

**DANIEL ISLAND MARINE CARGO TERMINAL
JOINT PERMIT APPLICATION**

U.S. ARMY CORPS OF ENGINEERS

and

**SOUTH CAROLINA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL CONTROL – OFFICE
OF OCEAN AND COASTAL RESOURCE MANAGEMENT**

SUBMITTED BY

SOUTH CAROLINA STATE PORTS AUTHORITY

SEPTEMBER, 1999

Joint Federal and State Application Form For Activities affecting Waters of the United States or Critical Areas of the State of South Carolina	This Space for Official Use Only Application # _____ Date Received: _____ Project Manager: _____
<small><i>Authorities:</i> 33 USC 401, 33 USC 403, 33 USC 407, 33 USC 408, 33 USC 1341, 33 USC 1344, 33 USC 1413 and Section 48-39-10 et. seq. of the South Carolina Code of Laws. These laws require permits for activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. The Corps of Engineers and the State of South Carolina have established a joint application process for activities requiring both Federal and State review or approval. Under this joint process, you may use this form, together with the required drawings and supporting information, to apply for both the Federal and/or State permit(s).</small>	
<small><i>Drawings and Supplemental Information Requirements:</i> In addition to the information on this form, you must submit a set of drawings and, in some cases, additional information. A completed application form together with all required drawings and supplemental information is required before an application can be considered complete. See the attached instruction sheets for details regarding these requirements. You may attach additional sheets if necessary to provide complete information.</small>	
1. Applicant's Name. Joe Bryant, Director of Terminal Development South Carolina State Ports Authority	4. Agent's Name (an agent is not required). NA
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7. Project Title. Daniel Island Marine Cargo Terminal	9. Project Location. Charleston Harbor, Daniel Island, Cainhoy Peninsula Street Address: <i>N/A</i> County: Berekeley and Charleston Counties Latitude: <i>N/A</i> Longitude: <i>N/A</i>
8. Nearest Waterbody to project site (if known). Charleston Harbor, Wando and Cooper Rivers, Beresford Creek, Flag Creek, and unnamed tributaries	
10. Directions to the Site (attach additional sheets if needed). See attached Supplemental Information	
11. Description of the Overall Project and of Each Activity In or Affecting U.S. Waters or State critical areas (attach additional sheets if needed). The South Carolina State Ports Authority is proposing to develop a marine cargo terminal facility at the south end of Daniel Island in Berekeley County, South Carolina. This activity includes the construction of cargo processing and support facilities, wharf and crane structures, an intermodal rail yard, stormwater management facilities and road and rail access. The project will require navigation improvements to the Cooper and Wando Rivers and dredge and fill activities in wetlands within the proposed project's boundaries. Details of the proposed project are presented in the attached supplemental information.	
12. Overall Project Purpose and the Basic Purpose of Each Activity In or Affecting U.S. Waters (attach additional sheets if needed). See attached Supplemental Information	

**DANIEL ISLAND MARINE CARGO TERMINAL
JOINT PERMIT APPLICATION**

**SUPPLEMENTAL INFORMATION –
PROJECT DESCRIPTION, EXISTING CONDITIONS,
AND POTENTIAL IMPACTS**

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1.0 INTRODUCTION

The South Carolina State Ports Authority (SCSPA) is proposing to construct a marine cargo terminal on Daniel Island near Charleston, South Carolina (Sheet 1). The following section presents a description of the Proposed Project, including project history, purpose and need of the project, facility design and construction methodologies. Sections 2.0 presents a discussion of existing conditions in the natural environment within the project area. Section 3.0 discusses potential impacts to wetlands, open water areas, and threatened and endangered species as a result of the Proposed Project.

1.1 Project History

The SCSPA currently operates a marine cargo terminal (the Wando Terminal) on the east bank of the Wando River, opposite of Daniel Island. Planning for the proposed Daniel Island Terminal began in 1989 as construction of the final phase of the Wando Terminal was begun. Between 1989 and 1992, the South Carolina State Ports Authority (SCSPA) studied numerous alternative locations for development of a new terminal complex. In 1992, the SCSPA acquired 800 acres on Daniel Island fronting on the Cooper River for future terminal development. In 1997, the SCSPA acquired an additional 521 acres on Daniel Island fronting the Wando River for additional terminal development. The Proposed Project considered in this permit application includes both of these parcels along with associated roadway and rail access facilities.

1.2 Purpose and Need of the Proposed Project

1.2.1 The Need for Additional Terminal Capacity

The total container throughput for the Port of Charleston for fiscal year 1997 was 1.15 million twenty-foot equivalent units (TEU). For the period of 1992 to 1997, the annual cargo throughput for the port as measured in TEUs has increased 7.4 percent per year.

The SCSPA recently completed a study of its future cargo opportunities and facilities needs titled "South Carolina State Ports Authority Business Plan and Project Feasibility Study" (commonly called the "Mercer Report"). The Mercer Report projects that unless constrained by facility limitations the annual container throughput for the Port of Charleston can be expected to increase by 5.8 percent per year through the year 2020, reaching a level of approximately 4 million TEUs per year (Mteu/yr) by the year 2020.

The Mercer Report projection is based primarily on increasing levels of international trade and industrial activity throughout the world and assumes only that the existing shipping lines using the Port of Charleston will continue. This projection does not include the impacts of attracting additional shipping lines to the port, which would add to these projections.

Based on the findings of the Mercer Report, the nine berths at the existing three SCSPA terminals have a maximum practical capacity (MPC) of 1.8 Mteu/yr. The MPC of a terminal is based on the limitations of five components of container processing:

- Berth and Apron Capacity - based on the number and size of ships, the hours of operation of the berths, and the assumed maximum acceptable berth occupancy;
- Ship to Apron Transfer Capacity - determined by the number and productivity of container cranes and the hours of operations of those cranes;
- Apron to Storage Transfer Capacity - based on the number, type, and productivity of yard transfer equipment;
- Storage Capacity - determined by the number of slots available for storing containers, the type and density of storage operations, and the average dwell time of the stored cargo; and
- Gate Processing Capacity - based on the productivity (minutes per gate transaction) of gate lanes and the operating hours of those lanes.

The Mercer Report estimate of capacity takes into account current improvements to existing facilities by the SCSPA. Further increases in throughput capacity are primarily constrained by the land area available for storage and processing of containers, and the length of wharf and apron available for unloading ships.

The Mercer Report indicates that further growth of Charleston's container business will be hindered when 75 percent of the MPC is reached, a situation expected to occur in 2000 to 2002. New terminal facilities must be available by 2004 - 2005 or further growth in cargo movements will be constrained.

The largest container ships now calling at the Port of Charleston are "fourth generation" vessels. These vessels are approximately 965 feet long and 105 feet wide, with drafts up to 38 feet. These vessels are known as "Panamax" vessels because they are the largest vessels that can transit the Panama Canal. Such vessels carry up to 4,250 TEU. Ships now being added to the world container fleet are dominated by "Post-Panamax" vessels capable of carrying 5,000 to 8,000 TEU. These ships may be up to 1,140 feet in length and 156 feet in width, with drafts up to 46 feet. The first call of one of these new vessels at the Port of Charleston occurred in July 1998, which began post-Panamax service to Charleston.

The size of future vessels is a significant consideration for the Proposed Project. In February 1998, the U.S. Department of Transportation released a report entitled *The Impacts of Changes in Ship Design on Transportation Infrastructure and Operations*. This report outlines the following changes to current port terminal design standards and operations that will be required to accommodate such vessels:

- Deeper shipping channels able to accommodate ships with drafts up to 46 feet;

- Longer and deeper berths able to accommodate such vessels;
- Larger container cranes able to load and unload vessels up to 18 containers wide;
- Larger container processing and storage areas, up to 75 acres for each berth; and
- More efficient landside transportation linkages with greater capacity, including increased use of rail transportation.

It is the position of the SCSPA that in order to be competitive its new terminal facilities must include terminals capable of accommodating these new larger vessels. The transition to larger container vessels and increased cargo throughput significantly influences the physical requirements for new terminal facilities. Future berths will need to have a minimum length of 1,000 feet each, must have a depth sufficient to accommodate the new generation of container vessels, and must have efficient access to the ocean via channels deep enough to accommodate the new generation of container vessels. Each berth will require an average of 100 acres of backland, 50 acres for container storage and processing, and 50 acres for support operations and infrastructure (such as stormwater management and utilities). This backland must be located directly behind and continuously adjoining the berth for efficient cargo operations.

Each new unit of a 1,000-foot berth and 100 acres of associated backland is projected to provide an additional 267,000 TEU/yr in throughput capacity. Modern terminals require efficient roadway linkage to the interstate highway system, since the majority of landside container movements are by truck. However, as the port's role as a regional load center for container movements increases, it is mandatory that its terminals have an on-dock or near-dock intermodal rail yard for transferring containers onto rail cars, along with good access to the existing mainline railroad system.

Based on existing cargo throughput and throughput capacity projections discussed above, the SCSPA has identified the following needs for new container facilities as the basis for the Proposed Project:

- An additional 1,000 feet of berth and 100 acres of backland by 2007;
- An additional 2,000 feet of berth and 200 acres of backland by 2011;
- An additional 3,000 feet of berth and 300 acres of backland by 2015; and
- An additional 4,000 feet of berth and 400 acres of backland by 2018.

The new terminals must include locations which will cost-effectively accommodate the new generation of container ships. Further, all new terminals must have efficient roadway linkage to the interstate highway system, must include an intermodal rail yard, and must have efficient linkage to the existing mainline rail system.

1.2.2 Site Development Requirements for a Container Terminal Facility

To be competitive in the existing seaport environment, a modern container terminal must meet several important operational requirements. The terminal must have berths and wharves of sufficient size to accommodate the vessel traffic projected for the facility. The size of new container vessels requires that each berth have a minimum length of 1,000 feet, a minimum width of 150 feet, and a minimum draft of -45 feet. The backland directly behind and continuously adjacent to the berth must include approximately 100 acres for each berth for container storage and processing, support operations, and support infrastructure. The terminal must have a sufficient number of container cranes to meet the throughput requirements of shippers, and those cranes must have the outreach sufficient to reach across the full width of the vessel. The SCSPA estimates a minimum outreach of 200 feet may be required.

The backland behind each berth must provide for storage and staging of containers transiting the facility. Included are facilities to provide power to refrigerated containers, facilities for minor container and chassis maintenance, and gate facilities for the inspection, receipt, and delivery of container equipment and cargo. Additional facilities include unloading docks and warehouses for loading (stuffing) or unloading (stripping) cargo from containers, facilities to accommodate U.S. Customs and USDA cargo inspections, administrative offices, and maintenance facilities for container-handling equipment and the terminal facility.

The terminal must be provided with utilities such as power, water, and sewage collection to meet the operational requirements of ships, cranes, cargo processing facilities, maintenance facilities and administrative facilities. It must also provide facilities for the collection and treatment of stormwater to meet applicable regulatory requirements. Substantial areas must be committed for stormwater treatment. The terminal operating areas must be illuminated to meet applicable safety requirements,

and both lighting and utility services must be designed to allow the greatest practical flexibility in the use and layout of the container storage areas.

The terminal must include internal roadway systems to allow efficient flow of traffic between the wharves and container storage/processing areas, between container storage/processing areas and the gate facility, and between the container storage/processing areas and the intermodal rail yard. Rail access to the intermodal rail yard must be designed to minimize interference with container and truck movements within and between the terminal facilities.

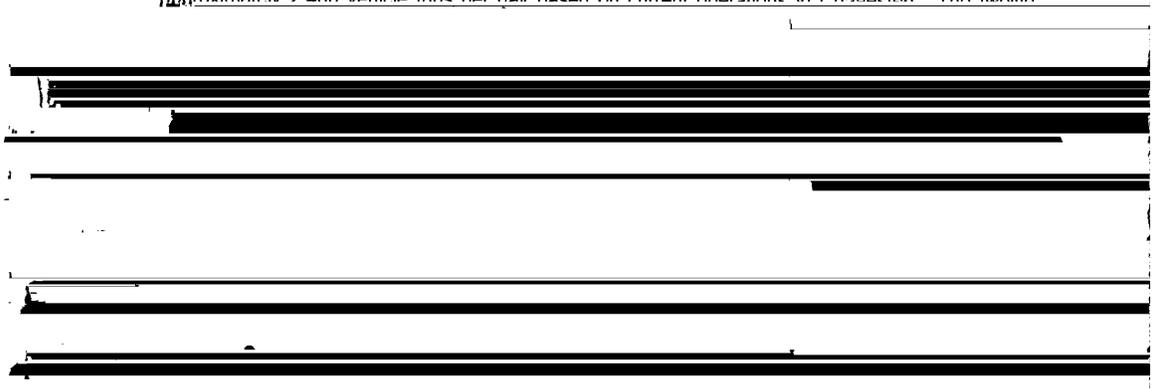
The construction of a marine cargo terminal involves many of the same requirements as other large facilities such as bridges and airports. A key aspect is land access for transporting required fill and building materials. For a port facility, it is also necessary to provide water access to the site for the construction of wharves and the dredging of the berths. As with other major construction operations, various temporary utility services (power, water, sewerage treatment) are likely to be required.

Since the operation of a container facility involves heavy pavement loading, an important factor in terminal construction is providing a soil base capable of supporting the required pavement and facilities. This often requires extensive compaction and improvement to existing soils, particularly where the terminal is constructed over former dredged material disposal sites.

1.2.3 The Need For Land Transportation Facilities

The primary operational goal for roadway access to a container terminal is quick and efficient access to the interstate highway system, and to intermodal rail yards if they are not on or adjacent to the terminal. Factors considered in achieving this goal include the distance of the terminal site from the interstate system and minimizing the mixing of the high volume of terminal truck traffic with local traffic on local roads for reasons of safety and maintaining vehicle speed. This goal is best met by locating the terminal close to an interstate highway with a grade-separated, limited access roadway.

Each terminal unit (1,000-foot berth plus 100 acres total backland) is projected to generate approximately 2,400 vehicle trips per day based on current operations in Charleston. The trucks



The SCSPA, the Mercer Report, and a review of U.S. port development in recent years all indicate that efficient rail access is required for a modern terminal complex to be competitive. Such access must be capable of providing access from an on-dock or near-dock intermodal rail yard to multiple mainline systems to effectively serve a port's service area, or "hinterland". At the levels of rail activity anticipated for the proposed terminal complex, a single track will be sufficient, except where a by-pass area is needed. Such areas may be as long as 10,000 feet to accommodate a train of up to 9,000 feet in length. The intermodal rail yard must have sufficient loading and storage tracks to accommodate the anticipated cargo throughput.

The design engineers for the proposed rail facilities indicate that railroads require that track grade not exceed 0.5 percent over extended distances, with instantaneous grades not exceeding 1 percent. This severely limits the ability of designers to use fixed structures for crossing features such as waterways. In addition, the maximum safe curvature for a track designed to accommodate an operating speed of 25 miles per hour is 5 degrees. Such a curve has a radius of approximately 1,146 feet.

The track subgrade must be above the 100-year storm flood elevation to maintain its structural integrity and to provide emergency access to the terminal during storm events. The track itself will be approximately 2.75 feet higher than the subgrade, resulting in a minimum track elevation of 18.8 feet above the Mean Low Water Datum (MLW). The right-of-way for the track must be wide enough to contain the track and ballast and drainage structures, and must accommodate required cut and fill slopes. In order to accommodate the current double-stack container trains as well as future larger loads, and to meet the safety requirements for passing under roadway bridges, the track must provide a vertical clearance of at least 32.5 feet and a horizontal clearance of at least 25 feet on each side of the track.

1.2.4 The Need for Ocean Disposal of Dredged Material

The SCSPA will need to dredge approximately 3 million cubic yards (mcy) of sediment for the development of berths at the proposed Daniel Island terminal facilities and an additional 8.5 mcy of sediment from the combined channel and turning basin between the southeast side of the existing Wando Reach channel and the proposed SCSPA berth adjacent to the proposed terminal. The SCSPA has indicated that they need to dispose of this material at the Charleston Ocean Dredged Material Disposal Site (ODMDS) for the following reasons:

- Disposal of this volume of uncontaminated natural sediment in existing confined upland disposal areas adjacent to Charleston Harbor would represent an unacceptable use of the limited disposal capacity of such areas. Such areas are better used in conjunction with the maintenance dredging of more contaminated materials. Use of confined

disposal areas for the Proposed Project would decrease the time period before additional confined dredged material disposal areas must be developed for Charleston Harbor.

- The approved federal dredging to deepen Charleston Harbor to a depth of 45 feet Mean Low Water (MLW) includes disposal of the majority of dredged material at the Charleston ODMS. The proposed federal dredging of the Daniel Island Access Channel would likely also involve the use of the Charleston ODMS for disposal. SCSPA use of similar dredging equipment and the same disposal site for dredging of the berthing areas would significantly reduce public expenditures.

1.3 Project Description

The proposed marine cargo terminal facility will be located on the south end of Daniel Island as shown on Sheet 2. The Proposed Project includes the development of 7,000 feet of wharf structure on the Cooper River and development of 5,000 feet of wharf structure on the Wando River. Both of these wharf structures will be developed with multiple container gantry cranes of sufficient size to service the anticipated future fleet of container vessels expected to call at the Port of Charleston.

The SCSPA proposes to develop approximately 660 acres of lighted paved area for container processing and storage behind the wharves on the Wando River and Cooper River. In addition, the SCSPA proposes to develop approximately 182 acres of paved area and buildings for support operations and facilities.

An intermodal rail yard will be constructed on approximately 30 acres of property near the center of the southern portion of Daniel Island. This rail yard will be connected to existing rail lines by a new line extending approximately 12.9 miles to the existing East Cooper and Berkeley Railroad (EC&B) rail line now serving the Amoco Chemical and Nucor Steel facilities. The EC&B Railroad is operated by the State Public Utilities Commission.

The location of the proposed rail line right-of-way is shown on Sheets 3 and 4. The proposed rail line extends along the west side of the SCSPA property on Daniel Island and crosses Beresford Creek on a vertical lift bridge. The proposed rail line continues north on Thomas Island and crosses under I-526 on a trestle as that highway rises to cross Clouter Creek. The proposed location provides a minimum of 32.5 feet vertical clearance over the proposed track.

From this point, the proposed rail extends northeastward between Clements Ferry Road and Clouter Creek, crossing Cainhoy Road between Cainhoy Village and the Amoco Chemical Facility. The proposed line then follows the north side of Cainhoy Road until joining the existing EC&B rail line close to the point where the existing line crosses Cainhoy Road.

Approximately 8,800 feet of the proposed rail line is on property which is now part of the Francis Marion National Forest. The proposed right-of-way (50 feet each side of centerline) includes approximately 24 acres of National Forest property. The SCSPA currently is negotiating an exchange of properties with the U.S. Forest Service to allow construction of the line through the Forest.

The Proposed Project includes construction of 2.4 miles of a four-lane access road from the proposed terminal facilities to the existing I-526 interchange at Clements Ferry Road. The location of the proposed roadway is shown on Sheet 3. The proposed roadway extends along the western side of the SCSPA property on Daniel Island and crosses Beresford Creek on a fixed bridge. The roadway will continue on an elevated trestle south along the SCSPA property to the terminal site.

The proposed terminal complex will include approximately 65 acres of stormwater treatment ponds in three sites as shown on Sheet 2. One pond will be located in a park at the south end of Daniel Island and will discharge to the Cooper River. A second pond will be located in the northeast corner of the SCSPA property and will discharge to the Wando River. The third pond will be located in the northwest portion of the SCSPA property and will discharge to the Cooper River.

A 55-acre public park facility at the south end of Daniel Island will also be developed once 50 percent of the proposed terminal facilities are constructed; however, this park will belong to the City of Charleston and is not part of this permit application. Additional open space and buffer areas will be provided in the vicinity of the stormwater treatment ponds in the northeast and northwest corners of the SCSPA property.

Finally, development of the proposed marine cargo terminal facilities will require navigation improvements to the Cooper and Wando Rivers adjacent to the proposed terminal facilities. These improvements include widening and deepening of the existing channel in the Wando River and dredging of berthing areas on each side of Daniel Island.

The Corps of Engineers is completing an evaluation of navigation improvements to the Wando Reach of the Charleston Harbor channel system which would provide navigation access to the proposed marine cargo terminal facilities on the Wando River. If the proposed marine cargo terminal facilities are permitted, the preferred alternative alignment for the modified channel will include dredging a combined channel and turning basin between the southeast side of the existing Wando Reach channel and the proposed SCSPA berth adjacent to the proposed terminal. The preferred configuration of the improved channel is shown on Sheet 2. The expanded federal waterway will be 1,470 feet wide and will have an authorized depth of -45 feet MLW. The preferred improvements require dredging approximately 8.5 million cubic yards of sediment.

The proposed SCSPA terminals include a berthing area approximately 5,000 feet long and 150 feet wide adjacent to proposed wharves on the Wando River and a berthing area approximately 7,000 feet

long and 125 feet wide adjacent to the proposed wharves on the Cooper River. The proposed berthing areas, shown on Sheet 2, have a depth of -55 feet MLW and require approximately 3 million cubic yards of dredging.

The SCSPA has proposed that all material dredged for both the berthing areas and the channel improvements be placed in the EPA-approved Charleston ODMDS, which is located southeast of Morris Island in approximately 30 to 50 feet of water. The site has an area of 11 square miles, the center of which is approximately 6 miles from shore; however, all dredge material will be placed in a two-mile square within the ODMDS due to live bottoms identified in the western portion of the 11 square mile site. The location of the proposed disposal area is shown on Sheet 5.

1.4 Proposed Facility Design

The SCSPA proposes to construct the wharf structures as a pile support deck on the Cooper River (Sheet 62) and a pile support deck with a cofferdam on the Wando River side (Sheet 63). The purpose of the cofferdam is to stabilize the existing dike structure landward of the proposed wharf. The dike presently retains the dredge spoil that has been deposited in the Middle Cell and the Wando Cell. This dredge material is a saturated soft clay with very poor physical properties. The dike itself is an earthen dike which is unstable under either a seismic event or under dredging activity that removes material in front of the dike.

Detailed design for the terminal backland areas has not been completed at this time. For the purposes of this permit application, it has been assumed that the entire area, other than parks, stormwater management areas, and buffer areas, will be paved or will be covered with buildings. The type of pavement will vary and has not been specified.

Typical sections for the proposed roadway are shown on Sheet 64. For the 3,500 feet of road on land between the existing I-526 interchange and the beginning of the Beresford Creek bridge, the roadway will include four 12-foot traffic lanes, a 15-foot median lane, and 10-foot shoulders with 1.5-foot wide concrete barriers for an overall paved width of 86 feet. This portion of the roadway will be provided with stormwater treatment areas as required by applicable state regulations.

The proposed road bridge over Beresford Creek will have four 12-foot traffic lanes, two 7.5-foot internal shoulders with a concrete barrier, and 10-foot outside shoulders with concrete barriers for an overall width of 86 feet. Minimum elevation of the bridge will be approximately 18.9 feet MLW. The road bridge will provide a vertical clearance of approximately 50 feet at mean higher high water over the open water portion of the span. Total length of the structure will be 9,200 feet with the open water portion of the bridge providing a horizontal clearance of 162 feet. Design details of the proposed road bridge over Beresford Creek are given in Sheet 65.

The typical rail line section will include a single rail, drainage ditches, and an access road (Sheet 66). In some locations, a parallel frontage road will be required to provide access for property owners (Sheet 67). The rail right-of-way will generally be 100 feet wide, except for where additional right-of-way is required for frontage roads, drainage structures, or to accommodate required cut or fill. In areas subject to coastal flooding the top of track will be at a minimum elevation of 18.8 feet MLW in order to keep the supporting earthwork and ballast above the 100-year flood elevation.

Approximately 7,307 feet of the proposed rail line will be constructed on trestle across open water or wetland areas below the State Critical Area boundary. The railroad trestle through these areas will be approximately 15 feet wide (Sheet 68). The top of track on trestle will be constructed at a minimum elevation of 18.8 feet MLW. The trestle will be located and the right-of-way designed so as to provide a minimum vertical clearance over the track of 32.5 feet and a minimum horizontal clearance of 22 feet.

Details of the proposed railroad bridge over Beresford Creek are presented on Sheets 69 through 71. The proposed bridge will provide a horizontal clearance of 40 feet. In the open position, the bridge will provide 20 feet of clearance over mean high water (6.78 feet MLW). In the closed position, the bridge will provide 6 feet of clearance above mean high water.

Based on projected rail traffic for the proposed terminal, the rail bridge will be kept in the open position except when closure is required to allow train passage. It is projected that after construction the required closures will range from once per day up to four times per day, assuming that 25 percent of the total container traffic moving through the terminals is transported by rail. If the portion of container traffic were to increase to 40 percent, up to seven closures per day will be required.

Approximately 8,813 feet of the proposed track will be constructed on a filled causeway across freshwater wetland areas above the State Critical Area boundary. The remaining 52,078 feet of proposed track will be constructed in uplands. The following table summarizes the lengths of rail line over open water, wetlands, and uplands:

Environmental Feature	Rail Structure	Length (feet)
Open Water/Estuarine Wetlands	Trestle/Bridge	7,300
Freshwater Wetlands	Rail Bed on Fill	8,813
Uplands	Rail Bed on Grade	52,078

1.5 Proposed Construction Methodologies

The SCSPA proposed method for dredging berth and channel improvements is by clamshell dredge. Dredged material will be transported to the Charleston ODMS by dump scow.

For wharf construction, it is anticipated that required earth fill will be placed from shore using land-based equipment. A combination of barge-mounted and land based equipment will be used to drive piles, place required rip-rap, construct decks, and install items such as crane rails, bollards, and fenders. On the Wando side, a series of coffercells beneath the landward side of the wharf will be installed prior construction of the wharf and dredging of the adjacent berth.

The proposed access road bridge will be constructed from barges in open water and from barge mats in wetland areas. No earthen fill will be placed in tidal wetlands during construction of the proposed road bridge.

Construction of the rail line will begin with clearing and grubbing of vegetation from the right-of-way sufficient to permit construction. The area of clearing and grubbing will vary with location. Economically-viable salvage of forest resources prior to clearing will be encouraged. Once the area has been cleared and grubbed, necessary excavation or placement of fill to achieve the required track bed grade and drainage will be accomplished. All earthwork will be conducted with appropriate erosion controls pursuant to applicable environmental protection requirements. This will be followed by compaction of the subgrade, installation of drainage structures, and finally by installation of ballast stone, ties, and track.

The same basic sequence will be followed in freshwater wetland areas which are to be crossed on fill. In these areas, however, all fill placement will be contained within turbidity barriers to prevent distribution of fill outside permitted fill areas. Rail construction access will be provided by using the track bed as an access road to minimize the need for temporary placement of fill outside the permitted permanent fill areas.

In areas below the State Critical Area boundary, the SCSPA proposes to construct the proposed rail trestle from barges in open water areas and from barge mats in wetland areas. A discussion of wetland impacts as a result of the Proposed Project is presented in Section 3.0.

2.0 EXISTING CONDITIONS

The following section provides an overview of existing wetlands, open water areas, and threatened and endangered species within the project area.

2.1 Wetlands

A variety of wetlands occur throughout the project area. Extensive salt marshes dominated by *Spartina* and *Juncus* spp. occur along the east bank of the Cooper River adjacent to the proposed terminal facility. The proposed access road crosses salt marshes adjacent to the Cooper River, Beresford Creek and Clouter Creek. The proposed railroad serving the Daniel Island terminal crosses salt marshes adjacent to Beresford Creek, Clouter Creek, and Yellow House Creek.

Freshwater wetlands also occur throughout the project area; however, all freshwater wetlands potentially impacted by the Proposed Project occur north of the Mark Clark Expressway. Freshwater wetlands in the vicinity of the Proposed Project include herbaceous marshes, shrub wetlands, and woodland and forested wetlands. Many of these wetlands are small and isolated; others are complex systems and are part of larger drainages. Detailed descriptions of each wetland potentially affected by the Proposed Project, including acreages of impact, are given in Section 3.0.

Despite various human disturbances, most of the wetlands potentially affected by the Proposed Project exist more or less in a natural condition. On the Cainhoy Plantation and Francis Marion National Forest, firebreaks are routinely cut around the margins of wetlands during controlled burns of the surrounding uplands; however, the overall hydrology of wetlands in these areas does not appear changed. There have been no efforts to systematically drain wetlands in the vicinity of the Proposed Project. Some of the freshwater wetlands are undergoing vegetative succession as a result of anthropogenic and natural disturbances such as past clearing or logging, fire exclusion, and storm damage, especially following Hurricane Hugo.

2.2 Open Water Areas

2.2.1 Flows and Tides

Open water areas in the vicinity of the Proposed Project consists mainly of the Cooper River, Wando River, Beresford Creek, and Charleston Harbor. All of these water bodies are part of the Charleston Harbor estuarine system. This system has been extensively affected by human activities, especially as a result of the Santee-Cooper Project in the 1930's.

The Santee-Cooper Project was implemented because of increased demand for electric power. The project was completed in 1941 and created two freshwater lakes by diverting flows from the Santee

River with the construction of the Wilson Dam across the Santee River to form Lake Marion and the construction of the Pinopolis Dam near the headwaters of the West Branch Cooper River to form Lake Moultrie. A four-mile diversion canal was built to connect the two lakes. The water surface elevation difference between Lake Moultrie and the West Branch Cooper River is approximately 70 feet. The diverted flows from the Santee River through the Pinopolis Dam to the West Branch Cooper River had pronounced effects on the Cooper River and Charleston Harbor. The Cooper River was transformed from a tidal slough with a mean annual downstream flow of 71 ft³/s to a riverine system with a mean annual flow of 15,600 ft³/s. The diversion of water transformed Charleston Harbor from a well mixed estuary to a partially mixed estuary and an effective sediment trap. After diversion, shoaling in navigation channels of Charleston Harbor jumped from about 110,000 yd³/year to over 10 million yd³/year and through improved dredging and disposal methods, stabilized at about 7.5 million yd³/year (prior to re-diversion). Additionally, mean salinity values in Charleston Harbor decreased from 31 to 16 ppt.

In 1985, the U.S. Army Corps of Engineers re-diverted flows from Lake Moultrie back to the Santee River to alleviate the severe sedimentation problem in Charleston Harbor created by the diversion of freshwater flows. The re-diversion was accomplished by building an 11-mile canal from Lake Moultrie to the Santee River. After re-diversion, flows to the Cooper River were reduced from the annual mean flow of 15,600 ft³/s to a weekly mean flow between 3,000 and 4,500 ft³/s and sedimentation was greatly reduced.

Charleston Harbor, the Cooper and Wando Rivers, and Beresford Creek experience semi-diurnal tides. Charleston Harbor experiences mean and spring tidal ranges of 5.13 and 5.95 feet, respectively, at the harbor entrance from the Atlantic Ocean near Fort Moultrie and has mean and spring tidal ranges of 5.27 and 6.11 feet, respectively, at the Customs House in the City of Charleston. The Cooper River is tidally affected throughout its entire reach up to the Tailrace Canal, and has mean and spring tidal ranges of 5.40 and 6.26 feet, respectively, at the south entrance of Clouter Creek on the lower Cooper River near Daniel Island. Saltwater in the Cooper River extends from the Harbor upstream to several miles below the confluence of the West Branch Cooper River and East Branch Cooper River.

Tidal ranges in the Wando River amplify as they progress upstream. Mean and spring tidal ranges at Hobcaw Point, near the confluence with the Cooper River, are 5.44 and 6.31 feet, respectively. Upstream, at Big Paradise Island, mean and spring tidal ranges increase to 6.54 and 7.59 feet, respectively. Saltwater extends throughout the entire reach of the Wando River.

2.2.2 Aquatic Sediments

The following discussion is based on information contained in a 1990 report by the South Carolina Wildlife and Marine Resources Department, Marine Resources Division, entitled *A Physical and Ecological Characterization of the Charleston Harbor Estuarine System*.

Surficial sediments in Charleston Harbor originate from both marine sources and freshwater runoff. The deposition of sediments is controlled by a variety of factors, including riverine flow rates, location of the saltwater wedge, and tidal currents. Changes to the hydrology of the Cooper River and Charleston Harbor that resulted from the diversion and subsequent re-diversion of the Santee River have resulted in changes to the nature of sediments in many portions of the harbor that are still in progress.

Lower Wando River

Fine to medium sand is the most prevalent bed material in the Wando River. Sediment samples collected from a station in the midpoint of the river between Daniel Island and Hobcaw Point during the period 1984 to 1988 averaged 70 to 75 percent sand, approximately 20 percent clay, about 5 percent silt, and a small amount of shell hash.

A more intensive survey in July 1988 sampled 18 stations in the Wando River between the south end of Daniel Island and the I-526 bridge. These results indicated that stations near the center of the river were generally comprised of greater than 75 percent sand, while several of those near the shore had a lower percentage of sand (>38 percent) with higher amounts of silt and clay. Sediment at one site near a discharge from the Daniel Island disposal sites was found to be predominantly silt. Above the Wando Terminal, surficial sediments were found to be primarily well-sorted medium sand. The only area of the river exhibiting more than 2 percent organic matter in surficial sediments was that portion below the I-526 bridge.

Lower Cooper River

Silts and clays characterize the prevalent sediment type in the lower Cooper River. Four-year data for a station in the middle of the Cooper River near the proposed Cooper River berths and the Naval Base indicate that sediments at this location ranged from 0 to 20 percent sand, 10 to 60 percent silt, and 30 to 80 percent clay.

Intensive sampling in 1988 found that stations in the center of the river near the south end of Daniel Island had more than 38 percent silt or clay. Some stations near the Daniel Island shore had more than 38 percent sand while one station near a discharge from the Daniel Island disposal sites had

more than 38 percent silt. Three stations just south of the confluence of Clouter Creek with the Cooper River had more than 75 percent sand.

Data on Sediment to be Dredged for the Proposed Project

A project-specific sampling and analysis program was conducted to assess the acceptability of aquatic sediments to be excavated for the Proposed Project for ocean disposal at the Charleston ODMDS. Similar sampling and analyses have been conducted at the Charleston Naval Base site for use in the comparison of alternatives. The report of this testing program is available upon request and summarized below.

Eleven stations in Charleston Harbor were sampled as part of this program: three in the proposed Cooper River berthing area, two in the proposed Wando River berthing area, three in the proposed Wando Reach realignment area, and three adjacent to the Charleston Naval Base site. Samples were collected by vibracore to an elevation of -47 feet MLW, which was done to simulate the mixture of sediments generated by a clambucket dredge. The length of the cores varied between stations due to differences in existing depth, which ranged from 7 to 31 feet. The cores ranged in length from 10 feet to 30 feet.

Grain size analysis of each sample revealed a dominance by fine-grained materials. The percentage of silts and clays in each sample ranged from 20.4 percent to 86.7 percent, and averaged 61 percent. The finest materials were found at the former Naval Base site.

Analytical results of the vibracore samples showed little contamination or anthropogenic influences. This is expected since the cores contained mostly deep geologic deposits laid down before any human influences on sediment characteristics. Analytical results for polynuclear aromatic hydrocarbons similarly indicated the uncontaminated nature of the sediments. Analyses for pesticides, PCBs, dioxins, and furans were mostly below detection limits.

Sediments at Charleston ODMDS

The following discussion is based on information contained in a 1997 report by the South Carolina Wildlife and Marine Resources Department, Marine Resources Research Institute, entitled *An Assessment of Benthic Infaunal Assemblages and Sediments in the Vicinity of the Charleston Ocean Dredged Material Disposal Area*.

The sediments at most stations sampled in 1993 and 1994 in and around the Charleston ODMDS were comprised of medium to fine-grained sands mixed with moderate amounts of shell hash. The mean sand content over the two years was 82 percent, and the mean CaCo₃ (shell hash) content was 14 percent.

The 1993 sampling found 12 stations near the center of the ODMDS had sediments containing greater than 10 percent mud (silt/clay), with 6 of those containing greater than 45 percent mud. The 1994 sampling found only three stations with more than 10 percent mud, indicating that much of the mud had dispersed. Between the two years the mean percentage mud in the sediments varied significantly between sample locations. The study results indicated that the mud had apparently been dispersed over a wide area, most likely by the effects of waves and currents.

Trace metal concentrations in the surface sediments were found to be low, generally below published bioeffects levels. No PAH, PCB, or pesticide contaminants were detected in any of the 1993 or 1994 samples. However, it is suspected that higher levels of contaminants may occur periodically following dumping activities since contaminants often bind to the fine-grained sediments such as those typically encountered in maintenance dredging in Charleston Harbor.

2.3 Threatened and Endangered Species

Several state and federal listed threatened and endangered species occur, or have the potential to occur, in the vicinity of the Proposed Project, including the rail line serving the proposed terminal. For this project, the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), and the South Carolina Department of Natural Resources were contacted for information on known populations of federal and state endangered or threatened species and other sensitive species in the project area. The U.S. Forest Service was also contacted for data on listed species within the Francis Marion National Forest. Table 2.1 lists the state and federal listed threatened and endangered species that have the potential to occur in the project area. A description of these species is provided below. Section 3.0 contains a description of potential impacts to these species as a result of construction and operation of the Proposed Project.

2.3.1 Plants

Three species of federally endangered plants have the potential to occur in the project study area; Canby's dropwort, American chaffseed, and Pondberry.

Canby's Dropwort (*Oxypolis canbyi*)

Canby's dropwort is a perennial herb which grows 2.6 to 3.9 feet tall. It is a rare plant native to the coastal plain of Delaware, Maryland, North Carolina, South Carolina, and Georgia, where it occupies pond cypress savannas, the shallows and edges of cypress/pond-pine ponds, sloughs, and wet pine savannas. Due to its rarity and vulnerability to threats (habitat alteration/destruction), the species was federally listed as endangered on February 25, 1986.

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TABLE 2.1
 STATE AND FEDERAL LISTED SPECIES POTENTIALLY OCCURRING
 WITHIN THE DANIEL ISLAND TERMINAL PROJECT AREA

	Species	Common Name	Federal Status	State Status	U.S. Forest Service Status	
Plants	<i>Oxypolis canbyi</i>	Canby's dropwort	E		E	
	<i>Schwalbea americana</i>	American chaffseed	E		E	
	<i>Lindera melissifolia</i>	Pondberry	E		E	
	<i>Agrimonia incisa</i>	Incised groovebur	NC		S	
	<i>Amorpha georgiana</i>	Georgia indigo bush		SC		
	<i>Asclepias pedicellata</i>	Savannah milkweed	RC		S	
	<i>Asplenium heteroresiliens</i>	Carolina spleenwort	NC		S	
	<i>Astragalus michauxii</i>	Sandhills milkvetch		SC	S	
	<i>Carex chapmanii</i>	Chapman's sedge	NC		S	
	<i>Echinodorus parvulus</i>	Little bur-head		SC	S	
	<i>Fimbristylis perpusilla</i>	Fringe rush	NC			
	<i>Gentiana autumnalis</i>	Pine barren gentian		SC	S	
	<i>Litsea aestivalis</i>	Pondspice		SC	S	
	<i>Lobelia boykinii</i>	Boykin's lobelia		SC	S	
	<i>Lysimachia loomisii</i>	Loomis' loosestrife			S	
	<i>Macbridea caroliniana</i>	Carolina birds-in-a-nest		SC	S	
	<i>Narthecium americana</i>	Yellow asphodel	C/NC		S	
	<i>Oxypolis ternata</i>	Piedmont cowbane		SC	S	
	<i>Pellandra sagittaeifolia</i>	Spoon-flower		SC	S	
	<i>Pieris phyllireifolia</i>	Climbing heath		SC	S	
	<i>Plantago sparsiflora</i>	Pineland plantain		SC	S	
	<i>Platanthera integra</i>	Yellow fringeless orchid		SC		
	<i>Pteroglossapsis ecristata</i>	Crested-fringed orchid		SC	S	
	<i>Rhexia aristosa</i>	Awned meadow beauty		SC	S	
	<i>Sarracenia rubra</i>	Sweet pitcher plant		SC	S	
	<i>Sporobolus teretifolius</i>	Wire leaved dropseed	NC		S	
	<i>Trillium pusillum</i>	Least trillium	NC		S	
	Animals	<i>Acipenser brevirostrum</i>	Shortnose sturgeon	E		
		<i>Ambystoma cingulatum</i>	Flatwoods salamander	T	E	T
		<i>Caretta caretta</i>	Loggerhead turtle	E		
<i>Chelonia mydas</i>		Green sea turtle	T	E		
<i>Dermochelys coriacea</i>		Leatherback turtle	E			
<i>Haliaeetus leucocephalus</i>		Bald eagle	T		T	
<i>Mycteria americana</i>		Wood stork	E		E	
<i>Picoides borealis</i>		Red-cockaded woodpecker	E		E	
<i>Balaena glacialis</i>		Northern right whale	E			
<i>Megaptera novaeangliae</i>		Humpback whale	E			
<i>Trichechus manatus</i>		West Indian manatee	E			

Key:
 E = Endangered
 T = Threatened
 NC = Of National Concern
 RC = Of Regional Concern
 SC = Of State Concern
 S = Sensitive
 P or C = Proposed or Candidate species for listing

The species has never been documented as occurring within the Francis Marion National Forest although suitable habitat for the species is present within the National Forest. Only one known existing population of Canby's dropwort is known in Berkeley County; this population is not located within the project area. No populations are known in Charleston County. Appropriate habitat for Canby's dropwort does exist within portions of the project area north of the Mark Clark Expressway.

American Chaffseed (*Schwalbea americana*)

American chaffseed is primarily a coastal plain species of the Atlantic and Gulf coasts. Existing populations are currently known from 71 locations in New Jersey, North Carolina, South Carolina, Georgia, and Florida. Within South Carolina several populations are known from Berkeley and Charleston Counties; most of these are within the Francis Marion National Forest. None of the known populations, however, are within the project area. Appropriate habitat for American chaffseed does exist within the open pine flatwoods of the Cainhoy Plantation and Francis Marion National Forest which are maintained by regular burning.

Historically, the species was reported to exist on savannas and pinelands throughout the coastal plain where frequent, naturally occurring fires maintained sub-climax communities. Most of the surviving populations, and the most vigorous, are in areas that are still subject to frequent fire including private plantations that are burned regularly for game management and forest management areas that are burned to maintain habitat for wildlife including the Federally listed endangered red-cockaded woodpecker. Due to extirpation of the species from over half of its historical range and a decline in known occurrences due to fire suppression and habitat alteration/destruction, American chaffseed was federally listed as an endangered species on September 29, 1992.

The USFS has been actively involved in monitoring the effects of forest management activities to populations of the species within the Francis Marion National Forest. These activities include evaluating the effects of growing season burns as it relates to the health and vigor of the species, experimental transplanting of individuals, and germination of seed.

Pondberry (*Lindera melissifolia*)

Lindera melissifolia, commonly called pondberry or southern spicebush, is a deciduous, aromatic shrub, 1.5 to 7 feet tall. Its bright yellow flowers are grouped in tight clusters and appear in February and March. Pondberry populations in the coastal plain of North and South Carolina occur in distinctively different habitats; in South Carolina the species occurs at the margins of limestone sinks and undrained shallow depressions. Populations also occur in pinelands and in open and burned areas. Within the area potentially impacted by the Proposed Project the general area of appropriate habitat for pondberry are the open pine flatwoods of the Cainhoy Plantation and Francis Marion National Forest which are maintained by regular burning.

There are currently 36 populations of pondberry distributed in Arkansas, Georgia, Mississippi, Missouri, North Carolina, and South Carolina. Within South Carolina, several populations of pondberry occur on the Francis Marion National Forest in Berkeley County. Two of these populations are located within the project area; the nearest being approximately 6,000 feet east of the proposed rail alignment. The USFS is proactively managing and monitoring populations of the species that occur within the Forest. These activities include monitoring effects of prescribed burns, transplanting of plants to establish new colonies, genetic variability of the species, germinating seed and outplanting seedlings, and establishing new plants from rhizomes.

Pondberry was officially listed as federally endangered on July 31, 1986. The major threat to the continued existence of the species is alteration or destruction of its habitat through land-clearing, drainage modification, or timber harvesting.

Other Plants

Several plants, while not federally listed as endangered or threatened, are recognized by the State of South Carolina and/or the U.S. Forest Service as either "Of Concern" (South Carolina) or "Sensitive" (U.S. Forest Service). Twenty-four of these plants were identified as potentially occurring within the project area (Table 2.1); of these, pondspice (*Litsea aestivalis*), sweet pitcher plant (*Sarracenia rubra*), and incised groovebur (*Agrimonia incisa*) have historically been found within two miles of the proposed rail alignment within the Francis Marion National Forest.

2.3.2 Animals

Of the state and federal listed animal species, one fish, one amphibian, five reptiles, six birds, and four mammals have the potential to occur in the project area. These species include the shortnose sturgeon, flatwoods salamander, American alligator, loggerhead turtle, green sea turtle, leatherback turtle, Kemp's ridley sea turtle, Bachman's sparrow, American swallow-tailed kite, bald eagle, woodstork, red-cockaded woodpecker, Bachman's warbler, northern right whale, humpback whale, manatee, and Rafinesque's big-eared bat.

Fish

Shortnose Sturgeon (Acipenser brevirostrum)

The shortnose sturgeon was listed as endangered throughout its range on March 11, 1967. No estimate of the historical population size is available. While the species was rarely the target of commercial fishing, it often was taken incidentally in the commercial fishery for Atlantic sturgeon. In the 1950's, sturgeon fisheries declined on the east coast which resulted in a lack of records of

shortnose sturgeon. The USFWS believed the population of shortnose sturgeon had declined because of pollution and overfishing, both directly and incidentally in shad gillnets. Other impacts to shortnose sturgeons have resulted from dam construction (substantially reducing suitable habitat), habitat alterations from discharges, dredging and disposal of material into rivers, and development activities involving estuarine/riverine mudflats and marshes.

The shortnose sturgeon spawns in the coastal rivers along the east coast of North America from the St. John River in Canada to the St. Johns River in Florida. It lives mainly in the slower moving riverine waters or near-shore marine waters and migrates periodically into the faster moving fresh water areas to spawn. They nest in deeper water 6 to 10 feet with rock or hard bottom. In South Carolina, they are known from the river systems that empty into Winyah Bay and the Santee/Cooper River complex that forms Lake Marion. One landlocked group may exist in Lake Marion on the Santee River in South Carolina. The presence of shortnose sturgeons would not be unexpected in the vicinity of Daniel Island.

Amphibians

Flatwoods Salamander (Ambystoma cingulatum)

The flatwoods salamander is a poorly understood species found primarily in a pine-wiregrass flatwoods environment. Both slash and longleaf pine species have been implicated by several researchers as the dominant overstory species. Breeding habitat has been reported variable as well, and includes shallow cypress ponds, cypress swamps, roadside ditches, ponds and swamps dominated by sweetgum and blackgum trees, and open, marshy pasture ponds. It apparently spends much of its life underground; however, it emerges for courtship, spermatophore deposition, and egg laying during the fall. Rainfall is probably the primary determinant for initiation of the breeding period and late fall and early winter rainfall determines when eggs actually hatch. Eggs from a single pond may hatch over a long period of time depending on the pond's depth and the period of time it takes to fill. Due to its terrestrial mode of reproduction, both severe drought and excessive rainfall may limit breeding success and nest-site availability from year to year.

The flatwoods salamander was listed as federally threatened on April 1, 1999. It is also listed as an endangered species by the state of South Carolina. The biggest threat to the salamander is the destruction of its habitat. Currently, there is no existing regulatory mechanisms for the protection of the upland habitats where the species spend most of their lives. Flatwoods salamanders are also affected by the lowering of water tables due to ditching and draining, contact with pesticides, and suppression of the natural fire regime. Over use for commercial pet trade, scientific, or educational purposes may also have contributed to the species decline.

Historically, the flatwoods salamander has been found at several sites in the Francis Marion National Forest and surrounding areas. Its presence along the proposed rail line within the pine flatwoods of the Cainhoy Plantation and Francis Marion National Forest would not be unexpected.

Reptiles

American Alligator (Alligator mississippiensis)

An adult American alligator could only be confused with the American crocodile, which occurs in south Florida. The alligator is distinguished from the crocodile by having a broadly rounded snout. Also, unlike the alligator, the crocodile's fourth lower jaw tooth protrudes conspicuously upward. Due to population declines, the American alligator was federally listed as threatened on March 11, 1967. Although population levels have rebounded, the alligator continues to be listed as threatened due to its similarity of appearance to the endangered American crocodile. Similarity of appearance to a listed species is a regulatory designation to facilitate the enforcement and further the policy of the Endangered Species Act. It is used when a species is so closely similar to a listed species that enforcement personnel would have substantial difficulty in attempting to differentiate between the listed and unlisted species.

The alligator can be found in the river swamps, lakes, bayous, marshes, and other water bodies of the Gulf states and lower Atlantic coastal plains. Although no alligators were observed in the project area during field activities, the species would be expected to occur in the predominantly freshwater or slightly brackish wetlands along the tributaries to the Cooper and Wando Rivers. Few, if any, alligators would be expected in the isolated wetlands in the Francis Marion National Forest and Cainhoy Plantation due to these wetlands drying up when rainfall is insufficient.

Loggerhead Turtle (Caretta caretta)

Loggerhead turtles are circumglobal, inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. In the Atlantic, the loggerhead's range extends from Newfoundland to as far south as Argentina. During summer, nesting occurs in the lower latitudes, but not in the tropics. The primary Atlantic nesting sites are along the east coast of Florida, with additional sites in Georgia, North and South Carolina, and the gulf coast of Florida. In the eastern Pacific, loggerheads are reported as far north as Alaska, and as far south as Chile. Recent studies have shown the northern sub-population of loggerheads to be genetically distinct from the Florida population (Tom Murphy, South Carolina Department of Natural Resources, personal communication).

The loggerhead was listed as federally threatened on July 28, 1978. Threats to the species include loss of nesting beaches to various types of human disturbance including the problem of hatchling

disorientation from artificial light; excessive natural predation in some areas; inadvertent drownings when the turtles become trapped in fishing and shrimping trawls; and marine pollution from oil, plastics, and styrofoam.

The Daniel Island Terminal project area is located within a large loggerhead turtle nesting population zone that extends from North Carolina to Florida. South Carolina's shoreline is a migration path for loggerheads at all times of the year. The most significant loggerhead nesting beach north of Cape Canaveral, Florida is located on Cape Island in the Cape Romain National Wildlife Refuge northeast of Charleston. In an effort to assess dispersal patterns, migratory pathways, and foraging habitat use of South Carolina loggerhead sea turtles during the non-nesting period, scientists with the South Carolina Department of Natural Resources and Cape Romain National Wildlife Refuge fitted transmitters to five adult females while they were on the nesting beach on the night of July 14, 1998. The transmitters are linked to the Argos satellite system and data are received daily. Position reports for each of these turtles are available from the Department of Natural Resources web site at <http://www.dnr.state.sc.us/marine/turtles.html>.

Green Sea Turtle (Chelonia mydas)

With an estimated population of no more than 600,000 adults worldwide, the green turtle is found in tropical and temperate seas and oceans. The North American distribution is from Massachusetts to Mexico, and from British Columbia to Baja California. In the southeast, green turtles also occur in Puerto Rico and the Virgin Islands. Nesting within the continental United States is limited to 300 to 1,000 nests annually on Florida's east coast. Occasional nesting also occurs in Puerto Rico and in the U.S. Virgin Islands. Green turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The turtles are attracted to lagoons and shoals with an abundance of marine grass and algae.

The nesting populations on the east coast of Florida were listed as federally endangered on July 28, 1978; all other populations were listed as federally threatened. As with other species of sea turtles, factors contributing to the green turtle's decline include exploitation as a food source by humans, unnatural levels of predation, loss of nesting habitat to human encroachment, disorientation of hatchlings by artificial lights, and inadvertent drownings when the turtles become trapped in fishing and shrimping trawls.

Charleston Harbor is located within the green turtle's migrating and foraging range.

Leatherback Turtle (Dermochelys coriacea)

The leatherback is the most pelagic (open ocean) of the sea turtles and is often seen near the edge of the continental shelf; however, they are also observed just offshore of the surf line. Leatherbacks

require sandy nesting beaches backed with vegetation and sloped sufficiently so that the crawl to dry sand is not too far. A suitable depth to coarse, dry sand is important, because the female first excavates a pit for her body and then must reach moist sand before she can make the proper flask-shaped nest. The preferred beaches have proximity to deep water and generally rough seas. Critical habitat for the leatherback includes the waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands. The major nesting beaches are located in Malaya, Surinam, French Guiana, Mexico, Costa Rica, and St. Croix, U.S. Virgin Islands. Regular nesting in the United States is restricted to Florida; Culebra, Puerto Rico; and St. Croix, U.S. Virgin Islands.

The leatherback was listed as federally endangered on June 2, 1970. The decline in this species is considered primarily to be the result of exploitation by humans, mostly through consumption of the eggs, although the meat is also eaten. Increasing beach development and use are also detrimental, as sea turtles require relatively undisturbed beaches for nesting. Artificial lights have been shown to distract hatchlings away from the sea. Predation on the hatchlings by natural predators is extensive and further losses occur by drowning when the turtles are accidentally caught in commercial shrimping and fishing nets and longlines.

Outside of a remote occurrence, leatherback turtles would not be expected within the Daniel Island Terminal project area. While there is a potential for leatherbacks to be present off the coast of South Carolina during migration, no nesting beaches are known within South Carolina.

Kemp's (Atlantic) Ridley Sea Turtle (*Lepidochelys kempii*)

Outside of nesting, the major habitat for Kemp's Ridleys is the near-shore and inshore waters of the northern Gulf of Mexico, especially Louisiana waters. Kemp's Ridleys are often found in salt marsh habitats. The entire population nests on approximately 5 miles of beach between Barra del Tordo and Ostional in the state of Tamaulipas, Mexico. Nesting occurs from April to June during which time the turtles appear off Tamaulipas, Mexico. Adults are restricted to the Gulf of Mexico, but immatures have been observed along the Atlantic coast as far north as Massachusetts.

The Kemp's Ridley sea turtle was listed as federally endangered on December 2, 1970. Overharvesting of both eggs and adults for food and the skin has been a major factor in the turtle's decline. Currently, the major threat is drowning when inadvertently caught in shrimp nets. The Mexican government has prohibited harvesting since 1966, but population numbers have continued to decline.

Kemp's Ridleys are not common off the coast of South Carolina; however, immature individuals may be encountered in the near-shore and coastal waters of South Carolina.

Birds

Bachman's Sparrow (Aimphila aestivalis)

The Bachman's sparrow is found in dry, open pine flatwoods of the southeast. Due to declining populations, the Bachman's sparrow is considered a sensitive species by the U.S. Forest Service. Within the project area, the Bachman's sparrow potentially occurs in the pine flatwoods of the Cainhoy Plantation and Francis Marion National Forest.

American Swallow-Tailed Kite (Elandoides forficatus)

The swallow-tailed kite inhabits wooded river swamps, cypress swamps, marshes, pine flatwoods, and agricultural environments. Within the U.S., the bird is restricted to the southeastern coastal states. Most of the population migrates to the tropics in the winter. Due to declining populations, the swallow-tailed kite is listed as endangered by the State of South Carolina and is considered a sensitive species by the U.S. Forest Service. This species has the potential to occur in the pine flatwoods, marshes, and swamp systems throughout the project area.

Bald Eagle (Haliaeetus leucocephalus)

The bald eagle was initially listed on February 14, 1978 as an endangered species throughout the lower 48 states, except in Minnesota, Michigan, Wisconsin, Washington, and Oregon, where it was listed as a threatened species. On July 12, 1995, the USFWS announced that the bald eagle would be reclassified from endangered to threatened in the lower 48 states, effective August 11, 1995. In those states where the species was already listed as threatened, it remains classified as threatened; however, the bald eagle is scheduled for delisting from the Endangered Species list.

No bald eagles are known to nest within the project area. According to the South Carolina Department of Natural Resources, the nearest bald eagle nest is approximately 2.5 miles north of alternative rail alignment 5E. No bald eagles or bald eagle nests were observed during EIS field activities in 1998.

Wood Stork (Mycteria americana)

The wood stork is a highly colonial species usually nesting in large rookeries and feeding in large flocks. Wood storks primarily inhabit freshwater and brackish wetlands, feeding in freshwater marshes, narrow tidal creeks, flooded tidal pools, and roadside ditches. Nests are commonly located in the upper branches of large cypress trees or in mangroves on islands. They are also known to nest in man-made structures. Breeding within the United States is limited to Florida, Georgia, and South Carolina. After breeding, birds along the east coast migrate as far north as North Carolina.

The U.S. population of wood storks was listed as endangered on February 28, 1984. The current population is believed to number approximately 11,000 adults. Their decline has been attributed to loss of suitable feeding habitat through wetland alteration and destruction.

No wood stork nesting or roosting colonies are known within the project area. A rookery is located on the Santee Coastal Reserve approximately 28 miles northeast of the project area. No wood storks were observed within the project area during field activities in 1998, although potential feeding habitat does exist within the brackish and freshwater marshes and other wetlands near the proposed terminal and rail corridor.

Red-Cockaded Woodpecker (Picoides borealis)

The red-cockaded woodpecker was once common in the mature pine forests of the Southeast United States. It lived from Texas to Florida and north to Missouri, Kentucky, and Maryland. Unlike other woodpeckers, the red-cockaded woodpecker roosts in live pine trees. It needs older pines for its cavities and extensive pine forests or mixed pine/hardwoods to meet its foraging requirements. Much of the bird's habitat in the South has been cleared and much of the remaining pine forests are not suitable for roosting and foraging due to disturbance of natural regimes. Because of the loss and continued decline of habitat, the bird was placed on the federal endangered list in 1970.

The red-cockaded woodpecker typically makes its home in mature pine forests; specifically, those with long-leaf pines averaging 80 to 120 years old and loblolly pines averaging 70 to 100 years old. While other woodpeckers bore out cavities in dead trees where the wood is rotten and soft, the red-cockaded woodpecker is the only species which excavates exclusively in living pine trees. The older pine trees favored by the red-cockaded woodpecker often contain a fungus called red heart disease which softens the center of the trunk making it easier to excavate.

Red-cockaded woodpeckers live in a group or clan of two to nine birds. There is only one breeding pair within the clan. The other adults are usually male "helpers." Young birds hatched in the spring disappear from the clan throughout the year, but sometimes a male remains with the clan to become a helper. The clan nests and roosts in a group of cavity trees called a cluster. The cluster may have one or two cavity trees to more than 12, but it is used by only one clan. Typically, within any cluster, some cavities are still under construction, some are finished and in use, and some have been abandoned. In most clusters, all the cavity trees are within a circle about 1,500 feet in diameter. Each clan needs an average of 200 acres of old pine forest to support its foraging and nesting habitat needs. Some clans have been successful on fewer acres while others require as many as 300 acres to support themselves.

Several red-cockaded woodpecker clusters are known to exist in the Francis Marion National Forest and on the Cainhoy Plantation. The proposed rail alignment will pass near several cavity trees and impact the woodpecker's foraging habitat.

Bachman's Warbler (Vermivora bachmanii)

If not already, the Bachman's warbler is on the verge of extinction. It was listed as federally endangered throughout its range on March 11, 1967. Records indicate the bird breeds in the southeastern U.S. and winters in western Cuba and the Isle of Pines. The birds migrated southward in late summer and returned in early spring, with one group apparently moving generally along the east coast, and another skirting the Gulf coast and continuing up the Mississippi Valley. The only confirmed nest observations were recorded during the period from 1897 to 1937. Of these, 26 were from the l'On Swamp area in South Carolina, several Louisiana locations, Kentucky, Maryland, and near the Long/McIntosh County line in Georgia. No confirmed breeding records have been reported from the United States since the mid-1960's.

Historic records indicate the Bachman's warbler nested in low, wet forested areas containing variable amounts of water, but usually with some water that was permanent. These areas were described in general as being forested with sweet gum, oaks, black gum, and other hardwoods; and where there was an opening in the forest canopy, the ground being covered with dense thickets of cane, palmetto, blackberry, gallberry, and other shrubs and vines.

Most authorities agree that if the Bachman's warbler still exists it is most likely in the l'On Swamp area in Charleston and Berkeley Counties, South Carolina. Researchers believe that the habitat near this bird's last known nesting sites may have improved after Hurricane Hugo because the forest canopy was removed from many areas.

Other Birds

Other listed birds found in South Carolina include the peregrine falcon (*Falco peregrinus*) and piping plover (*Charadrius melodus*). The peregrine falcon reportedly has been observed wintering on the Cooper River bridges; however, the species is not expected to occur within the project area on a routine basis due to lack of suitable habitat.

The piping plover is a coastal beach/dune species and would not occur in the project area since this habitat does not occur within the project area.

The ivory-billed woodpecker (*Campephilus principalis*), a federally listed species, historically inhabited cypress swamps throughout the southeast, including South Carolina, but has not been documented in North America in nearly thirty years.

Mammals

Northern Right Whale (Balaena glacialis)

Northern right whales are found in the north Atlantic Ocean from west of Greenland to Florida and Texas on the western brim and to Madeira on the eastern brim. In summer, they are found in the north portion of this range as they feed in the plankton-rich colder water. From February to April mating and calving occur in the warmer southern waters. The occurrence of northern right whales off the coast of South Carolina would be expected during their seasonal migrations in late spring and fall.

The northern right whale was listed as federally endangered on June 2, 1970. By the 1800's the animal had been hunted almost to extinction and their numbers remain low (the eastern American population is estimated at 300). Since these whales are slow moving skimmer feeders at or near the surface of the water, they are very susceptible to collisions with ships.

Humpback Whale (Megaptera novaeangliae)

The humpback whale is found in all oceans and has a seasonal north-south migration pattern. The species prefers coastal areas more than most other whales, especially when feeding and calving/breeding. In North America, humpbacks winter in the Caribbean and migrate to areas off the New England coast in the summer. Some sightings have been reported in the Gulf of Mexico. Although they typically migrate via Bermuda, there is the potential for occurrence anywhere along the east coast of the U.S., including South Carolina, during their spring and fall migrations.

The humpback was listed as federally endangered on June 2, 1970. The world population of these whales currently is estimated at 9,500 to 10,000 animals and commercial whaling of the species is prohibited. The major threats to the humpbacks are entanglement in fishing nets, collision with ocean-going vessels, and disturbance by whale watchers.

West Indian Manatee (Trichechus manatus)

Manatees inhabit both salt and fresh water of sufficient depth (5 feet to usually less than 20 feet) throughout their range. They may be encountered in canals, rivers, estuarine habitats, saltwater bays, and on occasion have been observed as much as 3.7 miles off the Florida Gulf coast. During winter months, the United States' manatee population confines itself to the coastal waters of the southern half of peninsular Florida and to springs and warm water outfalls as far north as southeast Georgia. Manatees also winter in the St. Johns River, Florida near Blue Spring State Park. During summer months, they may migrate as far north as coastal Virginia on the east coast and the Louisiana coast on the Gulf of Mexico. Manatees are known to visit the Charleston Harbor area in

the summer months (April through November) as they migrate up and down the coast. In 1998, over 200 sightings of manatees were reported in South Carolina (Tom Murphy, South Carolina Department of Natural Resources, personal communication).

The manatee was listed as federally endangered on March 11, 1967. Manatee population trends are poorly known, but deaths have increased steadily (6.1 percent a year, exponential regression, 1976 to 1991). Mortalities from collisions with watercraft are up 10.3 percent a year from 21 percent of all deaths in 1976 to 1980 to 29 percent in 1986 to 1991. Deaths of dependent calves are up 12 percent a year from 14 to 24 percent of all deaths. The combination of high mortality rates and low reproductive rates have led to serious doubts about the species' ability to survive in the United States. Another closely related factor in the decline has been the loss of suitable habitat through incompatible coastal development, particularly destruction of sea grass beds by boating facilities.

Rafinesque's Big-Eared Bat (*Plecotus rafinesquii*)

Rafinesque's big-eared bat is perhaps the least known of all eastern U.S. bats. This species occurs in the southeastern U.S. from Texas and Oklahoma to the east coast and north to Illinois, Indiana, Ohio, West Virginia, and Virginia. In the northern part of their range, they hibernate in caves, mines, or similar habitats, including cisterns and wells. In contrast, they are not usually found in caves during winter in the more southern parts of their range. These bats appear widespread in distribution but are abundant nowhere. Rafinesque's big-eared bat is listed as endangered by the State of South Carolina and the U.S. Forest Service. The species is under review for possible federal listing by the U.S. Fish and Wildlife Service.

Maternity colonies are usually found in abandoned buildings and are more rarely found in caves and mines. Males are generally solitary during summer, roosting in buildings or hollow trees. Little is known about their feeding behavior or reproduction except that the females usually bear one pup, in late May or early June. No information is available on these bats in the vicinity of the Proposed Project and its alternatives; however large clusters (hibernacula or maternity colonies) of these bats would not be expected in the area due to lack of suitable habitat (caves, mines, and buildings).

Other Mammals

Other whales found in North American waters that are listed as federally endangered include the sperm whale (*Physeter catodon*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), and Sei whale (*Balaenoptera borealis*). Although there is a chance one or more of these species may pass through the dredged material ocean dumping site, these species are typically deep-ocean whales and would not be expected to occur in the near-shore waters adjacent to Charleston Harbor with any frequency.

Other federal listed mammals that historically occurred in South Carolina include the eastern cougar (*Puma concolor cougar*) and red wolf (*Canis rufus*). Despite occasional, unverified reports throughout the eastern half of the U.S., the eastern cougar is presumed to be extinct in the wild. The red wolf was extinct in the wild by 1980. The remaining population is now split among captives in breeding programs and experimental populations in North Carolina, Tennessee, and on coastal islands in South Carolina, Mississippi, and Florida.

2.4 Essential Fish Habitat (EFH)

2.4.1 EFH in the Vicinity of the Proposed Project

The Proposed Project is within the South Atlantic Fishery Management Council's (SAFMC) area of jurisdiction which extends from the Florida Keys to the north coast of North Carolina. In October 1998, the SAFMC released the "Final Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council" (Final Habitat Plan). The following section describes the potential occurrence of EFH in the vicinity of the Proposed Project. This discussion relies in part on data and other information contained in the Final Habitat Plan. Potential impacts to EFH as a result of construction and operation of the Proposed Project are discussed in Section 3.0.

The Final Habitat Plan identifies the following EFH within the South Atlantic region:

Estuarine areas	Estuarine emergent wetlands
	Estuarine scrub/shrub mangroves
	Sea grass
	Oyster reefs and shell banks
	Intertidal flats
	Palustrine emergent and forested wetlands
	Aquatic beds
	Estuarine water column
Marine areas	Live/hard bottoms
	Coral and coral reefs
	Artificial/manmade reefs
	Sargassum
	Marine water column

The potential for each of these habitats to occur in the Project area is discussed below. Table 2.2 lists those EFH known to occur occurring in the Project area.

TABLE 2.2
DESIGNATED ESSENTIAL FISH HABITAT
OCCURRENCE IN THE PROJECT AREA

	Essential Fish Habitat	Known to Occur in Project Area
Estuarine areas	Estuarine emergent wetlands	Yes
	Estuarine scrub/shrub mangroves	No
	Seagrass	No
	Oyster reefs and shell banks	Yes
	Intertidal flats	Yes

Estuarine Emergent Wetlands

Estuarine marshes constitute a complex ecosystem that serves as essential fish habitat but also is vital to many other wildlife species. In South Carolina, the salt marsh systems are of principal importance as nursery areas. Extensive salt marshes occur in the vicinity of the Proposed Project, especially along the west and north sides of Daniel Island.

Estuarine Shrub/Scrub Mangroves

Within the United States, mangrove wetlands do not occur north of Florida; consequently, this type of EFH is not found in the vicinity of the Proposed Project.

Sea Grass

At least 13 species of sea grass occur in U.S. waters, with the exception of Georgia and South Carolina where highly turbid freshwater discharges, suspended sediments, and a large tidal amplitude combine to prevent their permanent establishment. No sea grass EFH is found in the vicinity of the Proposed Project.

Oyster Reefs and Shell Banks

Oyster and shell EFH in the South Atlantic can be defined as the natural structures found in the intertidal zone or just below the intertidal zone, that are composed of oyster shell, live oysters and other organisms that are discrete, contiguous and clearly distinguishable from scattered oysters in marshes and mudflats, and from wave-formed shell windrows. The most extensive contiguous intertidal oyster reefs in the South Atlantic region occur in the South Carolina coastal zone. These reefs diminish in size and significance south of Georgia and north of South Carolina. In South Carolina, oysters are predominantly intertidal.

Beginning in 1980, the South Carolina Department of Natural Resources conducted an extensive survey of intertidal oyster resources and maintains the data in its Geographic Information System. Results of this survey (1982 survey data) show large numbers of oyster beds in the Charleston Harbor estuary, especially along the east bank of the Wando River. The 1982 survey revealed at least two oyster beds along the west bank of the Wando River adjoining Daniel Island. Two of these oyster beds, totaling 0.04-acre, are located within the "footprint" of the proposed wharf structure. Several oyster beds are also located along Beresford Creek; however, none are located within the area of the proposed access road and railroad bridges.

Intertidal Flats

Tidal flats are critical structural components of coastal systems that serve as benthic nursery areas, refuges, and feeding grounds for a variety of animals and thus provide essential fish habitat. Factors that affect the regional character of tidal flats include tidal range, prevailing weather patterns, currents, and coastal geography and geology. In South Carolina, mesotidal (6.5 to 10.8 feet) coasts with short barrier islands and numerous tidal inlets result in strong tidal currents which are the predominant influence on tidal flats. There are an estimated 1 million acres of tidal flats along the South Atlantic coast. Tidal flats are not as predominant within Charleston Harbor as in other regions; however, in the vicinity of the Proposed Project, tidal flats occasionally occur in shallow areas as a narrow margin between the open waters of the Cooper and Wando Rivers and adjacent salt marshes.

Palustrine Emergent and Forested Wetlands

This habitat type includes the tidal fresh and freshwater marshes (palustrine emergent or riverine emergent classification of Cowardin et al. 1979) and swamp forests (palustrine forested), some of which are also tidal. Both habitat types occur in South Atlantic estuarine drainage areas in the tidal and freshwater portions of riverine tributaries. Relatively few studies have been performed in the South Atlantic region to specifically investigate/document use of such habitats by Council-managed species, with the possible exception of white shrimp (*Penaeus setiferus*). Some studies have been performed which document the use of these habitats by important prey species, such as blue crabs, bay anchovies, and alosids (alewife and blueback herring).

Many of the South Carolina river/estuary systems have more than 500 acres of tidal freshwater marsh, including Charleston Harbor (Cooper, Wando, and Ashely Rivers). In the vicinity of the Proposed Project these habitat types occur at the heads of tributaries to Clouter Creek, Yellowhouse Creek, Flag Creek, Martin Creek, and Beresford Creek.

Aquatic Beds

Submerged rooted vascular vegetation in tidal fresh or freshwater portions of estuaries and their tributaries performs the same functions as sea grasses. Specifically, aquatic bed meadows possess the same four attributes: 1) primary productivity; 2) structural complexity; 3) modification of energy regimes and sediment stabilization; and 4) nutrient cycling. The term "aquatic bed" is used to describe areas of submerged rooted aquatic vascular vegetation which occur in oligohaline, tidal fresh or freshwater portions of estuaries and their tributary rivers.

Large expanses of aquatic beds are known in the South Atlantic region; however, they do not occur in the vicinity of the Proposed Project due to high salinities in the area. Aquatic beds are known to exist in the upper Cooper River several miles upstream of the biotics study area.

Estuarine Water Column

The estuarine water column traditionally comprises four salinity categories: oligohaline (<8 parts per thousand [ppt]), mesohaline (8-18 ppt), and polyhaline waters (18-30 ppt) with some euhaline water (>30 ppt) around inlets. Saline environments have moving boundaries, but are generally maintained by sea water transported through inlets by tide and wind mixing with fresh water supplied by land runoff. All of the open water areas within Charleston Harbor is estuarine water habitat.

Live/Hard Bottoms

From Cape Hatteras to Cape Canaveral, most of the offshore substrate is covered by a vast plain of sand and mud underlain at depths of less than three feet by carbonate sandstone. The productivity of this sand and mud covered plain is low. Scattered irregularly over the shelf, however, are zones of highly concentrated invertebrate and algal growth, usually in association with marked deviations in relief that support substantial fish assemblages. These "live bottom" areas are usually found near outcropping shelves of sedimentary rock in the zone from 90 to 210 feet deep. Live bottom is especially evident at the shelf break, a zone from about 210 to 600 feet deep where the continental shelf adjoins the deep ocean basin and is often characterized by steep cliffs and ledges. The live bottom areas constitute essential habitat for warm-temperate and tropical species of snappers, groupers, and associated fishes.

In 1992, the SEAMAP-South Atlantic Bottom Mapping Work Group of the Atlantic States Marine Fisheries Commission began mapping hard bottom habitats from the shore out to a depth of 656 feet. Color versions of these maps are available over the internet at the Council's web site (www.safmc.noaa.gov). Live bottoms have been identified in the western portion of the 11 square mile ODMDS.

Coral and Coral Reefs

Coral reef communities or solitary coral specimens exist throughout the South Atlantic region from near-shore environments to continental slopes and canyons, including the intermediate shelf zones. Dependent upon many variables, corals may dominate a habitat, be a significant component, or be individuals within a community characterized by other fauna. Potential habitat for octocorals and/or Pennatulacea may exist within the subtidal zones of the Project area.

Artificial/Manmade Reefs

Manmade reefs are defined as any area within marine waters in which suitable structures or materials have intentionally been placed by man for the purpose of creating, restoring, or improving long-term habitat for the eventual exploitation, conservation, or preservation of the resulting marine ecosystems naturally established on these sites. All manmade reef development and management in South Carolina is guided by the South Carolina Marine Artificial Reef Management Plan, adopted in 1991. As of January 1998, the state's system of marine artificial reefs consisted of 43 permitted sites along approximately 160 miles of coastline. The nearest artificial reef to the Proposed Project is the Charleston Near-shore Reef located 2.5 nautical miles southeast of the Charleston Harbor north jetty.

Sargassum

Pelagic brown algae *Sargassum natans* and *S. fluitans* form a dynamic structural habitat within warm waters of the western North Atlantic. Most pelagic *Sargassum* circulates between 20°N and 40°N latitudes and 30°W longitude and the western edge of the Florida Current/Gulf Stream. The greatest concentrations are found within the North Atlantic Central Gyre in the Sargasso Sea. Large quantities of *Sargassum* frequently occur on the continental shelf off the southeastern U.S. Depending on prevailing surface currents, this material may remain on the shelf for extended periods, be entrained into the Gulf Stream, or be cast ashore. *Sargassum* is considered essential habitat because it provides protection, feeding opportunity, and use as a spawning substrate to species managed by the Council.

Although small quantities of *Sargassum* may drift through the approach channel to Charleston Harbor and the ODMDS, all major *Sargassum* habitat areas are well offshore of the Proposed Project.

Marine Water Column

The marine water column is defined as the open water marine (ocean) environment and extends vertically from the ocean bottom to the water surface. That portion of the Proposed Project that contains marine water (open water) habitat includes the shipping channel from the mouth of Charleston Harbor to three miles offshore and the ODMDS and its approaches.

2.4.2 Potential EFH Species in the Vicinity of the Proposed Project

Table 2.3 lists the species for which the SAFMC manages or has developed fishery management plans. The following section discusses these species potential to occur in EFH in the vicinity of the Proposed Project. Potential impacts to these species as a result of construction and operation of the proposed marine terminal are discussed in Section 3.0.

TABLE 2.3
 FISHERY MANAGEMENT PLANS AND MANAGED SPECIES
 FOR THE SOUTH ATLANTIC REGION

Common Name	Species
Shrimp Fishery Management Plan brown shrimp pink shrimp rock shrimp royal red shrimp white shrimp	<i>Penaeus aztecus</i> <i>P. duorarum</i> <i>Sicyonia brevirostris</i> <i>Pleoticus robustus</i> <i>Penaeus setiferus</i>
Red Drum Fishery Management Plan red drum	<i>Sciaenops ocellatus</i>
Snapper Grouper Fishery Management Plan (73 species) Representative Species: blackfin snapper blueline tilefish gray snapper greater amberjack jewfish mutton snapper red porgy red snapper scamp silk snapper snowy grouper speckled hind vermilion snapper yellowedge grouper warsaw grouper white grunt wreckfish	<i>Lutjanus buccanella</i> <i>Caulolatilus microps</i> <i>L. griseus</i> <i>Seriola dumerili</i> <i>Epinephelus itajara</i> <i>L. analis</i> <i>Pagrus pagrus</i> <i>L. campechanus</i> <i>Mycteroperca phenax</i> <i>L. vivanus</i> <i>E. niveatus</i> <i>E. drummondhayi</i> <i>Rhomboplites aurorubens</i> <i>E. flavolimbatus</i> <i>E. nigrilus</i> <i>Haemulon plumieri</i> <i>Polyprion americanus</i>
Coastal Migratory Pelagics Fishery Management Plan dolphin cobia king mackerel Spanish mackerel	<i>Coryphaena hippurus</i> <i>Rachycentron canadum</i> <i>Scomberomorus cavalla</i> <i>S. maculatus</i>
Golden Crab Fishery Management Plan golden crab	<i>Chaceon fenneri</i>
Spiny Lobster Fishery Management Plan spiny lobster	<i>Panulirus argus</i>
Coral and Coral Reef Fishery Management Plan varied coral species and coral reef communities comprised of several hundred species	
Calico Scallop Fishery Management Plan calico scallop	<i>Argopecten gibbus</i>
Sargassum Habitat Fishery Management Plan Sargassum (and associated fauna) where it occurs in the EEZ and state waters	<i>Sargassum</i>

Source: South Atlantic Fishery Management Council, 1999.

Penaeid and Deepwater Shrimp

In the southeastern U.S., the shrimp industry is based on the white shrimp (*Penaeus setiferus*), brown shrimp (*P. aztecus*), pink shrimp (*P. duorarum*), and the deeper water rock shrimp (*Sicyonia brevirostris*). The royal red shrimp (*Pleoticus robustus*) also occurs in deeper water and sustains a limited harvest.

For penaeid shrimp, EFH in the vicinity of the Proposed Project includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes), and subtidal and intertidal non-vegetated flats. The high salinity oceanic waters serve as habitat for large, mature shrimp which spawn offshore. Brown and pink shrimp apparently move to relatively deep continental shelf water while white shrimp appear to remain near-shore in shallower water. After entering the estuaries, postlarval shrimp occupy nursery areas which offer abundant food, suitable substrate, and shelter from predators.

In South Carolina the nursery habitat of penaeid shrimp is the high marsh areas with shell hash and mud bottoms. In addition, there is seasonal movement out of the marsh into deep holes and creek channels adjoining the marsh system. Therefore, the area of particular concern for early growth and development encompasses the entire estuarine system from the lower salinity portions of the river systems through the inlet mouths. For the Proposed Project, this includes all of the estuarine wetland and open water areas in the vicinity of the Proposed Project.

EFH for rock shrimp and royal red shrimp occurs in deeper offshore waters. None of these areas occur in the vicinity of the Proposed Project.

Red Drum (*Sciaenops ocellatus*)

Red drum spawn in the ocean along beaches and in the vicinity of inlets and passes. Eggs and larvae are carried by tidal and wind currents into estuarine systems. After maturation, adult red drum spend less time in the estuaries and more time in the ocean where they migrate seasonally along the coast, inshore and/or north in spring and offshore and/or south in fall.

Red drum EFH includes all of the following habitats to a depth of 164 feet offshore: tidal freshwater; estuarine emergent vegetated wetlands (flooded salt marshes, brackish marsh, and tidal creeks); estuarine scrub/shrub (mangrove fringe); submerged rooted vascular plants (sea grasses); oyster reefs and shell banks; unconsolidated bottom (soft sediments); ocean high salinity surf zones; and artificial reefs. In South Carolina, all of these habitats occur except mangroves and sea grasses. In the vicinity of the Proposed Project, EFH for the red drum is found within all estuarine waters and wetlands and the near-shore marine waters at the mouth of Charleston Harbor.

Snapper Grouper Complex

Ten families of fishes containing 73 species are managed by the SAFMC. There is considerable variation in specific life history patterns and habitat use among the snapper grouper species complex. EFH for the snapper grouper complex includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on the shelf break zone from shore to at least 600 feet (2000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition, the Gulf Stream is an essential habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and near-shore snapper grouper species, EFH includes areas inshore of the 100-foot contour, such as attached macroalgae, sea grasses, salt marsh and brackish marsh, tidal creeks, mangrove fringe, oyster reefs and shell banks, soft sediments, artificial reefs, coral reefs, and live/hard bottom. Of these habitats, the salt and brackish marshes, tidal creeks, and soft sediments are known to exist in the vicinity of the Proposed Project.

Coastal Migratory Pelagics

This species grouping includes dolphin (*Coryphaena hippurus*), cobia (*Rachycentron canadum*), king mackerel (*Scomberomorus cavalla*), and Spanish mackerel (*S. maculatus*). The habitat of adults in the coastal pelagic management group, except dolphin, is the coastal waters out to the edge of the continental shelf in the Atlantic Ocean. Dolphin is an oceanic species that may be found on the shelf.

EFH for coastal migratory pelagic species includes sandy shoal of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone (but from the Gulf Stream shoreward) including *Sargassum*. In addition, all coastal inlets and all state-designated nursery habitats are of particular importance to coastal migratory pelagics. For cobia, EFH also includes high salinity bays, estuaries, and sea grass habitat. The Gulf Stream is an essential habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.

Within the vicinity of the Proposed Project, the habitat potentially most important for coastal migratory pelagics is the Charleston Harbor estuarine system, including all associated wetlands and open water areas. Even though the coastal migratory pelagics are not commonly found in these areas, the estuarine system provides important habitats for most prey species of coastal pelagics.

Golden Crab (*Chaceon fenneri*)

The golden crab inhabits the continental slope of Bermuda and the southeastern U.S. from off Chesapeake Bay, south through the Florida Straits, and into the eastern Gulf of Mexico. Reported depth distributions of the golden crab range from 670 feet off the Dry Tortugas to 3,300 feet off Bermuda.

EFH for golden crab includes the U.S. continental shelf from Chesapeake Bay south through the Florida Straits and into the Gulf of Mexico. In addition, the Gulf Stream is an essential habitat because it provides a mechanism to disperse golden crab larvae. None of the golden crabs' EFH is within the vicinity of the Proposed Project nor does the golden crab occur in the vicinity of the Proposed Project.

Spiny Lobster (*Panulirus argus*)

The spiny lobster is concentrated in the Florida Keys where the adults spawn. Many larvae and pueruli (transitional swimming stage) are swept by the Florida Current into the Gulf Stream where they eventually die although some manage to escape the Gulf Stream for Florida's southeast coast where they can be found year-round. The spiny lobster, and consequently its EFH, does not occur in the vicinity of the Proposed Project.

Coral and Coral Reefs

EFH for corals (stony corals, octocorals, and black corals) incorporates habitat for over 200 species and includes the following:

- A) EFH for hermatypic stony corals includes rough, hard, exposed, stable substrate from Palm Beach County, Florida, south through the Florida reef tract in subtidal to 98 feet depth, subtropical (15° to 35° C), oligotrophic waters with high (30 to 35 ppt) salinity and turbidity levels sufficiently low enough to provide algal symbionts adequate sunlight penetration for photosynthesis.
- B) EFH for *Antipatharia* (black corals) includes rough, hard, exposed, stable substrate, offshore in high (30 to 35 ppt) salinity waters in depths exceeding 54 feet, not restricted by light penetration on the outer shelf throughout the management area.
- C) EFH for octocorals excepting the order Pennatulacea (sea pens and sea pansies) includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinity and light penetration throughout the management area.
- D) EFH for Pennatulacea (sea pens and sea pansies) includes muddy, silty bottoms in subtidal to outer shelf depths within a wide range of salinity and light penetration.

EFH for octocorals and Pennatulacea may occur in the subtidal zones of the Project area.

Calico Scallop (*Argopecten gibbus*)

The calico scallop occurs most often at moderate depths of 59 to 240 feet and is restricted generally to the continental shelf of the western North Atlantic and Gulf of Mexico between about 20°N and 35°N latitude. The EFH for calico scallops is the unconsolidated sediments including hard sand bottoms, sand and shell hash, quartz sand, smooth sand-shell-gravel, and sand and dead shell in 43 to 308 foot depths with concentrations occurring on the Cape Canaveral grounds (Stuart to St. Augustine, Florida) and sporadically occurring northeast and southwest of Cape Lookout, North Carolina in 62 to 102 foot depths, and offshore of the South Carolina/Georgia border in 121 to 148 foot depths. In addition, the Gulf Stream is an essential habitat because it provides a mechanism to disperse calico scallop larvae.

No calico scallop EFH occurs in the vicinity of the Proposed Project.

Sargassum

EFH for pelagic *Sargassum* is where it occurs in the Exclusive Economic Zone (EEZ) and state waters. The EEZ extends from 3 to 200 miles offshore. In addition, the Gulf Stream is an essential habitat because it provides a mechanism to disperse *Sargassum*. In the vicinity of the Proposed Project, *Sargassum* and *Sargassum* EFH may exist from time to time in the near shore waters off of Charleston Harbor.

3.0 POTENTIAL IMPACTS FROM THE PROPOSED PROJECT

The Proposed Project will affect wetlands, threatened and endangered species, and designated EFH in the project area.

3.1 Wetlands

Impacts to estuarine and freshwater wetlands that will be affected by the Proposed Project were quantified by determining the acreage of wetlands to be filled, dredged, or bridged. Jurisdictional boundary surveys of all freshwater wetlands were performed according to the *Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)*. All freshwater wetland boundaries were subsequently field checked and approved by the U.S. Army Corps of Engineers and their positions located with a map grade digital GPS unit (± 1 meter accuracy). Freshwater wetland boundaries along the proposed rail alignment were surveyed to a minimum of 50 feet each side of the rail centerline (100-foot wide corridor); this width approximates the actual "footprint" of the proposed rail line serving the Daniel Island terminal. Acreages of impact in freshwater wetlands were determined along the proposed rail alignment by overlaying a 100-foot corridor along the rail line. Estuarine wetlands were identified as those wetlands below the State of South Carolina Coastal Council "Critical Line." Impacts to wetlands resulting from construction of the terminal facilities were also computed by overlaying a plan view of the terminal components (berths, wharves, and container yard) on a map of the wetlands. Estuarine wetlands impacted by the access road were determined by overlaying an 86-foot wide corridor.

Sheets 7 through 11 show the wetland and open water impact areas resulting from construction of the terminal on Daniel Island. Sheets 18 through 56 show the impacts to wetlands along the proposed road and rail lines. Sheet 12 lists the acreages of wetlands impacted along the Cooper and Wando Rivers resulting from construction of the terminal. Sheets 13 through 15 lists the acreages of wetlands impacted by construction of the road and rail line. Sheets 57 through 60 present a description of each wetland impact area along the road and rail line.

3.1.1 Dredge

All wetland dredge activities associated with the Proposed Project will be limited to the terminal facility area on Daniel Island. A total of 8.0 acres of estuarine wetlands (cordgrass/needlerush marsh) will be dredged to a depth of -55 feet MLW during construction of the berths on the Cooper and Wando River sides of Daniel Island. No freshwater wetlands will be dredged.

Wetlands to be Dredged (acres)	
Estuarine	8.0
Freshwater	0
Total	8.0

3.1.2 Fill

A total of 41.1 acres of cordgrass/needlerush marsh will be filled during construction of the container yard for the terminal facility. A total of 20.5 acres of freshwater wetlands occurring within the rail alignment will be filled.

Wharf construction at the terminal facility will result in partial fill of approximately 17.8 acres of cordgrass/needlerush marsh. The wharf structures will be constructed as a pile support deck on the Cooper side and with a combination pile support deck with coffercells on the Wando side (see Sheets 62 and 63). This type of structure will eliminate all characteristics of the salt marsh beneath the structure but will maintain some open water beneath the deck.

For both freshwater and estuarine wetlands, a total of 79.4 acres will be filled or partially filled as a result of the Proposed Project.

Wetlands to be Filled/Partially Filled (acres)	
Estuarine	58.9
Freshwater	20.5
Total	79.4

3.1.3 Bridges

The proposed access road and railroad will be pile supported over existing estuarine wetlands. The road bridge will cross 7.5 acres of estuarine wetlands (cordgrass/needlerush marsh). (This acreage is based on an 86-foot bridge width.) The proposed rail line will cross 2.4 acres of cordgrass/needlerush marsh, based on a 15-foot wide trestle.

Wetlands to be Trestled (acres)	
Estuarine	7.5 (road), 2.4 (trestle)
Freshwater	<0.1
Total	10.0

3.2 Open Water Areas

The Proposed Project will result in expansion of the existing channel in the Wando River and dredging and filling in the Wando and Cooper Rivers for berth and wharf areas. Also, the proposed road and rail bridges over Beresford Creek will cross open water. Specific impacts to these areas are discussed below.

3.2.1 Dredge

The proposed alignment for the modified Wando Reach channel includes dredging a combined channel and turning basin between the southeast side of the existing Wando Reach channel and the proposed SCSPA berth adjacent to the proposed terminal. The expanded federal waterway will be 1,470 feet wide and will have an authorized depth of -45 feet MLW. The proposed improvements will require dredging approximately 8.5 million cubic yards of sediment.

Dredging for berth construction in open water areas will cover approximately 31.6 acres and require removal of approximately 3 million cubic yards of sediment.

3.2.2 Fill

A total of 20.9 acres of open water areas will be permanently filled during construction of the container yard for the terminal facility. An additional 17.5 acres of open water will be partially filled during construction of the wharves. No open water areas will be filled along the proposed access road or rail alignment.

Open Water Areas to be Filled/Partially Filled (acres)	
Container Yard	20.9
Wharves	17.5
Total	38.4

3.2.3 Bridges

The proposed road bridge will cross 0.2 acre of open water at Beresford Creek (based on an 86-foot wide bridge). The proposed rail bridge will cross 0.1 acre of open water at Beresford Creek (based on a 15-foot wide trestle). No impacts to these open water areas are expected as a result of the presence of the road and rail bridges.

Open Water Areas to be Bridged (acres)	
Road Bridge	0.2
Rail Bridge	0.1
Total	0.3

3.3 Threatened and Endangered Species

3.3.1 Upland Species

Plants

No state or federal listed upland plant populations are known within the area to be occupied by the proposed terminal facility on Daniel Island nor does the area support appropriate habitat for these species. Consequently, no direct effects to listed upland plant species are expected as a result of construction of the Daniel Island terminal itself.

No listed upland plant species are known along the proposed rail alignment serving the terminal facility; however, the proposed alignment does pass through appropriate habitats for several listed upland plant species as noted in Section 2.3 (see Table 2.1). No direct effects to any populations of listed upland plant species are expected as a result of construction and operation of the proposed rail alternative. An indirect effect will be loss of available habitat for recruitment of new populations.

Animals

Listed upland threatened and endangered animal species known to occur in the Charleston area include the bald eagle and red-cockaded woodpecker. No bald eagles are known to nest within the project area. According to the South Carolina Department of Natural Resources, the nearest bald eagle nest is approximately 2.5 miles north of proposed rail alignment 5E. No direct impacts to this species are expected as a result of construction and operation of the Proposed Project.

Impacts to the red-cockaded woodpecker as a result of the Proposed Project will include loss of foraging habitat. All impacts to the red-cockaded woodpecker will occur along the proposed rail alignment on the Cainhoy Plantation and Francis Marion National Forest.

Several other listed upland animal species may also occur in the proposed terminal area or along the proposed rail alignment. These include the Bachman's warbler, Bachman's sparrow, American swallow-tailed kite, and Rafinesquès big-eared bat. If any of these species exist in the area, impacts could range from incidental take to loss of nesting, roosting, and foraging habitat. Potential prudent

measures to prevent adversely affecting these species include acquisition of appropriate habitat, possibly for annexation into the Francis Marion National Forest.

3.3.2 Aquatic Species

Plants

No freshwater wetlands are known within the area of the proposed terminal location. Consequently, no effects to listed freshwater plant species are expected as a result of construction and operation of the Daniel Island terminal facility.

No populations of listed freshwater plants are known along the proposed rail alignment serving the terminal facility; however, the proposed rail alignment does pass through appropriate habitat for several listed freshwater plant species as noted in Section 2.3. Potential impacts to freshwater plant species along the rail alignment include loss of available habitat for recruitment of new populations and loss of existing populations, if present.

Animals

Listed threatened and endangered animals and species of concern associated with freshwater habitats and potentially occurring within the project area include the wood stork, flatwoods salamander, and American alligator.

No wood stork nesting or roosting colonies are known within the project area. A rookery is located on the Santee Coastal Reserve north of the project area. However, potential feeding habitat does exist within the brackish and freshwater marshes near the proposed terminal area and proposed rail corridors. The Proposed Project will have minimal impact to any wood stork populations in the area.

Appropriate habitat (i.e., pine flatwoods and shallow, freshwater wetlands) for flatwoods salamanders does not exist within the proposed site for the terminal facility on Daniel Island. Construction and

operation of the terminal facility should have no effect on the flatwoods salamander.

Potential flatwoods salamander habitat (i.e., pine flatwoods) does exist along the proposed rail

- Habitat fragmentation;
- Disruption of movement patterns due to rail presence;
- Habitat alteration with potential for introduction of predatory species due to changed hydrography.

No alligators were observed in any of the wetlands potentially impacted by the Proposed Project; however, their existence along the proposed rail line cannot be ruled out. If any alligators do exist in the potentially impacted wetlands, impacts could range from incidental take to loss of habitat.

3.3.3 Estuarine and Pelagic Species

Several sea turtles, whales, the shortnose sturgeon, and manatee are all listed species with the potential to occur in estuarine and offshore waters within the project area.

Outside of a remote occurrence, leatherback turtles would not be expected within the Daniel Island terminal project area. There is a potential for leatherbacks to be off the coast of South Carolina during migration but no nesting beaches are known within South Carolina. The Proposed Project should have no effect on existing populations of the leatherback turtle.

South Carolina's shoreline is a migration path for loggerhead turtles at all times of the year. Charleston Harbor is located within a large nesting population zone that extends from North Carolina to Florida. The Proposed Project is located in an area potentially frequented by foraging loggerheads; thus the Proposed Project may affect loggerheads by reducing foraging habitat quality in the vicinity of the terminal and increasing risk of injury to individuals from collision or prop wash from ships.

The green sea turtle may also be found within the Charleston Harbor estuary system. Migrating and foraging green sea turtles may be affected by the Proposed Project by reduced habitat quality in the vicinity of the terminal and increased risk of injury to individuals from collision or prop wash from ships.

On rare occasions, the Kemp's Ridley sea turtle may be in Charleston Harbor or offshore of Charleston. Although the Proposed Project may increase risk of injury to individuals from collision or prop wash from ships, these impacts are not expected to affect the species due to their minimal occurrence in the area.

The presence of shortnose sturgeons would not be unexpected in the Proposed Project area. Dredging of the Cooper and Wando Rivers for the Proposed Project could degrade habitat quality and affect availability of the sturgeon's food supply of benthic insects, crustaceans, and molluscs.

Manatees are likely to be encountered in Charleston Harbor during the summer months as they migrate up and down the coast. The Proposed Project could affect manatees in the area by increasing the risk of injury or death from collision or propwash from ships.

The northern right whale may be encountered off the coast of South Carolina during their seasonal migrations. Since these whales are slow moving skimmer feeders at or near the surface of the water, they are susceptible to collisions with ships. Increased shipping traffic resulting from the Proposed Project may add a risk of collision to northern right whales offshore of Charleston Harbor.

Humpback whales may also occur anywhere along the east coast of the U.S., including South Carolina. A minimal increase in the risk of collision with a ship could result from the increased shipping traffic associated with the Proposed Project.

3.4 Essential Fish Habitat (EFH)

Several activities associated with construction and operation of the Proposed Project will impact or have the potential to impact designated EFH and Council-managed species that use EFH in the Charleston Harbor estuary and near shore marine waters. These activities include:

- Dredging of the Cooper and Wando Rivers adjacent to and along the approaches to the Daniel Island terminal;
- Dredging/filling of salt marsh areas, intertidal flats, and tidal waters that adjoin Daniel Island;
- Filling of freshwater wetlands along the proposed rail line;
- Disposal of dredged material at the ODMDS;
- Increased shipping traffic.

Sheet 61 summarizes the types and quantities of impacts expected within each EFH as a result of the Proposed Project. Potential effects to EFH and dependent resources resulting from these impacts are discussed in the following section.

Habitat Loss

Construction of the Proposed Project will result in the direct loss of approximately 101 acres of estuarine EFH. This loss will be associated with dredge and fill activities in salt marsh (66.9 acres), open water (20.9 acres) and palustrine emergent and forested wetlands (12.9 acres). Loss of these habitats can have an adverse effect on organisms within the following Council-managed species groups: penaeid shrimp, especially the white shrimp; red drum; select species from the snapper grouper complex; and the coastal migratory pelagics (by affecting prey species). Also, at least two oyster beds totaling 0.04 acre (based on a 1982 survey) will be destroyed.

Habitat Modification

Construction of the Proposed Project will result in modification of approximately 59 acres of existing estuarine EFH. The 86-foot wide pile-supported access road will shade 7.5 acres of salt marsh.

During berth construction along the Cooper and Wando Rivers, approximately 3 million cubic yards of sediment will be removed from 31.6 acres of estuarine water column (open water) habitat. An additional 8.5 million cubic yards of sediment will be dredged to provide turning basins and channel access to the existing federal channel.

Construction of the wharves associated with the Proposed Project will result in partial fill of approximately 17.5 acres. In these areas, the existing substrate will be filled; however, the water column beneath the wharves will only be filled along a slope that extends from the bottom of the berth to the bottom of the deck structure. The result will be an open water zone of varying depth beneath the wharf structures.

Habitat Disturbance

Existing estuarine and marine EFH within the Project area that is not directly lost or modified by the Proposed Project could be subjected to varying levels of disturbance as a result of construction and operation of the Proposed Project. The predominant cause of this disturbance is expected to be the increased shipping traffic – up to 7 more ships per day compared to current levels – and would chiefly affect the estuarine and marine water column (open water) habitats. Cargo arriving through the port will be diverse and range from toxic and hazardous chemical and petroleum products to relatively benign materials such as paper. Major spills and other discharges of toxic or hazardous materials are uncommon, but are of concern since large and significant areas of EFH exist in the area. These potential impacts will be reduced by the use of spill abatement measures (e.g., stormwater ponds for spills on land) and spill prevention and response plans.

The effects of vessel induced wave damage or disturbance is difficult to quantify but may be of concern. In some areas, high energy wave trains from large vessels may be responsible for erosion of intertidal wetlands. Indirect effects may include resuspension of sediments and contaminants that can affect EFH. Where sediments flow back into existing channels, the need for maintenance dredging, with its attendant impacts, may increase.

Disturbance to the marine water column and substrate in the vicinity of the ODMDS is also possible due to dredge disposal. Potential impacts to EFH include direct removal/burial of organisms as a result of placement of dredged material; turbidity/siltation effects, including increased light attenuation from turbidity; contaminant release and uptake of nutrients, metals, and organics; and release of oxygen consuming substances.

4.0 MITIGATION AND CONSERVATION RECOMMENDATIONS

The SCSPA is developing an integrated mitigation program to compensate for several of the unavoidable impacts of the Proposed Project, and to meet multiple regulatory requirements of state and federal agencies. In accordance with discussions with resource management agencies, the mitigation program proposal will be completed following receipt of agency and public comments on the draft EIS and on the proposed permit applications. The proposed program will be included in the final EIS and in amendments to the permit applications. The program will address two general areas, social impacts, and impacts to specific biotic communities, wetlands, and waters of the United States. Key features of the developing programs are outlined in the following paragraphs.

4.1 Social Impact Program

The SCSPA has worked very closely with the City of Charleston and the owners of Daniel Island in planning for a terminal on the island. A land use plan was developed that addressed terminal location, transportation access, and measures to reduce and mitigate the impacts on the surrounding community. A Development Agreement between the City of Charleston and the South Carolina State Ports Authority was signed that addressed specific items the SCSPA would provide with the port development.

In addition, the SCSPA has held numerous meetings in the Cainhoy area to discuss the Proposed Project with communities outside the Daniel Island development. The SCSPA was instrumental in bringing together a committee made up of representatives of the various affected communities to help define potential social impacts of the project and to discuss possible mitigation alternatives. This committee was primarily interested in impacts imposed by rail and highway infrastructure. Meetings with this committee continues, but specific items are being discussed that would mitigate the anticipated impacts to these communities. It is expected a formal agreement will be reached with the committee that will specify acceptable mitigation to social impacts to these communities.

4.2 Biotic and Wetland Program

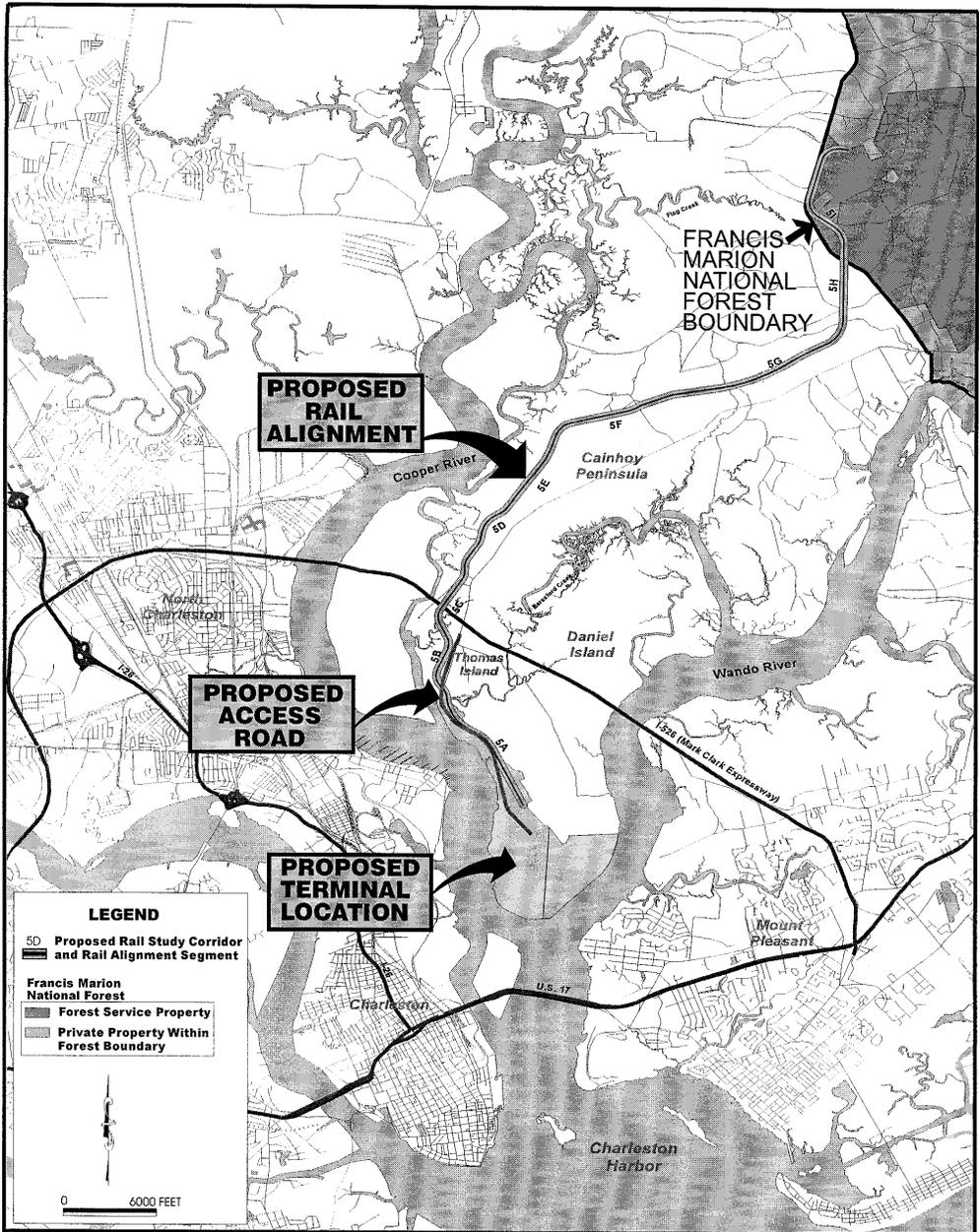
The goal of the proposed biotics/wetlands mitigation program is to compensate for unavoidable impacts to protected species such as the red-cockaded woodpecker and flatwoods salamander, to compensate for unavoidable impacts to the functions and values of wetlands and essential fish habitat, and to meet State of South Carolina requirements for replacement of wetlands unavoidably displaced by the Proposed Project.

The central theme of the proposed program is the acquisition, restoration and/or enhancement, and preservation of habitats similar to those being affected by the Proposed Project. This program will be accomplished in large measure by the acquisition of and improvements to properties near the project

site, the Francis Marion National Forest, and/or the Cape Romain National Wildlife Refuge. Land modifications and management will be undertaken to increase the values of these areas to protected species, as well as their wetland and fisheries values. To ensure the long-term value of these properties in terms of habitat and wetland functions, they will be placed under conservation easement and/or transferred to the U.S. Forest Service or U.S. Fish and Wildlife Service for management as part of the National Forest or Refuge as appropriate. Details regarding mitigation and conservation measures for wetlands and threatened and endangered species impacted by the proposed project will be presented in a forthcoming mitigation and conservation plan.

LIST OF SHEETS

Sheet No.	Title/Description
1	Project Location
2, 6	Terminal Facilities and Channel Configuration
3, 4, 16, 17	Location of Proposed Access Road and Rail
5	Location of Dredge Disposal Area
7 - 10	Terminal Facilities – Wetland Impacts
11	Wetland and Open Water Channel Impacts
12	Terminal Facility Dredge and Fill Impacts
13 - 15	Road and Rail Wetland Impacts
18 - 25	Wetland Impacts – Road and Rail Key Sheets
26 - 56	Wetland Impacts – Road and Rail Plan View
57 - 60	Wetland Descriptions
61	Impacts to Essential Fish Habitat
62	Wharf Design – Cooper River
63	Cofferdam Detail – Wando River
64	Typical Access Road Section
65	Profile of Road Bridge over Beresford Creek
66	Typical Railroad Section through Wetlands with Vehicle Access Road
67	Typical Railroad Section through Wetlands With 20' Frontage Road
68	Typical Section – Railroad on Trestle over Saltwater Wetlands
69	Plan View – Rail Bridge Crossing at Beresford Creek
70	Elevation View – Rail Bridge Crossing at Beresford Creek
71	Section of Rail Bridge Crossing at Beresford Creek



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY & CHARLESTON STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA
 STATE PORTS AUTHORITY

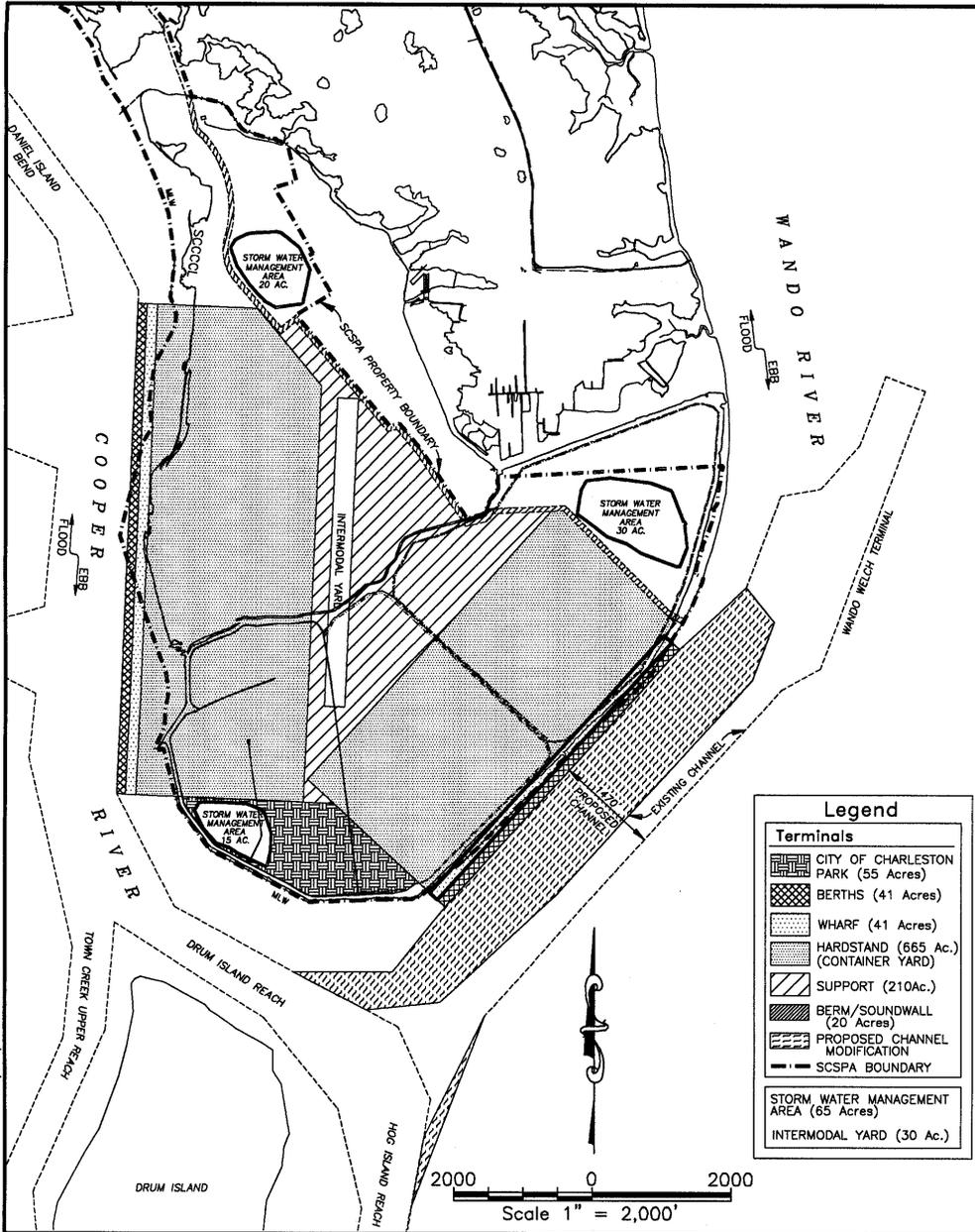
PROJECT LOCATION

SHEET 1 OF 71 DATE: AUG 1999

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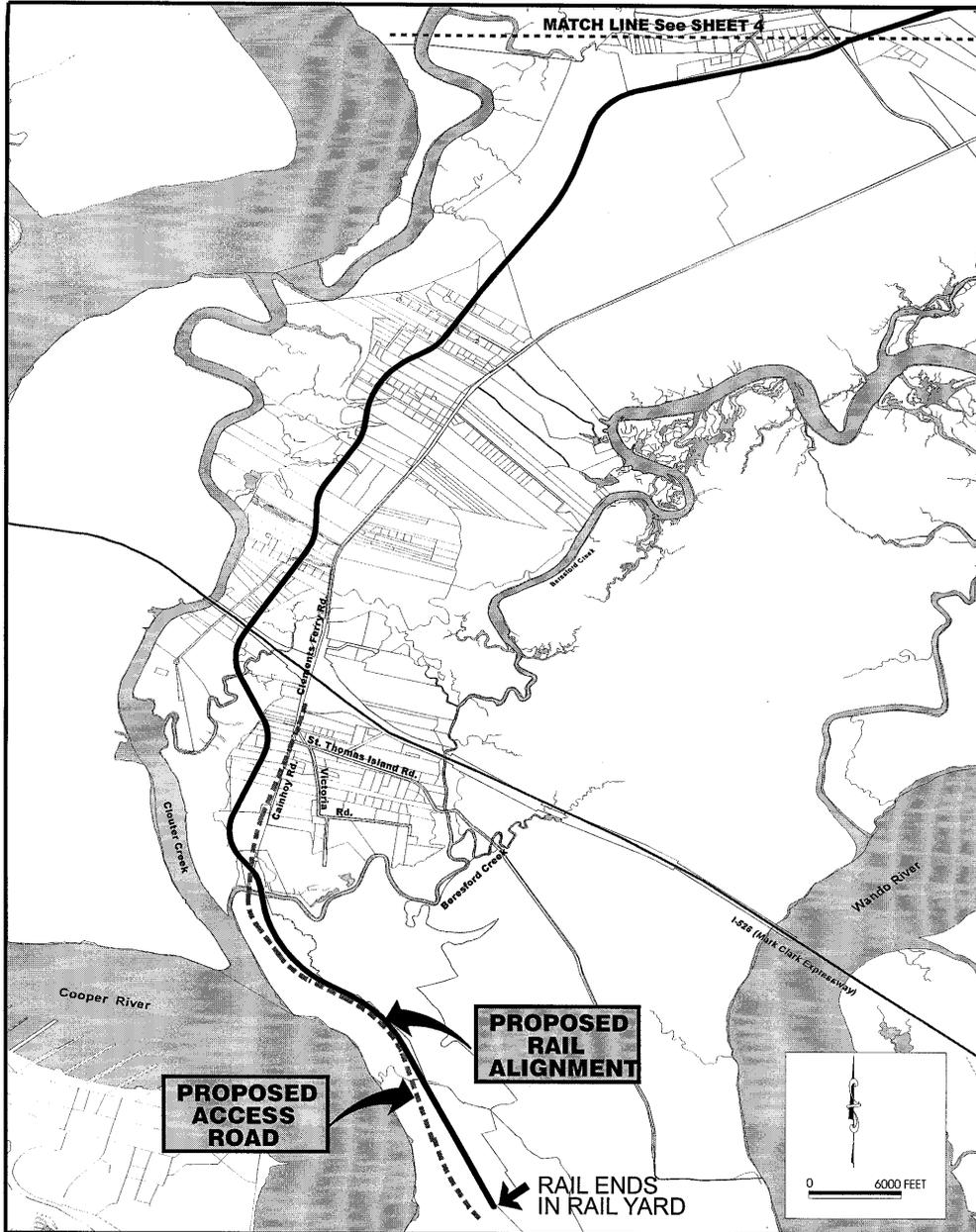
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 COUNTY OF: BERKELEY & CHARLESTON STATE: S.C.
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**TERMINAL FACILITIES &
 CHANNEL CONFIGURATION**

SHEET 2 OF 71 DATE: AUG. 1999

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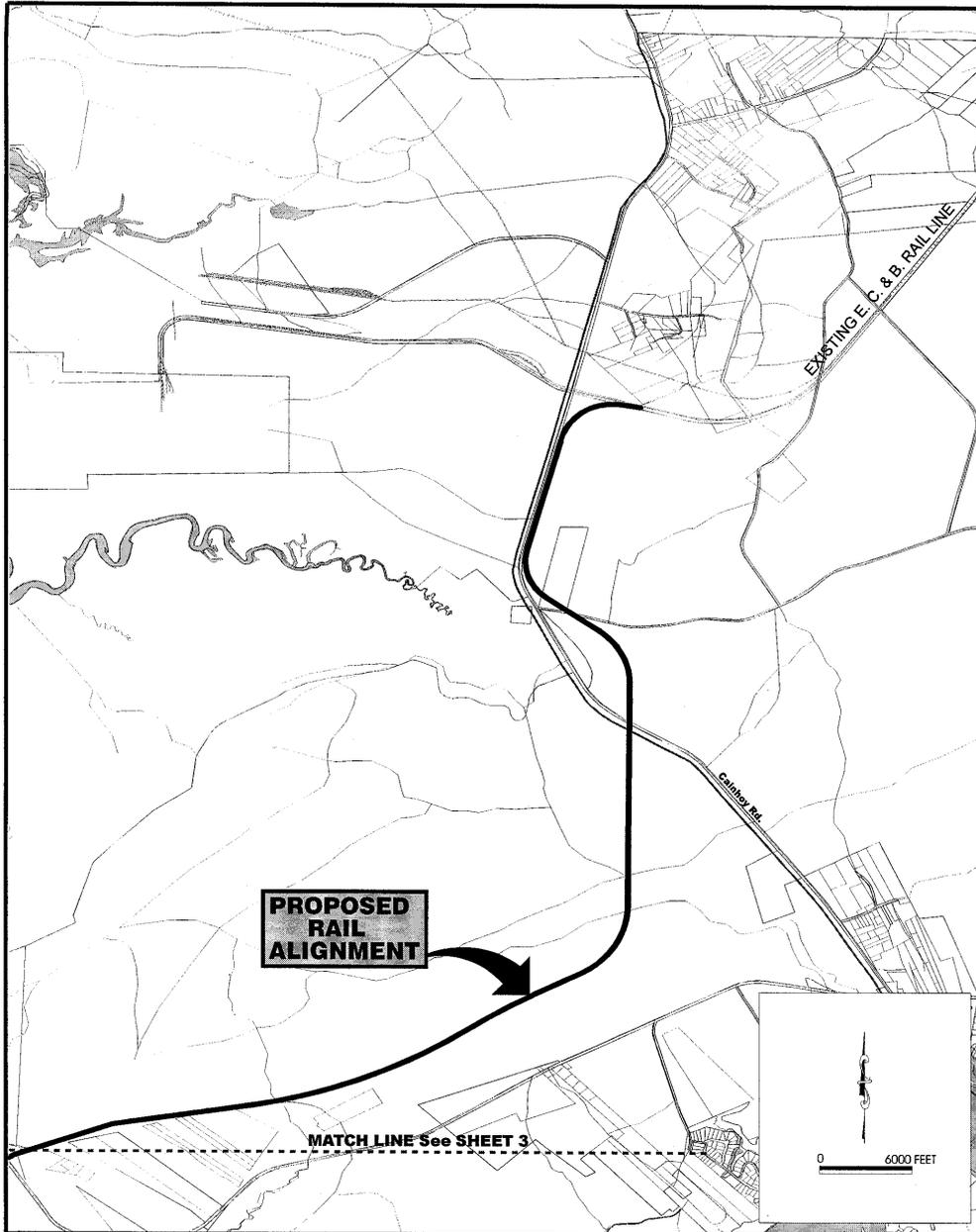
**LOCATION OF PROPOSED
 ACCESS ROAD AND RAIL**

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
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**PROPOSED
RAIL
ALIGNMENT**

MATCH LINE See SHEET 3

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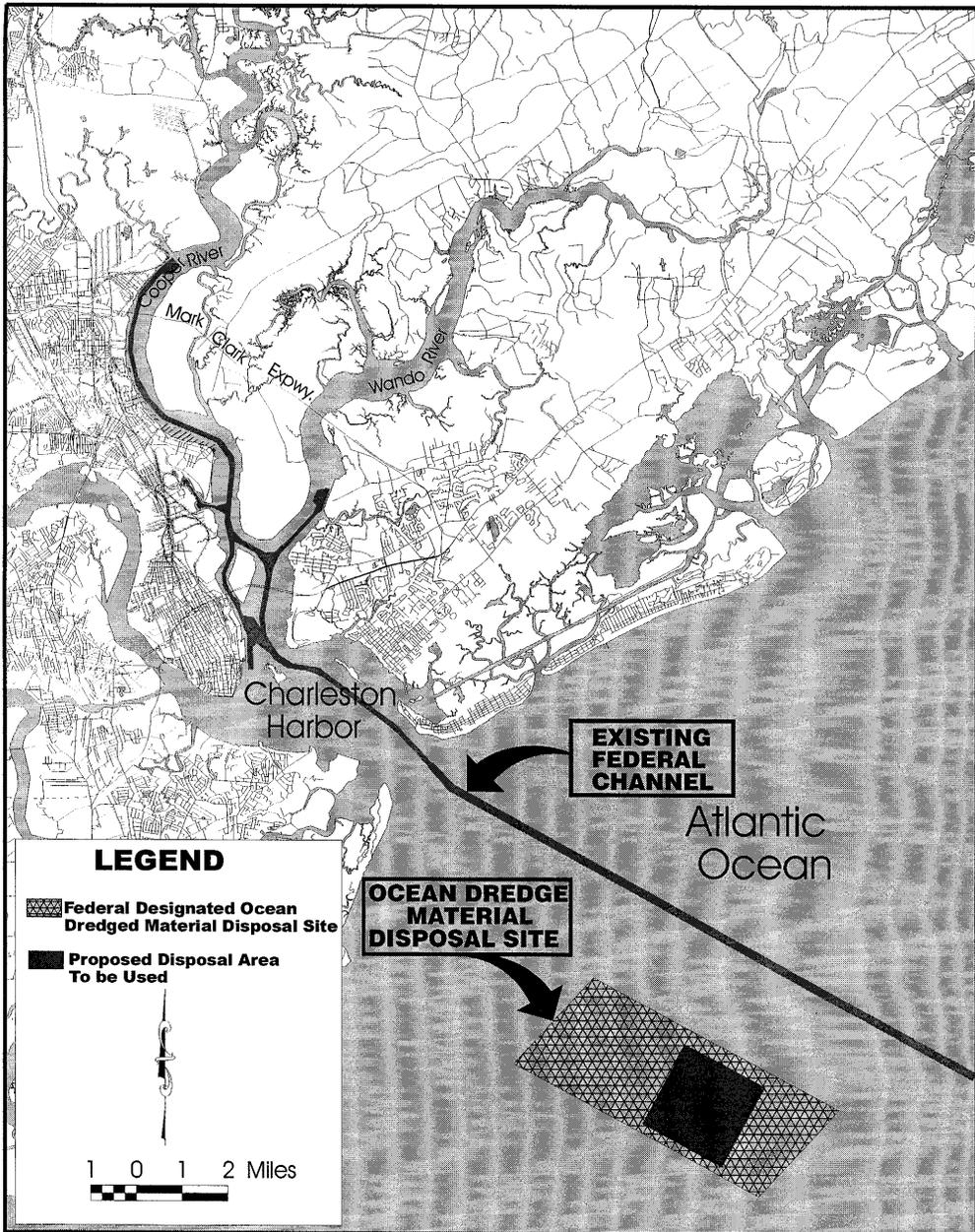
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**LOCATION OF PROPOSED
ACCESS ROAD AND RAIL**

SHEET 4 OF 71 DATE: AUG 1999

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LEGEND

-  Federal Designated Ocean Dredged Material Disposal Site
-  Proposed Disposal Area To be Used


 1 0 1 2 Miles

DATUM: HORIZ: NAD83
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SOURCE: "U.S. ARMY FINAL FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT, CHARLESTON HARBOR", FEB. 1996

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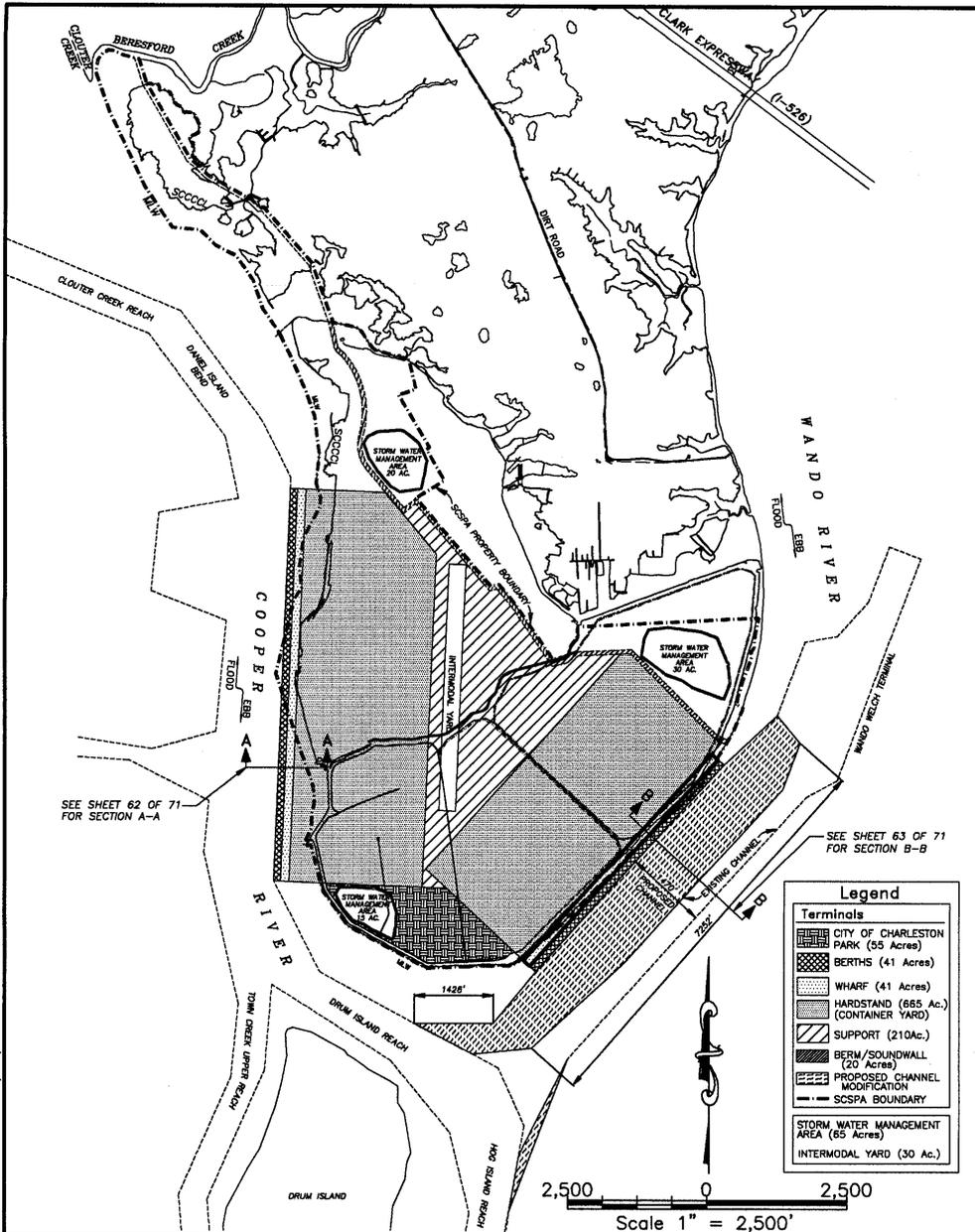
LOCATION OF DREDGE DISPOSAL AREA

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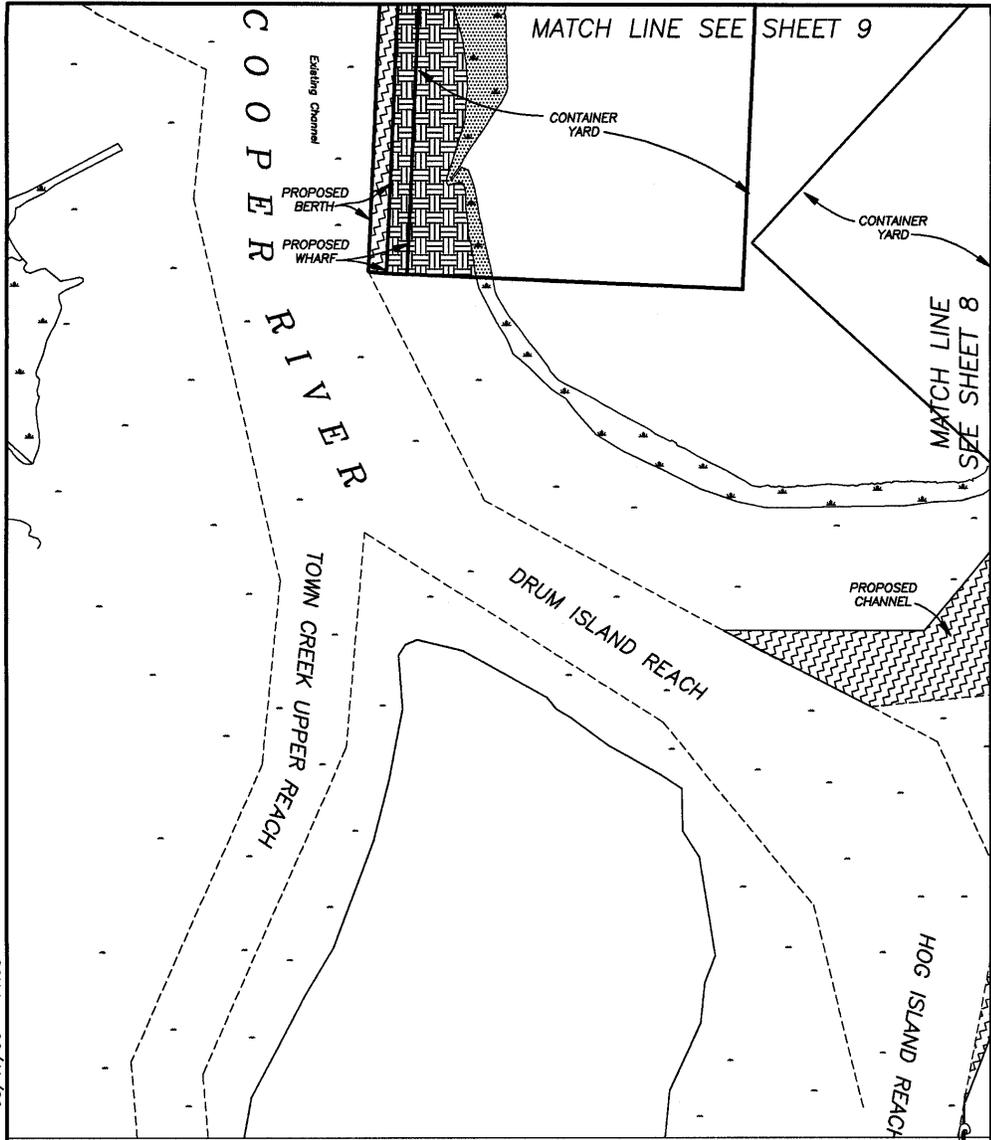
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**TERMINAL FACILITIES &
 CHANNEL CONFIGURATION**

SHEET 6 OF 71 DATE: AUG. 1999

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- Wetlands to be Filled
- Wetlands to be Dredged
- Open Water to be Filled
- Open Water to be Dredged

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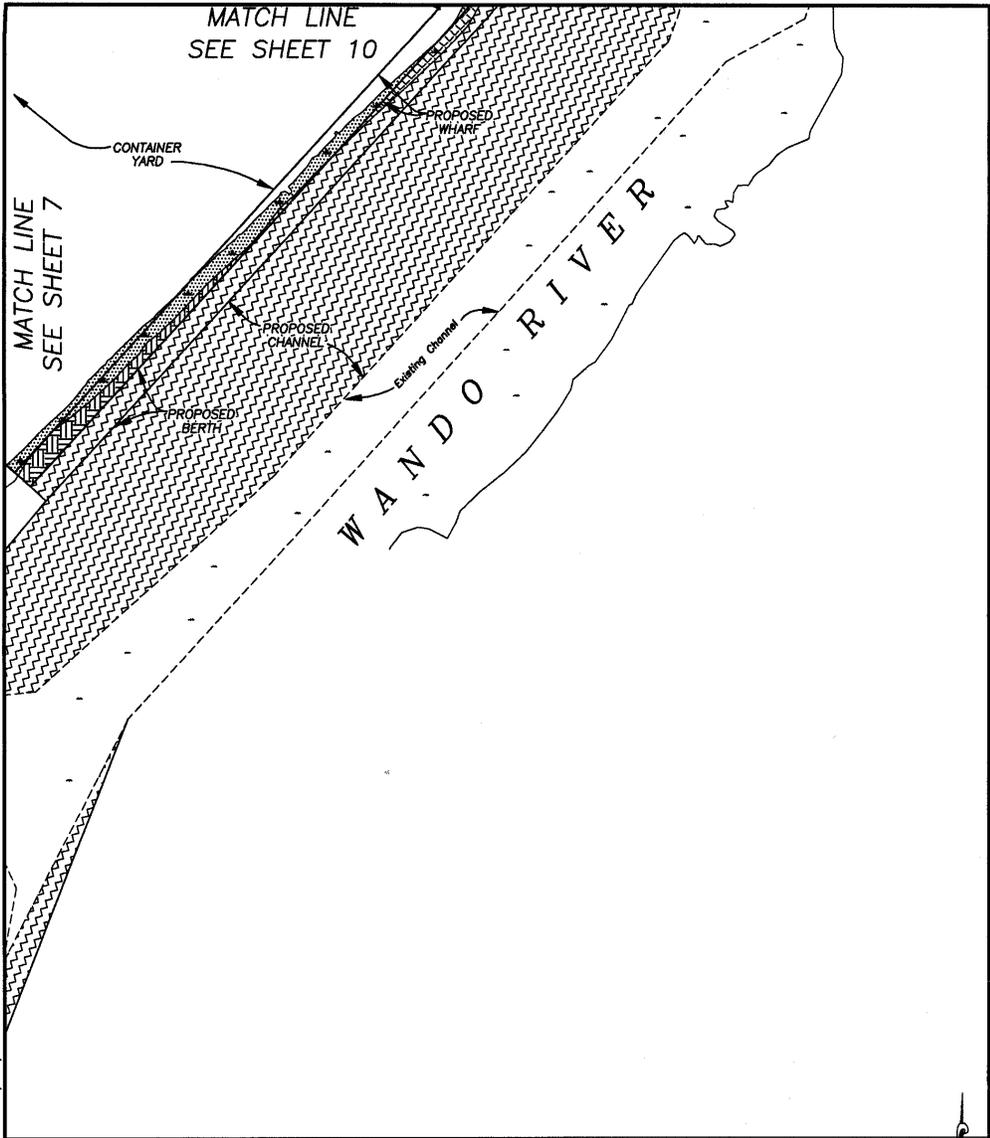
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TERMINAL FACILITIES

SHEET 7 OF 71 DATE: AUG. 1999

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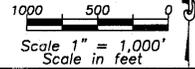
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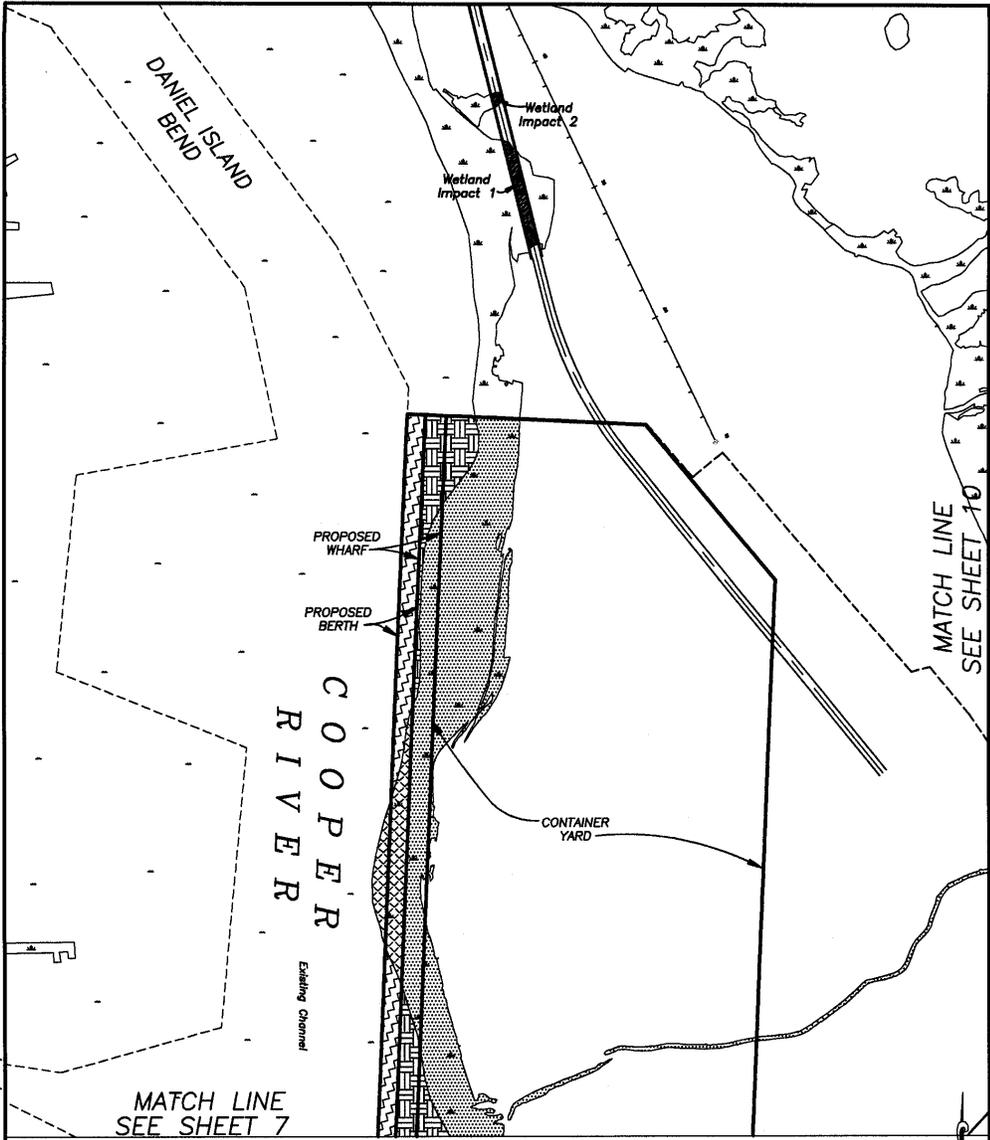
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TERMINAL FACILITIES

SHEET 8 OF 71 DATE: AUG. 1999

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 Wetlands to be Filled	 Wetlands to be Dredged
 Open Water to be Filled	 Open Water to be Dredged

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Scale in feet

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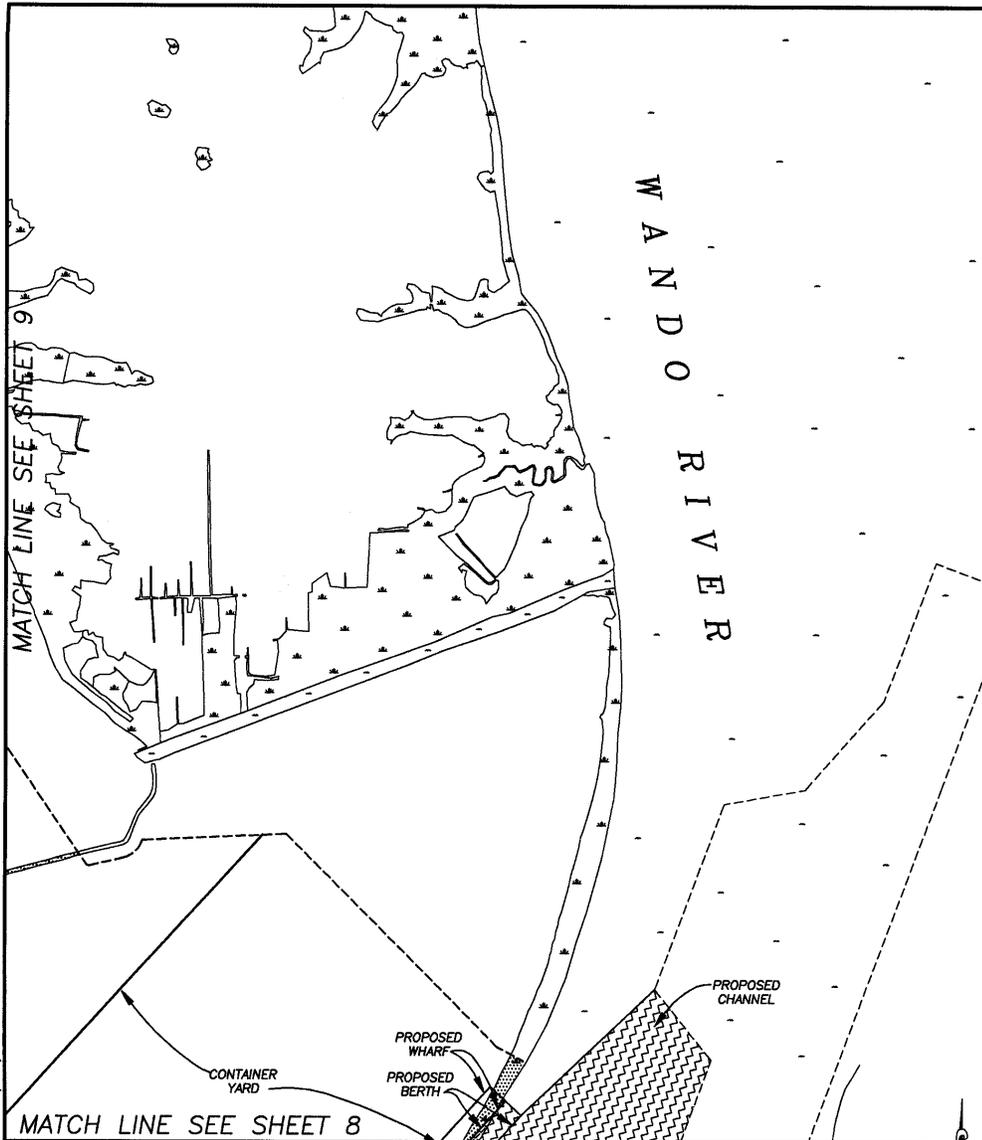
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TERMINAL FACILITIES

SHEET 9 OF 71 DATE: AUG. 1999

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Wetlands to be Filled	Wetlands to be Dredged
Open Water to be Filled	Open Water to be Dredged

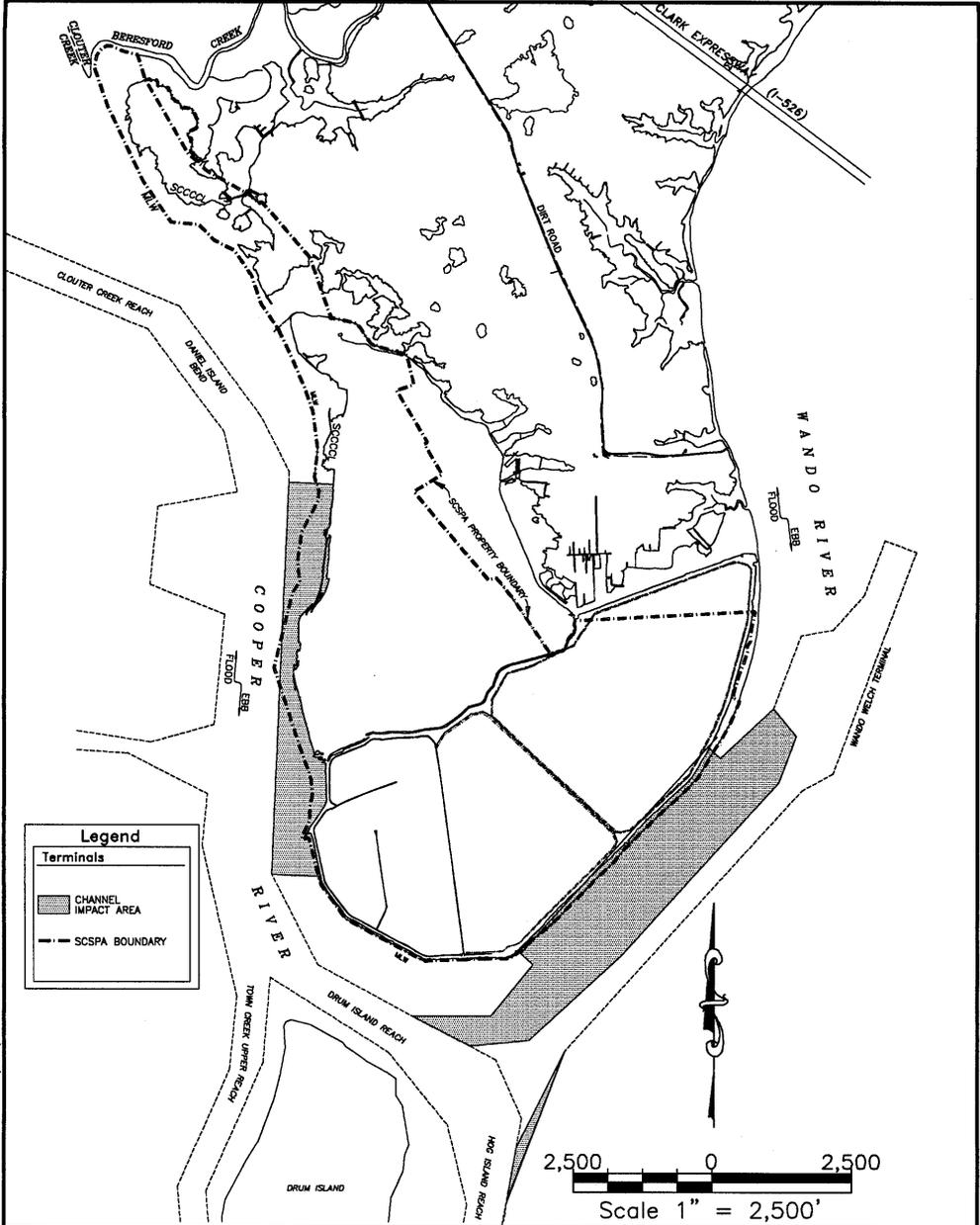
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TERMINAL FACILITIES

SHEET 10 OF 71 DATE: AUG. 1999



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Legend

Terminals

- CHANNEL IMPACT AREA
- SCSPA BOUNDARY

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PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY & CHARLESTON STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

WETLAND AND OPEN WATER CHANNEL IMPACTS

SHEET 11 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

B. DOUGLAS
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Terminal	Impact Zone	Impact Type	Habitat Description	Area (acres)
Cooper River Side	Berth	Dredge	Cordgrass/Needlerush marsh	6.1
	Berth	Dredge	Open Water	16.2
	Total for Zone:			22.3
	Wharf	Fill	Cordgrass/Needlerush marsh	10.9
	Wharf	Partial Fill	Open Water	13.0
	Total for Zone:			23.9
	Container Yard	Fill	Cordgrass/Needlerush marsh	38.8
	Container Yard	Fill	Open Water	20.8
	Total for Zone:			59.6
	Wando River Side	Berth	Dredge	Cordgrass/Needlerush marsh
Berth		Dredge	Open Water	15.3
Total for Zone:			17.2	
Wharf		Fill	Cordgrass/Needlerush marsh	6.9
Wharf		Partial Fill	Open Water	4.5
Total for Zone:			11.4	
Container Yard		Fill	Cordgrass/Needlerush marsh	2.3
Container Yard		Fill	Open Water	0.1
Total for Zone:			2.4	
Cooper/Wando River Combined	Berth	Dredge	Cordgrass/Needlerush marsh	8.0
	Berth	Dredge	Open Water	31.6
	Total for Zone:			39.6
	Wharf	Fill	Cordgrass/Needlerush marsh	17.8
	Wharf	Partial Fill	Open Water	17.5
	Total for Zone:			35.3
	Container Yard	Fill	Cordgrass/Needlerush marsh	41.1
	Container Yard	Fill	Open Water	20.9
Total for Zone:			62.0	

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
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 AT: DANIEL ISLAND/CAINHOY PENINSULA
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 APPLICATION BY: SOUTH CAROLINA
 STATE PORTS AUTHORITY

**TERMINAL FACILITY
DREDGE & FILL IMPACTS**

SHEET 12 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

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Wetland Impact ID	Wetland Type	Impact Source	Impact Type	Impact Size (acres)	Total Wetland Size (acres)	% Area Impacted
1	cordgrass/needlerush marsh	road	trestle	1.4	N/A	N/A
2	cordgrass/needlerush marsh	road	trestle	0.2	N/A	N/A
3	cordgrass/needlerush marsh	rail	trestle	0.3	N/A	N/A
4	cordgrass/needlerush marsh	road	trestle	1.8	N/A	N/A
5	cordgrass/needlerush marsh	road	trestle	0.1	N/A	N/A
6	cordgrass/needlerush marsh	road	trestle	0.0	N/A	N/A
7	cordgrass/needlerush marsh	road	trestle	0.2	N/A	N/A
8	cordgrass/needlerush marsh	rail	trestle	0.0	N/A	N/A
9	cordgrass/needlerush marsh	road	trestle	0.4	N/A	N/A
10	cordgrass/needlerush marsh	rail	trestle	0.1	N/A	N/A
11	cordgrass/needlerush marsh	road	trestle	0.1	N/A	N/A
12	cordgrass/needlerush marsh	rail	trestle	0.2	N/A	N/A
13	cordgrass/needlerush marsh	road	trestle	1.8	N/A	N/A
14	cordgrass/needlerush marsh	rail	trestle	0.2	N/A	N/A
15	open water	road	bridge	0.2	N/A	N/A
16	open water	rail	bridge	0.0	N/A	N/A
17	cordgrass/needlerush marsh	rail	trestle	0.1	N/A	N/A
18	cordgrass/needlerush marsh	road	trestle	1.4	N/A	N/A
19	cordgrass/needlerush marsh	rail	trestle	0.0	N/A	N/A
20	cordgrass/needlerush marsh	rail	trestle	0.5	N/A	N/A
21	cordgrass/needlerush marsh	road	trestle	0.0	N/A	N/A
22	cordgrass/needlerush marsh	road	trestle	0.1	N/A	N/A
23	cordgrass/needlerush marsh	rail	trestle	0.4	N/A	N/A
24	open water	rail	trestle	0.0	N/A	N/A
25	cordgrass/needlerush marsh	rail	trestle	0.4	N/A	N/A
26	open water	rail	trestle	0.0	N/A	N/A
27	cordgrass/needlerush marsh	rail	trestle	0.1	N/A	N/A
28	forested maritime wetland	rail	trestle	0.1	1.9	5
29	cordgrass/needlerush marsh	rail	trestle	0.0	N/A	N/A
30	cordgrass/needlerush marsh	rail	trestle	0.1	N/A	N/A
31	cordgrass/needlerush marsh	rail	trestle	0.1	N/A	N/A
32	forested ravine	rail	fill	0.1	0.1	100
33	forested hardwood bottom	rail	fill	0.6	3.6	17
34	forested hardwood bottom	rail	fill	0.1	3.6	3
35	forested hardwood bottom	rail	fill	0.3	3.9	8
36	forested hardwood bottom	rail	fill	0.0	3.9	0
37	forested hardwood bottom	rail	fill	0.0	3.9	0
38	forested ravine	rail	fill	1.1	7	16
39	forested hardwood bottom	rail	fill	0.3	28.1	1
40	forested hardwood bottom	rail	fill	0.0	28.1	0
41	forested seepage slope	rail	fill	0.0	9	0
42	forested seepage slope	rail	fill	0.4	9	4
43	forested seepage slope	rail	fill	0.9	9	10
44	forested seepage slope	rail	fill	0.4	9	4

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
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 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD & RAIL
 WETLAND IMPACTS**

SHEET 13 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

Wetland Impact ID	Wetland Type	Impact Source	Impact Type	Impact Size (acres)	Total Wetland Size (acres)	% Area Impacted
45	shrub wetland	rail	fill	0.0	3.1	1
46	shrub wetland	rail	fill	0.5	3.1	16
47	shrub wetland	rail	fill	0.5	1.1	45
48	swamp gum/shrub wetland	rail	fill	2.8	21.5	13
49	mixed woodland/shrub wetland	rail	fill	2.5	181.7	1
50	shrub wetland	rail	fill	0.3	1.4	21
51	mixed woodland/shrub wetland	rail	fill	1.4	181.7	1
52	pond pine woodland/shrub wetland	rail	fill	0.1	0.1	100
53	forested hardwood stream wetland	rail	fill	0.2	47.6	0
54	forested hardwood stream wetland	rail	fill	0.4	47.6	1
55	forested hardwood stream wetland	rail	fill	0.3	47.6	1
56	forested hardwood stream wetland	rail	fill	0.2	47.6	0
57	swamp gum/shrub wetland	rail	fill	0.1	154.9	0
58	stream swamp forest	rail	fill	1.1	16.8	7
59	mixed woodland/shrub wetland	rail	fill	0.5	85.4	1
60	mixed woodland/shrub wetland	rail	fill	0.7	85.4	1
61	longleaf pine woodland/shrub wetland	rail	fill	0.6	4.2	14
62	forested hardwood stream wetland	rail	fill	0.2	52.2	0
63	forested hardwood stream wetland	rail	fill	0.5	52.2	1
64	forested hardwood stream wetland	rail	fill	0.2	52.2	0
65	forested hardwood stream wetland	rail	fill	0.2	52.2	0
66	forested hardwood stream wetland	rail	fill	0.5	52.2	1
67	forested hardwood stream wetland	rail	fill	1.4	72.6	2
68	herbaceous wetland	rail	fill	0.4	1.7	24
69	swamp gum/shrub wetland	rail	fill	0.0	49.3	0
70	swamp gum/shrub wetland	rail	fill	0.0	49.3	0
71	swamp gum/shrub wetland	rail	fill	0.4	49.3	1
72	swamp gum/shrub wetland	rail	fill	0.4	1.9	21

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DATUM: HORIZ: NAD83
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 STATE PORTS AUTHORITY

**ROAD & RAIL
WETLAND IMPACTS**

SHEET 14 OF 71 DATE: AUG. 1999

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Wetland Type	Impact Type	Impact Size (acres)
Estuarine Wetlands		
Cordgrass/needlerush marsh	Rail Trestle	2.4
Cordgrass/needlerush marsh	Road Bridge	7.5
Total Estuarine Wetlands		9.9
Freshwater Wetlands		
Forested maritime wetland	Rail Trestle	<0.1
Forested hardwood stream wetland	Rail Fill	4.1
Forested ravine	Rail Fill	1.1
Forested seepage slope	Rail Fill	1.7
Forested hardwood bottom	Rail Fill	1.2
Stream swamp forest	Rail Fill	1.1
Longleaf pine woodland/shrub wetland	Rail Fill	0.6
Pond pine woodland/shrub wetland	Rail Fill	<0.1
Swamp gum/shrub wetland	Rail Fill	3.7
Mixed woodland/shrub wetland	Rail Fill	5.1
Herbaceous wetland	Rail Fill	0.4
Shrub wetland	Rail Fill	1.3
Total Freshwater Wetlands		20.5
Open water	Rail Bridge	0.1
Open water	Road Bridge	0.2
Total Open Water		0.3

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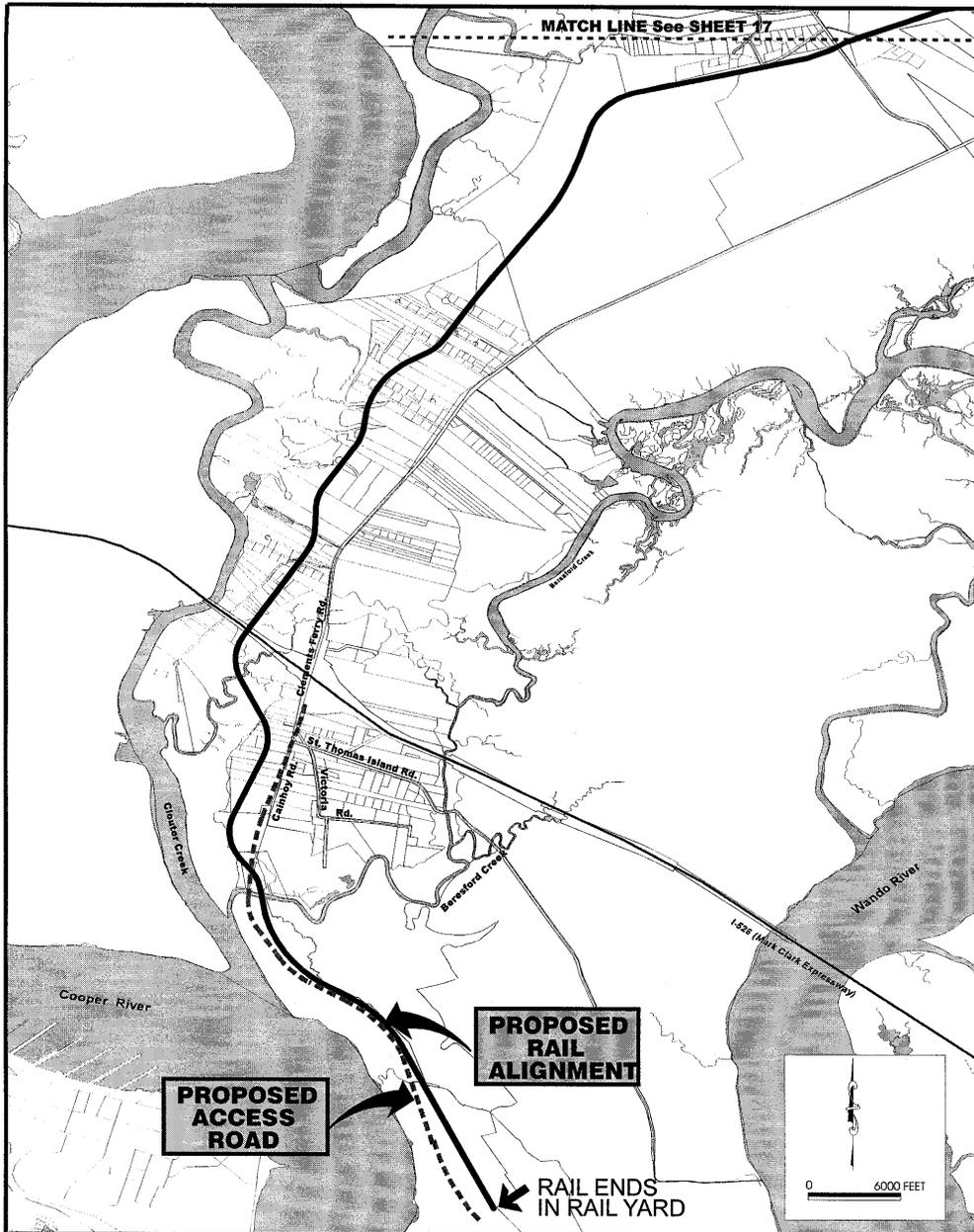
PROPOSED: DANIEL ISLAND TERMINAL
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**ROAD & RAIL
 WETLAND IMPACTS SUMMARY**

SHEET 15 OF 71 DATE: AUG. 1999

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DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

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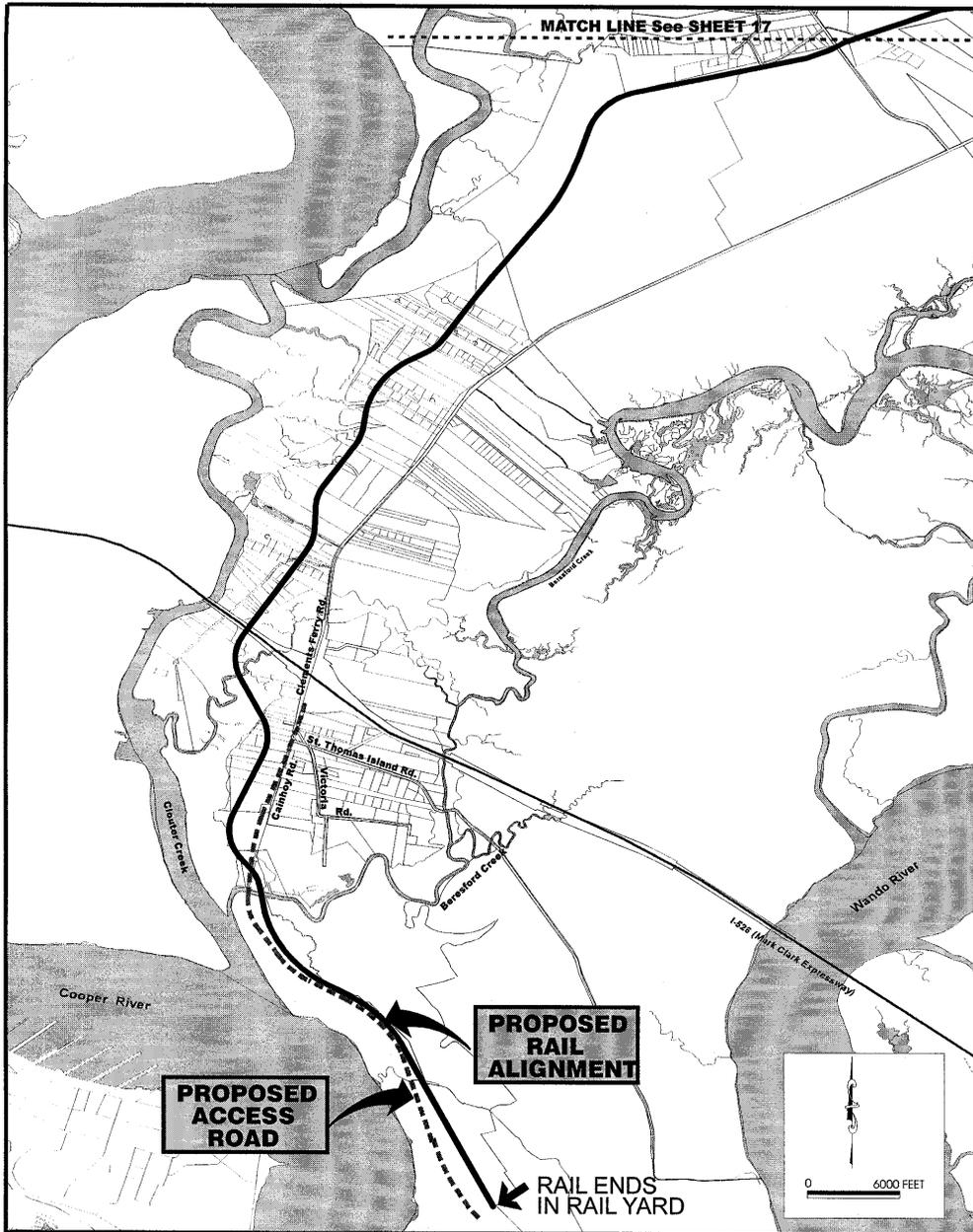
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 ACCESS ROAD AND RAIL**

SHEET 16 OF 71 DATE: AUG 1999

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DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

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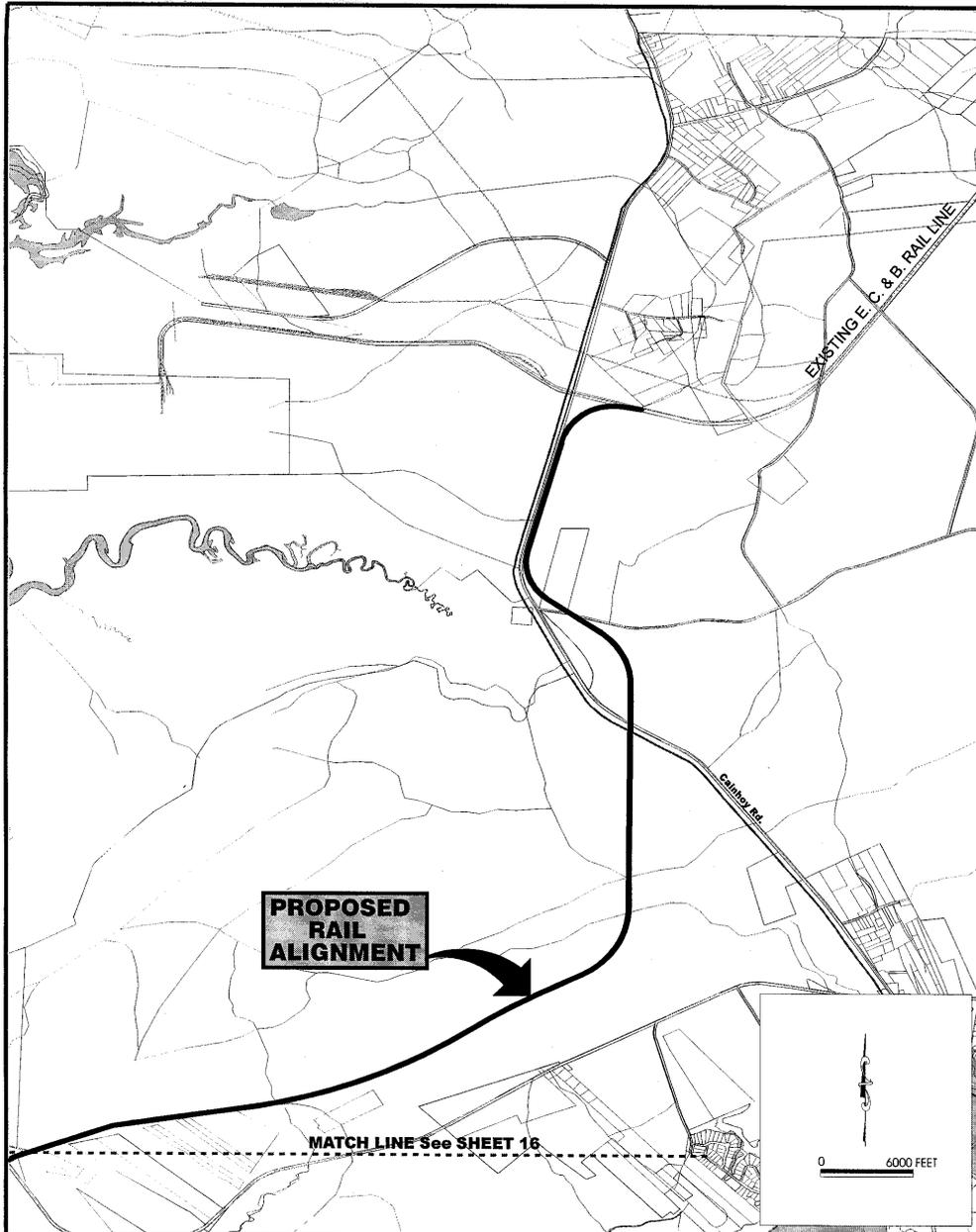
**LOCATION OF PROPOSED
 ACCESS ROAD AND RAIL**

SHEET 16 OF 71 DATE: AUG 1999

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DATUM: HORIZ: NAD83
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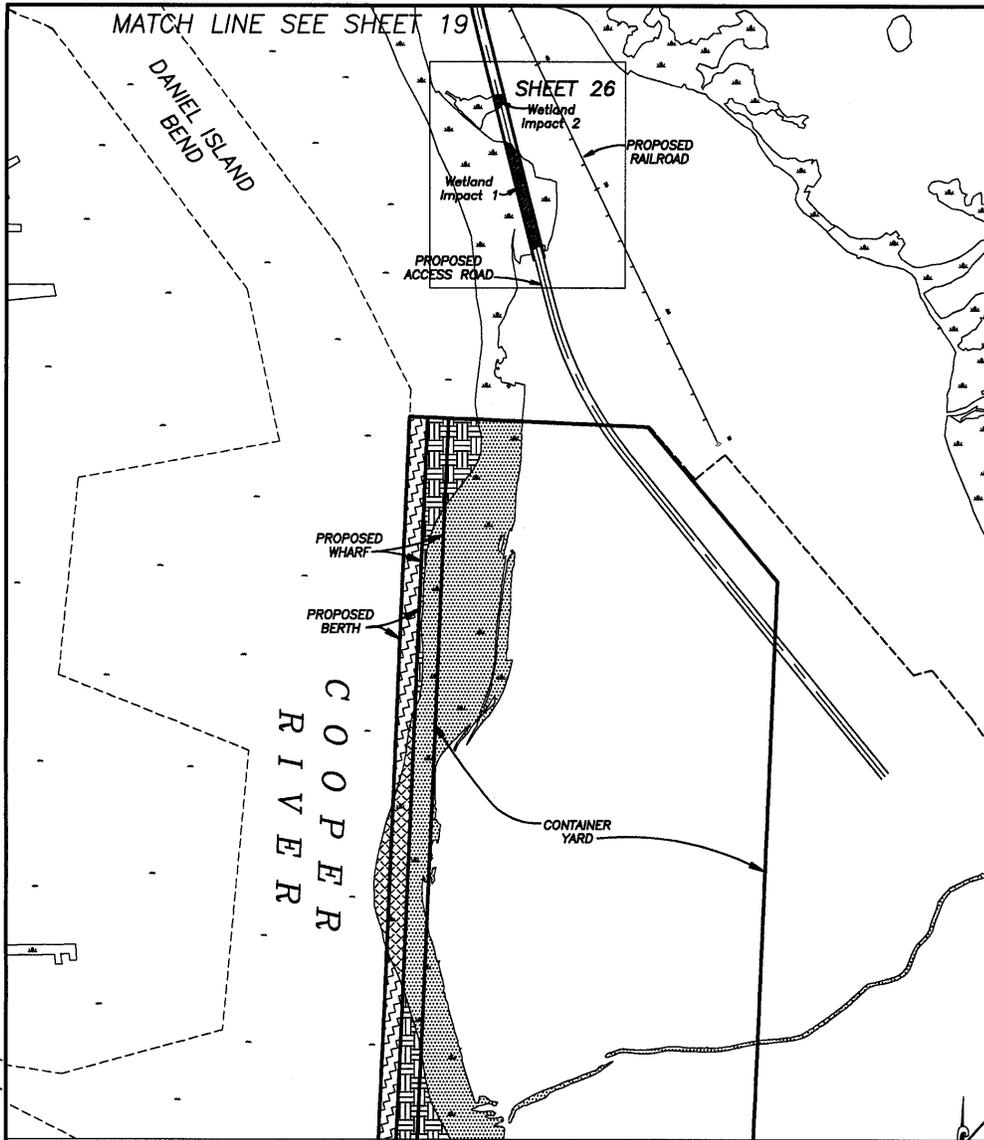
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 STATE PORTS AUTHORITY

**LOCATION OF PROPOSED
ACCESS ROAD AND RAIL**

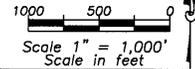
SHEET 17 OF 71 DATE: AUG 1999

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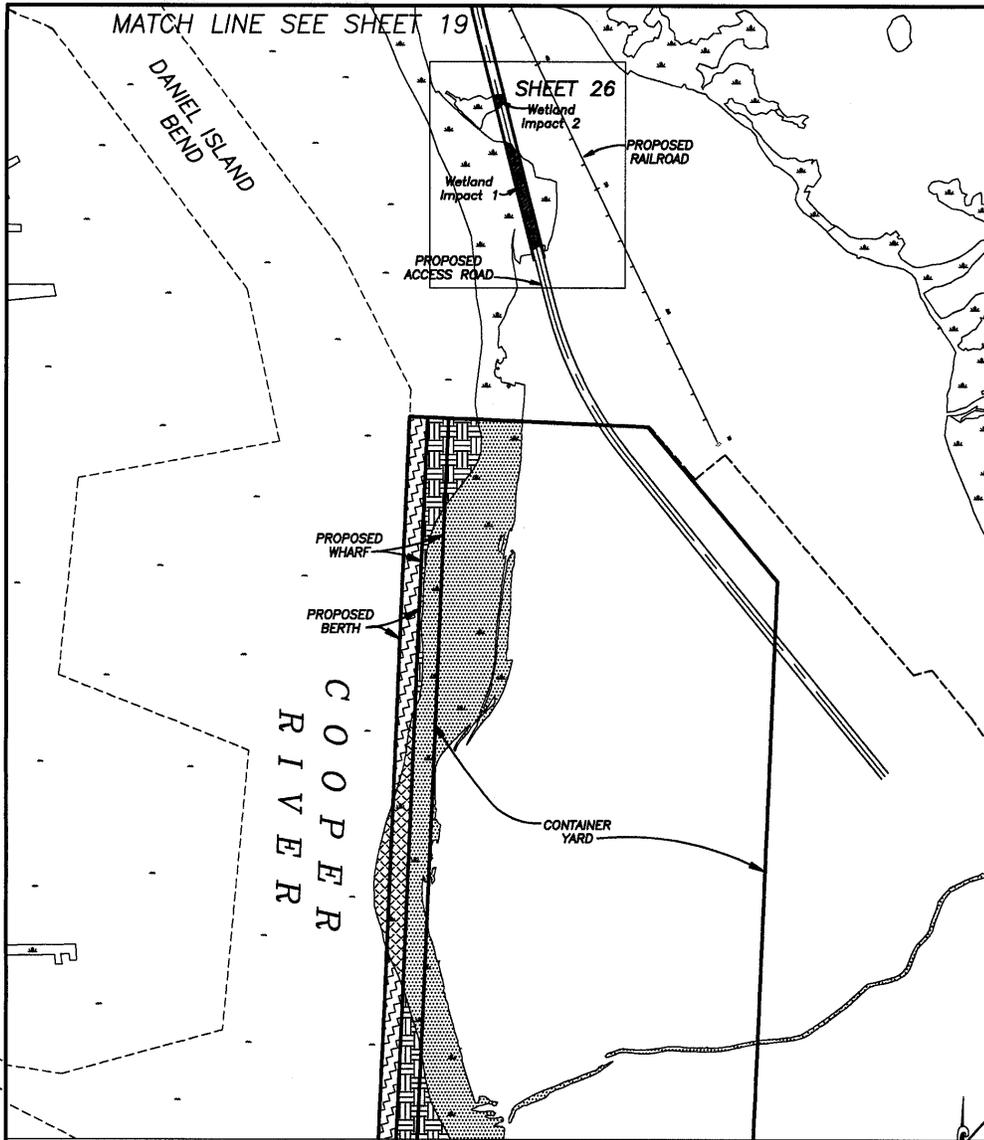
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**ROAD AND RAIL
 KEY SHEET**

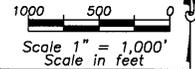
SHEET 18 OF 71 DATE: AUG. 1999

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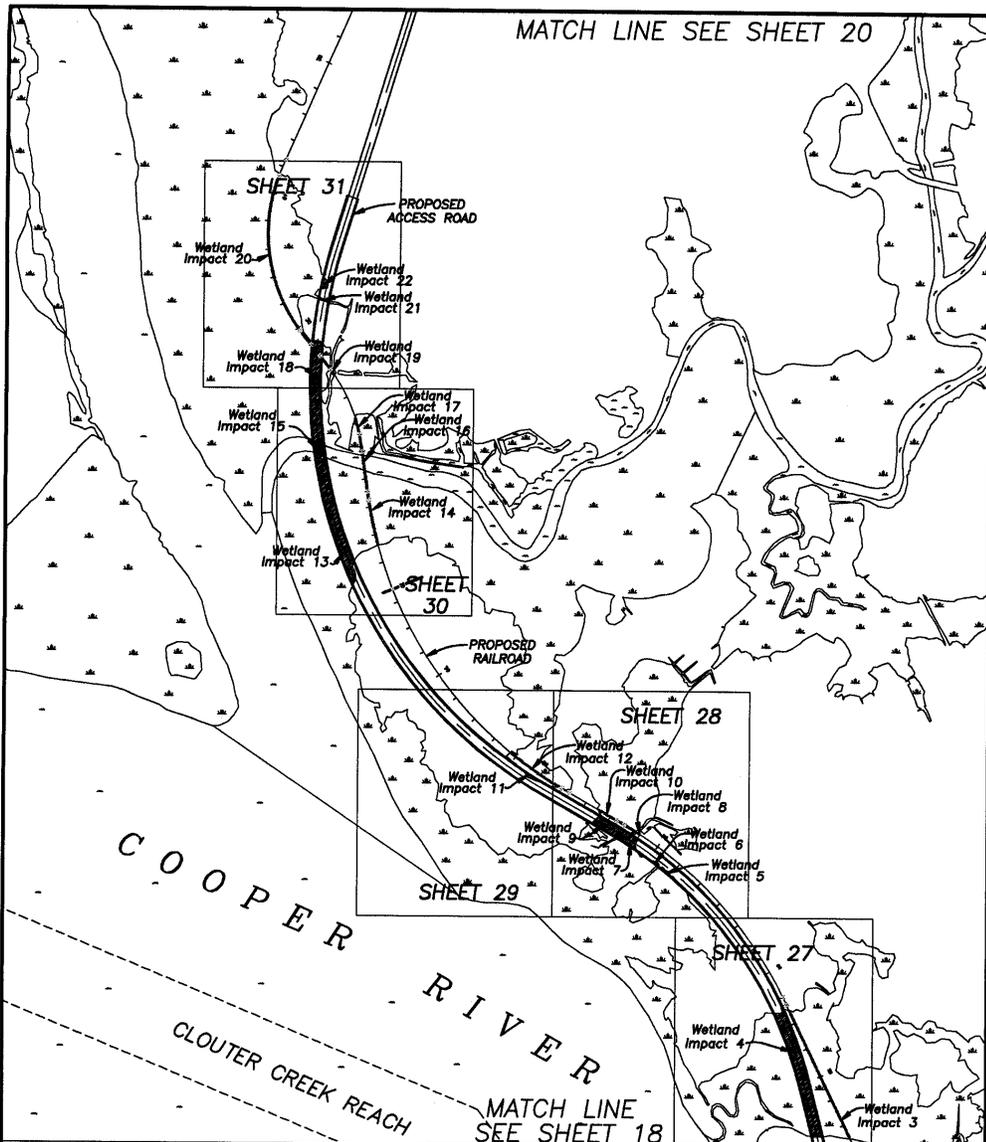
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**ROAD AND RAIL
 KEY SHEET**

SHEET 18 OF 71 DATE: AUG. 1999

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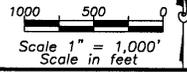
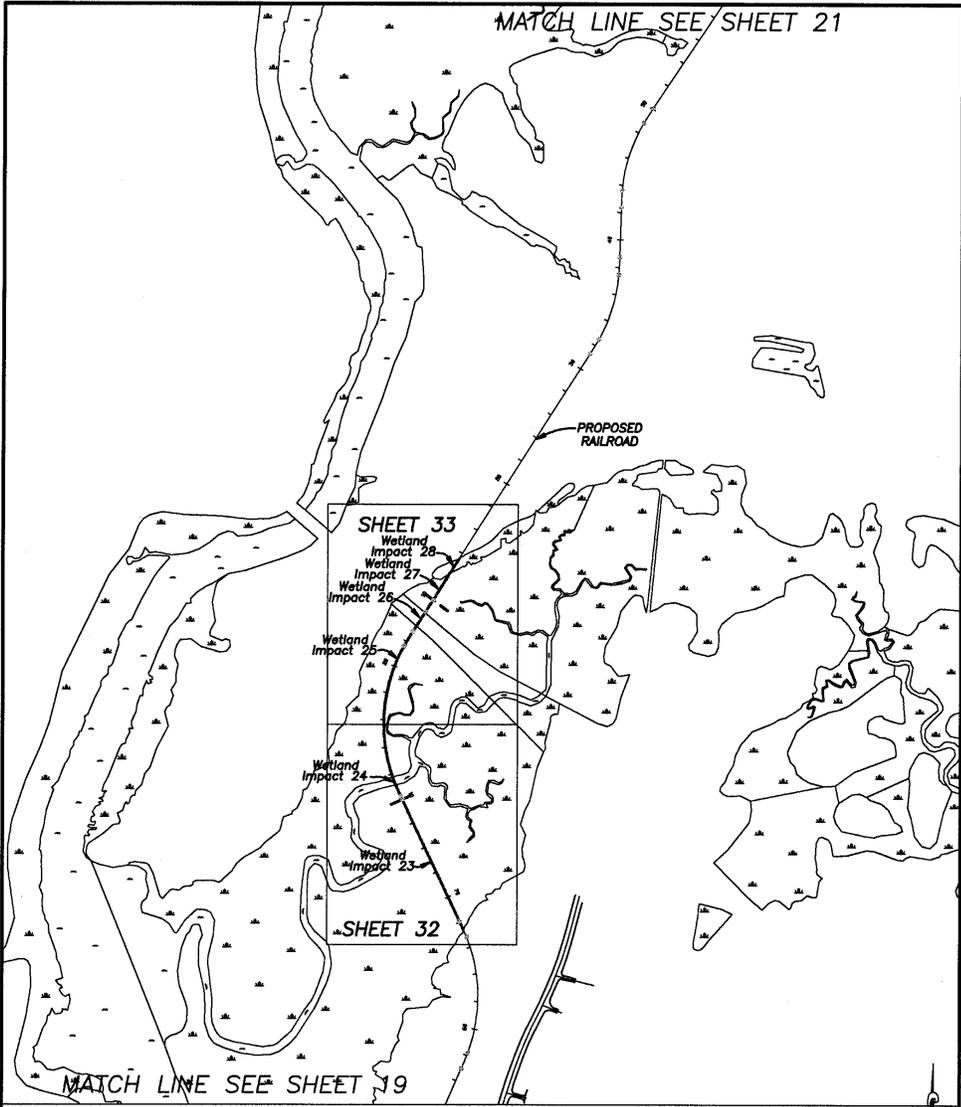
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**ROAD AND RAIL
 KEY SHEET**

SHEET 19 OF 71 DATE: AUG. 1999

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DATUM: HORIZ: NAD83
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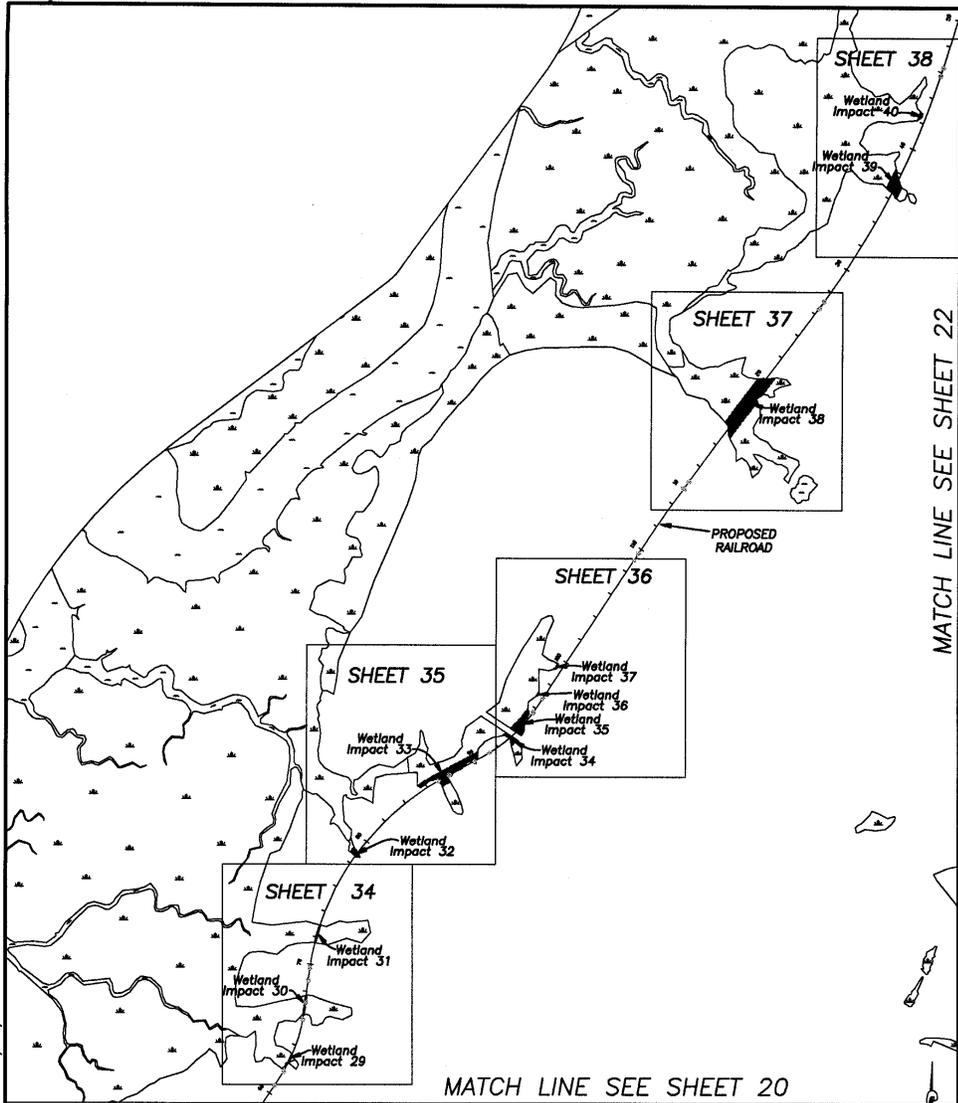
PROPOSED: DANIEL ISLAND TERMINAL
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**ROAD AND RAIL
 KEY SHEET**

SHEET 20 OF 71 DATE: AUG. 1999

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DATUM: HORIZ: NAD83
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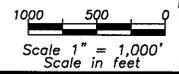
PROPOSED: DANIEL ISLAND TERMINAL
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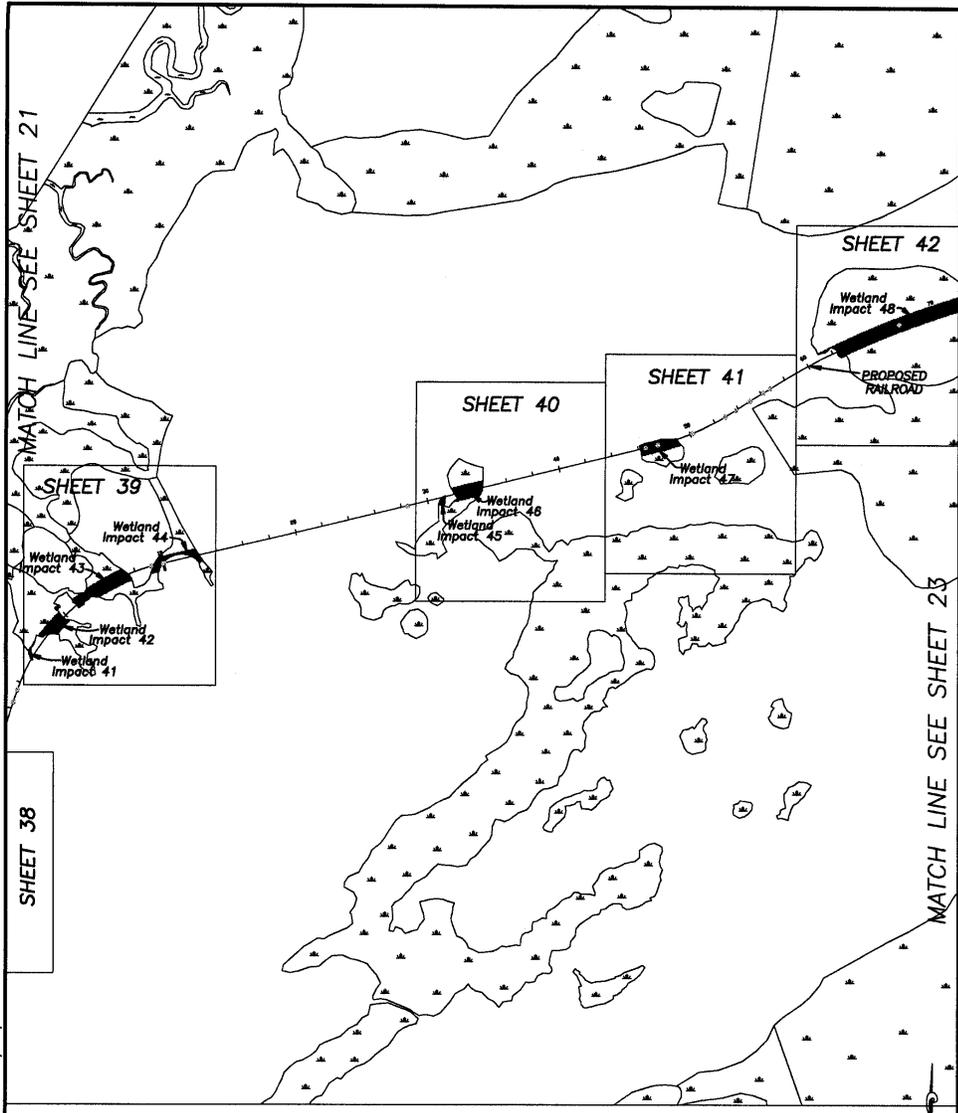
**ROAD AND RAIL
KEY SHEET**

SHEET 21 OF 71 DATE: AUG. 1999

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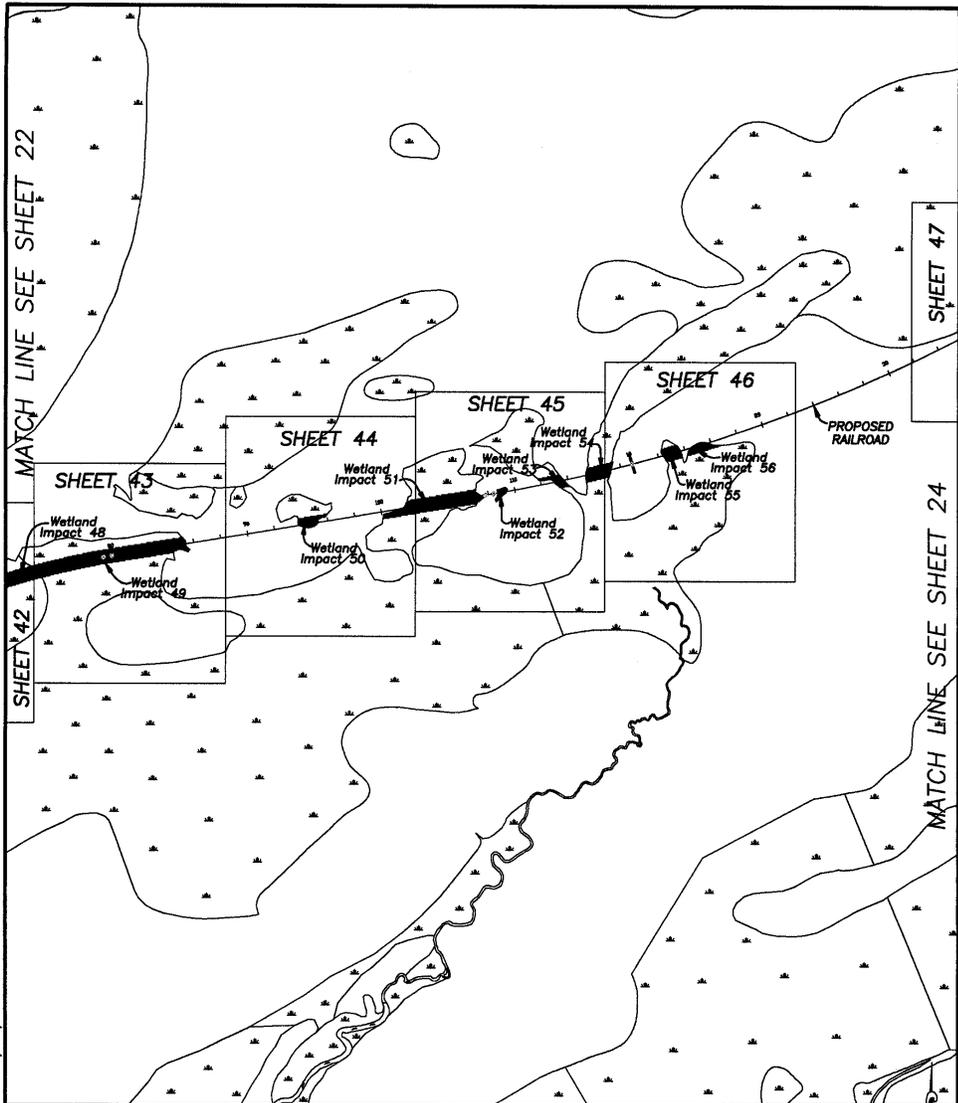
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KEY SHEET**

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APPLICATION BY: SOUTH CAROLINA STATE
PORTS AUTHORITY

SHEET 22 OF 71 DATE: AUG. 1999

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DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

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 PORTS AUTHORITY

**ROAD AND RAIL
 KEY SHEET**

SHEET 23 OF 71 DATE: AUG. 1999

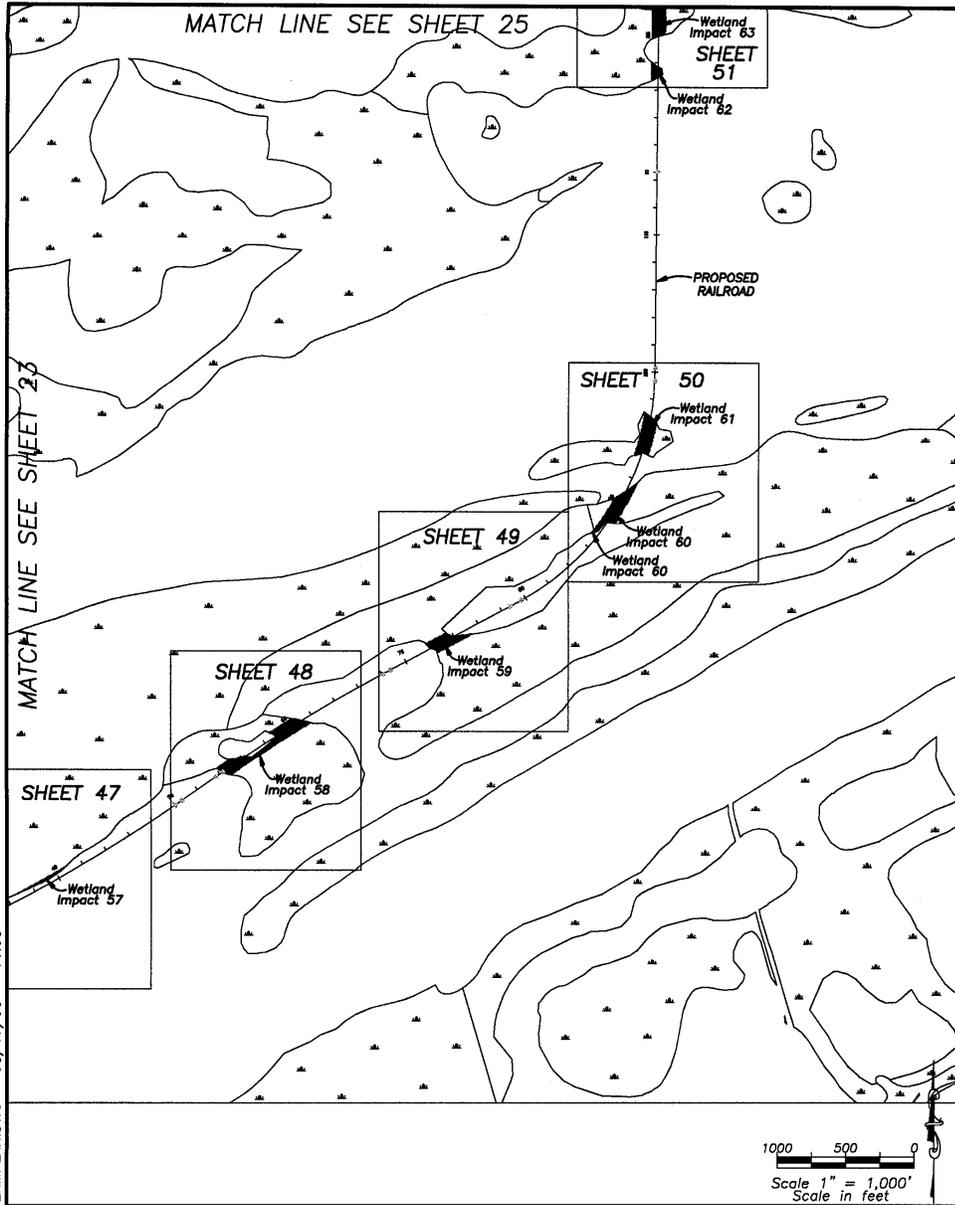
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DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

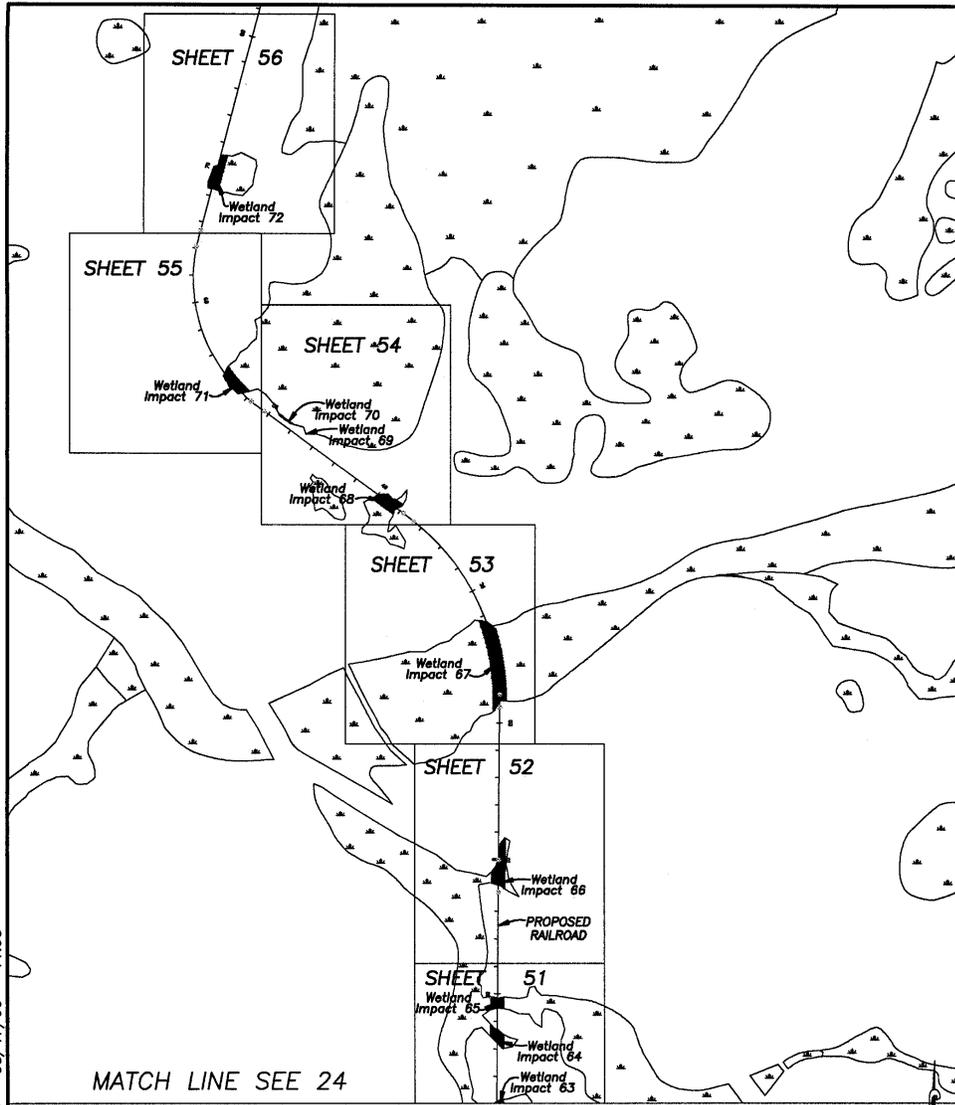
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**ROAD AND RAIL
 KEY SHEET**

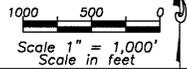
SHEET 24 OF 71 DATE: AUG. 1999

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DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

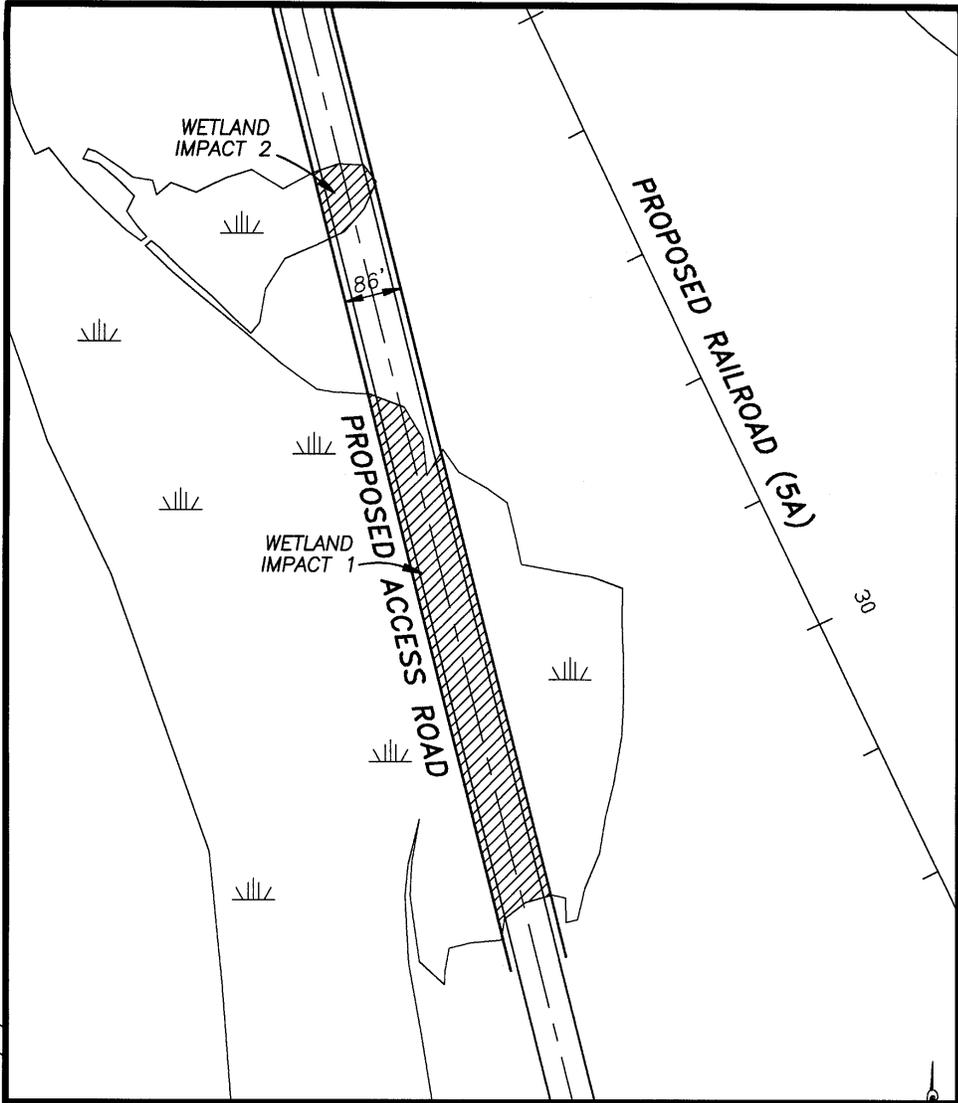
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**ROAD AND RAIL
 KEY SHEET**

SHEET 25 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

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LEGEND

 Wetlands to be Bridged (Road)

200 100 0
 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

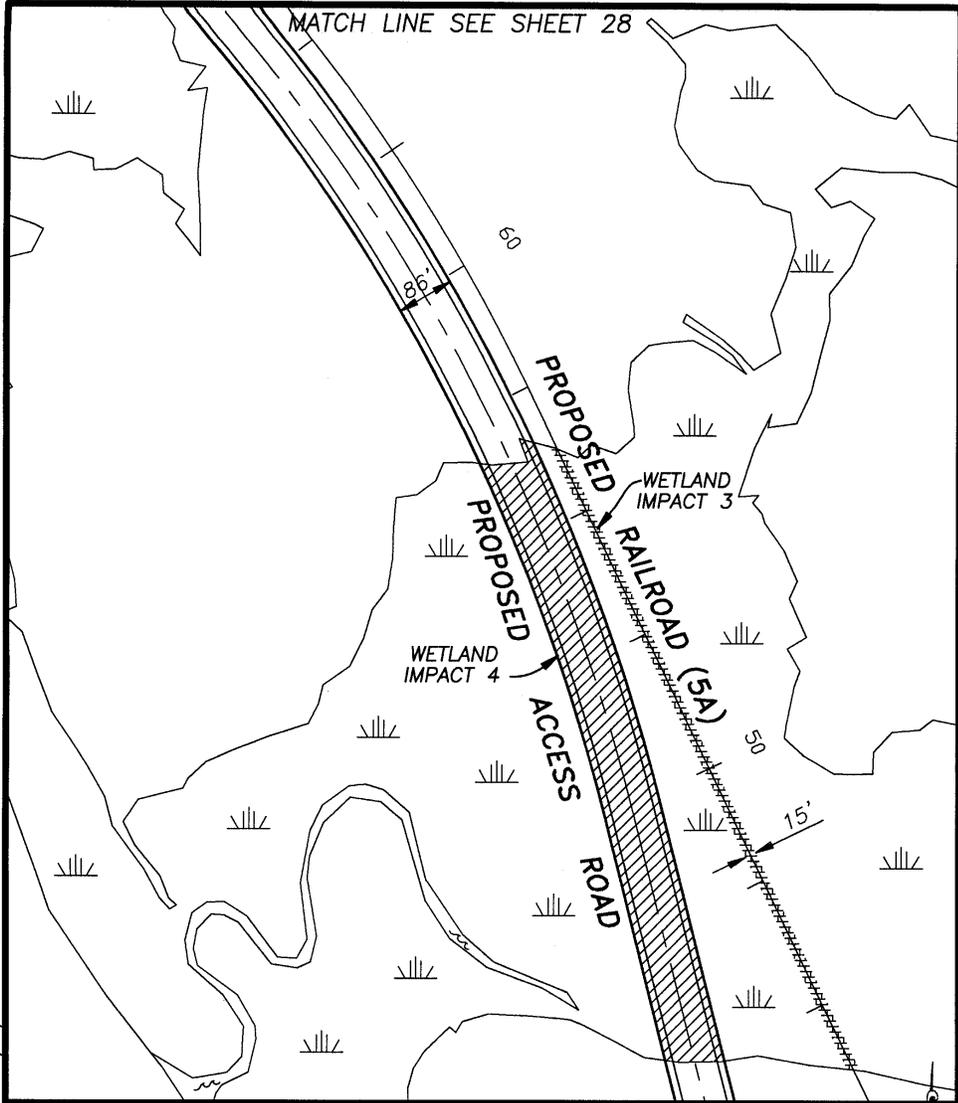
PROPOSED: DANIEL ISLAND TERMINAL
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 APPLICATION BY: SOUTH CAROLINA STATE
 PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 26 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

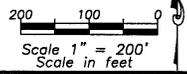
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LEGEND

- Wetlands to be Bridged (Road)
- Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

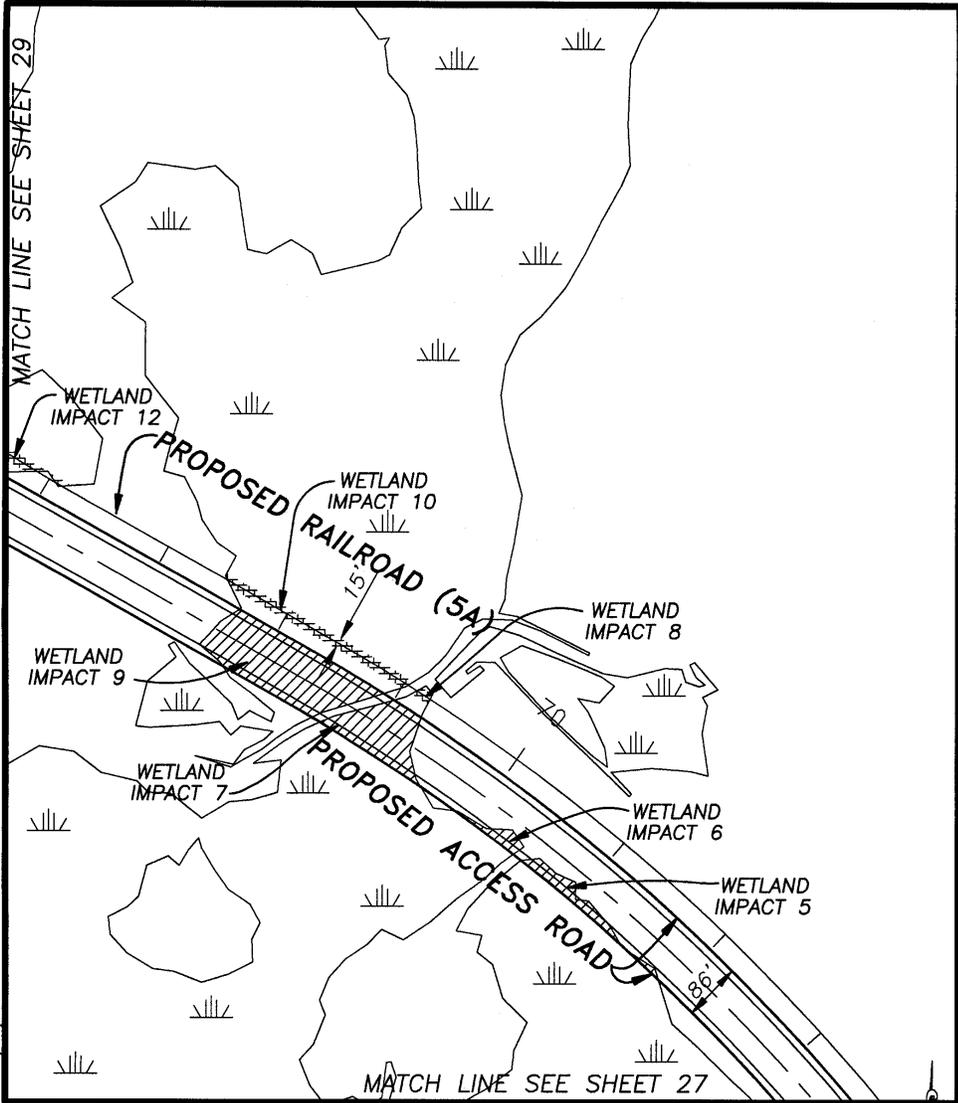
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**ROAD AND RAIL
 PLAN VIEW**

SHEET 27 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

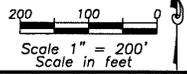
URS Greiner Woodward Clyde



P. CARTWRIGHT
 R:\DANIELIS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND

-  Wetlands to be Bridged (Road)
-  Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

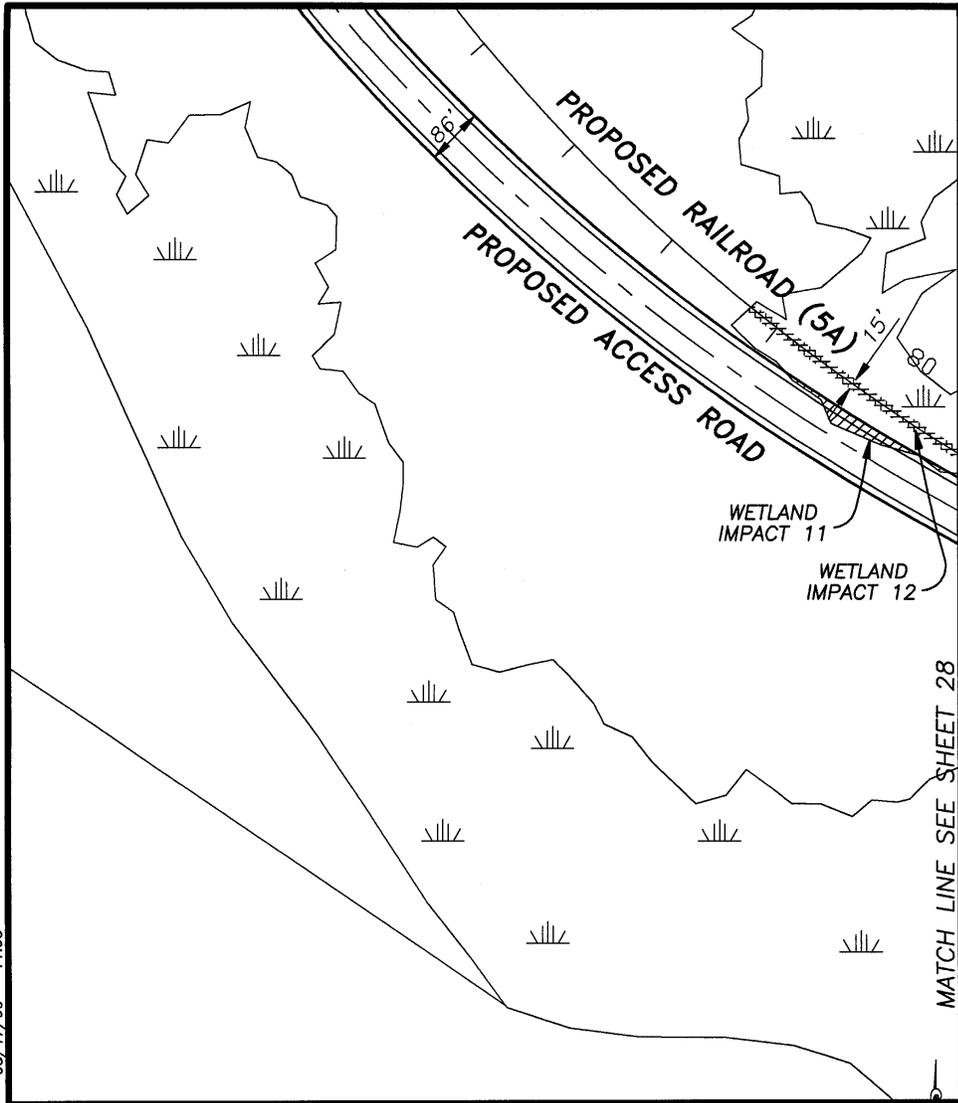
PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 28 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

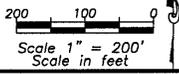
URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND

- Wetlands to be Bridged (Road)
- Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

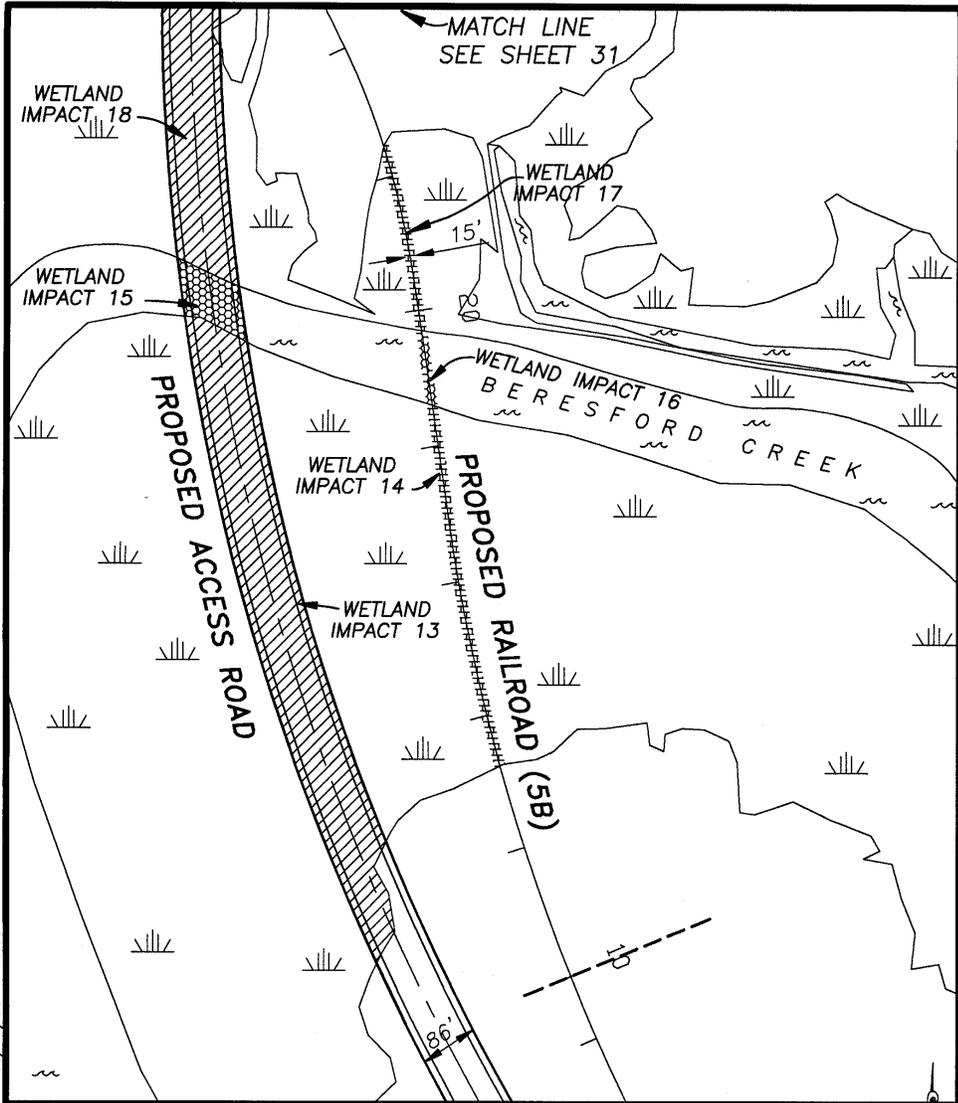
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 29 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

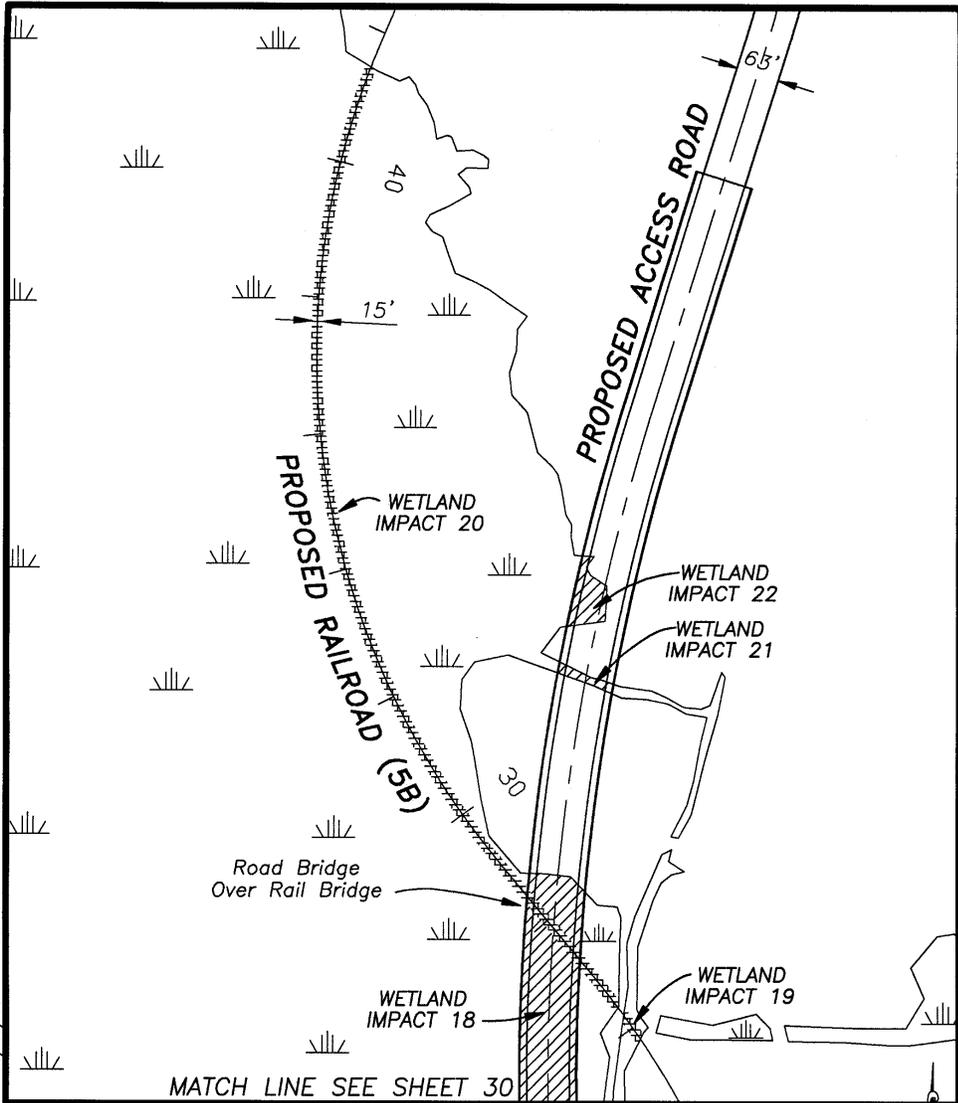


P. CARTWRIGHT
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LEGEND		
	Wetlands to be Bridged (Road)	
	Wetlands to be Trestled (Railroad)	
	Open Water to be Bridged	
DATUM: HORIZ: NAD83 VERT: MLW = MEAN LOW WATER		PROPOSED: DANIEL ISLAND TERMINAL IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS AT: DANIEL ISLAND/CAINHOY PENINSULA COUNTY OF: BERKELEY STATE: S.C. APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY
ROAD AND RAIL PLAN VIEW		SHEET 30 OF 71 DATE: AUG. 1999

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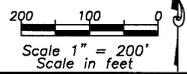


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P. CARTWRIGHT
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LEGEND

- Wetlands to be Bridged (Road)
- Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

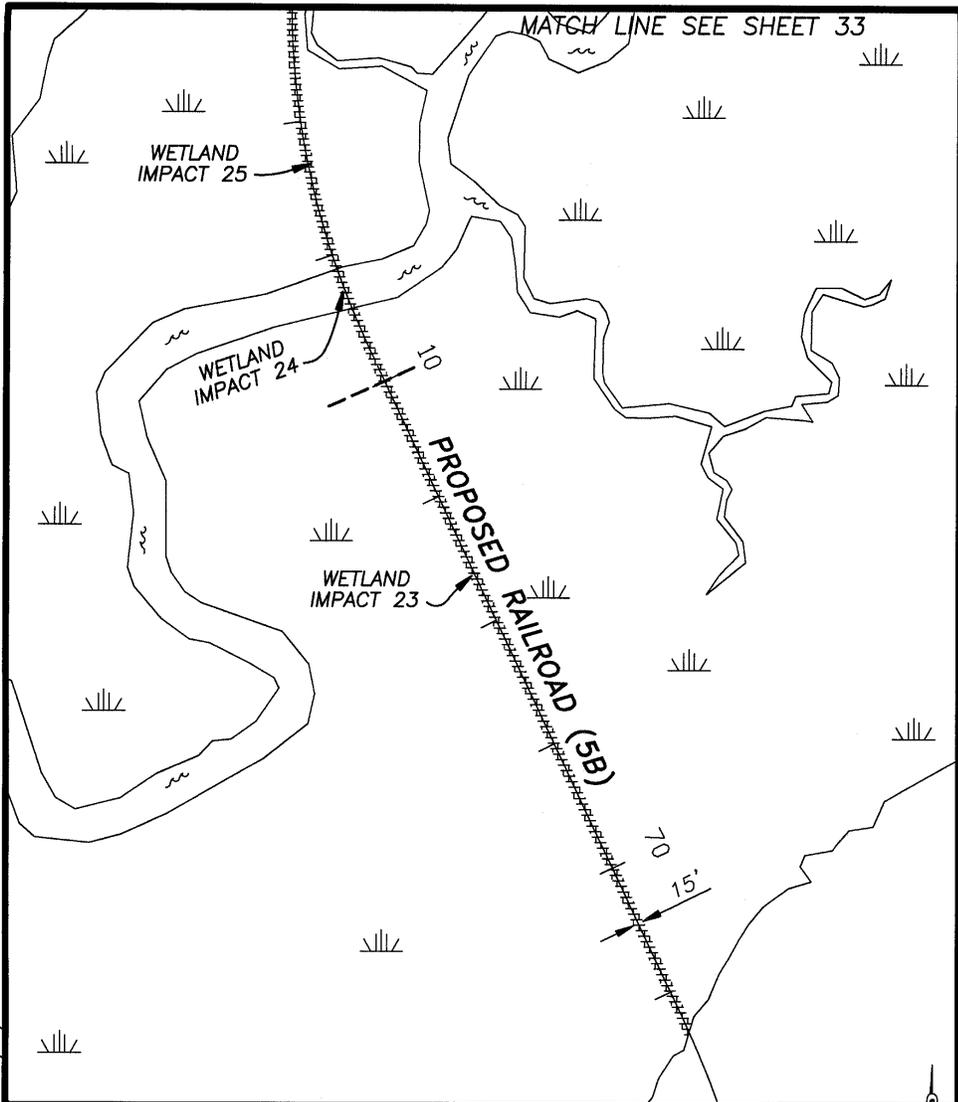
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 31 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

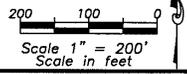
URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND

 Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

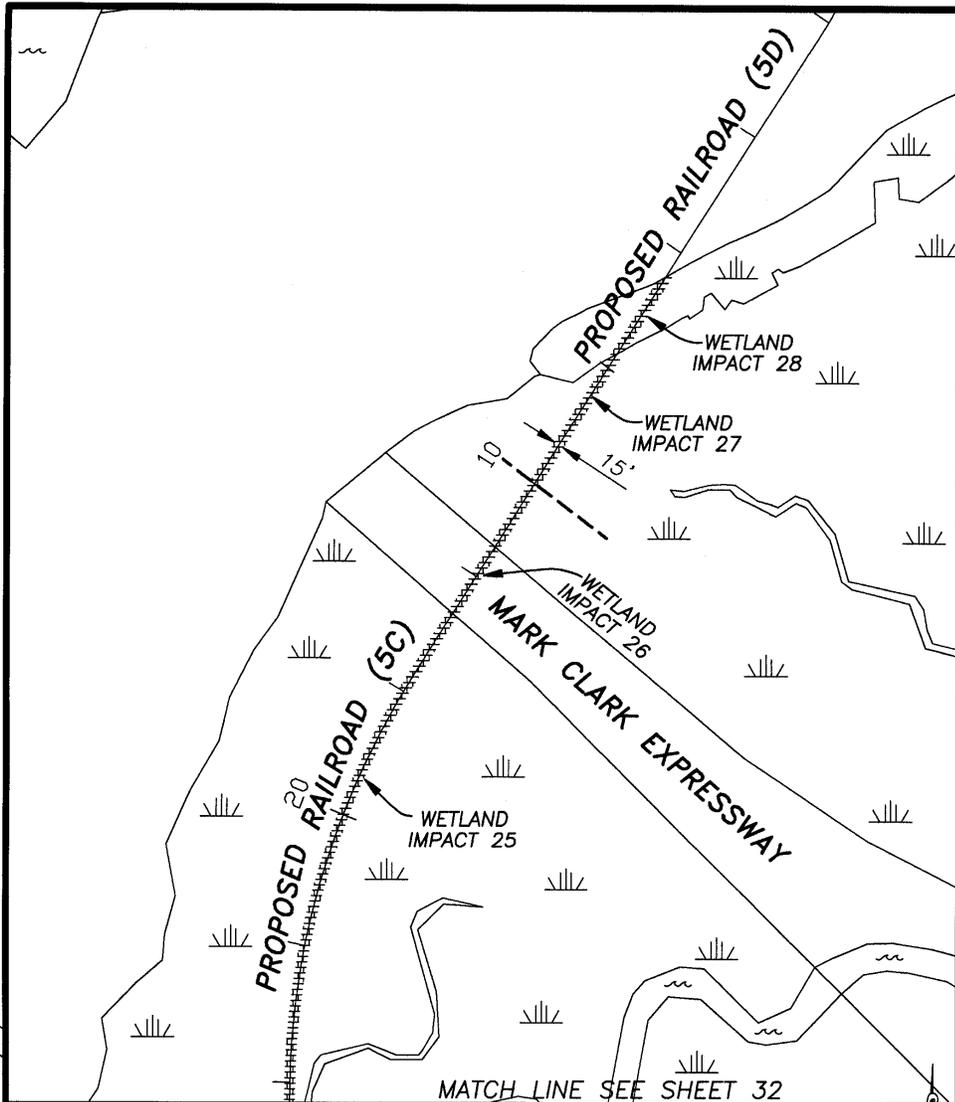
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 32 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

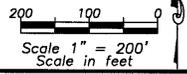
URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND

 Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

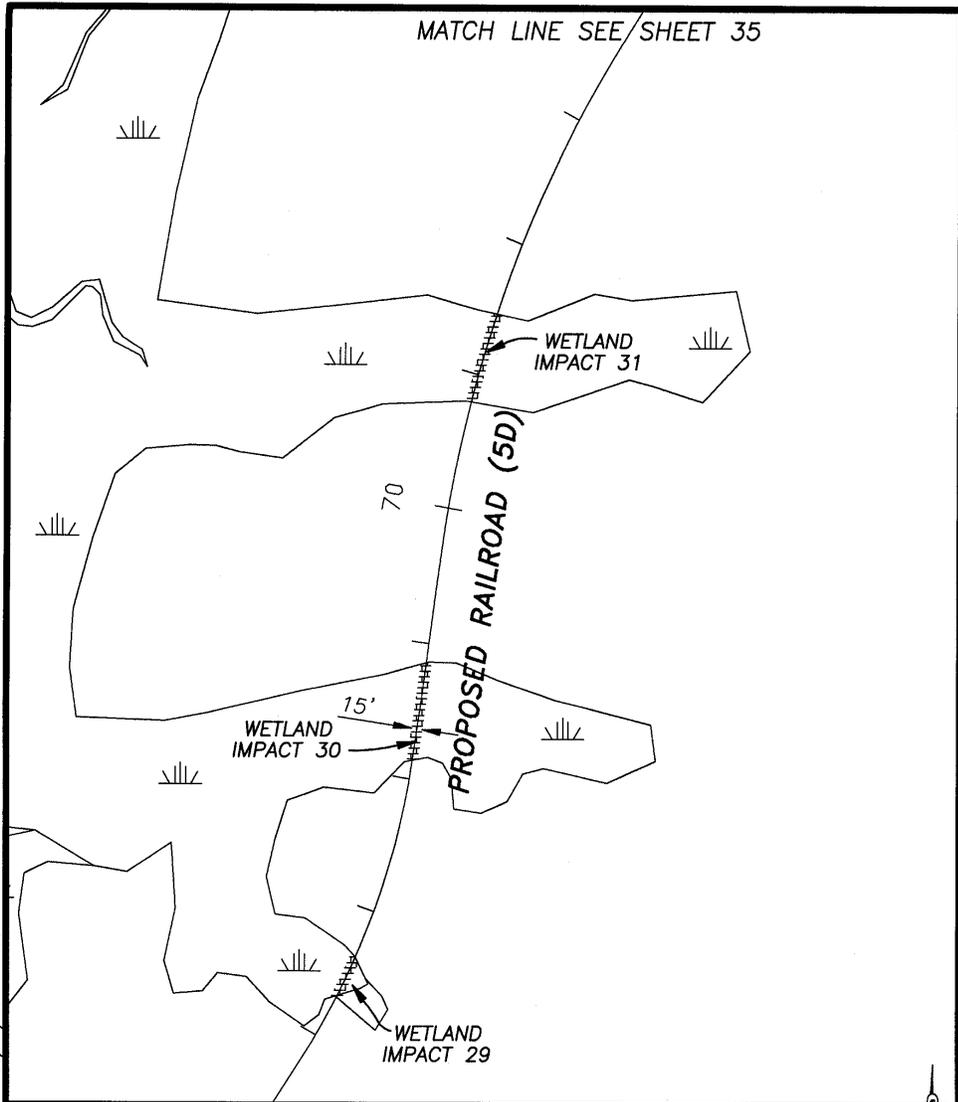
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 33 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

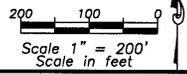
URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND

 Wetlands to be Trestled (Railroad)



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

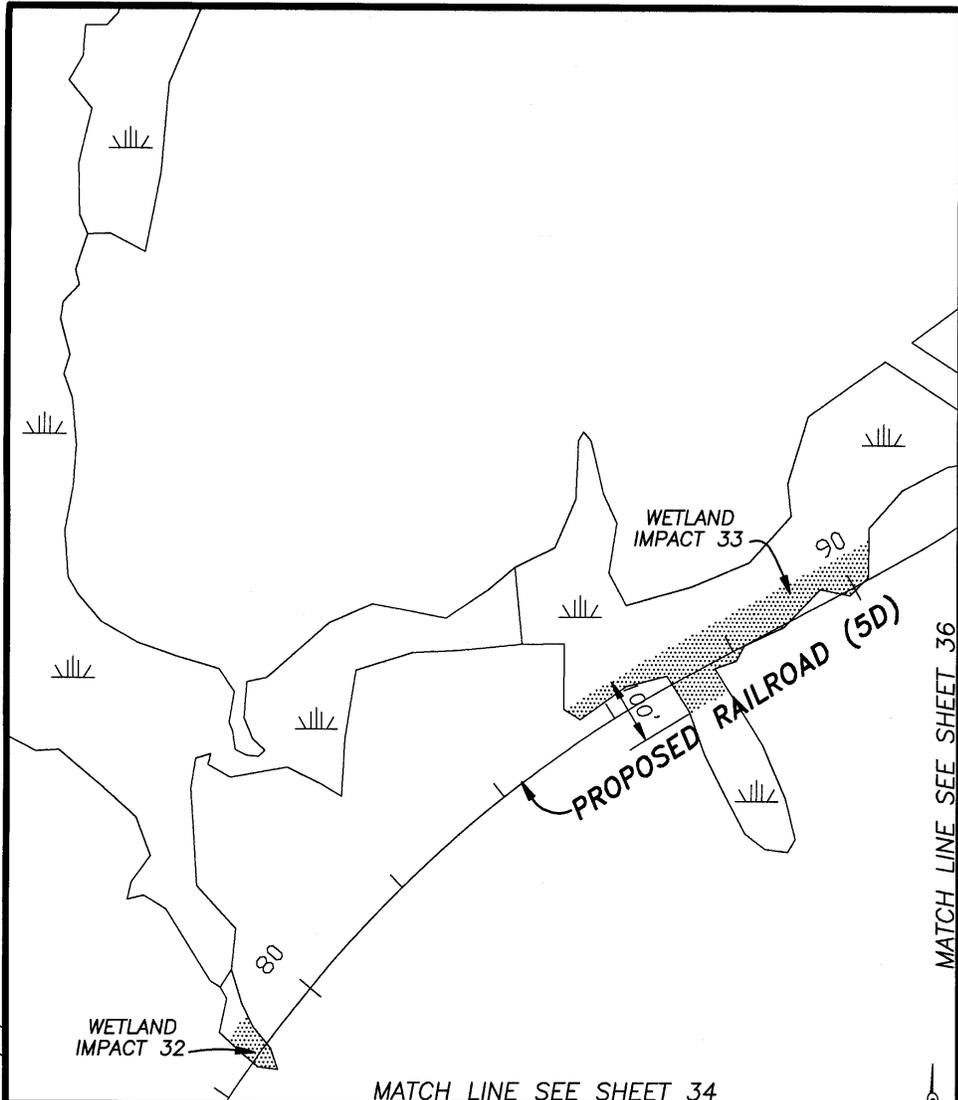
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 34 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

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P. CARTWRIGHT
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LEGEND
 Wetlands to be Filled

200 100 0
 Scale 1" = 200'
 Scale in feet

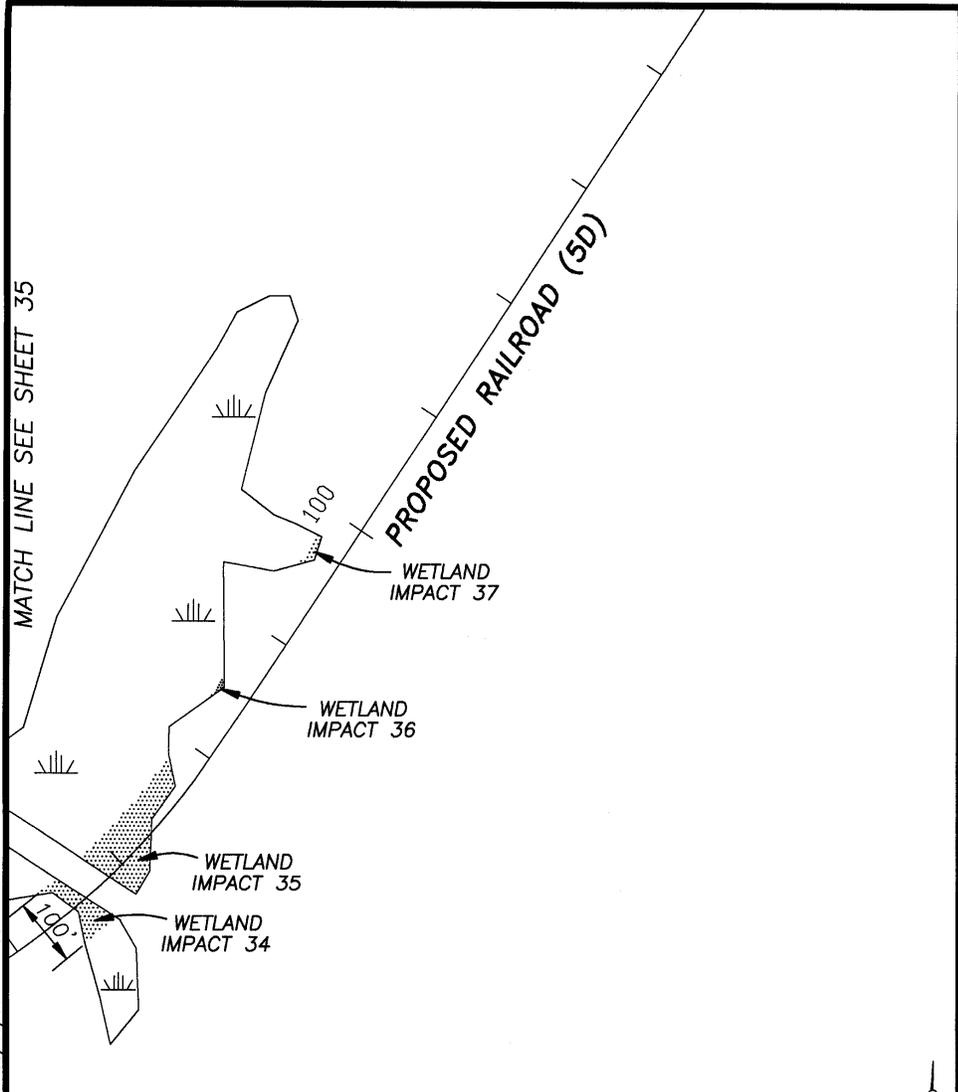
DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
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 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 35 OF 71 DATE: AUG. 1999

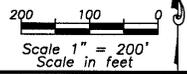
FOR PERMIT PURPOSES ONLY URS Greiner Woodward Clyde



P. CARTWRIGHT
R: DANIELIS\PERMITS\PERPLAN.DWG 08/17/99 11:08

LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

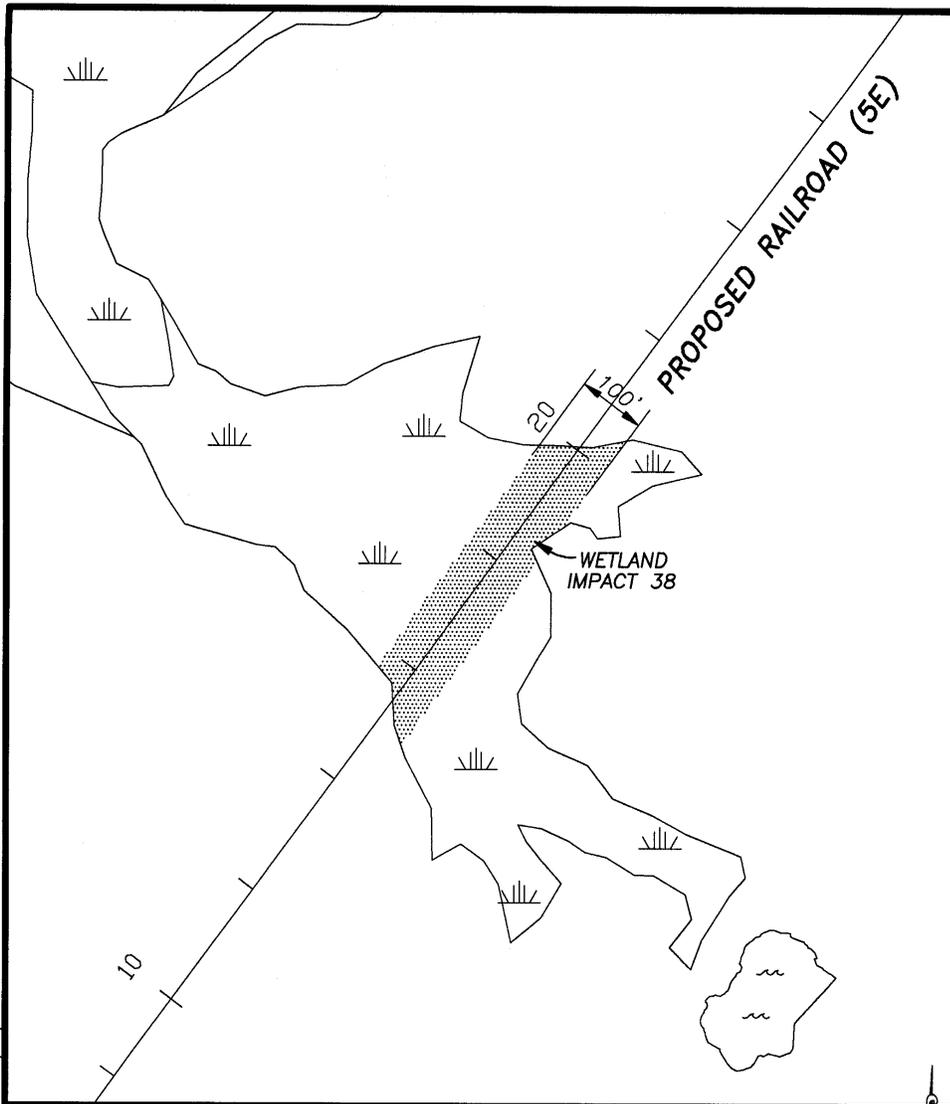
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 36 OF 71 DATE: AUG. 1999

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P. CARTWRIGHT
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LEGEND
 Wetlands to be Filled

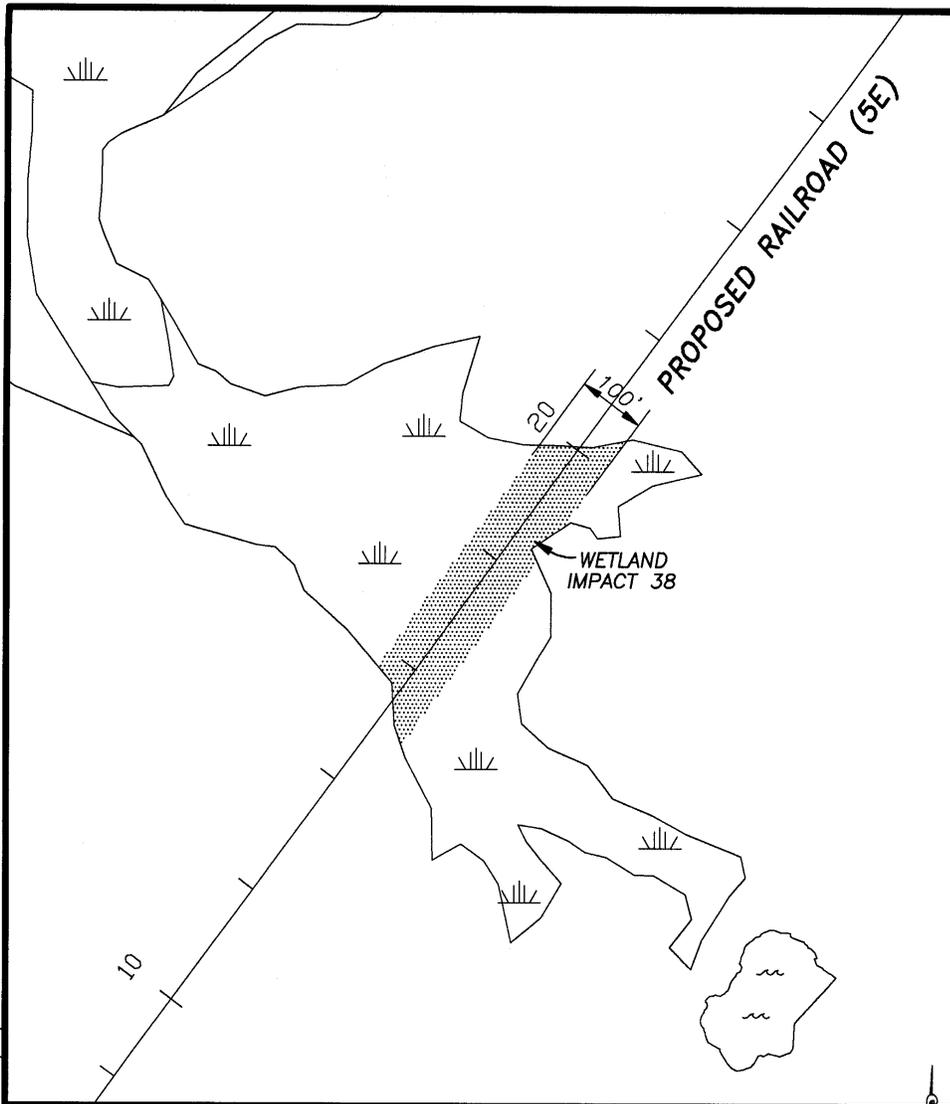
200 100 0
 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 37 OF 71 DATE: AUG. 1999

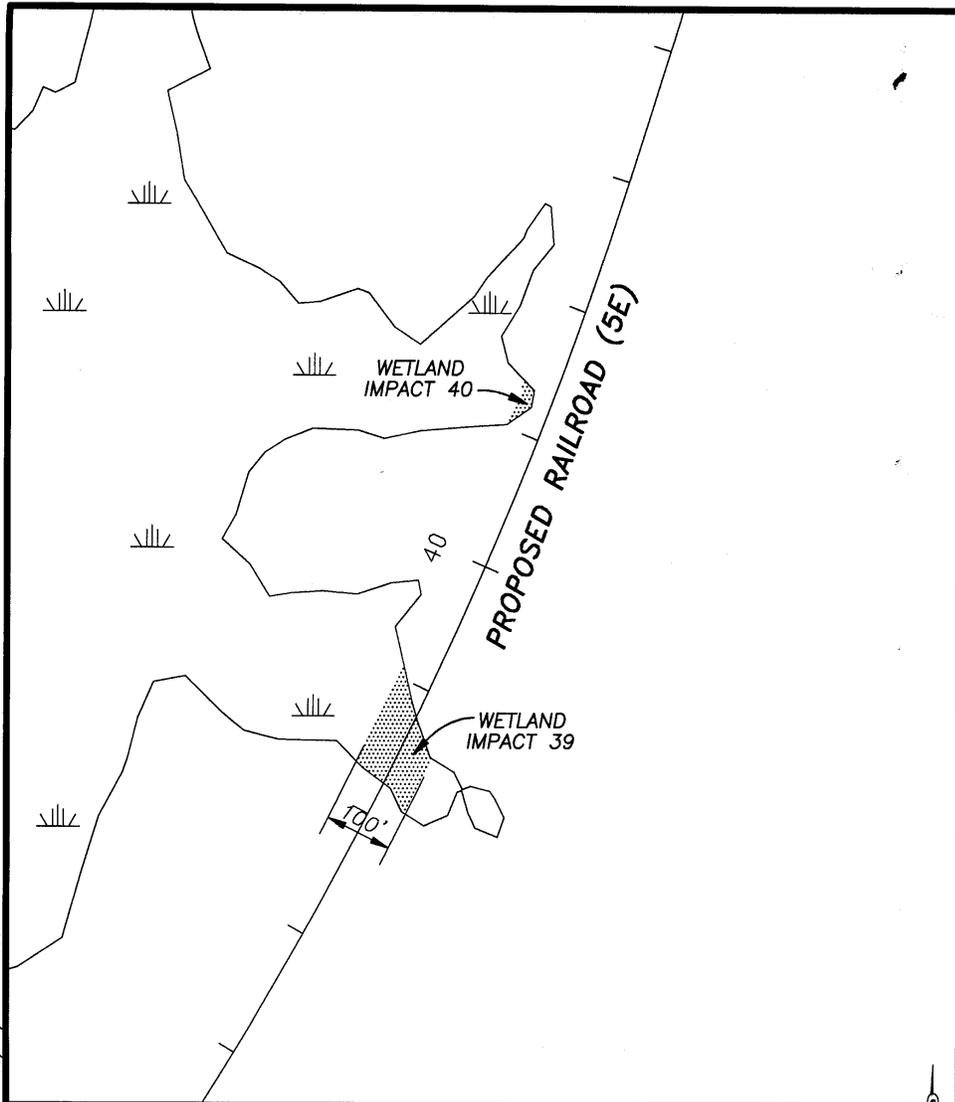


P. CARTWRIGHT
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<p>LEGEND</p> <p> Wetlands to be Filled</p>		<p>200 100 0</p> <p>Scale 1" = 200'</p> <p>Scale in feet</p>
<p>DATUM: HORIZ: NAD83 VERT: MLW = MEAN LOW WATER</p>		<p>PROPOSED: DANIEL ISLAND TERMINAL IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS AT: DANIEL ISLAND/CAINHOY PENINSULA COUNTY OF: BERKELEY STATE: S.C. APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY</p>
<p>ROAD AND RAIL PLAN VIEW</p>		<p>SHEET 37 OF 71 DATE: AUG. 1999</p>

FOR PERMIT PURPOSES ONLY

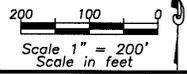
URS Greiner Woodward Clyde



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LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

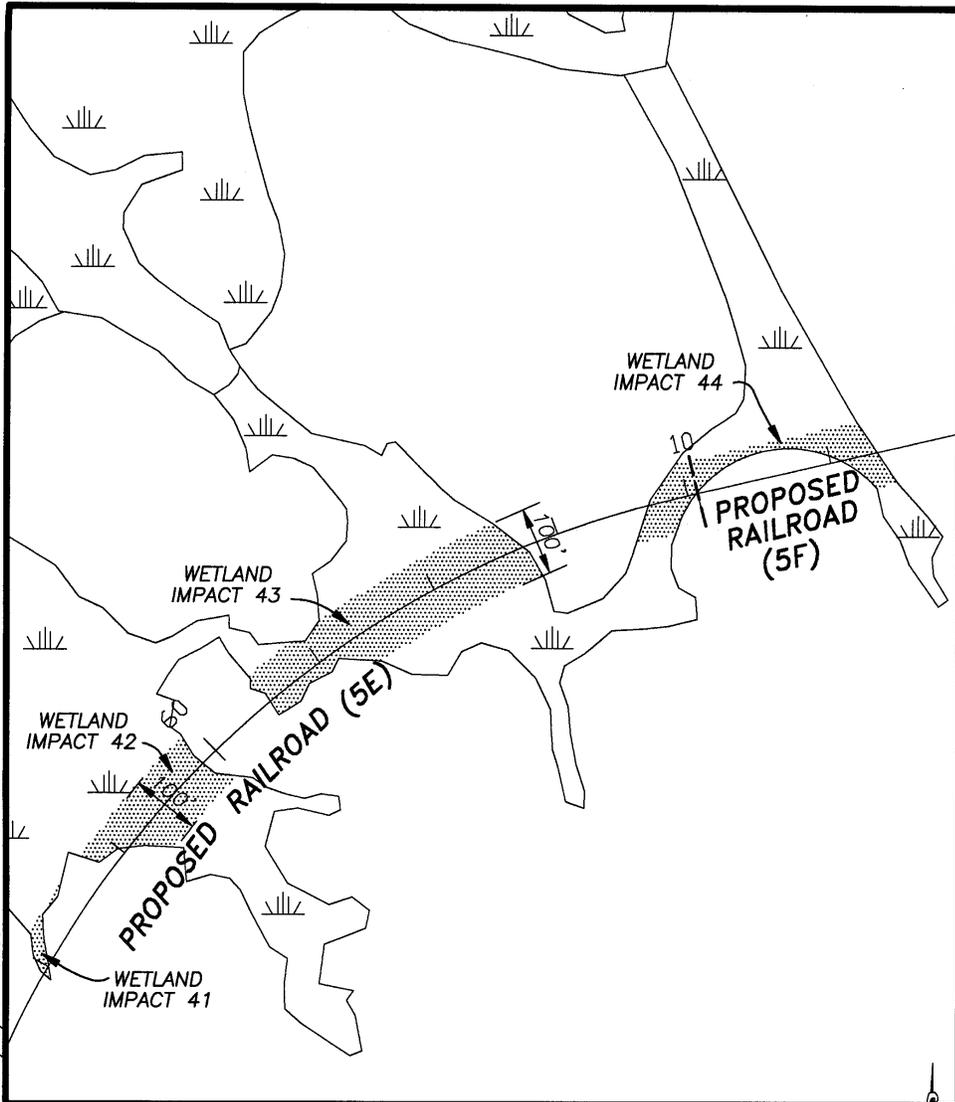
PROPOSED: DANIEL ISLAND TERMINAL
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AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 38 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

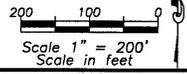
URS Greiner Woodward Clyde



P. CARTWRIGHT
R:\DANIELIS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

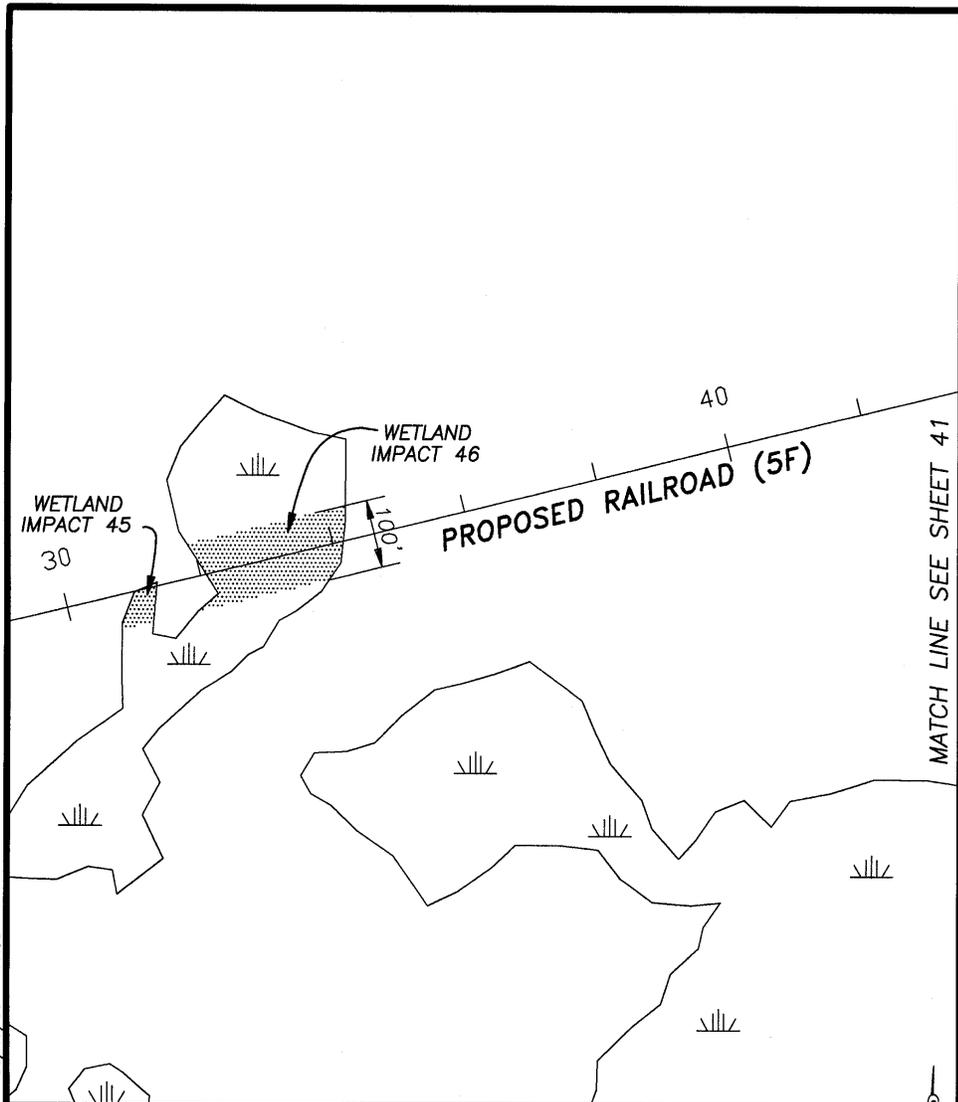
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IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 39 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND
 Wetlands to be Filled

200 100 0
 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

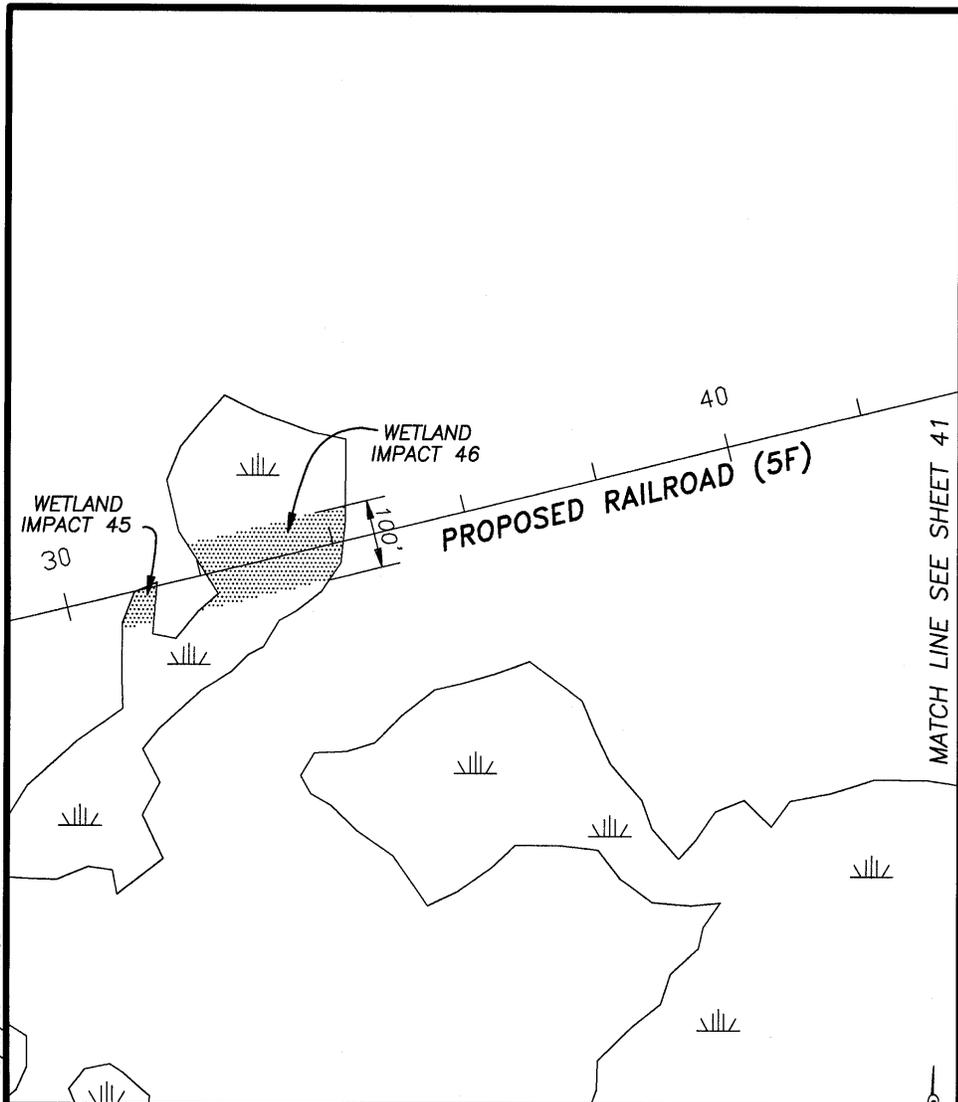
PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 40 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY URS Greiner Woodward Clyde

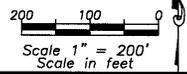
MATCH LINE SEE SHEET 41



P. CARTWRIGHT
R:\DANIELIS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

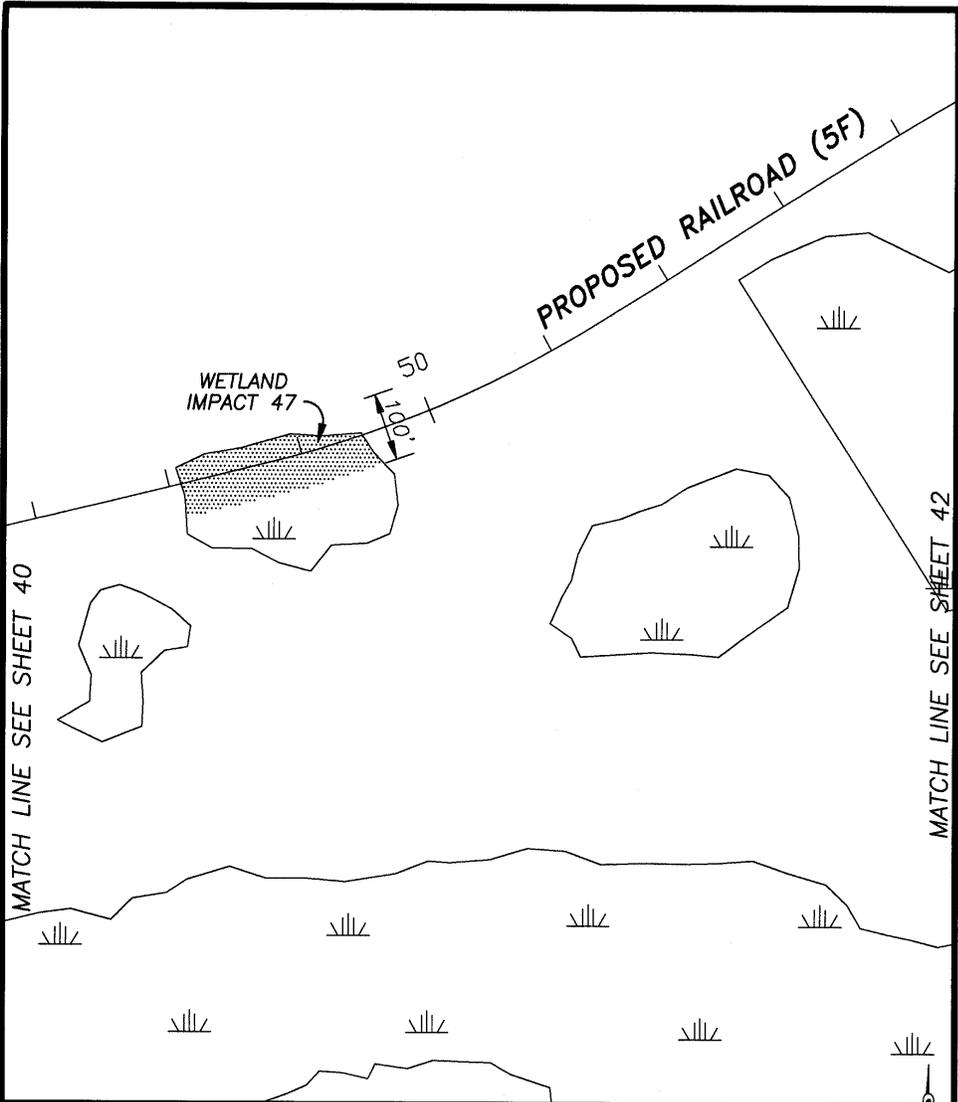
PROPOSED: DANIEL ISLAND TERMINAL
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COUNTY OF: BERKELEY STATE: S.C.
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**ROAD AND RAIL
PLAN VIEW**

SHEET 40 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde



P. CARTWRIGHT
R:\DANIELIS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND
 Wetlands to be Filled

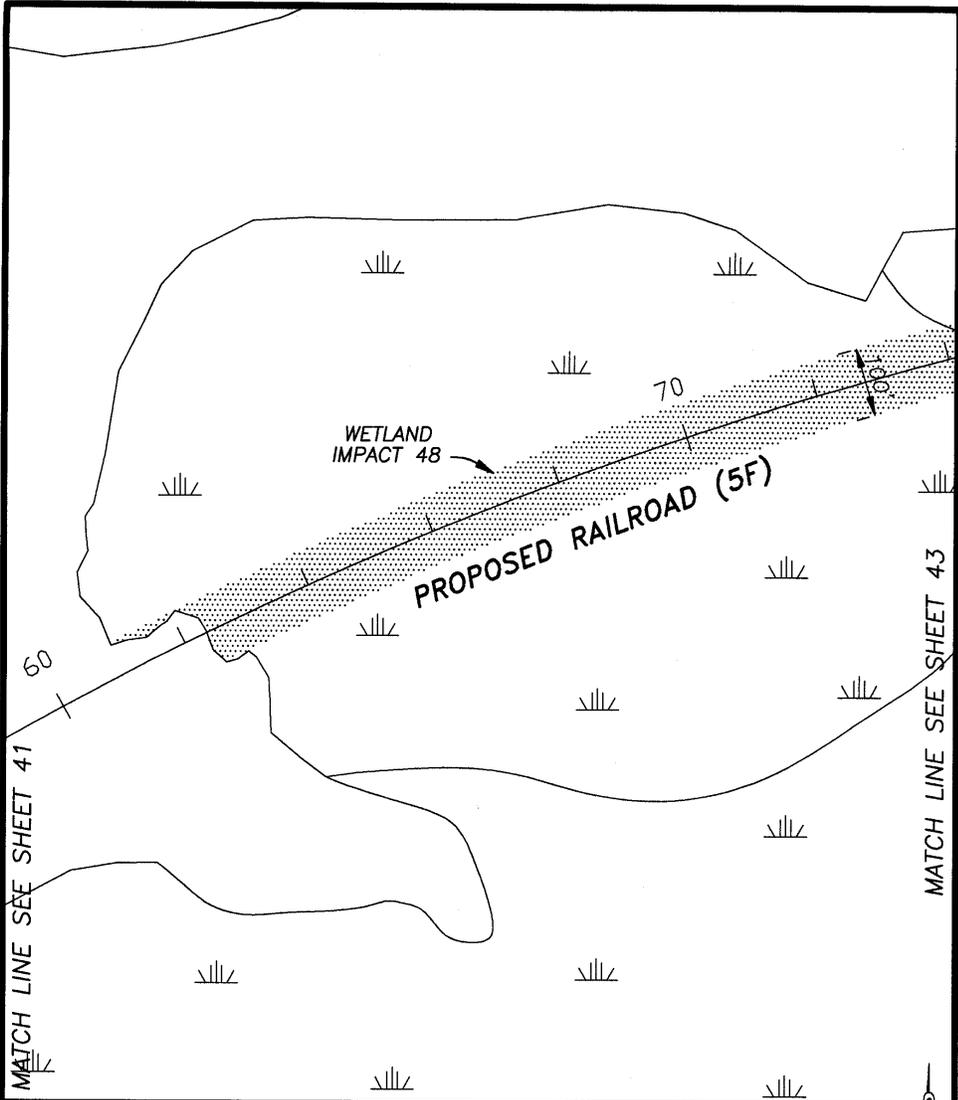
200 100 0
 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
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 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 41 OF 71 DATE: AUG. 1999



P. CARTWRIGHT
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LEGEND
 Wetlands to be Filled

200 100 0
 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

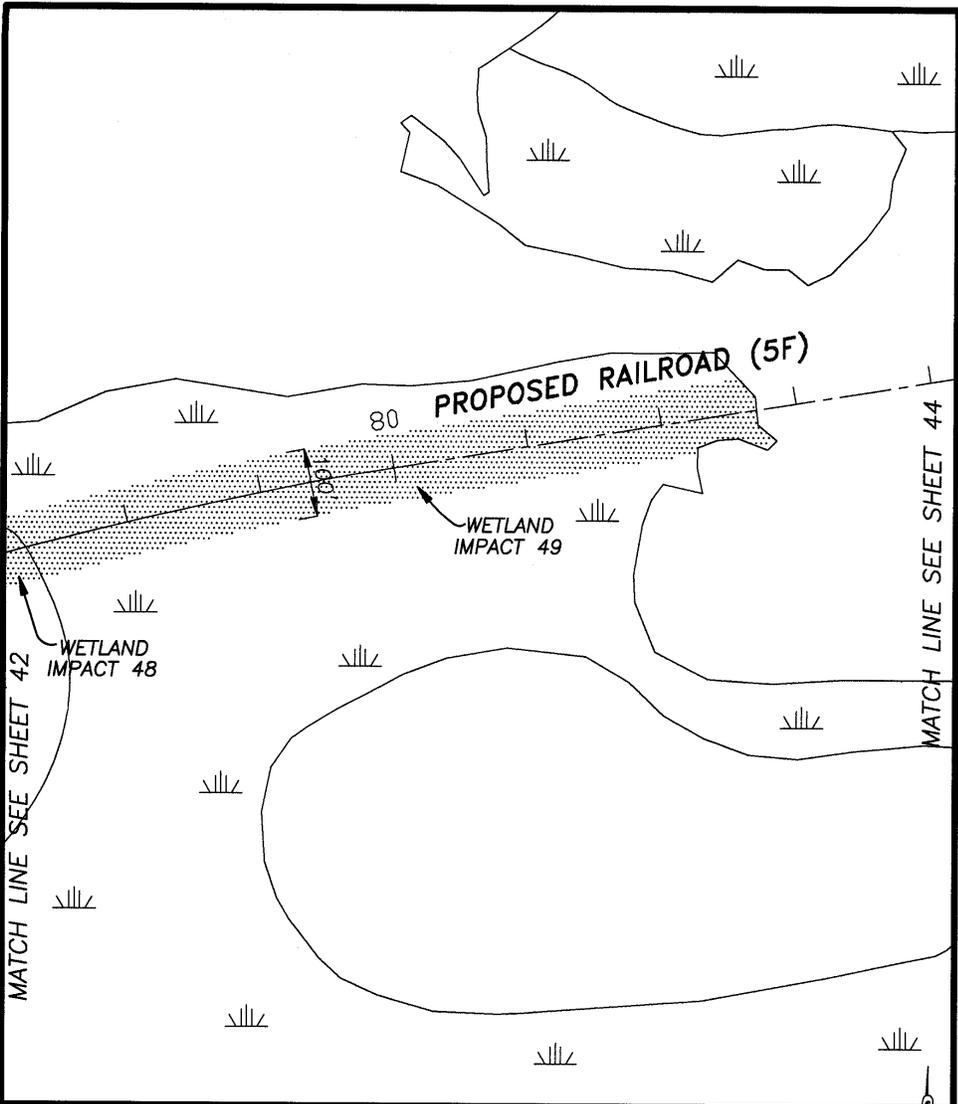
PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 42 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

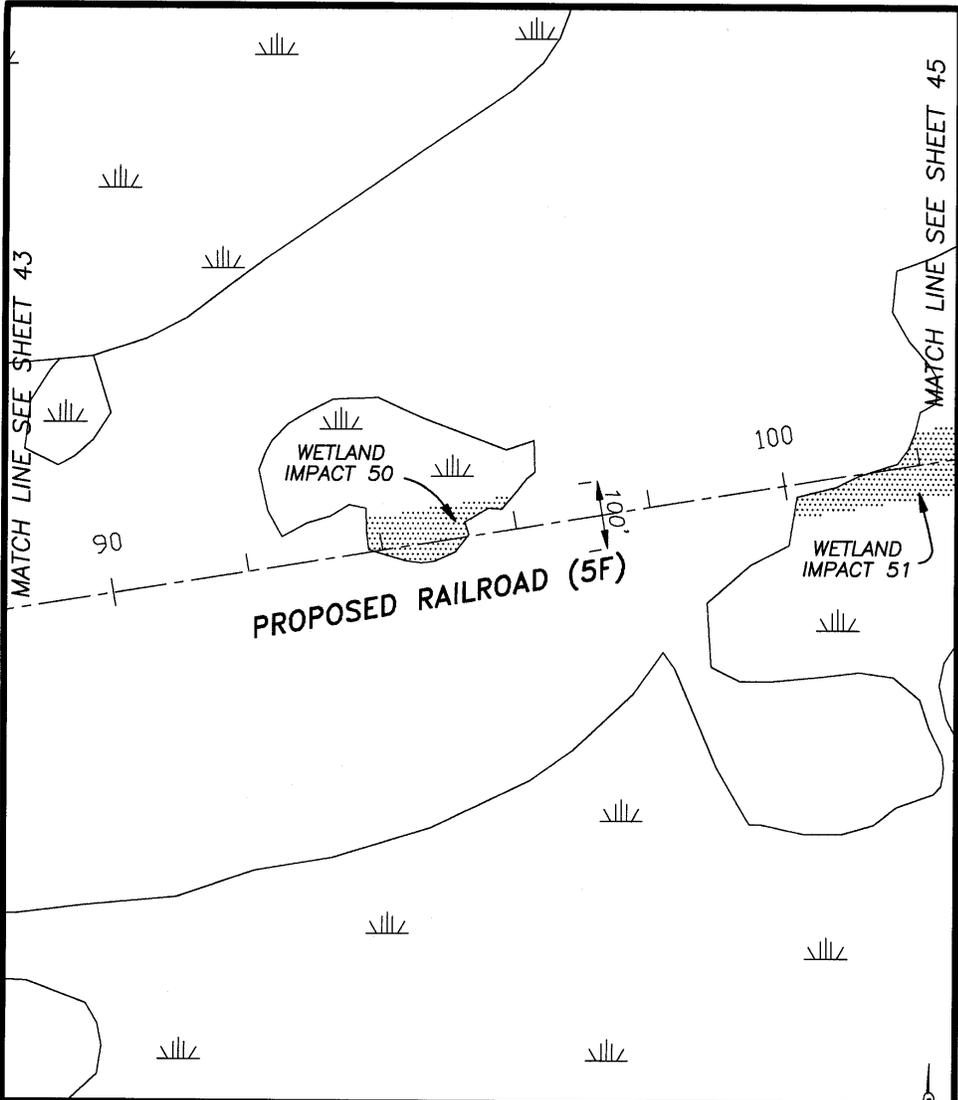


P. CARTWRIGHT
 R:\DANIELS\PERMITS\PERPLAN.DWG 08/17/99 11:08

<p>LEGEND</p> <p> Wetlands to be Filled</p>		<p>200 100 0</p> <p>Scale 1" = 200'</p> <p>Scale in feet</p>
<p>DATUM: HORIZ: NAD83 VERT: MLW = MEAN LOW WATER</p>		<p>PROPOSED: DANIEL ISLAND TERMINAL IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS AT: DANIEL ISLAND/CAINHOY PENINSULA COUNTY OF: BERKELEY STATE: S.C. APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY</p>
<p>ROAD AND RAIL PLAN VIEW</p>		<p>SHEET 43 OF 71 DATE: AUG. 1999</p>

FOR PERMIT PURPOSES ONLY

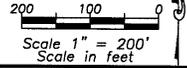
URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

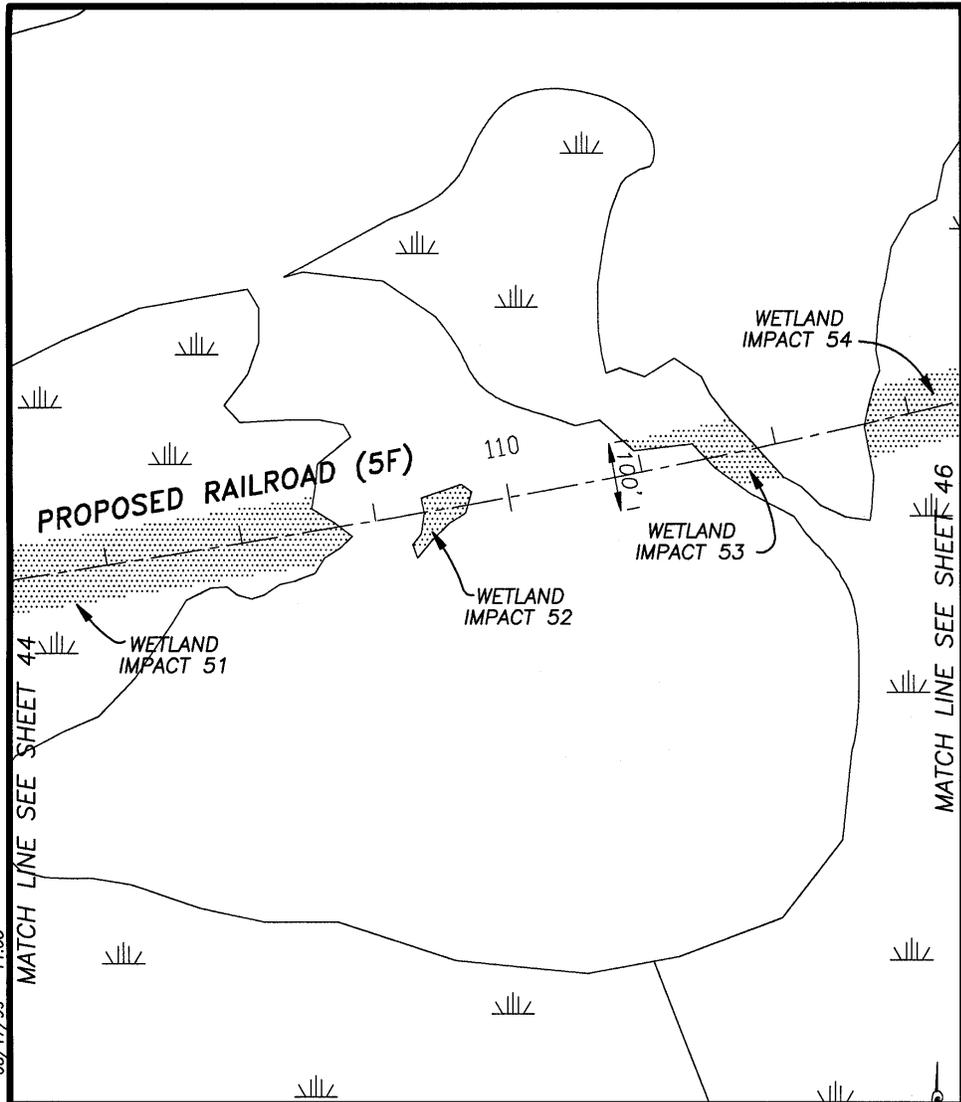
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 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE
 PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 44 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde



P. CARTWRIGHT
R. DANIELS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND
 Wetlands to be Filled

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 Scale 1" = 200'
 Scale in feet

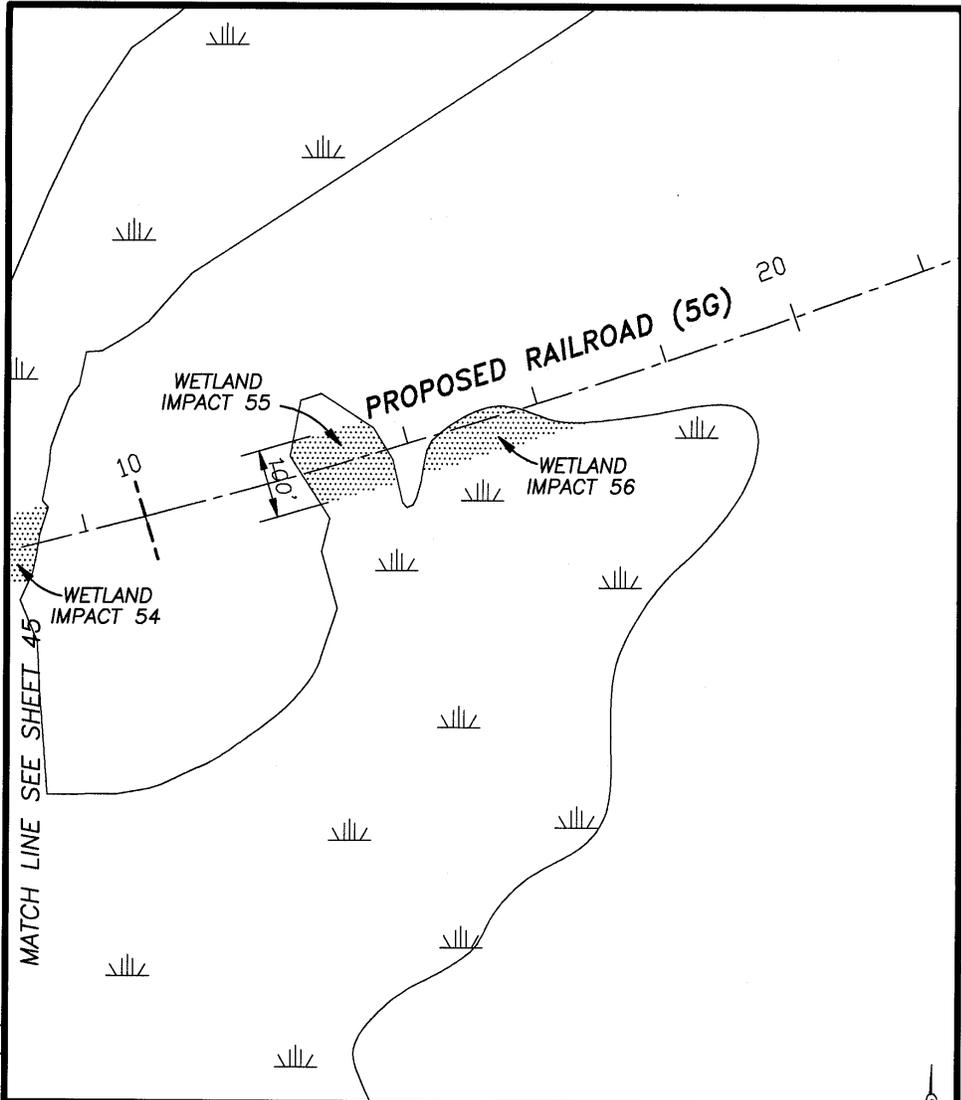
DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 45 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND
 Wetlands to be Filled

200 100 0
 Scale 1" = 200'
 Scale in feet

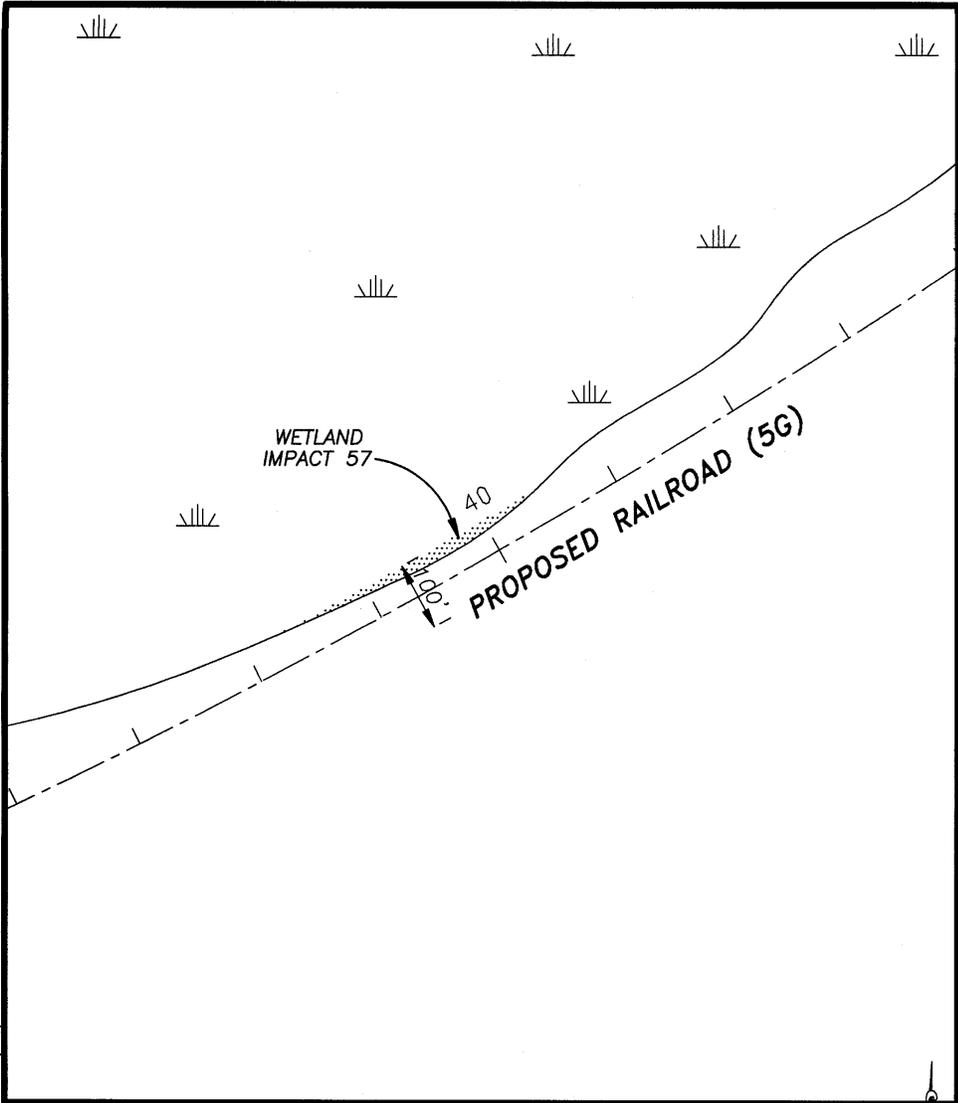
DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
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 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 46 OF 71 DATE: AUG. 1999

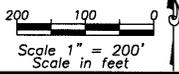
FOR PERMIT PURPOSES ONLY URS Greiner Woodward Clyde



P. CARTWRIGHT R:\DANIELIS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

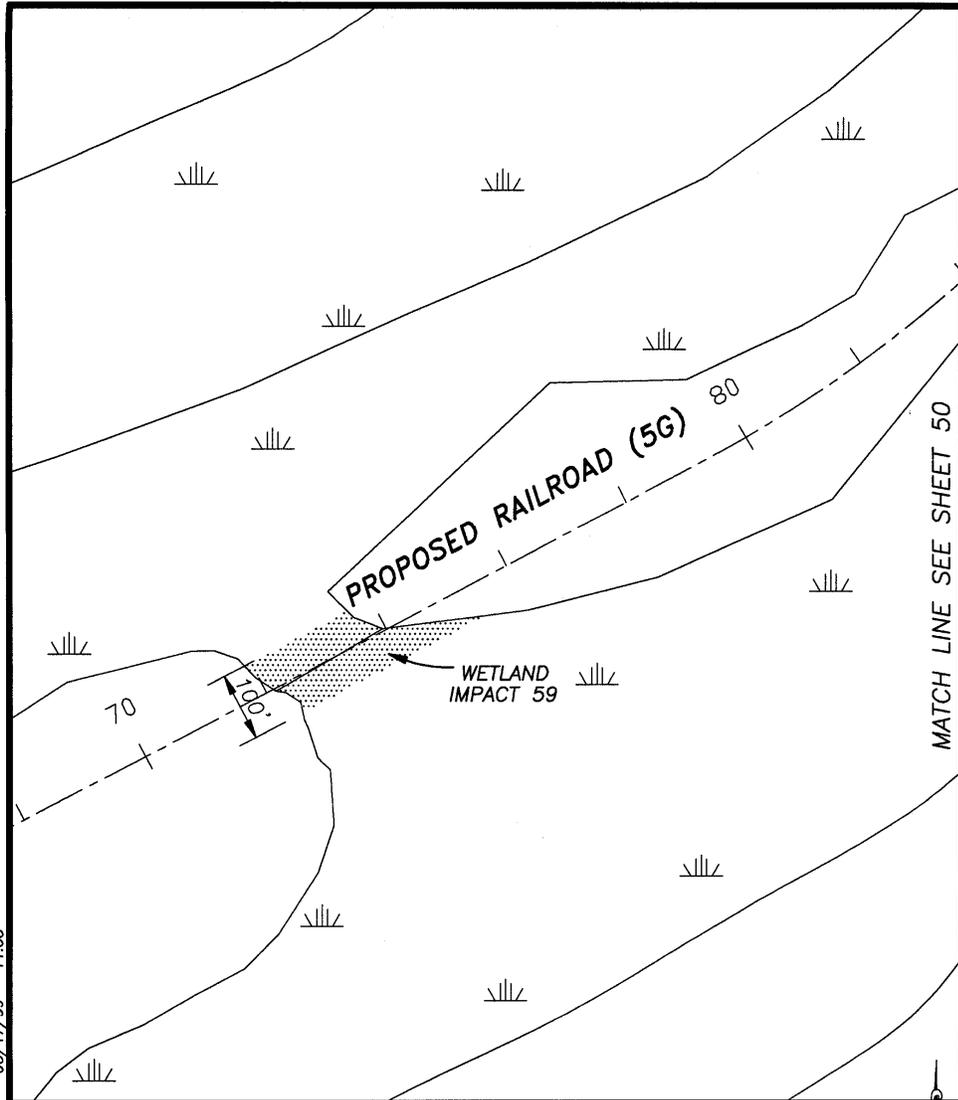
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 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 47 OF 71 DATE: AUG. 1999

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URS Greiner Woodward Clyde



P. CARTWRIGHT
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LEGEND
 Wetlands to be Filled

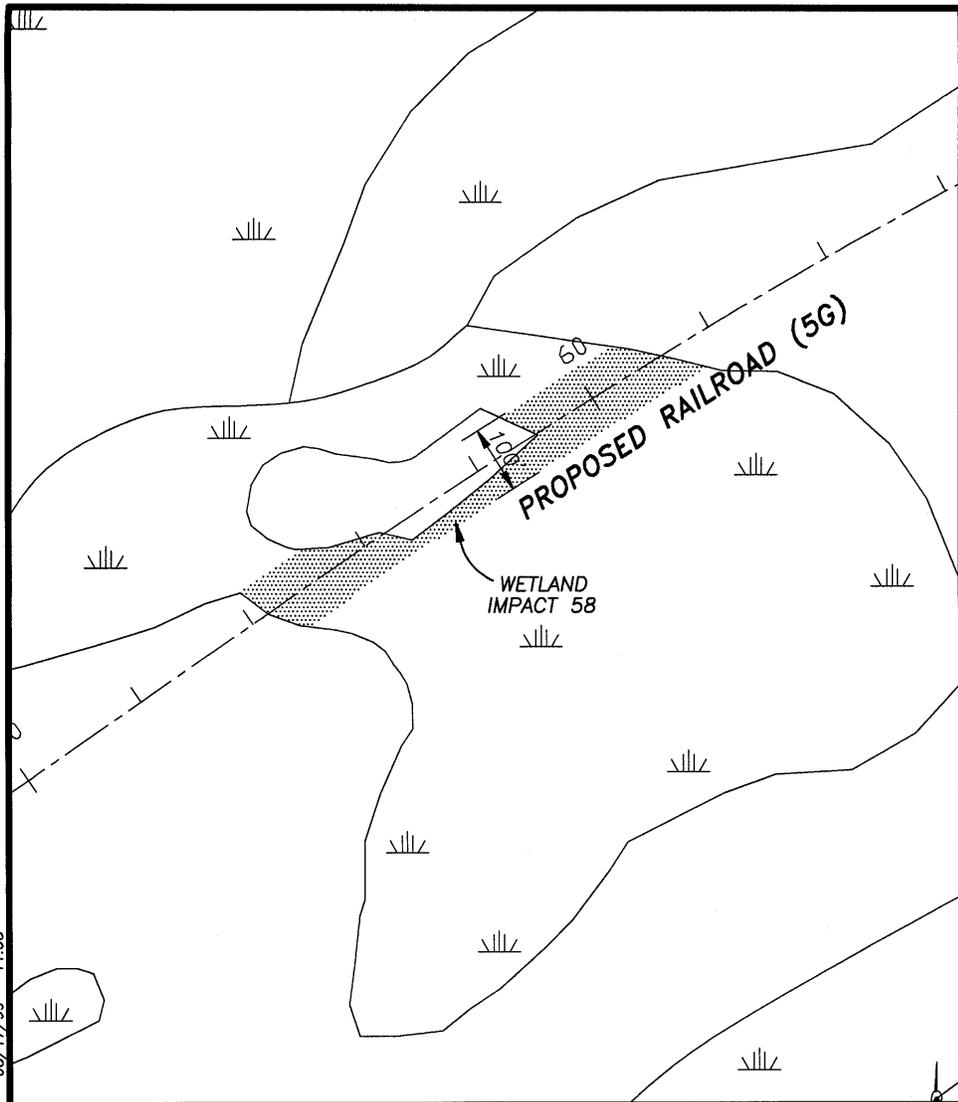
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 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

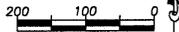
**ROAD AND RAIL
 PLAN VIEW**

SHEET 49 OF 71 DATE: AUG. 1999



P. CARTWRIGHT
R:\DANIELS\PERMITS\PERMPLAN.DWG 08/17/99 11:08

LEGEND
 Wetlands to be Filled

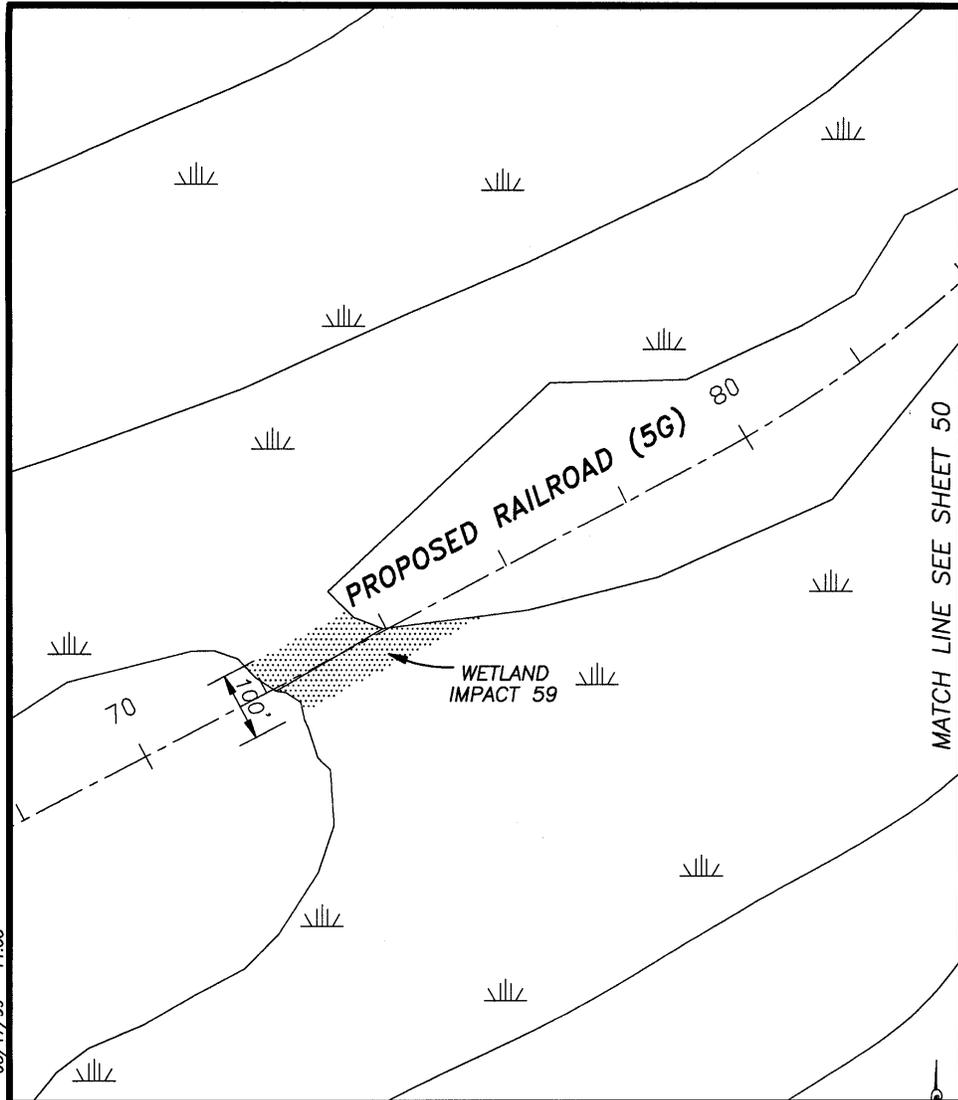

 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
 PLAN VIEW**

SHEET 48 OF 71 DATE: AUG. 1999



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LEGEND
 Wetlands to be Filled

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 Scale 1" = 200'
 Scale in feet

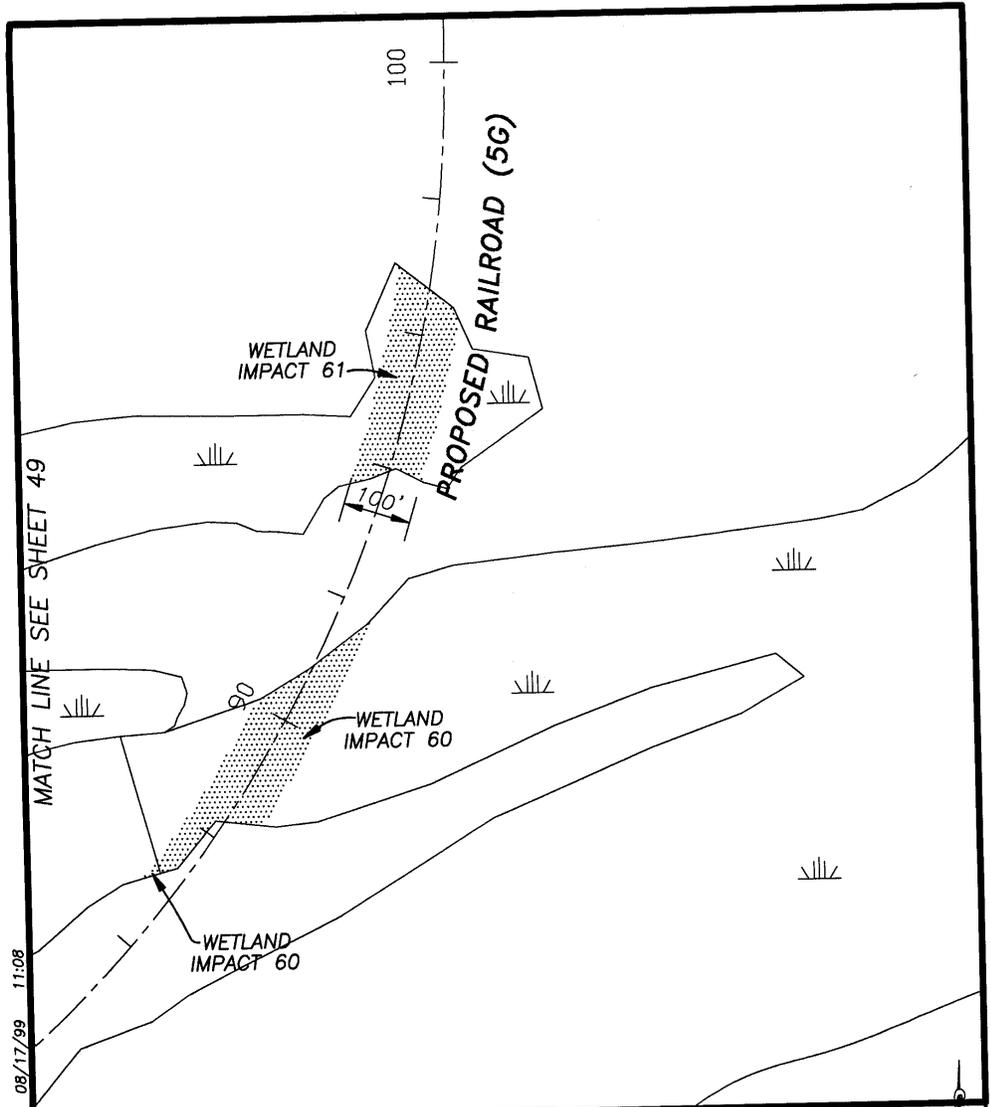
DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

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**ROAD AND RAIL
 PLAN VIEW**

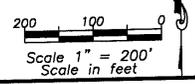
SHEET 49 OF 71 DATE: AUG. 1999

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LEGEND
 Wetlands to be Filled



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

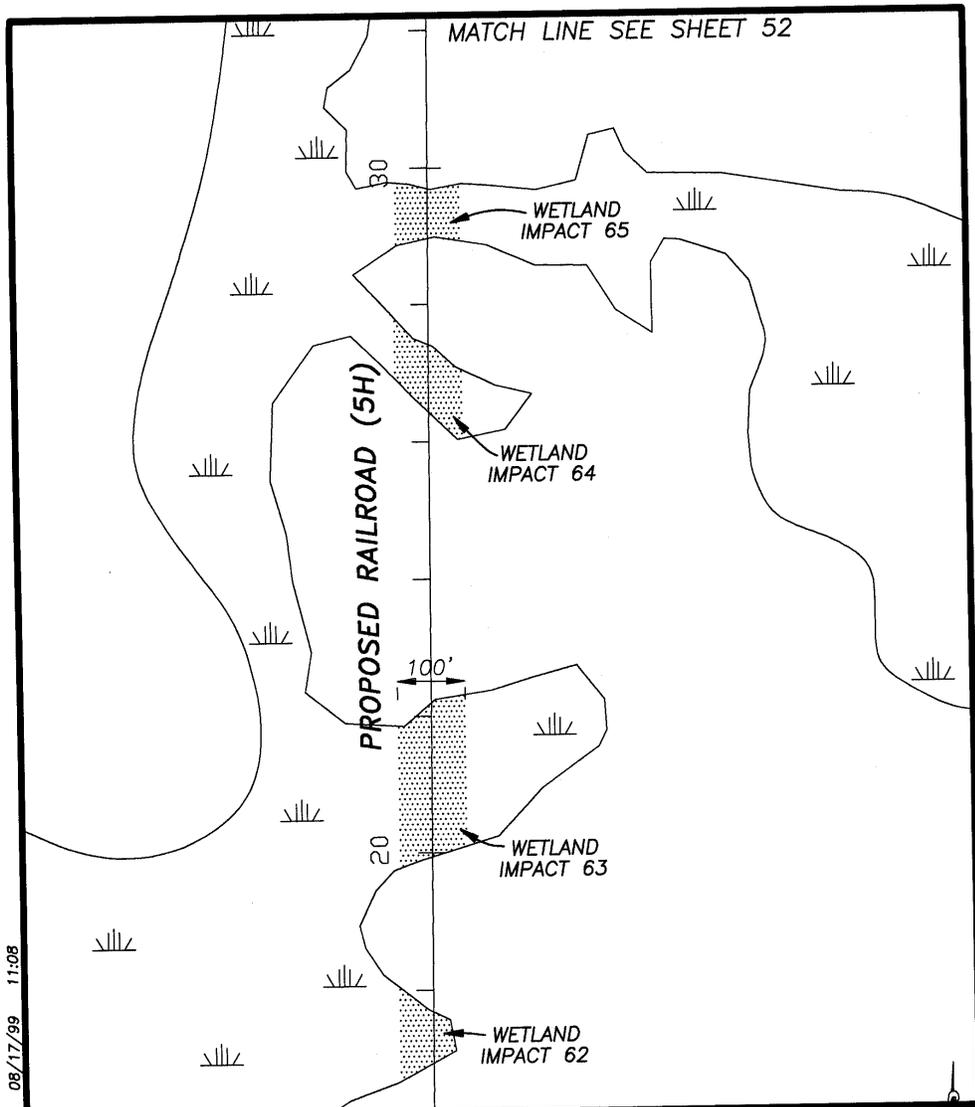
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**ROAD AND RAIL
 PLAN VIEW**

SHEET 50 OF 71 DATE: AUG. 1999

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LEGEND
 Wetlands to be Filled

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 Scale 1" = 200'
 Scale in feet

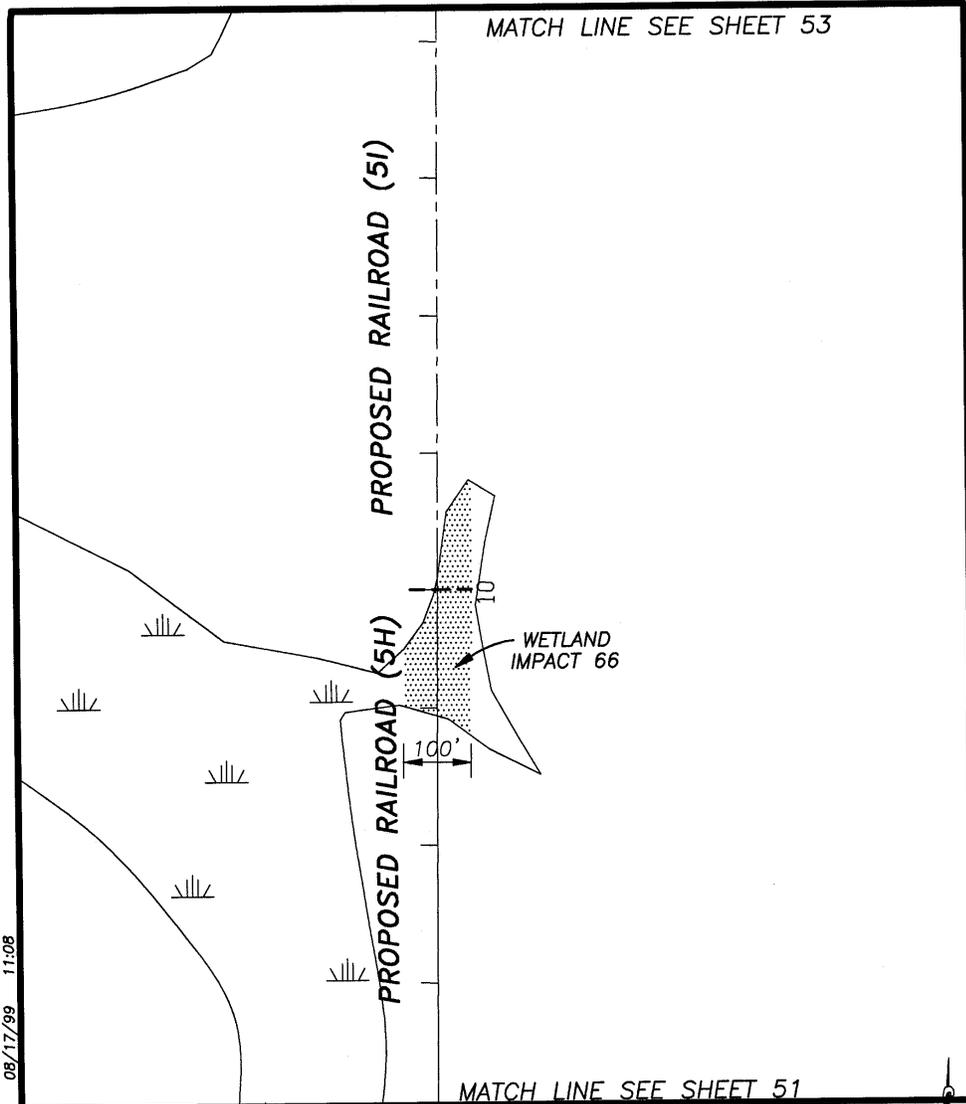
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**ROAD AND RAIL
 PLAN VIEW**

SHEET 51 OF 71 DATE: AUG. 1999

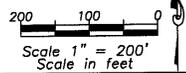
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LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

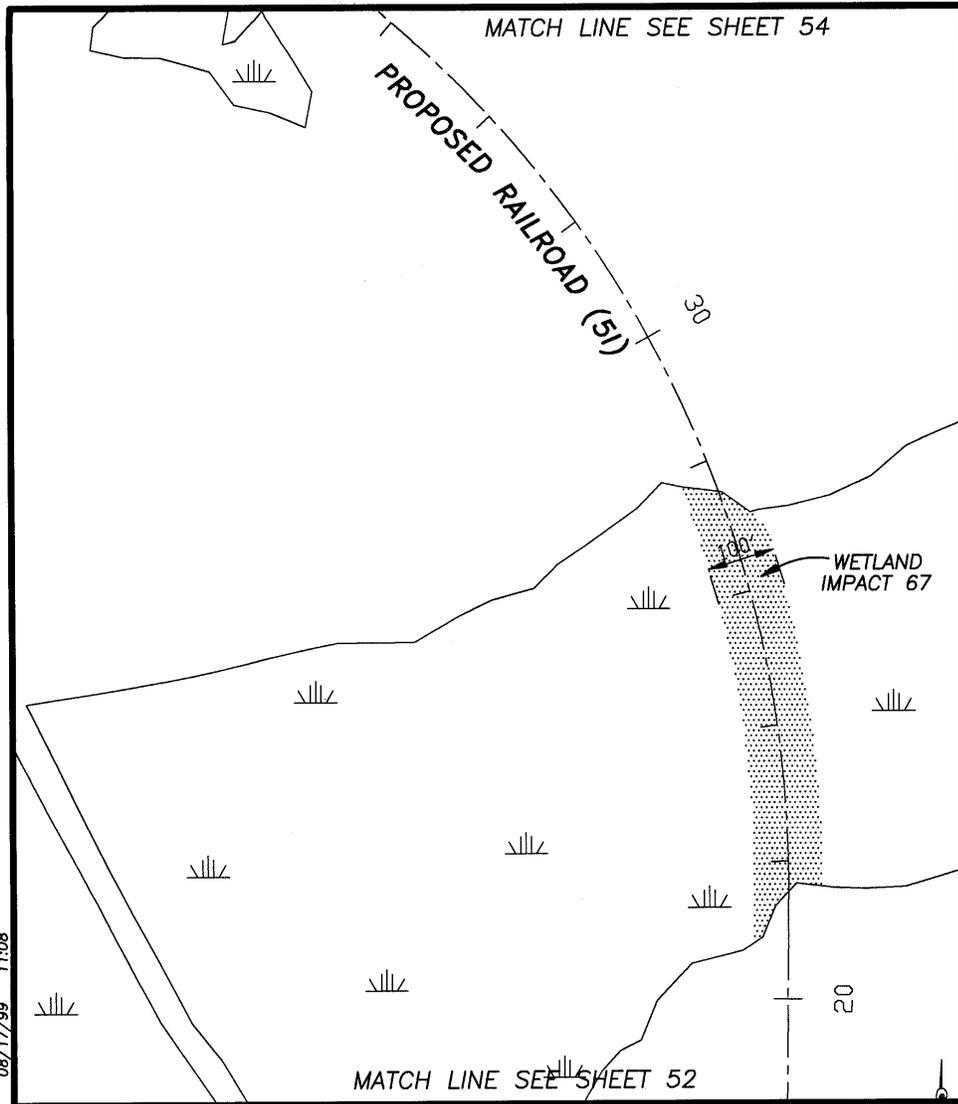
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APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

**ROAD AND RAIL
PLAN VIEW**

SHEET 52 OF 71 DATE: AUG. 1999

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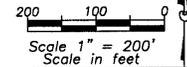
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LEGEND

 Wetlands to be Filled



DATUM: HORIZ: NAD83
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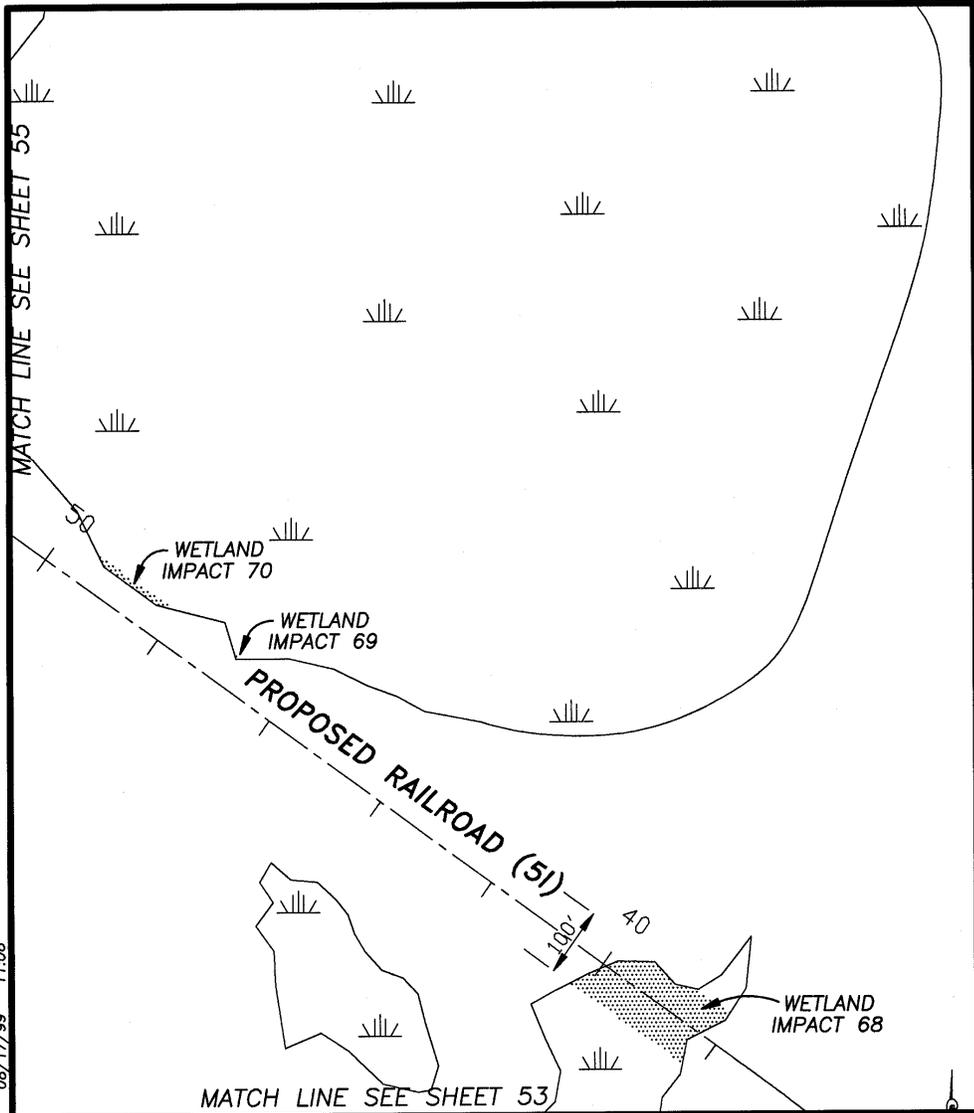
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**ROAD AND RAIL
 PLAN VIEW**

SHEET 53 OF 71 DATE: AUG. 1999

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LEGEND
 Wetlands to be Filled

200 100 0
 Scale 1" = 200'
 Scale in feet

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

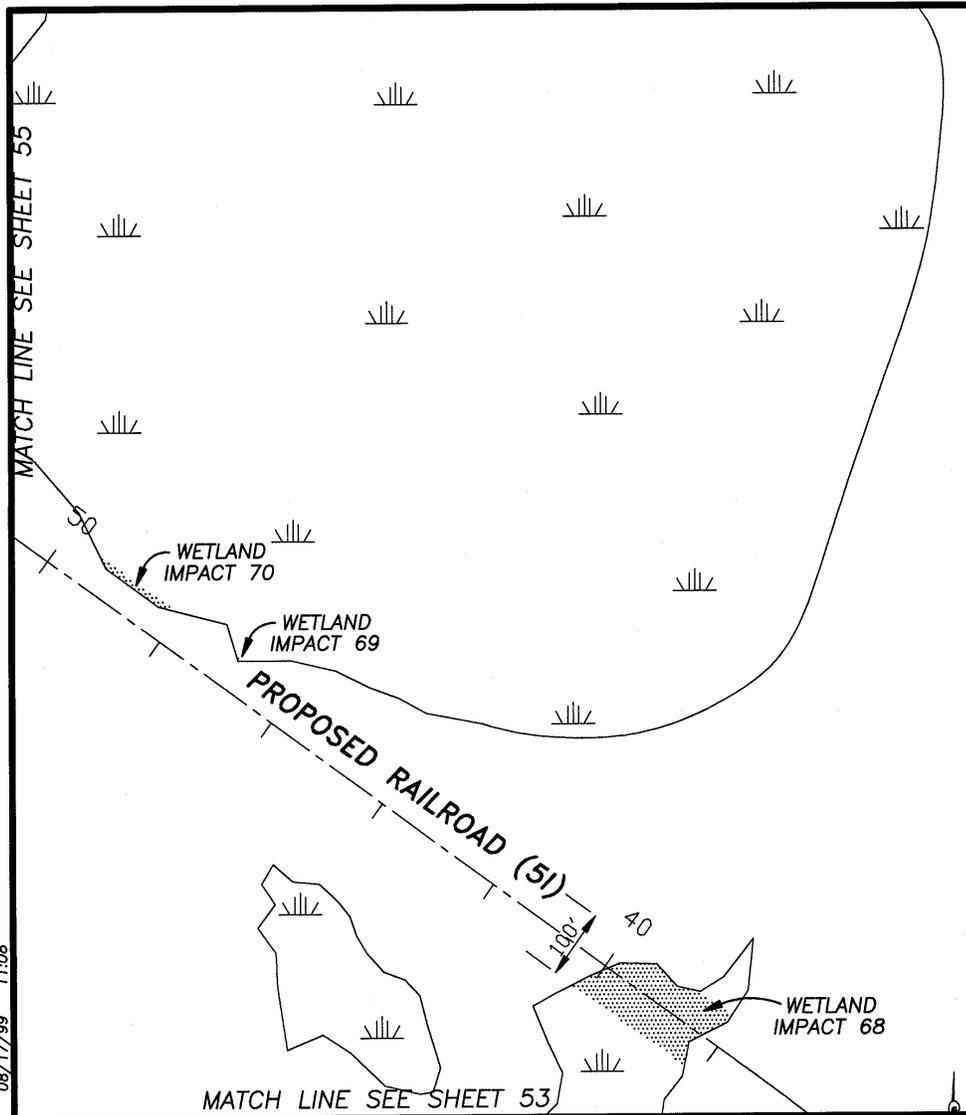
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ROAD AND RAIL PLAN VIEW

SHEET 54 OF 71 DATE: AUG. 1999

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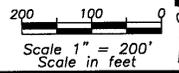
MATCH LINE SEE SHEET 55

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LEGEND

Wetlands to be Filled



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

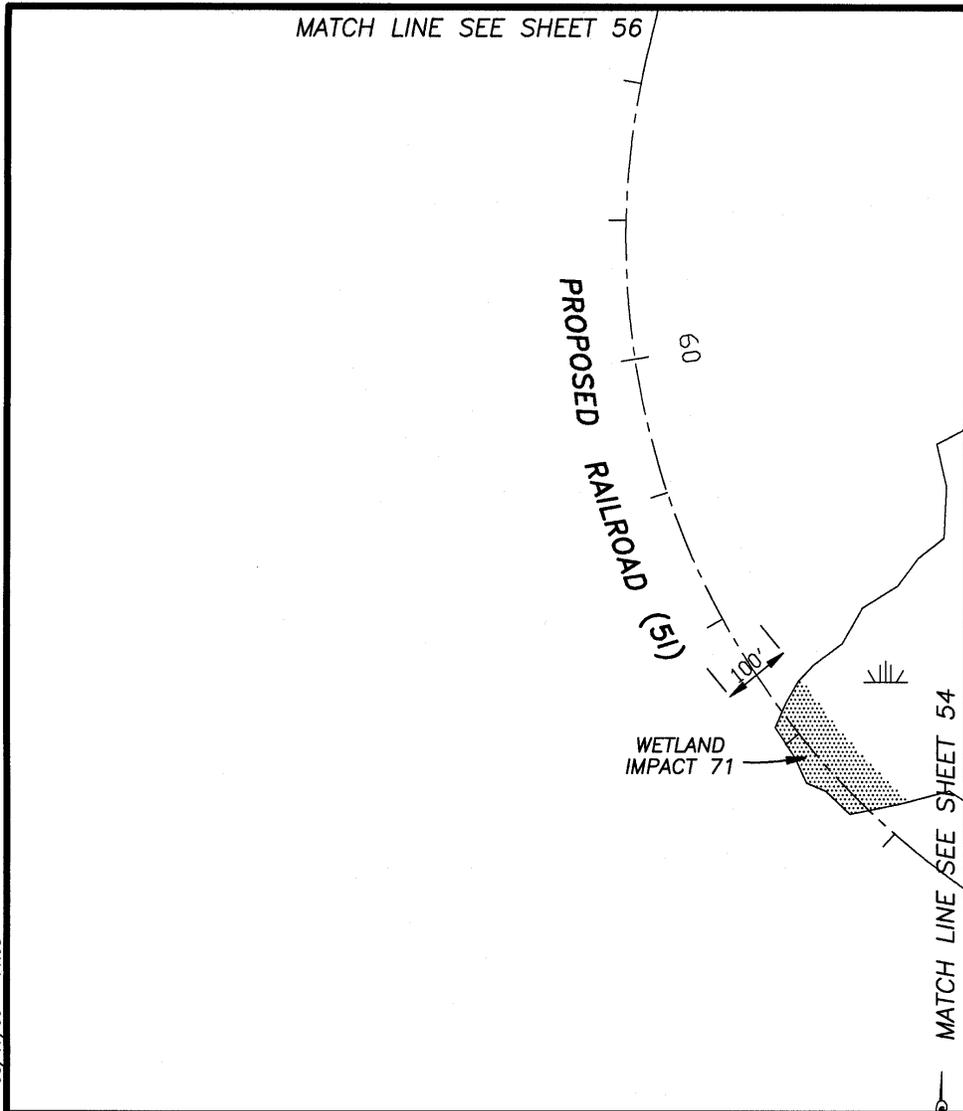
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**ROAD AND RAIL
PLAN VIEW**

SHEET 54 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

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LEGEND
 Wetlands to be Filled

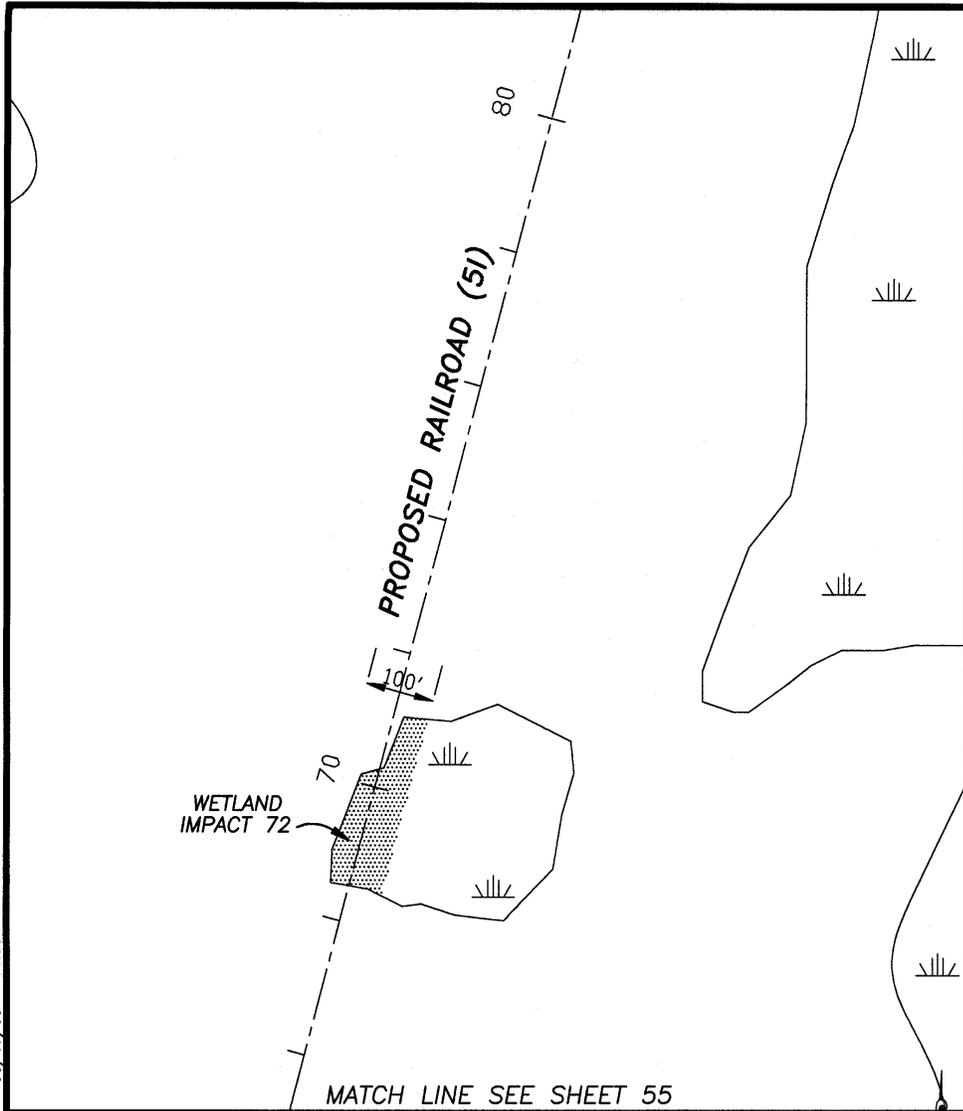
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**ROAD AND RAIL
 PLAN VIEW**

SHEET 55 OF 71 DATE: AUG. 1999



LEGEND

Wetlands to be Filled

Scale 1" = 200'
Scale in feet

DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

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ROAD AND RAIL PLAN VIEW

SHEET 56 OF 71 DATE: AUG. 1999

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Wetland Impacts 1 - 14

A large cordgrass/needlerush tidal marsh adjacent to the Cooper River and Beresford Creek. Impacts to this marsh will consist of shading from the 86-ft wide pile-supported access road. The 15-ft wide rail trestle will result in negligible shading to the marsh beneath the trestle.

Wetland Impacts 15 - 16

The open water portion of Beresford Creek. The road and rail bridges will cross approximately 0.2 and 0.04 acres of this stream, respectively. No long term impacts are expected to the open water portion of the stream beneath the bridges.

Wetland Impacts 17 - 27

A large cordgrass/needlerush tidal marsh north of Beresford Creek. Impacts to this marsh will consist of shading from the 86-ft wide pile-supported access road. The 15-ft wide rail trestle will result in negligible shading to the marsh beneath the trestle.

Wetland Impact 28

A predominantly freshwater wetland. This forested wetland contains water oak, longleaf pine, cabbage palm, and wax myrtle. Portions of this wetland appear to become inundated by salt water during high, storm-driven tides. The rail trestle will cross approximately 0.1 acre of this wetland. Impacts include limited shading from the trestle and cutting of woody vegetation (trees) beneath the trestle.

Wetland Impacts 29 - 31

A cordgrass/needlerush tidal marsh along Clouter Creek. The 15-ft wide rail trestle will result in negligible shading to the marsh beneath the trestle.

Wetland Impact 32

A forested ravine with a spring seep that flows west to a salt marsh. The rail line will cross approximately 0.1 acres of this wetland on fill.

Wetland Impact 33 - 37

A hardwood forested stream wetland. This wetland consists of several small streams that converge at the south end of the wetland. At least two small springs and the remains of a springhouse or still are located along the southeast side of the wetland. The rail line will cross approximately 1.0 acre of this wetland on fill.

Wetland Impact 38

A series of forested ravines with large *Liriodendron tulipifera* and magnolias. Sweet gum and bays are also common. A permanent stream from the large sand mine east of the alignment flows through the wetland. Other wet weather stream channels are evident. These flow to a large hardwood bottomland wetland adjacent to the tidal marshes along Yellow House Creek. The rail line will cross approximately 1.0 acres of this wetland on fill.

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STATE PORTS AUTHORITY

WETLAND DESCRIPTIONS

SHEET 57 OF 71 DATE: AUG. 1999

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Wetland Impacts 39 - 40

A stream hardwood bottom. A deep ravine with an intermittent stream at or near the surface. Magnolia, laurel oak, wax myrtle, red bay, sweetgum, and *Lyonia* common throughout. The rail line will cross approximately 0.3 acre of this wetland on fill.

Wetland Impacts 41 - 44

A series of forested seepage slopes with small streams that flow from east to west to the tidal marshes along Yellow House Creek. Soil consists of wet muck. *Liriodendron tulipifera* and sweetgum common. *Peltandra* sp. and sphagnum present in streams. The rail line will cross approximately 1.7 acres of this wetland on fill.

Wetland Impacts 45 - 46

A shrub wetland with no overstory. Dense chain fern, *Vaccinium*, *Lyonia*, wax myrtle and small bays also present. Appears to be an isolated wetland. The rail line will cross approximately 0.5 acre of this wetland on fill.

Wetland Impact 47

Predominantly a grassy/shrubby wetland with scattered *Nyssa* west of alignment. Chainfern throughout. Appears to be an isolated wetland. The rail line will cross approximately 0.5 acre of this wetland on fill.

Wetland Impact 48

This wetland begins as an extensive *Nyssa/Lyonia* swamp system. Numerous gums and dense chain fern dominate the east and central portions of this wetland. *Lyonia* dominates the west half of the wetland. The rail line will cross approximately 2.8 acres of this wetland on fill.

Note: The wetlands containing wetland impacts 48 - 51 and 53 - 60 are all hydrologically connected and form the headwaters of Martin Creek.

Wetland Impacts 49 and 51

A predominantly shrub wetland. This wetland is part of a large mixed wetland complex that extends several thousand feet to the south and southeast and eventually drains to Martin Creek. Where the rail alignment crosses the east portion of this wetland *Persea*, chain fern, and cinnamon fern are common throughout with scattered pond pine and *Nyssa*. The eastern portion of this wetland contains a shrubby seepage slope with evidence of heavy disturbance from firebreaks and hurricane damage. The eastern half of this wetland also contains a pond pine woodland/shrub wetland. Pond pine and *Persea* with extremely dense *Lyonia* and *Clethra* dominate the overstory and shrub layers. Scattered *Nyssa* occurs throughout the eastern portion of the wetland. The rail line will cross approximately 3.9 acres of this wetland on fill.

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WETLAND DESCRIPTIONS

SHEET 58 OF 71 DATE: AUG. 1999

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Wetland Impact 50

An isolated shrub wetland with chainfern and *Peresa* throughout. Sphagnum and pitcher plants are also common. The rail line will cross approximately 0.3 acre of this wetland on fill.

Wetland Impact 52

A small, isolated pond pine woodland/shrub wetland. Dominant species are pond pine with dense *Peresa*. Chain fern and *Xyris elliottii* common throughout. The rail line will cross all of this wetland (0.1 acre) on fill.

Wetland Impacts 53 - 56

A forested wetland with two stream crossings (Wetland Impacts 53 and 54). The south crossing is a small, intermittent stream crossing with sweetgum, bays, and blackberries. *Clethra* and maidencane dense at margins. This intermittent stream is a tributary to Martin Creek. The north stream crossing is Martin Creek and contains vegetation similar to the south crossing. This permanent stream drains the large wetland system to the northeast. The rail line will cross approximately 1.1 acres of this wetland on fill.

Wetland Impact 57

A large swamp gum/shrub wetland containing a permanent stream (Martin Creek). Overstory contains large sweetgums, black gum, and other hardwoods. Understory varies from open to thick shrub (*Lyonia*, *Clethra*, small bays). Large blowdown trees, presumably from Hurricane Hugo, occur throughout. The rail line will cross approximately 0.1 acre of this wetland on fill.

Wetland Impact 58 - 60

A large, mixed woodland/shrub wetland with moderately dense *Lyonia*, longleaf pine, and bays. Portions of a stream swamp forest are also within the impact area within this wetland. Wetland drains to Martin Creek. The rail line will cross approximately 2.3 acres of this wetland on fill.

Wetland Impact 61

A longleaf pine-dominated woodland/shrub wetland with *Lyonia*, *Ilex glabra*, small bays, scattered chain fern, and sphagnum moss. The rail line will cross approximately 0.6 acre of this wetland on fill.

Wetland Impact 62 - 66

A series of small tributaries to Flag Creek. Wetland consists of a mix of forested hardwoods (*Quercus*, sweetgum, red maple), *Nyssa*, and *Peresa* with dense margins of *Clethra* and *Lyonia*. The north portion of this wetland that is crossed by the rail alignment is located beneath a high voltage power line and has been cleared of most woody vegetation. Remaining vegetation includes cattails and *Lyonia*. The rail line will cross approximately 1.6 acres of this wetland on fill.

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WETLAND DESCRIPTIONS

SHEET 59 OF 71 DATE: AUG. 1999

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Wetland Impact 67

Flag Creek (also shown as Pepper Gully on some maps) crossing in the Francis Marion National Forest. A forested stream swamp with dense margins of *Clethra*, *Lyonia*, and *Persea*. Interior of magnolias, *Ilex glabra*, and large *Nyssa*. Water flow in stream is apparently year-round. The rail line will cross approximately 1.4 acres of this wetland on fill.

Wetland Impact 68

An isolated, predominantly herbaceous wetland in the Francis Marion National Forest. *Dichromena* and *Polygala simosa* are common throughout. *Nyssa* is common in south end of wetland. The rail line will cross approximately 0.4 acre of this wetland on fill.

Wetland Impact 69 - 71

A large swamp gum/shrub swamp dominated by *Nyssa*, with dense *Lyonia*. The east edge of the rail alignment intersects the margin of this wetland. The rail line will cross approximately 0.4 acre of this wetland on fill.

Wetland Impact 72

An isolated swamp gum woodland wetland. Common vegetative species include *Persea*, red maple, buttonbush, and chainfern. The rail line will cross approximately 0.4 acre of this wetland on fill.

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WETLAND DESCRIPTIONS

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Essential Fish Habitat	Impact Source - Location	Impact Quantity	Impact Type	Council-Managed Species Affected
Estuarine Emergent Wetlands (Salt Marsh)	Dredge – Cooper Berth Dredge – Wando Berth Fill – Cooper Wharves and Container Yard Fill – Wando Wharves and Container Yard Shading/Piles – Elevated Road	6.1 acres 1.9 acres 49.7 acres 9.3 acres 2.6 acres Total – 69.6 acres	Habitat Loss Habitat Loss Habitat Loss Habitat Loss Habitat Modification	1,2,3,4 1,2,3,4 1,2,3,4 1,2,3,4 1,2,3,4
Oyster Reefs and Shell Banks	Dredge/Fill – Wando Berth/Wharf	2 beds – 1830 ft ² total	Habitat Loss	Oysters (not Council managed)
Intertidal Flats	Dredge/Fill – Cooper and Wando Berths and Wharves	Marginal – acreage included in salt marsh (above)	Habitat Loss	1,2,3,4
Palustrine Emergent and Forested Wetlands	Fill – Rail Line	13.3 acres	Habitat Loss	1,2,3,4
Estuarine Water Column (Open Water)	Dredge – Cooper Berths Dredge – Wando Berths Partial Fill – Cooper Wharves Partial Fill – Wando Wharves Fill – Cooper Container Yard Fill – Wando Container Yard Increased Shipping – Shipping Channel	16.2 acres 15.3 acres 13.0 acres 4.5 acres 20.8 acres 0.1 acre 6 to 7 more ships per day compared to current levels	Habitat Modification Habitat Modification Habitat Modification Habitat Modification Habitat Loss Habitat Loss Habitat Disturbance	1,2,3,4,6 1,2,3,4,6 1,2,3,4,6 1,2,3,4,6 1,2,3,4,6 1,2,3,4,6 1,2,3,4,6
Sargassum	Disturbance from ship traffic – Shipping Channel	None to minimal	Habitat Disturbance	5
Marine Water Column (Open Water)	Increased Shipping – Shipping Channel Dredged Material Disposal - ODMS	6 to 7 more ships per day compared to current levels 12 million cubic yards	Habitat Disturbance Habitat Disturbance	None 1,3,4,6

- (1) penaid shrimp
- (2) red drum
- (3) snapper grouper complex
- (4) coastal migratory pelagics
- (5) Sargassum
- (6) corals (octocorals and/or Pennatulacea)

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DATUM: HORIZ: NAD83
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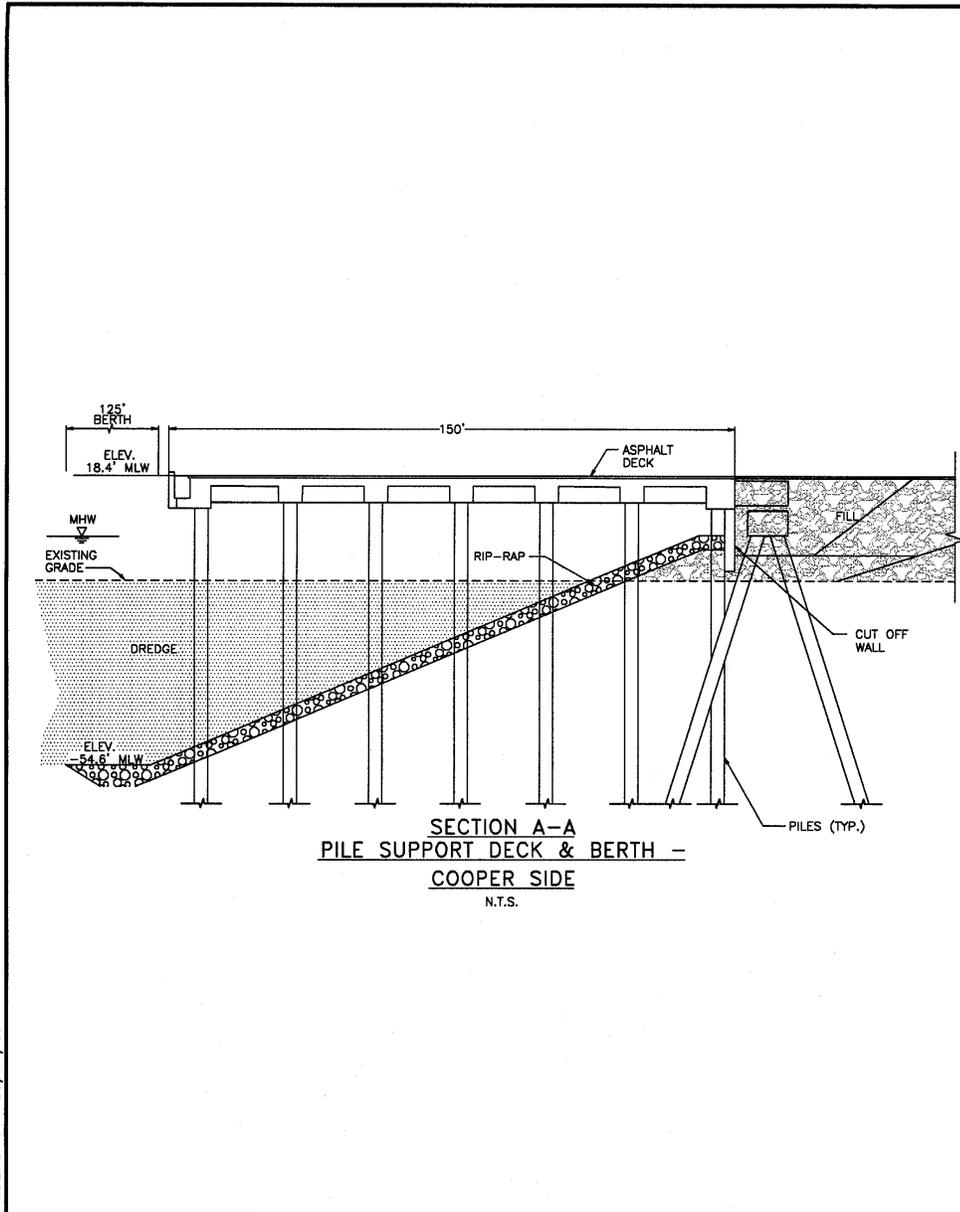
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APPLICATION BY: SOUTH CAROLINA STATE PORTS AUTHORITY

IMPACTS TO ESSENTIAL FISH HABITAT

SHEET 61 OF 71 DATE: AUG. 1999

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SECTION A-A
 PILE SUPPORT DECK & BERTH -
 COOPER SIDE
 N.T.S.

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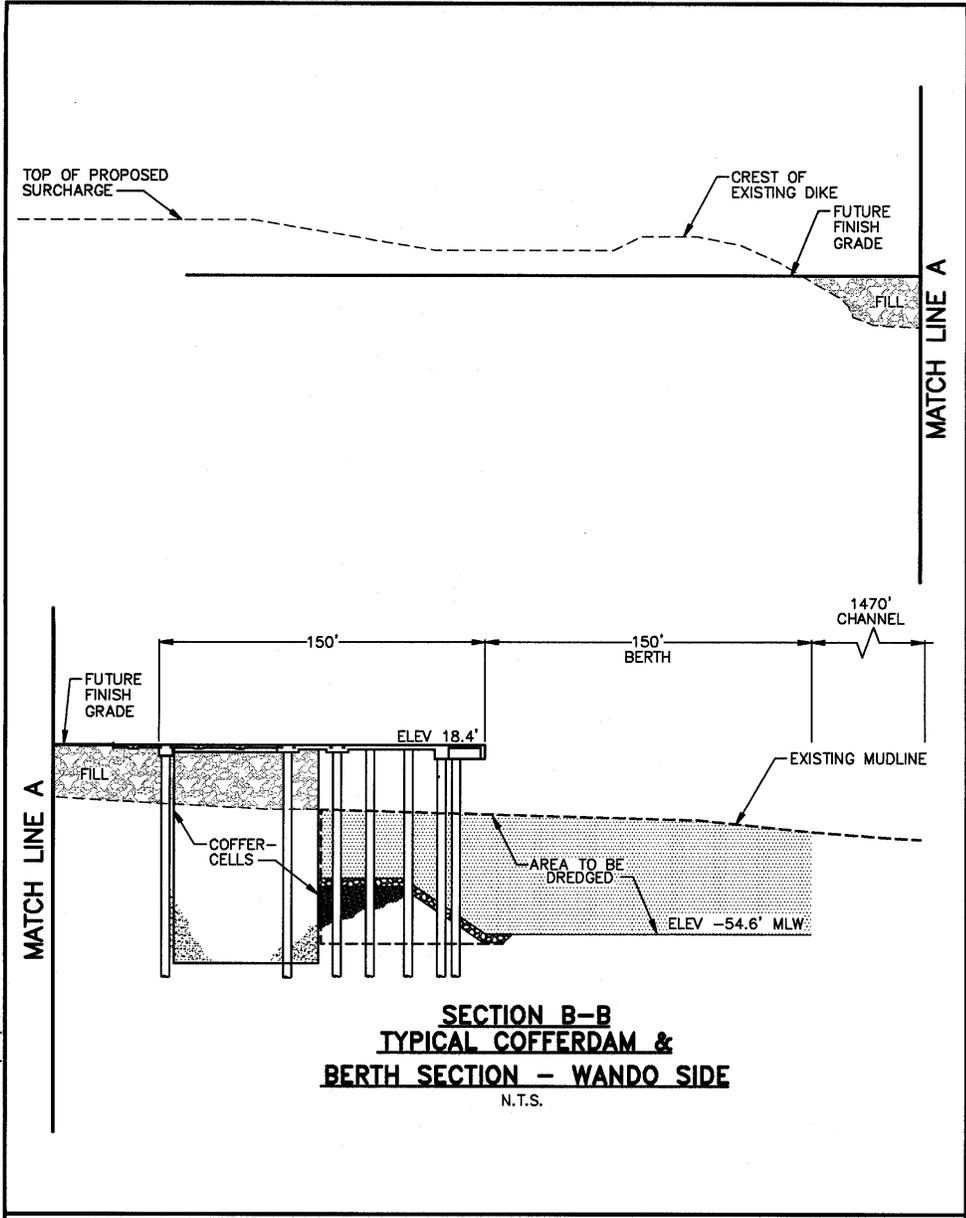
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 STATE PORTS AUTHORITY

**WHARF DESIGN
 COOPER RIVER**

SHEET 62 OF 71 DATE: AUG. 1999

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**SECTION B-B
TYPICAL COFFERDAM &
BERTH SECTION - WANDO SIDE**
N.T.S.

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DATUM: HORIZ: NAD83
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**COFFERDAM DETAIL
WANDO RIVER**

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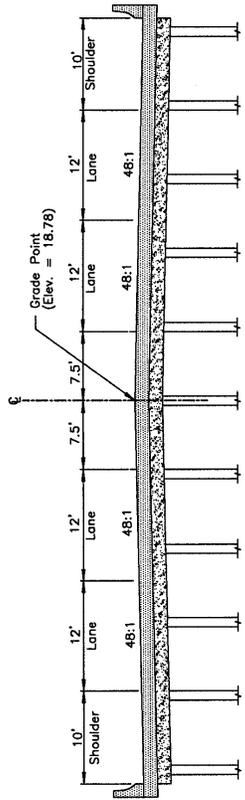
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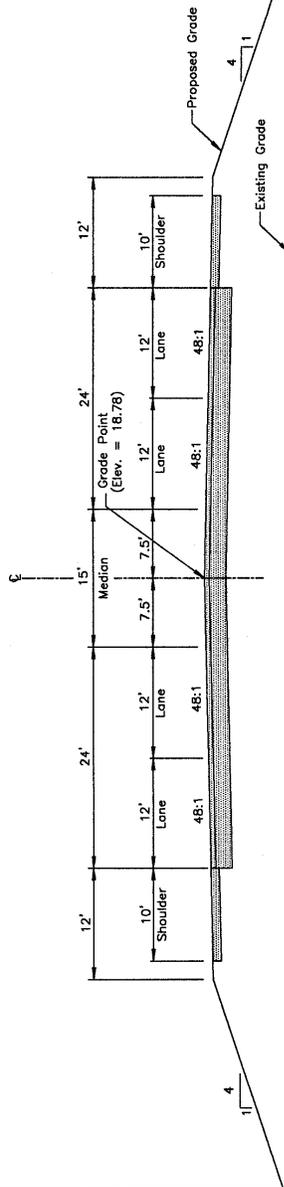
DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

**TYPICAL ACCESS
 ROAD SECTION**

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**TYPICAL 5-LANE ACCESS ROAD BRIDGE SECTION
 OVER WETLANDS**
 N.T.S.



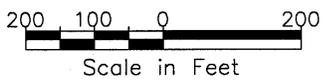
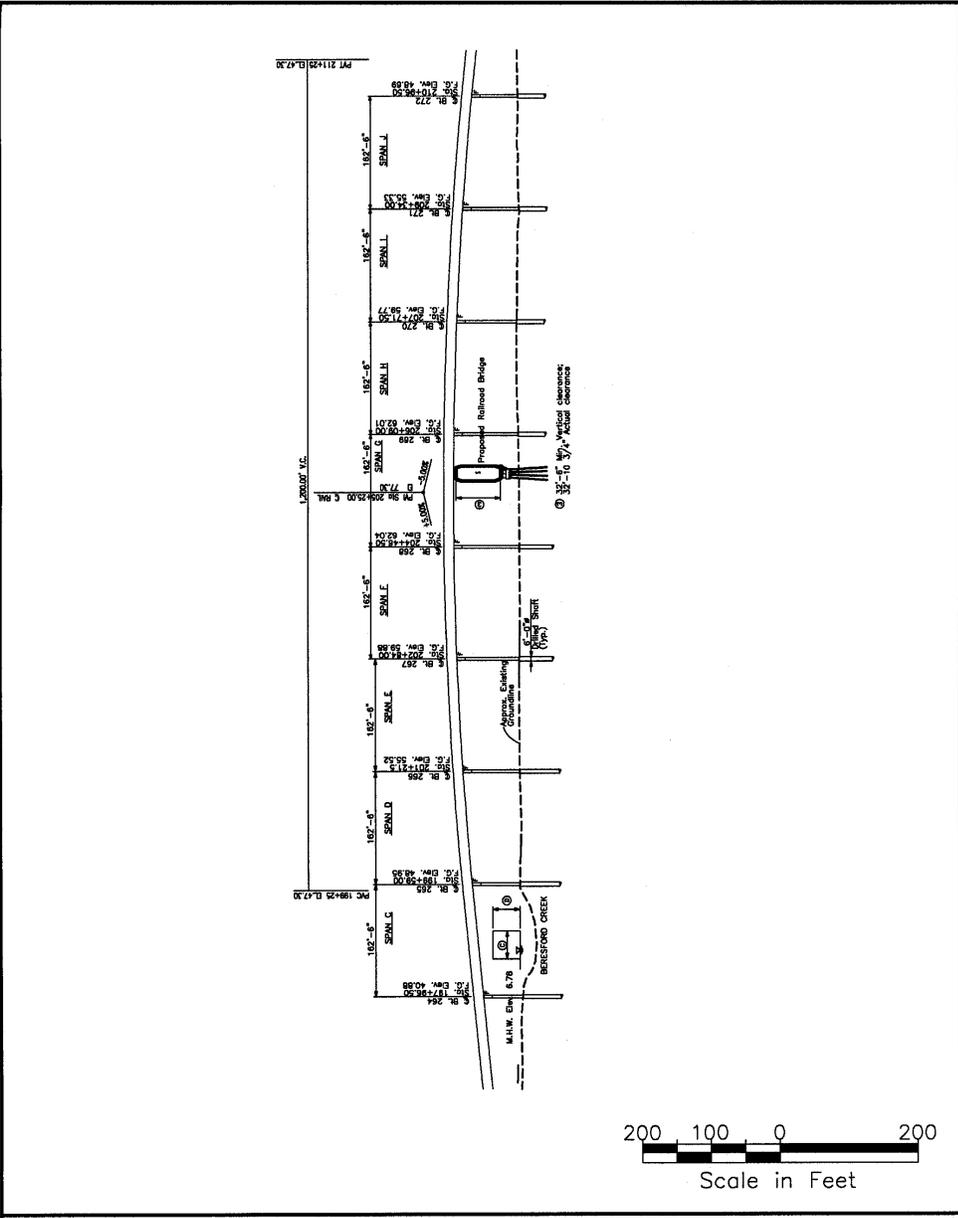
**TYPICAL 5-LANE ACCESS ROAD SECTION
 IN UPLANDS**
 N.T.S.

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STATE PORTS AUTHORITY

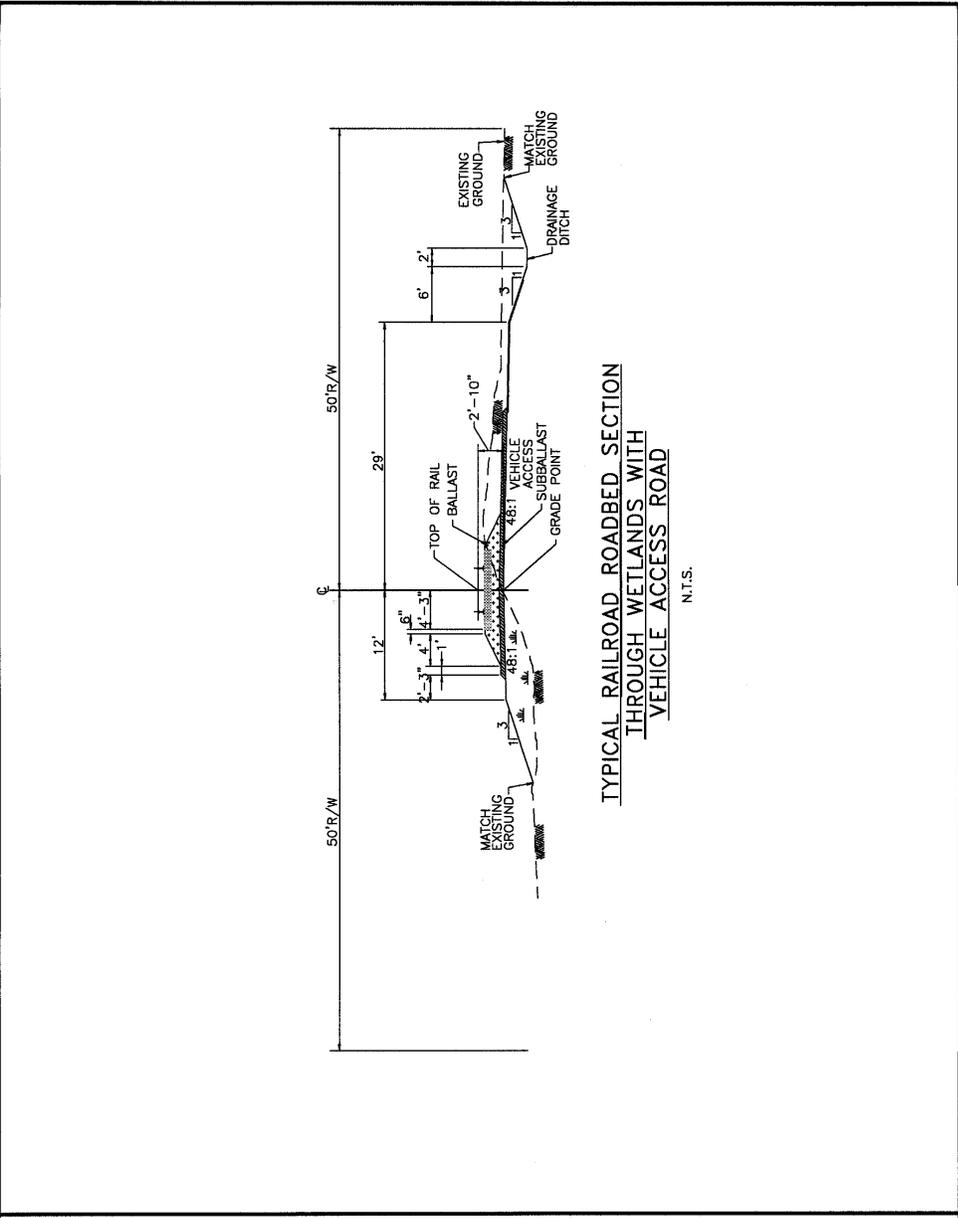
**PROFILE ROAD BRIDGE
OVER BERESFORD CREEK**

SHEET 65 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

B. DOUGLAS
R. DANIELIS \TYPRSEC.DWG 08/17/99



TYPICAL RAILROAD ROADBED SECTION
THROUGH WETLANDS WITH
VEHICLE ACCESS ROAD
N.T.S.

DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA
STATE PORTS AUTHORITY

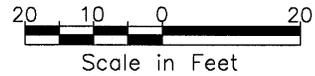
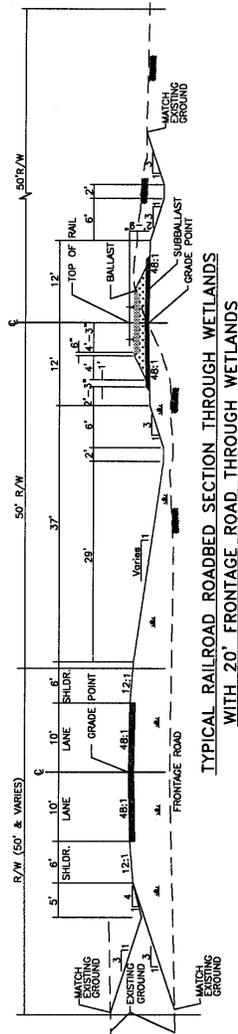
TYPICAL RAILROAD SECTION

SHEET 66 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

B. DOUGLAS
R. DANIELIS \ WSMITH \ TYPRES.DWG 08/17/99



DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

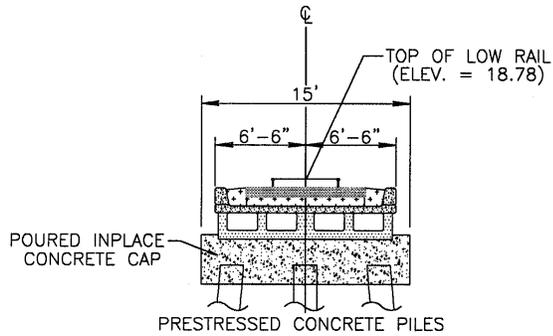
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA
STATE PORTS AUTHORITY

**TYPICAL
RAILROAD SECTION**

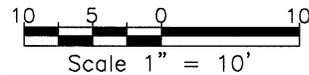
SHEET 67 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde



**TYPICAL SECTION
RAILROAD ON TRESTLE
OVER SALTWATER WETLANDS**



B. DOUGLAS
R. DANIELS \ TYPRESEC.DWG 08/18/99

DATUM: HORIZ: NAD83
VERT: MLW = MEAN LOW WATER

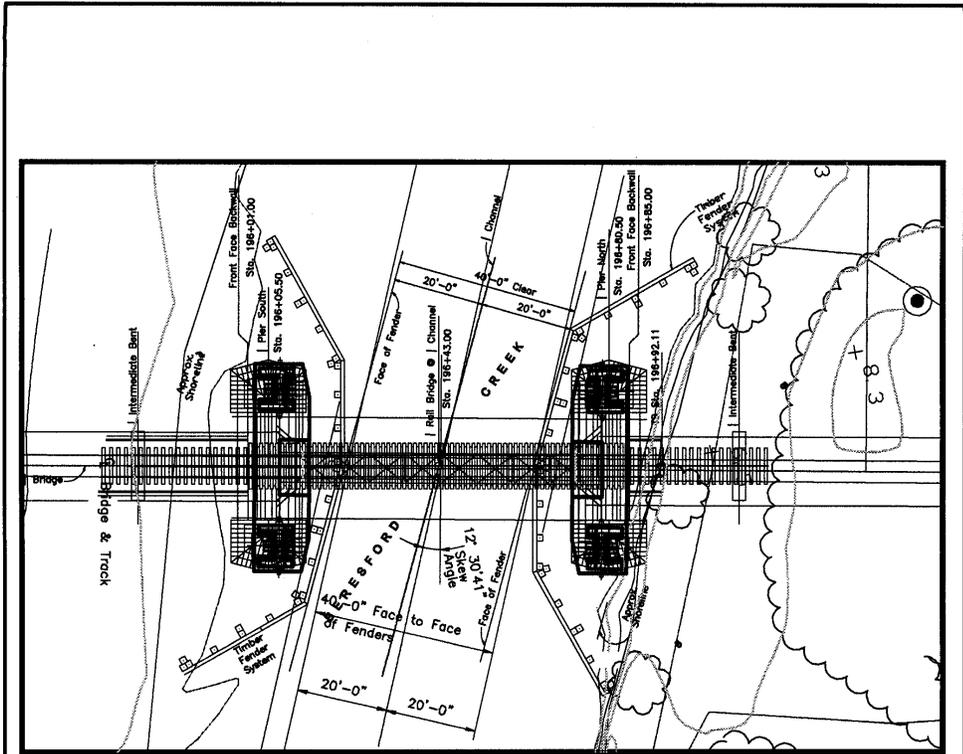
PROPOSED: DANIEL ISLAND TERMINAL
IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
AT: DANIEL ISLAND/CAINHOY PENINSULA
COUNTY OF: BERKELEY STATE: S.C.
APPLICATION BY: SOUTH CAROLINA
STATE PORTS AUTHORITY

**TYPICAL
RAILROAD SECTION**

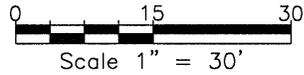
SHEET 68 OF 71 DATE: AUG. 1999

FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde



**PLAN VIEW
RAIL BRIDGE CROSSING AT BERESFORD CREEK**



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA
 STATE PORTS AUTHORITY

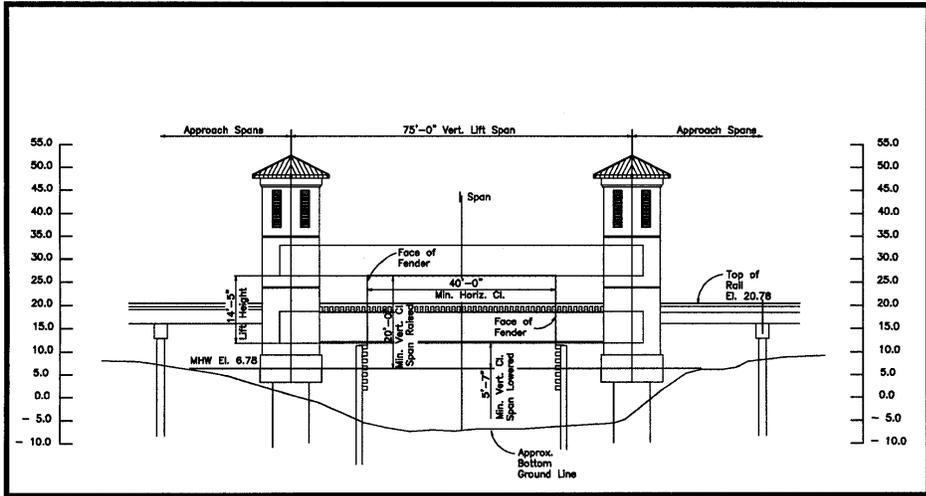
**PLAN VIEW OF RAIL
 BRIDGE CROSSING AT
 BERESFORD CREEK**

SHEET 69 OF 71 DATE: AUG.1999

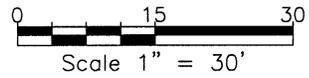
FOR PERMIT PURPOSES ONLY

URS Greiner Woodward Clyde

B. DOUGLAS
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ELEVATION



DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA
 STATE PORTS AUTHORITY

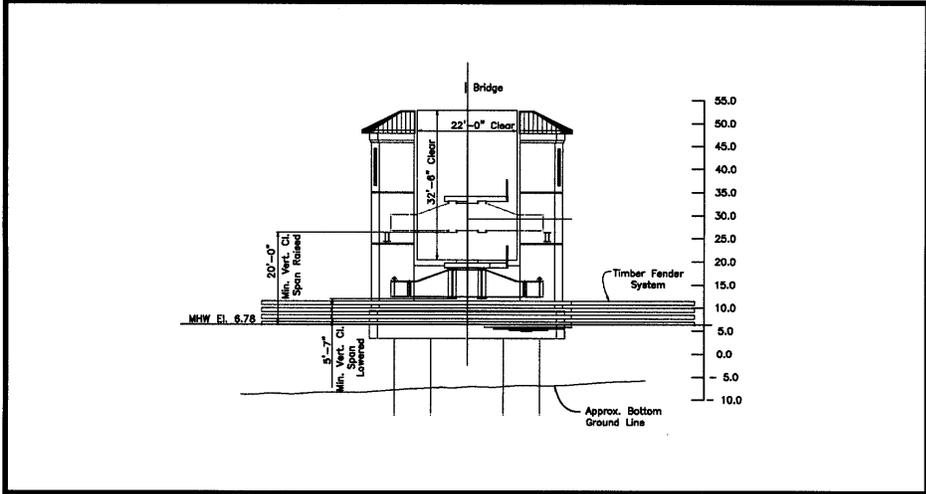
**ELEVATION VIEW OF RAIL
 BRIDGE CROSSING AT
 BERESFORD CREEK**

SHEET 70 OF 71 DATE: AUG.1999

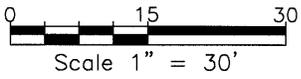
FOR PERMIT PURPOSES ONLY

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B. DOUGLAS
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SECTION



B. DOUGLAS
 R:\DANIELS\WSMITH\BRIDGDTL.DWG 08/18/99 12:13

DATUM: HORIZ: NAD83
 VERT: MLW = MEAN LOW WATER

PROPOSED: DANIEL ISLAND TERMINAL
 IN: COOPER RIVER/WANDO RIVER DRAINAGE BASINS
 AT: DANIEL ISLAND/CAINHOY PENINSULA
 COUNTY OF: BERKELEY STATE: S.C.
 APPLICATION BY: SOUTH CAROLINA
 STATE PORTS AUTHORITY

**SECTION OF RAIL
 BRIDGE CROSSING AT
 BERESFORD CREEK**

SHEET 71 OF 71 DATE: AUG.1999

FOR PERMIT PURPOSES ONLY

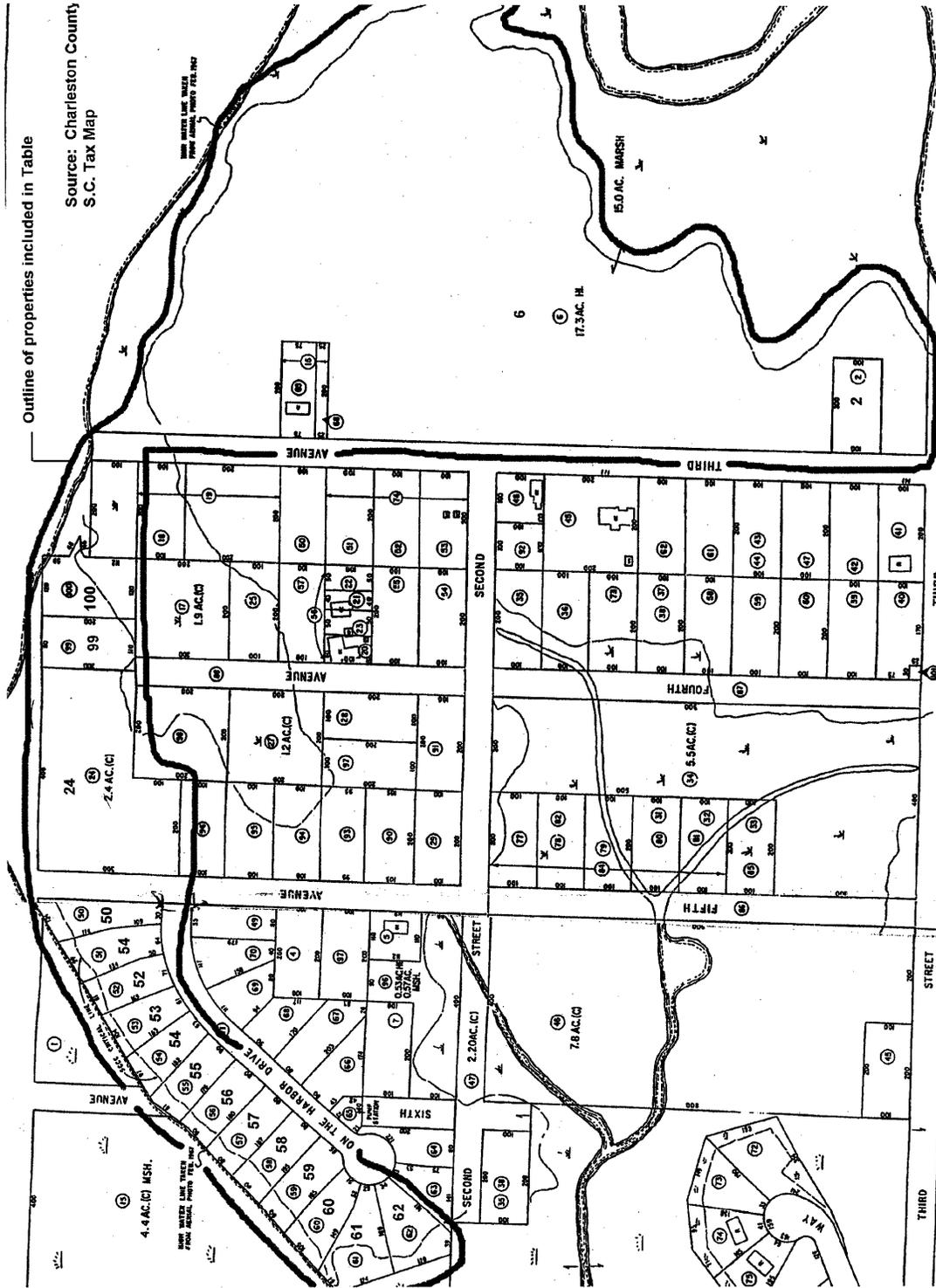
URS Greiner Woodward Clyde

**DANIEL ISLAND MARINE CARGO TERMINAL
JOINT PERMIT APPLICATION**

ADJACENT PROPERTY OWNERS

Outline of properties included in Table

Source: Charleston County
S.C. Tax Map

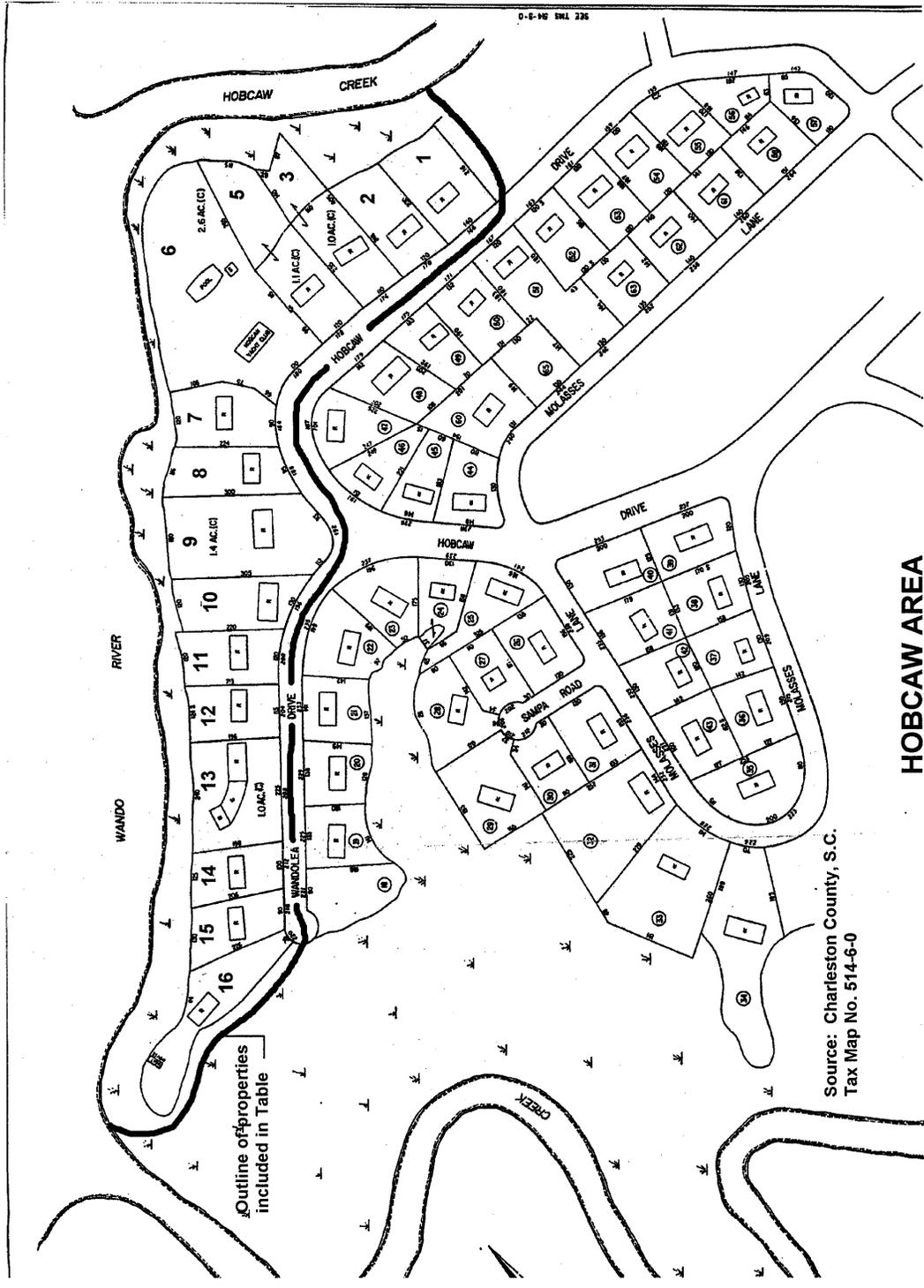


SCANLONVILLE AREA

**ADJACENT PROPERTY OWNERS
DEPARTMENT OF ARMY PERMIT APPLICATION
PROPOSED DANIEL ISLAND MARINE CARGO TERMINAL**

Note: Area and Map ID Number refers to appropriate map – see attached

Area	Map ID Number	Owner
Hobcaw Point	514-06-00-001	Rodenberg, John S & Catherine T.
Hobcaw Point	514-06-00-002	Marsh Raymond Jr. & Elizabeth W.
Hobcaw Point	514-06-00-003	Rike Katharyne H. & James H.
Hobcaw Point	514-06-00-005	Adams Mary M.
Hobcaw Point	514-06-00-006	Hobcaw Yacht Club The/CR
Hobcaw Point	514-06-00-007	Kosnik Sally Jo
Hobcaw Point	514-06-00-008	Farrah Mary F.
Hobcaw Point	514-06-00-009	Hawkins Louise P. & David J.
Hobcaw Point	514-06-00-010	Richards Robert A.
Hobcaw Point	514-06-00-011	Webster Martha Elizabeth/EA/CR
Hobcaw Point	514-06-00-012	Carpenter Catherine H. & Edwin J.
Hobcaw Point	514-06-00-013	Hawkins June E.
Hobcaw Point	514-06-00-014	Mayfield William A.
Hobcaw Point	514-06-00-015	Jefferies James Stocker
Hobcaw Point	514-06-00-016	Gaillard William Lucas//RR/LE/EA Life Estate



Outline of properties included in Table

Source: Charleston County, S.C.
Tax Map No. 514-6-0

HOBCAW AREA

**ADJACENT PROPERTY OWNERS
DEPARTMENT OF ARMY PERMIT APPLICATION
PROPOSED DANIEL ISLAND MARINE CARGO TERMINAL**

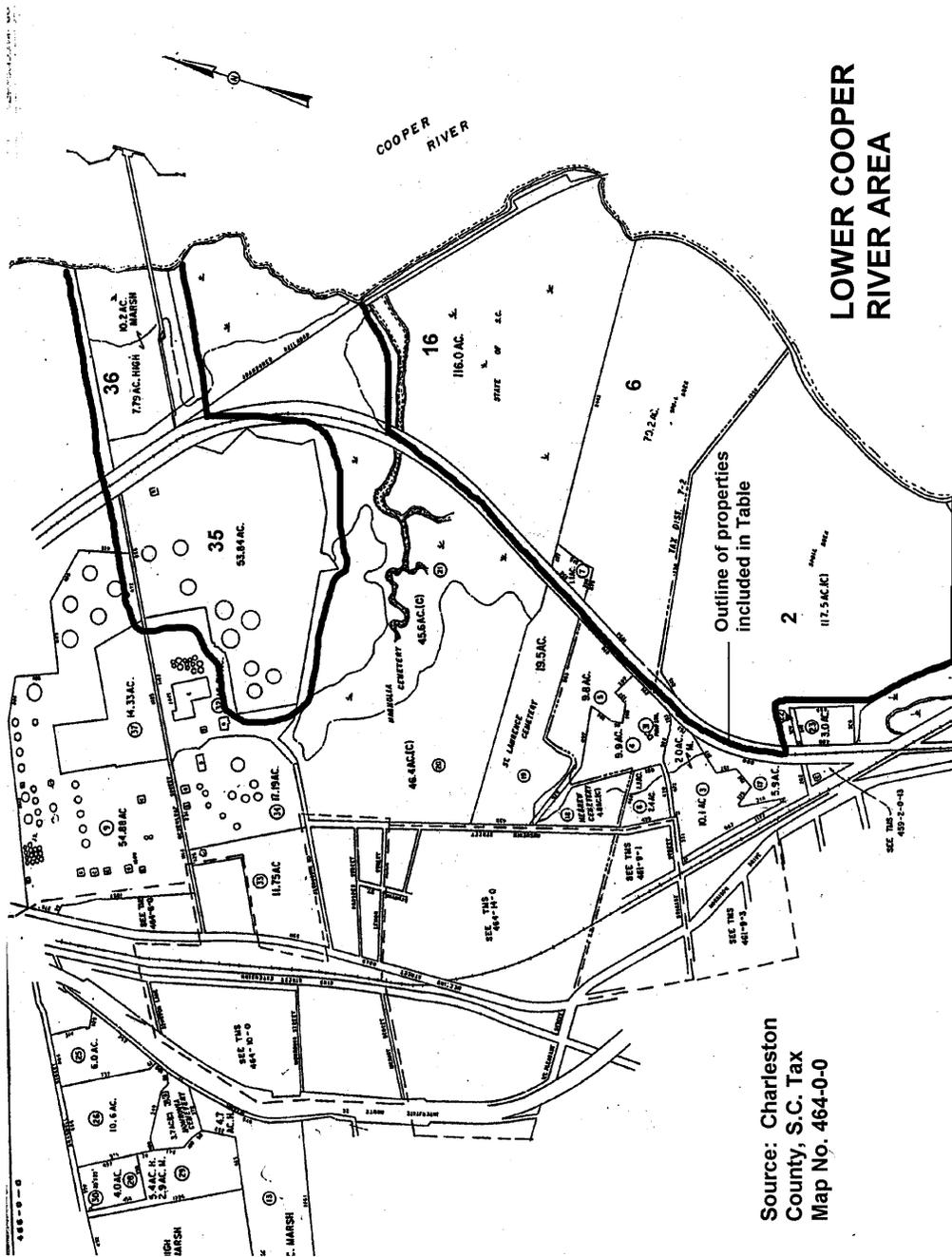
Note: Area and Map ID Number refers to appropriate map – see attached

Area	Map ID Number	Owner
Lower Cooper River	464-00-00-002	Holston Land CO/CR C/O Tax Dept. Family Line
Lower Cooper River	464-00-00-006	Beach Co The
Lower Cooper River	464-00-00-016	State of South Carolina/CR C/O Governor Richard Ril
Lower Cooper River	464-00-00-035	Allied Terminals Inc./CR C/O Michael E. Law Presid
Lower Cooper River	464-00-00-036	Allied Terminals Inc./CR C/O Michael E. Law Presid

**ADJACENT PROPERTY OWNERS
DEPARTMENT OF ARMY PERMIT APPLICATION
PROPOSED DANIEL ISLAND MARINE CARGO TERMINAL**

Note: Area and Map ID Number refers to appropriate map – see attached

Area	Map ID Number	Owner
Lower Cooper River	464-00-00-002	Holston Land CO/CR C/O Tax Dept. Family Line
Lower Cooper River	464-00-00-006	Beach Co The
Lower Cooper River	464-00-00-016	State of South Carolina/CR C/O Governor Richard Ril
Lower Cooper River	464-00-00-035	Allied Terminals Inc./CR C/O Michael E. Law Presid
Lower Cooper River	464-00-00-036	Allied Terminals Inc./CR C/O Michael E. Law Presid



**LOWER COOPER
RIVER AREA**

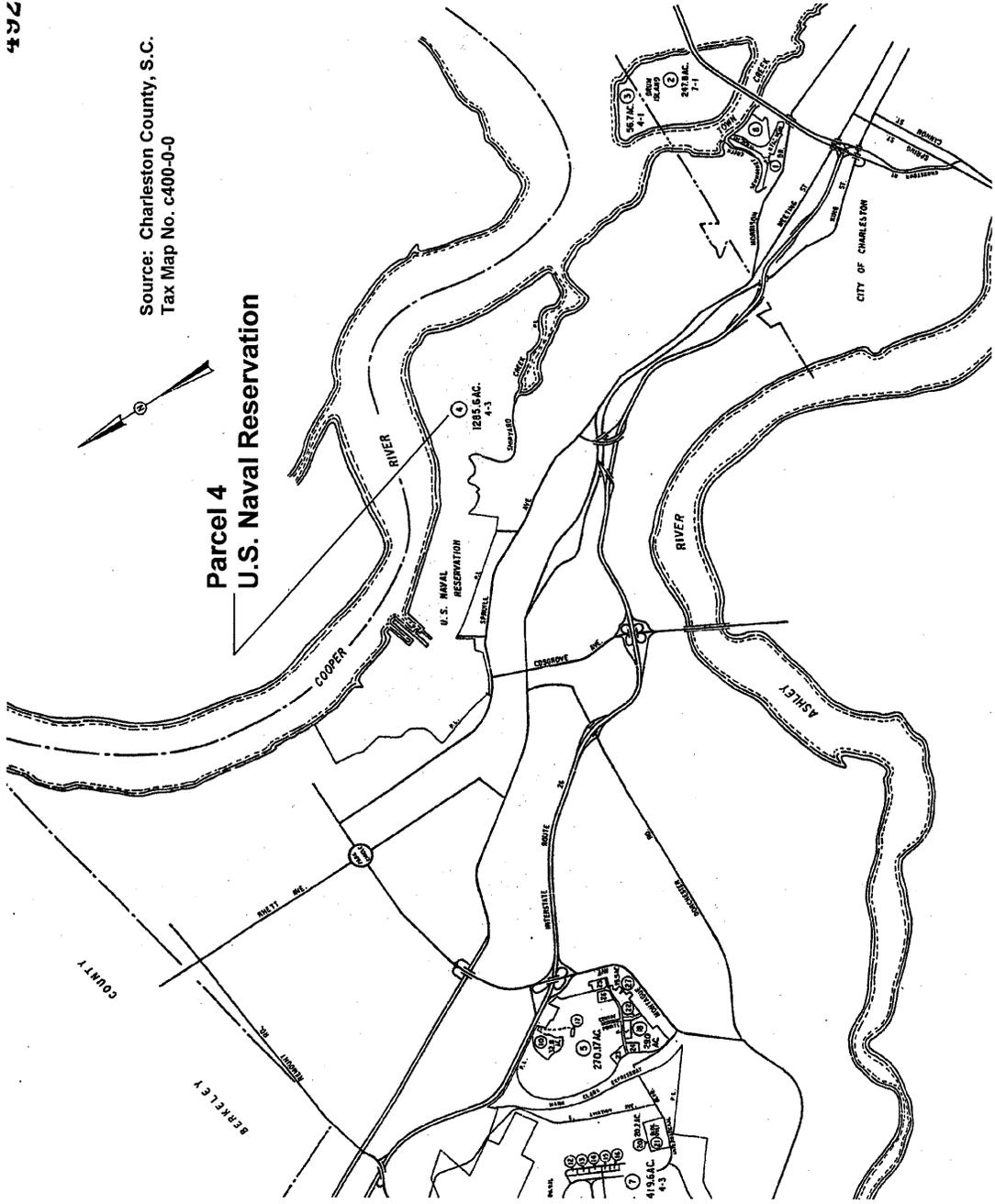
Outline of properties
included in Table

Source: Charleston
County, S.C. Tax
Map No. 464-0-0

Source: Charleston County, S.C.
Tax Map No. c400-0-0



Parcel 4 U.S. Naval Reservation



**ADJACENT PROPERTY OWNERS
DEPARTMENT OF ARMY PERMIT APPLICATION
PROPOSED DANIEL ISLAND MARINE CARGO TERMINAL**

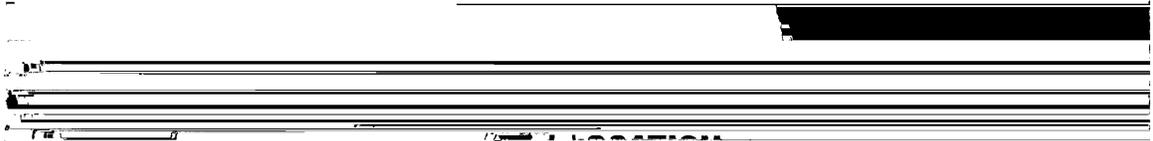
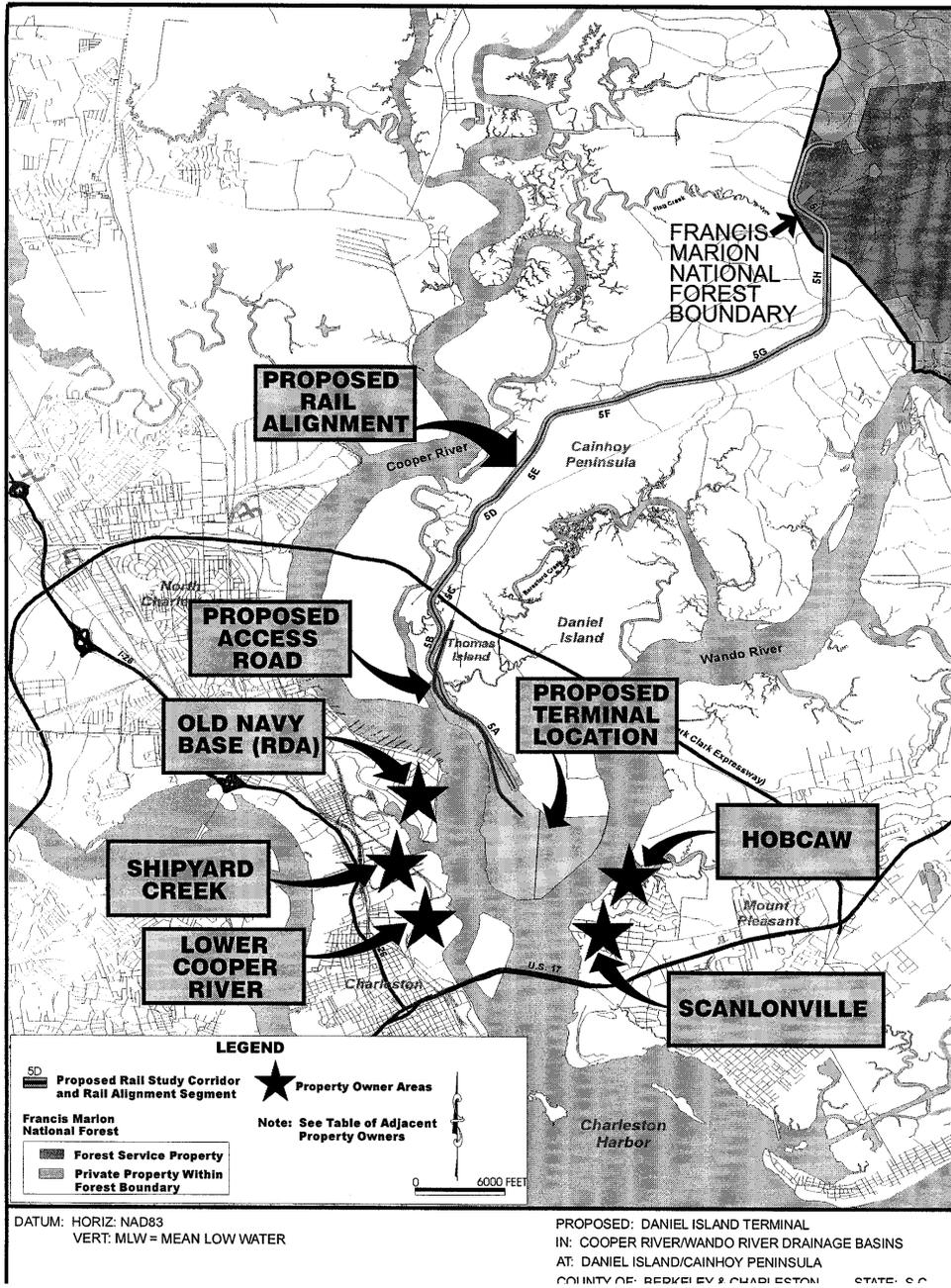
Note: Area and Map ID Number refers to appropriate map – see attached

Area	Map ID Number	Owner
Rail Alignment	1	Ralston Michael G & M Elizabeth
Rail Alignment	2,3,4,5,6,7	South Carolina State Ports Authority
Rail Alignment	8,9	Shaw George Jr.
Rail Alignment	10	Shaw George Heirs of/CR C/O Charlie Shaw
Rail Alignment	11	Chisolm Carl
Rail Alignment	12	Burns Manzy
Rail Alignment	13	Riley David
Rail Alignment	14	Riley David & Mary E
Rail Alignment	15	Perrineau Florence
Rail Alignment	16	Perrineau Grace Heirs of C/O Betty Ann Foy
Rail Alignment	17	Shaw Hershal R & Janice I
Rail Alignment	18	Brown Emory O Richard Weil
Rail Alignment	19	Dennis Benjamin
Rail Alignment	20,21	South Carolina State Ports Authority
Rail Alignment	23	Yom Tov LLC
Rail Alignment	24	Reformed Episcopal Church/CR
Rail Alignment	25	Myers Roy
Rail Alignment	27,29,30	South Carolina State Ports Authority
Rail Alignment	31	Wigfall Theodore
Rail Alignment	32	South Carolina State Ports Authority
Rail Alignment	34	Porcher Robert III
Rail Alignment	35	Nelson Julia F.
Rail Alignment	36	MLL
Rail Alignment	37	Nelson Richard E
Rail Alignment	38,39,40,41,42,43 ,44	South Carolina State Ports Authority
Rail Alignment	45	Bellinger Ben Heirs of C of Elizabeth Rivers/CR
Rail Alignment	46	Stoney Jane S/CR
Rail Alignment	47, 48	Clouter Creek Corporation/CR
Rail Alignment	49	Clouter Court LLC/CR
Rail Alignment	49	Cainhoy Park LCC
Rail Alignment	50,51	Carolina Trade Zone
Rail Alignment	52	Myers Nathaniel J
Rail Alignment	53	Myers Gloria F
Rail Alignment	54	Green-Myers Dev/CR
Rail Alignment	55	Green-Myers Dev/CR
Rail Alignment	56	Green Leon O
Rail Alignment	60	Green Jerome L.
Rail Alignment	61,62,63,64,65,66 ,67	South Carolina State Ports Authority
Rail Alignment	68	Simmons Leroy
Rail Alignment	69	Bennett Toney Heirs of/CR
Rail Alignment	70	South Carolina State Ports Authority

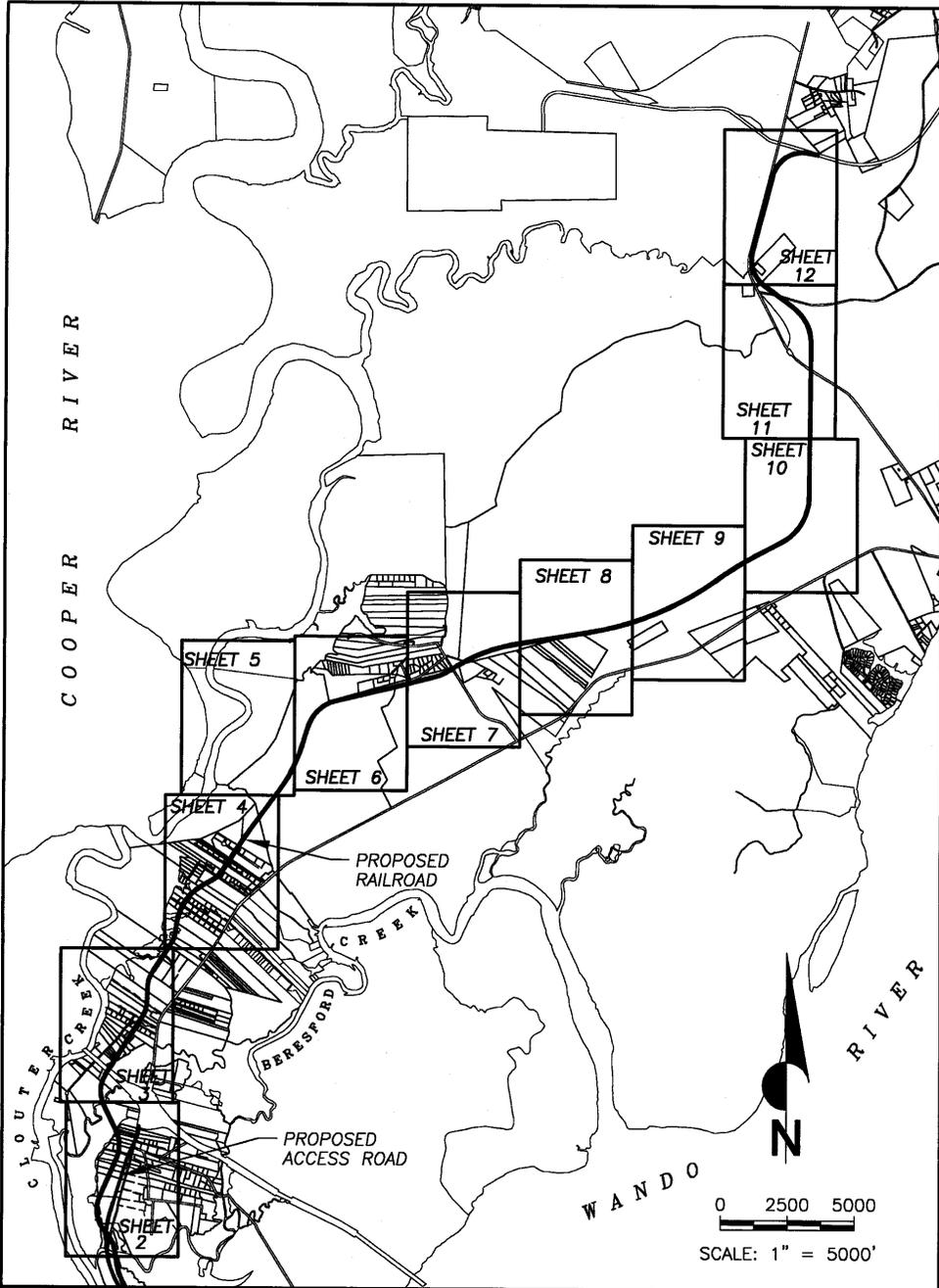
**ADJACENT PROPERTY OWNERS
DEPARTMENT OF ARMY PERMIT APPLICATION
PROPOSED DANIEL ISLAND MARINE CARGO TERMINAL**

Note: Area and Map ID Number refers to appropriate map – see attached

Rail Alignment	71	Rasool Farid
Rail Alignment	72,73,74,75,76,77	South Carolina State Ports Authority
Rail Alignment	78	CDS DEV/CR
Rail Alignment	79	Lawson-Johnston, Sr. Peter
Rail Alignment	80,82	South Carolina State Ports Authority
Rail Alignment	83	Alston Elias Heirs of C of Joseph Alston/CR
Rail Alignment	84	Green Patsy Heirs of C of Donna Green McCain/CR
Rail Alignment	A	Brown Louis
Rail Alignment	A-1	Lincoln Gladys
Rail Alignment	B	Mills Fortune Heirs of C of Clarence Mack/CR
Rail Alignment	C	Venning E Wallie Heirs of/CR C/O Isaiah Venning
Rail Alignment	D	Vander Smith Henry Jr. C/O Azile Owens-Todd
Rail Alignment	E, F	Dixon Geneva
Rail Alignment	G	Coles Emily Barnes
Rail Alignment	H	Williams Matiel



B. DOUGLAS
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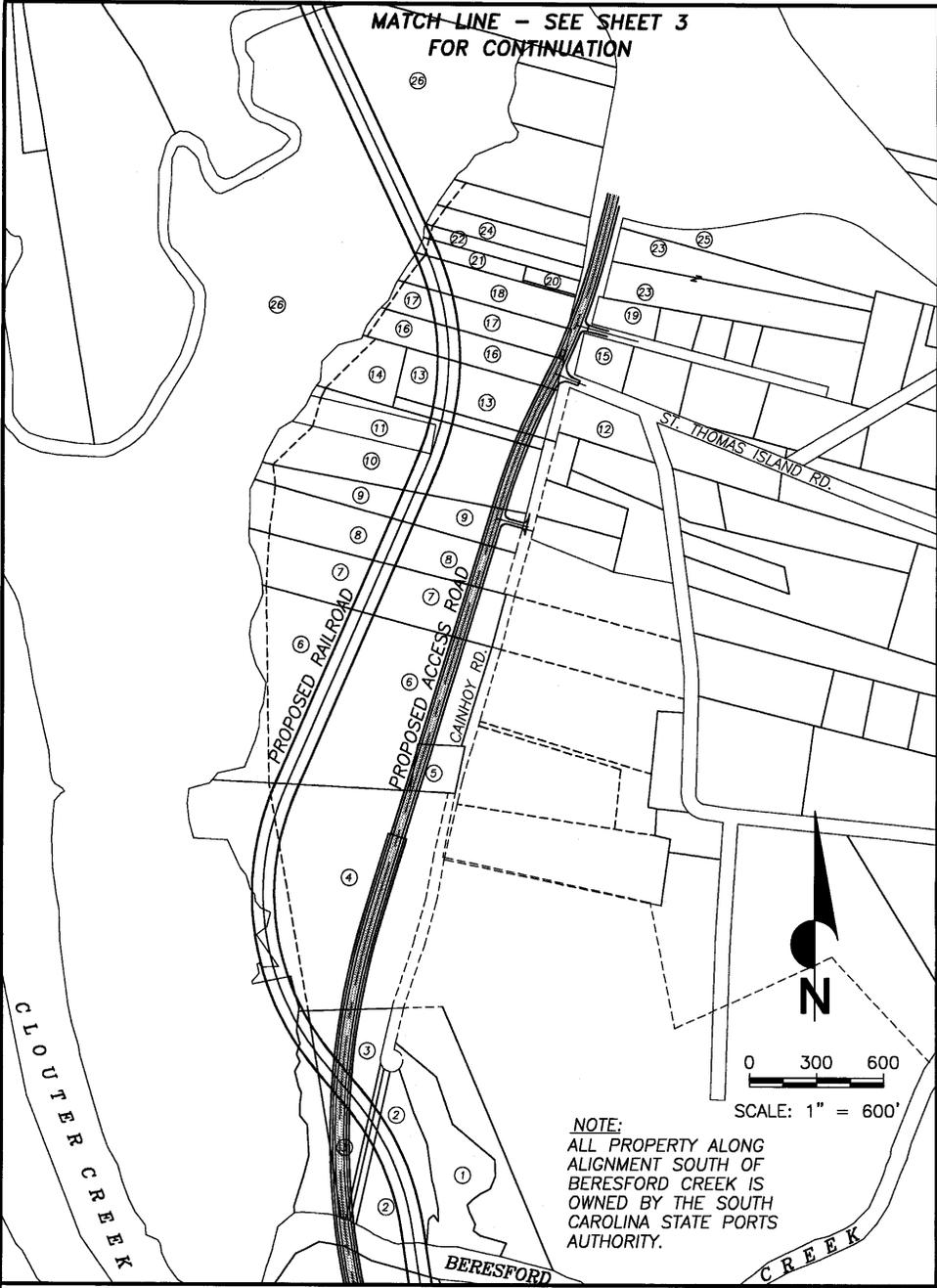


**KEY SHEET
PROPOSED RIGHT-OF-WAY
CURRENT PROPERTY OWNERS**

DATE: AUG. 1999

SHEET 1 OF 12

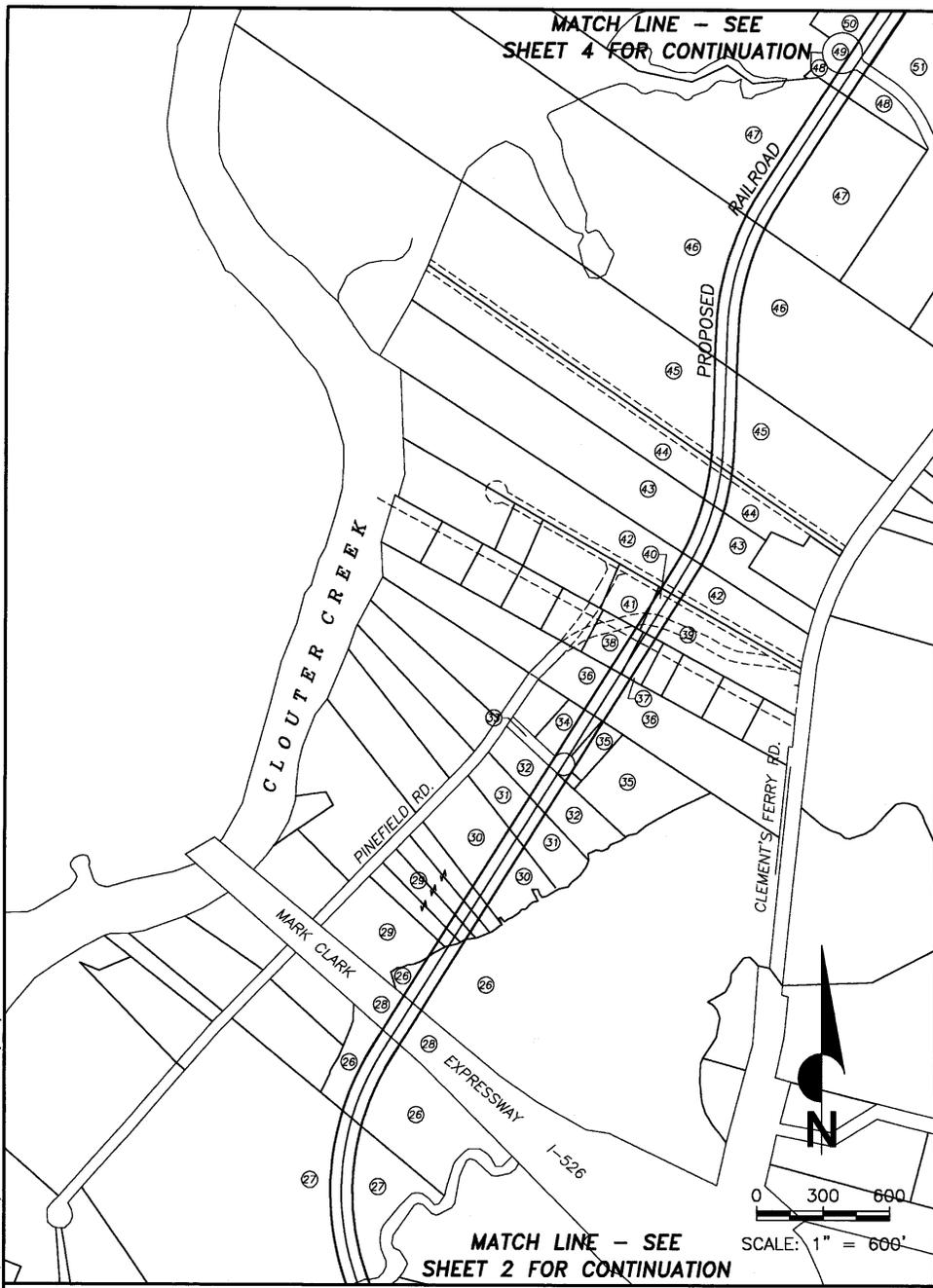
MATCH LINE - SEE SHEET 3
FOR CONTINUATION



B. DOUGLAS
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LEGEND
① PROPERTY ID NUMBER
DATE: AUG. 1999

**PROPOSED RIGHT-OF-WAY,
CURRENT PROPERTY OWNERS**

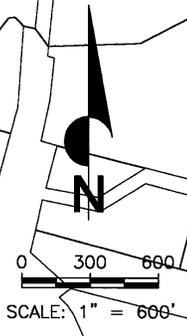


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LEGEND
 ① PROPERTY ID NUMBER
 DATE: AUG. 1999

MATCH LINE - SEE SHEET 2 FOR CONTINUATION

**PROPOSED RIGHT-OF-WAY,
 CURRENT PROPERTY OWNERS**





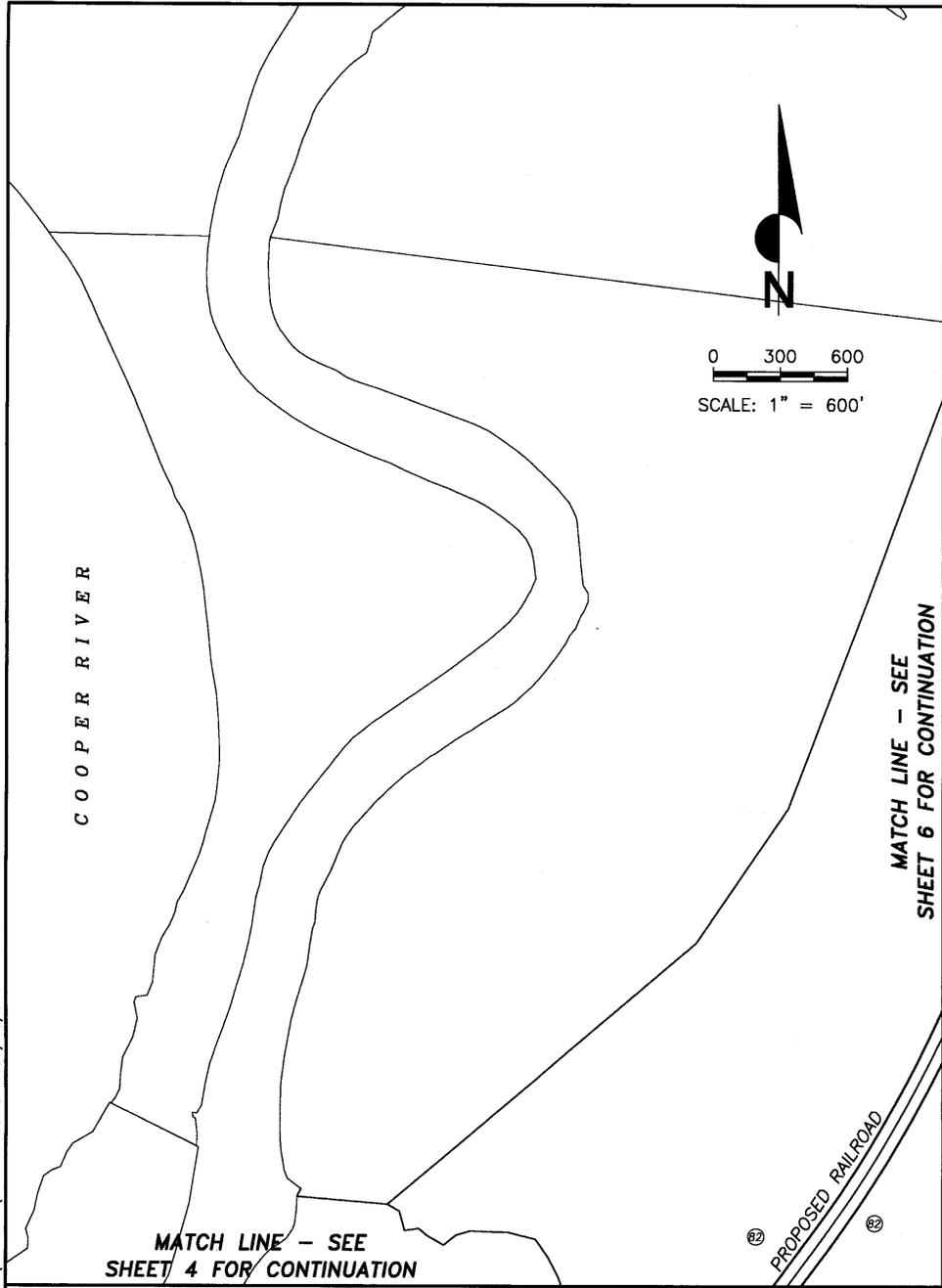
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LEGEND
① PROPERTY ID NUMBER
DATE: AUG. 1999

**PROPOSED RIGHT-OF-WAY,
CURRENT PROPERTY OWNERS**

SHEET 4 OF 12

URS Greiner Woodward Clyde



COOPER RIVER

PROPOSED RAILROAD

MATCH LINE - SEE SHEET 4 FOR CONTINUATION

MATCH LINE - SEE SHEET 6 FOR CONTINUATION

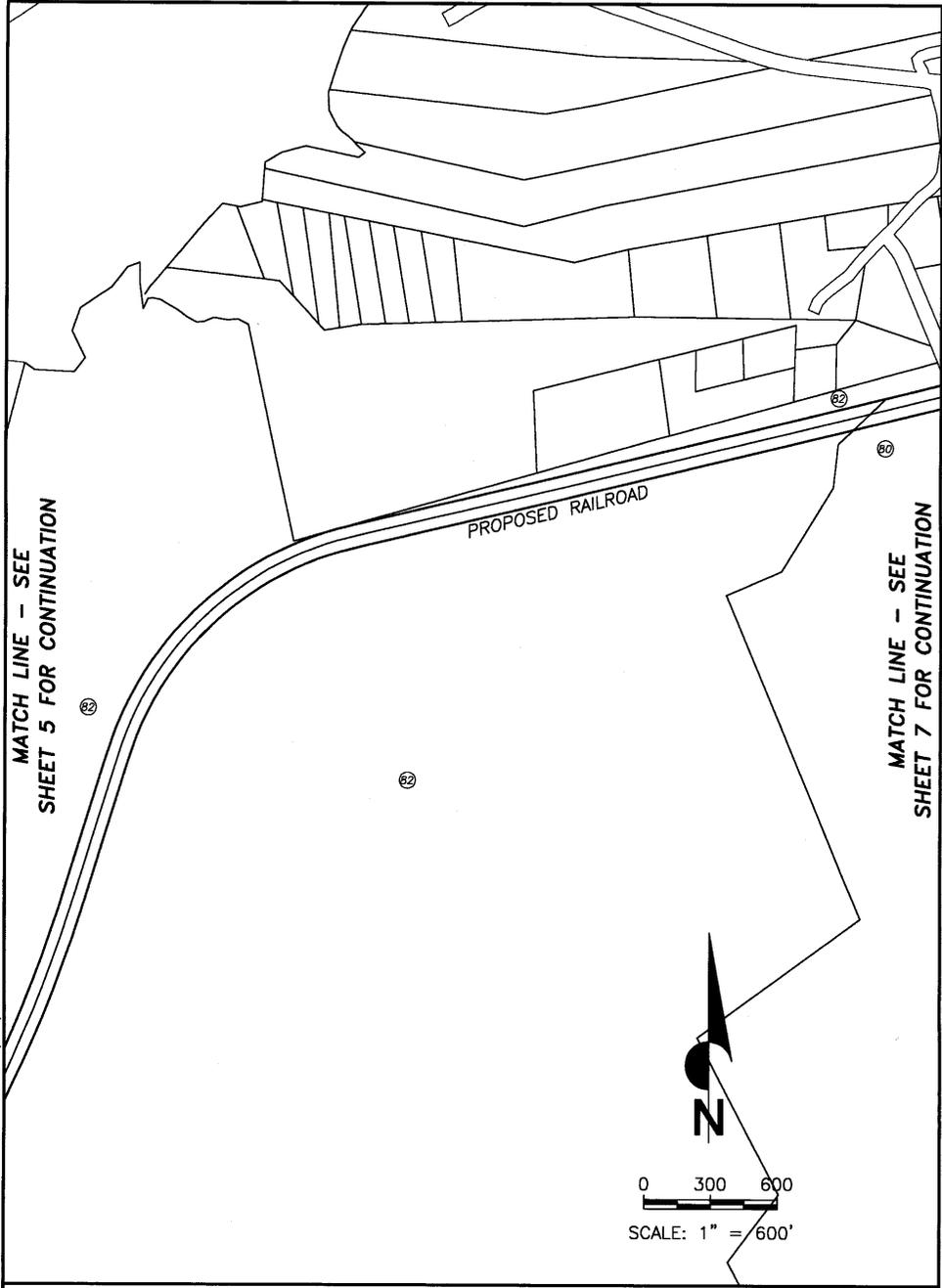
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LEGEND
 ① PROPERTY ID NUMBER
 DATE: AUG. 1999

PROPOSED RIGHT-OF-WAY,
 CURRENT PROPERTY OWNERS

SHEET 5 OF 12

URS Greiner Woodward Clyde



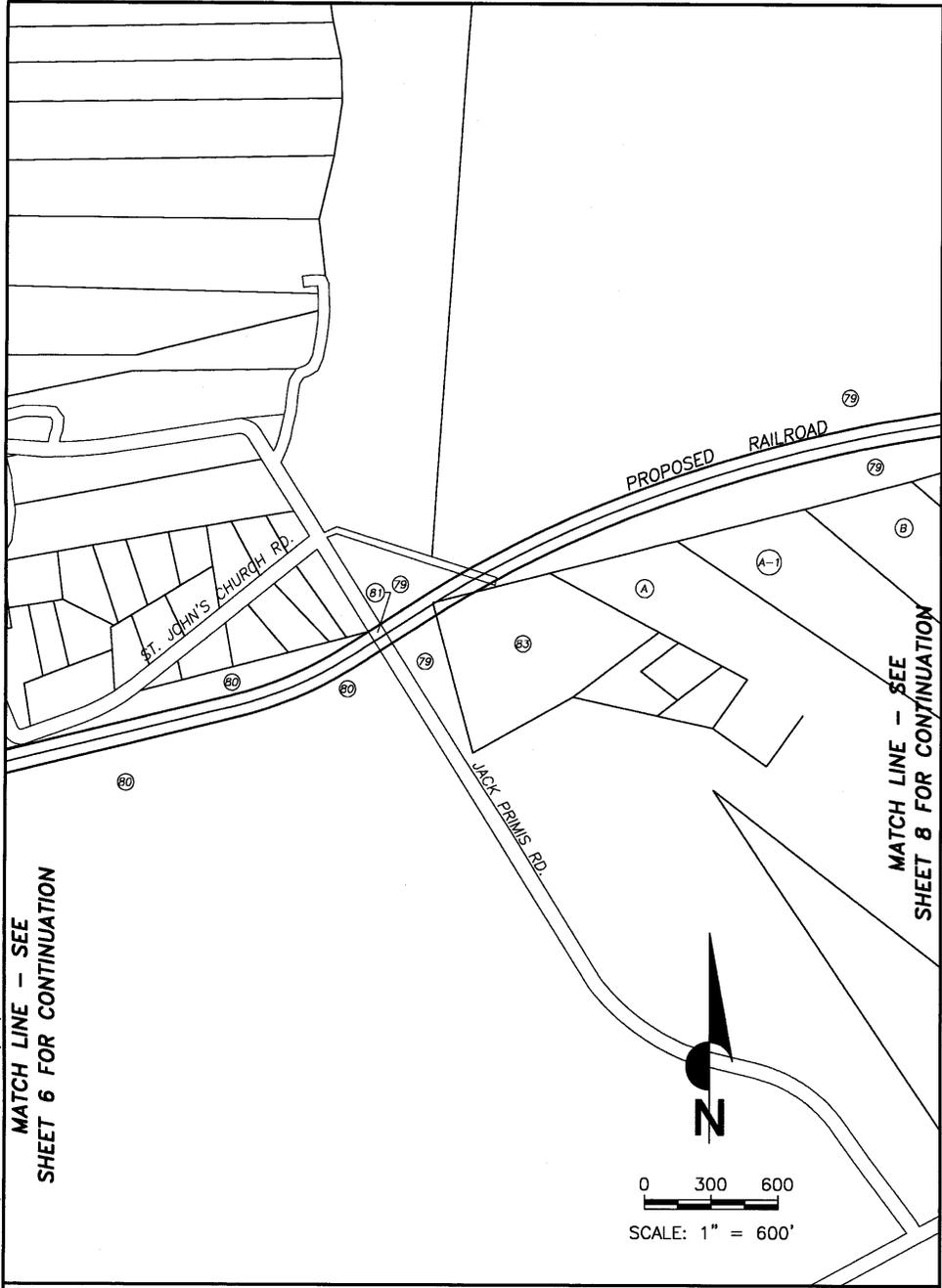
B. DOUGLAS
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**PROPOSED RIGHT-OF-WAY,
CURRENT PROPERTY OWNERS**

DATE: AUG. 1999

SHEET 6 OF 12

URS Greiner Woodward Clyde



B. DOUGLAS
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MATCH LINE - SEE
 SHEET 6 FOR CONTINUATION

MATCH LINE - SEE
 SHEET 8 FOR CONTINUATION

LEGEND
 ① PROPERTY ID NUMBER
 DATE: AUG. 1999

**PROPOSED RIGHT-OF-WAY,
 CURRENT PROPERTY OWNERS**

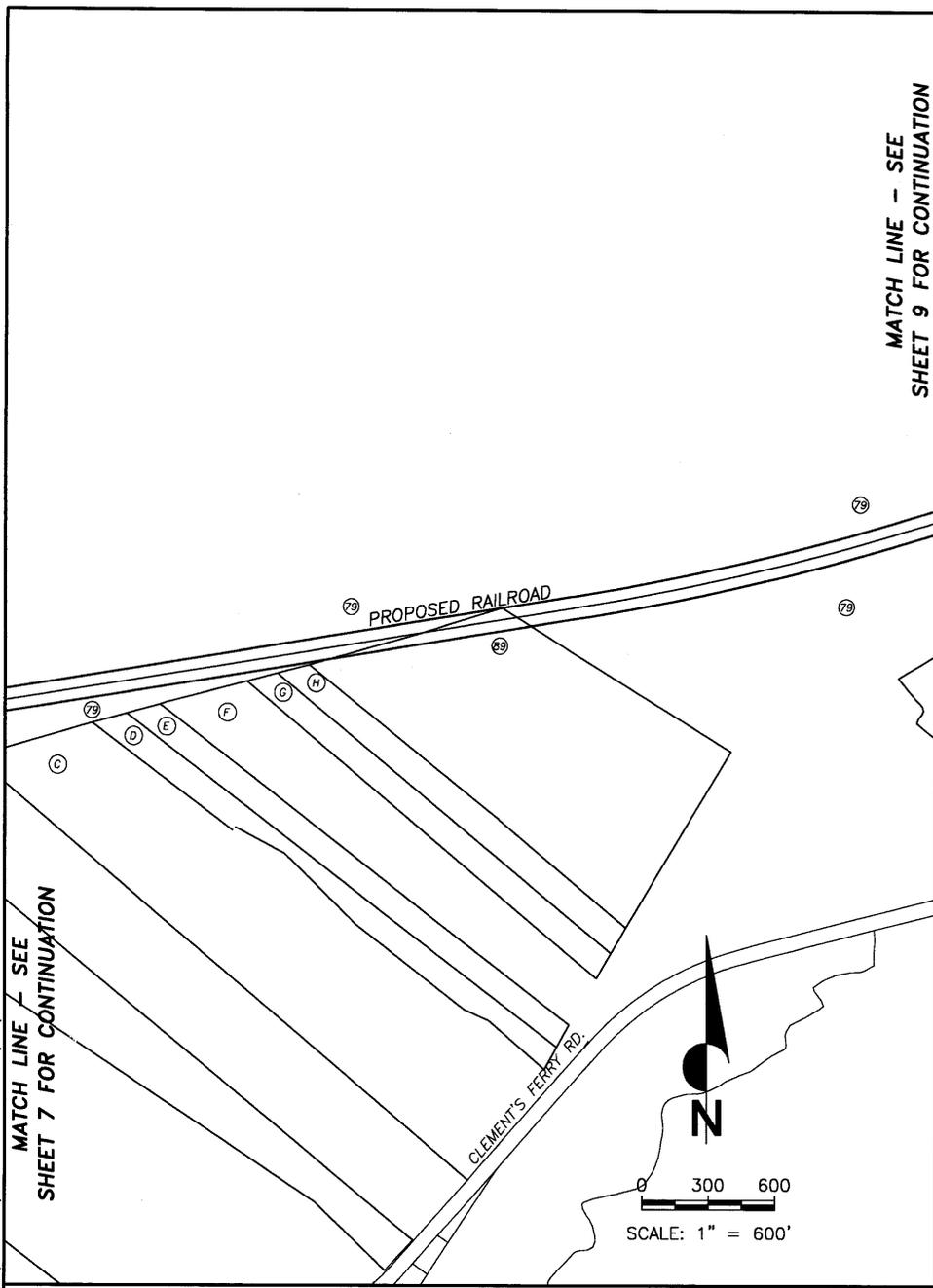
SHEET 7 OF 12

URS Greiner Woodward Clyde

B. DOUGLAS
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MATCH LINE - SEE
SHEET 7 FOR CONTINUATION

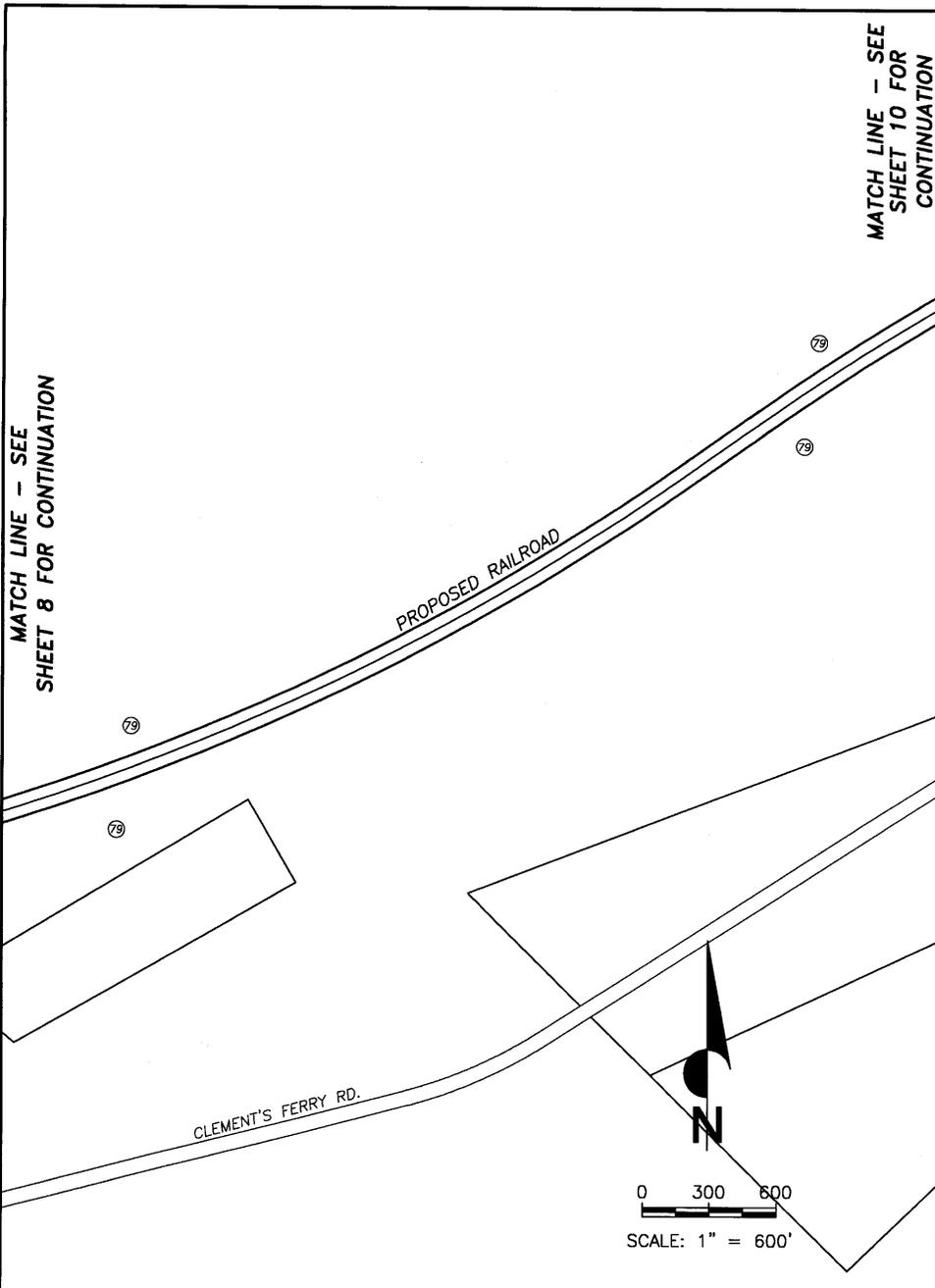
LEGEND
① PROPERTY ID NUMBER
DATE: AUG. 1999



**PROPOSED RIGHT-OF-WAY,
CURRENT PROPERTY OWNERS**

SHEET 8 OF 12

URS Greiner Woodward Clyde



B. DOUGLAS
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LEGEND
 ① PROPERTY ID NUMBER
 DATE: AUG. 1999

**PROPOSED RIGHT-OF-WAY,
 CURRENT PROPERTY OWNERS**

SHEET 9 OF 12

URS Greiner Woodward Clyde

MATCH LINE - SEE
SHEET 11 FOR CONTINUATION

MATCH LINE - SEE
SHEET 9 FOR
CONTINUATION

PROPOSED RAILROAD

78

79

79

79



0 300 600

SCALE: 1" = 600'

CLEMENT'S FERRY RD.

B. DOUGLAS
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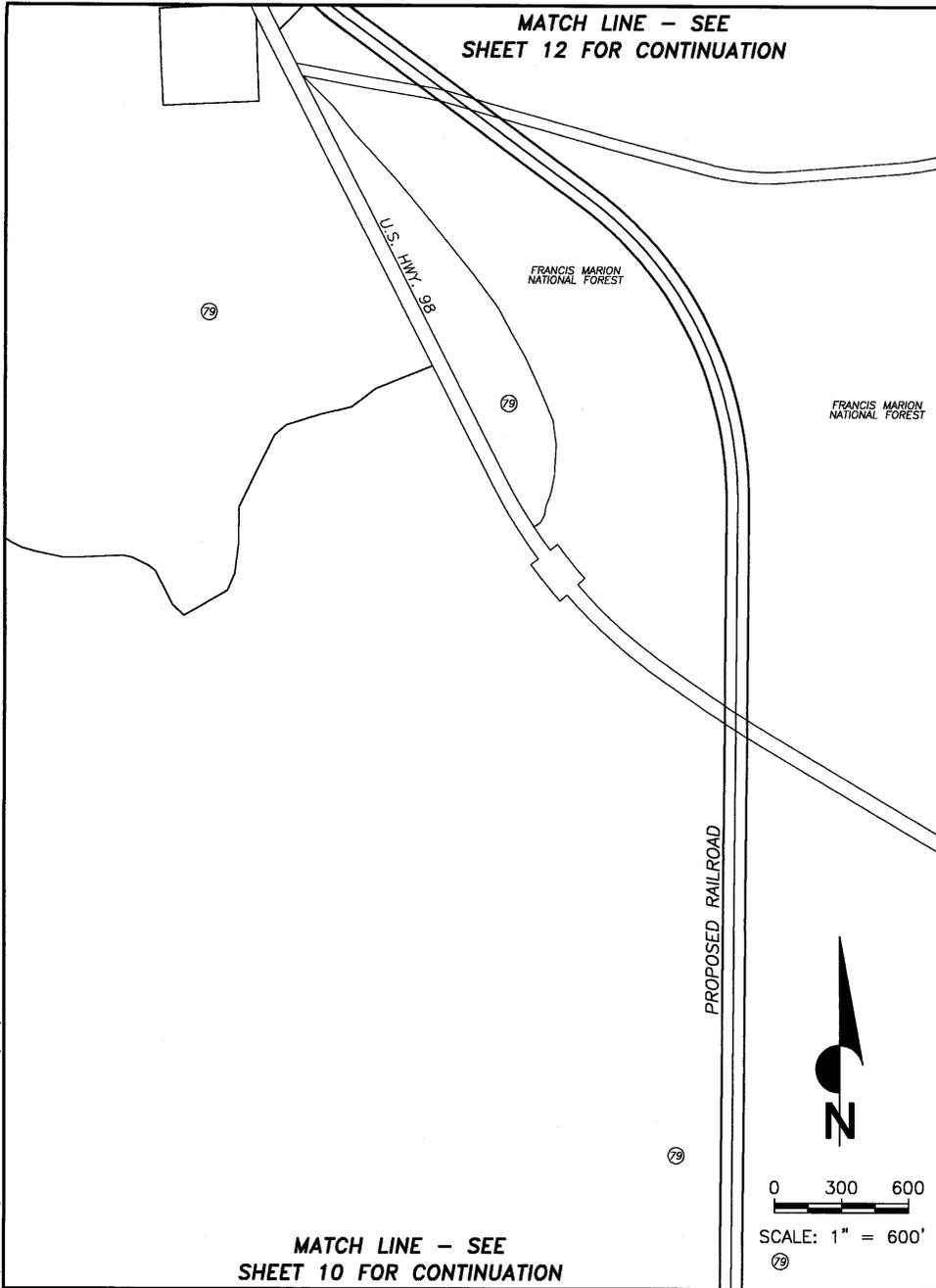
LEGEND
① PROPERTY ID NUMBER
DATE: AUG. 1999

PROPOSED RIGHT-OF-WAY,
CURRENT PROPERTY OWNERS

SHEET 10 OF 12

URS Greiner Woodward Clyde

MATCH LINE - SEE
SHEET 12 FOR CONTINUATION



MATCH LINE - SEE
SHEET 10 FOR CONTINUATION

B. DOUGLAS
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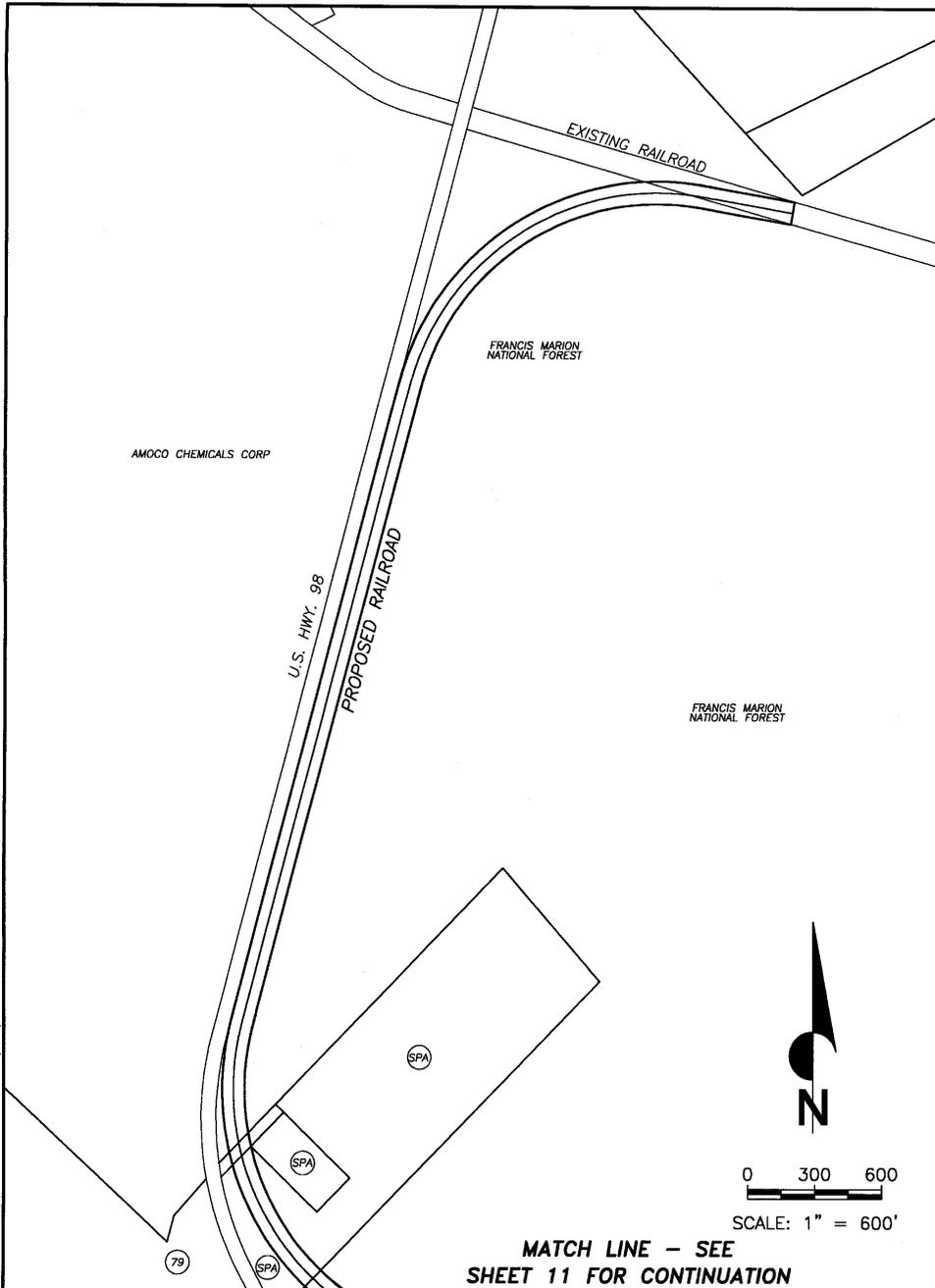
LEGEND
① PROPERTY ID NUMBER
DATE: AUG. 1999

**PROPOSED RIGHT-OF-WAY,
CURRENT PROPERTY OWNERS**

0 300 600
SCALE: 1" = 600'
①

SHEET 11 OF 12

URS Greiner Woodward Clyde



B. DOUGLAS
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LEGEND
 ① PROPERTY ID NUMBER
 DATE: AUG. 1999

**PROPOSED RIGHT-OF-WAY,
 CURRENT PROPERTY OWNERS**

**MATCH LINE - SEE
 SHEET 11 FOR CONTINUATION**

0 300 600
 SCALE: 1" = 600'

SHEET 12 OF 12

URS Greiner Woodward Clyde

