



Pony Express
6434098

1 roll of plans
RECEIVED
DEC 19 1991

December 17, 1991

Ms. Trudie D. Bell
Environmental Supervisor
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

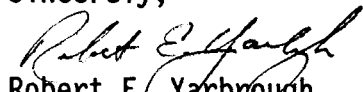
Dear Ms. Bell:

RE: PA 89-25 Hardee Power Station - Hardee - Vandolah Transmission Line -
SWFWMD Incompleteness Response.

Attached are copies and original signed and sealed drawings of documents supplied to SWFWMD in response to an insufficiency letter. Per your request, I am supplying these documents to you in an effort to keep you informed of our evolving mitigation plan. Hopefully, these documents will be sufficient for you to approve the mitigation plan as part of the Hardee- Vandolah portion of the transmission line.

Please contact me at 813-963-0994 if you have any questions or wish to meet to discuss the revised mitigation plan.

Sincerely,


Robert E. Yarbrough
Environmental Engineer

William A. Hartmann, P.E.
Surface Water Permitting Supervisor
Bartow Permitting Department
Resource Regulation

RECEIVED
WET. RES. MGT.

DEC 19 1991

Subject: Additional Information Request
Hardee Power Station
230 kV Transmission Line
(From Power Block to Existing Vandolah Sub-station)
Site Certification No.: PA 89-25
DOAH Case No.: 89-3560

Please refer to the following responses (underlined) to your insufficiency.

1. Please provide construction drawings (specifications and details) for the temporary wooden bridge structure to be placed in the floodplain of Payne Creek. This information needs to provide reasonable assurance that no adverse impacts (water quantity or quality) shall occur due to the proposed construction.

In response, please find the attached drawing for the temporary wooden bridge to be used to cross Payne Creek. As described in the previous incompleteness response, this bridge will be constructed of wooden mats constructed of 6"x 8" timbers designed specifically for temporary bridge construction. The only portion of the bridge that could obstruct flow is a single column of mats (42" in width) placed in a shallow portion of the channel (see the attached figure). The mats will be tied with ropes to the RR trestle or trees to prevent movement. The bridge can be removed in case of a major impending storm event. The maximum time the bridge will be in place is 2 weeks but may only be needed for 2 days if other problems are not incurred.

2. As discussed in the field visit with Mr. Robert Yarbrough on September 18, 1991, we identified those wetland areas that will require type-for-type mitigation. Although we understand your position as expressed in your last submittal, the type-for-type requirement does not distinguish between types of projects. To reiterate comments in our previous request for additional information, Section 3.2.3.1.2, Part B, Basis of Review, Chapter 40D-4, F.A.C. requires that for impacts to wetlands that are not considered significantly disturbed, compensation will include, as a minimum, type-for-type functional replacement of lost wetland habitat at a 1-to-1 ratio with additional compensation to achieve the total required compensation ratios (1.5:1 for non-forested and 2.5:1 for forested). Please include the type-for-type mitigation in your final compensation proposal.

Please refer to the attached Mitigation Proposal which proposes 2.5:1 type-for-type creation for fill in forested wetlands and 1.5:1 for fill in herbaceous wetlands and disturbed shrub wetlands. Please refer to the attached mitigation plan that describes these creation areas.

DEC 19 1991

3. As requested, please provide quantitative environmental baseline assessments for those areas that will require type-for-type mitigation in your post certification submittal. This information is necessary to evaluate whether the mitigation area designs will provide reasonable assurance of type-for-type functional replacement and for you to develop success criteria. If you wish to propose reference wetlands to base your type-for-type mitigation design and success criteria on, the following information will need to be submitted: a wetland classification system for each type of distinct wetland system, propose specify wetlands to be designated as reference wetlands, and indicate which reference system corresponds to which impact area. Please contact the project Environmental Scientist, Howard Knight, to discuss a suitable classification system, arrange a site visit to each reference wetland, and discuss the details of the quantitative baseline assessments.

Attached is a quantitative description and sampling methodology of three wetland systems located within the Hardee-Vandolah portion of the transmission line. These three areas are considered undisturbed by SWFWMD staff and are associated with Wetlands D, F, and I which are wetlands that will be filled on the Hardee-Vandolah portion of the transmission line. The depiction of the location of these transects and the results of the sampling are provided in the attached figures and tables. Two marsh systems and one forested system were sampled. The data provided in the tables will allow these wetlands to serve as a reference in the design and evaluation of success of the mitigation.

- 4.a. As discussed in our field meeting of September 25, 1991, compensation required for clearing of forested wetlands will be determined based on the habitat value that remains after the initial impact and can be expected based on future maintenance practices. Please provide a description of initial clearing practices and future maintenance activities. We would encourage you to make all efforts to reduce impacts, and to establish and assure a viable wetland community in the future. Please discuss all options considered to minimize the loss of wetland habitat.

We have modified our clearing and maintenance activities based on discussions with SWFWMD staff suggesting that these modified activities would decrease our mitigation requirements. We propose to clear the forested areas by the use of hand clearing techniques that involve chain saws cutting the trees at 3 inches above the ground or water elevation. The trees will be left where they fall as long as it is within the ROW. In the case of flowing systems, the trees will be felled in the direction of stream flow. Shrub species will be left undisturbed.

Maintenance activities in forested wetlands have also been changed based on discussions with SWFWMD staff. We propose our maintenance activities to include allowing shrubs and herbaceous plants to become established. Tree species or other plants considered hazardous to the transmission line will be herbicided utilizing individual tree treatment with approved herbicides on an as needed basis. Nuisance species such as primrose willow, cattail, and Carolina willow will be controlled by the use of herbicide sprayed

RECEIVED
REG. MGT.
DEC 19 1991

on individual plants or groups of nuisance plants.

- b. The submitted compensation plan appears to address compensation for proposed impacts for the entire 78 mile transmission line. However, the only information submitted regarding impact areas is for the Hardee to Vandolah segment. Please clarify whether this application seeks approval for the entire transmission line within the SWFWMD area for the Hardee-Vandolah segment as previously understood. If the former, please address all aspects of surface water management relative to the entire line. Specifically, for wetland issues, you will need to provide further information quantifying the impact acreage, an evaluation of the habitat impacted, and demonstrate that the compensation proposed is sufficient. Accordingly, please provide a detailed compensation plan that addresses the impacts within the area for which you seek approval.

As discussed in the October 23, 1991 meeting, in order to expedite the approval for the Hardee - Vandolah portion of the transmission line, we are proposing compensation specifically for the first 8 mile segment. Please refer to our attached mitigation plan. This plan has implemented the reference wetland data described above in question 3. Wetland mitigation construction plans are provided that include plans for restoration of each of the sloughs although the impacts to wetlands within this initial segment are compensated for by restoration of Slough #3. The wetland impacts associated with filling, which include 1.74 acres, are proposed to be mitigated with a portion of the wetland creation within the eastern pasture are between Wetland #2 and #3. The mitigation construction plans show the design of the overall creation area which will be utilized for mitigation for fill for the remaining 70 miles of transmission line impacts.

The wetland impacts associated with clearing of 3.01 acres of wetland forest, 0.19 acres of forest/shrub, 5.69 acres of disturbed shrub, and 0.72 acres of Pine/live oak wetland are proposed to be compensated for within portions of Wetland Sloughs #2 and #3, east of the recreated wetland area adjacent to the canal. The attached restoration plans show the restoration of the slough areas.

- c. We offer the following guidance and comments regarding the various compensation proposals:

Area 1 Please provide complete design details regarding grading, modifications to the existing pine canopy, existing and proposed water levels, control elevations of the berm and ditch blocks, planting and/or mulching, success criteria, and monitoring and maintenance. In addition, please determine the extent of drawdown impacts due to the existing ditch and locate the proposed berm sufficiently landward to avoid the drawdown effects of the ditch, or otherwise quantify your compensation acreage to reflect the loss by drawdown.

Please refer to the attached Mitigation Plan. These

DEC 19 1991

plans detail the grading, construction design, protection of existing pine canopy, existing and proposed water levels and control elevations of the berm and ditch blocks. Drawdown impacts of the existing ditch are shown in the hydrological study enclosed and were used to locate the earthen berm. Substantial wetland improvements are expected because of the extensive dewatering consequences of the canal and existing scour in the historic wetland. These improvements are expected to be substantial well east of the existing ditch into Area 2 described below.

The monitoring design and maintenance criteria are described in the submitted construction plans and narratives. The primary method to evaluate and determine success of the wetland restoration plan will take the form of vegetation transects located in appropriate areas of the restored wetland systems. These transects will determine vegetation species and coverage, extent and movement of vegetation zones and then compare between events to evaluate any changes. Permanent stations will be marked along the transects to ensure an accurate record of conditions throughout the study. Monitoring will occur on a modified quarterly basis for three years or longer if necessary to determine the extent of the restoration within the wetland slough. Maintenance is not expected to be necessary but will be evaluated during each monitoring event.

The attainment of success will largely need to be based on the conditions determined on the proposed transects following their first sampling and comparison with the undisturbed reference transects located further east from Myrtle Slough. It is expected that landward vegetation shifts will become evident through time as will increases in vegetation densities and species changes to more hydric representatives.

Area 2

As discussed in our field meeting of October 7, 1991 with Mr. Barry Lenz, portions of this area can expect to have some measurable improvement in depth and duration of inundation. However, a good portion of the specified acreage is already a viable wetland that can expect no measurable improvement. As discussed, please provide site topography, proposed restoration elevations, zonate and quantify areas that can expect varying degrees of improvement, design elevations of the berm and ditch blocks, and existing and proposed depth and duration of inundation. Please propose specific success criteria and monitoring methodology to establish successful enhancement.

Please refer to the Mitigation Plan for a description of proposed compensation proposed for

DEC 19 1991

clearing.

Area 3

As discussed in our field meeting with Mr. Lenz, the vast majority of this site is a functional wetland that can expect only minor improvement in depth and duration of inundation by placement of ditch blocks along the old fire break. Placement of the berm may have some localized effects, however those effects may be detrimental in part, such as over-inundation in the vicinity of the berm. Further, we anticipate only minor improvements up-gradient from the berm. As discussed, please provide site topography, proposed restoration elevations, zonate and quantify areas that can expect varying degrees of improvement, design elevations of the berm and ditch blocks, and existing and proposed depth and duration of inundation. Please propose specific success criteria and monitoring methodology to establish successful enhancement. In addition, please determine the extent of drawdown impacts due to the existing ditch and locate the proposed berm sufficiently landward to avoid the drawdown effects of the ditch. Please provide the acreage of wetland loss incurred from construction of the berm and include this as part of your impact acreage.

This area is not currently proposed for compensation for the Hardee - Vandolah segment of the transmission line. The attached Construction Plans indicate our proposed activities within Area 3. This area will be proposed as compensation for impacts to wetlands in areas south of Vandolah.

Area 4

As discussed in our field meeting with Mr. Lenz, the vast majority of this site is a functional wetland. We expect no measurable improvement to this system by the placement of the berm. We do have concerns regarding the potential over-inundation of and adverse impacts to this system. If you wish to propose this for wetland enhancement, please address these issues. Please provide the acreage of wetland loss incurred from construction of the berm and include this as part of your impact acreage.

