



**US Army Corps  
Of Engineers**  
Wilmington District

# PUBLIC NOTICE

Issue Date: March 13, 2015  
Comment Deadline: April 13, 2015  
Corps Action ID Number: SAW-2014-00864

The Wilmington District, Corps of Engineers (Corps) received an application from the North Carolina Department of Transportation (NCDOT) seeking Department of the Army authorization to impact 460 linear feet (lf) of stream channel for the Windy Road Bridge Replacement Project (BR No 12, state project number 17BP.10R.53). The project proposes to remove the existing bridge and replace it with a double 8 x 9 foot reinforced Concrete Box Culvert. The project site is located where Windy Road crosses Emerson Branch, approximately 0.15 miles southwest of the intersection of Mooresville Road and Windy Road in Concord, Cabarrus County, North Carolina.

Specific plans and location information are described below and shown on the attached plans. This Public Notice and all attached plans are also available on the Wilmington District Web Site at <http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram.aspx>

**Applicant:** North Carolina Department of Transportation  
Attn: Mr. Larry Thompson  
716 West Main Street  
Albemarle, North Carolina 28001

## Authority

The Corps evaluates this application and decides whether to issue, conditionally issue, or deny the proposed work pursuant to applicable procedures of the following Statutory Authorities:

- ☒ Section 404 of the Clean Water Act (33 U.S.C. 1344)
- ☐ Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)
- ☐ Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413)

## Location

Project Size: Approximately 0.105 miles      Nearest Town: Concord  
Nearest Waterway: Emerson Branch      River Basin: Yadkin-Pee Dee  
Latitude and Longitude: 35.479291 N, -80.729249 W

## **Existing Site Conditions**

The proposed project includes the existing Windy Road and adjacent wooded and cleared residential land. Windy Bridge currently crosses Emerson Branch via a bridge. There is a perennial unnamed tributary to Emerson Branch that runs parallel to Windy Road on the northwest side. No wetlands occur on site and soils are made up of Poindexter loam (PoD), Chewacla sandy loam (ChA) and Pacolet sandy loam (PaF).

## **Applicant's Stated Purpose**

The project's purpose is to replace a structurally deficient and functionally obsolete bridge to improve safety and provide more efficient traffic operations to the segment of Windy Road that crosses Emerson Creek. The applicant's stated purpose and need is as follows:

"NCDOT Bridge Maintenance Unit records indicate that Bridge No.12 has a sufficiency rating of 7 out of a possible 100 for a new structure and is considered structurally deficient and functionally obsolete. Replacement of this inadequate structure will result in safer and more efficient traffic operations. The roadway is also compromised due to the nearby unnamed tributary eroding the banks and roadway fill along the facility, the narrow roadway at the bridge, and lack of a shoulder considering the traffic volume utilizing the facility. In addition to the replacement of the bridge, roadway improvements including 11' travel lanes, 6 foot wide shoulders, and guardrail are also proposed to create a safer facility for the traveling public".

## **Project Description**

The proposed project consists of removing the obsolete bridge and replacing it with a double 8 x 9 foot Reinforced Concrete Box Culvert (RCBC). In addition to the bridge replacement, roadway improvements also include widening the road shoulders and providing guardrail to improve safety of the facility. The project length is approximately 0.105 miles with atypical section of 11 foot travel lanes and six foot wide shoulders. A total of two jurisdictional streams will be impacted by this project. Proposed Impacts include the fill of 54 lf and stabilization of 43 lf of Emerson Branch due to the construction of a culvert and associated bank stabilization and the relocation of 363 lf of a perennial tributary of Emerson Branch due to road widening associated with the roadway improvements and bridge replacement.

## **Avoidance and Minimization**

The applicant provided the following information in support of efforts to avoid and/or minimize impacts to the aquatic environment:

Avoidance and minimization has been employed in the project area to the maximum extent practicable. The following measures were implemented for the project:

- The project was designed to avoid or minimize disturbance to aquatic life movements.

- NCDOT will minimize long-term water quality impacts using the most recent Best Management Practices for Protection of Surface Waters, as identified in the Federal Aid Highway Program (FHPM) and North Carolina Administrative Code, Chapter 4.
- Sediment and erosion control measures will accommodate a 25 year storm event.
- Special sediment control fence is used in low areas along the standard silt fence.
- The use of 2:1 fill slopes in jurisdictional areas where practicable.
- Lowered the roadway profile to minimize impacts to jurisdictional resources which reduces the amount of off-site borrow required for the job and reduced widening required by using guardrail.
- The construction sequence has been developed to avoid temporary impacts by providing an off-site detour.

### **Compensatory Mitigation**

The applicant offered the following compensatory mitigation plan to offset unavoidable functional loss to the aquatic environment:

#### *On-Site Stream Relocation*

On-site stream relocation has been fully evaluated and is being pursued on this job. NCDOT intends to relocate approximately 363 lf of stream as discussed with the Corps prior to submission of this permit application. The plan is to relocate the jurisdictional stream approximately 20 feet west and create a stable channel that does not jeopardize the existing roadway. The existing stream adjacent to the roadway is unstable and creating bank erosion and failures. NCDOT will perform the stream relocation in right of way to be purchased for the project and provide a 2' base channel with floodplain benches and side slopes of 2:1 along with vegetative planting. Bed stabilization by imbedding rock in the channel base at certain intervals is also being employed with the project to minimize potential future downcutting. The specific stream relocation plan sheet is included with this permit application within the roadway plan set.

#### *Off-site Compensation*

The NCDOT has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. The impact to Emerson Branch is anticipated to be 97 total linear feet. Of the 97 lf of impact, 43 lf is due to bank stabilization which does not require compensation. The remaining 54 lf is less than the threshold typical of the Nationwide Permit No. 14 which requires mitigation for a loss of more than 150 lf. Currently, NCDOT does not propose compensation for these impacts to Emerson Branch.

### **Essential Fish Habitat**

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, this Public Notice initiates the Essential Fish Habitat (EFH) consultation requirements. The Corps' initial determination is that the proposed project would not effect EFH or associated fisheries managed by the South Atlantic or Mid Atlantic Fishery Management Councils or the National Marine Fisheries Service.

## Cultural Resources

Pursuant to Section 106 of the National Historic Preservation Act of 1966, Appendix C of 33 CFR Part 325, and the 2005 Revised Interim Guidance for Implementing Appendix C, the District Engineer consulted district files and records and the latest published version of the National Register of Historic Places and initially determines that:

- ☒ Should historic properties, or properties eligible for inclusion in the National Register, be present within the Corps' permit area; the proposed activity requiring the DA permit (the undertaking) is a type of activity that will have no potential to cause an effect to an historic properties.
- ☐ No historic properties, nor properties eligible for inclusion in the National Register, are present within the Corps' permit area; therefore, there will be no historic properties affected. The Corps subsequently requests concurrence from the SHPO (or THPO).
- ☐ Properties ineligible for inclusion in the National Register are present within the Corps' permit area; there will be no historic properties affected by the proposed work. The Corps subsequently requests concurrence from the SHPO (or THPO).
- ☐ Historic properties, or properties eligible for inclusion in the National Register, are present within the Corps' permit area; however, the undertaking will have no adverse effect on these historic properties. The Corps subsequently requests concurrence from the SHPO (or THPO).
- ☐ Historic properties, or properties eligible for inclusion in the National Register, are present within the Corps' permit area; moreover, the undertaking may have an adverse effect on these historic properties. The Corps subsequently initiates consultation with the SHPO (or THPO).
- ☐ The proposed work takes place in an area known to have the potential for the presence of prehistoric and historic cultural resources; however, the area has not been formally surveyed for the presence of cultural resources. No sites eligible for inclusion in the National Register of Historic Places are known to be present in the vicinity of the proposed work. Additional work may be necessary to identify and assess any historic or prehistoric resources that may be present.

The District Engineer's final eligibility and effect determination will be based upon coordination with the SHPO and/or THPO, as appropriate and required, and with full consideration given to the proposed undertaking's potential direct and indirect effects on historic properties within the Corps-identified permit area.

## Endangered Species

Pursuant to the Endangered Species Act of 1973, the Corps reviewed the project area, examined all information provided by the applicant and consulted the latest North Carolina Natural Heritage Database. Based on available information:

- ☒ The Corps determines that the proposed project would not affect federally listed endangered or threatened species or their formally designated critical habitat.
- ☐ The Corps determines that the proposed project may affect federally listed endangered or threatened species or their formally designated critical habitat. The Corps initiates consultation under Section 7 of the ESA and will not make a permit decision until the consultation process is complete.
- ☐ The Corps is not aware of the presence of species listed as threatened or endangered or their critical habitat formally designated pursuant to the Endangered Species Act of 1973 (ESA) within the project area. The Corps will make a final determination on the effects of the proposed project upon additional review of the project and completion of any necessary biological assessment and/or consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service.

## Other Required Authorizations

The Corps forwards this notice and all applicable application materials to the appropriate State agencies for review.

**North Carolina Division of Water Resources (NCDWR):** The Corps will generally not make a final permit decision until the NCDWR issues, denies, or waives the state Certification as required by Section 401 of the Clean Water Act (PL 92-500). The receipt of the application and this public notice, combined with the appropriate application fee, at the NCDWR Central Office in Raleigh constitutes initial receipt of an application for a 401 Certification. A waiver will be deemed to occur if the NCDWR fails to act on this request for certification within sixty days of receipt of a complete application. Additional information regarding the 401 Certification may be reviewed at the NCDWR Central Office, Transportation Permitting Unit, 512 North Salisbury Street, Raleigh, North Carolina 27604-2260. All persons desiring to make comments regarding the application for a 401 Certification should do so, in writing, by April 13, 2015 to:

NCDWR Central Office  
Attention: Ms. Amy Chapman, Transportation Permitting Unit  
(USPS mailing address): 1617 Mail Service Center, Raleigh, NC 27699-1617

Or,

(physical address): 512 North Salisbury Street, Raleigh, North Carolina 27604

### **North Carolina Division of Coastal Management (NCDCM):**

- ☐ The application did not include a certification that the proposed work complies with and would be conducted in a manner that is consistent with the approved North Carolina Coastal Zone Management Program. Pursuant to 33 CFR 325.2(b)(2) the Corps cannot issue a Department of Army (DA) permit for the proposed work until the applicant submits such a certification to the Corps and the NCDCM, and the NCDCM notifies the Corps that it concurs with the applicant's consistency certification. As the application did not include the consistency certification, the Corps will request, upon receipt,, concurrence or objection from the NCDCM.
- ☒ Based upon all available information, the Corps determines that this application for a Department of Army (DA) permit does not involve an activity which would affect the coastal zone, which is defined by the Coastal Zone Management (CZM) Act (16 U.S.C. § 1453).

