

MEMORANDUM OF UNDERSTANDING  
BETWEEN  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,  
NORTH CAROLINA WILDLIFE RESOURCES COMMISSION,  
AND U.S. FISH AND WILDLIFE SERVICE

THIS AGREEMENT is made and entered into on the date hereinbelow last written, by and between the State of North Carolina, acting through the Wildlife Resources Commission (WRC) and the Department of Transportation (NCDOT); and the United States of America, acting through the U.S. Department of Interior, Fish and Wildlife Service (USFWS).

WHEREAS, the USFWS is authorized to enter into agreements with the State of North Carolina in accordance with the provisions of the Fish and Wildlife Coordination Act, 48 Stat. 401, as amended; 16 U.S.C. 661-667d; and

WHEREAS, under existing provisions of law the WRC and NCDOT are authorized to enter into agreements with the USFWS; and

WHEREAS, the purpose of this Memorandum of Understanding is to establish a Mitigation Bank for mitigating unavoidable pocosin wetland losses associated with future NCDOT projects in pocosin wetlands; and

WHEREAS, a portion of the former J.T. Barefoot & Sons Tract, hereafter referred to as the Pridgen Flats Mitigation Site, upon which USFWS holds a perpetual conservation easement in the National Wildlife Refuge system was formerly pocosin wetlands prior to clearing and draining for agricultural use, and can be restored to its previous condition through appropriate restoration and management techniques;

NOW, THEREFORE, it is mutually agreed among the three parties that the following general provisions are adopted and will be implemented as indicated.

General Provisions

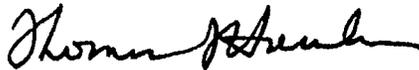
1. The term of the agreement shall be for a period of twenty (20) years.
2. The attached restoration and monitoring plan is an integral part of this MOU (Attachment A) and identifies initial and long-range habitat improvement measures which will be implemented by NCDOT. Initial restoration activities and the associated costs will be the responsibility of the project sponsor, NCDOT.
3. The USFWS will manage the mitigation bank site in perpetuity. If any structure installed by NCDOT fails

within the life of this agreement, it will be repaired or replaced by NCDOT.

4. Mitigation from the bank will be used only to offset unavoidable impacts on pocosin wetlands when the applicant can demonstrate to the satisfaction of all parties to the MOU that there are no available or practical onsite mitigation alternatives.
5. Projects to be permitted using this area as mitigation shall be debitted from the bank at a 2:1 ratio (acres restored : acres impacted).
6. The mitigation bank will be used for mitigating unavoidable impacts associated with NCDOT projects occurring in North Carolina on pocosin wetland habitat types. For the purposes of this agreement, pocosin wetlands are defined as palustrine broad-leaved evergreen scrub/shrub (a sparse needle-leaved evergreen forested overstory may be present) saturated or seasonally flooded/saturated freshwater wetlands, characterized by acid water chemistry and highly organic soils.
7. The mitigation bank will not be used to offset any project impacts on Federally-listed endangered or threatened species.
8. If future NCDOT projects requiring mitigation occur within the mitigation bank site, whether the bank is to be debitted or offsite areas are used for mitigation, then the debits for such projects will equal four (4) times the acreage caused to be lost by the project.
9. The USFWS will provide data sheets for each credit or debit transaction to all parties to the MOU for signature concurrence. No credits or debits can be applied until all parties concur with the USFWS data sheet analysis. Such concurrence, substantiations of reasons for nonconcurrence, or requests for additional review time must be forwarded to the Raleigh Office of USFWS within 30 working days after receipt of the data sheet. If no response from a party is received within this time frame, it will be deemed to indicate concurrence by that party. Copies of annual transaction data sheets will be held as a permanent record by USFWS and NCDOT. An annual summary of credits and debits will be prepared by the USFWS on a calendar year basis and provided to each party, until such time as all credits from the bank have been depleted.
10. This MOU does not eliminate the applicant's or agencies' responsibilities under all applicable Federal, State and local laws and/or regulations.