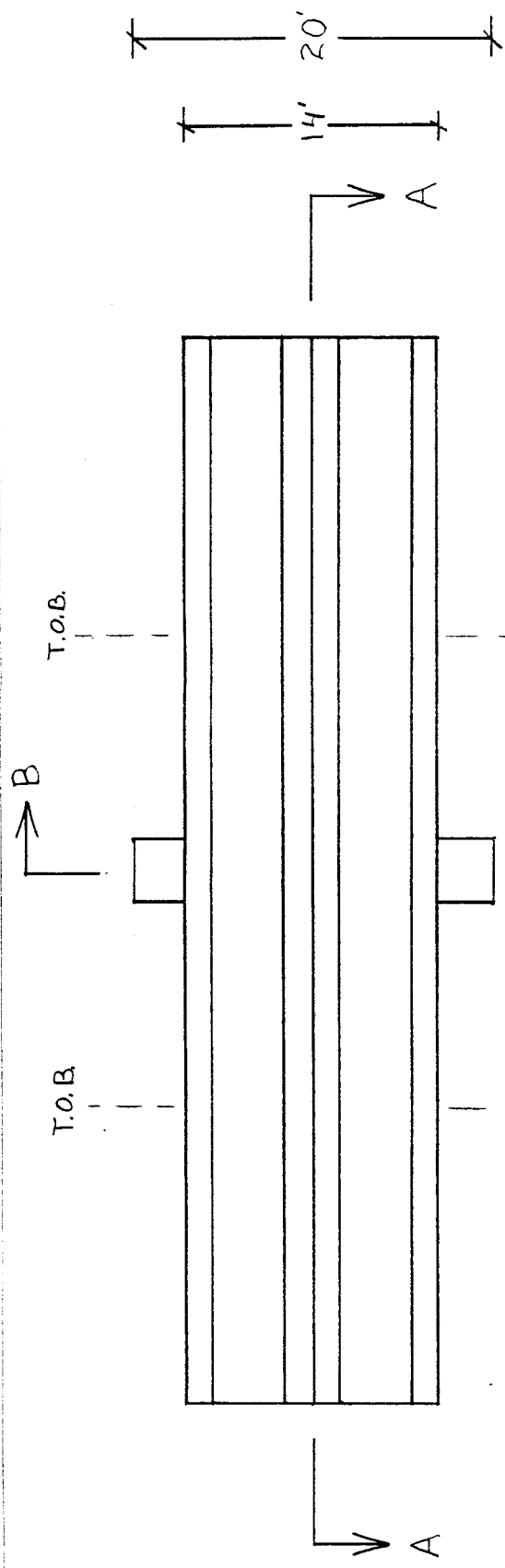
This area is not currently proposed for compensation for the Hardee - Vandolah segment of the transmission line. The attached Construction Plans indicate our proposed activities within Area 4. This area will be proposed as compensation for impacts to wetlands in areas south of Vandolah.

Area 5

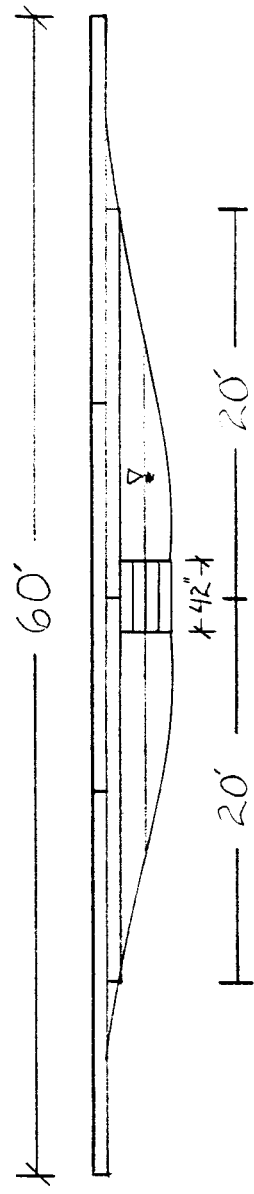
As discussed in our field meeting with Mr. Lenz, a portion in

RECEIVED
 WEST. RES. MGT.
 DEC 19 1991

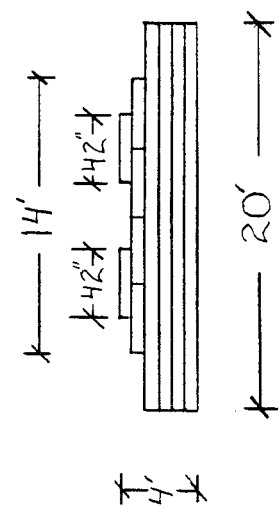
DEC 19 1991



PLAN VIEW



SECTION A-A



SECTION B-B

SEMINOLE ELECTRIC
 TEMPORARY BRIDGE
 CROSSING OF
 PAYNE CREEK

SCALE: 1" = 10'

DEC 19 1991

**WETLAND COMPENSATION PLAN
FOR THE
SEMINOLE ELECTRIC COOPERATIVE
HARDEE POWER STATION TO VANDOLAH SUBSTATION
230 KV ELECTRICAL TRANSMISSION LINE**

INTRODUCTION

Seminole Electric Cooperative, Inc. (SECI) proposes the following wetland compensation plan for wetland impacts caused by the construction of a 230 kV electrical transmission line south from the Hardee Power Station for 9 miles to the Vandolah Substation. This represents the initial segment of a total 78 mile transmission line south to the Ft. Myers Substation. This project has been reviewed and approved by the state of Florida through the Electrical Power Plant Siting Act and received Site Certification #89-25. In association with this transmission line, there are wetland impacts which include filling for power poles and access roads and clearing for transmission lines. The wetland compensation plan has been designed in Charlotte County on the C.M. Webb Wildlife Management Area (CMWWMA) to provide wetland creation and restoration areas. These areas are described below and referenced in the plan exhibits.

PROJECT DESIGN

This project segment is a 9 mile 230 kV transmission line which runs south from the Hardee Power Plant (presently under construction) south to Seminole Electric's Vandolah Substation. In association with this project there are impacts to jurisdictional wetlands which include filling and clearing. The following table shows the types and acreages of wetland impacts. These are shown in detail on the previously submitted permit exhibit drawings.

<u>Wetland Filling</u>	<u>Area</u>
forest	0.30 acres
oak/pine	0.00 acres
disturbed shrub	1.05 acres
shrub	0.00 acres
marsh	<u>0.31 acres</u>
TOTAL	1.66 acres

<u>Wetland Clearing</u>	<u>Area</u>
forest	3.01 acres
oak/pine	0.72 acres
shrub	0.00 acres
disturbed shrub	5.69 acres
marsh	<u>0.00 acres</u>
TOTAL	9.42 acres

DEC 19 1991

Two types of compensation are proposed for these wetland impacts. For the wetland filling, a wetland creation plan has been designed on the CMWWMA. This area is located between existing wetland sloughs #2 and #3 within the Myrtle Slough drainage basin. For the wetland clearing, a wetland restoration plan has been designed on three wetland sloughs which are tributaries to Myrtle Slough. These plans are described below.

WETLAND CREATION

A type for type wetland creation plan has been designed for the 1.66 acres of wetland filling impacts caused by this first segment of the project. A 2.5:1 mitigation ratio is proposed for filling forested wetlands and a 1.5:1 mitigation ratio is proposed for filling disturbed shrub and marsh areas. As a result of the filling impacts to wetlands there is a total of 2.80 acres of wetland creation provided for this first segment of the project. This is comprised of 0.75 acres of forested wetland and 2.05 acres of marsh. The disturbed shrub filling is compensated by creation of marsh areas. All wetland creation areas have been integrated within an anticipated 20 acre wetland creation site for the entire project corridor. The overall wetland mitigation area is expected to be constructed at one time and concurrent with the actual construction impacts of the first segment of the corridor.

Overall, the wetland creation site is designed to provide type for type mitigation for wetland filling impacts. As a result, the mitigation site includes appropriate areas of mesic forest, cypress swamp and marsh. The design uses the wetland hydroperiod elevations of the adjacent restored slough systems and provides a diversification of wetland habitat on the CMWWMA. In addition, within the creation wetland, an isolated wetland component has been incorporated which relies on groundwater level fluctuations. Standard wetland creation designs have been used and vegetation species scheduled for planting are derived from the wetland impact areas.

WETLAND RESTORATION

For the wetland clearing caused by the project, a wetland restoration plan has been designed on the CMWWMA. This plan proposes the restoration of three slough tributaries which are part of the Myrtle Slough drainage basin in the north central portion of the CMWWMA. These three tributaries were ditched in the early 1900's as part of the construction of a north-south railroad grade. As a result, wetland hydroperiods and vegetative communities have been variously damaged and degraded. Generally, existing wetland conditions become more degraded from south to north along the flow pattern of the canal. At the northern slough, the historic wetland area closest to the existing canal has been so severely dewatered that it is no longer jurisdictional. This area is proposed for a wetland creation design through restoration of the historic hydroperiod.

Wetland restoration will be accomplished by SECI through the construction of earthen berms located parallel to the main north-south canal and abandoned railroad grade.

RECEIVED
DEC 19 1991

These berms will hold wetland water elevations to historic levels during the summer wet season. These elevations have been determined from evaluation of the saw palmetto lines along each wetland area. Each earthen berm will have a weir located at the berm midpoint or its intersection with the existing wetland scour line. The weir invert elevation will be set at the historic seasonal high water elevation and will be constructed of inter-locking, open-faced concrete blocks. This will provide stability to the structure and also serve as a fish ladder to the restored wetlands upstream. Overall, this design is expected to cause the return of natural vegetative communities and the return of all historic wetland functions. Design criteria for the earthen berms and structures were derived from meetings with the Southwest Florida Water Management District (SWFWMD) and the Florida Department of Environmental Regulation (FDER).

The extent of existing wetland degradation has been assessed for all areas of the three sloughs. This has allowed the determination of the amount of wetland restoration expected within the different areas of the three sloughs. These determinations are shown on the wetland restoration plan sheet. The approximate 11 acre wetland creation area on the northern slough (#3) will provide 1:1 wetland mitigation credit (wetland restoration acreage : wetland clearing acreage). The wetland restoration in the middle area of the northern slough (#3) and the western area of the central slough (#2) will provide wetland mitigation at a 3:1 ratio. The wetland restoration at the eastern extent of the northern slough (#3), eastern extent of the central slough (#2) and the entire southern slough (#1) will provide wetland mitigation at a 5:1 ratio.

The permit application and the preceding table of wetland impacts shows that the initial powerline corridor segment causes 9.42 acres of wetland clearing. This is comprised of 3.01 acres of forested wetland, 0.72 acres of live oak/slash pine wetland and 5.69 acres of disturbed shrub wetland. As compensation for these wetland impacts, SECI proposes ratios of 1:1 (wetland restoration acreage : wetland clearing acreage) for the forested wetland clearing, and 0.5:1 for the oak/pine and disturbed shrub wetland clearing. Based on these ratios, a total of 6.22 acres of wetland restoration credits must be provided on the CMWWMA area.

On the CMWWMA, this acreage of wetland restoration credits is provided in the northern slough (#3) within the wetland creation area. Therefore, a total of 6.22 acres of the 10.03 acre credits in this area is dedicated to this first project segment. These areas are shown on the attached construction plans and permit exhibits.

WETLAND MONITORING

The wetland restoration and creation areas will be subjected to a monitoring program to determine the success of the compensation plan. The restoration monitoring will include vegetation transects in representative areas of the restored wetlands. Separately, an overall visual assessment of success will be conducted for the wetland creation areas (see mitigation construction plans). The restoration monitoring transects and overall creation monitoring will be conducted on a quarterly basis in April, July and October with only a photograph and water depth measuring event in January. This will be conducted over

a two year period with semi-annual events scheduled during the third year. A baseline monitoring event can be completed immediately following comment and approval of the restoration and creation plan from the environmental agencies. Nuisance vegetation establishment will be evaluated during the monitoring events and will be controlled through maintenance, if necessary. Depending on the extent and type of nuisance vegetation cover, the selective application of a herbicide or hand removal will be implemented.

SUMMARY

This wetland restoration and creation plan is designed to compensate fully for the wetland impacts caused by the initial segment of the project corridor. The incorporation of the diverse wetland creation design and the extensive wetland slough restoration will provide complete wetland compensation along with important regional benefits to the CMWWMA. Further impacts to wetlands caused by the remaining portion of the corridor will be incorporated into this wetland compensation plan. This will be shown in future permit applications.