### **Evaluation**

The decision whether to issue a permit will be based on an evaluation of the probable impacts including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values (in accordance with Executive Order 11988), land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people. For activities involving the discharge of dredged or fill materials in waters of the United States, the evaluation of the impact of the activity on the public interest will include application of the Environmental Protection Agency's 404(b)(1) guidelines.

### **Commenting Information**

The Corps of Engineers is soliciting comments from the public; Federal, State and local agencies and officials, including any consolidated State Viewpoint or written position of the Governor; Indian Tribes and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. Requests for a public hearing shall be granted, unless the District Engineer determines that the issues raised are insubstantial or there is otherwise no valid interest to be served by a hearing.

The Corps of Engineers, Wilmington District will receive written comments pertinent to the proposed work, as outlined above, until 5pm, April 13, 2015. Comments should be submitted to Crystal Amschler, Asheville Regulatory Field Office, 151 Patton Avenue, Room 208, Asheville, North Carolina 28801-5006, at (828) 271-7980 ext. 231.



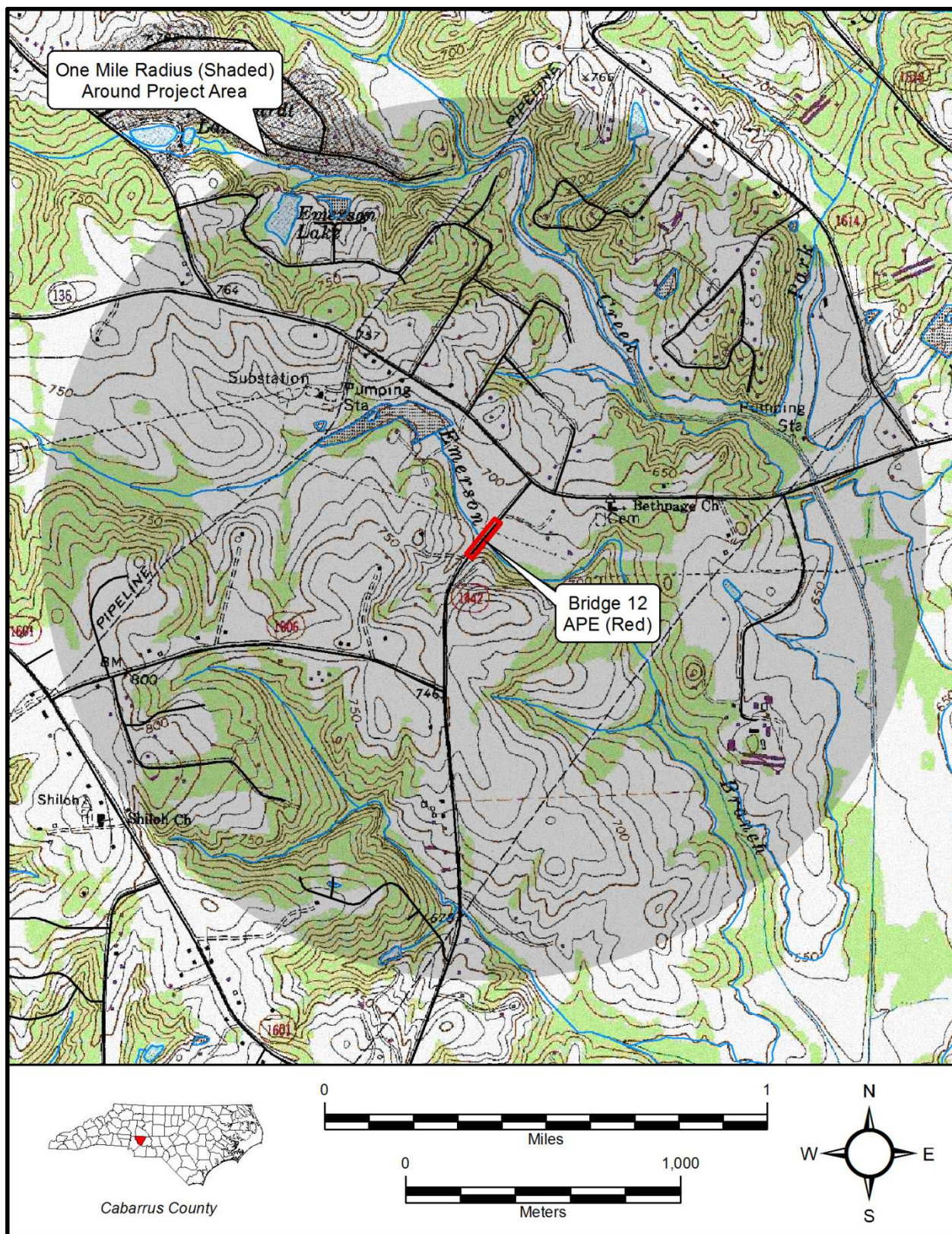


Figure 1. Topographic Setting of the Project Area, Kannapolis (1993), NC, USGS 7.5' Topographic Quadrangle.



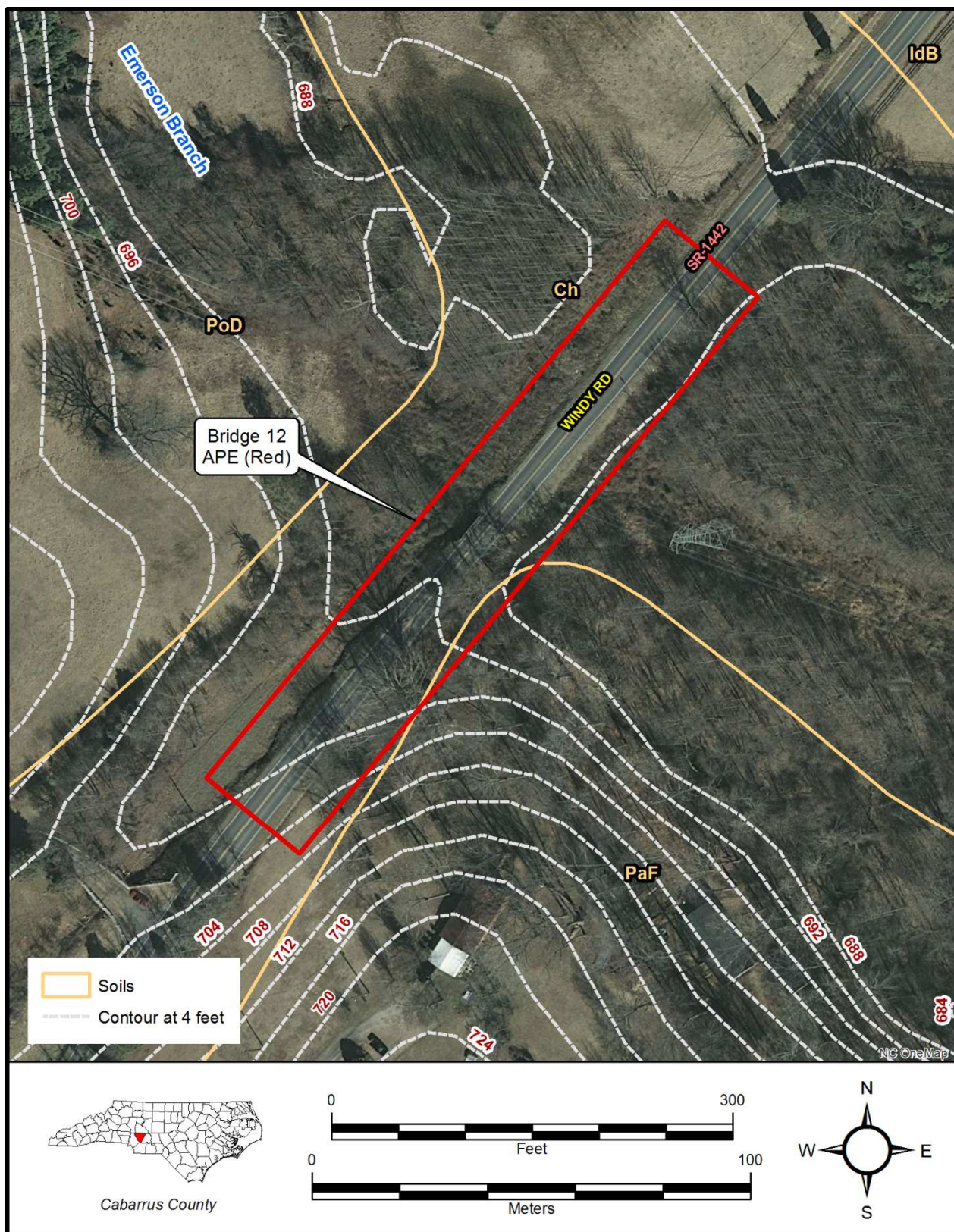


Figure 2. Aerial photograph of the APE showing development, landforms, and soils within and near the project area.