11. Five (5) years after implementation of the restoration plan, a complete evaluation of the restoration program will be made by the parties involved to evaluate success and to take corrective actions, if necessary, as outlined in the attached implementation plan.
12. Amendment or modification of the MOU may be proposed at any time, but will not be adopted unless agreed to by all parties. If proposed revisions are not agreed to within one (1) year after submission, then the party proposing the revision may elect to terminate its participation in this agreement at the end of that one year period. In the event that NCDOT terminates its participation in this agreement, alternative mitigation will be required for those impacts for which debits have been made from the bank. The scope of the alternative mitigation shall be adjusted according to pocosin wetland values anticipated to result from the restoration activities implemented prior to termination of the agreement relative to pocosin wetland values which would have been expected to result from fulfillment of the terms of this agreement.

IN WITNESS THEREOF, the parties have caused this agreement to be executed on the date hereinbelow last written.



\_\_\_\_\_  
Secretary  
N.C. Department of Transportation



\_\_\_\_\_  
Date



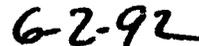
\_\_\_\_\_  
Executive Director  
N.C. Wildlife Resources Commission



\_\_\_\_\_  
Date



\_\_\_\_\_  
Regional Director  
U.S. Fish and Wildlife Service



\_\_\_\_\_  
Date

Attachment A.

Restoration and Monitoring Plan  
Pridgen Flats Pocosin Mitigation Bank  
Sampson County, North Carolina

November 20, 1991

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PRIDGEN FLATS POCOSIN MITIGATION BANK

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- \* Figure 2. Schematic of flashboard riser.
- \* Figure 3. Reduced size cross-sections of existing drainage ditches.

## INTRODUCTION

The proposed mitigation area is on a 346.20 acre conservation easement on a farm that reverted to Farmer's Home Administration (FmHA) ownership after the failure of farming operations. The FmHA has given the easement to the U.S. Fish and Wildlife Service (USFWS). The property is located south of Kerr in Sampson County, and can be accessed along the abandoned railroad embankment behind Ander's Store in Kerr, or from SR 1105 along the railroad embankment. A map of the property is attached (Figure 1).

The North Carolina Department of Transportation (NCDOT) proposes to restore the wetlands on this property and receive mitigation credits for this activity. This will involve restoring natural conditions on the property so that a wetland community similar to the original can develop.

## EXISTING CONDITIONS

### Vegetation

The easement occurs in a landscape studded with Carolina Bays and their associated sand rims. There is a large Carolina Bay west of the easement which is designated as Pridgen Flats on the U.S.G.S. topographic map. The easement includes areas of former and existing Carolina Bay and sand rim habitat, as well as other upland areas.

Pocosin restoration efforts will take place on both sides of the abandoned railroad embankment at the northern end of the easement. The soil in this section is predominantly Lynn Haven Sand, a hydric soil, and was formerly vegetated with typical tall pocosin vegetation. A remnant of the original vegetation occurs to the west of the field. This fragment has a scattered canopy of pond pine (*Pinus serotina*) with a dense shrub layer composed of *Gordonia lasianthus*, *Lyonia lucida*, *Cyrilla racemiflora*, *Ilex glabra*, *Ilex coriacea*, *Myrica cerifera*, and *Persea borbonia*. *Smilax laurifolia* is abundant and *Sphagnum* species is also to be found.

Currently, the restoration area primarily consists of open fields in an early state of old field succession, with a few young pines and shrubs (those listed above plus *Baccharis halimifolia*) and abundant grasses. The northwest section of the restoration area contains windrows composed of the shrubs listed above.

The restoration area is bordered to the north by a mixed stand of *Pinus serotina*, *Pinus taeda*, and *Pinus palustris*. There is a scattered shrub understory, apparently the result of a recent fire. The restoration area is bordered to the east and south by open fields on non-hydric soil.