RECEIVED
WET. RES. MGT.
DEC 19 1991

WETLAND RESTORATION MONITORING PLAN

RECEIVED
WETLAND RES. MGT.

DEC 19 1991

Monitoring of the expected vegetation changes within the wetland restoration areas will be necessary to determine the success of the overall restoration plan. The monitoring is proposed to be conducted on a quarterly basis over a three year period. This will allow the first year to serve as a type of baseline and be compared to the following two years of expected vegetation changes.

Changes in wetland species composition, percent cover and densities are anticipated because of the hydrological improvements to the wetland sloughs. To accurately determine and then evaluate these changes, permanently marked transects will be established at key points within the wetland restoration areas.

The proposed transect locations are marked on the construction plan sheets for each of the three slough systems. They correspond to the wetland areas which are expected to show response to the improved hydrological conditions. The transects will be field located following a detailed assessment of each proposed location. They will be marked by iron rods driven into the ground at the end points. The transects will typically vary in length because of the varying dimensions of the wetland areas. Permanently marked sampling plots will be systematically located along each transect line. The size and location of each plot will vary dependent upon the length of the transect and the vegetation community dimensions and diversity at each sampling area. For example, if a sampled area is comprised of a monoculture of a transitional grass species the plots may be of uniform size at regular intervals. However, if the sampled area is comprised of several community types the plots must be spaced and sized to accurately depict the changes in percent cover and species composition anticipated with the hydrological improvements. Transect plot size will represent a minimum of 10% of the sampled wetland transect area.

When all transects and sampling plots are located and marked the baseline data will be collected and tabulated. The above activity will occur prior to the construction of the hydrological improvements to ensure accuracy and prevent sampling bias. The proposed transect locations are shown on page 1 of 5 of the construction drawings.

The southern slough restoration area (#1) will have two transects located perpendicular to the slough flow. They are numbered 1A and 1B. This area is expected to be difficult to show a vegetation change in response to the hydroperiod restoration so the two transects are similarly oriented and within the main area of the slough.

The central slough restoration area (#2) will require five monitoring transects because of the extended length of the existing wetland scour/fire line, the existing extent of wetland impacts and the convoluted configuration of the wetland area. Three of the transects (2A, 2B and 2E) are located at the western extent of the slough where

DEC 19 1991

significant improvements are expected. Further east the wetland restoration is expected to be subtle and two transects (2C and 2D) are oriented perpendicular to the existing scour over 800' lengths. These are the only two transects proposed which do not extend to the existing wetland delineation line. This is proposed because of the expected limit of restoration further away from the shallow scour.

The northern slough restoration area (#3) will require three transects (3A, 3B and 3C). All three transects are located perpendicular to the flow of the slough. The western-most transect will be established within the existing upland area adjacent to the proposed berm. This will allow an evaluation of not only the ground cover vegetation changes, but also the response of the existing slash pine tree cover. The other transects will provide an assessment of the two other types of wetland restoration areas.

In addition to this design for the vegetation monitoring transects, a permanent field mark will be made of the existing delineation between vegetative communities along each transect. This will be accomplished by the placement of iron rods in the wetland systems at the point of existing community delineations. For example, where these zones are present, an iron rod will be located at the delineation between the pickerelweed and maidencane zone, or a St. Johns wort and transitional vegetation zone. This will allow a more generalized evaluation of wetland response to the improved hydrological conditions.

All data will be evaluated based on the classification of the individual plant species as either transitional or submerged. Then following repeated monitoring events the expected shifts in vegetation species and types can be evaluated. It is expected that expanded shifts in vegetation community zones and an increase in more hydric species will prove the successful restoration of the wetlands. This information can then be compared with the three reference transects to be located in undisturbed wetland areas much further east from these restoration areas. A photographic record will be made during the monitoring of all sampling locations.

Monitoring reports will be submitted to the environmental agencies within 30 days except for the annual event which will require 60 days to allow an examination of vegetation trends over the previous year and previous seasons.

WETLAND MITIGATION PLAN DESCRIPTION

RECEIVED
WET. RES. MGT.

DEC 19 1991

Mitigation Construction Area 1 - Forested

Mitigation construction Area 1 is a forested mitigation system 0.38 acres in size. Proposed elevations in this area will range from 0.5 feet above the seasonal high water (S.H.W.) of adjacent wetland #2 to 0.5 feet below this elevation. Mesic vegetation will be planted between elevations ranging from S.H.W. to 0.5 feet above S.H.W. This vegetation will consist of overstory trees such as sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*), laurel oak (*Quercus laurifolia*) and American elm (*Ulmus americana*) with understory vegetation such as smartweed (*Polygonum hydropiperoides*), chain ferns (*Woodwardia spp.*) and wax myrtle (*Myrica cerifera*).

Hydric vegetation will be planted between proposed elevations ranging from S.H.W. to 0.5 feet below S.H.W.. This vegetation will consist of overstory species such as pond cypress (*Taxodium ascendens*), red maple (*Acer rubrum*) and pop ash (*Fraxinus caroliniana*) with an understory of pickerelweed (*Pontederia cordata*), ludwigia (*Ludwigia repens*) and green arum (*Peltandra spp.*).

All trees will be planted on 10 foot centers in 3 gallon containers and all herbaceous understory on 5 foot centers in 2 inch pots. Planting medium will consist of a 6 inch (minimum) layer of organic sand topsoil strippings.

Mitigation Construction Areas 2A and 2B - Shrub

Mitigation areas 2A and 2B will be created to compensate for impacts to wetland shrub communities. The total area of this mitigation type is 1.05 acres. Elevations range from the S.H.W. of adjacent wetland #2 to 0.5 feet below S.H.W. Vegetative constituents in this creation area will consist of mesic and hydric shrub and herbaceous species. These shrub species may include buttonbush (*Cephalanthus occidentalis*), wax myrtle (*Myrica cerifera*) dahoon holly (*Ilex cassine*) and blackhaw viburnum (*Viburnum obovatum*). Herbaceous species may include smartweed (*Polygonum hydropiperoides*), bacopa (*Bacopa caroliniana*), green arum (*Peltandra spp.*), and chain ferns (*Woodwardia spp.*).

Shrub species will be planted in a 1 gallon size on 5 foot centers and herbaceous species will be planted in a 2 inch pot size on 5 foot centers. Planting medium will consist of a minimum of 6 inches of organic sand topsoil scrapings.

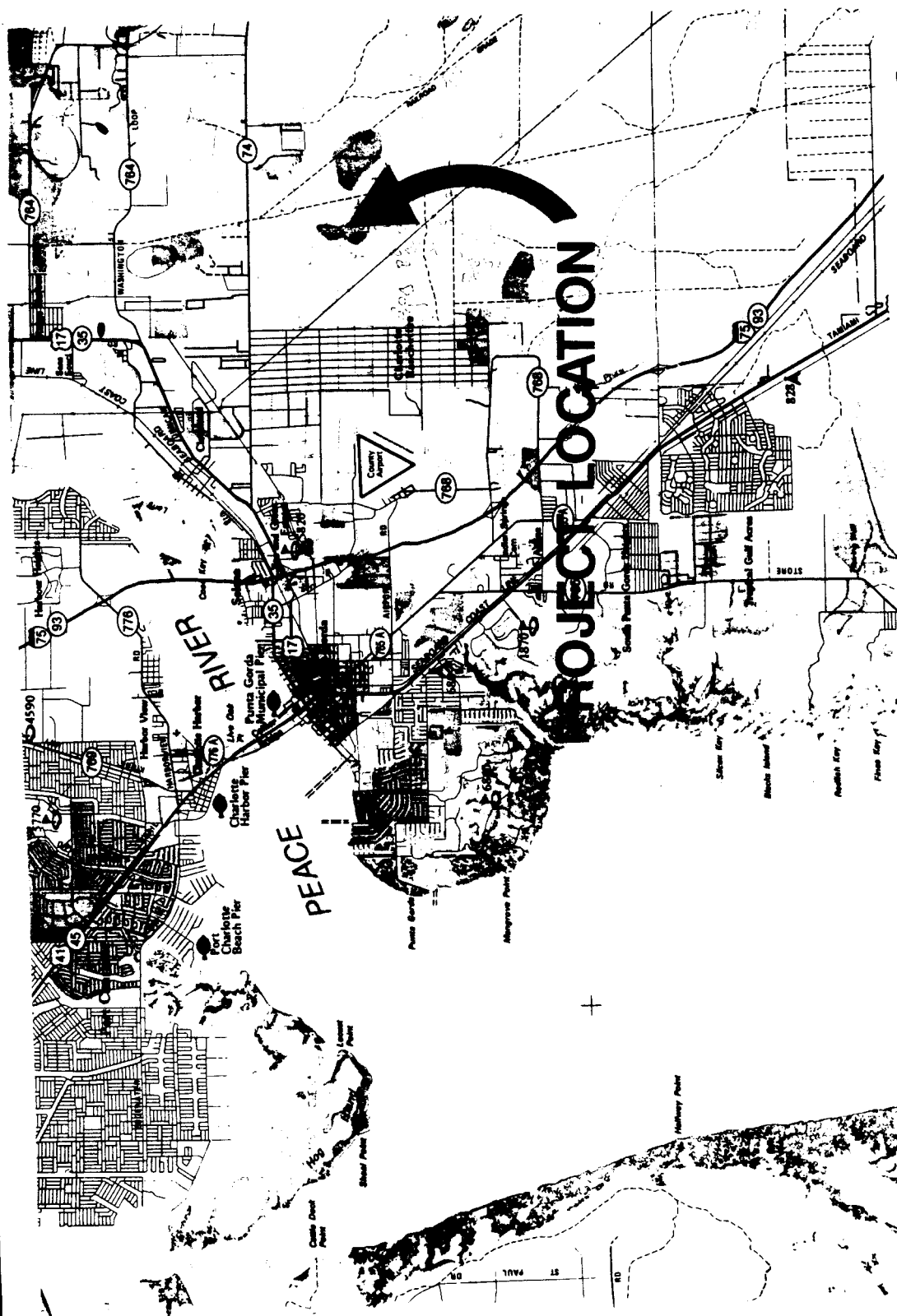
Mitigation Construction Area 3 - Herbaceous

A 0.31 acre herbaceous mitigation area will be created to compensate for project impacts to this wetland type. As the Southwest Florida Water Management District will require this herbaceous area to remain isolated from adjacent wetland areas, the system will be

designed utilizing groundwater as a source of hydration with mesic areas above S.H.W. separating the area from the adjacent wetland hydroperiods. Elevations within the mitigation area will range from the seasonal high groundwater level (S.H.G.L.) to a depth of 2 feet below this elevation. Vegetative constituents may consist of transitional and emergent species such as redroot (*Lachnanthes caroliniana*), juncus (*Juncus polycephalus*), bacopa (*Bacopa caroliniana*), pickerelweed (*Pontederia cordata*) and rush (*Rhynchospora spp.*).

Herbaceous species will be planted from 2 inch pots on 3 foot centers. Planting medium will consist of organic sand topsoil scrapings placed in a 6 inch layer.