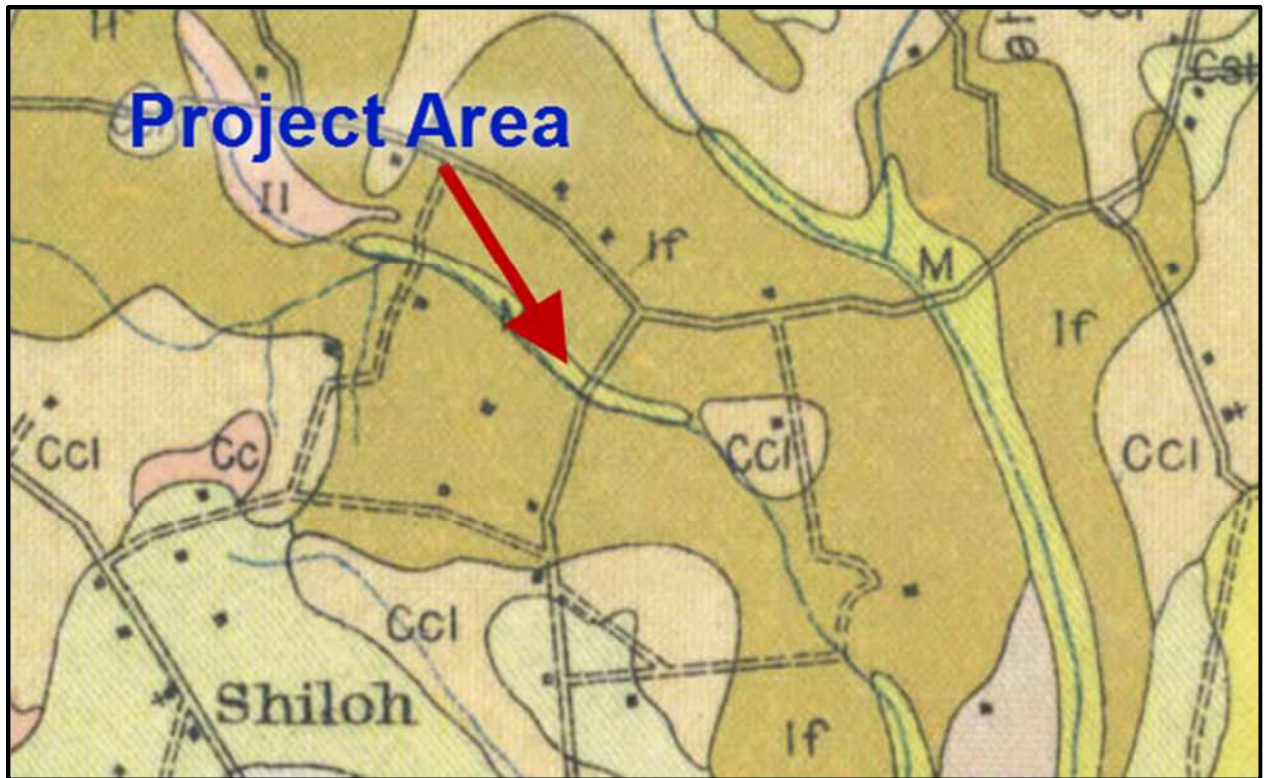


Figure 3. The 1910 Soil Survey Map for Cabarrus County showing the location of the project area.

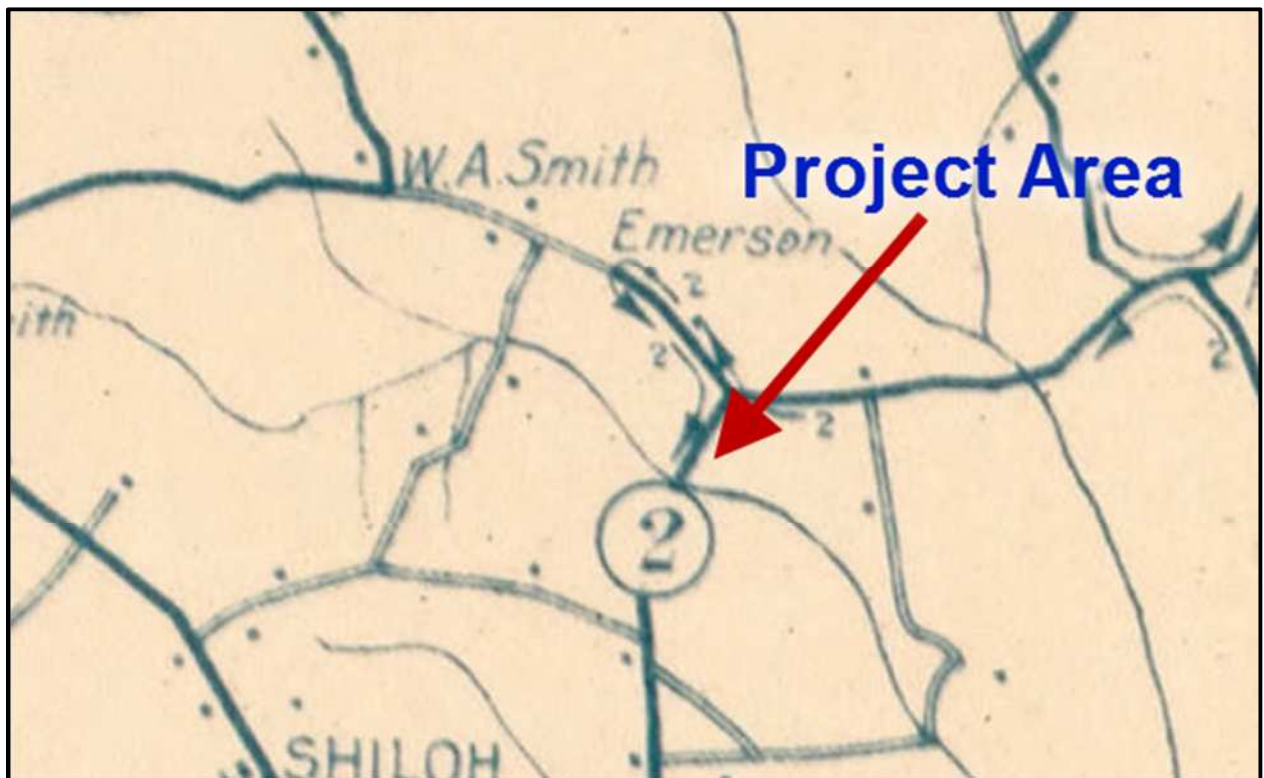


Figure 4. The circa 1921 U.S. Post Office map showing the location of the project area.

- Increased sedimentation and siltation from construction and/or erosion
- Changes in light incidence and water clarity due to increased sedimentation and vegetation removal
- Changes in water temperature due to vegetation removal
- Increased nutrient loading during construction via runoff from exposed areas
- Increased concentration of toxic compounds from roadway runoff, construction, and toxic spills, and increased vehicular use

Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of a stringent erosion control schedule and use of BMPs. The contractor will be required to follow contract specifications pertaining to erosion control measures (as outlined in 23 CFR 650, Subpart Band Article 107-13) entitled Control of Erosion, Siltation, and Pollution (NCDOT, Specifications for Roads and Structures).

These measures include:

- Use of dikes, berms, silt basins, and other containment measures to control runoff during construction. Regular maintenance and inspection of these structures to insure effectiveness.
- Elimination of construction staging areas in floodplains or adjacent to streams and tributaries to help reduce the potential for petroleum contamination or discharges of other hazardous materials into receiving waters.
- Rapid re-seeding of disturbed sites to help alleviate sediment loadings and reduce runoff.
- Careful management and use of herbicides, pesticides, de-icing compounds, or other chemical constituents to minimize potential negative impacts on water quality. Utilize roadside maintenance crews well versed in the use of these chemicals.
- Avoidance of direct discharges into streams whenever feasible. Filtering runoff effluent through roadside vegetation in order to remove contaminants and to minimize runoff velocities.

### **WILD AND SCENIC RIVERS**

This project will not impact any designated Wild and Scenic Rivers or any rivers included in the list of study rivers (Public Law 90-542, as amended) or North Carolina Natural and Scenic Rivers.

### **ESSENTIAL FISH HABITAT**

The project will not impact any essential fish habitat afforded protection under the Magnuson- Stevens Act of 1996 (16 U.S.C 1801 et seq.).

### **ALTERNATIVES ANALYSIS**

Several alternatives were evaluated for this project. The first of these includes the option to not replace the bridge; however, this is not a feasible alternative as the bridge has a sufficiency rating of 7, is functionally obsolete, and structurally deficient. The other alternatives evaluated were all related to replacement of the bridge and improving safety of the bridge approach.

A second alternative evaluated included relocation of the road to the east in order to avoid the UT to Emerson Branch. This alternative was eliminated due to the need of additional right of way, it considerably increases project length, and could increase potential impacts to other jurisdictional resources. The relocation of the roadway would likely require extensive right of way impacts, potential taking of homes, and relocation of driveways due to the length of roadway that would be required in order to tie back in.

A third alternative reviewed included replacement of the bridge with no roadway improvements; however, this option did not fully address the purpose and need of the project due to the lack of roadway shoulders and narrow lanes of the bridge. This alternative would likely require a later fix of the roadway and impacts to the UT to Emerson Branch which is unstable and eroding toward the road.

The fourth alternative considered was to replace the bridge and address the roadway deficiencies as well as the instability of the UT to Emerson Branch. This alternative fully addresses the purpose and need of the project as the bridge would be replaced and roadway shoulders plus guardrail would be provided to improve safety of the facility to the traveling public and addresses the adjacent channel which is actively eroding toward the road.

Several options for the fourth alternative were considered to address the UT to Emerson Branch which included piping the stream, trying to stabilize it in place, or relocating it away from the road with natural channel design concepts, a rip rap lined channel, or trying to create a stable channel with a blended approach. Piping the stream channel was not considered a feasible option as it would create greater maintenance concerns and increased impacts to jurisdictional resources. Stabilization of the stream in place with retaining walls or rip rap on the banks was considered as it helped with the channel erosion issues; however, there were concerns with the constructability of retaining walls and anchoring the guard rail as well as not addressing the lack of shoulders or improving safety along this stretch of roadway.

