side of bridges. Indicate which are salt waterlines and fresh waterlines.

(7) Show sanitary piping connections to latrines. Show in plan how cleanout is connected to sanitary line.

(8) On sheet 10, the outfall from sanitary sewerline is not shown. What is destination of sewage? Where is it discharged and what type of treatment is provided (treatment plant, etc.)?

b. If as-built drawings can be furnished which show the various layout of the utilities and other needed information indicated above, it would not be necessary to repeat the information on the survey sheets.

c. Unless affected utilities can be relocated by local sponsor in advance of construction operations, which is standard procedure, it is obvious that some interruption in service will take place during construction activities. In any event, close coordination and cooperation will be necessary between the Corps of Engineers, St. Thomas Department of Public Works, and the construction contractor.

2. Existing Construction - Furnish any details available (as-built drawings, etc.) which shows type of construction of the following features:

a. Seawall (Guttet's Gade and Veterans' Blvd).

b. Covered gutter, concrete pavement, drop inlets, cross drains, manholes, etc. along Guttet's Gade.

c. Bridges at Antoni Street, General Gade, Gamble Gade, and Store Straede (Bridges Nos. 1, 2, 3, and 4 as shown on survey sheets).

d. Box culvert under Jane Tuitt School

e. Pump house on southside of school

3. Highway and Bridge Standards

a. Furnish Highway Design Manual (St. Thomas, V. I.) if available.

b. Furnish recommendations as to desired bridge widths, design loading for bridges and streets, need for sidewalks on bridges, etc. if different from design manual.

4. Coordination - Two sets of survey sheets (1 thru 10) are being furnished. At your earliest convenience, please mark up one set as indicated above and return along with other available information as follows:

Jacksonville District, Corps of Engineers
Engineering Division - Design Branch
P. O. Box 4970
Jacksonville, Florida 32232

If telephone contact is desired, call Marvin G. Lane, Area Code (904) 791-2412.

TABLE

OPEN CHANNEL

SAUAN GUT- STA. 8+00 TO STA. 18 + 50

Quantities and cost estimates

(Date of estimate: APRIL 1981)

JWH

Item	Unit	Unit Price	Quantity	Total
Mob and demob	Job	LS	1	40,000
Bypass & temporary construction	Job	LS	1	184,000
Remove exist. concrete channel	Job	LS	1	24,000
Excavation (some rock)	CY	8.00	5,800	46,400
Fill and backfill	CY	5.00	2,200	11,000
Concrete	CY	300	800	240,000
Cement	Cwt.	5.00	4,200	21,000
Reinforcing steel	Lb.	0.50	100,000	50,000
Fencing	LF	20.00	2,400	48,000
Sub-total				$ 664,400
Adjusted sub-total				$ 664,000
Contingencies (15 % ±)				100,000
Contract price				$ 764,000
E&D and S&A (15 % ±)				115,000
Total Initial Cost				$ 879,000

SAJ FL 369(OT)
10 Jan 64

TABLE

INCL 3

SAJEN-DS 23 February 1981

SAVAN GUT, ST. THOMAS, V. I.

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1. Utility Services

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(a) Where does discharge line from pump house end?

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(e) Furnish pump capacity.

(6) At Bridges Nos. 2, 3, and 4 (sheets 6 & 8) show further routing of waterlines on each ide of bridges. Indicate which are salt waterlines and fresh waterlines.

(7) Show sanitary piping connections to latrines. Show in plan how cleanout is connected to sanitary line.

INCL 4

(8) On sheet 10, the outfall from sanitary sewerline is not shown. What is destination of sewage? Where is it discharged and what type of treatment is provided (treatment plant, etc.)?

b. If as-built drawings can be furnished which show the various layout of the utilities and other needed information indicated above, it would not be necessary to repeat the information on the survey sheets.

c. Unless affected utilities can be relocated by local sponsor in advance of construction operations, which is standard procedure, it is obvious that some interruption in service will take place during construction activities. In any event, close coordination and cooperation will be necessary between the Corps of Engineers, St. Thomas Department of Public Works, and the construction contractor.

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a. Seawall (Guttet's Gade and Veterans' Blvd).

b. Covered gutter, concrete pavement, drop inlets, cross drains, manholes, etc. along Guttet's Gade.

c. Bridges at Antoni Street, General Gade, Gamble Gade, and Store Straede (Bridges Nos. 1, 2, 3, and 4 as shown on survey sheets).

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b. Furnish recommendations as to desired bridge widths, design loading for bridges and streets, need for sidewalks on bridges, etc. if different from design manual.

4. Coordination - Two sets of survey sheets (1 thru 10) are being furnished. At your earliest convenience, please mark up one set as indicated above and return along with other available information as follows:

Jacksonville District, Corps of Engineers
Engineering Division - Design Branch
P. O. Box 4970
Jacksonville, Florida 32232

If telephone contact is desired, call Marvin G. Lane, Area Code (904) 791-2412.

IN REPLY ADDRESS
COMMISSIONER OF PUBLIC WORKS
REFER_____

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES

CHARLOTTE AMALIE, ST. THOMAS, V.I. 00801

DEPARTMENT OF PUBLIC WORKS

March 13, 1981

Mr. James L. Garland
Chief, Engineering Division
Department of the Army
Jacksonville District, Corps of Engineers
Federal Building P. O. Box 4970
Jacksonville, Florida 32201

Dear Mr. Garland:

The results of the February 1981 field trip to Savan Gut, St.Thomas by ACE representatives, Hashtak and Lane, are exemplified by the attached correspondence from concerned agencies and individuals. The general meetings and field trips were extremely productive and gave the Corps and the local government officials valuable insights into the special circumstances surrounding the project.

I would appreciate your office's review of the attached correspondence and the acceptance of those design recommendations and observations that can be practically applied to the project. We are cognizant of the 3 million dollar authorization ceiling under which the Corps must operate however, please include all acceptable recommendations, including the covering of the gut, as itemized elements in your final engineering cost estimate.

We appreciate your efforts to get this project moving and look forward to cooperating with you and your staff to correct the serious flood problems in the Savan area.

Should you have any questions or comments on the above please contact me at once. I look forward to hearing from you real soon.

Sincerely,

Robert S. Mathes
Director of Planning &
Development

ATTACHMENTS
cc: Senator Milton A. Frett
Director of V.I. Planning office
Executive Director Urban Renewal Board

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES

OFFICE OF THE GOVERNOR
VIRGIN ISLANDS PLANNING OFFICE
P. O. Box 2606
Charlotte Amalie, St. Thomas, V.I. 00801

February 27, 1981

Mr. Robert Mathes
Director of Planning
Dept. of Public Works
P.O. Box 476
Charlotte Amalie
St. Thomas, V.I. 00801

Dear Mr. Mathes:

Based on my staff members' reports of the recent meetings and field inspection relating to the Savan gut Flood Control Project, I have the following comments. Due to the area's present state of development, archaeological remains of significance are not visible on the ground surface and are not likely to be discovered in any reconnaissance survey. However, because of this condition, it is very important that project excavation be monitored for any appearance of significant archaeological materials. A specialist on the project should be designated to watch for archaeological materials, to alert local agencies, and to arrange for the recording or salvage of materials within a specified period of time. One area of particular note is the outflow point at the harbor bulkhead, which will be dredged to a greater depth. Historic materials are recorded from all over the harbor, including areas adjacent to the bulkhead. We would like to see recovery methods for these materials designed into the project.

In regard to above-ground historic structures, documentation and recording is recommended for a number of structures, including the wall at #33 Vester Gade (now within the urban renewal area) and #6 and #7 Guttets Gade. Other properties worthy of recording will presumably indentified in the report of the consulting firm doing the cultural resource survey. Measured drawings and photographic documentation will be required. I suggest that this recording work be carried out prior to actual initiation of the project.

With regard to the gut itself, it is understood that this must be significantly altered in order for the project to have its desired effect. I suggest again that further documentation, primarily photographic, of the impacted area be provided prior to project initiation. Existing measured

drawings of the gut are probably sufficient for the topographic and plan details. At least three cross-sectional drawings and three twenty foot longitudinal drawings (ten feet either side of the cross-sections) should also be provided. Locations for these can be worked out with my staff. Two sets of all documentation should be submitted - one for the Bureau of Libraries, Museums, and Archaeological Services, and one for the V.I. Planning Office.

I agree that a covered channel will have a less adverse effect on the general appearance of the historic district than the other proposed safety measures, such as chain-link fences on both sides of an open gut.

If you have any furhter questions, please feel free to contact me.

Sincerely yours,

Roy

Roy E. Adams
Director of Planning/SHPO

ERL-WRC/REA/tv

VIRGIN ISLANDS URBAN RENEWAL BOARD

P. O. BOX 2295 . ST. THOMAS . VIRGIN ISLANDS of the U.S.A. . 00801

Office of the
EXECUTIVE DIRECTOR

Telephone
ST. THOMAS 774-0019

March 2, 1981

Mr. Robert S. Mathis
Director of Planning & Redevelopment
Department of Public Works
St. Thomas, V. I. 00802

Re: COE Design, Savan Gut

Dear Mr. Mathis:

In keeping with your request made at meetings held on February 25 and 26 at Public Works Department with Mr. John Hashtak and Mr. Glenn Lane, both from the Corp of Engineers, and currently engaged in the design of the Savan Gut, I submit to you the following comments:

1. That the COE reconsider the 2' drop inlet-effect which will be placed at the inlet (Northend) of the existing culvert which runs underneath Jane E. Tuitt School. This structure should be increased to 4' to 6' deep.

2. That the COE re-study the proposed alignment of the new culvert at the intersection of Gamle Gade and Store Straede. The culvert is indicated as running across an incline (the foot of Fireburn Hill) rather than at the lowest point in the area, and through a substantially large 3 story attractive and well kept building.

3. We strongly support the suggestion to cover the culvert to eliminate the health and safety hazzard but in doing so that the side walls be designed structually strong enough to support a roadway designed to carry a standard highway loading.

Very truly yours,

Franklin Douglas

Franklin Douglas
Technical Assistant

FD:glg

ST. THOMAS
774-0880 ext. 245
774-5770

MILTON A. FRETT

Member, District of St. Thomas - St. John

Fourteenth Legislature of the Virgin Islands

Charlotte Amalie, V.I. 00801

P. O. Box 477

CHAIRMAN:
Committee on Public Safety
VICE CHAIRMAN:
Committee on Judiciary

MEMBER:
Committee on Agriculture
Committee on Finance
Committee on Labor and Veterans Affairs

March 3, 1981

Mr. Robert Mathes
Department of Public Works
Government of the Virgin Islands
St. Thomas, Virgin Islands 00801

Dear Bob:

This is a follow-up to our meeting of February 26, 1981 at which time you suggested that a letter of specific concern as well as recommendations for the improvement of the Savan Gut be sent to you.

In addition to that which has been accomplished thus far, my main area of concern on behalf of the residents of the Savan Area, is to have a covering placed over the gut as a part of the total rehabilitation of the project. I would strongly recommend that this be done.

In light of this concern and in support of my recommendation, I have cited the existing unsanitary condition of the gut and the fact that it also represents a threat to safety. This gut has also become the dumping ground for large household appliances and other types of discarded material.

It was previously decided that two (2) separate estimates of the cost of covering the gut would be made. One estimate will entail the cost of a pedestrian walkway while the other will consist of a covering capable of bearing vehicular traffic.

This will be especially wise since the Legislature will have to address the question of additional funding, i.e., an amount in excess of the $3,000,000 contribution being made by the Federal Government. Having alternative plans available for legislative consideration would assist greatly in determining which of the two would be more feasible following the overall cost analysis, all things being equal.

As I have suggested, I think it would be wise to include in your mailing list the Chairman and/or members of the Legislature's Standing Committee on Public Works. It is a project that I think they should be kept abreast of.

Sincerely,

Milton A. Frett
Senator

MAF/ss

United States Department of the Interior
FISH AND WILDLIFE SERVICE
P.O. Box 3005 - Marina Station
Mayaguez, Puerto Rico 00708

December 17, 1980

Mr. James L. Garland
Chief, Engineering Division
U.S. Army Corps of Engineer
Jacksonville District
P.O. Box 4970
Jacksonville, Florida 32201

Dear Sir:

Attached is the resource report for the Savan Gut Sec. 205 project for St. Thomas, U.S. Virgin Islands. In general we believe that construction of the flood control facilities will not adversely effect the fish & wildlife resources of the area.

This report is provided in accordance with the Fish & Wildlife Coordination Act (48 Stat. 401, as amended; 15 U.S.C. 661 et. seq.)

Sincerely,

Felix Lopez
Acting Biologist in Charge

Attachment

cc: Jacksonville Area Office

Savan Gut
Charlotte Amalie
St. Thomas, U.S. Virgin Islands

Location

Savan Gut, a drainage canal, has a ½ square mile drainage basin which extends from St. Thomas's central ridge, through central Charlotte Amalie, to its discharge into Crown Bay and the Caribbean Sea.

Description

Savan Gut is a drainage gut that is similar to most other drainages on the island of St. Thomas. The gut exhibits a steep gradient from its 1400 foot origin to a location about one half mile from its outlet. The gradient on this lower reach flattens out considerably before entry into Crown Bay. The lower area is completely urbanized; houses, shops, small businesses and streets are located on the banks and over the drainage canal.

Approximately, one half mile above the harbor, the Jane Tuitt School is located, sitting astride Savan Gut. The school causes a severe constriction in the Gut, funneling the gut into a 4'x8' box culvert.

The area above Jane Tuitt School is sparsely urbanized. A few houses occupy areas adjacent to Savan Gut. From the bridge

(#1 on the engineering drawings) located above the Jane Tuitt School to the origin of the gut, the area consists of mostly natural vegetation not having been developed as yet. Riparian vegetation is charactarized by grasses and some scattered Flamboyan and Tamarind trees. Several of these Flamboyan trees are fairly large, reaching height in excess of 25 feet.

Fish and Wildlife Resources

There are no fish living in Savan Gut, owing mainly to the fact that the Gut only carries water during periods of heavy rain. Wildlife observed in the area consisted mostly of small birds that are accustomed to life in urbanized areas. Bananaquit and Pearly-eyed thrasher were seen during our observation, however, we made no surveys of the upper drainage due to limted access. Department of Conservation and Cultural Affairs personnel stated that the upper drainage provides important feeding habitat for both the migratory and indigenous birds of St. Thomas.

Recommendations

Overall, it is not expected that the Savan Gut flood protection project will adversely impact fish and wildlife species of the area. We would like to see the Corps of Engineers confine their

activity in the Gut to the area below Bridge #1 which is located above the Jane Tuitt School. The upper area provides habitat that is important to bird species of the island.

Additionally, the Corps of Engineers should investigate a method of retaining some of the water that flows, unused, out of the Gut. St. Thomas has been experiencing water shortages for many years. Increased development and tourism puts severe strain on the water resources of the island. An old cistern is located just above the Jane Tuitt School. Perhaps this cistern could be refurbished and expanded to store some of the rain water that flows out of Savan Gut.

One of the major problems with the drainage in Savan Gut is accumulated rubbish that finds its way into the channel. Once the flood control structures are completed, open areas from Bridge #1 should be fenced on both sides to help prevent people from using the drainage for garbage disposal.

SAJEN-RH 8 December 1980

Mr. Robert Mathes
Director of Planning and Development
Department of Public Works
Government of the Virgin Islands
Charlotte Amalie, St. Thomas, VI 00801

Dear Mr. Mathes:

This letter refers to our previous letter dated 3 October 1980 concerning a study we are currently preparing for flood reduction measures in the Savan Gut area. For convenient reference, a location map showing the major features of our proposed plan is provided as Inclosure 1.

Our study has progressed to the point that a preliminary alinement plan has been developed. Copies of the preliminary alinement are inclosed for your examination. It is most noteworthy that our alinement does not conform exactly to the existing gut alinement. The criteria that we must use for the design of flood control channels prescribe limits to the minimum degree of curvature required in bends, extent of spiral transition curves, and the amount of invert super elevation. Using these design criteria, the proposed alinement would require the removal or relocation of 13 structures, as shown on Inclosures 2 through 7. This may be a major concern because these structures are located within the limits of the Charlotte Amalie historical districts as listed on the National Register of Historic Places. The local Archeological and Historic Preservation Officer would have to make a determination if these 13 structures could be removed or relocated.

It is requested that after your review of the preliminary alinement, a joint meeting and field trip be conducted to the project area. It is suggested that representatives of the Virgin Islands Urban Renewal Board, Planning Office, and Archeological and Historic Preservation Officer be advised of this meeting along with the consultants for the Veterans Drive widening project. We recommend that you coordinate with local agencies to determine when this meeting would be most suitable. Because of the upcoming holiday

8 December 1980

season it might be advisable to consider a mid-January meeting. In order to expedite arrangements for our meeting, please feel free to contact Mr. John Hashtak, the project manager at (904) 791-2208. Prior to our meeting, it would be extremely helpful if you could provide us with any design or as-built drawings for utilities located under or around the existing gut.

Sincerely,

JAMES L. GARLAND
Chief, Engineering Division

6 Incl (Trip)
1. Location map
2. - 7. Alinement plan

Copy Furnished (w/incl):
Honorable Arnold M. Golden
Commissioner, Dept. of Public Works
Charlotte Amalie
St. Thomas, VI 00801

Mr. Thomas B. Blake
Director of Planning
Virgin Islands Planning Office
PO Box 2606
St. Thomas, VI 00801

Archeological & Historic
Preservation Officer
Virgin Islands Planning Office
PO Box 2606
St. Thomas, VI 00801

Field Supervisor
Division of Ecological Services
U. S. Fish & Wildlife Service
PO Box 3005 - Marina Station
Mayaguez, PR 00708

Mr. Tom Derr
Dalton, Dalton, Newport
34 N. Hawkins Ave.
Akron, OH 44313

bcc:
SAJDS

SAJEN-RH 29 October 1980

Mr. Tom Derr
Dalton, Dalton, Newport
34 N. Hawkins Avenue
Akron, Ohio 44313

Dear Mr. Derr:

This refers to your telephone request of 24 October 1980 concerning information about our current flood control study for the Savan Gut section of Charlotte Amalie, St. Thomas, Virgin Islands.

Inclosed is a location map showing major features of the standard project flood design as it is currently envisioned. These major features include a new 800-foot long box culvert under the central business district, a new concrete open channel averaging 14 feet in width and 5 feet in depth from the school to the business district, a buried concrete diversion chute around the school, replacement of three bridges, and a stilling basin located near St. Thomas Harbor. The stilling basin is designed to be underground and to extend from the existing harbor bulkhead about 40 feet north toward the business district. Inasmuch as the stilling basin will be in the area of your road widening project, future coordination between our offices concerning this matter will be necessary. Accordingly, it is requested that a copy of your preliminary road widening plans be provided this office along with a current estimate of your construction schedule.

Please let us know if we can be of any further service.

Sincerely,

1 Incl
Location Map

JAMES L. GARLAND
Chief, Engineering Division

Copy Furnished:
Mr. Robert S. Mathes
Dir. of Plng & Development
Dept. of Public Works
Government of the Virgin
Islands of the U. S.
Charlotte Amalie, St. Thomas,
V. I. 00801

DALTON · DALTON · NEWPORT

34 N. HAWKINS AVENUE AKRON OHIO 44313 216 836-9111

January 13, 1981

Mr. James L. Garland
Chief, Engineering Division
Department of the Army
Jacksonville District
Corps of Engineers
P. O. Box 4970
Jacksonville, Fla. 32232

Subject: Proposed Highway Project
TERR 0001 (004)
Charlotte Amalie
St. Thomas, Virgin Islands

Dear Mr. Garland:

Thank you for the location map and general description of your proposed flood control project relating to Savan Gut on St. Thomas which you sent via your letter of October 29, 1980. I would also like to thank you for the drawings you sent which show the preliminary alignment of the proposed structure. We received the drawings and a copy of your letter to Mr. Mathes on December 15, 1980.

I have enclosed the material listed below which will help describe the proposed highway project along the waterfront area of Charlotte Amalie.

1. Typical Section of the proposed highway at the waterfront.

2. Overall plan of the proposed facilities along the waterfront.

3. Highway location plan taken from the Draft E.I.S.

Your letter and drawings indicate that a stilling basin is being proposed northward from the existing bulkhead. Since we are proposing to construct a new bulkhead 35'± south of the existing bulkhead, it appears that we will have to accommodate an outfall structure for the stilling basin in our design. When you have proceeded far enough in your design to have developed the basic profile and cross sectional features and dimensions of the stilling basin, along with any pertinent hydraulic data, we would appreciate having this information.

The magnitude of both projects will certainly require coordination of design and construction. Our present schedule calls for the final Location Report and E.I.S. to be submitted for review and circulation about May 1981. Assuming we receive approval of these documents in late summer of this year, we will then proceed into Preliminary and Final Design. Prior to beginning Preliminary Design, we must have aerial mapping prepared and other field surveys completed. From the beginning of Preliminary Design to the completion of Final Design and Bidding, approximately 20 months time will have elapsed. Therefore, construction would occur in the first half of 1983. As you probably can understand, not all of the events which must happen between now and construction are under our control and the general schedule which I have outlined above has certain assumptions built into it with regard to review and response times.

If you have any further questions about our project, please let me know.