RECEIVED
DEC 19 1991



SEMINOLE ELECTRIC WETLAND RESTORATION

FIGURE 1

LOCATION MAP

Dames & Moore

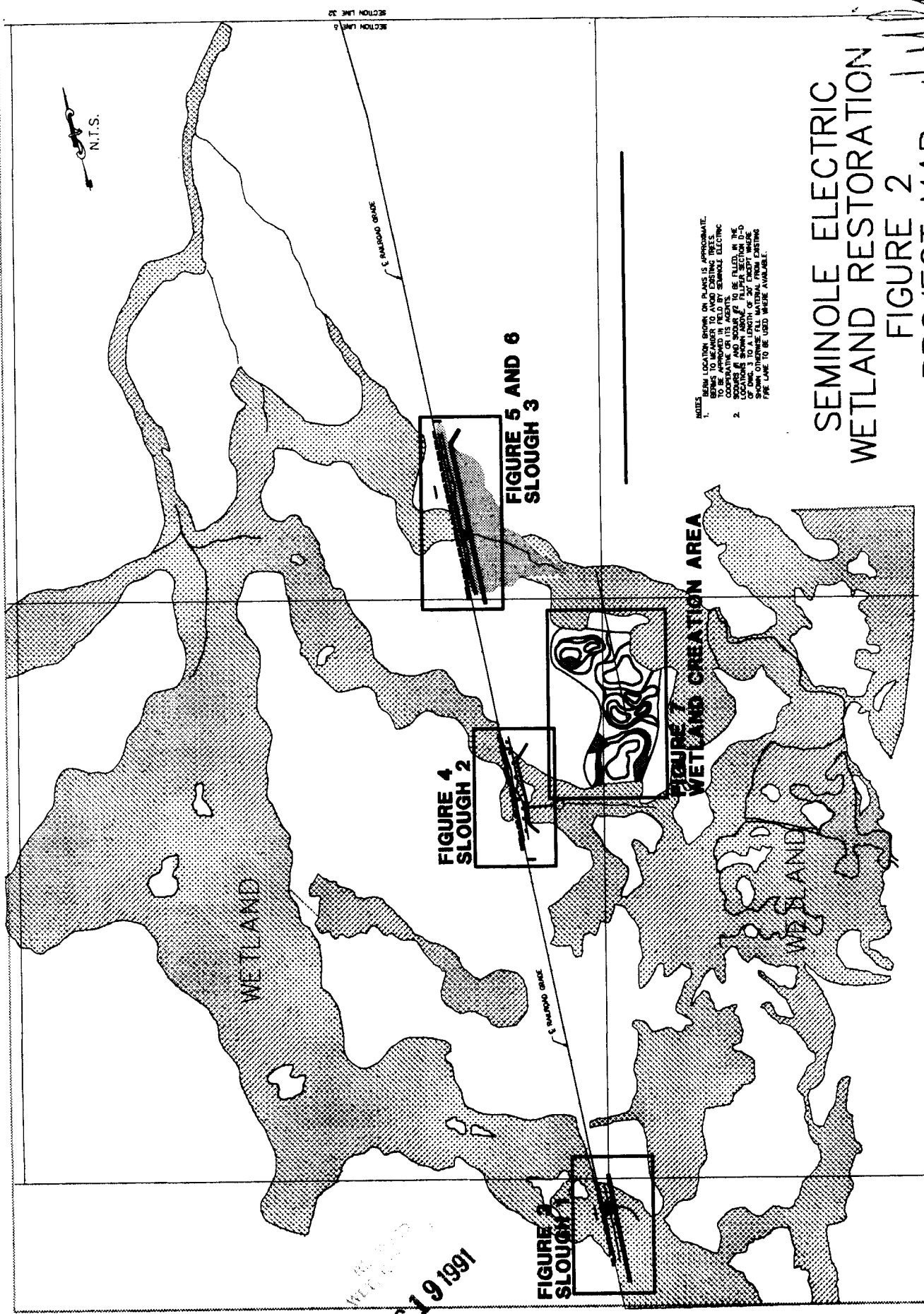
**Civil Engineering/Water Resources/Waste Management/Planning
Environmental Services/Geotechnical Engineering**

Environmental Services/Geotechnical Engineering
One North Main Street Suite Seven Hundred Tampa Florida 33609



RECEIVED
WET. RES. MGT.
197

DEC 19 1991



- NOTES
1. BEAM LOCATION SHOWN ON PLANS IS APPROXIMATE. BEAM LOCATIONS SHOWN ON PLANS ARE TO BE JOINTED IN FIELD BY SEMINOLE ELECTRIC COOPERATIVE OR ITS AGENTS.
 2. LOCATIONS SHOWN ON THIS PLAN ARE TO BE FILLED IN THE FIELD BY SEMINOLE ELECTRIC COOPERATIVE OR ITS AGENTS. LOCATIONS SHOWN ON THIS PLAN ARE TO BE FILLED IN THE FIELD BY SEMINOLE ELECTRIC COOPERATIVE OR ITS AGENTS. LOCATIONS SHOWN ON THIS PLAN ARE TO BE FILLED IN THE FIELD BY SEMINOLE ELECTRIC COOPERATIVE OR ITS AGENTS.

SEMINOLE ELECTRIC WETLAND RESTORATION FIGURE 2 PROJECT MAP

DAMES & MOORE

CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MARRY, SUITE 700 TAMPA, FLORIDA 33609
TAMPA (813) 876-1116 PINELLAS (813) 443-6827



DEC 19 1991

11-21-91



RECEIVED
MET. RES. MGT

DEC 19 1991

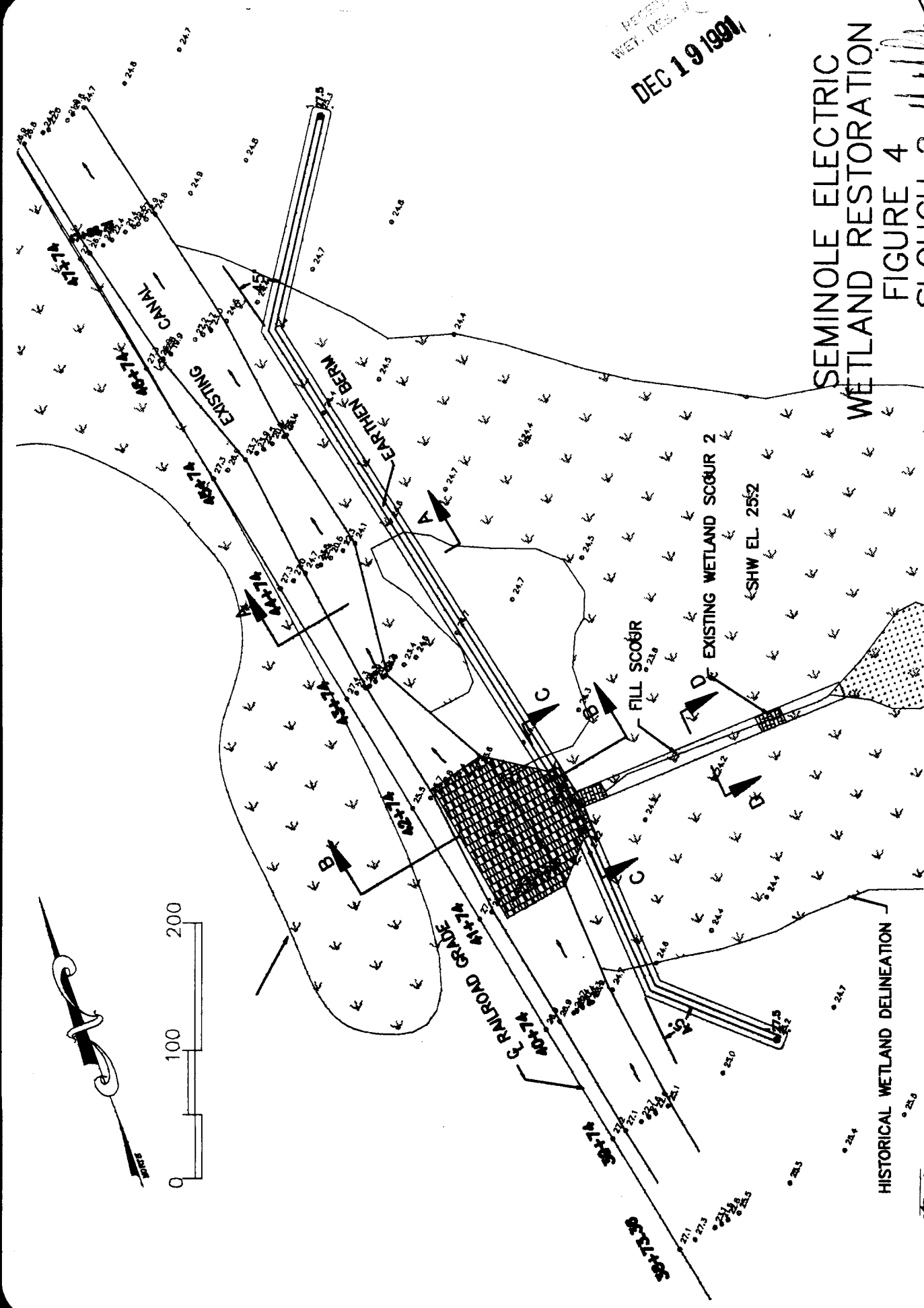
DAMES & MOORE

CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MARY, SUITE 700 TAMPA,FLORIDA 33609
TAMPA (813)876-1115 PINEHILLS (813)443-6827

RECEIVED
WET. RES. DIV.
DEC 19 1991

SEMINOLE ELECTRIC WETLAND RESTORATION

FIGURE 4
SLOUGH 2



DAMES & MOORE



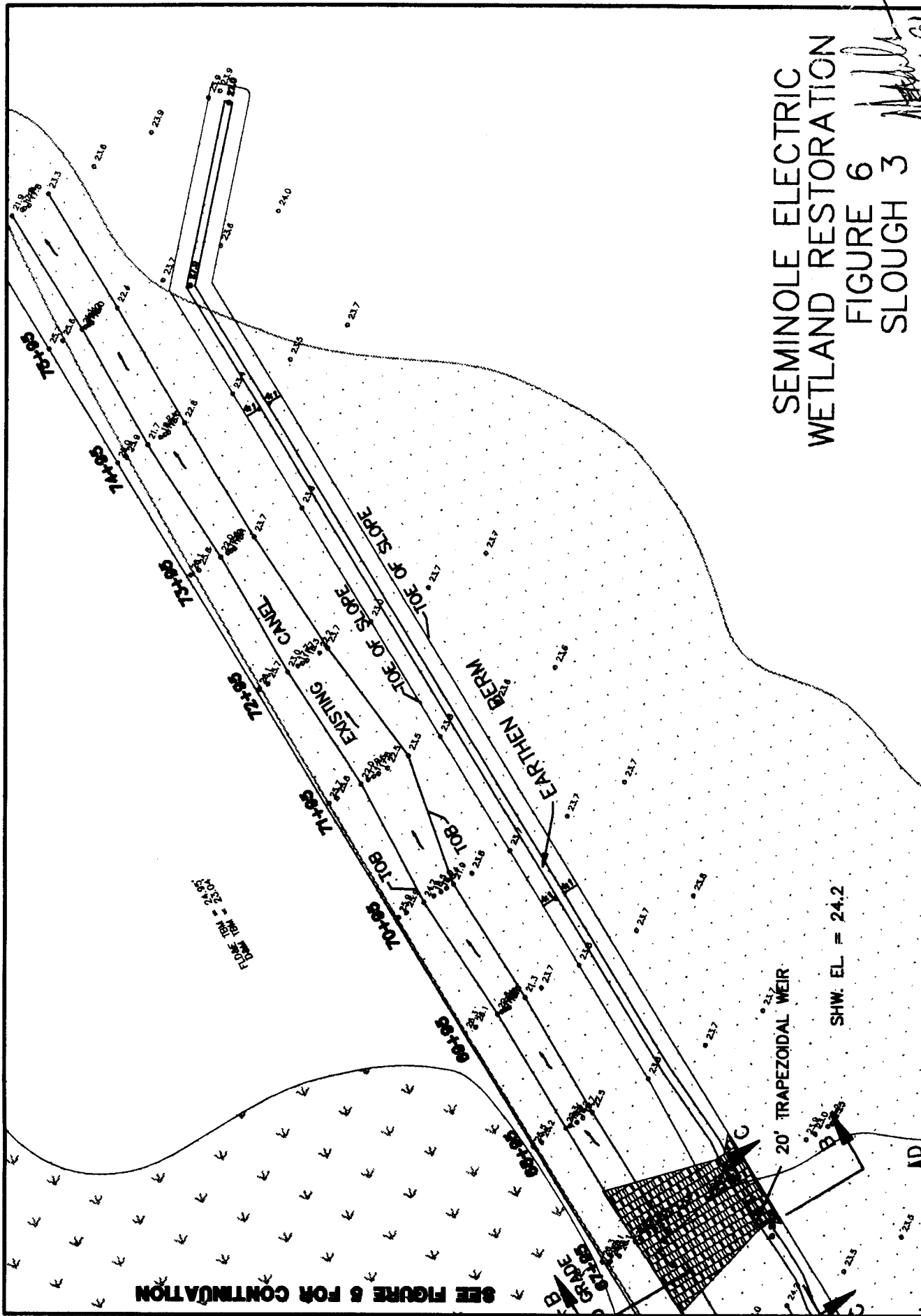
CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MARRY, SUITE 700 TAMPA, FLORIDA 33609
TAMPA (813)876-1115 PINELLAS (813)443-9827