Relocation of the channel and trying to stabilize it with natural channel design was discussed in depth but there were several problematic issues. A full stream restoration using natural channel design techniques would require increased right of way, the existing channel slope is very steep and would require hardened structures to assist with potential down cutting, the Division noted the stream as being very flashy, constructability of the channel with a 2-foot meandering base would require specialized contractors, and past experience with natural channel design in similar situations has not been successful and created long term maintenance issues for the Department. Relocation of the channel with a rip rap lined channel was also explored as an option and addresses the purpose and need for the project but does not replace the stream with similar existing function. This option was dismissed for the following blended approach.

Relocation of the UT to Emerson Branch approximately 20 feet west of its current location appears to be the least environmentally damaging alternative as it maintains a daylighted channel and provides a stable stream cross section as well as addresses the project purpose and need to improve overall safety in the vicinity of the bridge replacement project. This blended option to relocate the channel requires minimal right of way compared to other alternatives, provides for a stable stream with a 2' base, floodplain benches, and associated vegetative planting. It also provides for the channel slope by embedding rip rap in the base of the channel at certain intervals in order to maintain long term stability and minimize future downcutting.

## **MITIGATION OPTIONS**

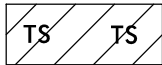
The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the waters of the United States. CEQ has defined mitigation of wetland and surface water impacts to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts ( 40 CFR 1508.20).

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance and minimization measures were incorporated as part of the project design. Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts.

|                         |                     |
|-------------------------|---------------------|
| PROJECT REFERENCE NO.   | SHEET NO.           |
| 17BP10.R.53             | 4                   |
| RW SHEET NO.            |                     |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |



DENOTES IMPACTS IN  
SURFACE WATER



DENOTES TEMPORARY  
IMPACTS IN SURFACE WATER

NAD 83/NA 2011

-L-  
PI Sta 11+26.59  
 $\Delta = 4^{\circ} 23' 18.8''$  (RT)  
 $D = 2^{\circ} 09' 43.6''$   
 $L = 202.98'$   
 $T = 101.54'$   
 $R = 2,650.00'$   
 $V = 45$  MPH  
 $e = 0.04$

-L- POT Sta. 16+00.66

**SITE 1**

CLASS 'II' RIP RAP  
EST. 15 TONS  
30 SY GEOTEXTILE

STREAM RELOCATION  
SEE DETAIL 'A'  
ON SHEET NO. 2  
CLASS 'II' RIP RAP  
EST 60 TONS  
63 SY GEOTEXTILE

**SITE 2**

ROCK STEP DOWN  
CLASS 'II' RIP RAP (TYP.)

-L- POT Sta. 10+00.00

SR 1442 WINDY ROAD  
22' BST

REMOVE 18" RCP-III

JERRY WAYNE PARKER JR.  
WENDY H PARKER  
DB 10711 PG 335

-L- PT Sta. 12+28.03

-L- PC Sta. 10+25.05

SPECIAL CUT DITCH  
W/CLASS 'B' RIP RAP  
SEE DETAIL 'B'  
EST. 75 TONS  
156 SY GEOTEXTILE

CLASS 'II' RIP RAP  
EST. 45 TONS  
45 SY GEOTEXTILE

ALLEN WENDY PARKER  
DB 2171 PG 69

PERMIT DRAWINGS  
SHEET 1 OF 4

REVISIONS

8/17/99

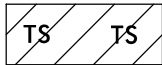
8/17/2014 17BP10.R.53 HYD perm wet.DGN



|                         |                     |
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| PROJECT REFERENCE NO.   | SHEET NO.           |
| 17BP10.R.53             | 4                   |
| RW SHEET NO.            |                     |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |



DENOTES IMPACTS IN  
SURFACE WATER



DENOTES TEMPORARY  
IMPACTS IN SURFACE WATER

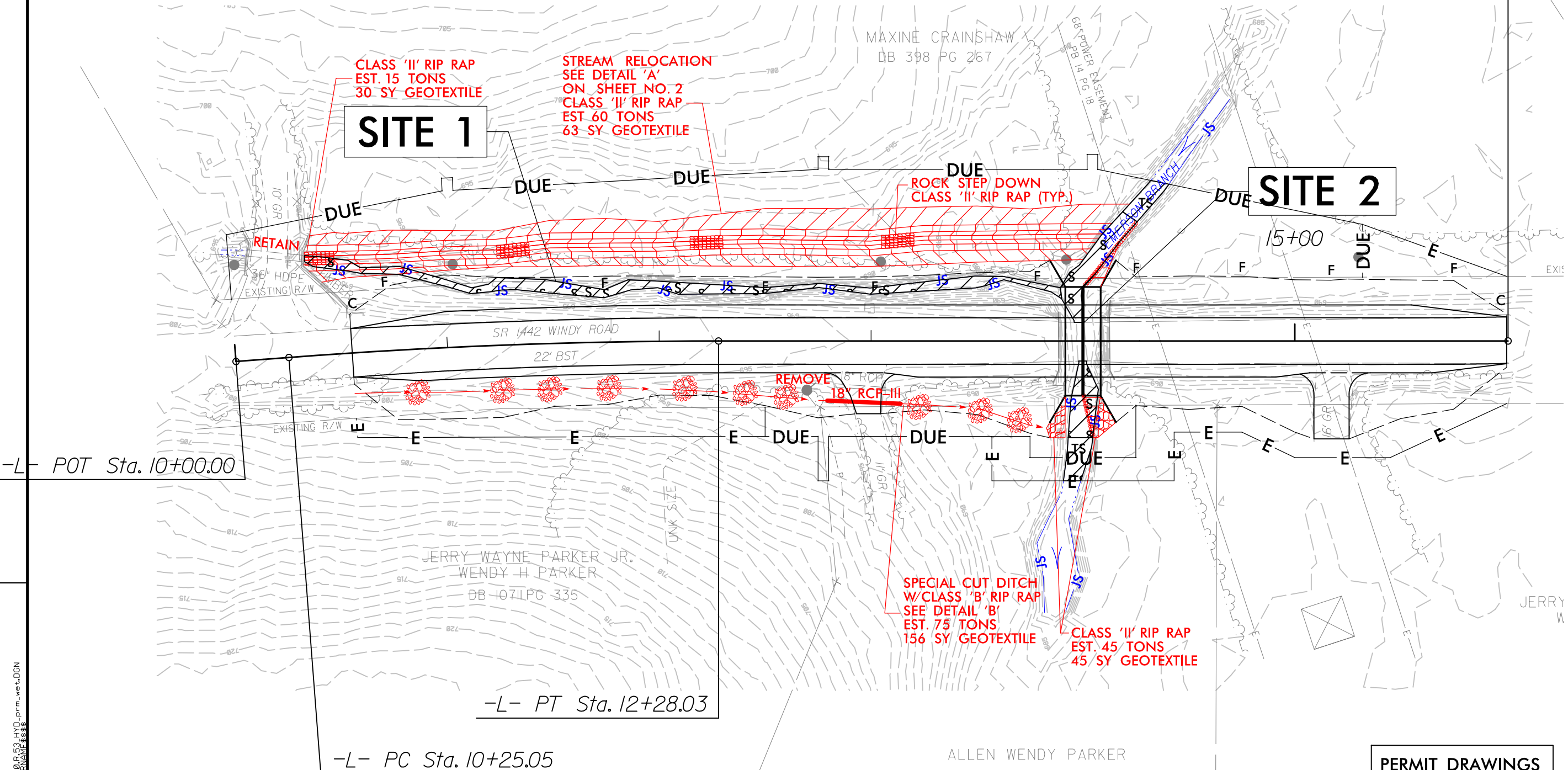
NAD 83/NA 2011

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PI Sta 11+26.59  
 $\Delta = 4^{\circ} 23' 18.8''$  (RT)  
 $D = 2^{\circ} 09' 43.6''$   
 $L = 202.98'$   
 $T = 101.54'$   
 $R = 2,650.00'$   
 $V = 45$  MPH  
 $e = 0.04$

-L- POT Sta. 16+00.66

**SITE 1**

**SITE 2**



PERMIT DRAWINGS  
SHEET 2 OF 4

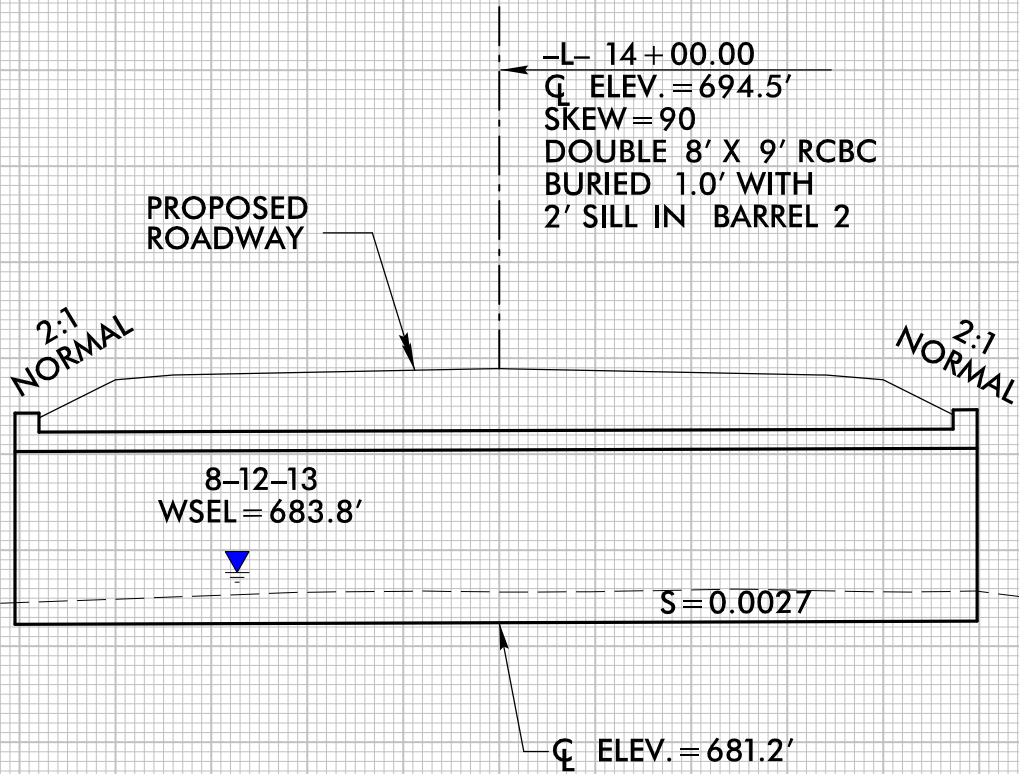
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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