Very truly yours,

DALTON·DALTON·NEWPORT

C. T. Derr

C. T. Derr, P.E.
Project Manager

CTD:cmr
Enclosure
File 7913700
cc: Mr. Al Muhic

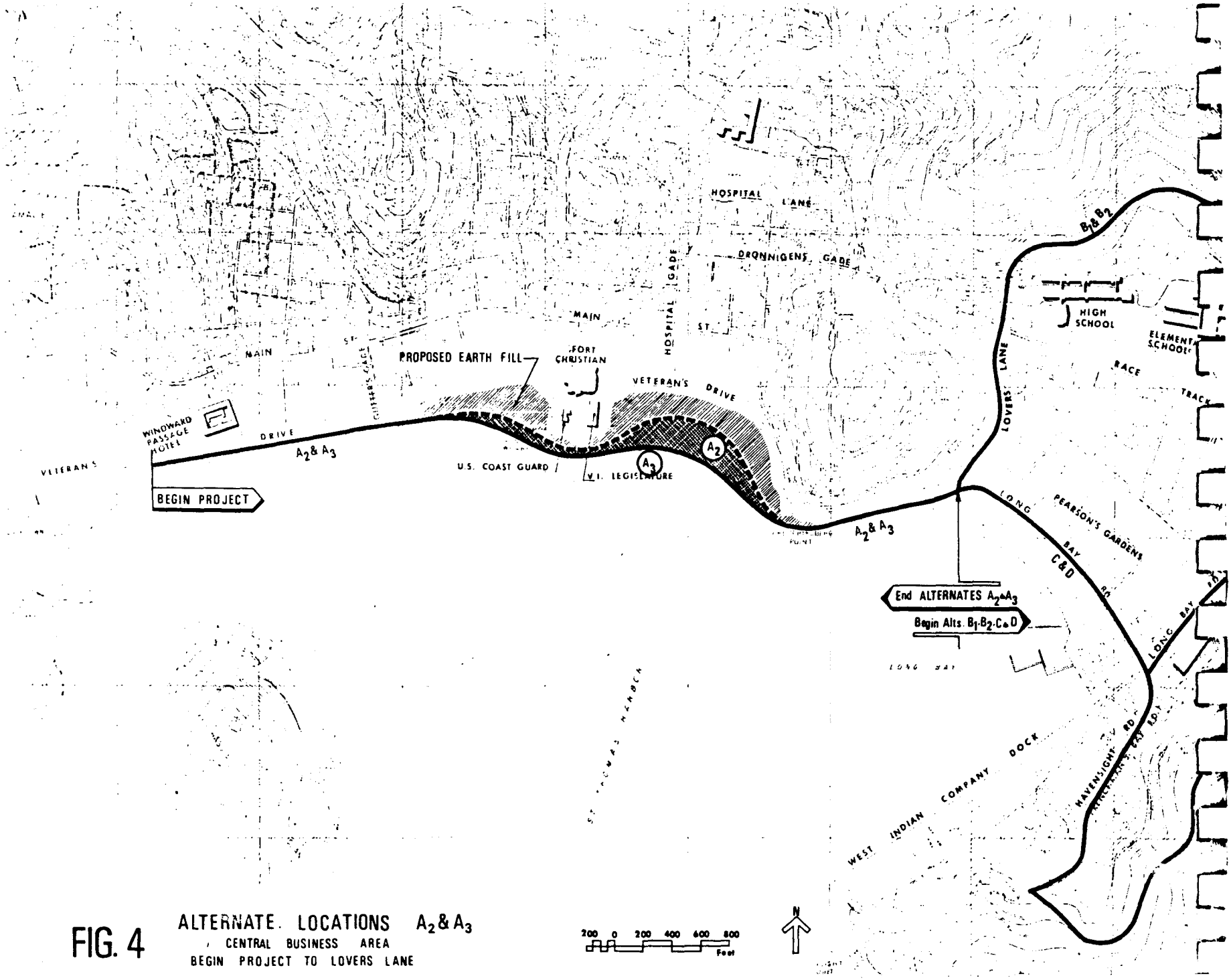
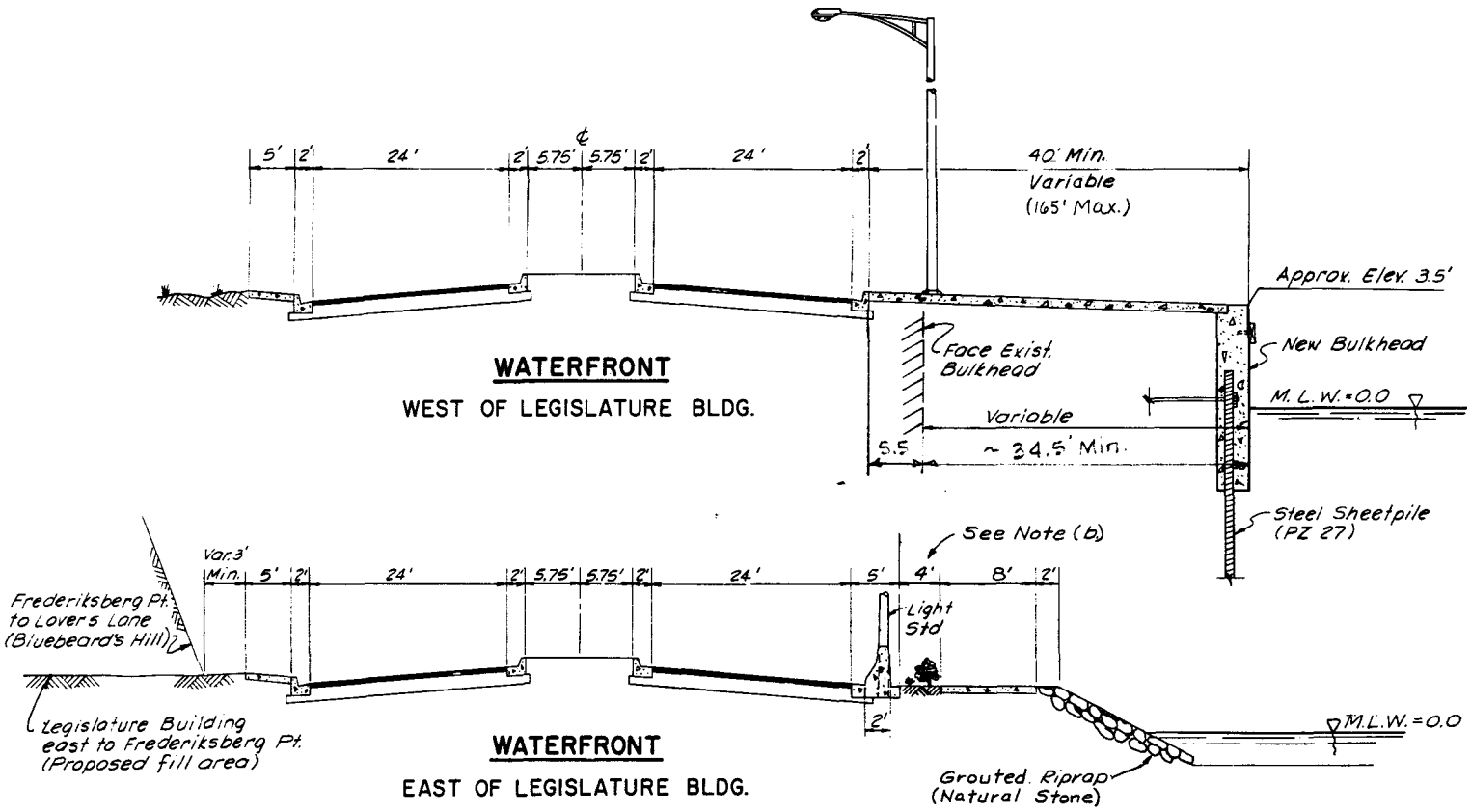
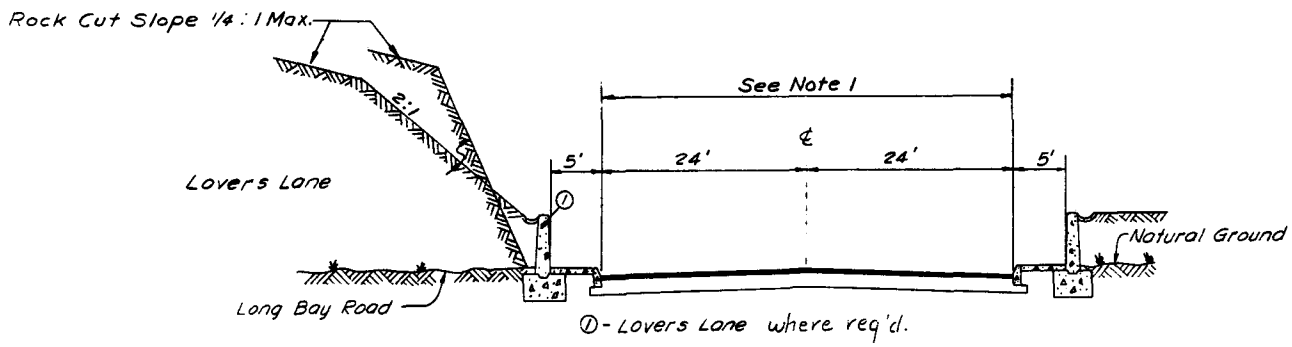


FIG. 4 ALTERNATE LOCATIONS A_2 & A_3
CENTRAL BUSINESS AREA
BEGIN PROJECT TO LOVERS LANE





LOVERS LANE - Long Bay Rd. To Sugar Estate Rd. (Recommended)

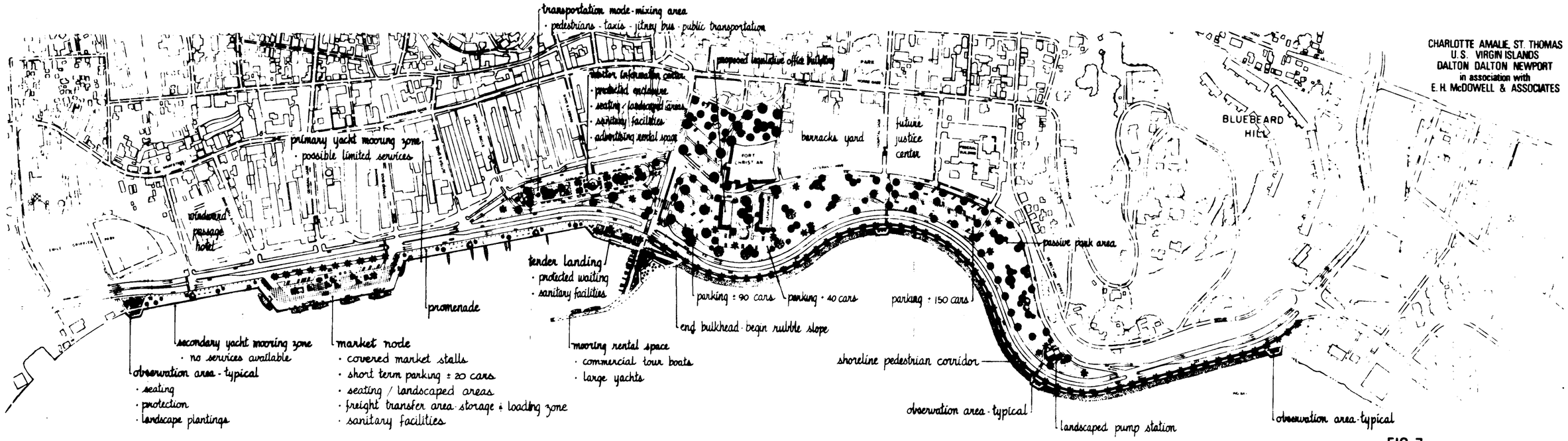
Notes:

(a) Pavement widens from 48' to 60' at major intersections to provide for turning lane.

(b) Space to be Used for Planting and occasional benches.

(c.) Exist. Storm Sewers and Culverts to be extended through new bulkhead and stone riprap. Sizes appropriate for drainage areas and hydraulic conditions. New inlets to be installed along gutter line of new pavement.

FIG. 5 TYPICAL SECTIONS - URBAN AREA



CHARLOTTE AMALIE, ST. THOMAS
U.S. VIRGIN ISLANDS
DALTON DALTON NEWPORT
in association with
E. H. McDOWELL & ASSOCIATES

FIG. 7
PROPOSED NEW HIGHWAY AND
LINEAL PARK MITIGATION PLAN

SAJEN-RI 3 October 1980

Mr. Robert S. Mathes
Director of Planning and Development
Department of Public Works
Government of the Virgin Islands
Charlotte Amalie, St. Thomas, V. I. 00801

Dear Mr. Mathes:

This is in response to your letter dated 5 September 1980 concerning our current study for flood reduction measures in the Savan Gut area of Charlotte Amalie.

We have examined the preliminary sketch of the right-of-way alinement that the Virgin Islands Urban Renewal Board is considering for a proposed road which would connect General Gade with Levkoi Strande. The inclosed location map shows the major features of the flood control plan which we are now studying. These features include a new 800-foot-long concrete box culvert under the central business district, a new concrete open channel averaging 14 feet in width and 5 feet in depth from the Jane E. Tuitt School downstream to the business district, a buried concrete diversion chute around the school, three new bridges over the gut, and a stilling basin located near the St. Thomas Harbor.

The work considered by Virgin Islands Urban Renewal Board is in the reach of our proposed canal enlargement which contains the junction with the chute. The performance of our hydraulic designs would be extremely sensitive to modification because during design conditions both the channel and the chute are flowing supercritically. Accordingly, the proposal to change the alinement of the existing gut and replace the existing channel with a new steel cylindrical pipe culvert would not be adaptable to our design. Another area of interest is the bridge over the gut at General Gade. Do you know if the proposed road work would involve any modification to the existing bridge? Our office is recommending replacement of this bridge and features such as net area, approach geometry, and low chord elevation would be critical to hydraulic performance.

SAJEN-RH 3 October 1980
Mr. Robert S. Mathes

It is recommended that a design be considered that would be satisfactory for flood conveyance as well as road construction. One such design could be a box culvert with the ceiling designed to be at least 1 foot above the design water surface profile. The pavement then could be placed on top of the box culvert and a suitable junction could be formed in the area where needed. From that point, a converging rectangular section could be constructed which could possibly be formed in place.

It is the desire of this office to cooperate fully with your office and the Virgin Islands Urban Renewal Board. It is requested that you consider proposals mentioned herein. We will provide drawings of our proposed alinement when they become available around 1 November 1980. It is recommended that after your review of the preliminary alinement plans, a joint meeting and field trip be conducted to determine the practicality of a multi-purpose design. This would also be an opportune time to coordinate detailed findings of our planning effort and insure public involvement in the plan formulation process.

Sincerely,

1 Incl
Location

JAMES L. GARLAND
Chief, Engineering Division

Copy furn (w/incl):
Virgin Islands Urban Renewal
Board

bcc:
DDE for PR & VI

IN REPLY ADDRESS
COMMISSIONER OF PUBLIC WORKS
REFER_____

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES

CHARLOTTE AMALIE, ST. THOMAS, V.I. 00801

—— o ——

DEPARTMENT OF PUBLIC WORKS

September 5, 1980

Mr. A. J. (Ed) Salem, P. E.
Chief, Project Planning Branch
Engineering Division
Corps of Engineers
Jacksonville District
P. O. Box 4970
Jacksonville, Florida 32201

Dear Ed:

Please find enclosed information from the V. I. Urban Renewal Board pertaining to the Savan Gut project.

As other supplemental data becomes available I will forward everything to you for a determination of inclusion in the project documents.

Thanks again for your continued cooperation.

Sincerely,

Bob

Robert S. Mathes
Director of Planning and Development

Enclosure

VIRGIN ISLANDS URBAN RENEWAL BOARD

P. O. BOX 2295 . ST. THOMAS . VIRGIN ISLANDS of the U.S.A. . 00801

Office of the
EXECUTIVE DIRECTOR

Telephone
ST. THOMAS 774-0019

August 5, 1980

Honorable Arnold M. Golden
Commissioner
Department of Public Works
Charlotte Amalie
St. Thomas, Virgin Islands

Re: Savan Renewal Area

PUBLIC WORKS DEPT
'80 AUG 6 PM 4:18

Dear Commissioner Golden:

In your letter of February 13, 1980, you indicated that the U.S. Army Corps of Engineers was in the process of designing improved flood control measures in the Savan Gut area and that preliminary design drawings will be ready this summer.

For the purpose of coordinating this office's plans with those of the C.O.E. and P.W.D., we have enclosed a preliminary sketch of the alignment of the new R.O.W. proposed which will tie General Gade and Levkoi Straede.

We further plan that the existing gut in that immediate area will be re-aligned in keeping with the new R.O.W. and a new steel cylindrical pipe culvert of some increased cross-sectional area (perhaps 100 sq. ft. ±) will be installed.

We are aware of the urgency in coordinating this new R.O.W. as evidenced by C.O.E. work crews making test boring in the area along the present course of the gut.

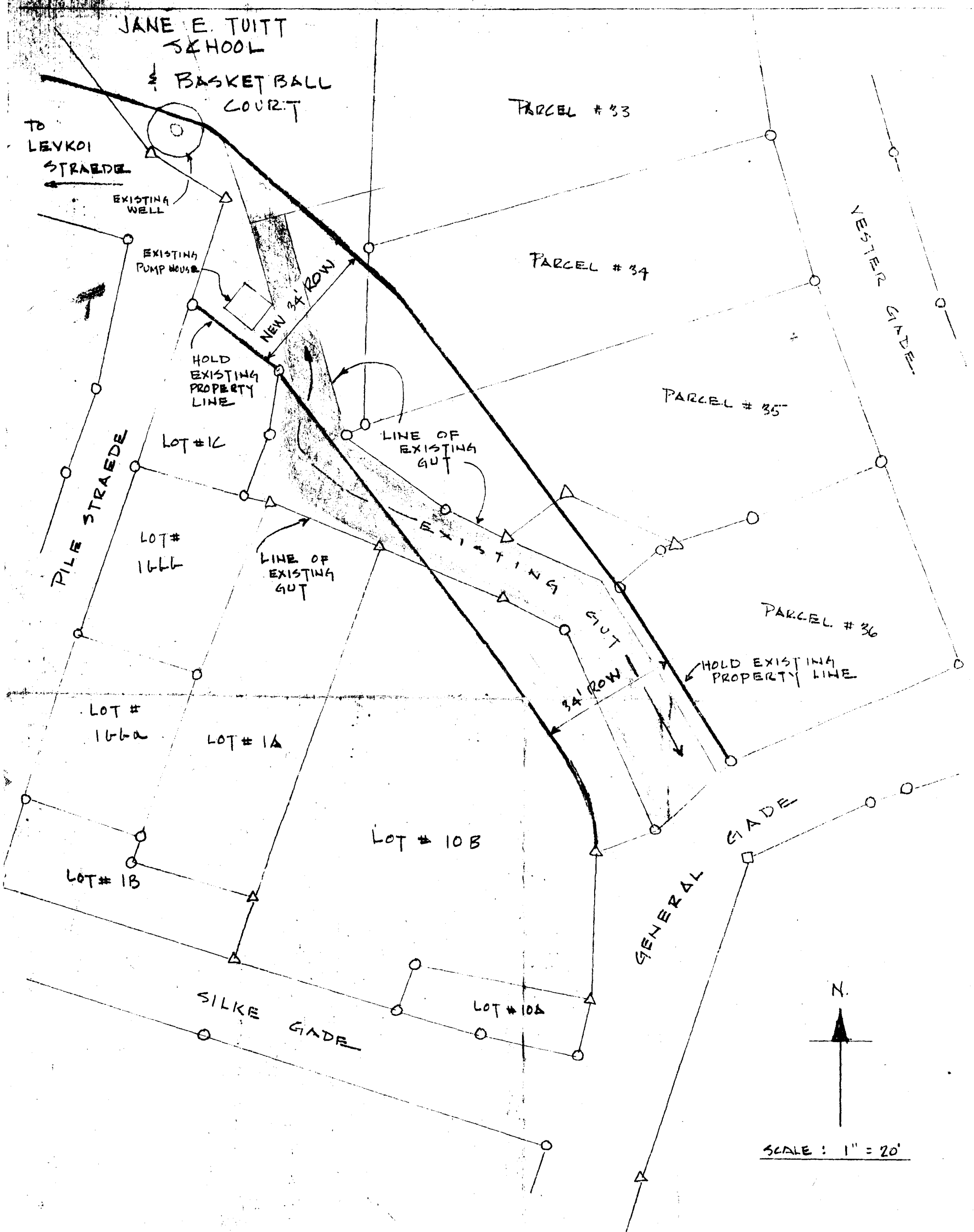
Input at this time from all agencies involved will be invaluable. Please don't hesitate to contact this office should you have any questions or comments regarding this project.

Sincerely,

J. Douglas for

Josephine Ottley
Executive Director

ib
Enclosures



PRELIMINARY LAYOUT
PROPOSED 34' RIGHT OF WAY
SAVAN RENEWAL AREA
V.I. URBAN RENEWAL BOARD JULY 30, 1980

SAJEN-RH 19 August 1980

Mr. Donald J. Hankla
U. S. Fish and Wildlife Service
15 North Laura Street
Jacksonville, Florida 32202

Dear Mr. Hankla:

The purpose of this letter is to initiate a request for a resource inventory and habitat evaluation for the Savan Gut area located in Charlotte Amalie in the south side of St. Thomas in the U. S. Virgin Islands. This office is currently preparing a detailed project report for flood protection measures in the area based on the findings of a reconnaissance report prepared in 1977. At that time a joint preliminary field reconnaissance was conducted with representatives of this office, the Fish and Wildlife Service and the local sponsor, the Virgin Islands Public Works Department.

The plan currently being considered is very similar to that recommended in the reconnaissance report. Inclosed is a location map of the study area, showing the location of the existing gut, bridges, and Jane E. Tuitt School about 1,850 feet upstream of St. Thomas Harbor.

Local interests are primarily interested in measures to reduce or relieve recurrent flooding at the school located astride Savan Gut and also to reduce flooding in the business district further downstream. Accordingly, we have developed a flood control project to relieve damages from storms up to the Standard Project Flood (SPF).

Major features of the design include a new 800-foot long concrete box culvert under the central business district, a new concrete open channel averaging 14 feet in width and 5 feet in depth from the school downstream to the business district, a buried concrete diversion chute around the school, 3 new bridges over the gut, and a stilling basin located near the St. Thomas Harbor.

SAJEN-RH 19 August 1980

Mr. Donald J. Hankla, Area Manager

The current schedule for this project includes the submission of the Detailed Project Report to higher authority by 30 December 1980. Accordingly it is requested that the resource inventory and habitat evaluation begin as soon as possible under our existing transfer fund agreement. We currently show an unobligated balance of $700 from the $1,000 transferred for this project in FY-79. In order to meet our current schedule, it is requested that the resource inventory and habitat evaluation be complete by 3 October 1980. A workshop will be scheduled shortly thereafter.

Mr. A. D. Cadorath, the former District Office contact for this project, has retired. Mr. John Hashtak is the new District Office contact for this office (904-791-2208 or FTS 946-2208).

Sincerely,

1 Incl
Location map

JAMES L. GARLAND
Chief, Engineering Division

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES

OFFICE OF THE GOVERNOR
VIRGIN ISLANDS PLANNING OFFICE
P. O. Box 2606
Charlotte Amalie, St. Thomas, V.I. 00801

June 11, 1980 809-774-1726

Mr. James L. Garland
Chief, Engineering Division
Department of the Army
Jacksonville District, Corps of
Engineers
P.O. Box 4970
Jacksonville, Florida 32201

Dear Mr. Garland:

This is in reply to your request for comments relative to the cultural resources of the area of proposed improvement to the Savanne (or Savan) Gut in Charlotte Amalie, St. Thomas. Contrary to the information which your letter of May 20, 1980, indicates that you received from the Department of the Interior, Heritage Conservation and Recreation Service, the whole of the project area on Guttets Gade south of Back Street is included within the Charlotte Amalie Historic District, a property listed in the National Register of Historic Places. The Jane E. Tuitt School itself is just outside the historic district, but there are a number of properties immediately to the north and west of it which are considered eligible.

Based on the information contained in your Reconnaissance Report, I believe that the Guttets Gade portion of your Savanne Gut project will have no effect on the above-ground structures of the historic district. However, depending on the extent of the excavation necessary to install the new culvert and the extent of disturbance caused during installation of the existing culvert, there may be an adverse effect on archaeological resources. The area in question is part of the old warehouse section of the original Charlotte Amalie Waterfront, and there is a possibility that the culvert excavation would uncover important buried remains of historic structures or activity areas. Since the street is now paved, of course, a pre-construction field survey would not yield any new information. It may be that the best method to avoid adverse effect would be to assign an historical archaeologist to monitor the project construction and to allow a temporary halt to the project should it become necessary to record archaeological information or to salvage materials.

For the Jane E. Tuitt School portion of the project, I do not forsee that there will be an impact on historic properties. A cultural survey should not be necessary, but, again, it may become necessary to salvage historic materials if any are encountered in the excavation for the drainage chute. I have one question concerning the project plans. In Table 2, "School Plan Costs", relocations are budgeted at a cost of $3000. Does this mean that individuals will be relocated and therefore existing structures removed?

Additionally, since I have been asked to comment on several Corps projects, it would be most helpful if you could send me a copy of the Corps' regulations for fulfilling its historic preservation responsibilities. Thank you for this opportunity to comment on your proposed project.

Sincerely,

Thomas R. Blake
Director of Planning, SHPO

ERL/TRB/jw

SAJEN-RF 22 December 1978

Honorable Juan Luis
Governor of the Virgin Islands of the
United States
Office of the Governor
Charlotte Amalie, St. Thomas
Virgin Islands

Dear Governor Luis:

Reference is made to your letters of 9 and 29 November 1978, concerning flooding problems on St. Thomas and St. Croix for which you requested assistance under the Section 205 Small Projects Program.

We are currently working on a Definite Project Report (DPR) for the Savan Gut area in Charlotte Amalie, which includes a portion of the downtown area. As that study progresses, the nature of the problems and needs and possible solutions will be more clearly defined. Your office will be kept advised as to the results of the various phases of the study.

We will initiate work on Reconnaissance Reports for the two areas on St. Croix at a later date as workload permits. Again, we will contact your office upon initiation of these study efforts.

We look forward to working with the Virgin Islands in assisting with some of your water resource problems.

Sincerely,

ROBERT J. WATERSTON III
LTC, Corps of Engineers
Acting District Engineer

Cy furn:
Deputy District Engineer
for P. R. & V. I.

THE VIRGIN ISLANDS OF THE UNITED STATES
OFFICE OF THE GOVERNOR
CHARLOTTE AMALIE, ST. THOMAS

November 9, 1978

Colonel James W. R. Adams
District Engineer
Department of the Army
Army Corps of Engineers
P. O. Box 4970
Jacksonville, Florida 32201

Dear Colonel Adams:

Attached are letters dated September 8, 1976 addressed to Colonel Donald A. Wisdom, former District Engineer by the late Governor Cyril E. King, and the Colonel's response dated November 26, 1976. These letters concern flood control for the Virgin Islands.

Because of recent flood conditions throughout the Virgin Islands, I find it necessary to seek the assistance of the Army Corps of Engineers with regard to flood control problems in the Virgin Islands through the Section 205 Program. After analysis of past flood histories and other technical information available, I have selected three areas which are in most urgent need for flood protection and consequently recommend those for the reconnaisance phase. The three areas are separate both functionally and hydrologically as illustrated on the enclosed maps. Those areas are as follows:

1. The downtown Charlotte Amalie, St. Thomas area which is the terminal point for several different steep watersheds. The area encompasses the downtown area from the Catholic Church on the west to Fort Christian on the east. This area has been severely flooded, with attendant property damage, during floods of 1960, 1969, 1970 and 1974. It is a

densely developed area of residences and commercial uses. The affected area is somewhat over twenty-five acres; the twenty-five year peak flood flow is estimated at 2,475 cubic feet per second (cfs) and the watershed area is 423 acres.

2. The Tide Village area east of Christiansted, St. Croix. The residential and commercial uses in the area have been seriously affected and damaged during past floods. Poor development planning has placed many homes into a flood zone including a major road serving the east end of St. Croix. The affected area is about fifty-two acres; the twenty-five year peak flood flow is estimated at 1374 cfs and the watershed area is 450 acres.

3. The lower portions of the town of Christiansted, St. Croix. Like Charlotte Amalie, several watersheds of the surrounding hills terminate in the town causing flash flood problems. The area affected extends from the Watergut area on the west to the Gallows Bay area on the east and reaching several blocks deep into the town. Like the other two areas it has experienced severe flood problems in the past. The affected area is about 120 acres. The twenty-five year peak flood flow is estimated at 4484 cfs; the watershed area is 1046 acres.

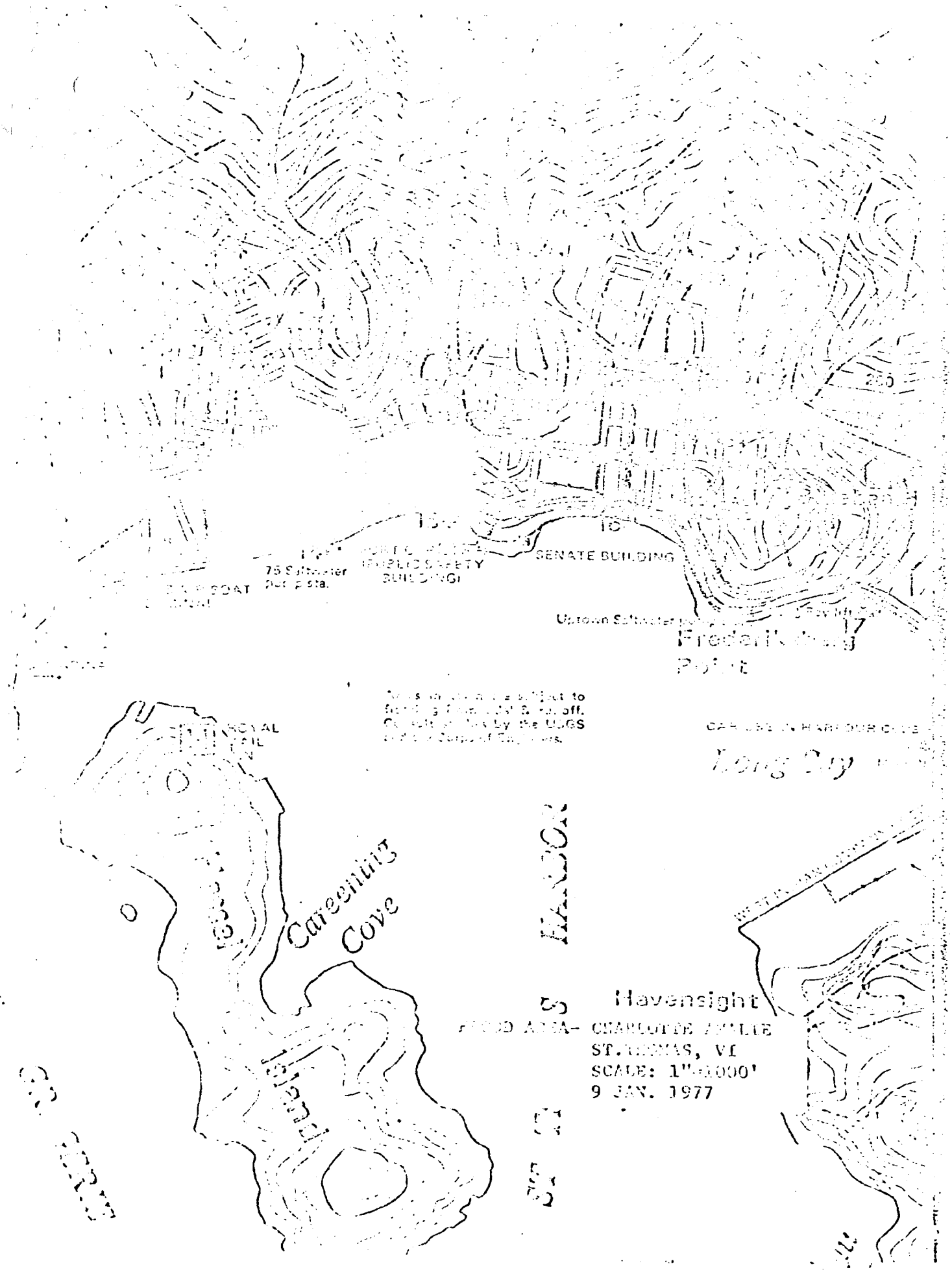
The attached maps are copies of portions of the Water Resources Maps forwarded to your office at an earlier date. The maps show the above mentioned areas in yellow. The indicated areas of flooding were taken from information supplied by the U. S. Geological Survey.

