

**B-2963 FLOOD STORAGE AND WETLAND
MITIGATION PLAN**

**TIP Project No. B-2963
State Project No. 8.2352201
FA Project BRSTP-1107 (4)**

**North Carolina Department of Transportation
Project Development and Environmental Analysis Branch**



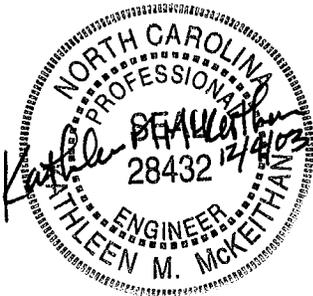
December, 2003

Prepared by:

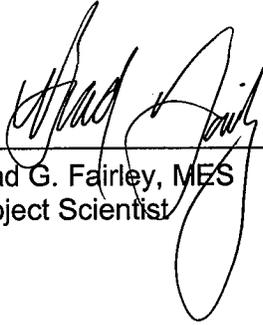


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I HEREBY CERTIFY THAT THE REPORT CONTAINED HEREIN WAS PREPARED BY ME
OR UNDER MY DIRECT SUPERVISION.

SIGNED SEALED, AND DATED THIS 4TH DAY OF DECEMBER 2003.
KATHLEEN M. MCKEITHAN, PE

EXECUTIVE SUMMARY

The North Carolina Department of Transportation (NCDOT) is replacing Bridge 111 on SR 1107 (Stagecoach Road) over New Hope Creek in Durham County. The existing one-lane bridge will be replaced with a two-lane bridge constructed at a higher elevation to reduce flooding. The replacement project, which is known as B-2963, will result in the loss of 0.5 acres of riverine wetland. The B-2963 project will also impact the flood storage capacity of Jordan Lake.

The B-2963 Flood Storage and Wetland Mitigation Plan presents the plan for mitigating the impacts associated with the replacement of Bridge 111 over New Hope Creek in Durham County. The report describes the proposed methodology for restoring the wetlands and flood storage capacity lost as a result of the B-2963 project.

The B-2963 project is located within the Jordan Lake Property. As a result, the US Army Corps of Engineers (USACE) requires NCDOT to provide in-kind mitigation for any fill reducing the flood storage capacity of the Lake. In recognition of this fact, NCDOT modified the design of the B-2963 project in order to minimize impacts. NCDOT reduced the amount of fill below the 240-foot contour by lengthening the bridge, removing a portion of the existing roadway fill, and excavating roadside ditches. These measures reduced the amount of fill by 2,556 cubic yards, leaving approximately 7,330 cubic yards of fill for which mitigation is required. With the USACE and NCDOT agreeing to a 1:1 compensation ratio, NCDOT is required to remove 7,330 cubic yards of fill below the 240-foot contour within the Jordan Lake Property.

The B-2963 Mitigation Site consists of an abandoned portion of the roadbed for Old Farrington Road that was vacated when Jordan Lake was created. The old roadbed is bisected by Morgan Creek. The mitigation project will involve the removal of the fill associated with the roadbed of Old Farrington Road below the 240-foot contour. In essence, the natural grade will be restored below the 240-foot contour.

When the project is complete, approximately 2,560 cubic yards and 4,850 cubic yards of fill will have been removed from the west portion and east portion of the Mitigation Site respectively. In total, approximately 7,400 cubic yards will be removed below the 240-foot contour within the Jordan Lake Property. A 1:1 credit ratio has been established by the USACE for fill removal. The B-2963 Mitigation Site will provide approximately 7,400 cubic yards of flood storage mitigation – sufficient to mitigate for the flood storage impacts of the B-2963 project.

The B-2963 project will result in the fill of approximately 0.5 acres of riverine wetland. The B-2963 Mitigation Site also provides opportunities for wetland restoration. Approximately 1.6 acres are present on the east portion, and 0.9 acres on the west portion. The USACE has agreed to a 2:1 ratio for the restoration of the wetland resulting from the removal of the old roadbed. The B-2963 Mitigation Site will provide 1.25 acres of wetland credits – sufficient to mitigate for the wetland impacts of the B-2963 project.

Impact and Mitigation Credits Summary Table

| Type of Mitigation | Impacts | Yield | Ratio | Credits |
|------------------------|-------------------|-------------------|-------|-------------------|
| Riverine Wetland | <0.5 acres | 2.5 acres | 2:1 | 1.25 acres |
| Flood Storage Capacity | 7,330 cubic yards | 7,400 cubic yards | 1:1 | 7,400 cubic yards |

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1.0 INTRODUCTION

1.1 BACKGROUND

The North Carolina Department of Transportation (NCDOT) is replacing Bridge 111 on SR 1107 (Stagecoach Road) over New Hope Creek in Durham County (Exhibit 1.1.1 and 1.1.2). The existing one-lane bridge will be replaced with a two-lane bridge constructed at a higher elevation to reduce flooding. The replacement project, B-2963, will result in the loss of 0.5 acres of riverine wetland. The B-2963 project will also impact the flood storage capacity of Jordan Lake.

The B. Everett Jordan Dam and Lake were created in 1981 and 1982 by the US Army Corps of Engineers (USACE) to provide flood control, water supply, recreation, and fish and wildlife enhancement to surrounding areas. Normal pool elevation for the lake is 216 feet above mean sea level (msl), with a maximum flood storage elevation of 240 feet above msl. As a result, the USACE has acquired all land within 5 vertical feet or 300 horizontal feet (whichever encompasses more area) beyond the 240-foot elevation surrounding the reservoir (USACE, 1992). The USACE purchased the land to ensure control over any development activities occurring below the 240-foot contour. All land within this contour is referred to as the Jordan Lake Property.

B-2963 lies within the Jordan Lake Property making its replacement subject to the USACE's requirements for development within the Jordan Lake flood storage area. The USACE has ruled that any activity that impacts or reduces the flood storage capacity as defined by the 240-foot contour requires mitigation. The USACE prefers that any development activities that affect the reservoir and its associated flood storage area be compensated for with in-kind mitigation whenever possible.

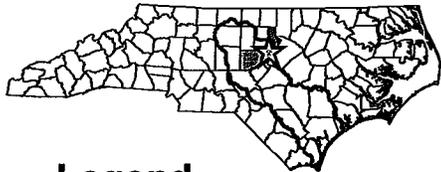
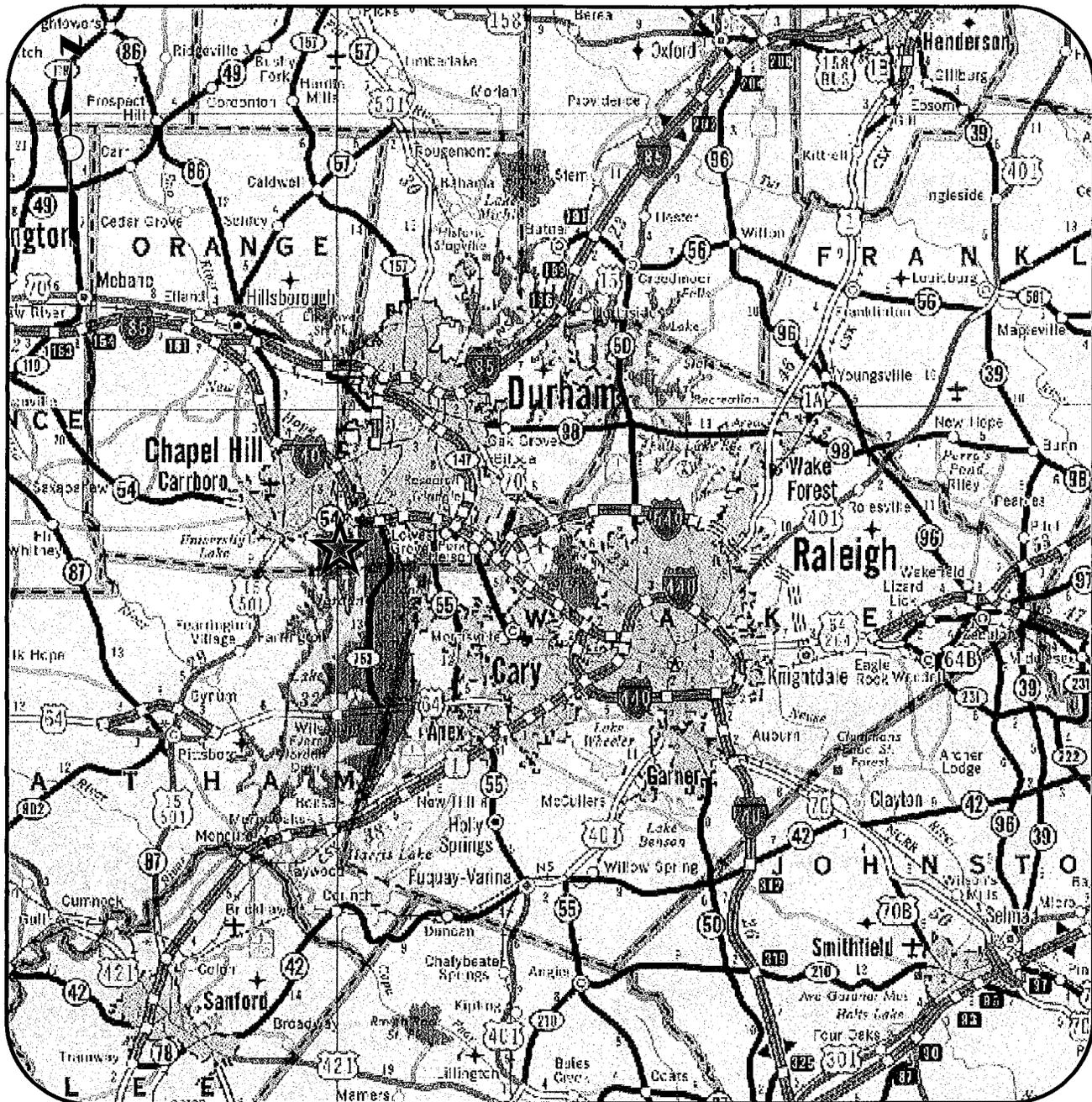
NCDOT modified the design of the bridge to minimize impacts to both wetlands and Jordan Lake flood storage capacity. However, even with the design changes impacts remained. The B-2963 project will result in the loss of approximately 0.5 acres of riverine wetland. In addition, approximately 7,330 cubic yards of fill will be placed below the 240-foot contour. NCDOT is therefore required to mitigate for lost flood storage capacity and wetland acreage caused by the B-2963 project.

1.2 PURPOSE

The B-2963 Flood Storage and Wetland Mitigation Plan presents the plan for mitigating the impacts associated with the replacement of Bridge 111 over New Hope Creek in Durham County. The report describes the proposed methodology for restoring the wetlands and flood storage capacity lost as a result of the B-2963 project.

1.3 THE MITIGATION SITE

NCDOT conducted a search for potential mitigation sites for the B-2963 project and identified seven abandoned Secondary Roads (SR) located within the Jordan Lake Property. NCDOT ultimately selected the portion of the abandoned roadbed of Old Farrington Road lying east of



Legend

-  Project Location
-  Cape Fear River Basin
-  Durham County
-  Chatham County



**North Carolina
Department of Transportation**

**B-2963 Flood Storage and Wetland
Mitigation Plan**

Chatham County, North Carolina

Project Vicinity

Not to Scale

Exhibit 1.1.1



Legend

- ★ Bridge Replacement
- Mitigation Site
- Flood Storage Capacity
- Major Hydrography



**North Carolina
Department of Transportation**

**B-2963 Flood Storage and Wetland
Mitigation Plan**

**Bridge Replacement Location
and Mitigation Site Location**

Scale: 1" = 4500'

Exhibit 1.1.2

Morgan Creek because it offered opportunities for restoration of both flood storage and wetlands. It is also relatively close to the B-2963 project, creating opportunities for efficiency during construction.

The B-2963 Flood Storage and Wetland Mitigation Site (Exhibit 1.3.1) is approximately four miles southeast of Chapel Hill. The Mitigation Site is located off of Farrington Road (SR 1726) near the Durham-Chatham county line. The proposed Mitigation Site lies approximately 2.5 miles southwest of the bridge replacement site. The B-2963 Flood Storage and Wetland Mitigation Site, as well as the Bridge 111 construction site lie within the Cape Fear River Basin, USGS Hydrologic Unit 03030002, NC Division of Water Quality (NCDWQ) Subbasin 03-06-05 (NCDWQ, 1999).

NCDOT initially identified only that portion of the abandoned roadbed lying east of Morgan Creek as the Mitigation Site. It was easily accessible, provided opportunities for both flood storage and wetland mitigation and appeared to meet all of the mitigation requirements for the B-2963 project. Following a site visit, the USACE agreed to a 1:1 ratio for flood storage mitigation and a 2:1 (standard) ratio for wetland restoration at a meeting held October 1, 2002 (Appendix A). The USACE also delineated the wetlands on the east portion of the Mitigation Site at the time of the site visit and indicated that planting would not be required for wetland restoration since the Mitigation Site was narrow and had an adjacent seed source.

In August 2003, a detailed survey of the portion of the roadbed east of Morgan Creek was carried out. The survey revealed that 1.6 acres of wetlands would be restored. Using the 2:1 ratio, the Mitigation Site would generate 0.8 acres of credit. The Mitigation Site will provide acreage sufficient to mitigate for the impacts of the B-2963 project. However, the survey also revealed that the east portion of the roadbed would yield only 4,850 cubic yards for restoration of flood storage capacity. Based on the 1:1 ratio specified by the USACE, the Mitigation Site was 2,480 cubic yards short of the 7,330 cubic yards of fill removal required by the B-2963 project.

Needing more flood storage credits, the western portion of the roadbed of Old Farrington Road (west of Morgan Creek) was investigated. While more difficult to access, a visual inspection of the Mitigation Site indicated that it would likely provide opportunities for the removal of the additional fill required. A detailed survey showed that the western portion of the roadbed would yield an additional 2,550 cubic yards of fill below the 240-foot contour. The survey also showed that the Mitigation Site offered opportunities for restoration of an additional 0.9 acres of wetland. An NCDOT representative delineated the wetland area on the western portion of the Mitigation Site in August of 2003. Eric Alsmeyer of the USACE was contacted on September 3, 2003 regarding verification for the wetland on the western portion of Morgan Creek. He stated that he did not need to see the site since the wetland type is the same as that on the east side of Morgan Creek and the wetland line was topographically very distinct. Using the 2:1 ratio, the western portion of the Mitigation Site would yield an additional 0.45 acres of wetland credit.

1.4 ENVIRONMENTAL SCREENING

An environmental screening of the Mitigation Site was conducted to evaluate existing conditions and to ensure that no "fatal flaws" exist that could deter or severely limit the potential for flood storage or wetland restoration. This screening consisted of the following: a site evaluation for hazardous materials, a review of protected species, and an investigation into the existence of cultural resources.



Legend

-  Flood Storage Capacity
-  Morgan Creek
-  Mitigation Site

B-2963 Flood Storage and Wetland Mitigation Plan

Project Location

Scale: 1" = 1250' Exhibit 1.3.1

Field reconnaissance of the Mitigation Site yielded no evidence of either above ground or underground storage tanks. No manufacturing facilities or other dischargers were observed in the vicinity of the Mitigation Site. Due to the previously disturbed nature of the Mitigation Site, it is unlikely that cultural resources exist within the fill that will be removed during construction.

The US Fish and Wildlife Service (USFWS) protects plants and animals with the federal status designations of Endangered, Threatened, Proposed, or Experimental (either essential or non-essential) under the 1973 Endangered Species Act. The following four species are federally protected and listed by the USFWS as occurring in Chatham County (USFWS, 2003): bald eagle (*Haliaeetus leucocephalus*) – Threatened (Proposed for delisting), Cape Fear shiner (*Notropis mekistocholas*) – Endangered, red-cockaded woodpecker (*Picoides borealis*) – Endangered, harperella (*Ptilimnium nodosum*) – Endangered. These species were not observed, nor was suitable habitat located during four site visits. It is reasonable to conclude that construction of the Mitigation Site will have no effect on the four listed species.

2.0 FLOOD STORAGE MITIGATION

2.1 BACKGROUND

B-2963 is located within the Jordan Lake Property. As a result, the USACE required NCDOT to provide in-kind mitigation for any fill reducing the flood storage capacity of the lake. In recognition of this fact, NCDOT modified the design of B-2963 in order to minimize impacts to the flood storage capacity of Jordan Lake. NCDOT reduced the amount of fill below the 240-foot contour by lengthening the bridge, removing a portion of the existing roadway fill, excavating roadside ditches, and excavating a parking lot. These measures reduced the amount of fill by 2,556 cubic yards, leaving approximately 7,330 cubic yards of fill for which mitigation is required. With the USACE and NCDOT agreeing to a 1:1 compensation ratio, NCDOT is required to remove 7,330 cubic yards of fill below the 240-foot contour within the Jordan Lake Property.

2.2 EXISTING CONDITIONS

The B-2963 Flood Storage and Wetland Mitigation Site consists of two sections of Old Farrington Road. The west portion extends from the shoulder of Farrington Road to Morgan Creek, a distance of some 950 feet (Appendix B, Photo 1). The east portion extends from Morgan Creek up the old roadbed to the 240-foot contour, a distance of 2,900 feet, approximately half the distance to Sandy Williams Road. Old Farrington Road was abandoned in the late seventies, prior to the creation of Jordan Lake.

The roadbed for Old Farrington Road is approximately 25-feet wide and was sufficient to support a 2-lane roadway. At the extreme east of the Mitigation Site the roadbed is nearly level with the adjacent ground. As the roadbed continues to the west, towards Morgan Creek, the amount and elevation of fill increases to two to three meters above the adjacent ground.

When the road was abandoned, the asphalt was removed but the compacted roadbed was left in place. Access to the abandoned portion of Old Farrington Road was blocked on the west with a steep embankment and on the east with a gate. (Appendix B, Photo 2). With the asphalt removed and vehicular traffic blocked, vegetation has invaded the roadbed. The vegetative

community consists of species typical of disturbed areas, such as sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), blackberry (*Rubus* sp.) and smartweed (*Polygonum* sp.).

The detailed survey of the Mitigation Site revealed 2,560 cubic yards of fill in the west portion and 4,850 cubic yards in the east portion.

2.3 METHODOLOGY

The methodology for restoring the flood storage capacity lost through B-2963 is fairly straightforward. Following the installation of appropriate erosion and sediment control measures, NCDOT plans to remove 7,400 cubic yards of fill lying below the 240-foot contour associated with the roadbed of Old Farrington Road.

The fill removed from Old Farrington Road will be disposed of in an appropriate manner. NCDOT conducted a geotechnical investigation of the east portion of the roadbed and determined that the fill was suitable for embankment construction (Appendix C). As a result, NCDOT intends to use the 7,330 of the 7,400 cubic yards of fill removed from Old Farrington Road in the embankment required to raise the roadbed for the B-2963 project.

2.4 PROPOSED CONDITIONS

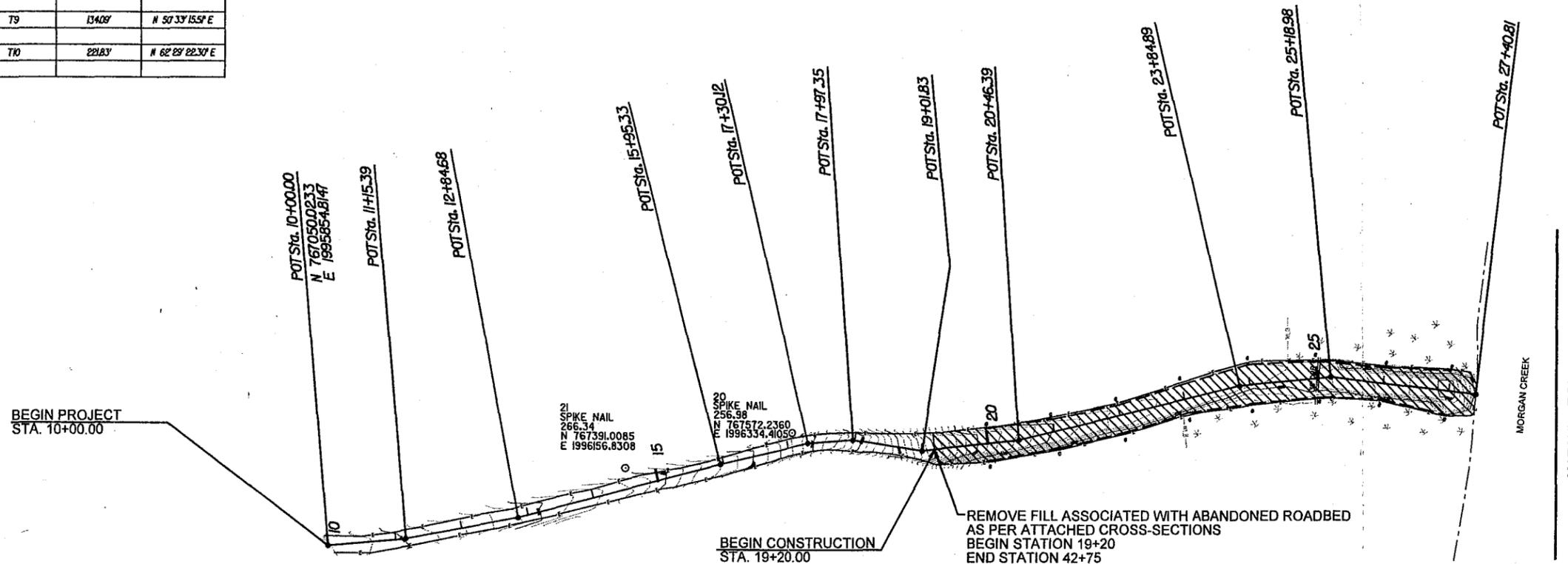
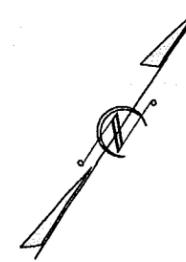
The Mitigation Plan recommends the removal of the fill associated with the roadbed of Old Farrington Road below the 240-foot contour. In essence, the natural grade will be restored in the area below the 240-foot contour.

Exhibits 2.4.1 and 2.4.2 show the plan view of the fill removal areas for the west and east portions of the project, respectively. Exhibits 2.4.3 and 2.4.4 show the existing and proposed profile of the west and east portions of the project, respectively. Exhibits 2.4.5 and 2.4.6 show example cross-sections for the west and east portions of the project, respectively.

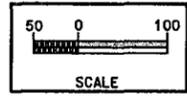
When the Mitigation Plan is implemented, approximately 2,560 cubic yards of fill will have been removed from the west portion of the Mitigation Site. Approximately 4,850 cubic yards will have been removed from the east portion of the Mitigation Site. In total, approximately 7,400 cubic yards will be removed below the 240-foot contour within the Jordan Lake Property. Using the 1:1 ratio established by the USACE, the B-2963 Mitigation Site will provide approximately 7,400 cubic yards of flood storage mitigation. This is approximately equal to the 7,330 cubic yards of mitigation required by the B-2963 project.

| STATION | TANGENT NUMBER | TANGENT LENGTH | BEARING |
|----------|----------------|----------------|-------------------|
| WEST | | | |
| 10+00.00 | | | |
| | T1 | 115.39 | N 51°03' 16.38" E |
| 11+15.39 | | | |
| | T2 | 169.29 | N 45°31' 57.67" E |
| 12+84.68 | | | |
| | T3 | 306.69 | N 41°31' 38.36" E |
| 15+91.33 | | | |
| | T4 | 134.07 | N 42°43' 51.98" E |
| 17+30.12 | | | |
| | T5 | 67.22 | N 51°58' 07.19" E |
| 17+97.35 | | | |
| | T6 | 104.49 | N 64°32' 58.76" E |
| 19+01.83 | | | |
| | T7 | 144.56 | N 49°49' 33.64" E |
| 20+46.39 | | | |
| | T8 | 338.50 | N 42°29' 56.76" E |
| 23+84.89 | | | |
| | T9 | 134.09 | N 50°33' 15.51" E |
| 25+18.98 | | | |
| | T10 | 221.83 | N 62°29' 22.30" E |
| 27+40.81 | | | |

| BENCHMARK | BM NUMBER | LENGTH TO STA. 10+00.00 | BEARING TO STA. 10+00.00 |
|------------|-----------|-------------------------|--------------------------|
| SPIKE NAIL | 21 | 455.50' | S 41°31' 59" W |
| SPIKE NAIL | 20 | 709.05' | S 42°33' 51.08" W |



NOTE:
 ASPHALT PILES NEAR STATION 10+00 AND 55+00
 SHALL BE REMOVED BY CONTRACTOR



LEGEND

FLOOD STORAGE RESTORATION (FILL REMOVAL)

B-2963 FLOOD STORAGE AND WETLAND MITIGATION PLAN

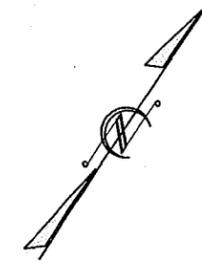
FLOOD STORAGE MITIGATION: WEST PORTION

EXHIBIT: 2.4.1

WEST

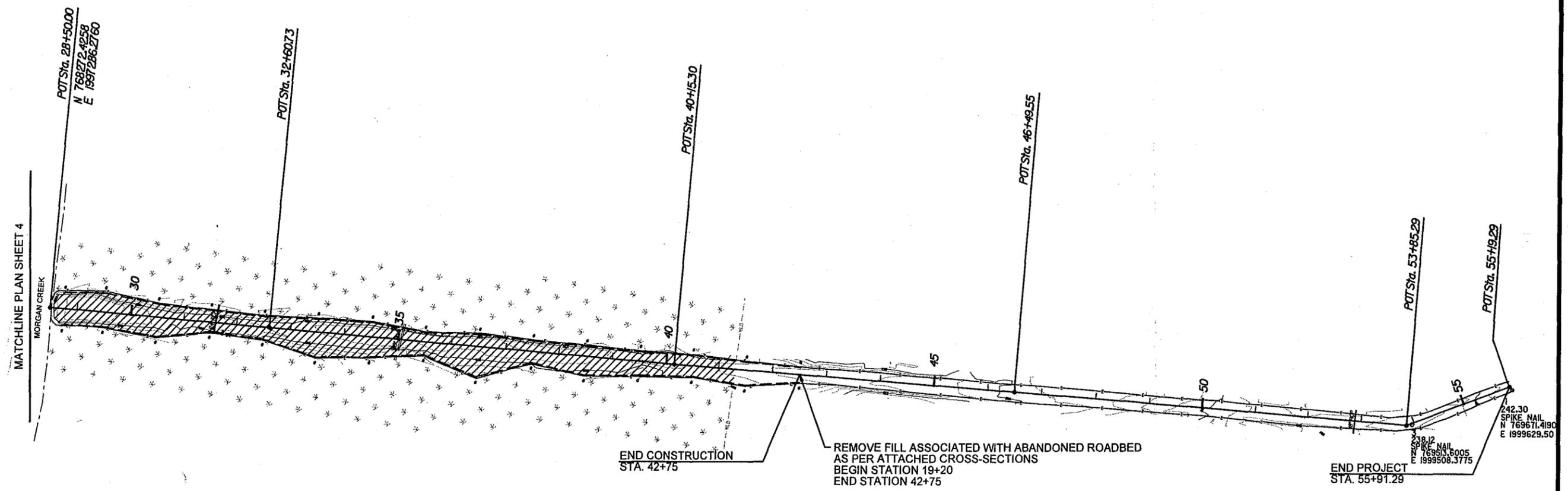


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| STATION | TANGENT NUMBER | TANGENT LENGTH | BEARING |
|----------|----------------|----------------|--------------------|
| EAST | | | |
| 28+50.00 | | | |
| | T11 | 4073 | N 61° 17' 32.16" E |
| 32+60.73 | | | |
| | T12 | 75457 | N 61° 04' 21.31" E |
| 40+15.30 | | | |
| | T13 | 63425 | N 60° 39' 01.74" E |
| 46+49.55 | | | |
| | T14 | 73574 | N 60° 40' 22.88" E |
| 53+85.29 | | | |
| | T15 | 20600 | N 36° 03' 04.79" E |
| 55+91.29 | | | |

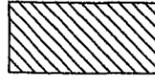
| BENCHMARK | BM NUMBER | LENGTH TO STA. 55+19.29 | BEARING TO STA. 55+19.29 |
|------------|-----------|-------------------------|--------------------------|
| SPIKE NAIL | 1 | 196.957 | N 35° 28' 21.52" E |
| SPIKE NAIL | 3 | 7.62 | N 76° 38' 51.17" W |



NOTE:
 ASPHALT PILES NEAR STATION 10+00 AND 55+00
 SHALL BE REMOVED BY CONTRACTOR

EAST

LEGEND

 FLOOD STORAGE RESTORATION (FILL REMOVAL)

B-2963 FLOOD STORAGE AND WETLAND MITIGATION PLAN

FLOOD STORAGE MITIGATION:
 EAST PORTION

EXHIBIT: 2.4.2

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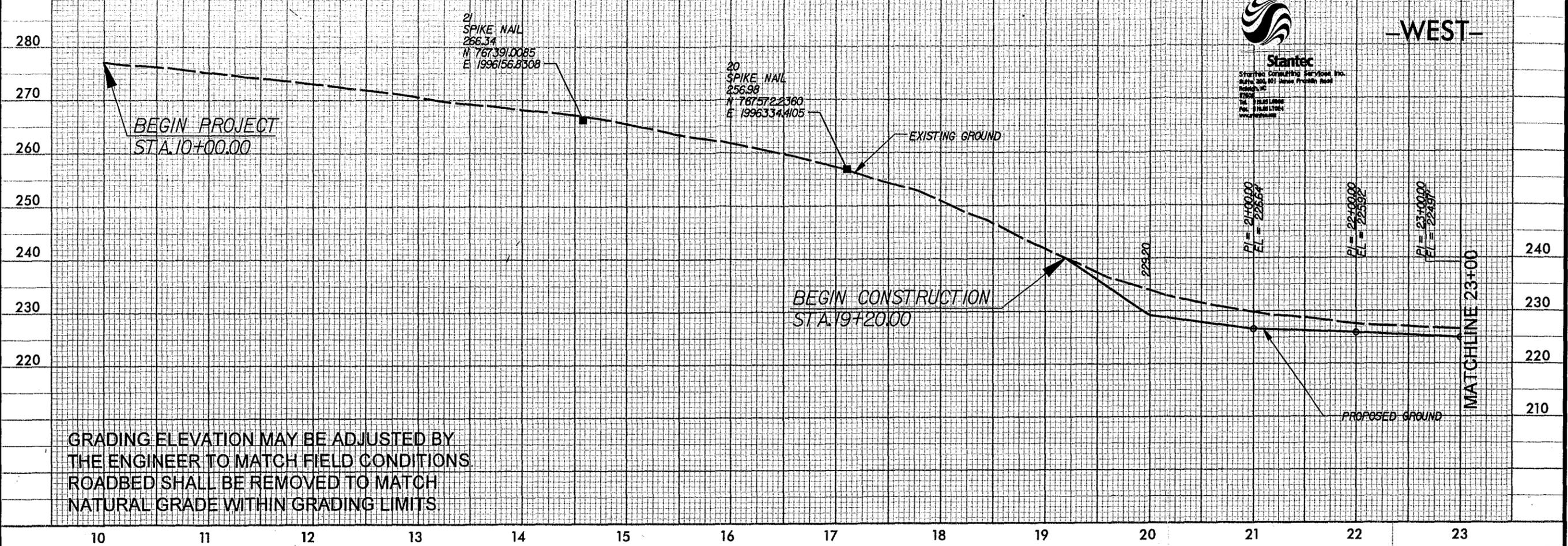
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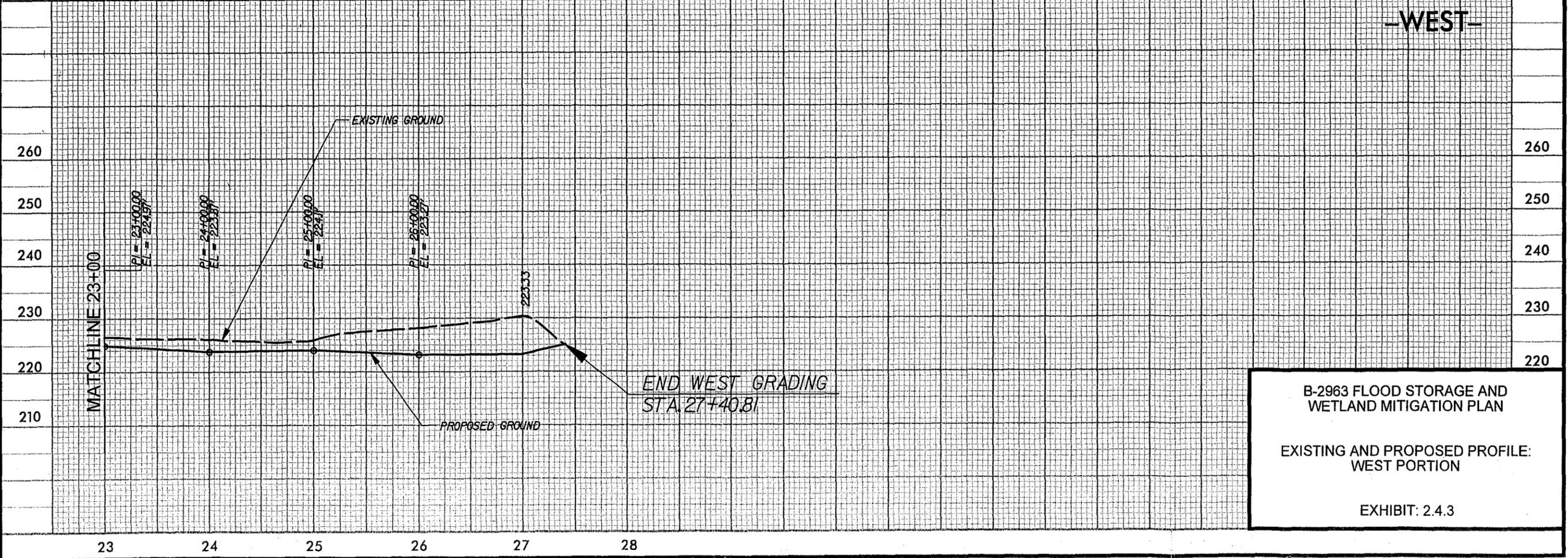


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-WEST-



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B-2963 FLOOD STORAGE AND WETLAND MITIGATION PLAN

EXISTING AND PROPOSED PROFILE: WEST PORTION

EXHIBIT: 2.4.3

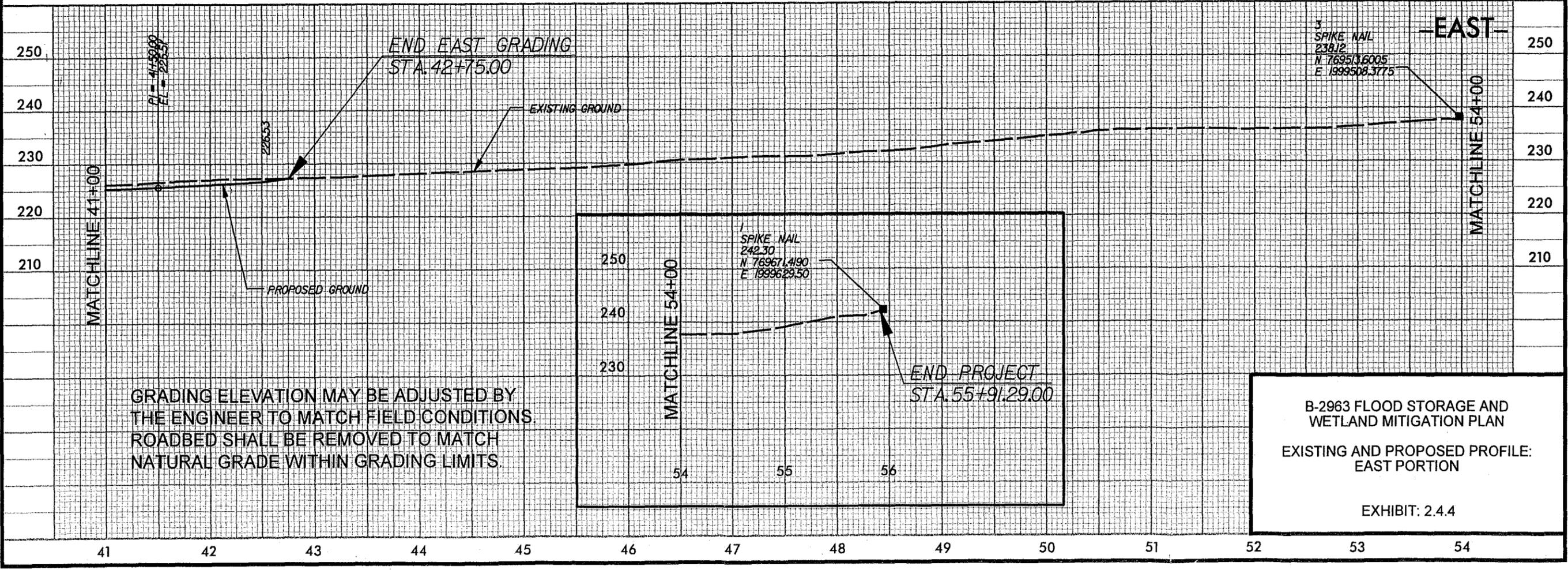
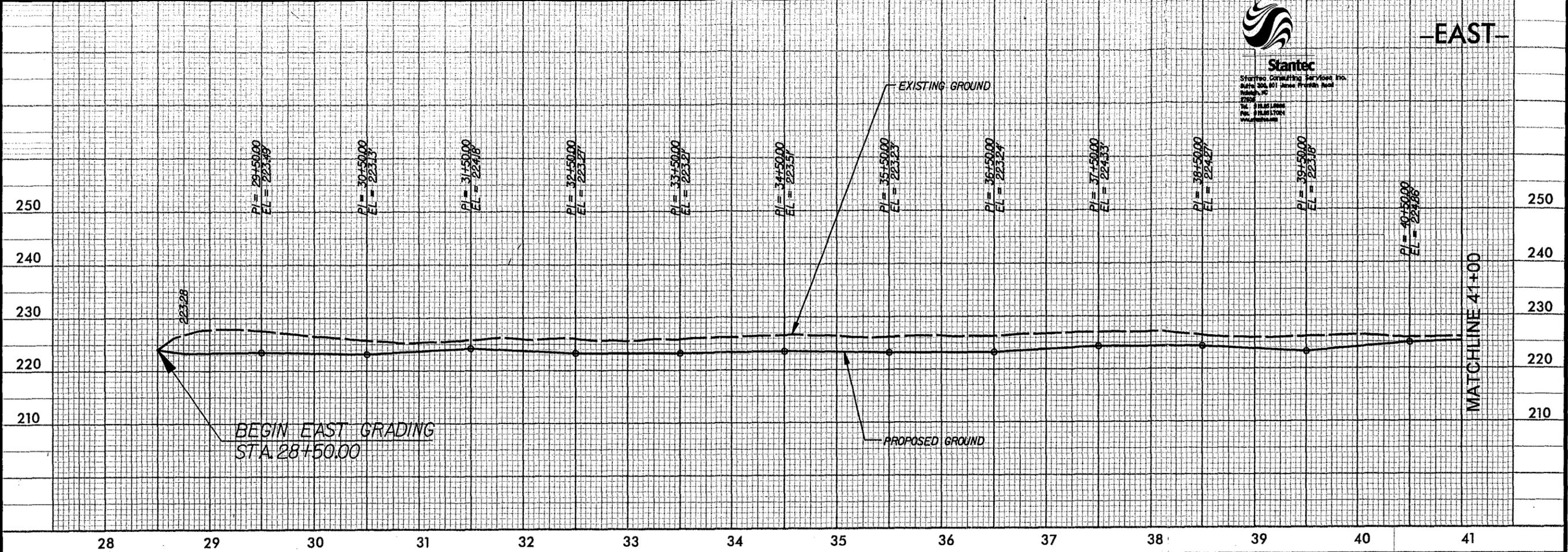
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5/28/99

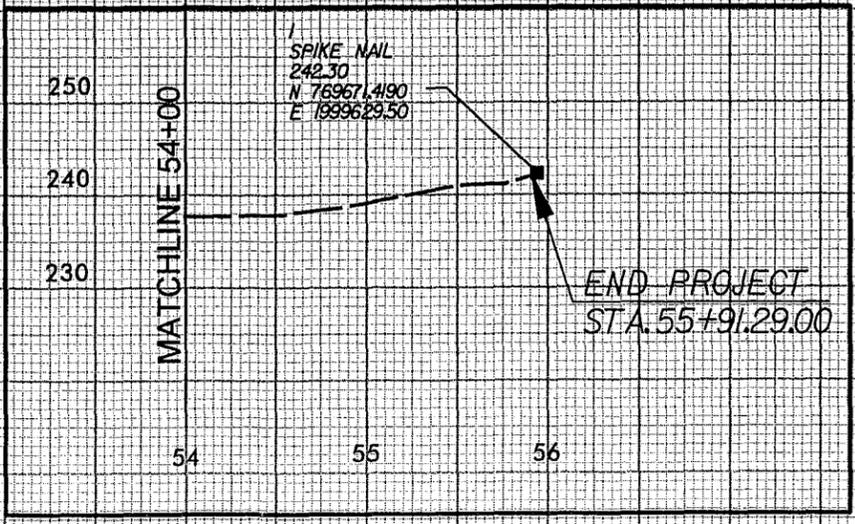


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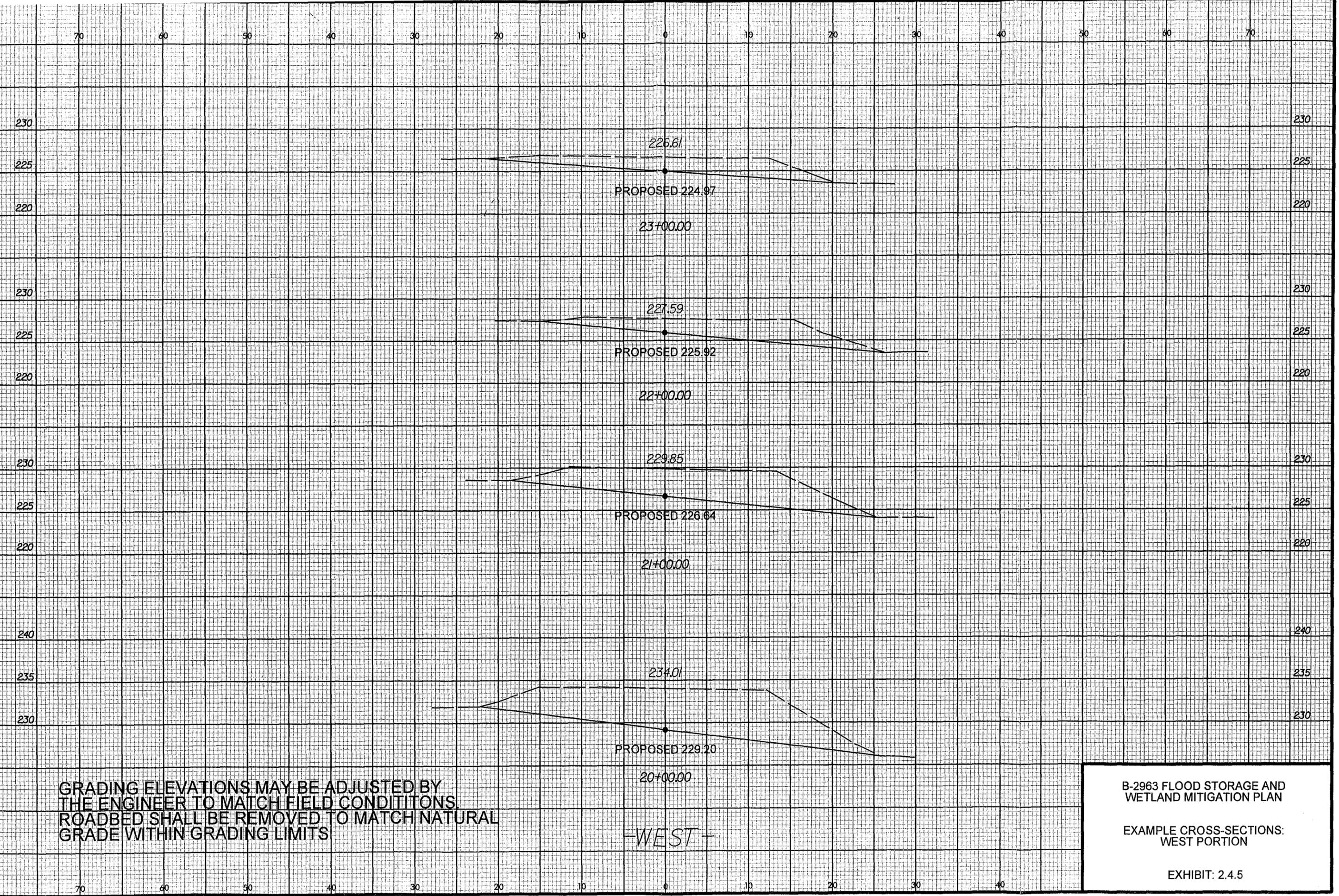


GRADING ELEVATION MAY BE ADJUSTED BY THE ENGINEER TO MATCH FIELD CONDITIONS. ROADBED SHALL BE REMOVED TO MATCH NATURAL GRADE WITHIN GRADING LIMITS.



B-2963 FLOOD STORAGE AND WETLAND MITIGATION PLAN
EXISTING AND PROPOSED PROFILE: EAST PORTION
EXHIBIT: 2.4.4

12/04/2003 8:23/25
us:\71000198\transportation\design\B-ridge Replacement\71000198_str.eem_xpl_EX245_6.dgn
gmiers



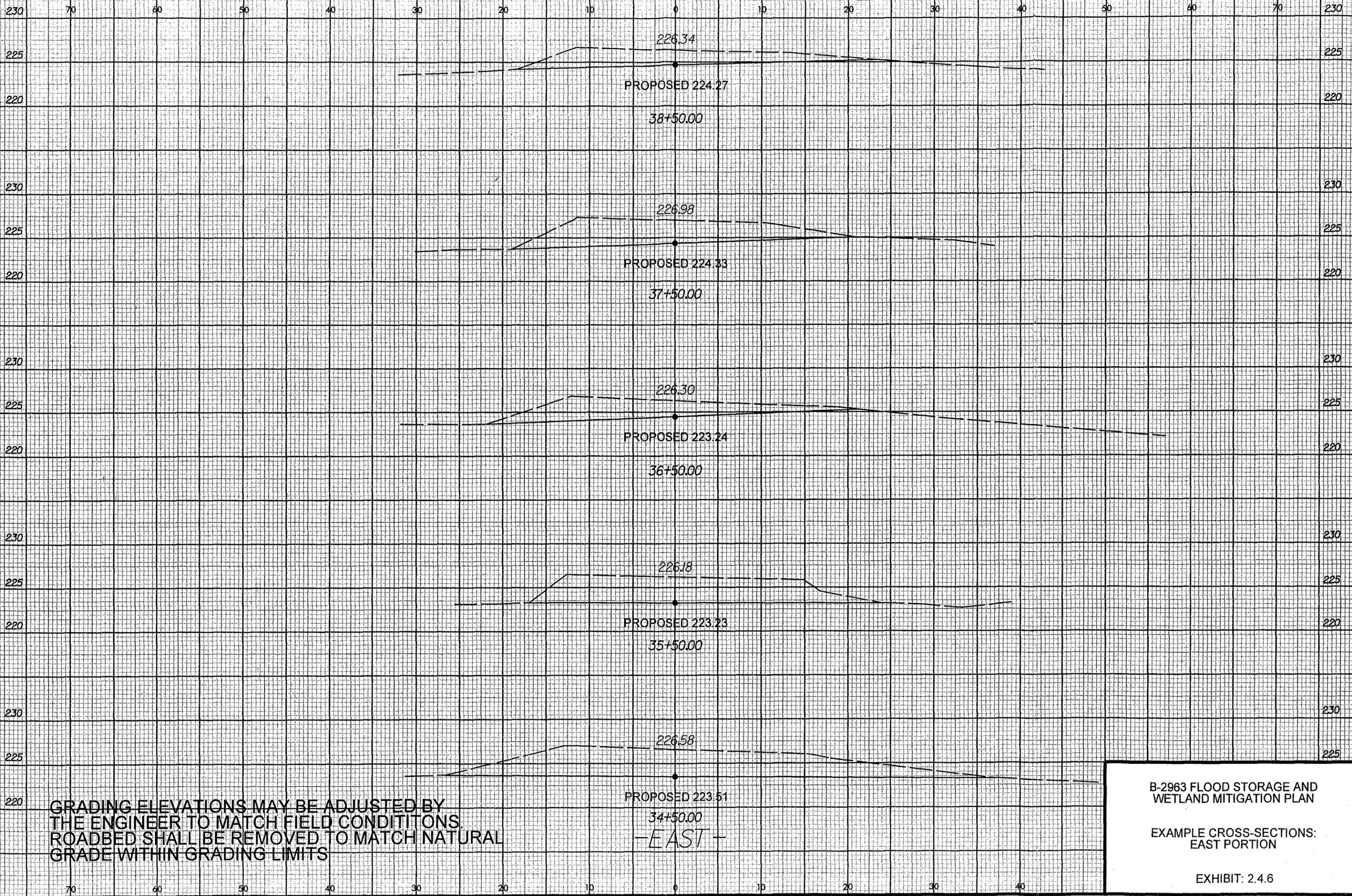
GRADING ELEVATIONS MAY BE ADJUSTED BY THE ENGINEER TO MATCH FIELD CONDITIONS. ROADBED SHALL BE REMOVED TO MATCH NATURAL GRADE WITHIN GRADING LIMITS.

-WEST-

B-2963 FLOOD STORAGE AND WETLAND MITIGATION PLAN

EXAMPLE CROSS-SECTIONS: WEST PORTION

EXHIBIT: 2.4.5



GRADING ELEVATIONS MAY BE ADJUSTED BY THE ENGINEER TO MATCH FIELD CONDITIONS. ROADBED SHALL BE REMOVED TO MATCH NATURAL GRADE WITHIN GRADING LIMITS.

PROPOSED 224.27
38+50.00
226.34

PROPOSED 224.33
37+50.00
226.98

PROPOSED 223.24
36+50.00
226.30

PROPOSED 223.23
35+50.00
226.18

PROPOSED 223.51
34+50.00
226.58

- EAST -

B-2963 FLOOD STORAGE AND WETLAND MITIGATION PLAN

EXAMPLE CROSS-SECTIONS: EAST PORTION

EXHIBIT: 2.4.6

3.0 WETLAND RESTORATION

3.1 BACKGROUND

The B-2963 project will result in the fill of approximately 0.5 acres of riverine wetland. Following a visit to the proposed B-2963 Flood Storage and Wetland Mitigation Site, the USACE agreed to a 2:1 ratio for wetland restoration. This means that NCDOT is required to restore 1.0 acres of riverine wetlands.

3.2 EXISTING CONDITIONS

Approximately 2,350 feet of Old Farrington Road lies within the riverine wetland associated with Morgan Creek. According to National Wetlands Inventory (NWI) mapping (USFWS, 1999), this wetland is designated a palustrine, forested, broad-leaved deciduous, temporarily flooded, diked/impounded wetland (PFO1Ah) (Cowardin *et al.*, 1979) (Exhibit 3.2.1).

3.2.1 Soils

A geotechnical report was provided for the east portion of the Mitigation Site by NCDOT (Appendix C). The report revealed that the soil present on the east portion of the Mitigation Site consists largely of coarse sandy material. According to the soil survey for Chatham County (Bureau of Chemistry and Soils, 1933), the entire Mitigation Site occurs on a loamy substrate. This is indication that the material to be removed from the Mitigation Site is fill material brought to the Mitigation Site in order to raise the road surface during construction of that portion of Old Farrington Road.

Four soil types underlie the Mitigation Site. The Mitigation Site crosses White Store fine sandy loam, Altavista fine sandy loam, Wehadkee silt loam and Congaree silt loam (Bureau of Chemistry and Soils, 1933) (Exhibit 3.2.1.1). According to the Hydric Soil Series List - Hydric Soils of North Carolina (NRCS, 1995), Wehadkee silt loam is a hydric soil. The 1933 Chatham County soil survey identifies most of the wetland area as occurring on non-hydric soils, however, the construction of Farrington and Old Farrington Roads and the Jordan Lake Reservoir have altered the hydrology of the area.

Hydric Soils

Wehadkee silt loam (We) is a poorly drained soil found on narrow flood plains. Infiltration is moderate and runoff is slow. The seasonal high water table is at or near the surface. Wehadkee soils are flooded very frequently for very brief periods. This soil is found along the floodplain on either side of Morgan Creek.

Non-Hydric Soils

White Store fine sandy loam (Ws) has a very fine textured surface layer. This increases the runoff potential, and decreases the permeability of the soil. This series underlays the upper half of the eastern portion of the Mitigation Site. This series grades into Altavista fine sandy loam closer to Morgan Creek.



Legend

- ← Morgan Creek
- Mitigation Site
-  NWI: PFO1Ah: Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded, Diked/Impounded



**North Carolina
Department of Transportation**

**B-2963 Flood Storage and Wetland
Mitigation Plan**

NWI Map

Scale: 1" = 1100'

Exhibit 3.2.1



Legend

-  Hydric Soil: We (Wehadkee silt loam)
-  Non-Hydric Soil: Ws (White Store fine sandy loam)
Am (Altavista fine sandy loam)
Ci (Congaree silt loam)
-  Morgan Creek
-  Mitigation Site

 **North Carolina
Department of Transportation**

**B-2963 Flood Storage and Wetland
Mitigation Plan**

Soils

Scale: 1" = 750' Exhibit 3.2.1.1

Altavista fine sandy loam (Am) is a moderately drained soil on stream terraces in the Piedmont region of North Carolina. Permeability is moderate and runoff is slow. The high water table is at or below a depth of 2.5 feet. This soil is found in a narrow band along the flood plain on the east side of Morgan Creek.

Congaree silt loam (Ci) is a well to moderately well drained soil found on floodplains or at the base of slopes. Permeability is moderate and runoff is slow. The high water table is below five feet, but the soils are subject to brief flood events during winter and early spring. This soil occurs within the flood plain of Morgan Creek, and borders the creek on the east and west portions of the Mitigation Site.

3.2.2 Vegetative Communities

Two of the vegetative communities present on the Mitigation Site can be classified according to the *Natural Communities of North Carolina* (Schafale and Weakley, 1990). These communities include a Piedmont Bottomland Hardwood Forest and a Piedmont Swamp Forest (Exhibit 3.2.2:1). The third community type is a disturbed, early successional hardwood community that is emerging on the abandoned roadbed. Due to the transitional nature of the roadbed, the community does not classify within those described by Schafale and Weakley. USACE Routine Wetland Determination forms for the Piedmont Bottomland Hardwood Forest and Piedmont Swamp Forest communities are located in Appendix C.

Abandoned Roadbed Community

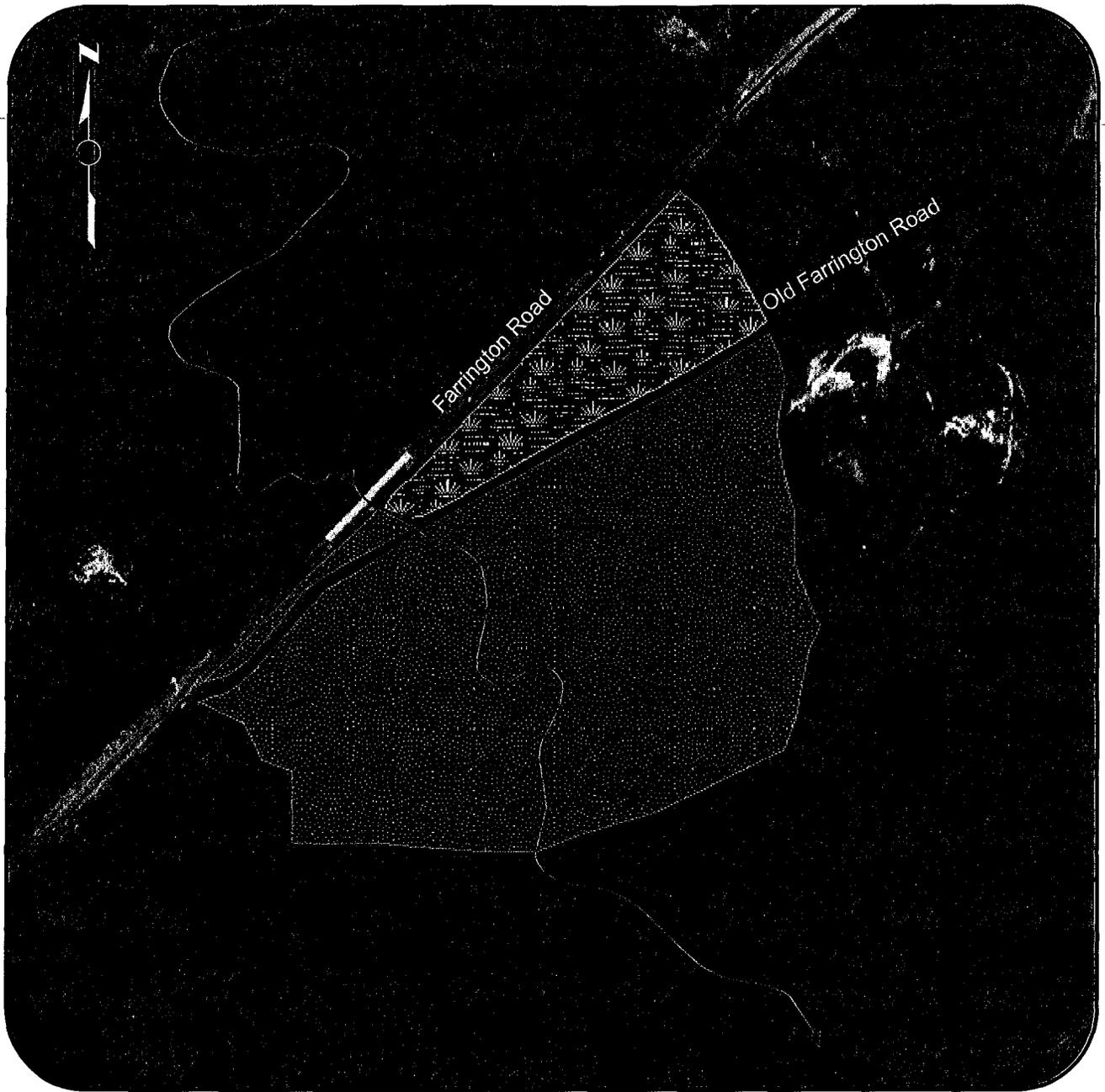
The vegetative community present on the old roadbed is typical of an early successional hardwood forest that has developed as a result of disturbance. The community is present on both the eastern and western portions of the Mitigation Site (Appendix B, Photos 3, 4, 5 & 6). The old roadbed community includes: red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), American sycamore (*Platanus occidentalis*), pawpaw (*Asimina triloba*), redbud (*Cercis canadensis*), river birch (*Betula nigra*), Christmas fern (*Polystichum acrostichoides*), muscadine grape (*Vitis rotundifolia*), and smartweed (*Polygonum* sp.).

Piedmont Bottomland Hardwood Forest

A Piedmont Bottomland Hardwood Forest community is present on both the eastern and western portions of the Mitigation Site. In the western portion of the Mitigation Site, the community occurs on both sides of the old roadbed (Appendix B, Photo 7). In the eastern portion of the Mitigation Site, the community is present only to the south of the old roadbed. The Piedmont Bottomland Hardwood Forest community includes: red maple, sweet gum, river birch, willow oak (*Quercus phellos*), green ash (*Fraxinus pennsylvanica*), ironwood (*Carpinus caroliniana*), Virginia creeper (*Parthenocissus quinquefolia*), lizards tail (*Saururus cernuus*), and false nettle (*Boehmeria* sp.).

Piedmont Swamp Forest

While a Piedmont Bottomland Hardwood Forest originally dominated the flood plain of Morgan Creek, the hydrology of the Mitigation Site has been altered by the construction of Old Farrington and Farrington Roads. These two roads have inhibited the drainage of the area between the two roads east of Morgan Creek. Frequent standing water has caused the Piedmont Bottomland Hardwood Forest in this area to transition toward a Piedmont Swamp



Legend

-  Abandoned Roadbed
-  Piedmont Swamp Forest
-  Piedmont Bottomland Hardwood Forest
-  Morgan Creek



**North Carolina
Department of Transportation**

**B-2963
Flood Storage and Wetland
Mitigation Plan**

Vegetative Communities

Scale: 1" = 575'

Exhibit 3.2.2.1

Forest community (Appendix B, Photo 8). The community present north of Old Farrington Road now includes: sweet gum, red maple, green ash, willow oak, river birch, tulip poplar (*Liriodendron tulipifera*), buttonbush (*Cephalanthus occidentalis*), sensitive fern (*Onoclea sensibilis*), common arrowhead (*Sagittaria sp.*), lizards tail, woolgrass (*Scirpus cyperinus*), and winged elm (*Ulmus alata*). The removal of the roadbed of Old Farrington Road will facilitate drainage of the Piedmont Swamp Forest community and encourage the re-establishment of a more typical Piedmont Bottomland Hardwood Forest.

3.2.3 Hydrology

As noted in the previous section, the hydrology of the Mitigation Site has been significantly altered. The hydrology of the area surrounding the Mitigation Site was originally dominated by the flooding of Morgan Creek. However, it appears that changes within the watershed of Morgan Creek have caused Morgan Creek to down cut, lowering the water table under the Mitigation Site. The changes caused by the lowering of Morgan Creek have been offset by the construction of Old Farrington and Farrington Roads, which impede drainage and help maintain hydrology. Jordan Lake represents an additional influence on the hydrology of the Mitigation Site. The Mitigation Site lies within the flood zone of Jordan Lake, resulting in periodic flooding.

3.3 METHODOLOGY

The methodology for wetland restoration at the B-2963 Mitigation Site is straightforward. The fill associated with the old roadbed will be removed. This will expose the underlying wetland soils and help restore the natural drainage of the Mitigation Site. After the fill has been removed, the area will be ripped to reduce the effects of compaction and facilitate the revegetation of the Mitigation Site. The Mitigation Site is long and narrow and located within an established Piedmont Bottomland Hardwood community. As a result, the USACE has stated that planting is unnecessary. It is expected that Mitigation Site will quickly revegetate from the existing, adjacent seed source.

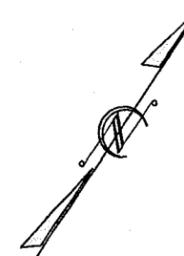
3.4 PROPOSED CONDITIONS

A temporary seed mix will be planted on-site as part of the erosion control plan. However, it is expected that a Piedmont Bottomland Hardwood Forest community will quickly establish on the Mitigation Site. Exhibits 3.4.1 and 3.4.2 show the areas of wetland restoration on the west and east portions of the Mitigation Site, respectively. The west portion of the Mitigation Site will yield 0.9 acres of wetland restoration and the east portion of the Mitigation Site will yield 1.6 acres of wetland restoration, a total of 2.5 acres. Based on the agreed upon ratio of 2:1, the B-2963 project will yield 1.25 acres of riverine wetland credits – more than enough to mitigate for the impacts of the B-2963 project.

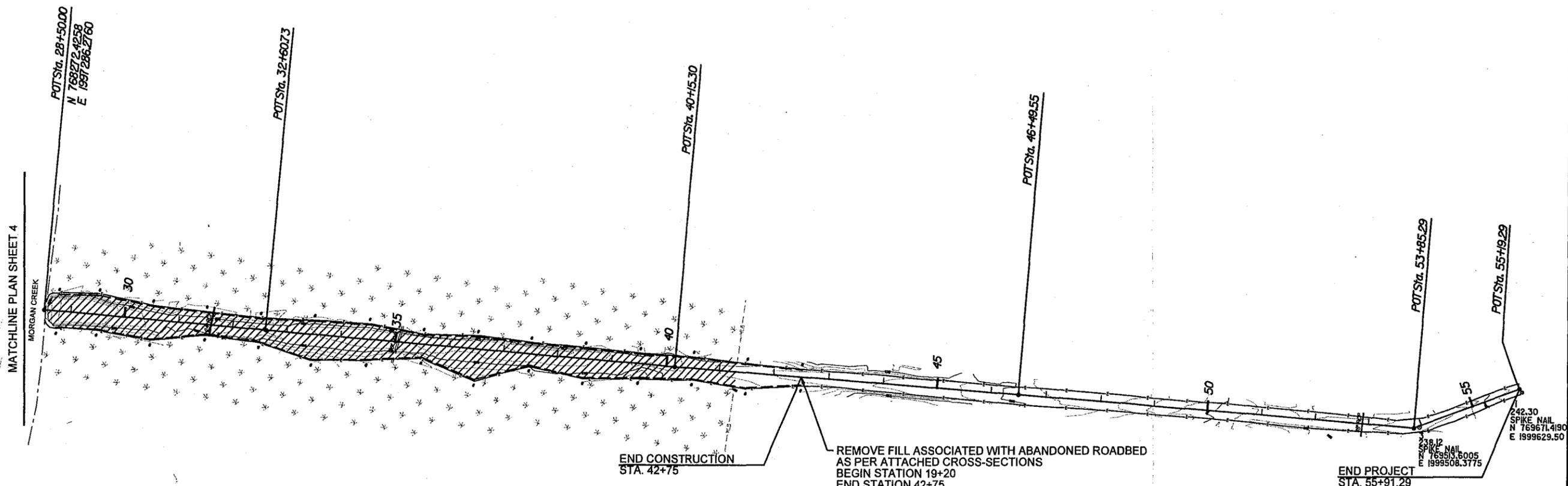
8/17/09

| STATION | TANGENT NUMBER | TANGENT LENGTH | BEARING |
|----------|----------------|----------------|--------------------|
| EAST | | | |
| 28+50.00 | T11 | 4073' | N 67° 17' 32.8" E |
| 32+6073 | T12 | 7545' | N 67° 04' 27.3" E |
| 40+15.30 | T13 | 63425' | N 67° 39' 07.7" E |
| 46+49.55 | T14 | 73574' | N 67° 40' 22.98" E |
| 53+85.29 | T15 | 20600' | N 36° 03' 04.75" E |
| 55+91.29 | | | |

| BENCHMARK | BM NUMBER | LENGTH TO STA. 55+19.29 | BEARING TO STA. 55+19.29 |
|------------|-----------|-------------------------|--------------------------|
| SPIKE NAIL | 1 | 185.95' | N 35° 28' 21.52" E |
| SPIKE NAIL | 3 | 7.62' | N 76° 38' 57.11" W |



Stantec
 Stantec Consulting Services Inc.
 Suite 300, 801 Jones Franklin Road
 Raleigh, NC
 27606
 Tel: 919.851.6866
 Fax: 919.851.7084
 www.stantec.com

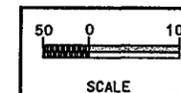


END CONSTRUCTION
STA. 42+75

REMOVE FILL ASSOCIATED WITH ABANDONED ROADBED
AS PER ATTACHED CROSS-SECTIONS
BEGIN STATION 19+20
END STATION 42+75

END PROJECT
STA. 55+91.29

NOTE:
ASPHALT PILES NEAR STATION 10+00 AND 55+00
SHALL BE REMOVED BY CONTRACTOR



LEGEND

WETLAND RESTORATION

EAST

B-2963 FLOOD STORAGE AND
WETLAND MITIGATION PLAN

WETLAND RESTORATION:
EAST PORTION

EXHIBIT: 3.4.2

02:02:37 PM
 U:\transportation\design\B-ridge Replacement\71000198-st-reom-ex342.dgn

4.0 CONSTRUCTION

In order to minimize damage to the surrounding area, the easement granted by the USACE for construction on the Mitigation Site restricts machinery to the old roadbed. With a limited number of places to turn equipment around, construction will be difficult.

The east portion of the Mitigation Site can be accessed off of Old Farrington Road. An NCDOT installed gate controls access. With the exception of some trees that have fallen across the roadway, and some saplings growing on the roadbed, equipment can be driven down the old roadbed. Access to the west portion is more difficult. The west portion is accessed from the shoulder of Farrington Road, just west of the south guardrail for the bridge over Morgan Creek. It will be necessary to construct a temporary access road for the west portion of the Mitigation Site. There are some young trees and fallen mature trees on the west portion of the roadbed.

Most of the Mitigation Site is located in a jurisdictional wetland. As a result, erosion and sediment control will be an issue. The plan must be rigidly enforced to prevent any violations.

The contract for construction of the B-2963 project will also include construction of the Flood Storage and Wetland Mitigation Site. This will ensure appropriate use of the fill removed from the Mitigation Site. The 7,400 cubic yards of fill removed from the Mitigation Site will be placed in the embankment for the new bridge.

5.0 MONITORING

The B-2963 Mitigation Site is located within a wetland and so successful restoration is almost guaranteed. As a result, the USACE has determined that monitoring will not be required.

6.0 DISPENSATION OF PROPERTY

As noted in Section 1.1, the B-2963 Mitigation Site is located within the Jordan Lake Property – the land acquired by the USACE when Jordan Lake was created. As a result, the USACE currently owns and manages the property on which the Mitigation Site is located. The USACE has granted NCDOT a temporary right-of-entry and easement to complete the B-2963 Flood Storage and Wetland Mitigation Project. When construction is complete, the easement will expire and management of the Mitigation Site will revert to the USACE. Ownership by the USACE will ensure that the Mitigation Site is protected from future development.

7.0 SUMMARY

The impacts associated with the B-2963 Project included 7,330 cubic yards of flood storage capacity for Jordan Lake and 0.5 acres of riverine wetland.

NCDOT identified the abandoned roadbed of Old Farrington Road as the preferred Mitigation Site because it would generate sufficient flood storage and wetland restoration credits. Following a site visit by the regulatory agencies, it was determined that credits for flood storage capacity would be issued at a 1:1 ratio while wetland restoration credits would be issued at a 2:1 ratio.

Following a detailed survey, it was determined that the B-2963 Mitigation Site would generate sufficient credits to mitigate for the project impacts. Table 7.1 shows that the B-2963 Mitigation Site provides exactly the amount of flood storage capacity and about 0.75 acres extra of riverine wetland credits.

Table 7.1 Impact and Mitigation Credits Summary Table

| Type of Mitigation | Impacts | Yield | Ratio | Credits |
|------------------------|------------------|------------------|-------|------------------|
| Riverine Wetland | <0.5 acres | 2.5 acres | 2:1 | 1.25 acres |
| Flood Storage Capacity | 7330 cubic yards | 7400 cubic yards | 1.1 | 7400 cubic yards |

8.0 REFERENCES

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http://soils.usda.gov/soil_use/hydric/states/nc.htm.
- Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.
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APPENDICES

APPENDIX A
B-2963 MITIGATION MEETING NOTES



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 1, 2002

MEMORANDUM TO: Project File

FROM: Robin C. Young
PDEA, Project Planning Engineer

SUBJECT: **B-2963 Mitigation Meeting**, Durham County, Replacement of
Bridge No. 111 on SR 1107 (Stagecoach Road) over New Hope
Creek, State Project 8.2352201, FA Project BRSTP-1107 (4)

A meeting for the subject bridge was held in the NCDOT Board Room of the Transportation Building on July 18, 2002. The following people were in attendance:

| | |
|------------------|--|
| David Cox | NC Wildlife Resources Commission (WRC) |
| Isaac Harrold | NC Wildlife Resources Commission (WRC) |
| John Hennessy | US Division of Water Quality (DWQ) |
| Howard Hall | US Fish & Wildlife (USFWS) |
| Rob Ayers | Federal Highway Administration (FHWA) |
| Joseph Cotton | Federal Highway Administration (FHWA) |
| Eric Alsmeyer | US Army Corps of Engineers (ACOE) – Regulatory |
| Michael Hosey | US Army Corps of Engineers (ACOE Ops) – Operations (Falls/Jordan Lake) |
| Carol Banaitis | US Army Corps of Engineers (ACOE Ops) – Operations (Falls/Jordan Lake) |
| Chris Militscher | US Environmental Protection Agency (EPA) |
| Scott Pohlman | NCDENR – Natural Heritage Program |
| Jerry Snead | NCDOT - Hydraulics Unit |
| Kathy Lassiter | NCDOT - Roadway Design Unit |
| Clint Morgan | NCDOT - Roadway Design Unit |
| Heather Montague | Project Development & Environmental Analysis (PDEA) |
| Lubin Prevatt | Project Development & Environmental Analysis (PDEA) |
| Robin Young | Project Development & Environmental Analysis (PDEA) |

The purpose of the meeting was to discuss mitigation associated with replacement of the subject bridge. The following is a summary of the topics.

Flood Storage (fill below 240 ft msl)

Initial fill mitigation was calculated at 9886 cubic yards (cy). By increasing the length (span) of the bridge, removal of part of the existing Roadway fill will account for 1850 cy of fill. In addition, 706 cy of excavation for standard roadway ditches will account for fill. This results in total flood storage mitigation of 7330 cy.

There are seven Secondary Roads (SR) that enter the flood pool of the lake on the Jordan Lake Property. These 7 roads need to be evaluated as possible sites for mitigation. There may be potential for fill along the old roadways to be removed in order to restore flood storage as well as wetlands. If NCDOT is able to access these roads with their equipment and if the elevations of these locations are within a range that is usable, it is possible that these will serve as our mitigation sites. If it is feasible, NCDOT will be able to use material from these sites and haul it to the project site to use as fill.

Wetlands (Water Quality)

As of April 25, 2002, wetland impacts were calculated as follows: Fill in wetlands (0.267 acres), Mechanized Clearing using Method III (0.318 acres), and Temporary Fill in SW (0.059 acres). Since that time, DOT's Construction office has agreed to use Method II for clearing & grubbing which will decrease the amount of acres impacted. Standard ratios will apply for mitigation.

Mitigation should be at the reservoir/on the lake property. There are seven Secondary Roads (SR) that enter the flood pool of the lake on the Jordan Lake Property. These seven roads need to be evaluated as possible sites for mitigation. There may be potential for fill along the old roadways to be removed in order to restore wetlands. There may be more areas along the upper part of the lake, near Highway 54, and/or I-40. WRC would like as much "in kind" mitigation as possible. To the knowledge of the attendees, Wetland Restoration Program (WRP) is not doing any projects on Jordan Lake.

An onsite meeting was held on Friday, August 2, 2002 with the US Army Corps of Engineers (Regulatory & Operation Branches), Division of Water Quality, and NCDOT to evaluate possible mitigation sites. An old roadway was evaluated. At this time, it appears the roadway can serve mitigation requirements. The area must be surveyed to determine exactly how the cubic yardage will match up to the mitigation needs.

The green sheet should include a commitment stating all temporary clearing will be re-vegetated with appropriate plant species.

Recreation Access and Opportunity

ACOE Operations is concerned about the loss of existing parking during construction. Duck hunting season is September 1 – January 31 (Deer season may be extended through August) and all driveways should be open for the hunters to access.

Currently, visitors are parking on the shoulder of the road, just past the existing bridge; construction of the new bridge will eliminate this parking. Agencies feel NCDOT is taking away this roadside parking and should provide a new parking area in the northeast quadrant of the project (NC 751 side of bridge). This parking area could be attached to the WRC's existing service road, be a gravel lot, and provide parking for 5-6 vehicles. Elevation of this area is higher than the roadway and could be used as restoration and "in kind" mitigation.

Should NCDOT mitigate for the loss of parking along SR 1107? If NCDOT agrees to construct a parking area, who will maintain it? The agencies feel NCDOT should build and maintain the lot so it can be open year round and provide safety to recreational fishers and hikers in addition to the hunters. Apparently, the Red Mill Road Area of Falls Lake in Durham County has one parking lot that was constructed in addition to a realignment project and is now maintained by NCDOT. Since the land in question is recreational, publicly owned, and another agency (WRC) is willing to maintain the parking area, NCDOT agrees to build a gravel parking lot that will accommodate 5-6 vehicles. WRC's primary concern for this area is access during hunting season. WRC stated they are willing to overtake and maintain the parking facility. At this time, WRC does not have the staff or the funds to maintain the lot year round. Outside of hunting season, ACOE Operations will coordinate with WRC concerning the parking lot. Once the parking lot is constructed, it becomes full responsibility of WRC and ACOE Operations.

ACOE Operations feels development in the area will increase recreational use and safety should be a consideration.

Wildlife Habitat (Wildlife Passage)

Lengthening the new bridge has provided an increased area of passage for wildlife under the bridge. There was a concern about the rip rap drawn on the design plans. It was explained that the rip rap would be placed on the slopes of the bridge approaches and will not interfere with animal crossing in the area under the bridge. There is approximated 50 feet between the rip rap and the stream for passage under the bridge.

Critter Crossings/culverts were discussed and have been deemed not feasible at this site due to the location of the waterfowl impoundment, topography of the area, and lack of means to direct animals to particular crossings.

ACOE Operations stated in the last eight years, there have been 15 vehicular crashes in the vicinity of the bridge. One of these crashes involved a deer. The question arose, should wildlife signs be placed in the project vicinity? WRC stated to their knowledge, there were not many deer in the project vicinity, especially during peak traffic times. However, they would not be opposed to cautionary signs going up. At this time, the traffic representatives have not responded. If it is decided the signs are warranted, this will be stated in the Addendum to the Categorical Exclusion.

USFWS wants to make sure there is an updated survey for the plant species, Michaux's Sumac. All threatened and endangered species need to be re-surveyed and have obtained the USFWS approval.

Other

Mark Helmon with NCDOT's Right of Way Department has contacted ACOE Operations. There is a sewer line running along the north or south side of SR 1107. The bridge design calls for a pier location that will be within one foot of the sewer line. The sewer line owners are

looking to re-locate the line. Any utility re-alignment within the project area should be permitted with this project. ACOE looks to NCDOT to coordinate the easement of the new sewer line location, especially if it will be outside of the project limits. ACOE has their own real estate branch with their own regulations and may have to be included in any new location of the sewer line. The sewer line design is currently being handled and a final design is expected in a month or so. The sewer line location will be included on the drawings for the permit application.

ACOE wants NCDOT to look at methods of slowing down traffic along SR 1107, especially in the vicinity of Bridge No. 111. One suggestion was reducing the speed limit from 55 mph to 45 mph. After checking with the Assistant Division Traffic Engineer, the speed limit can be reduced to 45 mph due to roadway alignment between NC 751 and SR 1110 (Farrington Rd). NCDOT Division forces will go ahead and handle this.

Pavement markings for crosswalks were discussed. Since currently there are not hiking trails or greenways that cross the road within project limits, crosswalks are not warranted.

Before ACOE Regulatory can verify a permit, ACOE Operations must have everything they need.

APPENDIX B
PHOTOGRAPHS



Photo 1. View of the old bridge pilings in Morgan Creek for Old Farrington Road. Photo is taken from the west portion of the Site, looking towards the east portion.



Photo 2. View of the access point for the east portion of the Site. Orange flagging is hanging from the gate that blocks the entrance to the Mitigation Site.



Photo 3. Old roadbed on the west portion of the site. Both sides are bordered by a Piedmont Bottomland Hardwood Forest Community.



Photo 4. View of the old roadbed on the west portion of the site from the adjacent Piedmont Bottomland Hardwood Forest community. Note the elevation of the roadbed in comparison with the adjacent ground.



Photo 5. Old roadbed on the east portion of the site. Early successional hardwood species are beginning to establish on the roadbed.



Photo 6. View of the old roadbed on the east portion of the site from the adjacent Piedmont Bottomland Hardwood Forest. The photo was taken at the easternmost portion of the Mitigation Site, where the roadbed was nearly level with the adjacent ground.



Photo 7. View of the Piedmont Bottomland Hardwood Forest facing south from Old Farrington Road in the western portion of the site.



Photo 8. View of the Piedmont Swamp Forest north of Old Farrington Road. The removal of fill associated with the old roadbed will likely drain this portion of the Site, allowing it to transition back towards a Piedmont Bottomland Hardwood Forest Community.

APPENDIX C

GEOTECHNICAL REPORT

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY**

T. I. P. No. B-2963

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 32780.1.1 County CHATHAM Owner _____
 Date: Sampled 8/11/03 Received 8/13/03 Reported 8/15/03
 Sampled from _____ By J. I. MILKOVITS, JR.
 Submitted by N.W. WAINAINA _____ 1995 Standard Specifications

707089 TO 707097
8/19/03

TEST RESULTS

| Proj. Sample No. | | S-7 | S-8 | S-9 | | | |
|--------------------|---|--------|--------|--------|--|--|--|
| Lab. Sample No. | | 707095 | 707096 | 707097 | | | |
| Retained #4 Sieve | % | - | - | 1 | | | |
| Passing #10 Sieve | % | 100 | 100 | 96 | | | |
| Passing #40 Sieve | % | 99 | 91 | 92 | | | |
| Passing #200 Sieve | % | 50 | 60 | 76 | | | |

MINUS NO. 10 FRACTION

| SOIL MORTAR - 100% | | | | | | | |
|-----------------------|---|------|------|------|--|--|--|
| Coarse Sand Ret - #60 | % | 10.1 | 15.9 | 8.9 | | | |
| Fine Sand Ret - #270 | % | 47.7 | 30.6 | 15.1 | | | |
| Silt 0.05 - 0.005 mm | % | 20.1 | 31.4 | 37.8 | | | |
| Clay < 0.005 mm | % | 22.1 | 22.1 | 38.2 | | | |
| Passing #40 Sieve | % | - | - | - | | | |
| Passing #200 Sieve | % | - | - | - | | | |

| | | | | | | | |
|-----------------------|----|--------|--------|-----------|--|--|--|
| L. L. | | 28 | 29 | 43 | | | |
| P. I. | | 8 | 11 | 26 | | | |
| AASHTO Classification | | A-4(1) | A-6(4) | A-7-6(19) | | | |
| Station | | | | | | | |
| Hole No. | | #2 | #2 | #1 | | | |
| Depth (Ft) | | 6.00 | 10.00 | 2.00 | | | |
| | to | 8.00 | 11.00 | 5.00 | | | |

Soils Engineer

APPENDIX D

WETLAND DATA FORMS

DATA FORM

**ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)**

| | | | | | |
|---|--|-----|-----------------------|------------------------------------|--|
| Project/Site: B-2963 | | | Date: August 1, 2003 | | |
| Applicant / Owner: USACE | | | County: Chatham | | |
| Investigator: Lia Myott | | | State: North Carolina | | |
| Do Normal Circumstances exist on the site? | | YES | NO | Community ID: Swamp Forest Wetland | |
| Is the site significantly disturbed (Atypical Situation)? | | YES | NO | Transect ID: / | |
| Is the area a potential Problem Area? (If needed, explain on reverse) | | YES | NO | Plot ID: | |

VEGETATION

| Dominant Plant Species | Stratum | Indicator | Dominant Plant Species | Stratum | Indicator |
|---------------------------------|---------|-----------|------------------------------------|---------|-----------|
| 1 <i>Acer rubrum</i> | Tree | FAC | 9 <i>Cephalanthus occidentalis</i> | Shrub | OBL |
| 2 <i>Betula nigra</i> | Tree | FACW | 10 <i>Saururus cernuus</i> | Herb | OBL |
| 3 <i>Quercus falcata</i> | Tree | FACU- | 11 <i>Boehmeria cylindrica</i> | Herb | FACW+ |
| 4 <i>Platanus occidentalis</i> | Tree | FACW- | 12 <i>Scirpus cyperinus</i> | Herb | OBL |
| 5 <i>Fraxinus pennsylvanica</i> | Tree | FACW | 13 <i>Onoclea sensibilis</i> | Herb | FACW |
| 6 <i>Quercus phellos</i> | Tree | FACW- | 14 | | |
| 7 <i>Quercus alba</i> | Tree | FACU | 15 | | |
| 8 <i>Salix nigra</i> | Tree | OBL | 16 | | |

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 85%

Remarks:

Normal Circumstances do not exist on the site. The damming of Jordan Lake has created wetland areas where the vegetation and soils are still in transition. Hummocks of Southern red oak and white oak can be found on hummocks surrounded by two feet of water.

This wetland plot was taken approximately 10 feet from the edge of the surface water on the northern side of Old Farrington Road.

HYDROLOGY

| | | | |
|---|--------|--|--|
| <input type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Guage <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available | | WETLAND HYDROLOGY INDICATORS Primary Indicators: <input type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 Inches <input checked="" type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input checked="" type="checkbox"/> Drainage Patterns in Wetlands | |
| FIELD OBSERVATIONS | | Secondary Indicators (2 or more Required) <input checked="" type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input checked="" type="checkbox"/> Water-stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks) | |
| Depth of Surface Water | 0 (in) | | |
| Depth of Free Water in Pit | 8 (in) | | |
| Depth to Saturated Soil | 4 (in) | | |

SOILS

| Map Unit Name (Series and Phase): White Store sandy loam | | | | Drainage Class: Moderately Well | |
|---|---------|---|--|---------------------------------|--|
| Taxonomy (Subgroup): Thermic Oxyaquic Vertic Hapludalfs | | | Field Observations Confirm Mapped Type? YES NO | | |
| PROFILE DESCRIPTION | | | | | |
| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
| 0-6 | A | 10YR 6/3 | 10YR 6/3 | 20% | Fine sandy loam |
| 6-18+ | B | 10YR 7/2 | 10YR 4/6 | 10% | Clay loam |
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| HYDRIC SOIL INDICATORS: | | | | | |
| <input type="checkbox"/> Histosol | | <input type="checkbox"/> Concretions | | | |
| <input type="checkbox"/> Histic Epipedon | | <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils | | | |
| <input type="checkbox"/> Sulfidic Odor | | <input type="checkbox"/> Organic Streaking in Sandy Soils | | | |
| <input checked="" type="checkbox"/> Aquic Moisture Regime | | <input type="checkbox"/> Listed on Local Hydric Soils List | | | |
| <input checked="" type="checkbox"/> Reducing Conditions | | <input type="checkbox"/> Listed on National Hydric Soils List | | | |
| <input type="checkbox"/> Gleyed or Low-Chroma Colors | | <input type="checkbox"/> Other (Explain in Remarks) | | | |
| Remarks: | | | | | |

WETLAND DETERMINATION

| | | | |
|---|-----|----|---|
| Hydrophytic Vegetation Present? | YES | NO | Is this Sampling Point Within a Wetland? YES NO |
| Wetland Hydrology Present? | YES | NO | |
| Hydric Soil Present? | YES | NO | |
| Remarks: | | | |
| <p>The National Wetlands Inventory classifies this wetland as Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded, Diked/Impounded.</p> | | | |

DATA FORM

**ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)**

| | | |
|---|---------------|-----------------------------------|
| Project/Site: B-2963 | | Date: August 1, 2003 |
| Applicant / Owner: USACE | | County: Chatham |
| Investigator: Lia Myott | | State: North Carolina |
| Do Normal Circumstances exist on the site? | YES NO | Community ID: Swamp Forest Upland |
| Is the site significantly disturbed (Atypical Situation)? | YES NO | Transect ID: / |
| Is the area a potential Problem Area? (If needed, explain on reverse) | YES NO | Plot ID: |

VEGETATION

| Dominant Plant Species | Stratum | Indicator | | Dominant Plant Species | Stratum | Indicator |
|----------------------------------|---------|-----------|----|------------------------|---------|-----------|
| 1 <i>Pinus taeda</i> | Tree | FAC | 9 | | | |
| 2 <i>Quercus phellos</i> | Tree | FACW- | 10 | | | |
| 3 <i>Liquidambar styraciflua</i> | Tree | FAC+ | 11 | | | |
| 4 <i>Quercus nigra</i> | Tree | FAC | 12 | | | |
| 5 <i>Quercus stellata</i> | Tree | FACU | 13 | | | |
| 6 <i>Toxicodendron radicans</i> | Vine | FAC | 14 | | | |
| 7 <i>Vitis</i> sp. | Vine | FAC | 15 | | | |
| 8 <i>Asplenium</i> sp. | Herb | varies | 16 | | | |

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 86%

Remarks:

This upland plot was taken North of Old Farrington Road in an area that has been previously logged and planted with loblolly pine.

HYDROLOGY

| | | | |
|---|----------|---|--|
| <input type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Guage <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available | | WETLAND HYDROLOGY INDICATORS Primary Indicators: <input type="checkbox"/> Inundated <input type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands | |
| FIELD OBSERVATIONS | | Secondary Indicators (2 or more Required) <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks) | |
| Depth of Surface Water | 0 (in) | | |
| Depth of Free Water in Pit | N/A (in) | | |
| Depth to Saturated Soil | N/A (in) | | |

SOILS

| Map Unit Name (Series and Phase): Chewacla loam | | | Drainage Class: Somewhat poor | | |
|---|---------|---------------------------------|--|------------------------------|--|
| Taxonomy (Subgroup): Fluvaquentic Dystrachrepts | | | Field Observations Confirm Mapped Type? YES NO | | |
| PROFILE DESCRIPTION | | | | | |
| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
| 0-6 | A | 10YR 7/2 | | | Fine sandy loam |
| 6-12 | B1 | 10YR 6/4 | | | Clay loam |
| 12-18+ | B2 | 10YR 7/2 | | | Clay loam |
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| HYDRIC SOIL INDICATORS: | | | | | |
| <input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input type="checkbox"/> Gleyed or Low-Chroma Colors | | | <input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks) | | |
| Remarks: | | | | | |

WETLAND DETERMINATION

| | | | |
|---------------------------------|-----|-----------|--|
| Hydrophytic Vegetation Present? | YES | NO | Is this Sampling Point Within a Wetland? YES NO |
| Wetland Hydrology Present? | YES | NO | |
| Hydric Soil Present? | YES | NO | |
| Remarks: | | | |

DATA FORM

**ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)**

| | | |
|---|---------------|--------------------------|
| Project/Site: B-2963 | | Date: August 19, 2003 |
| Applicant / Owner: USACE | | County: Chatham |
| Investigator: Lia Myott | | State: North Carolina |
| Do Normal Circumstances exist on the site? | YES NO | Community ID: BH-Wetland |
| Is the site significantly disturbed (Atypical Situation)? | YES NO | Transect ID: / |
| Is the area a potential Problem Area? (If needed, explain on reverse) | YES NO | Plot ID: |

VEGETATION

| Dominant Plant Species | Stratum | Indicator | Dominant Plant Species | Stratum | Indicator |
|----------------------------------|---------|-----------|-----------------------------|---------|-----------|
| 1 <i>Fraxinus pennsylvanica</i> | Tree | FACW | 9 <i>Onoclea sensibilis</i> | Herb | FACW |
| 2 <i>Liquidambar styraciflua</i> | Tree | FAC+ | 10 | | |
| 3 <i>Betula nigra</i> | Tree | FACW | 11 | | |
| 4 <i>Platanus occidentalis</i> | Tree | FACW- | 12 | | |
| 5 <i>Acer rubrum</i> | Tree | FAC | 13 | | |
| 6 <i>Carpinus caroliniana</i> | Tree | FAC | 14 | | |
| 7 <i>Quercus phellos</i> | Tree | FACW- | 15 | | |
| 8 <i>Cicuta maculata</i> | Shrub | OBL | 16 | | |

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks:

This wetland plot was taken in an alluvial wetland area south of Old Farrington Road. Understory vegetation is non-existent.

HYDROLOGY

| | | | |
|---|---------|--|--|
| <input type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Guage <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available | | WETLAND HYDROLOGY INDICATORS Primary Indicators: <input type="checkbox"/> Inundated <input type="checkbox"/> Saturated in Upper 12 Inches <input checked="" type="checkbox"/> Water Marks <input checked="" type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input checked="" type="checkbox"/> Drainage Patterns in Wetlands | |
| FIELD OBSERVATIONS | | Secondary Indicators (2 or more Required) <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input checked="" type="checkbox"/> Water-stained Leaves <input checked="" type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks) | |
| Depth of Surface Water | 0 (in) | | |
| Depth of Free Water in Pit | 16 (in) | | |
| Depth to Saturated Soil | 12 (in) | | |

SOILS

| Map Unit Name (Series and Phase): Wehadkee silt loam | | | | Drainage Class: Poorly drained | |
|--|---------|---------------------------------|--|--------------------------------|--|
| Taxonomy (Subgroup): Typic Fluvaquents | | | Field Observations Confirm Mapped Type? YES NO | | |
| PROFILE DESCRIPTION | | | | | |
| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
| 0-6 | A | 10YR 4/4 | 2.5YR 3/6 | 20% | Fine sandy loam |
| 6-12 | Bg | 10YR 4/2 | 2.5YR 4/8 | 50% | Sandy clay loam |
| 12+ | Cg | 10YR 5/2 | 2.5YR 4/7 | 50% | Clay loam |
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| HYDRIC SOIL INDICATORS: | | | | | |
| <input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input checked="" type="checkbox"/> Aquic Moisture Regime <input checked="" type="checkbox"/> Reducing Conditions <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors | | | <input checked="" type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input checked="" type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks) | | |
| Remarks: | | | | | |

WETLAND DETERMINATION

| | | | |
|--|------------|----|--|
| Hydrophytic Vegetation Present? | YES | NO | Is this Sampling Point Within a Wetland? YES NO |
| Wetland Hydrology Present? | YES | NO | |
| Hydric Soil Present? | YES | NO | |
| Remarks: | | | |
| The National Wetlands Inventory classifies this wetland as Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded, Diked/Impounded. | | | |

DATA FORM

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

| | | |
|---|---|-------------------------|
| Project/Site: B-2963 | | Date: August 1, 2003 |
| Applicant / Owner: USACE | | County: Chatham |
| Investigator: Lia Myott | | State: North Carolina |
| Do Normal Circumstances exist on the site? | YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> | Community ID: BH-Upland |
| Is the site significantly disturbed (Atypical Situation)? | YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> | Transect ID: / |
| Is the area a potential Problem Area? (If needed, explain on reverse) | YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> | Plot ID: |

VEGETATION

| Dominant Plant Species | Stratum | Indicator | Dominant Plant Species | Stratum | Indicator |
|--|---------|-----------|------------------------------|---------|-----------|
| 1 <i>Quercus falcata</i> | Tree | FACU- | 9 <i>Smilax rotundifolia</i> | Vine | FAC |
| 2 <i>Quercus alba</i> | Tree | FACU | 10 | | |
| 3 <i>Liquidambar styraciflua</i> | Tree | FAC+ | 11 | | |
| 4 <i>Pinus taeda</i> | Tree | FAC | 12 | | |
| 5 <i>Cercis canadensis</i> | Tree | FACU | 13 | | |
| 6 <i>Quercus nigra</i> | Tree | FAC | 14 | | |
| 7 <i>Carya glabra</i> | Tree | FACU | 15 | | |
| 8 <i>Ulmus alata</i> | Shrub | FACU+ | 16 | | |
| Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 44% | | | | | |
| Remarks: This upland plot was taken South of Old Farrington Road. | | | | | |

HYDROLOGY

| | | | |
|---|----------|---|--|
| <input type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Guage <input type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input checked="" type="checkbox"/> No Recorded Data Available | | WETLAND HYDROLOGY INDICATORS Primary Indicators: <input type="checkbox"/> Inundated <input type="checkbox"/> Saturated in Upper 12 Inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands | |
| FIELD OBSERVATIONS | | Secondary Indicators (2 or more Required) | |
| Depth of Surface Water | 0 (in) | <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks) | |
| Depth of Free Water in Pit | N/A (in) | | |
| Depth to Saturated Soil | N/A (in) | | |

SOILS

| Map Unit Name (Series and Phase): Congaree silt loam | | | | Drainage Class: Moderately Well | |
|--|---------|---|--|---------------------------------|--|
| Taxonomy (Subgroup): Oxyaquic Udifluvents | | | Field Observations Confirm Mapped Type? YES NO | | |
| PROFILE DESCRIPTION | | | | | |
| Depth (inches) | Horizon | Matrix Color (Munsell Moist) | Mottle Colors (Munsell Moist) | Mottle Abundance/Contrast | Texture, Concretions, Structure, etc. |
| 0-9 | A | 10YR 4/3 | | | Sandy loam |
| 9+ | B | 10YR 3/6 | | | Loam |
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| HYDRIC SOIL INDICATORS: | | | | | |
| <input type="checkbox"/> Histosol | | <input type="checkbox"/> Concretions | | | |
| <input type="checkbox"/> Histic Epipedon | | <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils | | | |
| <input type="checkbox"/> Sulfidic Odor | | <input type="checkbox"/> Organic Streaking in Sandy Soils | | | |
| <input type="checkbox"/> Aquic Moisture Regime | | <input type="checkbox"/> Listed on Local Hydric Soils List | | | |
| <input type="checkbox"/> Reducing Conditions | | <input type="checkbox"/> Listed on National Hydric Soils List | | | |
| <input type="checkbox"/> Gleyed or Low-Chroma Colors | | <input type="checkbox"/> Other (Explain in Remarks) | | | |
| Remarks: | | | | | |

WETLAND DETERMINATION

| | | | |
|---------------------------------|-----|-----------|--|
| Hydrophytic Vegetation Present? | YES | NO | Is this Sampling Point Within a Wetland? YES NO |
| Wetland Hydrology Present? | YES | NO | |
| Hydric Soil Present? | YES | NO | |
| Remarks: | | | |