690

680



PERMIT DRAWINGS  
SHEET 3 OF 4

3:49:32 PM  
17BP.10.R.53-HVD  
8/23/99  
PFL.DGN

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

| WETLAND PERMIT IMPACT SUMMARY |                       |                       |                                 |                             |                             |                                      |                                |                           |                       |   |                                     |                            |
|-------------------------------|-----------------------|-----------------------|---------------------------------|-----------------------------|-----------------------------|--------------------------------------|--------------------------------|---------------------------|-----------------------|---|-------------------------------------|----------------------------|
| Site No.                      | Station (From/To)     | Structure Size / Type | WETLAND IMPACTS                 |                             |                             |                                      |                                | SURFACE WATER IMPACTS     |                       |   |                                     |                            |
|                               |                       |                       | Permanent Fill In Wetlands (ac) | Temp. Fill In Wetlands (ac) | Excavation in Wetlands (ac) | Mechanized Clearing in Wetlands (ac) | Hand Clearing in Wetlands (ac) | Permanent SW impacts (ac) | Temp. SW impacts (ac) | Existing Channel Impacts Permanent (ft) | Existing Channel Impacts Temp. (ft) | Natural Stream Design (ft) |
| 1                             | 10+35 to 13+90 -L- LT | Relocation            |                                 |                             |                             |                                      |                                | 0.03                      |                       | 363                                     |                                     |                            |
| 2                             | 13+90 to 14+41 -L-    | Culvert               |                                 |                             |                             |                                      |                                | 0.01                      | 0.01                  | 54                                      | 43                                  |                            |
|                               |                       | Bank Stabilization    |                                 |                             |                             |                                      |                                | 0.01                      |                       | 43                                      |                                     |                            |
|                               |                       |                       |                                 |                             |                             |                                      |                                |                           |                       |   |                                     |                            |
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|                               |                       |                       |                                 |                             |                             |                                      |                                |                           |                       |   |                                     |                            |
| TOTALS:                       |                       |                       |                                 |                             |                             |                                      |                                | 0.05                      | 0.01                  | 460                                     |                                     |                            |



CLEARING AND GRUBBING  
EROSION CONTROL FOR  
CONSTRUCTION SHEET 4



ENVIRONMENTALLY SENSITIVE AREA  
SEE PROJECT SPECIAL PROVISIONS

INSTALL TEMPORARY 36" PIPE  
TO USE AS TEMPORARY STREAM  
CROSSING. NCDOT STD. 1645.01

Excavate Proposed Ditch  
according to Detail A from  
Sta. 10+50 to Sta. 14+00

CLASS 'II' RIP RAP  
EST. 15 TONS  
30 SY GEOTEXTILE

STREAM RELOCATION  
SEE DETAIL 'A'  
ON SHEET NO. 2  
CLASS 'II' RIP RAP  
EST 60 TONS  
63 SY GEOTEXTILE

MAXINE CRAINSHAW  
DB 398 PG 267

-L- POT Sta. 16+00.66

RETAIN  
4" PLASTIC  
10' GR  
36" HDPE  
EXISTING R/W

GRAU 350 TL-3, +56

ROCK STEP DOWN  
CLASS 'II' RIP RAP (TYP.)

GRAU 350 TL-3, +55

SR 1442 WINDY ROAD

22' BST

REMOVE 18" RCF  
18" RCF-III

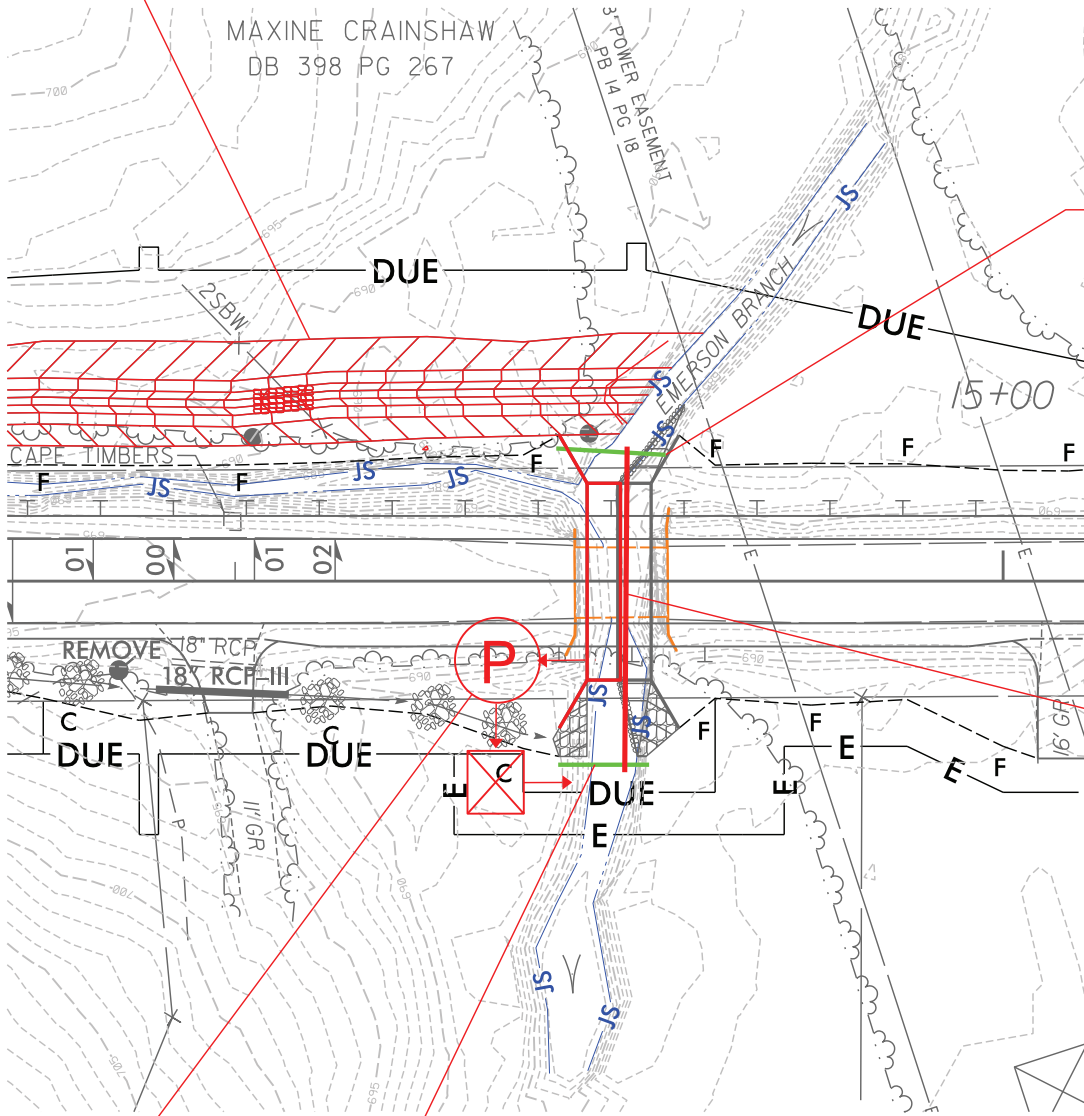
# DOUBLE 8' X 9' RCBC CULVERT CONSTRUCTION SEQUENCE

| PROJECT REFERENCE NO.   | SHEET NO.    |
|---|--------------|
| 17BP10.R.53   | EC-5/CONST.4 |
| HDR Engineering, Inc. of the Carolinas<br>3733 National Drive, Suite 207 Raleigh, N.C. 27612<br>N.C.B.E.L.S. License Number: F-0116 |              |

## PHASE I

1. RELOCATE THE EXISTING TRIBUTARY ACCORDING TO DETAIL 'A' AND STABILIZE WITH RIP RAP.
2. INSTALL IMPERVIOUS DIKES UPSTREAM AND DOWNSTREAM OF THE PROPOSED CULVERT.
3. INSTALL 54" CSP TO CARRY CLEAN WATER THROUGH THE WORK AREA AND ALLOW THE LOW FLOW BARREL (BARREL 1) TO BE CONSTRUCTED.
4. PROVIDE PUMP AND STILLING BASIN FOR DEWATERING THE WORK ZONE.
5. CONSTRUCT BARREL 1 INCLUDING WINGWALLS ATTACHED TO BARREL 1. PLACE INLET AND OUTLET STABILIZATION ASSOCIATED WITH BARREL 1.