DEC 19 1991

SEMINOLE ELECTRIC
WETLAND RESTORATION

DAMES & MOORE

CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE WABBY, SUITE 700 TAMPA,FLORIDA 33609
TAMPA (813)876-1116 PINELLAS (813)443-6827



SEMINOLE ELECTRIC
WETLAND RESTORATION
FIGURE 6
SLOUGH 3

DAMES & MOORE

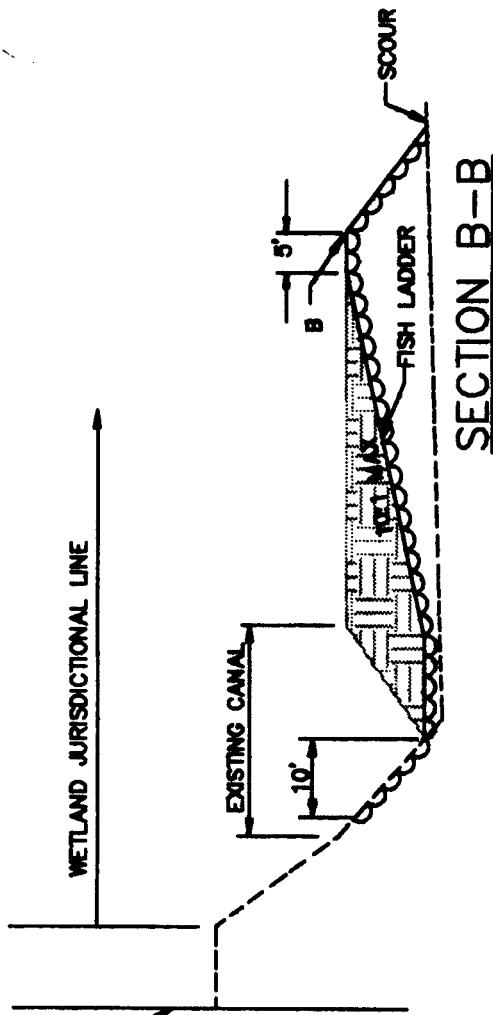
CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MABRY, SUITE 700 TAMPA, FLORIDA 33606
TAMPA (813)876-1116 PINELLAS (813)449-6827

RECEIVED
WET. RES. MGT.

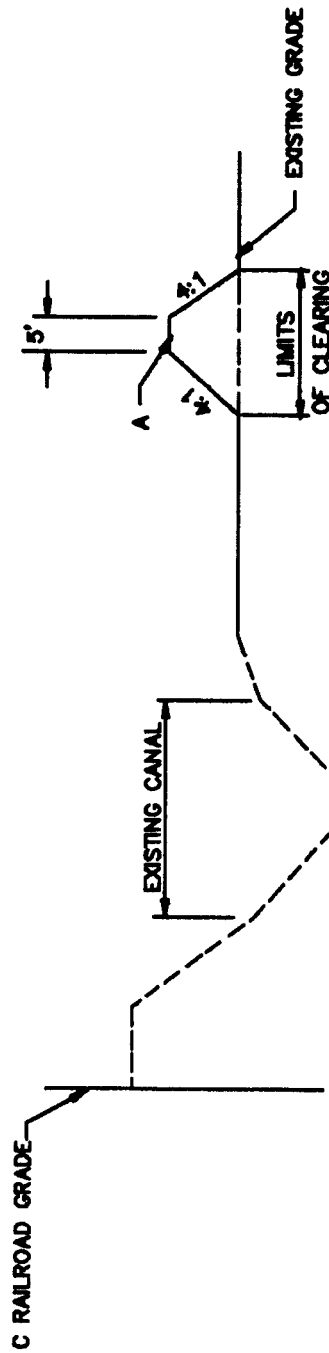
DEC 19 1991

SCOUR/ELEVATION CHART

	A	B	C	D
SCOUR 1	28.8	26.1	28.8	26.1
SCOUR 2	27.5	25.2	27.5	25.2
SCOUR 3	27.0	24.2	27.0	24.2

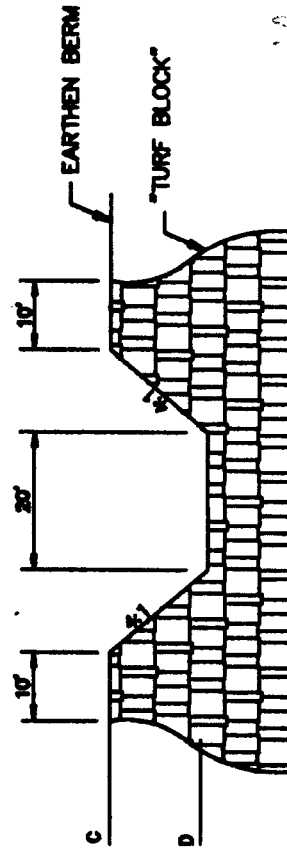


SECTION B-B



SECTION A-A

SCALE: HORIZ. 1" = 30'
VERT. 1" = 4'



SECTION C-C

RECEIVED
NOV 1991

DAMES & MOORE

FIGURE 10



CIVIL ENGINEERING/WATER RESOURCES/PORTS MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MAHRY, SUITE 700 TAMPA, FLORIDA 33609
TAMPA (813) 676-1115 PINELLAS (813) 449-0827

GRAPHIC SCALE



(IN FEET)
1 inch = 40 ft.

IMPROVED
PASTURE

50/FS
101/PHE
201/BC
50/LR

188/FL 450/COD
450/PH 188/RS
225/LC

EL. 25.0
(SHGW)

EL. 24.5

EL. 24.0

EL. 23.0

A-1

VARIES
20:1
40:1
20:1
MAX.

290/JP
77/PC
19/SL

MITIGATION CONSTRUCTION AREA &



DAMES & MOORE

PROPOSED
WETLANDS MITIGATION

DEC 19 1991

CITY OF TAMPA, FLORIDA
PLANNING AND DEVELOPMENT DEPARTMENT
100 SOUTH BAY STREET, SUITE 1700 TAMPA, FLORIDA 33601
TELEPHONE 813-255-1111 FACSIMILE 813-255-1111

galt
12-17-91

GRAPHIC SCALE



29/LS 29/UA 218/HM
29/AR 545/PH 327/MC
78/OL 218/WS 327/AC
29/CN 327/RC 218/CF

EL. 24.9 (SHW)

72/TA 183/PC
19/AR 52/BS
30/FC 52/LR
183/PS 52/CA

EL. 24.9 (SHW)

EL. 24.4
EL. 23.9

EL. 23.4

VARIES
20:1
MAX.

MATCH EXISTING GRADES

C-2

A-2

B-2

1779/JF
474/PC
118/SL

151/FS
303/PHE
605/BC
151/LR

508/FL
1220/PH
610/LC
1220/COD
508/RS

DAMES & MOORE

MITIGATION CONSTRUCTION AREA 1 & 4

DEC 18 1991

THIS DRAWING IS THE PROPERTY OF DAMES & MOORE. IT IS TO BE USED ONLY FOR THE PROJECT AND PURPOSE SPECIFIED HEREIN. IT IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT THE WRITTEN PERMISSION OF DAMES & MOORE.

DEC 18 1991

12-1-91

PALMETTO PRAIRIE D-2

GRAPHIC SCALE

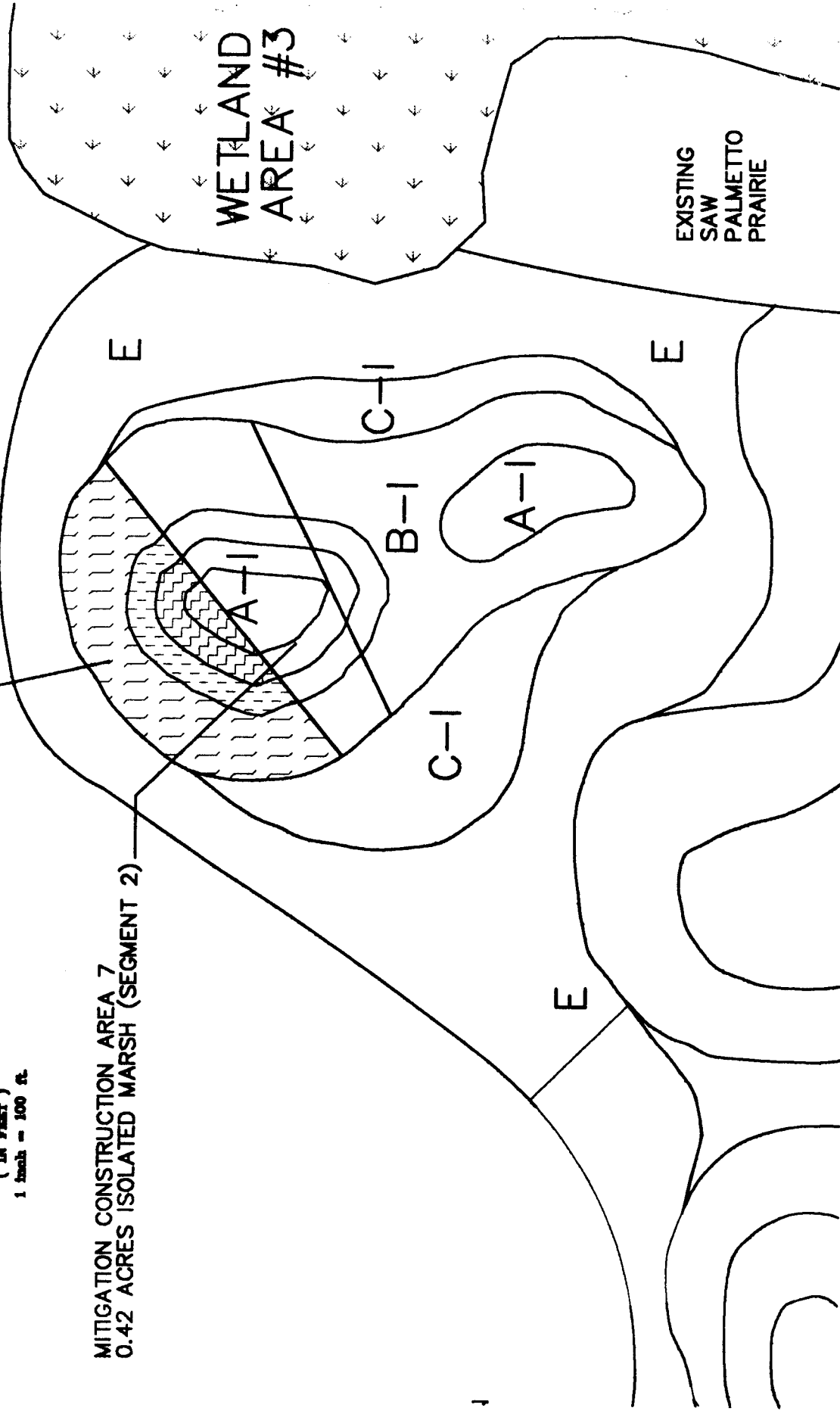


(IN FEET)

1 inch = 100 ft.

