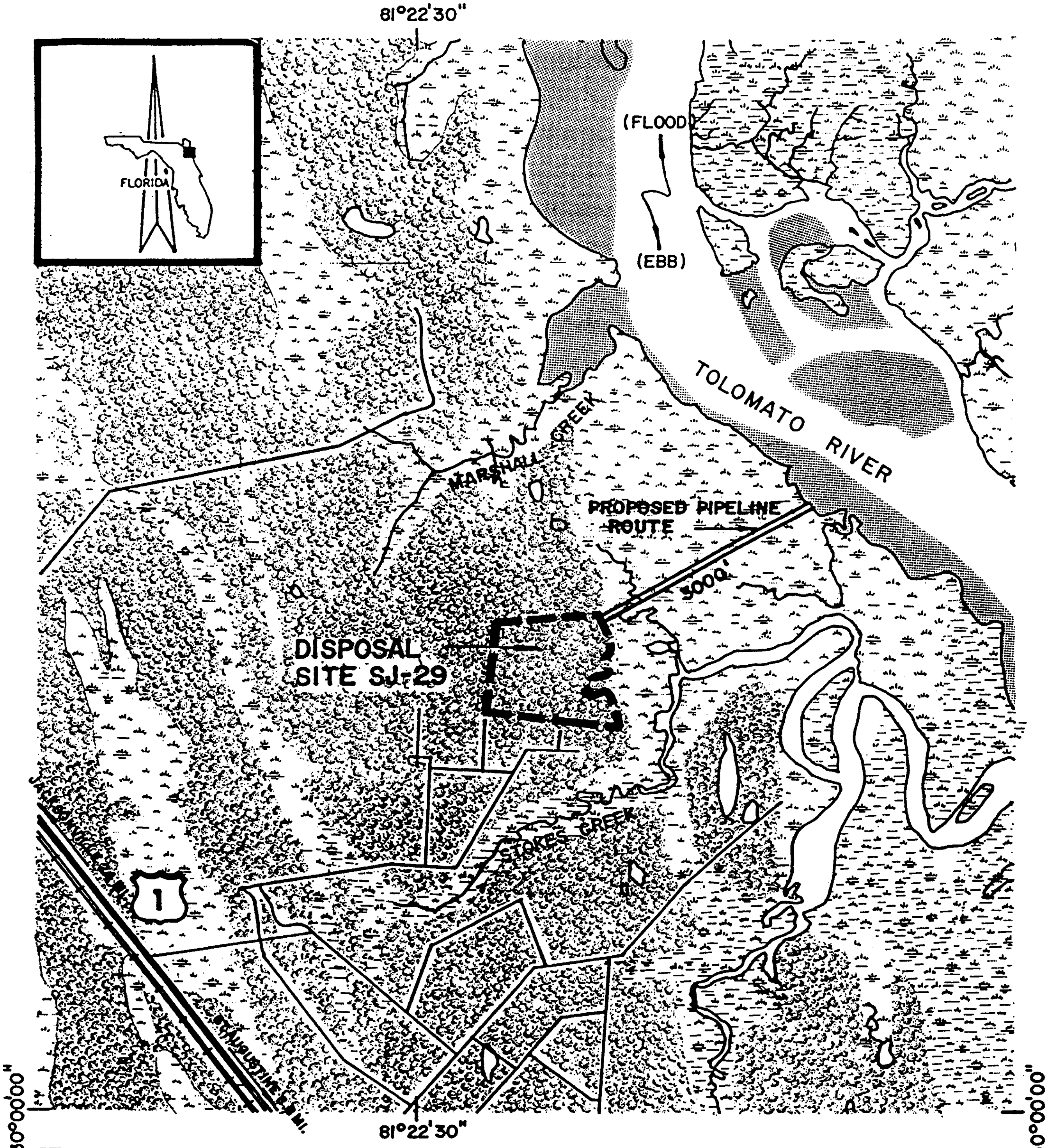
1.0 INTRODUCTION

A key element in the long-term utilization of any dredged material disposal site is the development and implementation of a site-specific management plan. The management plan for site SJ-29, outlined in this report, is intended to provide guidance for the development and operation of the disposal area so that optimum efficiency is achieved in both effluent quality and disposal area service life while minimizing the impact of the site on the environment and adjacent areas. Addressed are those facets of site design and operation which directly influence site efficiency or reduce off-site conflicts. These include elements of site preparation prior to the initial dredging and disposal of maintenance material, techniques of decanting and dewatering the maintenance material during and immediately following a disposal event, and criteria for post-dredging site operation and maintenance. Throughout, the goal of each aspect of site management is to assure that the site not only achieves its minimum design 50-year service life, but that it also fulfills its potential as a permanent operating facility for the intermediate storage and re-handling of maintenance material dredged from the Intracoastal Waterway (ICWW).

Site SJ-29 (Figure 1-1) is one of five maintenance material disposal sites selected to provide long-term dredged material containment capacity for the Intracoastal Waterway (ICWW) in St. Johns County, Florida. Specifically, site SJ-29 is intended to serve that portion of the ICWW defined in Taylor and McFetridge, (1989) as Reach III, extending 12.24 miles from Deep Creek in northern St. Johns County (ICWW mile 25.47) to the Bridge of Lions in St. Augustine, Florida (ICWW mile 37.71). Records indicate that no maintenance dredging has occurred in this reach since the establishment of the 12 foot project depth in 1952. However, a 1987 reconnaissance survey revealed shoaling within a 0.2 mile stretch of the Waterway in the vicinity of St. Augustine Inlet. Based solely on these findings, the projected 50 year disposal requirement to be met by site SJ-29 is less than 9,000 cubic yards (Taylor and McFetridge, 1989). However, the abandonment of any one reach of the ICWW channel due to a lack of adequate disposal capability is not considered to be practical if the overall Waterway is to be maintained as a viable avenue of maritime transportation. Moreover, the long range dredged material management plan established for the ICWW by the Florida Inland Navigation District requires that upland disposal be utilized as the primary means of dredged material management wherever possible. The provision of such a capability that satisfies present day containment and buffer requirements dictates that upland sites be at least 30 to 50 acres in size. Site SJ-29 meets these requirements. The total site area is 48.85 acres, of which approximately 39 acres will remain as a natural buffer area of undisturbed vegetation. The projected site disposal capacity is 146,751 cubic yards (c.y.).

As stated above, beyond satisfying an initial capacity requirement, the management objective for SJ-29 is to efficiently process (i.e. decant and dewater) the dredged material, and to operate the facility so as to extend its usefulness beyond the design service life. The potential long-term efficiency of the disposal area is established by the design and construction of the facility, while the degree to which this potential is realized



REFERENCED

USGS DURBIN, FL. QUADRANGLE 1952, PHOTOREVISED 1970.
USGS S.PONTE VEDRA BCH., FL. 1952, PHOTOREVISED 1970.

TAYLOR ENGINEERING INC 9086 CYPRESS GREEN DRIVE JACKSONVILLE, FLORIDA 32256	Figure I-I Location of Dredged Material Disposal Site SJ-29 St. Johns County, Florida	PROJECT REVISION SHEET DATE

is largely determined by operating procedures. Specific elements of site design and site operation during and following disposal activity will be discussed in turn as they relate to site efficiency and local impacts. However, design features and construction practices, beginning with site preparation, provide the foundation for the project, both physically and figuratively, and should reflect the level of effort that has gone into the selection of site SJ-29, as well as the substantial long-term commitment of state and federal funds that this project represents. Therefore, the plan begins in Section 2.0 with a discussion of site preparation and design. Site operational considerations during dredging are discussed in Section 3.0. Post-dredging site management is addressed in Section 4.0.

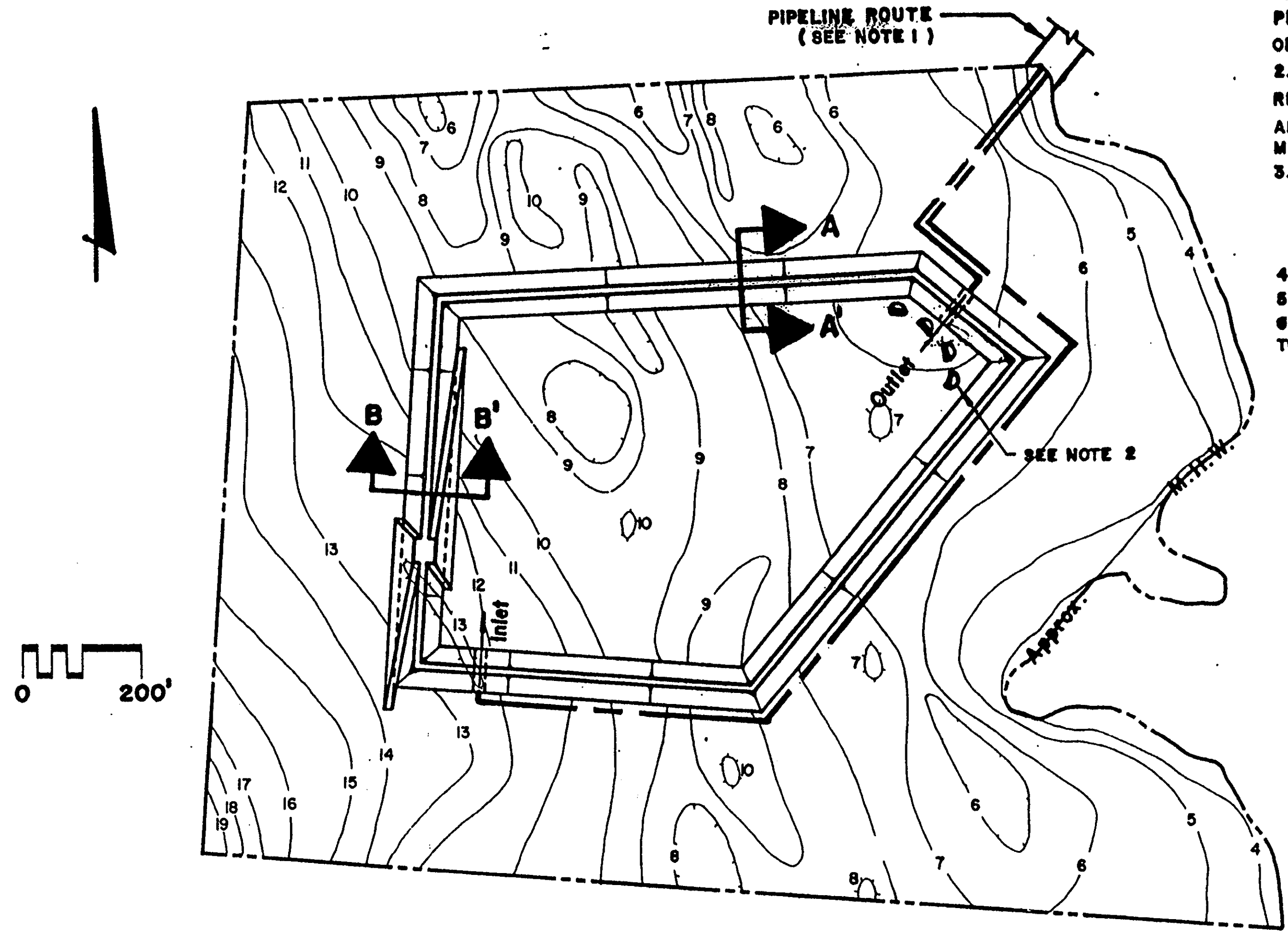
2.0 PRE-DREDGING SITE PREPARATION AND DESIGN FEATURES

2.1 Site Preparation

Site preparation required for the SJ-29 disposal area will include the clearing of vegetation, and the alteration of the existing topography within the proposed containment area, either prior to, following, or in association with dike construction. Historically, containment area construction has often been accomplished without any interior site preparation. Moreover, it is recognized that clearing and grubbing vegetation and uniformly excavating and leveling the site interior adds significantly to the initial construction cost of the containment area, and should not be undertaken without the expectation of significant benefits. However, it is felt such measures are warranted in the present situation. Regarding the clearing of vegetation, it has been established (Haliburton, 1978; Gallagher, 1978) that although a limited growth of herbaceous vegetation or native grasses can improve sedimentation by filtration, the woody vegetation (trees and heavy brush) that characterizes the majority of the proposed SJ-29 containment area can constrict or channelize the flow through the containment basin, resulting in short-circuiting, reduced retention times, resuspension of sediment through increased flow velocities, and the deterioration of effluent quality. Additionally, failure to clear existing vegetation will result in an increase in the organic content of the fill, rendering it less suitable for removal and re-use as construction material. Therefore, the containment area should be cleared and grubbed prior to construction.

Similarly, the existing topography within the containment area, although nearly level or gently sloping, if allowed to remain will cause the flow from inlet to weir to channelize. This would lead to reduced effective sedimentation area, increased flow velocities, and again, decreased solids removal efficiency. Moreover, irregular topography will produce irregular deposition, which, in turn, will result in the ponding of surface water, thereby inhibiting the drying of the deposition layer and making initial attempts at surface trenching more difficult. For these reasons, it is important that a uniform grade be provided from inlet to weir as part of the initial construction of the facility, with an adequate slope on the order of 0.2%. It is also recognized that given an initially level surface, differential settling of varying grain size fractions (i.e., rapid precipitation of the coarser fractions nearer the inlet with increasingly finer sediments deposited nearer the outlet) will quickly establish a deposition surface sloping downward from inlet to weir once disposal operations begin.

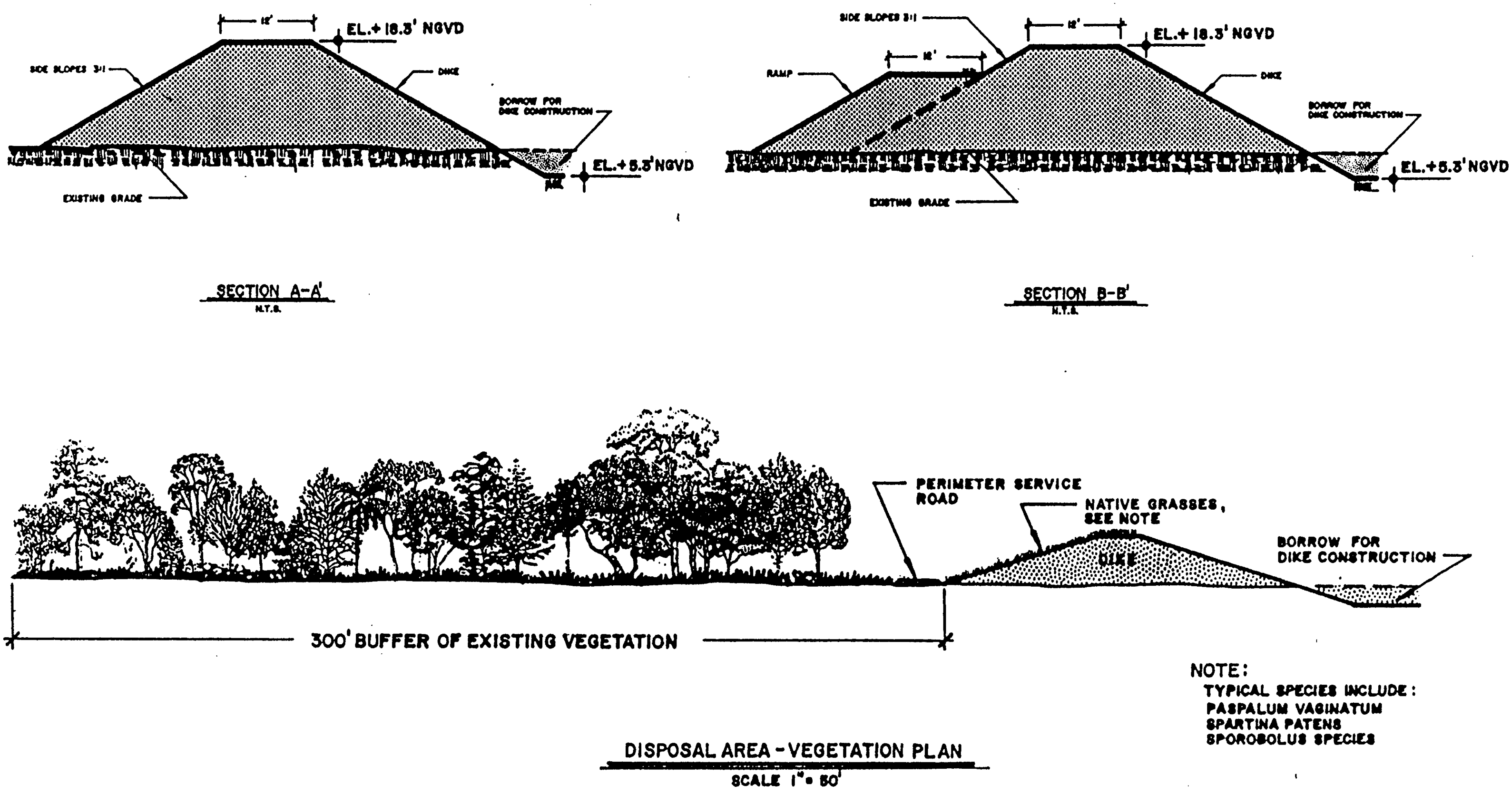
Preliminary site design (Figures 2-1, 2-2) assumes that the material for dike construction is to be obtained from the excavation of the interior of the containment area. Construction efficiency may dictate that the dike material be initially taken from a perimeter trench immediately inside the containment dikes. However, it is imperative if acceptable effluent quality is to be initially achieved that this trench be eliminated and the site



NOTES:

1. PIPELINE ROUTE (WIDTH 60', LENGTH 3000') TO RUN FROM R/W I.C.W.W. TO SITE BOUNDARY (M.H.W.); PIPELINE PLACEMENT WILL REQUIRE THE CROSSING OF 3000' OF SALT MARSH.
2. WEIRS: FOUR 9-15' DIA. CM HALF-PIPES W/ REMOVABLE FLASH BOARDS ADJ. FROM + 13 FT. ABOVE GRADE TO BELOW GRADE (W/CONNECTING MANIFOLD.)
3. CONTAINMENT AREA:
   - WITHIN OUTSIDE TOE OF DIKE: 14.75 AC.
   - WITHIN INSIDE TOE OF DIKE: 9.92 AC.
   - CAPACITY: 146,781 C.Y.
4. SECTION A-A', B-B' SEE SHEET 4 of 6.
5. ELEVATION DATUM: NGVD of 1929
6. AREA OUTSIDE DIKE WITHIN SITE BOUNDARY TO BE A BUFFER OF NATURAL VEGETATION.

TAYLOR ENGINEERING INC 9086 CYPRESS GREEN DRIVE JACKSONVILLE, FLORIDA 32256	**Figure 2-1** **Disposal Area Site Plan** **Site SJ-29** **St. Johns County, Florida**	PROJECT REVISION SHEET DATE



TAYLOR ENGINEERING INC
9086 CYPRESS GREEN DRIVE
JACKSONVILLE, FLORIDA 32256

Figure 2-2
Typical Dike and Ramp Sections, Vegetation Plan
Site SJ-29
St. Johns County, Florida

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interior re-graded prior to initial disposal, rather than allowing the trench to fill with sediment. Preliminary sub-surface surveys show that material obtained from either a uniform scraping of the site interior, or from digging a perimeter trench is equally suitable for dike construction. To provide the volume of material required to construct the dikes it is necessary to excavate 3.0 feet below the existing grade to an average grade elevation of +5.3 feet NGVD. Limited data obtained at the time of the soil survey showed the on-site water table at a mean elevation of +6.18 feet NGVD±, or 0.86 feet± above the excavation grade. Therefore, a sump and/or pumping of groundwater seepage may be required during construction.

2.2 Design Features

No attempt will be made here to address, in detail, all elements of site design. These are described elsewhere in the permit documentation. Rather, the present discussion will be limited to those aspects of site design which directly influence site operation and maintenance.

2.2.1 Site Capacity

Imposing a minimum design 50-year service life on the SJ-29 disposal facility insures that for each individual maintenance dredging event the containment area is over sized. This allows the placement of the dredged material in thin lifts, or relatively thin uniform layers over the whole of the containment area interior, thereby promoting the rapid and efficient dewatering of the entire lift prior to the next planned disposal event.

Based on the historical shoaling rate of Reach III, future dredging would probably occur no more often than once in ten years over the 50 year minimum life expectancy of site SJ-29. Therefore an conservative estimate of lift thickness can be calculated by equally dividing the total site capacity, 146,751 c.y., among the maximum of five dredging events resulting in an estimated disposal requirement of 29,350 c.y. per event. With a diked interior plan area of 9.92 acres, this produces an average lift of 1.70 feet.

The optimal maximum thickness of the deposition layer produced from a single dredging event (i.e., the maximum thin lift thickness) has been defined (Haliburton, 1978) under the U.S. Army Engineers Waterways Experiment Station (WES) Dredged Material Research Program (DMRP) as 3 feet or less when the material reaches its decant point (i.e., the point at which no ponded water remains above the depositional layer). If it is assumed that the bulked volume of the typical projected lift thickness of 1.70 feet approximates the volume of the material at its decant point, then it is apparent that the thickness of the projected lift is significantly less than the maximum thin lift thickness, as defined above. Moreover, two additional considerations make it reasonable to apply thin lift dewatering techniques to site SJ-29. First, the above definition of thin lift is based on the disposal of fine grained materials (i.e., silts and clays) which have proven most resistant to dewatering. The material to be placed in the SJ-29 disposal area is expected to be predominantly fine sand, although with a significant silt or clay component may be present. Therefore, future dredged material should return to a more stable soil form more readily than that upon which the optimum thin lift definition is based. Secondly, maintenance of the Intracoastal Waterway within Northeast Florida has historically been determined less by need than by the availability of adequate disposal areas, a situation which made necessary the present project. As documented in the project Phase I report (Taylor and McFetridge, 1989), the growth of environmental awareness supported by regulatory policy rendered unworkable most pre-existing disposal easements and accepted disposal practices. However, the provision of centralized, permanent disposal facilities such as site SJ-29 should allow for more frequent maintenance of the channel with a smaller volume of material being produced from each event.

The primary advantage of employing thin lifts is that each lift may be completely dewatered prior to each subsequent scheduled maintenance. Moreover, less active management of the dredged material is necessary to accomplish the dewatering. Specific dewatering techniques will be discussed in detail in Section 4.0, Post-Dredging Site Management.

2.2.2 Interior Earthworks

Secondary compartmentalization of the SJ-29 containment area is neither required nor is it desirable. Reducing the effective containment plan area would compromise the advantages of thin lift disposal already discussed. In addition, analysis of historical dredging records indicates the frequency of projected dredging (at intervals of ten or more years) does not warrant the use of parallel disposal areas.

Neither is the use of spur dikes to improve retention times appropriate for the site. This is the result of several considerations. One is that the increased retention times which may result from the use of spur dikes do not offset the loss of capacity within the containment area. Another is that although intended to improve the efficiency of fine particle retention, spur dikes are often counter-productive because they constrict the flow, leading to increased velocities and the possibility of sediment resuspension. For this site the increased irregularity of the containment area geometry would result in more dead zones, a reduced effective retention area, and less uniform deposition. Moreover, preliminary analysis of containment area efficiency indicates that retention times which are adequate to allow precipitation of the finest category of sediment likely to be encountered with the reach served by site SJ-29 are achievable without recourse to spur dikes.

2.2.3 Ramps

An important program concept is the management of each site as a permanent operating facility even though each is sized to provide capacity adequate for its projected 50-year design life. Therefore, ramps to provide heavy equipment access to the containment area interior have been integrated into the design of the containment dikes (Figure 2-2). This was done to provide the capability of efficiently removing the dewatered dredged material as prevailing restrictions and market conditions dictate. Thus, the disposal site is designed to function more as a material processing and rehandling station than as a permanent storage facility. In this manner the useful service life of the site may be extended indefinitely.

The ramps themselves obliquely traverse the containment dikes, maintaining the same 1V:3H side slope as the dikes. The recommended ascending/descending grade is 4%, with a road surface width of 12 feet. The ramps are positioned to facilitate the entry and exit of heavy equipment via a connection to Lynette Lane at the southwest corner of the site (Figure 2-1). In addition to providing for material removal, the ramps also allow easy entry for equipment to be utilized in the dewatering process. This is discussed in Section 3.0.

2.2.4 Ponding Depth

Ponding depth refers to the height of the water column (with its suspended sediment load) which is maintained above the depositional surface during dredging and disposal operations. Ponding depth is regulated by the height of the weir crest, and to a lesser extent, by the dredge plant output. More of an operational criterion than a design feature, ponding depth is nevertheless a primary design consideration, impacting containment area and dike geometry, as well as weir design.

It is advantageous to maintain as great a ponding depth during disposal operations as possible. Increased ponding depths produce increased retention times and decreased flow velocities through the containment basin, and are therefore directly related to improved solids retention and effluent quality. The limiting consideration for increased ponding depth is the unbalanced head, or hydrostatic pressure, which the dikes can withstand without compromising their structural integrity.

Preliminary design of the containment area and dikes has provided for a minimum 2 foot ponding depth in that the capacity of the site is reduced by the requirement of 2 feet of ponding plus 2 feet of freeboard at the end of the design service life of the containment area, if no intervening removal of dredged material has occurred. Additionally, preliminary analysis of containment area efficiency indicates that a 2 foot ponding depth provides adequate retention time and acceptable effluent quality.

Care must be exercised during disposal operations such that recommended increased ponding depths above the 2 foot minimum are not attained too quickly, causing excessive piping and the possibility of dike failure. However, operational experience has demonstrated that if ponding depth is increased slowly, or over a series of dredging events, the permeability of the interior dike slopes is reduced as fine sediments are filtered and trapped by piping through the dike thereby decreasing the probability of dike failure. Restricting initial ponding depth to 5 feet should eliminate this possibility while providing a sufficient safety factor to insure efficient solids removal.

2.2.5 Dike Erosion and Vegetation

The stability of the containment dikes must also be insured against erosion from rainfall runoff and wind. This will be accomplished by vegetating the dike slopes and crest immediately following dike construction (Figure 2-2). Native grasses will be used (including, but not limited to Paspalum vaginatum) which quickly form soil binding mats while not rooting so deeply so as to structurally weaken the dikes. Planting will be on maximum 18 inch centers using nursery stock (slips) to insure rapid coverage. An additional benefit of vegetating the dikes in this manner is the reduction of the visual impact of the containment area thereby improving site aesthetics and the local acceptance of what is to be a permanent facility.

2.2.6 Site Security

Security should be provided appropriate to the commitment of public funds that this project represents. As a minimum, the site perimeter should be fenced to control public access and to eliminate unauthorized vehicular traffic (off-road vehicles) which damages the dikes. Fencing will also serve to minimize vandalism.

In addition, on-site operators should be present at all times during active disposal and decanting operations following a dredging event, or at any time when significant ponded water remains within the containment area. This is to insure the proper operation, adjustment, and maintenance of the weirs, as well as to prevent the premature release of effluent through unauthorized weir operation. Active on-site operation will be discussed in more detail in Section 3.0.

2.3 Inlet Features

The number and location of the dredge slurry outfalls, or pipeline inlets, within the containment basin are the primary factors regulating the pattern of deposition within the disposal area. The disadvantage of a single, fixed inlet is the characteristic mounding of coarse material in the vicinity of the inlet, which if not mechanically re-distributed, results in reduced retention area. However, the relatively infrequent nature of the required maintenance cannot justify the expenditure and maintenance required by a fixed, multiple inlet manifold system for site SJ-29. More appropriate is the use of a moveable single inlet with the flexibility to be repositioned between dredging and disposal operations or within a single dredging event. The single inlet should also be fitted with a device which breaks the momentum of the jet, such as a flow-splitter or a spoon, to aid in the distribution of the slurry. However, the ability to more evenly distribute the coarser fraction of dredged material within the containment area by repositioning the inlet pipe and breaking the discharge jet may not preclude the necessity of regrading the de-watered sediment prior to the succeeding disposal operation. Efficient use of the containment area and maximum solids retention performance will require that the initial uniform slope (on the order of 0.2%) from inlet to weir be re-established between each disposal event.

Preliminary analysis of settling behavior for the SJ-29 disposal area indicates that the maximum available distance between inlet and weir more than adequate to meet solids retention requirements. Nevertheless, movement of the inlet to achieve more even sediment deposition should not be allowed to result in a significant reduction in the separation distance between inlet and outlet without the implementation of additional precautions to ensure that water quality standards are met. These may include increasing the ponding depth, or the use of floating baffles or turbidity screens surrounding the weirs.

2.4 Weirs

The efficiency of solids retention and the quality of effluent released from the SJ-29 containment area are strongly influenced by several aspects of weir design. These include weir type, weir crest length, and the location of the weirs within the containment area (Figure 2-1).

The type of weir structure to be employed at site SJ-29 represents a compromise between considerations of performance, adjustability, maintenance, and economy. A sharp-crested, rectangular weir is specified to minimize the depth of withdrawal of the supernatant. Sharp-crested means that the thickness of the weir crest (T) is small in comparison to the depth of flow over the weir (h); typically $h/T > 1.5$. Rectangular means that the weir crest is straight, and flow over the weir is perpendicular to the weir. Withdrawal depth refers to the depth at which the gravity forces on a suspended sediment particle exceed the inertial forces. Reducing the depth of withdrawal to a small fraction of the ponding depth as measured immediately in front of the weir, minimizes the possibility of sediment resuspension. Moreover, since the concentration of suspended sediment increases with depth, minimizing the depth of withdrawal maximizes solids retention. Specific expected performance characteristics of the SJ-29 weir system will be discussed later in this section.

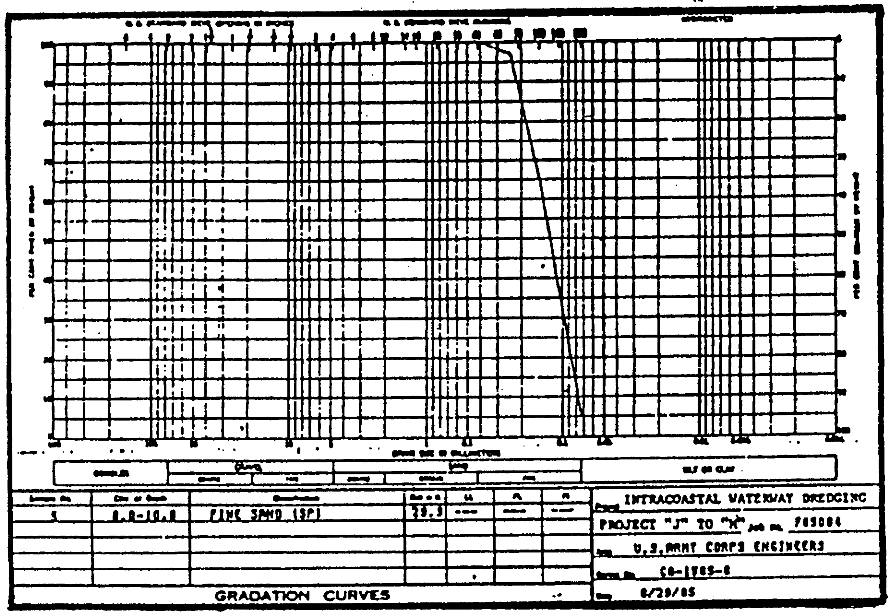
The adjustability of the weir crest height is accomplished by means of removable flashboards. The range of possible adjustment will be from a maximum elevation of +8.0 feet above grade, allowing 2.0 feet of freeboard below the dike crest elevation at the end of design service life, to a minimum elevation set below the original containment area interior grade, thereby providing a means of releasing ponded run-off prior to initial disposal operations. The flashboards are to be 4 x 4 stock, interlocking by tongue-and-groove to provide rigidity against hydrostatic pressure, and to minimize between-board seepage of water with a higher suspended sediment concentration than the clarified water selectively withdrawn over the weir crest. The use of a flashboard width of 3 inches (after milling) assures that the minimum adjustment increment is less than the projected depth of flow over the weir crest (4.8 inches) during disposal operations after the maximum ponding depth has been attained. At this point the weir discharge approximately equals the liquid inflow to the containment area. In this manner the operator is provided with adequate adjustment resolution to maximize weir performance and effluent quality.

The specification of a minimum weir crest length totaling 36 feet is based on U.S. Army Corps of Engineers guidelines related to dredge equipment. For this and all project calculations it has been assumed that a 24 inch O.D. dredge (discharge velocity, 16 ft/sec; volumetric discharge, 6430 c.y./hr; 20/80 solids/liquid slurry mix) would be used for future maintenance. However, the physical constraints of the channel will most likely dictate the use of a 16 to 18 inch O.D. dredge. Therefore, the assumption of a 24 inch dredge insures a conservative disposal site design. The 36 foot minimum length is to be provided by 4 corrugated metal half-pipes, each with a sharp-crested weir section of minimum length 9 feet. The four pipes will be connected by a common manifold such that the effluent will exit the containment area via a single pipe under the dike. Analysis of weir performance based on nomograms developed at the Waterways Experiment Station under the Dredged Material Research Program (Walski and Schroeder, 1978) indicates that these design parameters may be expected to produce an effluent suspended sediment concentration of 0.63 g/l, assuming an average ponding depth of 2 feet. Increasing ponding depth above this level as recommended should result in a further improvement in effluent quality. Translation of suspended solids concentration to a measure of turbidity on which Florida water quality standards are based is highly dependent on the suspended material characteristics. However, WES guidelines (Palermo, 1978) indicate that this effluent quality should be adequate.

The final weir design parameter which was considered is the location of the weirs within the containment area such that the distance from the dredge pipe inlet is maximized, and the return distance to the receiving waters is minimized (Figure 2-1). The latter requirement is to allow the effluent to be transported from the containment area by gravity flow. Positioning the weirs as shown in Figure 2-1 provides approximately 900 feet from inlet to weir.

Based on the above described weir locations, an analysis of containment area efficiency was performed.

Since no data characterizing channel sediments in the reach served by the proposed SJ-29 disposal area were available, the analysis was based on the sediment characteristics of core boring CB-IW85-6, taken in the ICWW approximately 1.5 miles northeast of Matanzas Inlet. The sediment obtained from this boring was considered to be the best representation of any material likely to be dredged from Reach III. This assumption is based upon the fact that the location of boring CB-IW85-6 and the area of shoaling in Reach III both lie in close proximity to the county's inlets. Boring logs, grain size data, and sediment settling curves for the CB-IW85-6 material are presented in Figure 2-3. A hydraulic analysis of the proposed containment area using these data indicates that the sediment will settle out of the average minimum ponding depth of 2 ft within 8 minutes, allowing for a safety factor of 3. This is considerably less than the computed basin retention time of 6.22 hrs which suggests that a basin efficiency of only 1.93 per cent is required. The reported mean efficiency of similar containment basins, based on WES-DMRP research (Shields, Thackston and Schroeder, 1987)is 44 per cent . Moreover, the WES-DMRP guidelines indicate that for a recommended minimum design weir loading (i.e, liquid discharge/weir crest length) of 1.07 cfs/ft, the expected withdrawal depth ranges from 0.67 ft based on empirical results, to 2.11 ft based on the WES Selective Withdrawal Model. It should be noted that even the larger of these values should not result in the resuspension of sediment because of the negative slope of the deposition layer from inlet to weir, resulting in greater ponding depths at the weir than the minimum 2 ft average ponding depth over the entire containment area. Providing ponding depths greater than the minimum 2 foot design depth (5 feet recommended) should eliminate the possibility of resuspension, as well as provide a significant increase in retention time to insure effluent quality in compliance with state water quality standards.



THOMPSON ENGINEERING TESTING, INC.
SIEVE AND HYDROMETER ANALYSIS
ASTM D422

PROJECT : JACKSONVILLE DISTRICT
CLIENT : U.S.ARMY CORPS ENGINEERS
BORING NO. CB-1W85-6
SAMPLE NO. 5

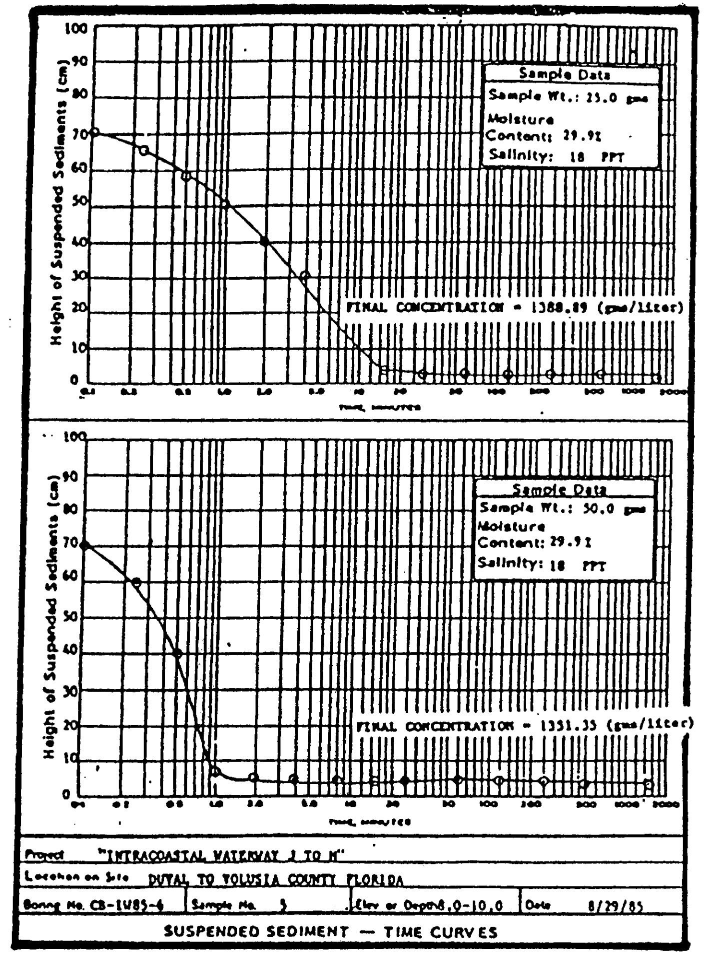
OUR JOB NO.: F85004
ANALYSIS DATE : 8/29/85
SAMPLE WT. 81.23 GMS.
DEPTH 8.0-10.0 FT.

SIEVE ANALYSIS

SIEVE NUMBER	SIEVE DIA.(MM)	CUMMULATIVE WEIGHT RETAINED	PERCENT RETAINED	PERCENT PASSING
4	4.75	0	0	100
10	2	0	0	100
20	.85	.1	.1	99.9
40	.425	.3	.4	99.6
60	.25	2.8	3.4	96.6
100	.15	28.9	35.6	64.4
200	.075	77.3	95.2	4.8

GRAVEL OR SHELL, PASSING 3IN. AND RETAINED ON NO.4 SIEVE------------------0%

SAND, PASSING NO.4 SIEVE AND RETAINED ON NO.200 SIEVE--------------------95.2%
--COARSE SAND, PASSING NO.4 SIEVE AND RETAINED ON NO.10 SIEVE-------0%
--MEDIUM SAND, PASSING NO.10 SIEVE AND RETAINED ON NO.40 SIEVE------.4%
--FINE SAND, PASSING NO.40 SIEVE AND RETAINED ON NO.200 SIEVE------94.8%



THOMPSON ENGINEERING TESTING, INC.
SIEVE AND HYDROMETER ANALYSIS
ASTM D422

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JACKSONVILLE, FLORIDA 32256

Figure 2-3
Sediment Data for Core Boring
CB-IW85 - 6

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3.0 OPERATIONAL CONSIDERATIONS DURING DREDGING

The primary considerations in managing the containment area during disposal operations are maintaining acceptable effluent quality during the decanting process, and by controlling the pattern of deposition, maximizing the potential for dewatering the deposited material subsequent to the completion of dredging operations. To this end, four aspects of site management are discussed. The first addresses the placement and handling of pipelines to and from the containment area. In this discussion, emphasis is placed on minimizing associated adverse environmental impacts. The second consideration discussed is the operation and monitoring of the containment area inlets. Site operational guidelines and procedures included here are intended to promote the efficient utilization of the containment area, and to facilitate the achievement of effluent water quality standards. The third site management consideration addressed, and the one most critical for determining the quality of effluent released from the disposal site, is weir operation. Lastly, a monitoring program to insure that the operation of the containment area does not degrade the shallow aquifer groundwater of the region will be discussed.

3.1 Placement of Pipelines

Each maintenance and disposal operation over the design life of the SJ-29 disposal site will require the placement and retrieval of both supply and return pipelines. The approximate route of these pipelines is shown in Figure 1-1. The pipelines will span approximately 3,000 feet of tidal marsh between the Tolomato River and the site boundary. The pipeline route will be located so as to minimize the impact of pipeline placement on existing salt marsh vegetation associated with Stokes Creek. From the Tolomato River marsh edge, the route proceeds southwesterly approximately 3000 ft, where it inters the northeast corner of the disposal site. Within the site property, the pipeline route continues southwesterly to the perimeter road which circles the containment dike. At this point the outlet pipeline crosses under the perimeter road via a culvert placed for the purpose and finally connects to the weir-manifold system. The inlet pipeline route follows the perimeter road around the east and south sides of the containment dike to the southwest corner of the site where it then passes under the perimeter road and enters the containment area by passing over the dike crest.

Considerations of the expected infrequency of maintenance dredging in this reach and the negative aesthetic effects on adjacent properties dictate that the pipeline be in place only when necessary. Therefore, immediately following completion of any required dredging, the supply pipeline will be removed. The return pipeline will remain in place until all ponded water is removed and the decanting process is completed, at which time it also will be removed.

It should also be noted that ponded rainwater which is expected to collect in the containment area will be