STREAM RELOCATION  
SEE DETAIL 'A'  
ROADWAY PLANSHEET 2



DE-WATERING STATION

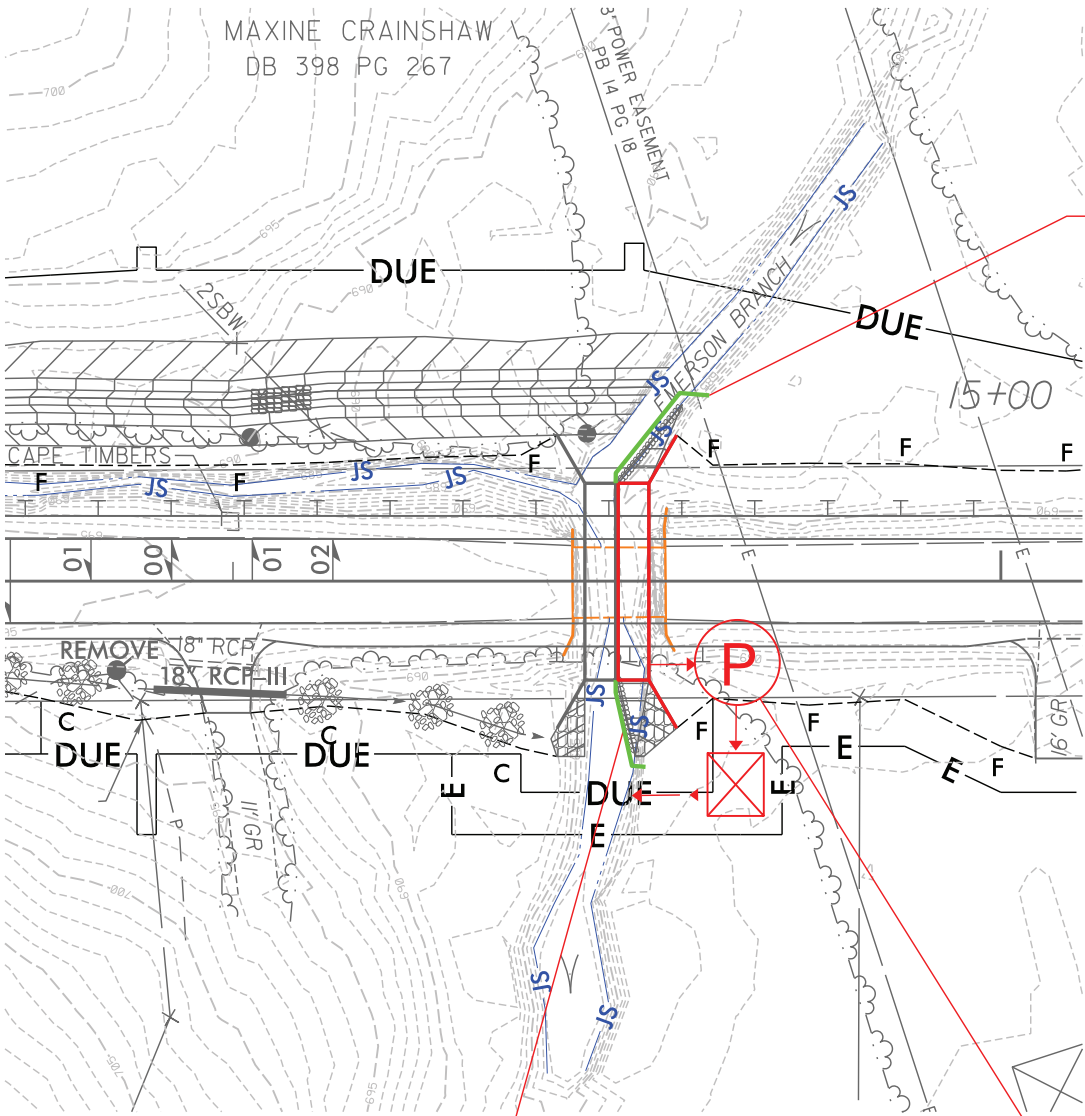
TEMPORARY  
IMPERVIOUS DIKE

TEMPORARY  
CULVERT  
54" CSP

TEMPORARY  
IMPERVIOUS DIKE

## PHASE II

1. REMOVE TEMP. 54" CSP AND INSTALL TEMPORARY IMPERVIOUS DIKES AS SHOWN TO DIVERT STREAM INTO THE CONSTRUCTED LOW FLOW BARREL.
2. PROVIDE PUMP AND STILLING BASIN FOR DEWATERING THE WORK ZONE FOR THE CONSTRUCTION OF BARREL 2.
3. CONSTRUCT BARREL 2 INCLUDING WINGWALLS ATTACHED TO BARREL 2 AND OUTLET STABILIZATION ASSOCIATED WITH BARREL 2.
4. CONSTRUCT FLOODPLAIN BENCH WITH NATIVE BED MATERIAL AND STABILIZE BENCH FACE WITH CLASS 'II' RIP RAP.
5. REMOVE IMPERVIOUS DIKES AND DEWATERING STATION.
6. REMOVE EROSION CONTROL DEVICES AND BEGIN ROADWAY IMPROVEMENTS.



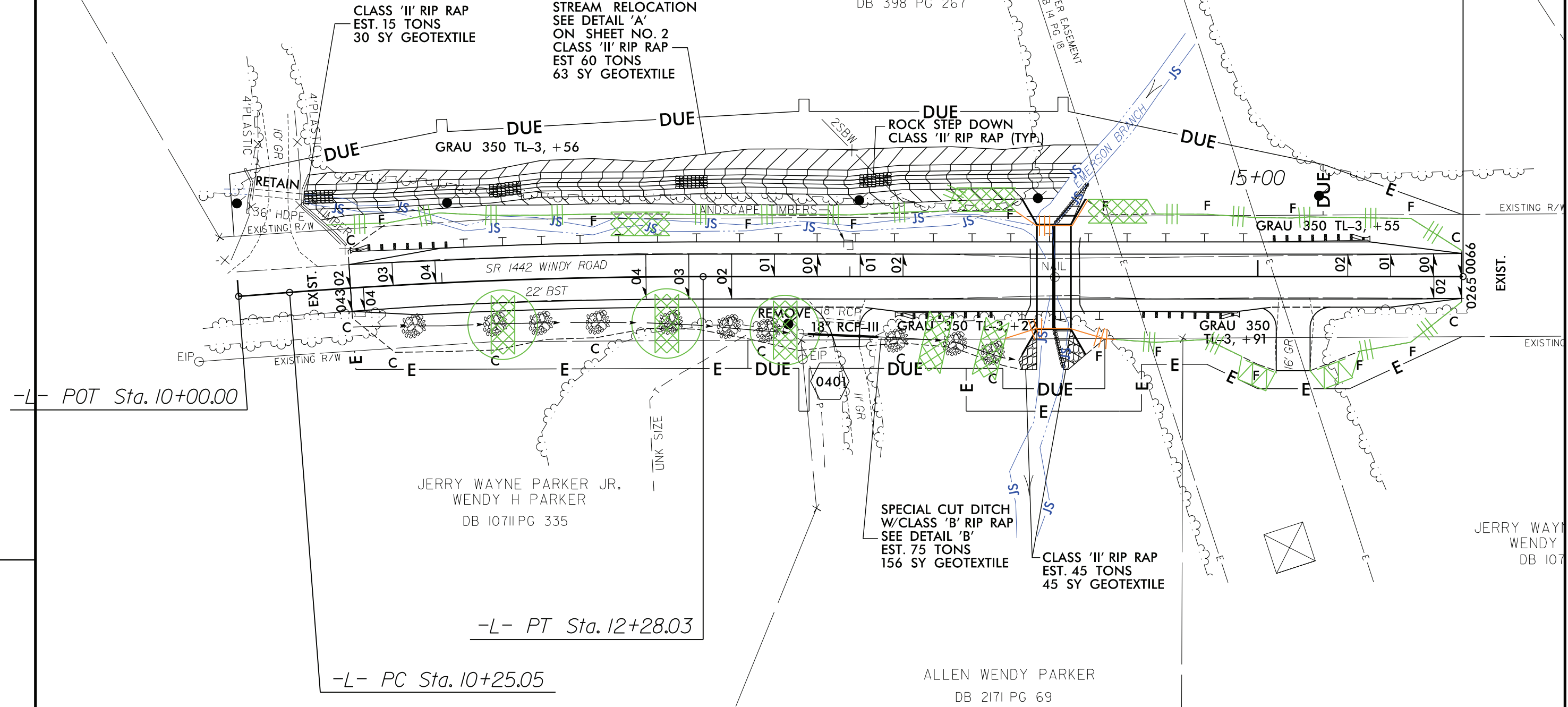
TEMPORARY  
IMPERVIOUS DIKE

DE-WATERING STATION

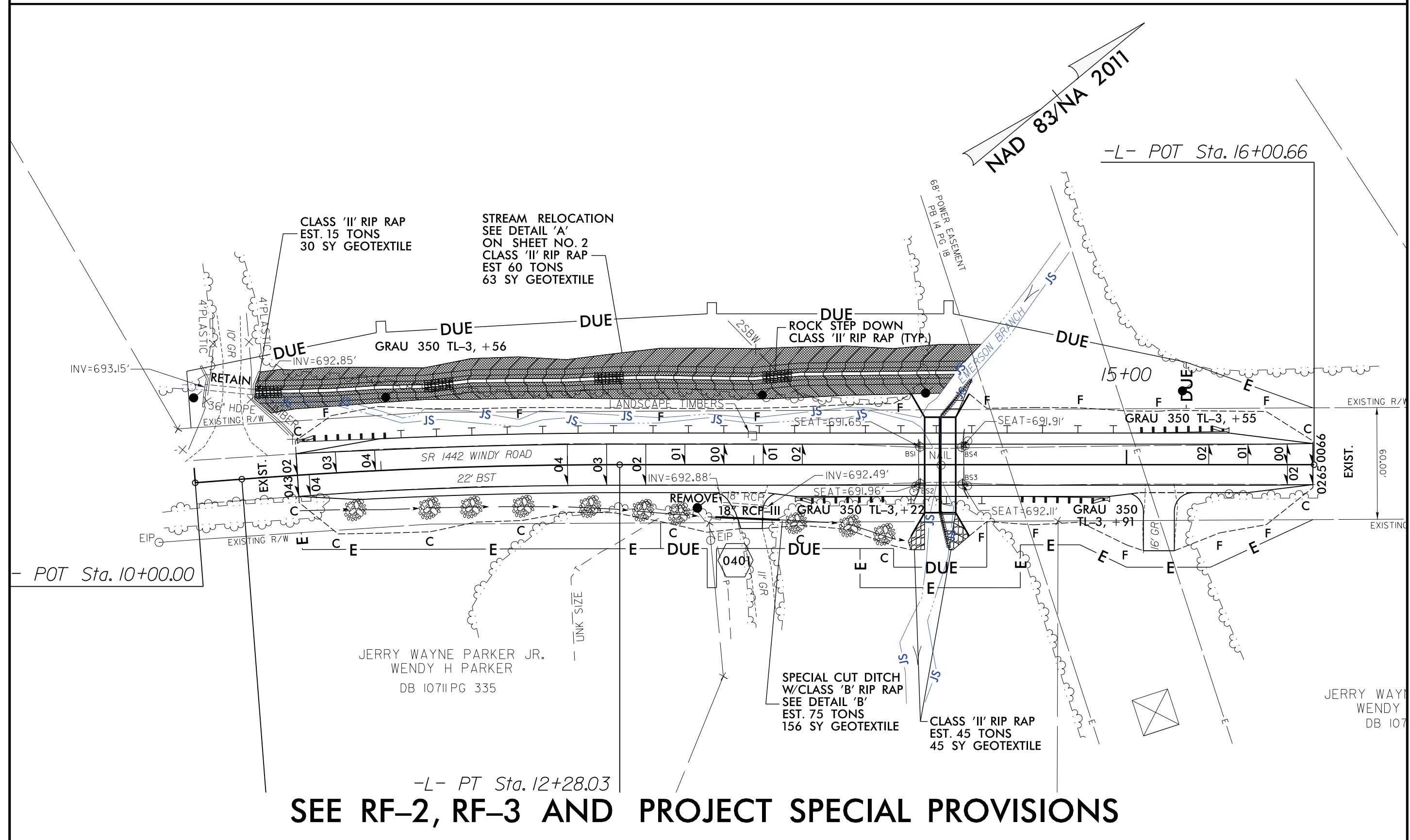


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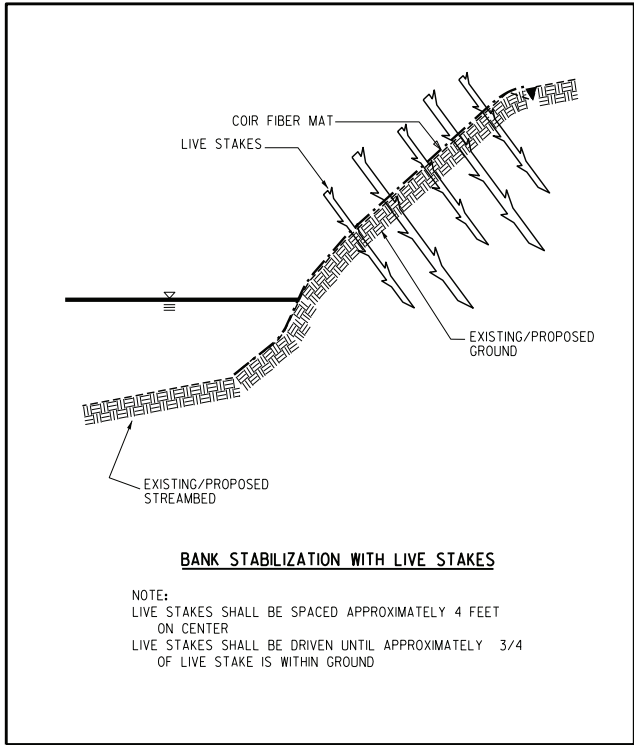
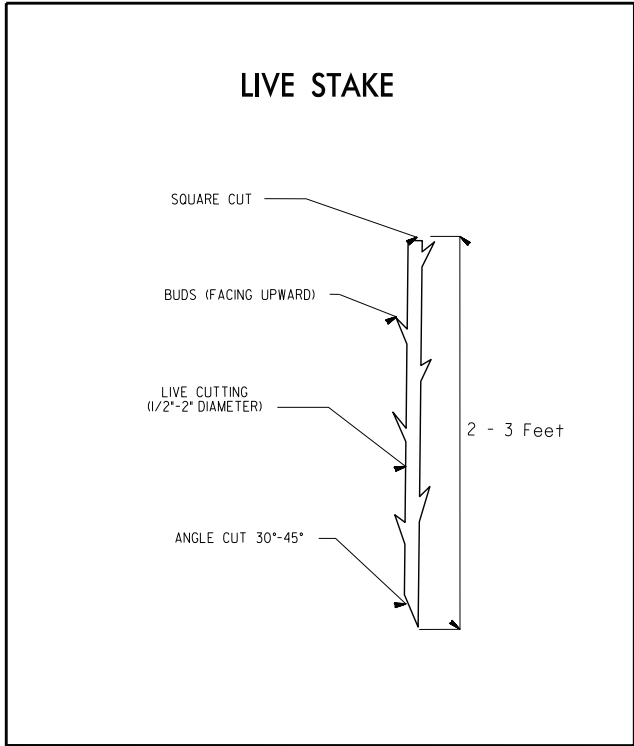


# 0.19 ACRE STREAMBANK REFORESTATION

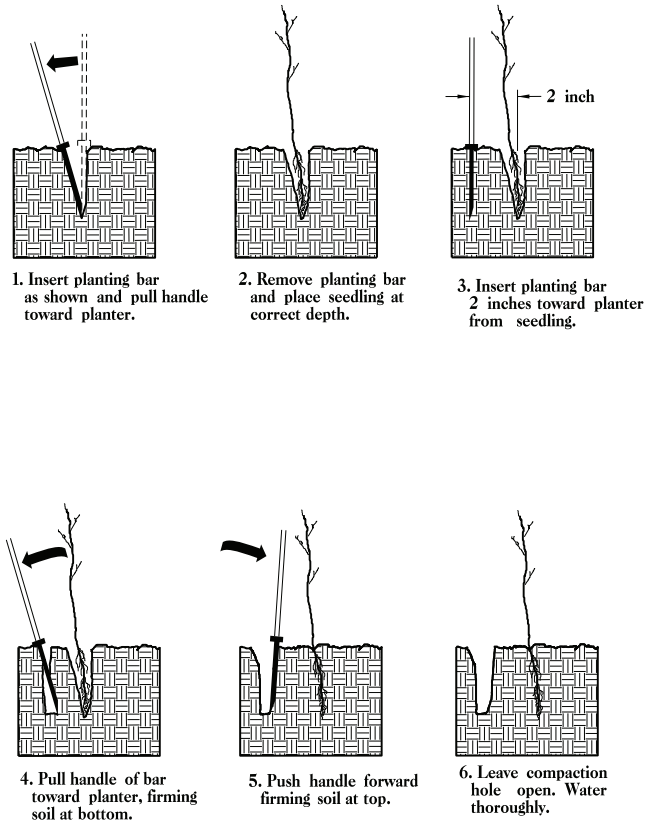


PLANTING DETAILS

LIVE STAKES PLANTING DETAIL



BAREROOT PLANTING DETAIL  
DIBBLE PLANTING METHOD  
USING THE KBC PLANTING BAR



PLANTING NOTES:

**PLANTING BAG**  
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

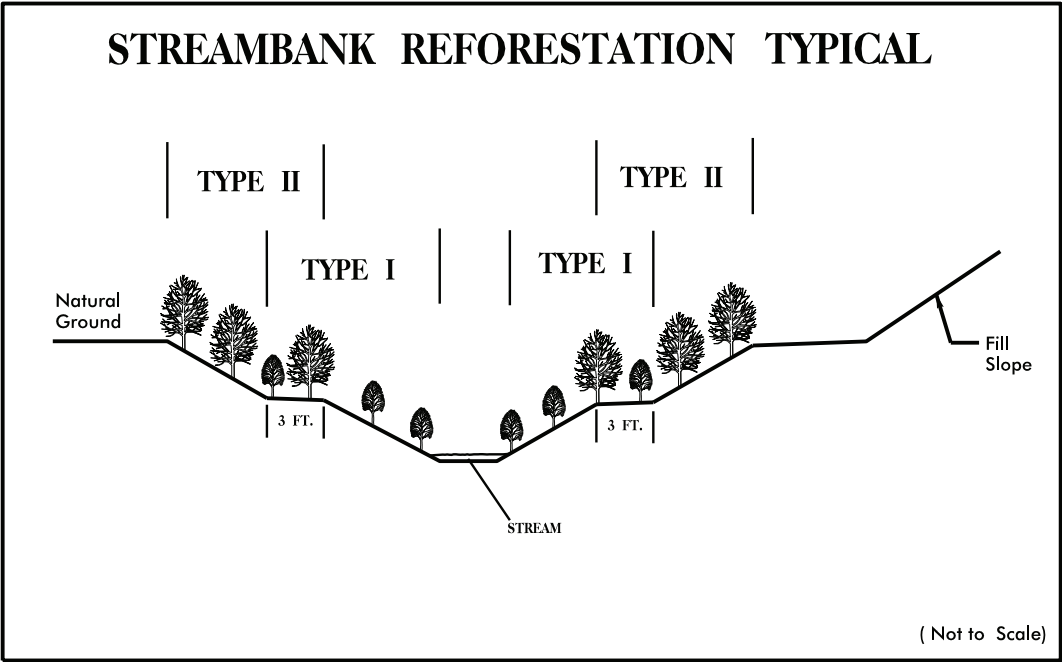


**KBC PLANTING BAR**  
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.



**ROOT PRUNING**  
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

- ☐ TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.
- ☐ TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.
- ☐ NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"