MITIGATION CONSTRUCTION AREA 7
0.42 ACRES ISOLATED MARSH (SEGMENT 2)

MITIGATION CONSTRUCTION AREA 8
0.47 ACRES ISOLATED MARSH (SEGMENT 1)

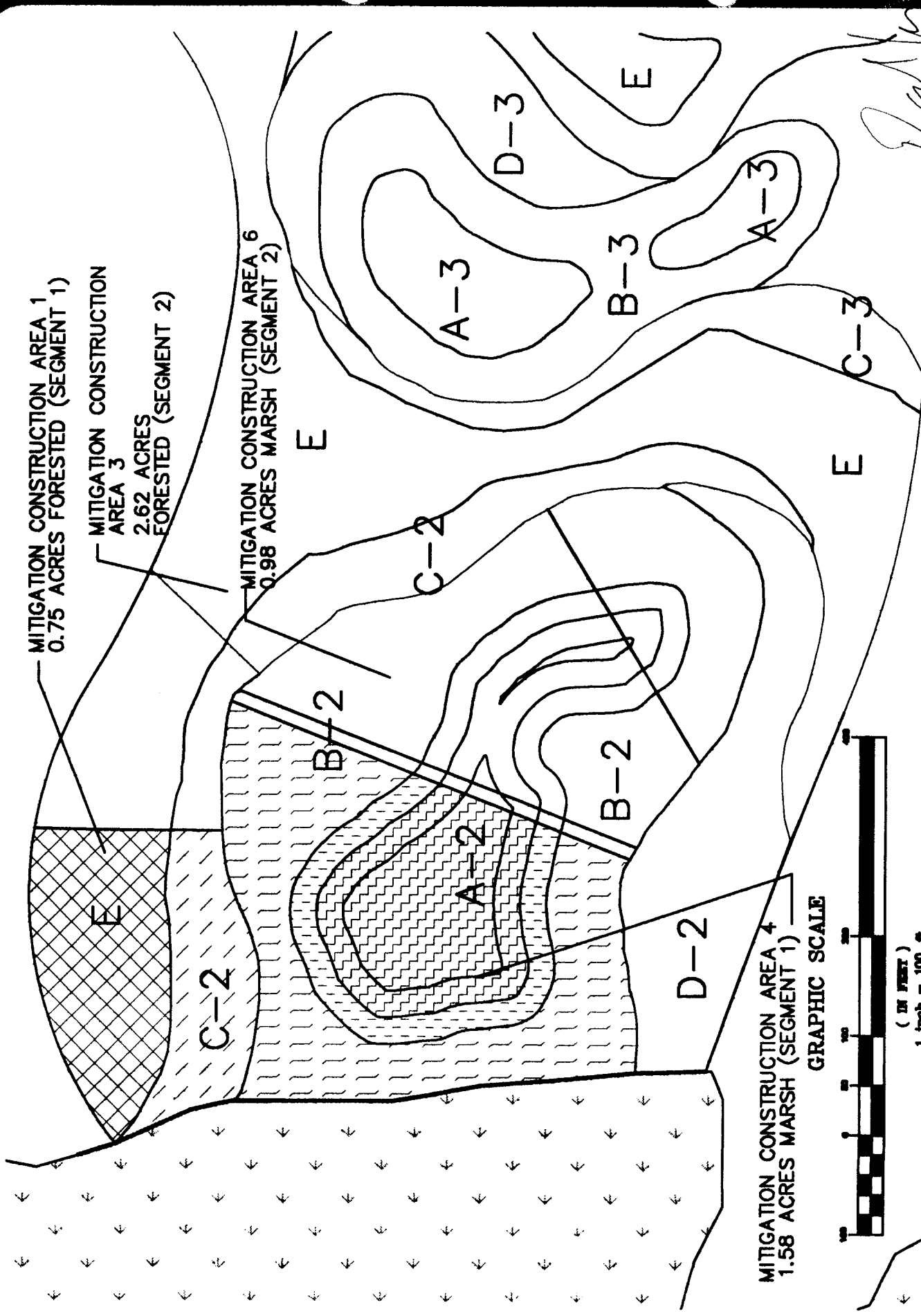


DAMES & MOORE

CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MARRY, SUITE 700 TAMPA, FLORIDA 33609
TAMPA (813)876-1115 PINELLAS (813)445-8887

DEC 19 1991

12/17/91



MITIGATION CONSTRUCTION AREA 1
0.75 ACRES FORESTED (SEGMENT 1)

MITIGATION CONSTRUCTION
AREA 3
2.62 ACRES
FORESTED (SEGMENT 2)

MITIGATION CONSTRUCTION AREA 6
0.98 ACRES MARSH (SEGMENT 2)

MITIGATION CONSTRUCTION AREA 4
1.58 ACRES MARSH (SEGMENT 1)

GRAPHIC SCALE



(IN FEET)
1 inch = 100 ft

DAMES & MOORE

CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE MABRY, SUITE 700 TAMPA, FLORIDA 33609
TAMPA (813)876-1115 PHOENIX (613)443-0827



John
12-17-91

DEC 19 1991

FORESTED	SYMBOL	QUANTITY	BOTANICAL NAME	COMMON NAME	SPECIFICATIONS
	TA	72	<i>Taxodium ascendens</i>	Pond cypress	1 Gallon, 3' - 4' HT., 10' o.c.
	AR	49	<i>Acer rubrum</i>	Red maple	1 Gallon, 3' - 4' HT., 10' o.c.
	FC	39	<i>Fraxinus caroliniana</i>	Pop ash	1 Gallon, 3' - 4' HT., 10' o.c.
	LS	29	<i>Liquidambar styraciflua</i>	Sweetgum	1 Gallon, 3' - 4' HT., 10' o.c.
	QL	78	<i>Quercus laurifolia</i>	Laurel oak	1 Gallon, 3' - 4' HT., 10' o.c.
	QN	29	<i>Quercus nigra</i>	Water oak	1 Gallon, 3' - 4' HT., 10' o.c.
	UA	29	<i>Ulmus americana</i>	American elm	1 Gallon, 3' - 4' HT., 10' o.c.
	PS	183	<i>Peltandra spp.</i>	Green arum	2" Pot, 6" - 9" HT., 5' o.c.
	PC	183	<i>Porteaderia cordata</i>	Pickereeweed	2" Pot, 6" - 9" HT., 5' o.c.
	BS	52	<i>Blechnum serrulatum</i>	Swamp fern	2" Pot, 6" - 9" HT., 5' o.c.
	LR	52	<i>Ludwigia repens</i>	Ludwigia	2" Pot, 6" - 9" HT., 5' o.c.
	CA	52	<i>Citrum americanum</i>	Swamp lily	2" Pot, 6" - 9" HT., 5' o.c.
	PH	545	<i>Polygonum hydropiperoides</i>	Smartweed	2" Pot, 6" - 9" HT., 5' o.c.
	WS	218	<i>Woodwardia spp.</i>	Chain-fern	2" Pot, 6" - 9" HT., 5' o.c.
	RC	327	<i>Ruellia carolinensis</i>	Wild petunia	2" Pot, 6" - 9" HT., 5' o.c.
	HM	218	<i>Hypericum myrtifolium</i>	St. John's-wort	2" Pot, 6" - 9" HT., 5' o.c.
	MC	327	<i>Myrica cerifera</i>	Wax myrtle	1 Gallon, 1' - 2' HT., 5' o.c.
	IC	327	<i>Ilex cassine</i>	Dahoon holly	1 Gallon, 1' - 2' HT., 5' o.c.
	CF	218	<i>Cornus foemina</i>	Swamp dogwood	1 Gallon, 1' - 2' HT., 5' o.c.
MARSH					
	FL	696	<i>Flaveria linearis</i>	Yellowtop	2" Pot, 6" - 9" HT., 3' o.c.
	PH	1670	<i>Polygonum hydropiperoides</i>	Smartweed	2" Pot, 6" - 9" HT., 3' o.c.
	LC	835	<i>Lachnanthes caroliniana</i>	Redroot	2" Pot, 6" - 9" HT., 3' o.c.
	COD	1670	<i>Cyperus odoratus</i>	Sedge	2" Pot, 6" - 9" HT., 3' o.c.
	RS	696	<i>Rhynchospora spp.</i>	Rush	2" Pot, 6" - 9" HT., 3' o.c.
	FS	201	<i>Fuirena scirpoidea</i>	Umbrella grass	2" Pot, 6" - 9" HT., 3' o.c.
	PHE	404	<i>Panicum hemitomon</i>	Maidencane	2" Pot, 6" - 9" HT., 3' o.c.
	BC	806	<i>Bacopa caroliniana</i>	Bacopa	4" x 4" Plug, 3' o.c.
	LR	201	<i>Ludwigia repens</i>	Ludwigia	2" Pot, 6" - 9" HT., 3' o.c.
	JP	2,069	<i>Juncus polycephalus</i>	Juncus	2" Pot, 6" - 9" HT., 3' o.c.
	PC	551	<i>Porteaderia cordata</i>	Pickereeweed	2" Pot, 6" - 9" HT., 3' o.c.
	SL	138	<i>Sagittaria lancifolia</i>	Arrowhead	2" Pot, 6" - 9" HT., 3' o.c.

DEC 19 1991



DAMES & MOORE

CIVIL ENGINEERING/WATER RESOURCES/WASTE MANAGEMENT/
ENVIRONMENTAL SERVICES/GEOTECHNICAL ENGINEERING/
PLANNING/LANDSCAPE ARCHITECTURE
ONE NORTH DALE HARBOR, SUITE 700 TAMPA, FLORIDA 33609
TAMPA (813)875-1116 FT. MYERS (813)443-0857

[Handwritten signature]
12/17/91

REFERENCE WETLAND SAMPLING METHODOLOGY

For the Hardee Power Station to Vandolah Substation segment of the electrical transmission line three wetlands were sampled qualitatively and quantitatively for their use as reference wetlands. The intent of the sampling was to determine future wetland mitigation success criteria and to ensure type for type species representation in the created wetlands. The three reference wetland vegetation transects include one hardwood swamp (Wetland D) and the transitional edge of two marshes (Wetland F and I).

These wetlands were sampled on October 29 and 30, 1991. The sampling methodology established a transect in each wetland along the center line of the proposed transmission line. Nine sampling points were established at regular intervals along each transect line. At each sampling point, the canopy, shrub layer, and two ground cover layers were sampled.

The canopy was sampled by the "nearest neighbor" or point-center quarter technique. The area around each point was divided into four quadrants using the four compass points. The tree (greater than 3" dbh) nearest the point was located and its point-to-tree distance was determined. Other parameters determined were the tree species, the approximate height and canopy diameter of the tree, and its diameter-at-breast-height (dbh).

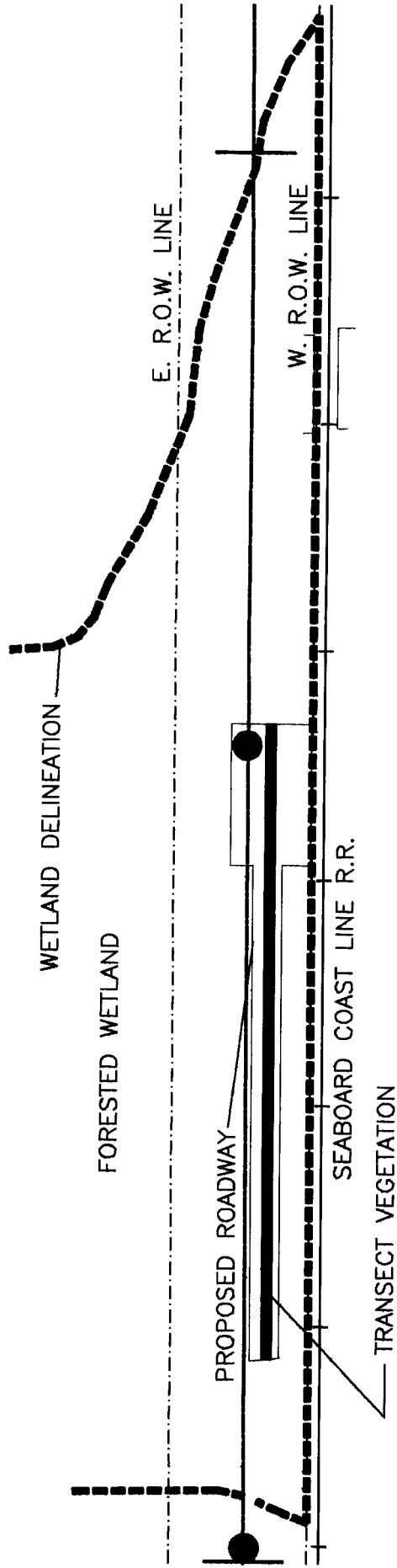
The shrub layer was determined by marking a 15 x 15 foot square in the previously established northwest quadrat. An estimate was then made of the areal coverage of each species with a height greater than three feet and a dbh less than 3".