## Soils

The Sampson County Soil Survey depicts several hydric soils within the easement boundary. These soils include Lynn Haven Sand, Leon Sand and Tomahawk Sand. The areas of hydric soils will be mapped by the NCDOT wetland mitigation staff.

Lynn Haven Sand is poorly drained with a surface layer of 8 inches of black sand. The subsurface is gray sand 4 inches thick. The subsoil is 58 inches thick. Infiltration is rapid and surface runoff is slow to ponded. It is further characterized by wetness, low fertility, and a hard pan within 30 inches of the surface. This is the dominant soil type in the restoration area.

Leon Sand, the other hydric soil, is not as extensive on the easement. The Leon series is a poorly drained sandy soil with a weakly cemented layer within 30 inches deep. Below this cemented layer is loose sand. The water table is 10 to 40 inches deep for more than 6 months during most years.

Another soil type, Tomahawk Sand, is listed as containing inclusions of a hydric soil, namely Leon Sand. Tomahawk occurs on a portion of the easement.

## Hydrology

The USFWS Conservation Easement was visited several times to gain an understanding of the existing drainage. An engineering survey measured slopes and sizes of the existing agricultural/railroad ditches, and existing natural ground slopes (Refer to Figures 1 and 3.)

The principal survey line is designated -L- on Figure 1, with other lines designated -T1- through -T5-. These lines were surveyed to assist in quantifying the principal drainage patterns and ditches. General contour lines are also provided. Note that the -L- line corresponds to the abandoned railroad bed, and the -T5- line to the northwest boundary ditch. These two lines, along with -T2-, closely parallel the principal existing drainage, which flows to the northwest and under highway SR 1007.

The existing ditch sections are shown on Figure 3, along with their maximum (bank full) flows and their average flows. The flows were calculated by the staff of the NCDOT State Hydraulics Engineer, using accepted hydrologic engineering practices.

## PROPOSED ACTIONS

### Vegetation

This restoration plan is designed to promote development of a scrub-shrub pocosin with a widely scattered pond pine overstory. The most expeditious way of re-establishing this community would be to replant the entire area with the shrub species originally present. Several suppliers of the desired shrub species have been located. However, all of these nurseries have limited supplies of these species. The available plants are of container size, and consequently have a fairly high cost. A three year delay in planting would be necessary to propagate shrub seedlings. Pond pine seedlings are available in ample quantity to provide the sparse coverage desired on the restoration area, and are relatively inexpensive.

Due to the limited supply of shrubs, it is not feasible to replant the entire easement. This restoration plan proposes an experimental approach to revegetating the restoration area. The goal of this strategy is to develop a scrub-shrub pocosin as quickly as possible while obtaining some comparative data on different planting approaches.

The restoration area will be divided into three sections roughly equivalent in size (Fig. 1). The first area, which is east of the railroad bed, will be replanted with pond pine seedlings and appropriate shrubs as described in the planting guidelines. The second area, the southwestern section of the easement, will be seeded. The seeds for this section will be gathered by NCDOT personnel from nearby pocosin areas, and distributed over the restoration area. The third section of the easement will be allowed to revegetate by natural succession. This section, the northwest corner, contains windrows of appropriate shrubs, and borders the remnant pocosin area to the west. A controlled burn will be conducted on the first two areas to prepare them for planting.

The guidelines for planting and monitoring these sections are attached as an appendix. Sufficient shrubs are currently available to replant the roughly 67 acre section as proposed in the guidelines.

## Soils

The Department recognizes the importance of hydric soils and wetland hydrology for the success of this project. The Department also recognizes the limitations of county soil surveys. Areas of hydric soils will be mapped by the NCDOT mitigation staff. The hydric soil criteria outlined in Hydric Soils of the United States (1991) will be used in conjunction with the field indicators of hydric soils listed in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual and the 1989 Interagency Manual in delineating the hydric soil boundary within the project area. The restorable portion of the property will consist of the areas of hydric soils.

## Hydrologic Restoration

Hydrologic restoration efforts will be directed to restore the original pocosin water levels as nearly as practical. Several methods were considered to achieve this goal and flow control devices known as flashboard risers were chosen. These structures will be installed at Sites 1 through 4 (Fig. 1). A schematic of a flashboard riser is illustrated in Figure 2.

Pipe sections of the flashboard risers were sized to allow full existing normal flow in the ditch. The riser section is designed to allow incremental adjustment from a "no restriction" condition to a "fully dammed" condition. Timber inserts are added incrementally from the bottom upward as desired, up to the top of the ditch.

Flashboard risers allow for a range in dam heights, and should enable control of ground water levels to predictable elevations. The control structures, when fully closed, are intended to control ground water levels to the approximate natural ground elevations at Sites 1 through 4.

It should be noted that these elevations are maximums, with the control structures fully closed; the optimum ground water level will be sought by field experimentation. The optimum results may well occur with the control structures only partially closed. Field calibrations will allow restoration of water levels to conditions present before the natural drainage was altered.

The ground water level will be monitored by ten monitoring wells, and also by observation of water levels in the ditches. Measurements from the groundwater monitoring wells and staff gauges will verify how well the flashboard risers influence and are able to restore ground water levels. The location and number of monitoring wells were determined by the USFWS and NCDOT geologists. The ditch level will be monitored by use of several surveyed staff gauges. Top-of-well elevations will also be surveyed so that any ground water flow regime can be established by appropriate well measurements. Monitoring will be manual, and will be performed by NCDOT monthly

for the first year, and seasonally (four times per year) for the following four years. The existing ground water level will be determined by several observations prior to any ditch closure, in order to establish a baseline against which to measure changes. (See Figure 1 for proposed well locations).

The wells have been installed by the NCDOT Geotechnical Unit at depths of 6 to 8 feet. Wells are capped, set in sand, and sealed in bentonite. Well pipe material is 2 inch diameter PVC pipe, consisting of a 5 foot lower screen section and a 5 foot plain upper section. The Geotechnical Unit has prepared well logs by observation at appropriate intervals, and has installed the wells so that none penetrate any impervious layer.

Although it might be desirable, the hydrologic controls are not likely to affect the entire 346.20 acre USFWS Conservation Easement. The portion of the Easement which includes the most likely area for hydrologic restoration is labeled "Restoration Area", and covers approximately 200 acres.

### **PROJECT TIMETABLE**

Seeds have been collected during September and November, 1991 in preparation for planting in the spring of 1992. In December of 1991, NCDOT will delineate the extent of hydric soils in the restoration area. Shortly afterwards, NCDOT intends to apply for the 404 and USFWS Special Use Permits, if required, so that the hydrologic restoration plan can be implemented this winter. Concurrently, contracts will be developed for the revegetation plan, which should be implemented next spring.

After the hydrologic structures have begun to operate, NCDOT will consult with the US Fish & Wildlife Service to agree on the effective restoration area that will generate credits. It is expected that restoration of hydrology will be a prime factor in this determination.

## APPENDIX 1.

Planting and Monitoring Guidelines for Planting Area, Pridgen Flats Mitigation Bank, Sampson County, North Carolina.

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### I. Monitoring Time Frame - Mitigation site shall be inspected at the following times:

- A. Prior to planting
- B. At completion of planting
- C. Three (3) and five (5) years following completion (or after 3rd and 5th growing seasons)

### II. Data to be Obtained at Specific Inspection Times

#### A. Prior to planting

##### 1. Check for proper plant species and acceptable plant quality.

10 per acre *Gordonia lasianthus*, #1 container  
10 per acre *Ilex glabra*, #1 container  
20 per acre *Myrica cerifera*, #1 container  
10 per acre *Persea borbonia*, #1 container  
30 per acre *Pinus serotina*, 1 yr. seedling,

Note: Plant species are contingent on availability at the time of planting. If sufficient quantities are not available, half of the plants may be planted one year and half the next.

##### 2. Check for proper planting methods

##### 3. Check for proper plant spacing (17.5' O.C. for container plants, 48' O.C. for seedlings)

#### B. At completion of planting check for conformity with plans as well as quality of planting.

C. Three (3) and five (5) years following completion (or after 3rd and 5th full growing season)

1. Estimate survival rate (optional - collect data if it can be determined)
2. Measure height of plants
3. Take Photographs (aerial and ground)
4. Estimate percent population
  - a. Planted species
  - b. Overall (including natural succession)

### III. Evaluation and Recourse Action

#### A. Acceptable survival rate

1. Planted area: 80% for container plants and 50% for seedlings, including planted and natural succession of desirable species.
2. Seeded and natural succession areas: stem density equal to that planted in the planted area.

#### B. Three (3) and five (5) year data evaluation

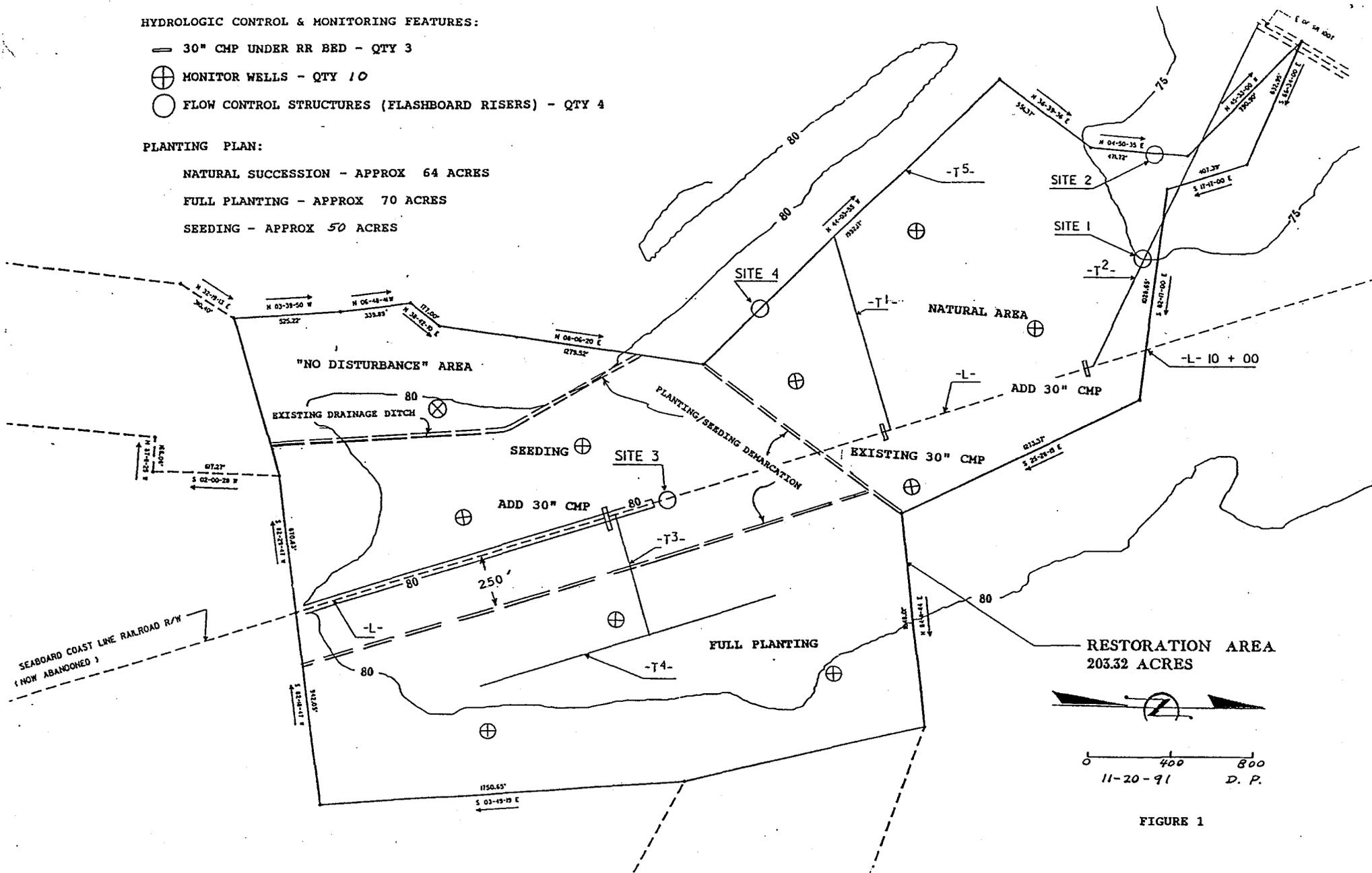
1. Below acceptable survival rate (recourse options)
  - a. Replant (supplemental or complete)
  - b. Reevaluate feasibility
2. Acceptable survival rate - no action

**HYDROLOGIC CONTROL & MONITORING FEATURES:**

- 30" CMP UNDER RR BED - QTY 3
- ⊕ MONITOR WELLS - QTY 10
- FLOW CONTROL STRUCTURES (FLASHBOARD RISERS) - QTY 4

**PLANTING PLAN:**

- NATURAL SUCCESSION - APPROX 64 ACRES
- FULL PLANTING - APPROX 70 ACRES
- SEEDING - APPROX 50 ACRES



RESTORATION AREA  
203.32 ACRES

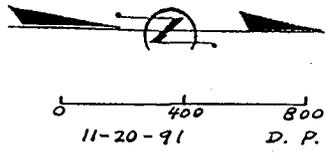


FIGURE 1

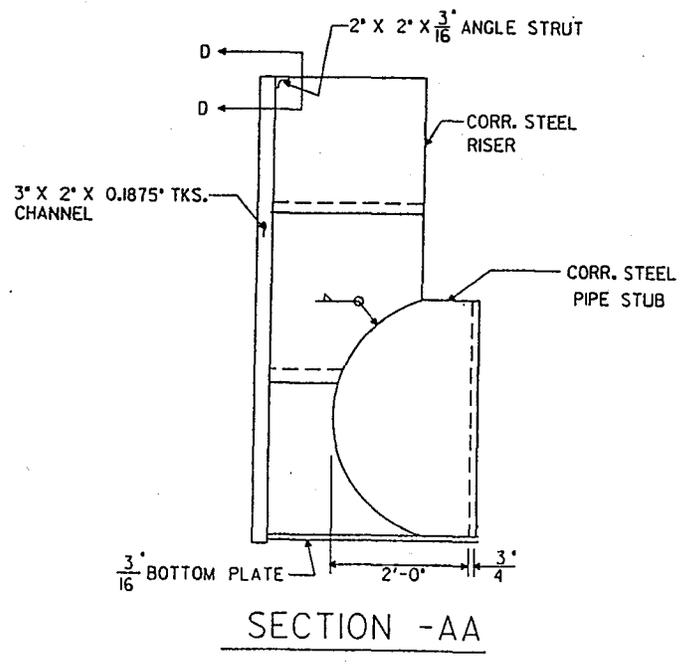
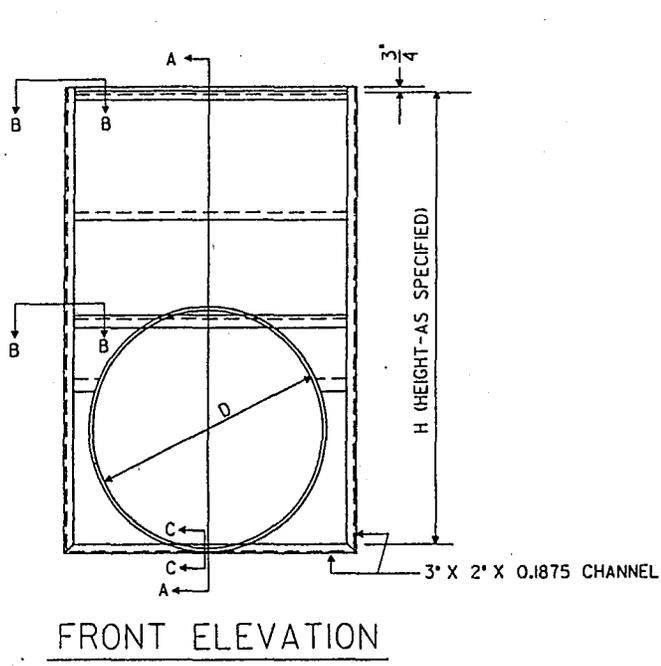


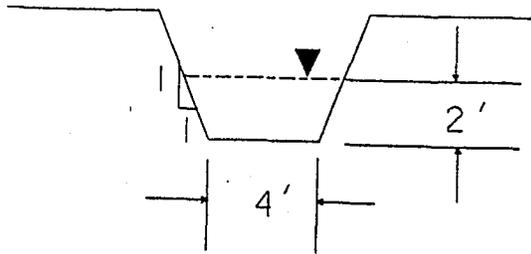
FIGURE 2

TYPICAL - FLASHBOARD RISER FOR CORRUGATED STEEL PIPE

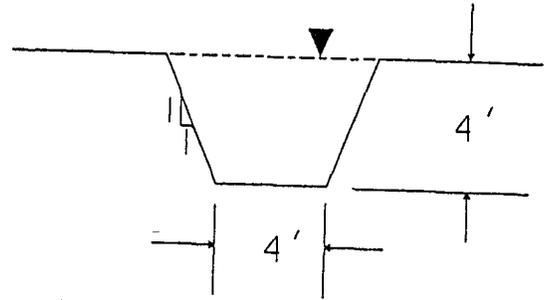
REDUCED DETAIL TAKEN FROM PLANS TITLED  
 "PROPOSED POCOSIN WETLAND BANK  
 'PRIDGEN FLATS', AUGUST 1991"

8-28-91

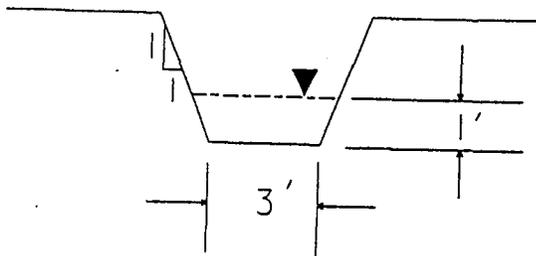
-T<sup>2</sup>- (SITE 1)  
AVERAGE FLOW  
(17 cfs±)



-T<sup>2</sup>- (SITE 1)  
DITCH FULL  
(66 cfs±)



-T<sup>5</sup>- (SITE 2)  
AVERAGE FLOW  
(4 cfs±)



-T<sup>5</sup>- (SITE 2)  
DITCH FULL  
(30 cfs±)

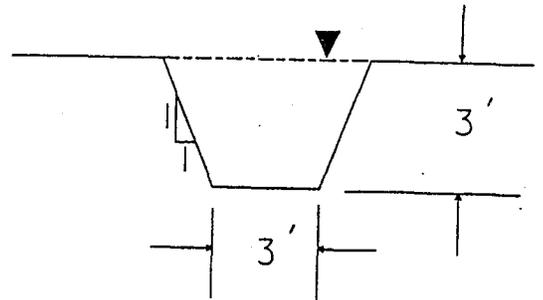


FIGURE 3

TYPICAL DITCH SECTIONS (EXISTING)

REDUCED DETAIL TAKEN FROM PLANS TITLED  
"PROPOSED POCOSIN WETLAND BANK  
'PRIDGEN FLATS', AUGUST 1991"