STREAMBANK REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

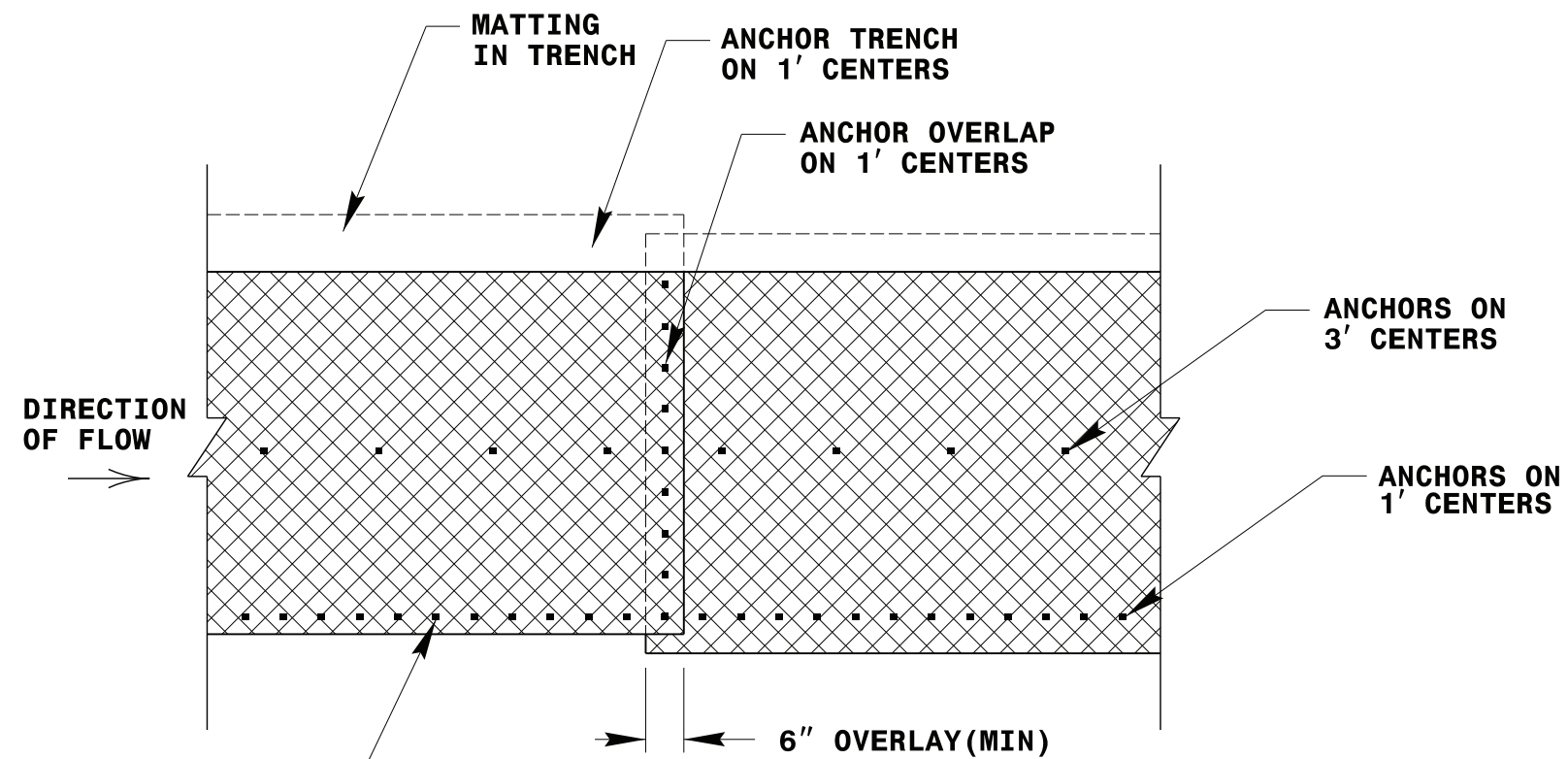
TYPE 1

|                   |               |                         |
|-------------------|---------------|-------------------------|
| 50% SALIX NIGRA   | BLACK WILLOW  | 2 ft - 3 ft LIVE STAKES |
| 50% CORNUS AMOMUM | SILKY DOGWOOD | 2 ft - 3 ft LIVE STAKES |

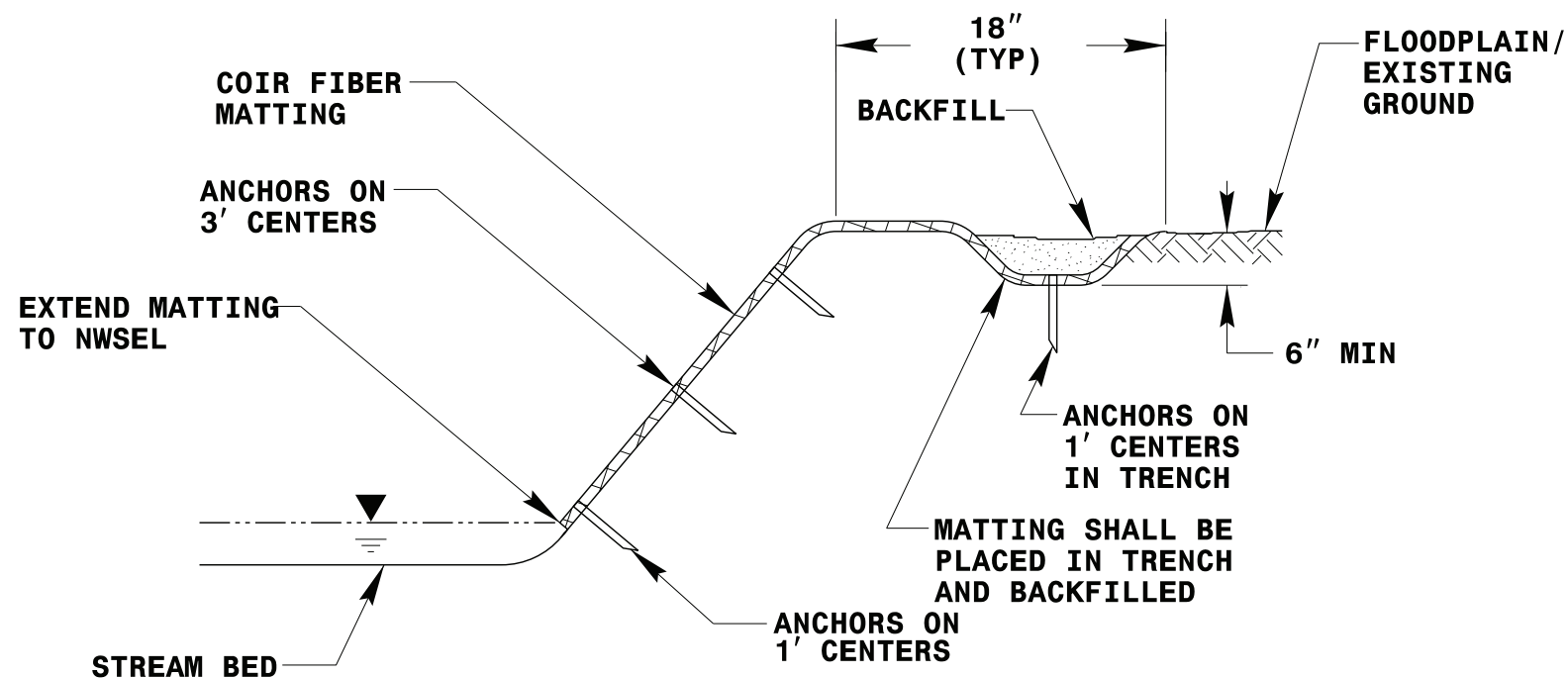
TYPE 2

|                             |              |                  |
|-----------------------------|--------------|------------------|
| 25% LIRIODENDRON TULIPIFERA | TULIP POPLAR | 12 in - 18 in BR |
| 25% PLATANUS OCCIDENTALIS   | SYCAMORE     | 12 in - 18 in BR |
| 25% FRAXINUS PENNSYLVANICA  | GREEN ASH    | 12 in - 18 in BR |
| 25% BETULA NIGRA            | RIVER BIRCH  | 12 in - 18 in BR |

- ☐ SEE PLAN SHEETS FOR AREAS TO BE PLANTED



**PLAN VIEW**

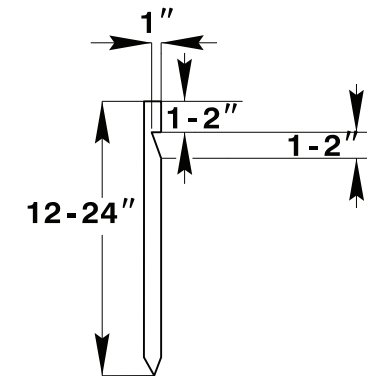


**TYPICAL CROSS SECTION**

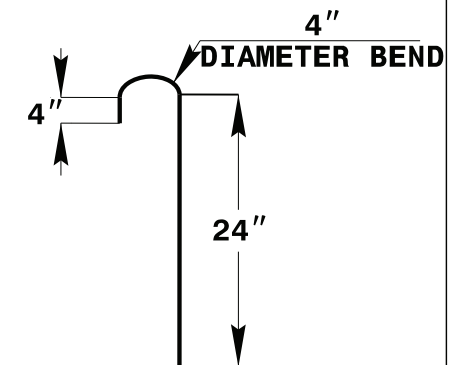
# **COIR FIBER MATTING DETAIL**

NOT TO SCALE

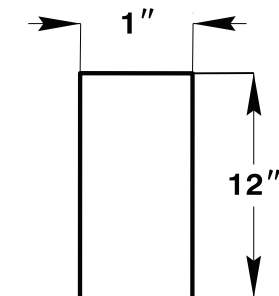
2" x 2" (nominal)  
WOODEN STAKE



#10 STEEL  
REINFORCEMENT BAR



1" (nominal)  
STAPLE



**ANCHOR OPTIONS**

**STREAMBANK REFORESTATION**

**DETAIL SHEET 2 OF 2**

N.C.D.O.T. - ROADSIDE ENVIRONMENTAL UNIT