The ground cover was determined in a similar manner using a 3 x 3 foot quadrat and sampling separately for those species 18" to 3 feet tall, and those 18" and under. In the marsh systems only one 3 x 3 foot quadrat was sampled at each point because of the limit in vegetation height.

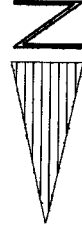
The results of this sampling are presented in the attached tables.

RECEIVED
WET. RES. INST.
DEC 19 1991

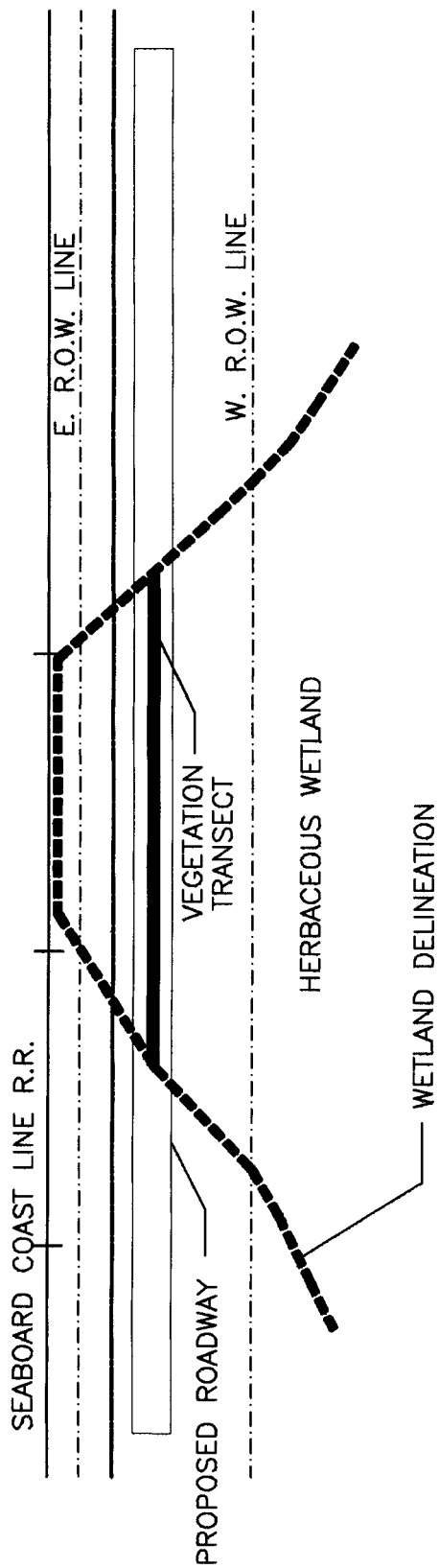
Reference Wetland Vegetation Transect - Wetland D



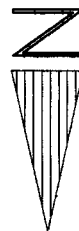
DEC 18 1991



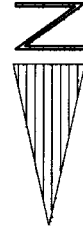
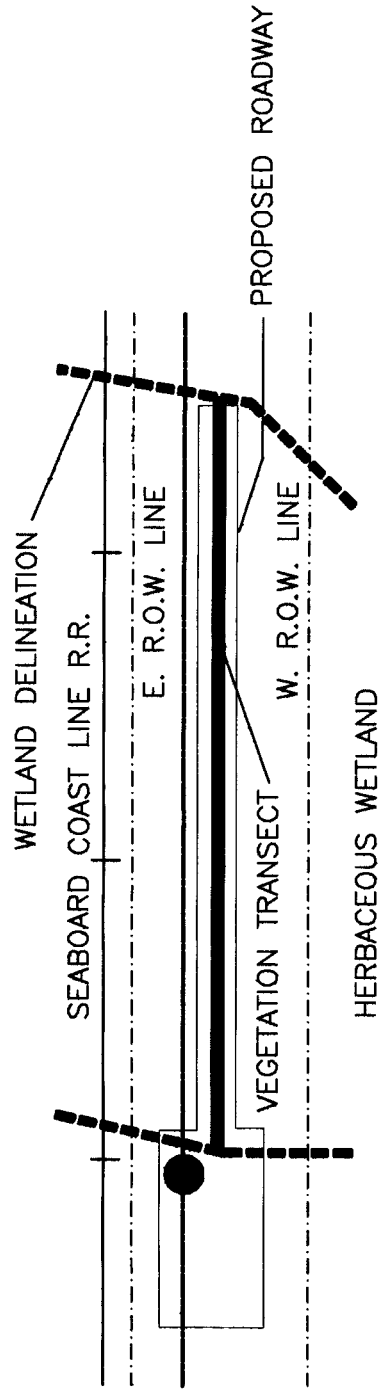
Reference Wetland Vegetation Transect - Wetland I



DEC 19 1991



Reference Wetland Vegetation Transect - Wetland F



DEC 19 1991

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 1 @ 0'
WATER DEPTH None

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Liquidambar styraciflua</i>	7'	13"	75'	15'
NW	<i>Ulmus americanus</i>	6'9"	3 3/4"	30'	8'
SE	<i>Quercus laurifolia</i>	4'9"	3 3/4"	25'	6'
SW	<i>Quercus laurifolia</i>	20'2"	3 1/2"	80'	25'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Viburnum obovatum</i>	2
	<i>Serenoa repens</i>	8
	<i>Ulmus americana</i>	15
	<i>Liquidambar styraciflua</i>	3
	<i>Quercus laurifolia</i>	2
	TOTAL COVER	30 %

WETLAND D
 WETLAND MGT.
 DEC 19 1991

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Urena lobata</i>	10
	<i>Gelsemium sempervirens</i>	5
	TOTAL COVER	15%

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Psychotria nervosa</i>	20
	<i>Urena lobata</i>	15
	<i>Clematis crispa</i>	5
	<i>Parthenocissus quinquefolia</i>	5
	<i>Momordica charantia</i>	5
	<i>Smilax bona-nox</i>	10
	TOTAL COVER	60%

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 2 @ 50'
WATER DEPTH N/A

NO. 1000
 WET. REF. 1000
DEC 19 1991

TREES

QUADRANT 25 ft. x 25 ft.	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Quercus nigra</i>	2'	5"	35'	12'
NW	<i>Quercus nigra</i>	5 1/2'	10"	40'	20'
SE	<i>Ulmus americana</i>	19 1/2'	7"	30'	20'
SW	<i>Quercus nigra</i>	12'	8"	45'	25'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Acer rubrum</i>	10
	<i>Liquidambar styraciflua</i>	2
	<i>Ulmus americana</i>	3
	<i>Serenoa repens</i>	15
	TOTAL COVER	30%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Ulmus americana</i>	1
	<i>Myrica cerifera</i>	1
	<i>Urena lobata</i>	3
	TOTAL COVER	5%

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Mikania scandens</i>	2
	<i>Toxicodendron radicans</i>	2
	<i>Rubus sp.</i>	2
	<i>Woodwardia virginica</i>	4
	TOTAL COVER	10%

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 3 @ 100' (at 185+00)
WATER DEPTH N/A

RECEIVED
 WET. RES. MGT.
 DEC 19 1991

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Quercus laurifolia</i>	7'3"	17"	55'	25'
NW	<i>Quercus laurifolia</i>	22'0"	4"	20'	6'
SE	dead	11'0"	13"	50'	N/A
SW	<i>Acer rubrum</i>	19'0"	8"	55'	12'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Serenoa repens</i>	70
	<i>Ulmus americana</i>	5
	TOTAL COVER	75%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

RECEIVED
WET. RES. MGT.

DEC 19 1991

STATION # 4 @ 150'
WATER DEPTH None

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	None				
SE	<i>Quercus laurifolia</i>	9'	10 1/2'	45	22
SW	<i>Quercus nigra</i>	16'	9 1/4"	40	20
NW	<i>Quercus nigra</i>	7'	4 1/2"	35	12

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Liquidambar styraciflua</i>	3
	<i>Quercus nigra</i>	3
	<i>Serenoa repens</i>	64
	TOTAL COVER	70%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 5 @ 200'
WATER DEPTH None

RECEIVED
WET. RES. MGT.

DEC 19 1991

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Quercus nigra</i>	12'	5"	28'	17'
NW	<i>Quercus nigra</i>	17'	7"	40'	15'
SE	<i>Quercus laurifolia</i>	21 1/2'	16 1/2"	40'	30'
SW	<i>Quercus nigra</i>	17'	6"	40'	15'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Serenoa repens</i>	60
	<i>Liquidambar styraciflua</i>	10
	TOTAL COVER	70%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 6 @ 250'
WATER DEPTH None

RECEIVED
 WET. RES. MGT.
 DEC 19 1991

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Quercus nigra</i>	12 1/2'	8 1/2"	45'	20'
NW	<i>Liquidambar styraciflua</i>	12'	4 1/2"	25'	8'
SE	<i>Quercus nigra</i>	4 1/2'	4"	25'	10'
SW	<i>Quercus nigra</i>	7'	7"	35'	35'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Liquidambar styraciflua</i>	20
	<i>Quercus nigra</i>	15
	<i>Rhododendron viscosum</i>	3
	<i>Ilex cassine</i>	2
	TOTAL COVER	40%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Pteridium aquilinum</i>	10
	<i>Quercus nigra</i>	5
	<i>Rhododendron viscosum</i>	5
	<i>Gelsemium sempervirens</i>	10
	TOTAL COVER	30%

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 7 @ 300'
WATER DEPTH None

RECEIVED
WET. RES. M&F.

DEC 19 1991

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Gordonia lasianthus</i>	15 1/2'	12"	50'	20'
NW	<i>Quercus nigra</i>	9'	9"	40'	12'
SE	<i>Quercus nigra</i>	13 1/2'	8"	40'	20'
SW	<i>Quercus nigra</i>	10'	8"	40'	10'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Rhododendron viscosum</i>	40
	<i>Liquidambar styraciflua</i>	15
	<i>Serenoa repens</i>	10
	TOTAL COVER	65

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Pteridium aquilinum</i>	15
	TOTAL COVER	15

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 8 @ 350'
WATER DEPTH None

RECEIVED
WET. RES. MGT.

DEC 19 1991

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Quercus nigra</i>	11'	5"	30'	6'
NW	<i>Quercus nigra</i>	4 1/2'	10"	40'	20'
SE	<i>Quercus nigra</i>	8 1/2'	4 1/4"	30'	6'
SW	<i>Quercus nigra</i>	6 1/2'	4 1/2"	15'	8'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Gordonia lasianthus</i>	5
	<i>Liquidambar styraciflua</i>	5
	<i>Rhododendron viscosum</i>	30
	TOTAL COVER	40%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Osmunda cinnamomea</i>	40
	<i>Gelsemium sempervirens</i>	5
	<i>Ilex cassine</i>	5
	TOTAL COVER	50%

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	None	
	TOTAL COVER	

WETLAND D
FORESTED REFERENCE WETLAND TRANSECT

STATION # 9 @ 400'
WATER DEPTH None

RECEIVED
 WCT. RES. MGT.