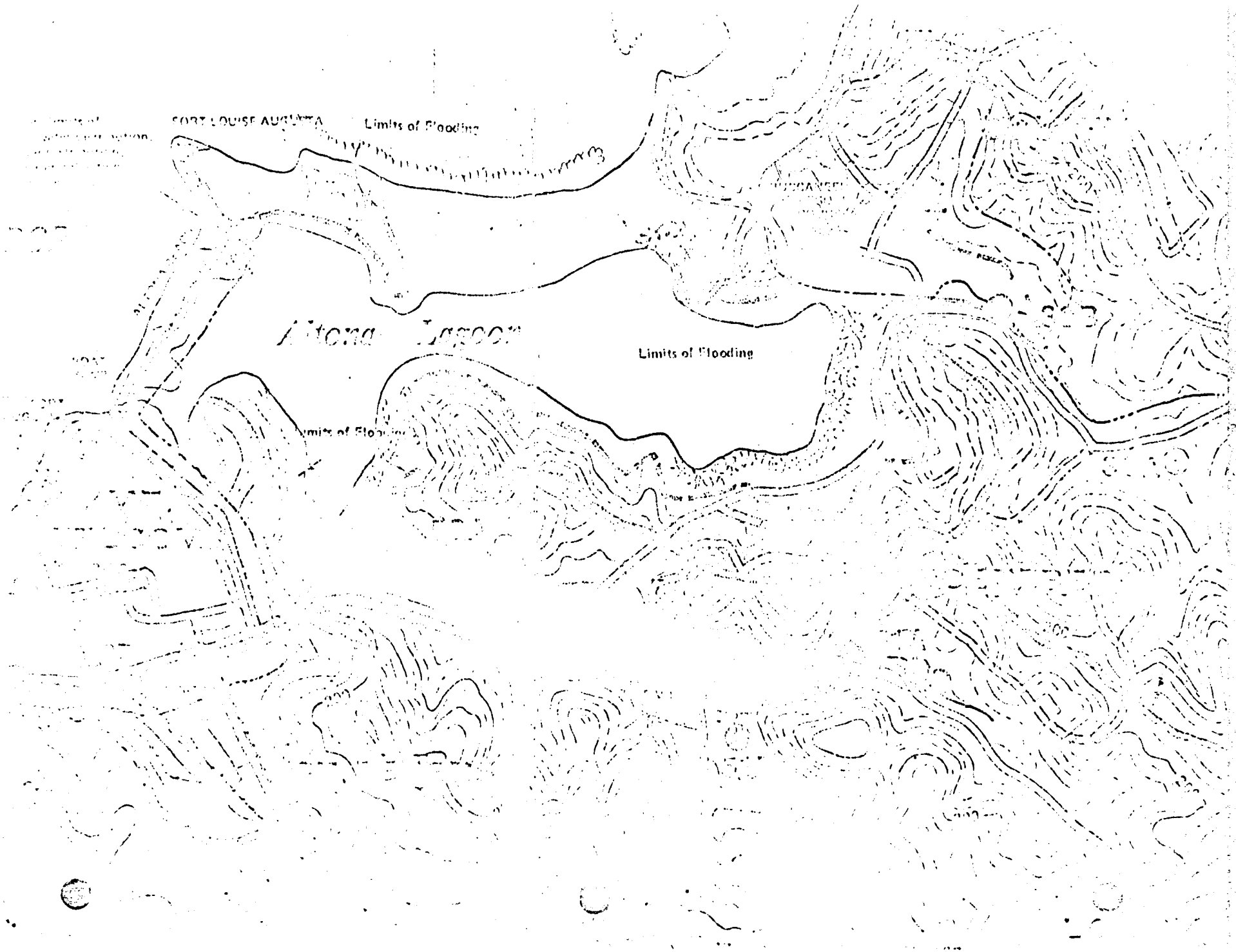
In addition to the three areas specifically mentioned above, it is necessary for me to bring to your attention that Mon Bijou, a centrally located housing development, has suffered severe damage during the last two floods and continue to be a highly prone flood area. This area is also in need of flood protection and I recommend that it be included in the reconnaisance phase.

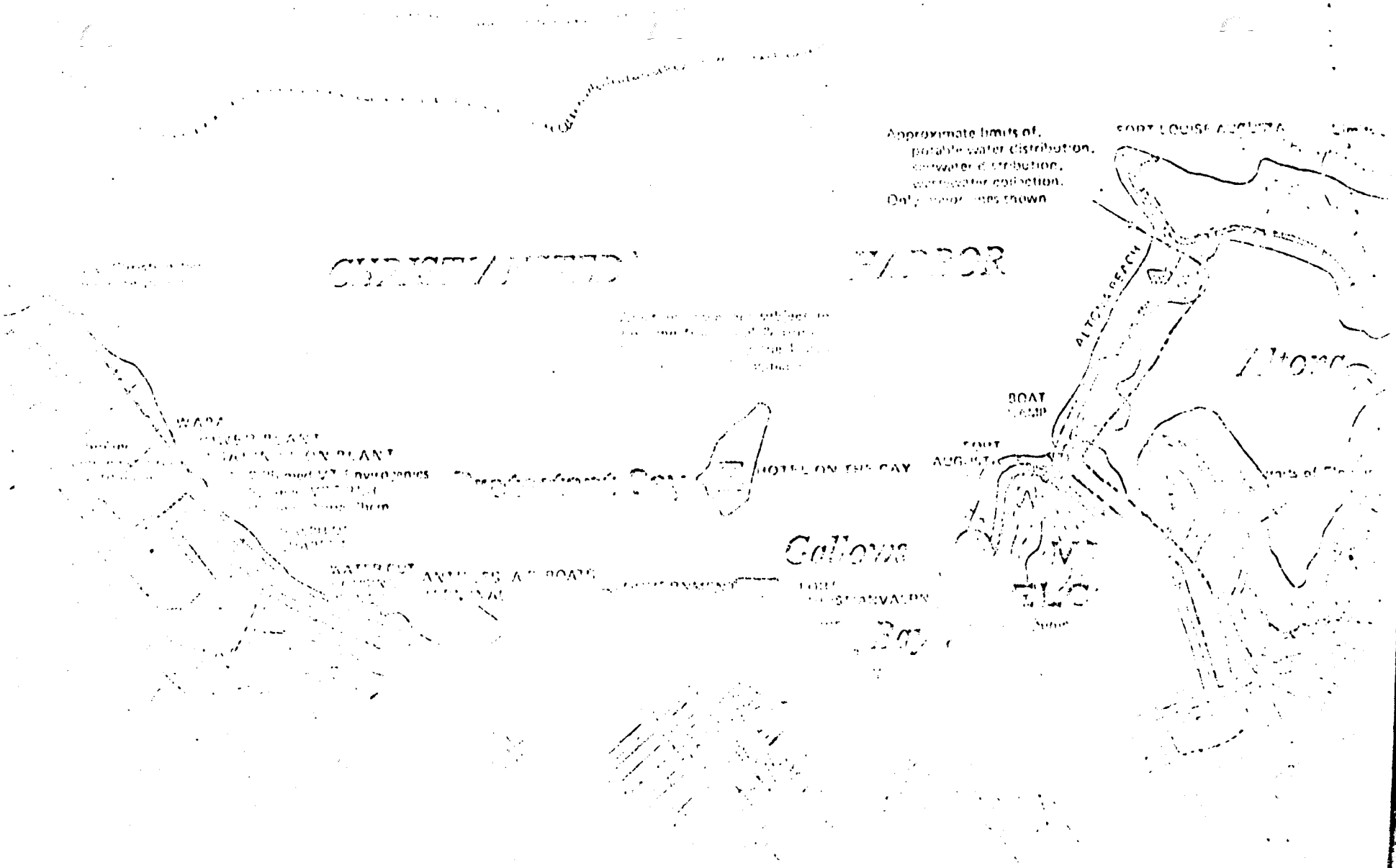
I hope this information is sufficient to commence the reconnaisance phase of your flood protection program. You can be assured of our assistance and cooperation in this effort. Hopefully we will see the flood problems minimized or eliminated in a very short time.

Sincerely yours,

Juan Luis
Governor


SENATE BUILDING
Frederiksted
Point
Long Bay
Careening
Cove
HARBOR
Havensight
CHARLOTTE AMALIE
ST. THOMAS, VI
SCALE: 1"=1000'
9 JAN. 1977


Limits of Flooding
Limits of Flooding


Approximate limits of,
potable water distribution,
sewerage collection.
Only major lines shown
ALTON BEACH
BOAT
HOTEL ON THE BAY
Gallows

IN REPLY ADDRESS
COMMISSIONER OF PUBLIC WORKS

REFER_____

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES
CHARLOTTE AMALIE, ST. THOMAS, V.I. 00801

DEPARTMENT OF PUBLIC WORKS

August 2, 1978

Mr. James L. Garland
Chief, Engineering Division
Department of the Army
P.O. Box 4970
Jacksonville, Florida 33201

Re: Savan Gut Section 205 Flood Control Study

Dear Mr. Garland:

Through the Director of Planning, Mr. Thomas R. Blake, I have received copies of the reconnaisance report and the required qualifications and duties of the local sponsor for the proposed savan gut flood control project in St. Thomas.

Since flood control is so very essential in this area, the Department of Public Works will be pleased to accept sponsorship of this program for the Virgin Islands, and we look forward to a cooperative relationship with you and the Corps of Engineers.

Kindly keep us informed as to the progress of this project and call upon us if we can be of any assistance.

Very truly yours,

Gordon A. Finch

Gordon A. Finch
Commissioner

cc: Mr. Thomas Blake

GOVERNMENT OF
THE VIRGIN ISLANDS OF THE UNITED STATES

OFFICE OF THE GOVERNOR
VIRGIN ISLANDS PLANNING OFFICE
P. O. Box 2606
Charlotte Amalie, St. Thomas, V.I. 00801

November 16, 1976

Mr. Ronald E. Hilton, Chief
Flood Plain Management Services Branch
P. O. Box 4970
400 W. Bay Street
Jacksonville, Florida 32201

Dear Mr. Hilton:

Pursuant to the letter from James Garland, Chief, Engineering Division, dated July 16, 1976 and to the conference of October 28, 1976 at the Virgin Islands Planning Office regarding the Savan flooding problem, the following decision has been reached.

Of the alternatives presented to us in the above-mentioned letter and discussed at the conference, we are requesting assistance in the form of solution 2 (a small flood control project) and solution 4 (school flood-proofing study). Although these solutions are not of immediate benefit to the Savan Community Renewal Project under the Community Development Block Grant, we see their long-range value in terms of assessing the relative costs of local government implementation. We look forward to further correspondence from you concerning this.

We have shared the data you gave us on Flood Plain information with Edward Phillips, Assistant Director, Virgin Islands Planning Office. Mr. Phillips heads the Long Range Planning section and will be in touch with you.

Thank you for your kind cooperation.

Sincerely yours,

Thomas R. Blake

Thomas R. Blake
Director of Planning

ES:TRB:ab

SAJEN-F 16 July 1976

Ms. Elizabeth Sanchez succeeded

Mrs. Kincey Potter
Senior Program Analyst
Community Development Unit
Virgin Islands Planning Office
P.O. Box 2606
Charlotte Amalie, St. Thomas, V.I. 00801

Dear Mrs. Potter:

Reference is made to your letter, dated 8 July 1976, regarding tha Savan flooding problem.

We apologize for not getting back in touch with you sooner on the Savan flooding problem. However, we recently tried to get in contact with the USDA Soil Conservation Service (SCS), Caribbean Area Director to discuss and determine their interest in the matter. However, to date, we have been unable to determine their interest.

As discussed at the 18 May 1976 meeting in your office between Messrs. Ronald Hilton of my staff and Trafton Fleetwood of our South Atlantic Division Office, it is felt that there are four (4) possible solutions to the Savan flood problem. They are as follows:

1. Relocate the school.

2. A small flood control project designed and constructed by the Corps under the Small Flood Control Projects Authority. This would have to be preceded by a preliminary reconnaissance report and if found warranted, a detail project report.

3. A small flood control project involving a cooperative agreement between Corps and SCS on planning, design, and construction.

4. Corps provide flood-proofing study for school under our Flood Plain Management Services (FPMS) program. Plans and specifications for flood-proofing by the Corps, construction of flood-proofing measures by the Virgin Islands government.

SAJEN-F
Mrs. Kincey Potter

16 July 1976

Two (2) of the four (4) possible solutions mentioned above involve the Corps Small Flood Control Projects Authority. Inclosed for your information is a fact sheet on that authority. It should also be pointed out that any project constructed by the Corps would have to be economically feasible according to our criteria for developing benefits and costs.

Your 8 July letter mentioned that planning for the project is proceeding. Please let us know your plans for the Savan area and also which of the four (4) possible solutions mentioned above you may want to pursue.

For your information, we received a letter, dated 24 May 1976, from Mr. Thomas R. Blake, Director of Planning for the Virgin Islands, requesting a Flood Plain Information (FPI) report for the Demarara section of Charlotte Amalia. The Demarara FPI study will be initiated by this office in Fiscal Year 1977. Actual initiation of the study will probably start about 1 November 1976 and should be completed by September 1977. We will be in contact with you and Mr. Blake when we initiate the Demarara study. Please inform Mr. Blake that we plan to initiate the Demarara FPI study in Fiscal Year 1977.

It is hoped the above and inclosed information will be helpful. If we can provide any additional information or data, please let us know.

Sincerely yours,

1 Incl
As stated

JAMES L. GARLAND
Chief, Engineering Division

CF: (w/o incl)
Ch, Proj Plng Br

Mr. Hilton/sb/3507

Mr. Salem

Mr. Marsch

SAJEN-RH March 1982

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX E

SECTION 404(B) EVALUATION

SECTION 205 DETAILED PROJECT REPORT
SAVAN GUT AT CHARLOTTE AMALIE
ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX E

SECTION 404(B) EVALUATION

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G. FINDINGS		

SECTION 404(b)(1) FOR SAVAN
GUT PROJECT, CHARLOTTE AMALIE,
ST. THOMAS, U.S. VIRGIN ISLANDS

A. PROJECT DESCRIPTION

1. Description of the Proposed Discharge of Dredged or Fill Materials. The proposed work calls for the excavation of approximately 40 cubic yards of predominantly sand material with small quantities of silt from the front of the existing seawall at the mouth of Savan Gut, Charlotte Amalie, St. Thomas and replacement with 40 cubic yards of tremie concrete. A 100-foot-long sheet pile cutoff wall will then be driven to elevation -25 feet m.s.l., both 55 feet east and west of the centerline of Guttets Gade. The concrete will serve as a seal between the new cutoff wall and the existing harbor bulkhead. Material excavated from the harbor bottom will be placed aboard trucks and removed to an inland disposal area yet to be determined.

2. Description of the Proposed Disposal Sites for Dredged or Fill Material. The proposed excavation will occur seaward of the existing seawall at the mouth of Savan Gut, Charlotte Amalie, a drainage channel undergoing study for possible improvement. Proposed harbor work will extend out from the seawall approximately 5 feet into harbor waters. The site at the seawall is used as an anchorage for harbor ship traffic with propellor scour frequently disturbing the bottom and removing any rooted vegetation.

B. PHYSICAL EFFECTS

3. Wetlands. No wetlands will be impacted.

4. Effects on the Water Column as to:

(a) Light Transmission. Once construction of the stilling basin is completed, there will be no changes from existing light transmission levels. Light levels are currently reduced at irregular intervals since Savan Gut is a partially natural-partially channelized drainage channel which drains stormwater from the island into the harbor. There may be slight increases in turbidity during stilling basin excavation, but this is expected to be localized and short-term in duration.

(b) Esthetics. Excavation and placing of concrete will temporarily cause impacts upon the scenic view over St. Thomas Harbor. This impact is temporary and will be removed once construction ceases. Actual removal of bottom sediments and placement of concrete on the harbor bottom will not be visable from the surface once completed, thus there will not be any long-term aesthetic impacts.

(c) Nekton and Plankton. Motile organisms will avoid the site of construction during the excavation. Once activity ceases those species typical of shallow water, tropical Caribbean seas should return to the site. Planktonic organisms may be temporarily impacted by short-term turbidity increases, but as the project area comprises a very small percentage of the total available aquatic habitat, this impact should be minimal.

5. Effects of Covering the Benthos. No discharge of excavated material from harbor bottom is expected. Placement of concrete will not impact any benthos as placement will occur after excavation ceases.

6. What Will be Changes in

a. Bottom Geometry. Excavation will result in removal of approximately 40 cubic yards of material from the St. Thomas Harbor, extending to a depth of -6.4 feet feet m.s.l., for a width of 5 feet, and a length of 110 feet (see plate B-2).

b. Substrate composition. The primary sandy substrate will be replaced with tremie concrete.

c. Salinity Gradients. No effects.

d. Alteration of Biological Communities Due to Exchange of Constituents Between Sediments and Overlying Water. No effects.

C. CHEMICAL-BIOLOGICAL INTERACTIVE EFFECTS

The tremie concrete used for fill meets the exclusion criteria outlined in 40 CFR 230.4 and is excluded from further testing.

D. REVIEW OF APPLICABLE WATER QUALITY STANDARDS

A review of 40 CFR indicates the proposed excavation and fill operations will not have any long-term impacts upon water quality, and is in conformance with applicable water quality standards.

E. STATEMENT AS TO CONTAMINATION OF FILL MATERIAL IF FROM A LAND SOURCE

Approximately 40 cubic yards (total) of tremie concrete will be utilized as a seal between the new cutoff wall and the existing bulkhead. As far as is known, this fill material is not subject to any sources of pollution and is not known to contain any levels of contamination.

F. CONCLUSIONS AND DETERMINATIONS

7. An ecological evaluation has been made following the evaluation guidance in 40 CFR 230.4, in conjunction with the evaluation considerations in 40 CFR 230.5.

8. Appropriate measures have been identified and incorporated in the proposed plan to minimize adverse effects on the aquatic environment as a result of discharge.

9. Consideration has been given to the need for the proposed activity, the availability of alternative sites and methods of disposal that are less damaging to the environment, and such water quality standards as are appropriate and applicable by law.

G. FINDING

The discharge sites for the proposed work have been specified through the application of the Section 404(b)(1) Guidelines.

SAJEN-RH March 1982

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX F

CONCRETE MATERIALS INVESTIGATION

SECTION 205 DETAILED PROJECT REPORT
SAVAN GUT AT CHARLOTTE AMALIE
ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX F

CONCRETE MATERIALS INVESTIGATION

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APPENDIX F

CONCRETE MATERIALS INVESTIGATION

A. INTRODUCTION

1. Purpose. This concrete materials investigation is in accordance with the requirements of appendix A of EM 1110-2-2000, "Standard Practice for Concrete" for projects with 2,000 to 10,000 cubic yards of concrete. The purpose of this appendix is to describe the concrete materials and facilities to be used for the Savan Gut project and to relate the use and location of these materials and facilities to the work areas.

2. Scope. This material investigation presents the investigation data leading to the recommendations for concrete materials suitable for use in construction of the Savan Gut project. The items discussed are the concrete investigation, the cementitious materials investigation, the aggregate investigation, the water investigation, and the batch plant investigation.

B. CONCRETE INVESTIGATION

3. Concrete Quantity. The Savan Gut constrution is estimated to require approximately 3,700 cubic yards of concrete. The maximum placement rate will be less than 50 cubic yards per hour.

4. Climatic and Functional Conditions. St. Thomas is the second largest of the U.S. Virgin Islands, covering about 28 square miles. It has an extremely irregular coastline and is very hilly with practically no flatland. This results in rather steep slopes over all the island, so that rainfall runoff is quite rapid and there are no permanent streams or rivers. During the warmest months the high temperatures average about 88°F with low temperatures about 76°F. During the coolest months the daily temperatures range from highs in the low 80's to the lows in the high 60's. The trade winds blow almost without exception from an easterly direction with the average maximum wind speed slightly above 16 miles per hour. The relative humidity averages near 80 percent. Evaporation is high due to the warm temperatures and constant wind flow. The evaporation at the coastal regions is more than the average annual rainfall for those regions. One of the principle causes of concern in the U.S. Virgin Islands is the short supply of water. The high evaporation rate and the rapid runoff from the steep slopes on St. Thomas make the 40 to 60 inches of annual rainfall insufficient. During the drier portions of the year it is sometimes necessary to carry water by barge from Puerto Rico.

5. Concrete Quality. The ultimate compressive strength of the concrete at 28 days will be 3,000 pounds per square inch. A maximum water-cement ratio of .55 will be required for concrete placed below elevation 4.0 mean sea level. The concrete mix design will be the responsibility of the Contractor in accordance with CW-03307.

6. Hot Weather Concreting. Provision for placement of concrete during hot weather will be included in the specifications. The maximum placing temperature for the concrete will be 85°F unless it contains a retarding admixture. All concrete will be batched, mixed, placed, cured, and tested in accordance with ACI 305R-77 for "Hot Weather Concreting."

C. CEMENTITOUS MATERIAL INVESTIGATION

7. Types and Kinds Required. The cement used in St. Thomas is imported from the Puerto Rican Cement Company. The only cement manufactured by that company is Type I Portland Cement, conforming to Federal Specification SS-C-1960/3 and ASTM C-150. Cement samples were previously sent to the Waterways Experiment Station (WES) for evaluation. Test results are shown in figure G-1.

8. Availability. The cement manufacturer in Puerto Rico is:

Puerto Rican Cement Company
Chase Manhattan Building
GPO Box 4487
Hato Rey, Puerto Rico 00912

Plant Location: Road No. 10
Ponce, Puerto Rico

In accordance with ER 1110-1-2002, 11 November 1977, appendix C, "Cement Quality Management System," the cement manufacturer was requested to submit to WES letters certifying that its plant maintains a quality control program and that its cement will meet the current Federal Specification requirements. The Puerto Rican Cement Company has been designated as a qualifed cement source under the Cement Quality Management System.

D. AGGREGATE INVESTIGATION

9. General. Coarse aggregate and 50 percent of the fine aggregate used in concrete on St. Thomas is quarried by Controlled Concrete Products, Inc. The other 50 percent of the fine aggregate is imported from the island of Barbuda (U.K.). The maximum size of coarse aggregate normally produced is 1 1/4 inches. The geologic type of the aggregate source is not readily

*CORECTED COPY

TO:	REPORT OF TESTS OF PORTLAND CEMENT	FROM: CORPS OF ENGINEERS U. S. ARMY
USAE District, Jacksonville P.O. Box 4970 Jacksonville, FL 32201		Structures Laboratory USAE Waterways Exp St ATTN: Cem & Pozz Group P.O. Box 631 Vicksburg, MS 39180

TEST REPORT NO. SAJ-137-80 | BIN NO. | CWT REPRESENTED: | DATE: 21 April 80

SPECIFICATION: SS-C-1960/3, Type I, | DATE SAMPLED: 15 March 80

COMPANY: Pureto Rican Cem Co | LOCATION Ponce, Puerto Rico | BRAND:

THIS CEMENT DOES X MEET SPECIFICATION REQUIREMENTS

SAMPLE NO.	1							
SiO_2, %	21.2							
Al_2O_3, %	5.4							
Fe_2O_3, %	2.9							
MgO, %	1.4							
SO_3, %	2.8							
LOSS ON IGNITION, %	1.0							
ALKALIES-TOTAL AS Na_2O, %	0.51							
Na_2O, %	0.44							
K_2O, %	0.11							
INSOLUBLE RESIDUE, %	0.07							
CaO, %	64.4							
C_3S, %	53							
C_3A, %	9							
C_2S, %	21							
$C_3A + C_3S$, %	63							
C_4AF, %	9							
$C_4AF + 2\ C_3A$, %	27							
HEAT OF HYDRATION, 7D, CAL/G	87	(HH @ 7 days (30% Replacement) 70 cal/g (Guadeloupe						
HEAT OF HYDRATION, 28D, CAL/G	98	* (HH @28 days (30% Replacement) 81 cal/g Pozzolan)						
SURFACE AREA, SQ CM/G (A.P.)	3930							
AIR CONTENT, %	7.5							
COMP. STRENGTH, 3 D, PSI	3300							
COMP. STRENGTH, 7 D, PSI	4720							
COMP. STRENGTH, D, PSI								
FALSE SET-PEN. F/I, %								
SAMPLE NO.	1							
AUTOCLAVE EXP., %	0.01							
INITIAL SET, HR/MIN	2:55							
FINAL SET, HR/MIN	4:45							
SAMPLE NO.								
AUTOCLAVE EXP., %								
INITIAL SET, HR/MIN								
FINAL SET, HR/MIN								

REMARKS:

THE INFORMATION GIVEN IN THIS REPORT SHALL NOT BE USED IN ADVERTISING OR SALES PROMOTION TO INDICATE EITHER EXPLICITLY OR IMPLICITLY ENDORSEMENT OF THIS PRODUCT BY THE U. S. GOVERNMENT.

W. G. MILLER
Chemist
Chief, Cement & Pozzolan Group

ENG FORM 1 MAR 72 6008-R

available. A brief geologic history of St. Thomas and the latest subsurfaces investigation performed as part of the Savan Gut Detailed Project Report, indicated in appendix c, should be useful in obtaining a general idea of the geologic formations found on the island.

10. Documentation of Aggregate Quality. Documentation of the aggregate quality is not available at the present time. However, Controlled Concrete Products, Inc., has sent aggregate samples for testing to the South Atlantic Division Laboratory. The aggregate will be tested prior to plans and specifications preparation.

E. WATER INVESTIGATION

11. Mixing Water. Due to the short supply of drinkable water on St. Thomas, mixing water used in concrete is obtained from wells. At the present time, test data on this water is not available. The water will be tested prior to plans and specifications preparation.

12. Curing Water. Moist curing techniques are not normally used in St. Thomas. However, should the Contracto elect to use moist curing techniques, the source of water will be identified and the water will be tested in accordance with CRD-C400 prior to commencement of construction.

F. BATCH PLANT REQUIREMENTS

13. Plant Requirements. The selection of the type of batch plant required is based on a 3,700-cubic yard quantity with a maximum placement rate of 50 cubic yards per hour and one maximum size aggregate. For the Savan Gut project, a manual batch plant would meet the concrete requirements. The batch plant would also need to meet the requirements of EM 1110-2-2000 and the requirements of the "Concrete Plant Standards of the Concrete plant Manufacturer's Bureau."

14. Availability of Offsite Plants. The only supplier of ready mix concrete in St. Thomas is Controlled Concrete Products, Inc. This batch plant is a semi-automatic plant with a capacity of 100 cubic yards per hour.

15. Mixer Requirements. Truck mixers will be used to convey the concrete from the batch plant to the work site. Truck mixers will conform to applicable truck mixer standards.

16. Special Requirements. The concrete is to be batched, transported, mixed, and placed within 1 hour after the introduction of cement into the mix. The maximum concrete placing temperature shall be 85°F unless it contains a retarding admixture.

SAJEN-RH

March 1982

SECTION 205 DETAILED PROJECT REPORT

SAVAN GUT AT CHARLOTTE AMALIE

ST. THOMAS, U.S. VIRGIN ISLANDS

APPENDIX G

DRAFT 221 AGREEMENT

AGREEMENT BETWEEN

THE UNITED STATES OF AMERICA

AND

THE U.S. VIRGIN ISLANDS

FOR LOCAL COOPERATION ON

THE SAVAN GUT FLOOD CONTROL PROJECT IN CHARLOTTE AMALIE, ST. THOMAS

THIS AGREEMENT entered into this _____ day of _____ 19__ by and between the UNITED STATES OF AMERICA (hereinafter called the "Government") represented by the Contracting Officer executing this agreement, and THE U.S. VIRGIN ISLANDS, represented by the Commissioner of the Department of Public Works, hereinafter called the "Virgin Islands," WITNESSETH THAT:

WHEREAS, construction of the Savan Gut Flood Protection Project, hereinafter called the "Project," was authorized by Section 205 of the 1948 Flood Control Act as amended.

WHEREAS, Virgin Islands hereby represents that it has the authority and capability to furnish the non-Federal cooperation required by the Federal legislation authorizing the Project and by other applicable law.

NOW THEREFORE, the parties agree as follows:

1. The Virgin Islands agrees that upon notification that the Government shall commence construction of the Savan Gut Flood Control Project, substantially in accordance with Federal legislation authorizing such Project, the Virgin Islands shall, in consideration of the Government commencing construction of such Project, fulfill the requirements of non-Federal cooperation specified in such legislation, to wit:

(a) Provide without cost to the United States all lands, easements, rights-of-way, including suitable borrow and disposal areas as determined by the Chief of Engineers necessary for the construction of the Project:

(b) Accomplish without cost to the United States all alterations and relocations of buildings, transportation facilities, storm drains, utilities, and other structures and improvements made necessary by the construction.

(c) Hold and save the United States free from damages due to the construction works except damages due to the fault or negligence of the United States or its contractors;

(d) Provide a cash contribution, prior to initiation of construction, equal to the cost of all outside project scope work, presently estimated at $477,000.

(e) Assume all project costs in excess of the Government limitation of $4,000,000.

2. The Virgin Islands agrees that all acquisitions required to comply with conditions of this contract shall be accomplished in accordance with the provisions of Public Law 91-646, Uniform Relocation Assistance and Real Property Acquisition Act of 1970.

3. The Virgin Islands agrees to comply with the conditions set forth in the attached Exhibit "A" as assurance of compliance with the Department of Defense directive under Title VI of the Civil Rights Act of 1964, which by reference is made a part of this contract as if it were fully set forth herein.

4. The Virgin Islands hereby gives the Government a right to enter upon, at reasonable times and in a reasonable manner, lands which the Virgin Islands owns or controls for access to the Project for the purpose of inspection, and for the purpose of repairing and maintaining the Project, if such inspection shows that the Virgin Islands for any reason is failing to repair and maintain the Project in accordance with the assurances hereunder and has persisted in such failure after a reasonable notice in writing by the Government delivered to Commissioner of the Department of Public Works. No repair and maintenance by the Government in such event shall operate to relieve the Virgin Islands of responsibility to meet its obligations as set forth in paragraph 1 of the Agreement, or to preclude the Government from pursuing any other remedy at law or equity.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

BY: _____
ALFRED B. DEVEREAUX, JR.
Colonel, Corps of Engineers
Commander and District Engineer
U.S. Army Engineer District,
Jacksonville

FOR THE SECRETARY OF THE ARMY

DATE: _____

GOVERNMENT OF THE U.S. VIRGIN ISLANDS

BY: _____
Commissioner of the Department
of Public Works

DATE: _____

CERTIFICATE OF AUTHORITY

I, _____, do hereby certify that I am the Attorney General of the Government of the U.S. Virgin Islands, that the Public Works Department is a legally constituted public body with full authority and capability to perform the terms of the agreement between the United States of America and the U.S. Virgin Islands in connection with the Savan Gut Flood Control Project, and to pay damages, if necessary, in the event of the failure to perform in accordance with Section 221 of Public Law 92-611 and that the person who has executed the contract on behalf of the Public Works Department has acted within its statutory authority.

In Witness Whereof, I have made and executed this Certificate this _____ day of _____ 19__.

_____
Attorney General
Government of the U.S. Virgin Islands

EXHIBIT "A"

ASSURANCE OF COMPLIANCE WITH THE DEPARTMENT OF DEFENSE DIRECTIVE UNDER TITLE VI OF THE CIVIL RIGHTS ACT OF 1964

THE U.S. VIRGIN ISLANDS HEREBY AGREES THAT it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and all requirements imposed by or pursuant to the Directive of the Deparmtne of Defense (32 CFR Part 300, issued as Department of Defense Directive 5500.11, Change 3, dated 11 April 1966) issued pursuant to that title, to the end that, in accordance with Title VI of the Act and the Directive, no person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the U.S. Virgin Islands receives Federal financial assistance from the Department of the Army and HEREBY GIVES ASSURANCE THAT it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of Federal financial assistance extended to the U.S. Virgin Islands by the Department of the Army, assurance shall obligate the U.S. Virgin Islands, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the Federal financial assistance is extended or for another purpose involving the provisions of similar services or benefits. If any personal property is so provided, this assurance shall obligate the U.S. Virgin Islands for the period during which the Federal financial assistance is extended to it by the Department of the Army.

THIS ASSURANCE is given in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property, discounts or other Federal Financial assistance which were approved before such date. The U.S. Virgin Islands recognizes and agrees that such Federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the U.S. Virgin Islands, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign this assurance on behalf of the U.S. Virgin Islands.

GOVERNMENT OF THE U.S. VIRGIN ISLANDS

DATE: _____ BY: _____

Commissioner of the Public Works Department