DEC 19 1991

TREES

QUADRANT	SPECIES	DIST. FROM POINT	DBH	APPROX. HEIGHT	CANOPY DIAMETER
NE	<i>Quercus nigra</i>	15'	7"	35'	20'
NW	<i>Quercus nigra</i>	9'	5"	36'	10'
SE	None				
SW	<i>Quercus nigra</i>	4'	5"	34'	10'

SHRUBS

QUADRAT 15 ft. x 15 ft.	SPECIES	PERCENT COVER
	<i>Serenoa repens</i>	20
	<i>Boehmeria cylindrica</i>	10
	<i>Quercus nigra</i>	10
	<i>Lyonia lucida</i>	10
	TOTAL COVER	50%

GROUND COVER (Greater than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Rhus copalina</i>	10
	<i>Quercus nigra</i>	10
	TOTAL COVER	20%

GROUND COVER (Less than 18" tall)

QUADRAT 3 ft. x 3 ft.	SPECIES	PERCENT COVER
	<i>Pteridium aquilinum</i>	10
	<i>Smilax bona-nox</i>	10
	TOTAL COVER	20%

RECEIVED
WETLAND MGT.
DEC 19 1991

WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT

STA # - 1 @ 0'
Water Depth - 2"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Juncus polycephalus</i>	60
<i>Hydrocotyle umbellata</i>	14
<i>Solidago sp.</i>	5
<i>Rhexia maritima</i>	2
<i>Euthamia minor</i>	4

TOTAL PERCENT COVER	85
----------------------------	-----------

COMMENTS: Trampled by cattle

RECEIVED
DEC 19 1991

WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT

STA # - 2 @ 48'
Water Depth - 2"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Hypericum fasciculatum</i>	4
<i>Panicum hemitomon</i>	20
<i>Juncus polycephalus</i>	40
<i>Polygonum hydropiperoides</i>	5
<i>Rhexia maritima</i>	5
<i>Euthamia minor</i>	15
<i>Bidens laevis</i>	6

TOTAL PERCENT COVER	95
----------------------------	-----------

COMMENTS:

RECEIVED
WET. RES. M/T
DEC 19 1991

**WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 3 @ 96'
Water Depth - 3"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Juncus polycephalus</i>	50
<i>Panicum hemitomon</i>	30
<i>Cyperus sp.</i>	4
<i>Bidens laevis</i>	2
<i>Polygonum hydropiperoides</i>	2
<i>Ludwigia repens</i>	2

TOTAL PERCENT COVER	90
----------------------------	-----------

COMMENTS:

RECEIVED
WET. RES. MGT.
DEC 19 1991

WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT

STA # - 4 @ 144
Water Depth - 6"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Panicum hemitomon</i>	40
<i>Bacopa caroliniana</i>	5
<i>Polygonum hydropiperoides</i>	2
<i>Juncus polycephalus</i>	15
<i>Cyperus sp.</i>	5
<i>Ludwigia octovalvis</i>	2
<i>Ludwigia repens</i>	1

TOTAL PERCENT COVER 70

COMMENTS:

WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT

RECEIVED
WETLAND MGT.
DEC 19 1991

STA # - 5 @ 192'
Water Depth - 3 1/2"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Panicum hemitomon</i>	40
<i>Solidago stricta</i>	2
<i>Cyperus sp.</i>	10
<i>Aster caroliniana</i>	3
<i>Hydrocotyle umbellata</i>	5
<i>Ludwigia octovalvis</i>	4
<i>Eupatorium capillifolium</i>	7
<i>Juncus polycephalus</i>	10
<i>Bidens laevis</i>	3
<i>Polygonum hydropiperoides</i>	4
<i>Centella asiatica</i>	2

TOTAL PERCENT COVER	90
----------------------------	-----------

COMMENTS:

**WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 6 @ 240
Water Depth - 3"
Stratum - Ground cover

RECEIVED
 WET. RES. UNIT
 DEC 19 1991

SPECIES	PERCENT COVERAGE
<i>Panicum hemitomom</i>	50
<i>Cyperus sp.</i>	12
<i>Juncus polycephalus</i>	18
<i>Hydrocotyle umbellata</i>	5
<i>Bidens laevis</i>	3
<i>Solidago stricta</i>	2
<i>Rhynchospora sp.</i>	4
<i>Aster caroliniana</i>	1

TOTAL PERCENT COVER 95

COMMENTS:

DEC 19 1991

WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT

STA # - 7 @ 288
Water Depth - 1"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Lachnanthes caroliniana</i>	10
<i>Panicum hemitomon</i>	25
<i>Juncus polycephalus</i>	15
<i>Solidago stricta</i>	8
<i>Rhynchospora sp.</i>	12
<i>Cyperus sp.</i>	5
<i>Eleocharis sp.</i>	5
<i>Polygonum hydropiperoides</i>	5
<i>Hydrocotyle umbellata</i>	5

TOTAL PERCENT COVER 90

COMMENTS:

RECEIVED
WET. RES. MGT.
DEC 19 1991

WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT

STA # - 8 @ 336'
Water Depth - No standing water
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Lachnanthes caroliniana</i>	2
<i>Bidens laevis</i>	10
<i>Panicum hemitomon</i>	30
<i>Hydrocotyle umbellata</i>	10
<i>Rhynchospora sp.</i>	2
<i>Ludwigia octovalvis</i>	3
<i>Centella asiatica</i>	2
<i>Eleocharis sp.</i>	1
<i>Cyperus sp.</i>	4
<i>Xyris sp.</i>	2
<i>Sagittaria lancifolia</i>	3
<i>Aster caroliniana</i>	1
<i>Polygonum hydropiperoides</i>	1
<i>Juncus polycephalus</i>	10
<i>Lindernia grandiflora</i>	4
<i>Solidago stricta</i>	15

TOTAL PERCENT COVER 100

COMMENTS:

RECEIVED

DEC 19 1991

**WETLAND F
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 9 @ 384
Water Depth - No standing water
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Flaveria floridana</i>	3
<i>Xyris sp.</i>	5
<i>Hydrocotyle umbellata</i>	10
<i>Juncus polycephala</i>	20
<i>Panicum hemitomon</i>	10
<i>Rhynchospora sp.</i>	30
<i>Centella asiatica</i>	2
<i>Euthamia minor</i>	5
<i>Eleocharis sp.</i>	10
<i>Lindernia grandiflora</i>	5

TOTAL PERCENT COVER	100
----------------------------	------------

COMMENTS:

RECEIVED
WET. RES. MGT.
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 1 @ 0'
Water Depth - Saturated, no standing water
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Juncus polycephalus</i>	35
<i>Lachnanthes caroliniana</i>	10
<i>Panicum hemitomom</i>	20
<i>Hydrocotyle umbellata</i>	10
<i>Pluchea odorata</i>	5
<i>Solidago stricta</i>	3
<i>Myriophyllum aquaticum</i>	1
<i>Rhexia maritima</i>	4
<i>Eupatorium capillifolium</i>	2

TOTAL PERCENT COVER 90

COMMENTS:

RECEIVED
WET. RES. MGT.
DEC 19 1991

WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT

STA # - 2 @ 40'
Water Depth - 3"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Lachnanthes caroliniana</i>	30
<i>Panicum hemitomon</i>	10
<i>Xyris sp.</i>	2
<i>Rhynchospora sp.</i>	2
<i>Juncus polycephalus</i>	6
<i>Ludwigia octovalvis</i>	3
<i>Sagittaria lancifolia</i>	2
<i>Hydrocotyle umbellata</i>	5

TOTAL PERCENT COVER 60

COMMENTS: Trampled

RECEIVED
WETLAND MGT.
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 3 @ 80'
Water Depth - 3"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Rhynchospora sp.</i>	40
<i>Panicum hemitomon</i>	10
<i>Aster caroliniana</i>	2
<i>Myriophyllum aquaticum</i>	2
<i>Solidago stricta</i>	3
<i>Euthamia minor</i>	4
<i>Lachnanthes caroliniana</i>	15
<i>Hydrocotyle umbellata</i>	3
<i>Eleocharis sp.</i>	1
<i>Juncus polycephalus</i>	5

TOTAL PERCENT COVER	85
----------------------------	-----------

COMMENTS: Trampled

WETLAND I
WETLAND I

DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 4 @ 120'
Water Depth - 1"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Fuirena breviseta</i>	25
<i>Scirpus pungens</i>	25
<i>Panicum hemitomon</i>	10
<i>Lachnanthes caroliniana</i>	15
<i>Hydrocotyle umbellata</i>	10
<i>Solidago stricta</i>	3
<i>Eupatorium capillifolium</i>	2
<i>Ludwigia repens</i>	4
<i>Polygonum hydropiperoides</i>	1
<i>Euthamia minor</i>	1
<i>Cyperus sp.</i>	4

TOTAL PERCENT COVER	100
----------------------------	------------

COMMENTS:

RECEIVED
WETLAND DIST.
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 5 @ 160'
Water Depth - 2"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Panicum hemitomom</i>	40
<i>Bacopa caroliniana</i>	5
<i>Hydrocotyle umbellata</i>	10
<i>Hypericum fasciculatum</i>	5
<i>Rhynchospora sp.</i>	5
<i>Juncus polycephalus</i>	10
<i>Paspalum distichum</i>	5
<i>Lachnanthes caroliniana</i>	2
<i>Lindernia grandiflora</i>	3

TOTAL PERCENT COVER	85
----------------------------	-----------

COMMENTS:

RECEIVED
WET. RES. DIST.
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 6 @ 200'
Water Depth - 3 1/2"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Panicum hemitomon</i>	20
<i>Paspalum distichum</i>	5
<i>Rhychospora sp.</i>	1
<i>Ludwigia peruviana</i>	5
<i>Hydrocotyle umbellata</i>	1
<i>Lindernia grandiflora</i>	1
<i>Lachnanthes caroliniana</i>	2
<i>Cyperus sp.</i>	1
<i>Pluchea odorata</i>	1
<i>Polygonum hydropiperoides</i>	1
<i>Eleocharis sp.</i>	2

TOTAL PERCENT COVER	40
----------------------------	-----------

COMMENTS:

RECEIVED
WET. RES. DIV.
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 7 @ 240'
Water Depth - 1"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Paspalum distichum</i>	30
<i>Panicum hemitomom</i>	20
<i>Rhynchospora sp.</i>	5
<i>Hydrocotyle umbellata</i>	5
<i>Hyptis alata</i>	2
<i>Xyris sp.</i>	3
<i>Cyperus sp.</i>	5
<i>Lindernia grandiflora</i>	5

TOTAL PERCENT COVER	75
----------------------------	-----------

COMMENTS:

RECEIVED
WET. RES. MGT.
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 8 @ 280'
Water Depth - 1 1/2"
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Hydrocotyle umbellata</i>	5
<i>Ludwigia repens</i>	2
<i>Cyperus sp.</i>	2
<i>Scirpus sp.</i>	3
<i>Lachnanthes caroliniana</i>	15
<i>Polygonum hydropiperoides</i>	3

TOTAL PERCENT COVER	30
----------------------------	-----------

COMMENTS:

RECEIVED
WET. RES. UNIT
DEC 19 1991

**WETLAND I
HERBACEOUS REFERENCE VEGETATION TRANSECT**

STA # - 9 @ 320'
Water Depth - No standing water
Stratum - Ground cover

SPECIES	PERCENT COVERAGE
<i>Cyperus polystachyos</i>	20
<i>Hydrocotyle umbellata</i>	10
<i>Panicum hemitomon</i>	10
<i>Xyris sp.</i>	5
<i>Rhynchospora sp.</i>	5
<i>Erigeron sp.</i>	3
<i>Ludwigia hirtella</i>	3
<i>Fuirena breviseta</i>	4

TOTAL PERCENT COVER

85

COMMENTS: