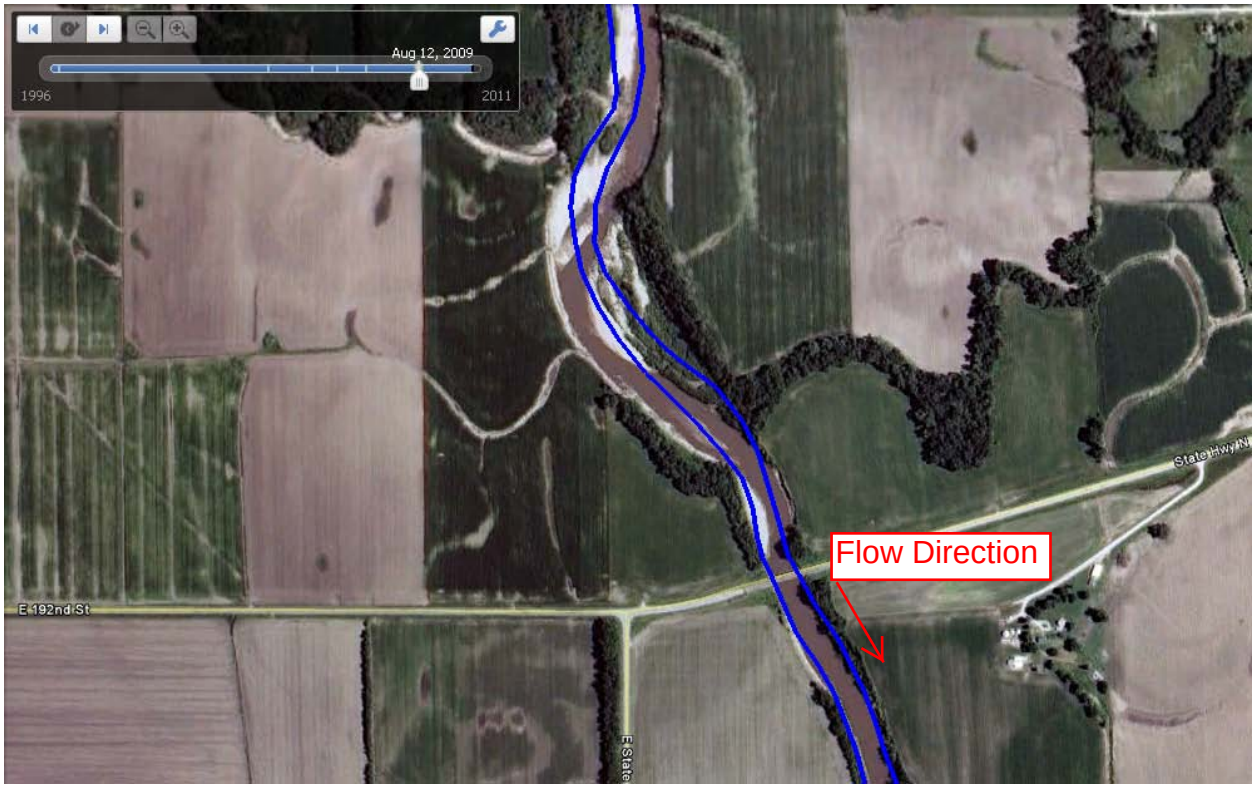
APPENDIX I

PROJECT FIGURES & DRAWINGS

Figure 1 - Looking downstream. Erosion encroaching of left bridge abutment.

Channel location in 1996



Channel location in 2009

Figure 2 - Comparison of aerial photographs

Vicinity and Location Maps

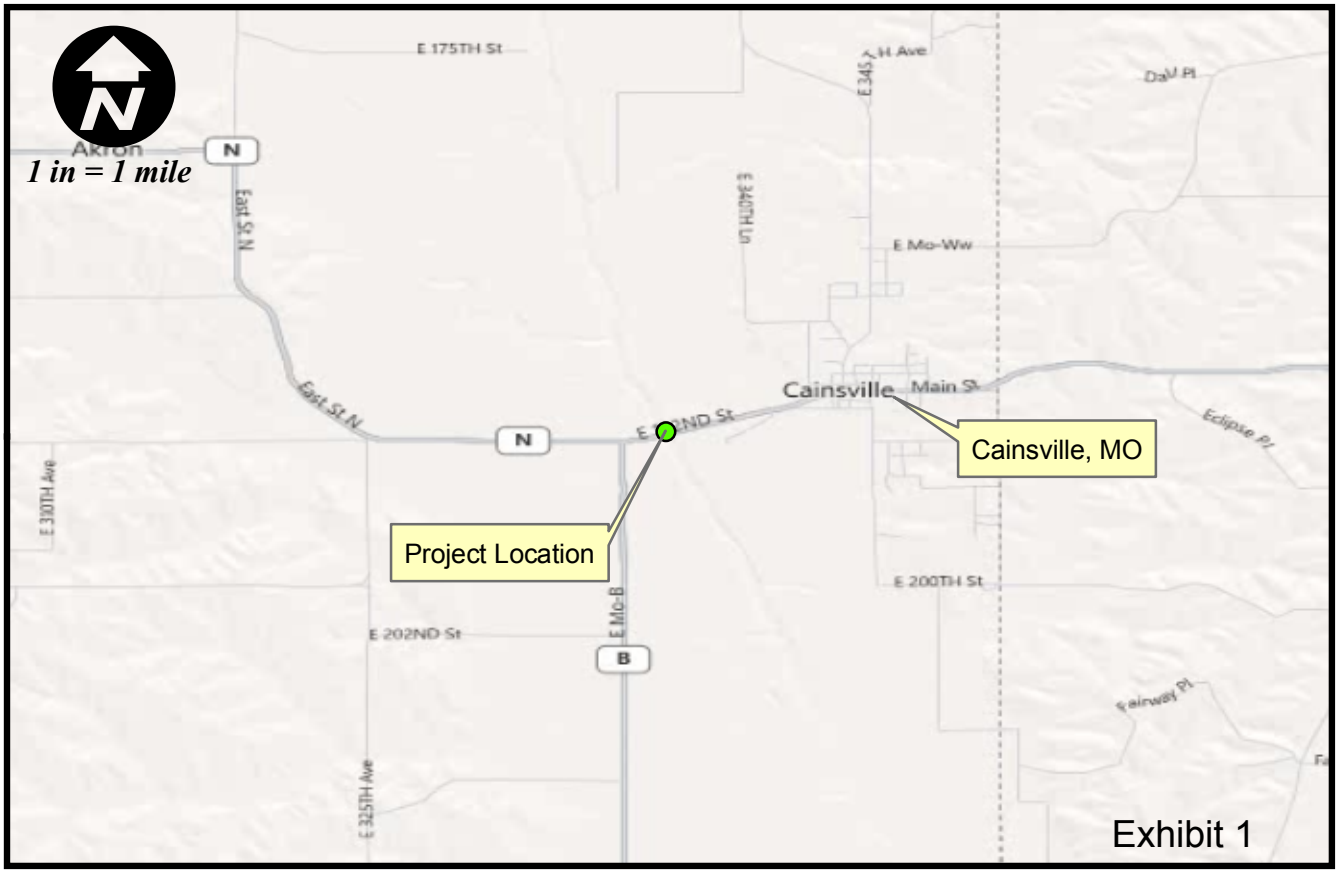


Figure 3 - Project location

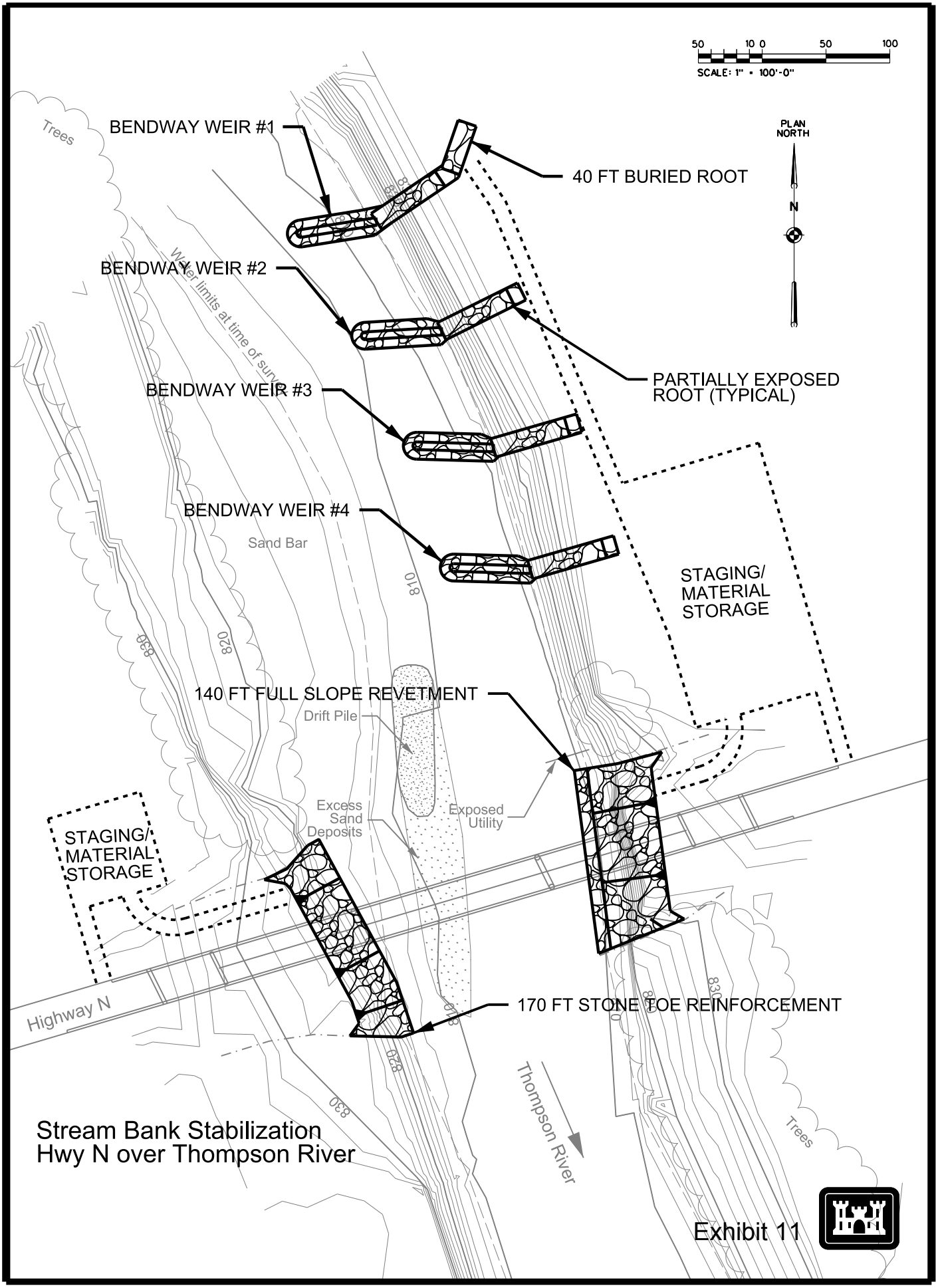


Figure 4 - Alternative #2 - Bendway Weirs

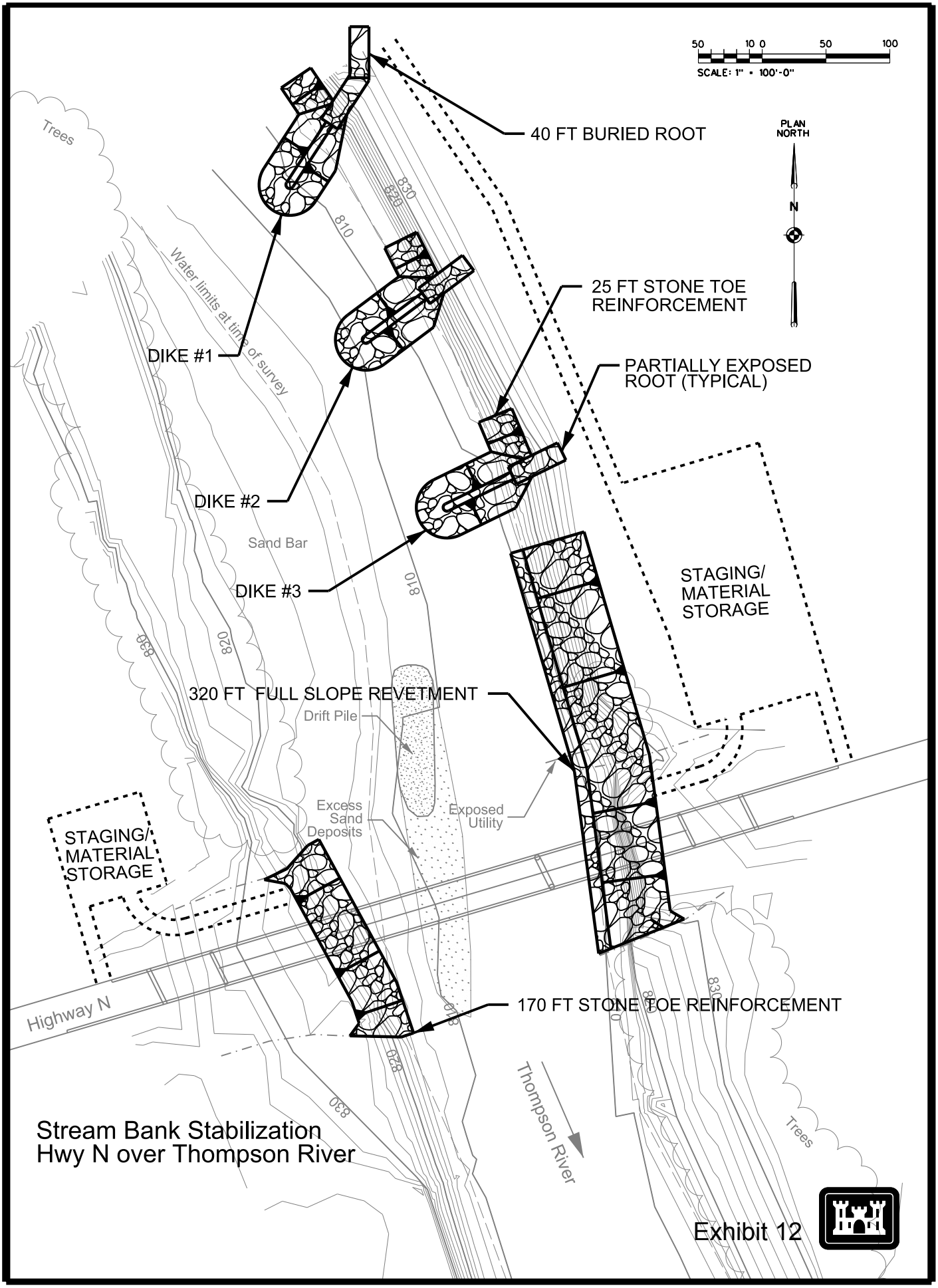


Figure 5 - Alternative #3 - Stone Dikes

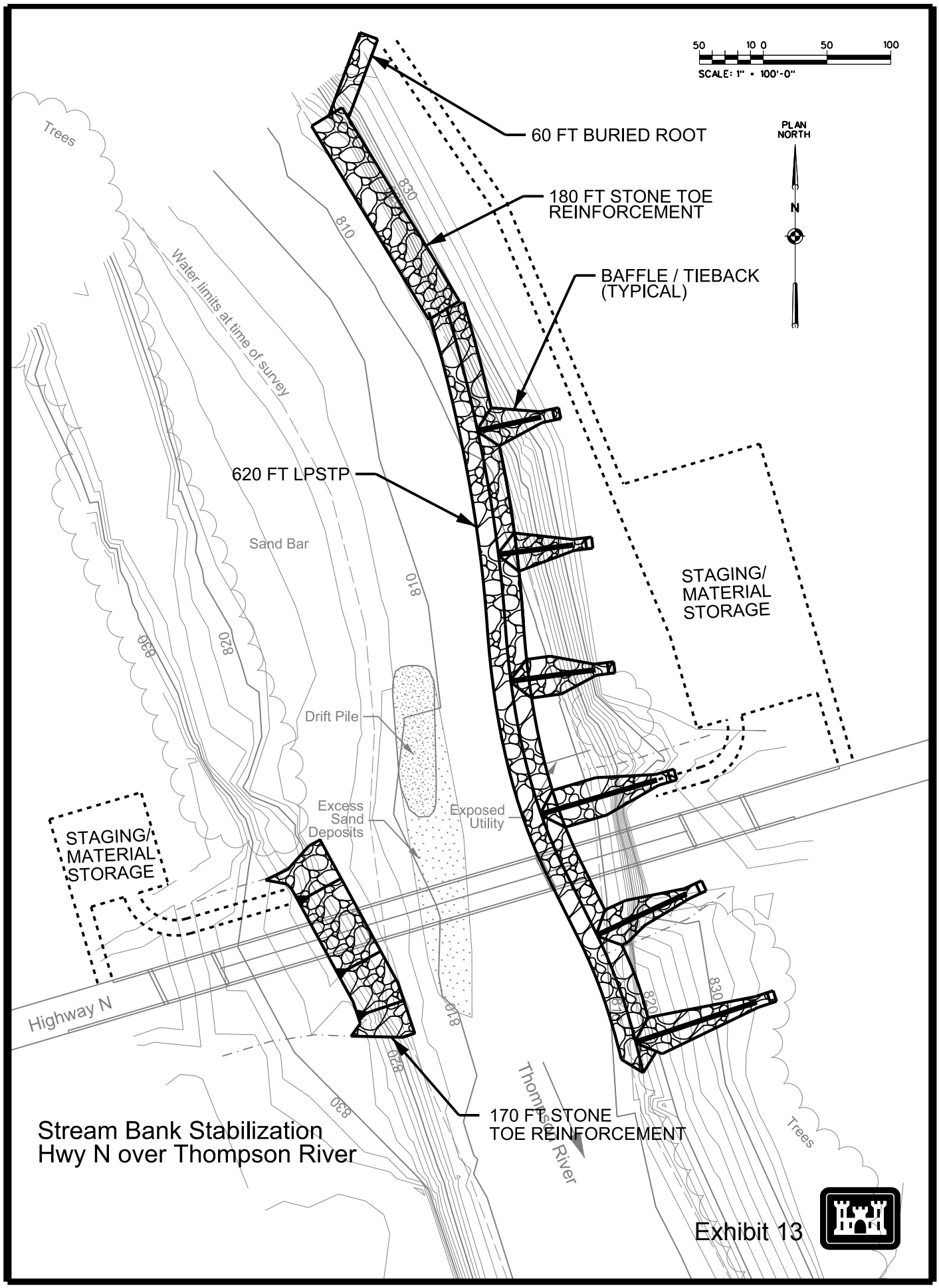


Figure 6 - Alternative #4 - LPSTP

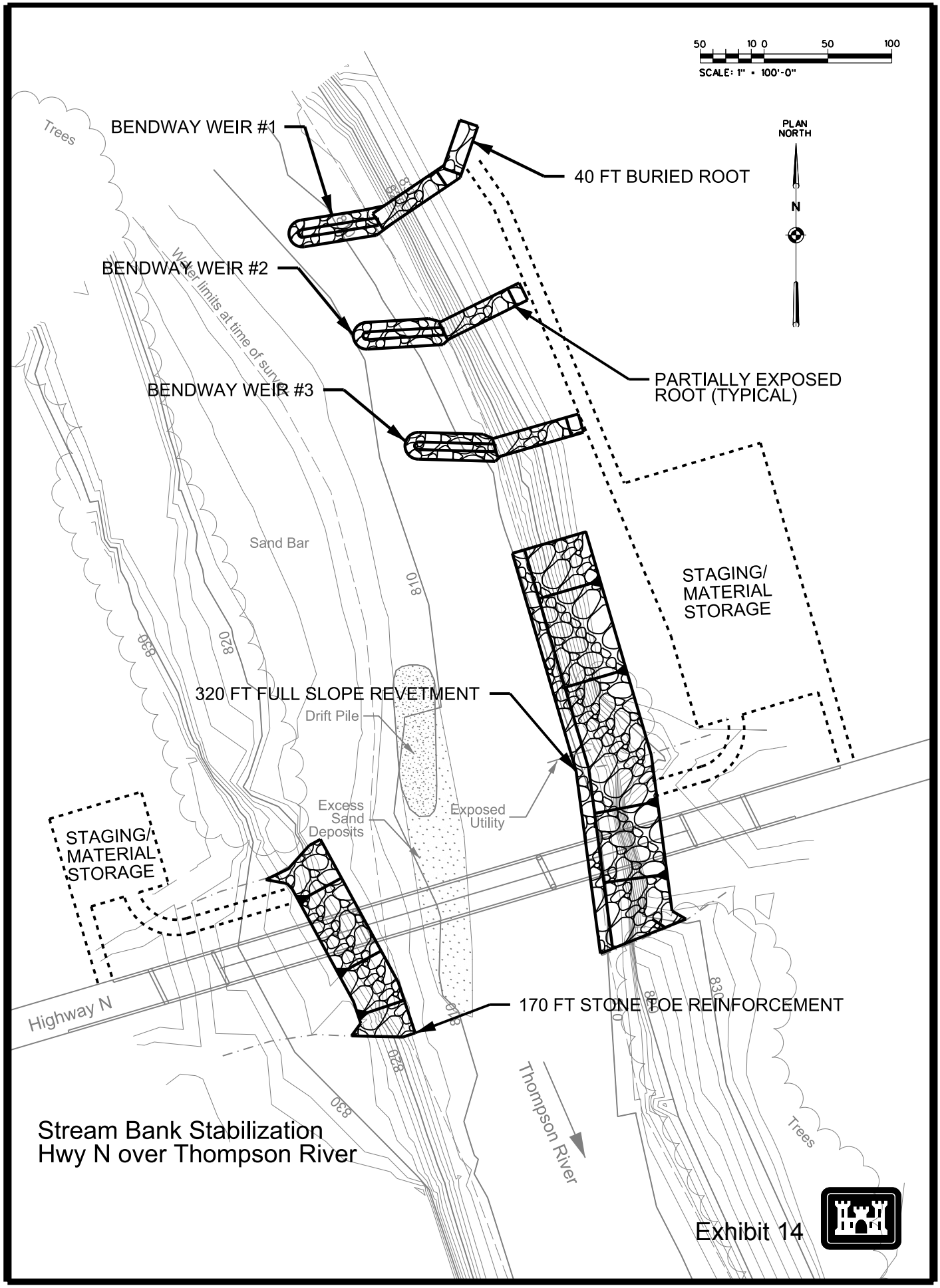


Figure 7 - Alternative #5 - Bendway Weirs with Revetment

APPENDIX II

U.S. FISH AND WILDLIFE SERVICE COORDINATION

From: Granet, Jesse J NWK
To: Morrow, Rick NWK
Subject: FW: Highway N Bridge Emergency Streambank Stabilization (UNCLASSIFIED)
Date: Wednesday, May 23, 2012 1:34:45 PM

Classification: UNCLASSIFIED
Caveats: NONE

-----Original Message-----
From: Rick_Hansen@fws.gov [mailto:Rick_Hansen@fws.gov]
Sent: Wednesday, May 23, 2012 8:42 AM
To: Granet, Jesse J NWK
Cc: Jane_Ledwin@fws.gov
Subject: Highway N Bridge Emergency Streambank Stabilization

Dear Jesse:

First, I would like to apologize for not replying to this project sooner. I remember reviewing it at one time and thought I'd responded, but could find no trace of my response. There are no federally listed species at the site so no further Section 7 consultation is required.

I recommend that the Missouri Department of Conservation's Management Recommendations for Construction Projects Affection Missouri Stream and Rivers be followed during the construction process.

thanks, RIck

Rick L. Hansen
U.S. Fish and Wildlife Service
Ecological Services
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203
573-234-2132, ext. 106
fax 573-234-2181
rick_hansen@fws.gov

Classification: UNCLASSIFIED
Caveats: NONE

APPENDIX III

MISSOURI STATE HISTORIC PRESERVATION OFFICE COORDINATION

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

May 29, 2012

Timothy Meade, District Archeologist
Corps of Engineers, Kansas City District
600 Federal Building
Kansas City, Missouri 64106-2896

Re: Stream Bank Stabilization on Highway N (COE) Harrison County, Missouri

Dear Mr. Meade:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

We have reviewed the 2012 report entitled *Archeological Survey of Bank Stabilization Efforts on the Thompson River at Highway N, Harrison County, Missouri* by David I. Cain. Based on this review it is evident that a thorough and adequate cultural resources survey has been conducted of the project area. We concur with your recommendation that there will be **no historic properties affected** and, therefore, we have no objection to the initiation of project activities.

Please be advised that, should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number (**003-HA-12**) on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

Mark A. Miles
Director and Deputy
State Historic Preservation Officer

MAM:jd

APPENDIX IV

PUBLIC NOTICE
AND
CLEAN WATER ACT SECTION 404(B)(1) EVALUATION

PUBLIC NOTICE

US Army Corps
of Engineers
Kansas City District

Issue Date: June 18, 2012
Expiration Date: July 18, 2012

30-Day Notice

JOINT PUBLIC NOTICE: This public notice is issued jointly with the Missouri Department of Natural Resources, Water Pollution Control Program. The Missouri Department of Natural Resources will use the comments to this notice in deciding whether to grant Section 401 water quality certification. Commenters are requested to furnish a copy of their comments to the Missouri Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102.

APPLICANT: Kansas City District, Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106-2896

PROJECT LOCATION (As shown on the attached drawings)**:** The project area is located at the MoDOT Highway N Bridge on the Thompson River, just west of Cainsville in Harrison County, Missouri. It is in Section 14 of Township 65 North, Range 26 West. The Thompson River generally flows north to south for several hundred feet upstream and downstream of the bridge, which is situated east to west across the river.

AUTHORITY: Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended, and Section 404 of the Clean Water Act (33 USC 1344).

ACTIVITY (As shown on the attached drawings)**:** The U.S. Army Corps of Engineers - Kansas City District, in cooperation with the Missouri Department of Transportation, District 1, propose an emergency streambank stabilization project along the Thompson River in Harrison County, Missouri. The purpose of the project is to address severely eroding banks along the Thompson River that are threatening to damage and flank the left bridge abutment of the Highway N Bridge and lead to its potential failure. The left bank upstream of the bridge is experiencing erosion because of the migrating bend in the Thompson River. There is no vegetation on the slope and stream bank sloughing is occurring. The channel of the Thompson River has migrated toward the left bank directing the river flow away from the center of the bridge. High flow events in 2007 and 2008 have accelerated the rate of erosion on the left bank and the unstable river bend is expected to damage the left abutment and potentially flank the

bridge in 2 – 3 years. If the river experiences high flow events before the project is constructed, bridge damage and failure is likely.

Four bendway weirs would be constructed along the left bank upstream of the bridge with full slope revetment on the left abutment and stone toe reinforcement on the right abutment. These weirs would realign the river channel and stabilize the upstream left descending bank by directing water towards the center of the bridge. The design would also encourage material deposition to stabilize the left bank. Each bendway weir would extend into the channel 60-ft and is approximately 5-ft above the channel bed with a trapezoidal key below the channel bed. They are spaced 100-ft apart and point upstream to direct water away from the unstable left streambank as it flows over the crest of the weirs. All the rock used for the bendway weirs would utilize Type 2 gradation. Rock revetments and reinforcement at the bridge abutments would provide additional protection during high flow events. The left bridge abutment would be protected by a 140-ft full slope revetment that would extend up two drainage ditches without impeding local drainage flow. The right bridge abutment would be protected by a 170-ft stone toe reinforcement that also extends up two other drainage ditches. These measures would protect the abutments during high water events. All the rock used in the left bank revetment and right bank reinforcement would utilize Type 1 gradation.

Direct project related impacts to waters of the U.S. would result from contouring the existing stream banks and placing clean rock fill along both banks of the Thompson River. Combining the two locations, fill would be placed along approximately 840 linear feet of the river. Contouring the stream banks would result in approximately 1,000 cubic yards of earthen fill material being placed below the ordinary high water mark elevation of 818.5 feet. Additionally, about 2,000 cubic yards of clean rock fill with minimal fines would be placed below the ordinary high water mark. These quantities have been increased by 20% from the preliminary design calculations to represent the maximum amount of fill that would be placed below the ordinary high water mark.

WETLANDS/AQUATIC HABITAT: No wetlands would be impacted as a result of this project. The Missouri Stream Mitigation Method (MSMM) is used within Missouri to assess the impacts (debits) and benefits (credits) of projects as part of CWA Section 404 authorizations. This method has been publicly vetted and approved for use by Corps Regulatory Offices within the state of Missouri. Completion of the MSMM worksheets demonstrated that the Recommended Plan would result in an overall net benefit to the environment. The Recommended Plan generated 1480 debits resulting from the addition of armor to the river banks. A total of 2738 credits would be generated by restoring streambank stability along 840 linear feet of the Thompson River. MSMM worksheets have been prepared (Appendix V). A DRAFT Section 404 (b)(1) Evaluation (40 CFR 230) has been prepared (Appendix IV).

APPLICANT'S STATEMENT OF AVOIDANCE, MINIMIZATION, AND COMPENSATORY MITIGATION FOR UNAVOIDABLE IMPACTS TO AQUATIC RESOURCES: The applicant proposes to minimize impacts to downstream receiving waters by incorporating on-site best management practices. Unavoidable impacts of the project are proposed will be off-set by the total net benefit of the project as referenced above by the MSMM worksheets.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1968, as amended: The Corps has made a preliminary determination that the proposed project would not result in significant degradation of the human environment and therefore the proposed project would support a Finding of No Significant Impact (FONSI). The Corps has prepared a Draft Environmental Assessment (EA) for the project; this draft document may be requested as described below under "Additional Information" and is available for review at the Corps of Engineers office and on line at the Corps' web page at: http://www.nwk.usace.army.mil/regulatory/CurrentPN/currentnotices.htm. The Corps will utilize comments received in response to this Public Notice and the Draft EA to complete our evaluation of the project for compliance with the requirements of NEPA, and other Federal, state, and local regulations, including this review for project compliance with the requirements of Section 404 of the Clean Water Act. The Corps has made a preliminary determination that the project as proposed would not be contrary to the public interest and is in compliance with the Section 404(b)(1) Guidelines (Appendix IV of Draft Environmental Assessment).

ADDITIONAL INFORMATION: Additional information about this application may be obtained by contacting Capt Damon Slaughter, 601 E. 12th Street, Kansas City, Missouri 64106, (816) 389-3711 or damon.b.slaughter@usace.army.mil. All comments to this public notice should be directed to the above address.

CULTURAL RESOURCES: The proposed project has been reviewed in compliance with the National Historic Preservation Act of 1966 (Public Law 89-665) including a check of the National Register of Historic Places and supplements thereto. No sites were identified within the project area. A site inspection of the project area was conducted on May 2, 2012. The inspection confirmed the low potential for archeological sites in the area. The results of the research and survey were coordinated by letter with State Historic Preservation Officer (SHPO). In that letter, the Corps requested concurrence that any proposed work in the project area would have no effect on historical properties and that any work could proceed without any further coordination, unless in the unlikely event that archeological materials were discover during construction. SHPO concurred with this recommendation.

ENDANGERED SPECIES: In compliance with the Endangered Species Act, a preliminary determination has been made that the described work will not affect species designated as threatened or endangered or adversely affect critical habitat. The U.S. Fish and Wildlife Service concurred with this determination in previous correspondence.

FLOODPLAINS: This activity is being reviewed in accordance with Executive Order 11988, Floodplain Management, which discourages direct or indirect support of floodplain development whenever there is a practicable alternative. By this public notice, comments are requested from individuals and agencies that believe the described work will adversely impact the floodplain.

WATER QUALITY CERTIFICATION: Section 401 of the Clean Water Act (33 USC 1341) requires that all discharges of dredged or fill material must be certified by the appropriate state agency as complying with applicable effluent limitations and water quality standards. This public notice serves as an application to the state in which the discharge site is located for

authorization can be issued. Certification, if issued, expresses the state's opinion that the discharge will not violate applicable water quality standards.

PUBLIC INTEREST REVIEW: The decision to issue authorization will be based on an evaluation of the probable impact including the 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 benefits 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, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and, in general, the needs and welfare of the people. The evaluation of the impact of the activity on the public interest will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency under authority of Section 404(b) of the Clean Water Act (33 USC 1344). The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; 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 an authorization for this proposal. To make this decision, comments are used to address impacts on endangered species, historic properties, water quality, general environmental effects, and other public interest factors listed above. Comments are used in preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

COMMENTS: This notice is provided to outline details of the above-described activity so this District may consider all pertinent comments prior to determining if issuance of an authorization would be in the public interest. Any interested party is invited to submit to this office written facts or objections relative to the activity on or before the public notice expiration date. Comments both favorable and unfavorable will be accepted and made a part of the record and will receive full consideration in determining whether it would be in the public interest to issue the Department of the Army authorization. Copies of all comments, including names and addresses of commenters, may be provided to the applicant. Comments should be mailed to the address shown on page 3 of this public notice.

PUBLIC HEARING: Any person may request, in writing, prior to the expiration date of this public notice, that a public hearing be held to consider this application. Such requests shall state, with particularity, the reasons for holding a public hearing.

NOTE: This public notice is posted on the Kansas City District Regulatory web page and can be viewed at the following address:

http://www.nwk.usace.army.mil/regulatory/CurrentPN/currentnotices.htm

Highway N Bridge
Section 14 Emergency Streambank Stabilization Project
Thompson River, Harrison County, Missouri

Section 404(b)(1) Evaluation

1. Introduction

This Section 404(b)(1) Evaluation is for the Highway N Bridge Section 14 Emergency Streambank Stabilization Project, Thompson River, Harrison County, Missouri. This evaluation meets the requirements found in 40 CFR 230, Section 404(b)(1): Guidelines for Specification of Disposal Sites for Dredged and Fill Material.

2. Project Description

a. Location: The project area is located at the MoDOT Highway N Bridge on the Thompson River, just west of Cainsville in Harrison County, Missouri. It is in Section 14 of Township 65 North, Range 26 West. The Thompson River generally flows north to south for several hundred feet upstream and downstream of the bridge, which is situated east to west across the river.

b. General Description: The U.S. Army Corps of Engineers - Kansas City District, in cooperation with the Missouri Department of Transportation, District 1, propose an emergency streambank stabilization project along the Thompson River in Harrison County, Missouri. The purpose of the project is to address severely eroding banks along the Thompson River that are threatening to damage and flank the left bridge abutment of the Highway N Bridge and lead to its potential failure. The left bank upstream of the bridge is experiencing erosion because of the migrating bend in the Thompson River. There is no vegetation on the slope and stream bank sloughing is occurring. The channel of the Thompson River has migrated toward the left bank directing the river flow away from the center of the bridge. High flow events in 2007 and 2008 have accelerated the rate of erosion on the left bank and the unstable river bend is expected to damage the left abutment and potentially flank the bridge in 2 – 3 years. If the river experiences high flow events before the project is constructed, bridge damage and failure is likely.

Four bendway weirs would be constructed along the left bank upstream of the bridge with full slope revetment on the left abutment and stone toe reinforcement on the right abutment. These weirs would realign the river channel and stabilize the upstream left descending bank by directing

water towards the center of the bridge. The design would also encourage material deposition to stabilize the left bank. Each bendway weir would extend into the channel 60-ft and is approximately 5-ft above the channel bed with a trapezoidal key below the channel bed. They are spaced 100-ft apart and point upstream to direct water away from the unstable left streambank as it flows over the crest of the weirs. All the rock used for the bendway weirs would utilize Type 2 gradation. Rock revetments and reinforcement at the bridge abutments would provide additional protection during high flow events. The left bridge abutment would be protected by a 140-ft full slope revetment that would extend up two drainage ditches without impeding local drainage flow. The right bridge abutment would be protected by a 170-ft stone toe reinforcement that also extends up two other drainage ditches. These measures would protect the abutments during high water events. All the rock used in the left bank revetment and right bank reinforcement would utilize Type 1 gradation.

Direct project related impacts to waters of the U.S. would result from contouring the existing stream banks and placing clean rock fill along both banks of the Thompson River. Combining the two locations, fill would be placed along approximately 840 linear feet of the river. Contouring the stream banks would result in approximately 1,000 cubic yards of earthen fill material being placed below the ordinary high water mark elevation of 818.5 feet. Additionally, about 2,000 cubic yards of clean rock fill with minimal fines would be placed below the ordinary high water mark. These quantities have been increased by 20% from the preliminary design calculations to represent the maximum amount of fill that would be placed below the ordinary high water mark.

c. Authority: This activity is regulated by the U.S. Army Corps of Engineers under Section 14 of the Flood Control Act of 1946 (Public Law 79-526), as amended, and Section 404 of the Clean Water Act (33 USC 1344).

3. Review of Compliance (§ 230.10 a-d)

a. No practicable alternative to the proposed project would have a less adverse impact on the aquatic ecosystem while providing a suitable level of bank protection to minimize the threat of damage to the Highway N Bridge. Additional information on the impacts of various alternatives to waters of the U.S. can be found in Section 4 of the Draft EA.

b. The proposed project does not appear to violate any applicable state water quality standards, or applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act. The proposed project is not likely to jeopardize the continued existence of species listed as

endangered or threatened under the Endangered Species Act of 1973, as amended, to result in the likelihood of the destruction or adverse modification of critical habitat. Furthermore, the proposed project would not violate the requirements of any Federally designated marine sanctuary.

c. The proposed project would not cause or contribute to significant degradation of waters of the U.S. This includes no adverse effects on human health, life stages of organisms' dependant on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values.

d. Appropriate and practical steps have been taken which will minimize potential adverse impacts on the aquatic ecosystem.

4. Technical Evaluation Factors (Subparts C-F)

a. Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

1) Substrate: Placement of riprap structures along 840 linear feet of the Thompson River to armor the streambank would bury the existing sand and silt substrate. It is necessary to bury the existing substrate with riprap because it is highly erosive and is threatening the stability of the Highway N Bridge. The proposed project would result in a minor, long-term impact to the existing substrate along a relatively short section of the Thompson River.

The Missouri Stream Mitigation Method was used to determine any compensatory mitigation that would be necessary to offset any potential negative impacts resulting from armoring the banks. The Missouri Stream Mitigation Method has been publicly vetted and approved for use by Corps Regulatory Offices within the state of Missouri. Using this method, a total of 1480 debits were generated by protecting the streambanks using riprap structures. A total of 2738 credits were generated by providing streambank stability along this same stretch of the Thompson River. Therefore, no additional mitigation measures are proposed.

2) Suspended particulates/turbidity: The proposed plan would result in minor short-term impacts to suspended particulates and an increase in turbidity during project construction. This would result from disturbing the existing sand/silt substrate in the channel and along the streambanks. Long-term, the eroding streambanks would be stabilized as a result of the project, therefore reducing the

amount of particulates that enter the Thompson River. No long-term negative impacts are expected.

3) **Water:** The project would not result in any long-term negative impacts to water quality. The project may result in minor short-term construction related impacts to water quality due to activities taking place within the river channel and on the banks. These activities would result in increased suspended particulates and increased turbidity. This has the potential to have secondary impacts on nutrient concentrations, dissolved oxygen, pH, and conductivity. These impacts would be minimized by using Best Management Practices (BMPs) to minimize the amount of runoff, and land/channel disturbance that would occur during project construction. Furthermore, project construction is tentatively scheduled for mid/late fall time period which would further minimize the impact to water quality because of cooler temperatures and reduced biological activity during this time of the year.

4) **Current patterns and water circulation:** Earthen fill material and clean rock fill would be used to protect the streambanks from erosion and would redirect the flow of water toward the center of the Highway N Bridge. Any changes to the direction or velocity of water flow and circulation would be minor. It is not anticipated that this would result in any significant changes to the location, structure and dynamics of the aquatic community, or the rate and extent of the mixing of dissolved and suspended components of the water body.

5) **Normal water fluctuations:** There are no anticipated changes to normal water fluctuations that would result from the proposed project. The project would not result in any changes to inundation periods or water level modifications during flood events, or during periods of baseflow.

6) **Salinity Gradients:** The proposed project would not impact any salinity gradients. The Thompson River is a freshwater system and this would not change as a result of the project.

b. Potential Impacts to the Biological Characteristics of the Aquatic Ecosystem (Subpart D)

1) **Threatened and endangered species:** There are no Federally-listed threatened or endangered species known to occur within or adjacent to the proposed project area. The U.S. Fish and Wildlife Service was consulted and it was determined that no Federally-

listed species, candidate species, or designated critical habitat are located within or adjacent to the project area. See Appendix II of the Environmental Assessment.

2) **Fish, crustaceans, mollusks, and other aquatic organisms in the food web:** The project would not result in significant adverse impacts to aquatic organisms. Minor short-term impacts to the aquatic community may result from the smothering of immobile organisms, direct displacement of organisms, and an increase in turbidity, during project construction. The impacts may affect individual organisms in a small stretch of the Thompson River, but would be unlikely to have a significant impact on the overall population of any particular species within the waterbody. Long-term, there would be a positive impact to the aquatic community by reducing the amount of sediment entering the river. Construction is tentatively scheduled to occur in October 2012, a time of the year when there is less biological activity. No significant adverse long-term impacts are anticipated.

3) **Other wildlife:** Wildlife associated with aquatic ecosystems includes resident and transient mammals, birds, reptiles, and amphibians. There would be minor, short-term impacts to these types of wildlife as a result of removing herbaceous vegetation and grasses. All disturbed land areas would be seeded with native grasses as part of project construction. Noise from construction equipment may also create a short-term negative impact to wildlife. Construction is tentatively scheduled to occur in October 2012, a time of the year when there is less biological activity. No significant adverse long-term impacts are anticipated.

c. Potential Impacts on Special Aquatic Sites (Subpart E)

1) **Sanctuaries and Refuges:** No sanctuaries or refuges were identified in or adjacent to the project area.

2) **Wetlands:** No wetlands were identified in or adjacent to the project area.

3) **Mud flats:** No mud flats would be impacted by the proposed project.

4) **Vegetated shallows:** No vegetated shallows would be impacted by the proposed project. No rooted aquatic vegetation is located within the project area.

5) **Coral reefs:** The project area does not provide the necessary environmental conditions to support corals.

6) **Riffle and pool complexes:** Because of the low gradient and sandy/silt nature of the channel substrate of the Thompson River, a stable riffle and pool complex does not exist.

d. Potential Effects on Human Use Characteristics (Subpart F):

1) **Municipal and private water supplies:** The project would not impact any municipal or private water supplies.

2) **Recreational and commercial fisheries:** The project would not affect the suitably of any recreational or commercial fisheries. The project area is relative small size and is not anticipated to negatively impact fish habitat.

3) **Water-related recreation:** The project would not impair or destroy any resources which support recreation activities.

4) **Aesthetics:** The project may result in minimal impacts to the aesthetics of the area as a result of using riprap to construct bank stabilization structures. This impact will be minimized by planting native vegetation in the areas disturbed by the construction process.

5) **Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves:** The project would not impact any of the above mentioned property types.

5. EVALUATION OF DREDGED OR FILL MATERIAL (Subpart G)

a. General evaluation of dredged or fill material: Fill material placed below the ordinary high water mark would consist of earthen fill material obtained from the existing streambanks, and clean rock fill with minimal fines obtained from a commercial source. There is no reason to believe that the streambanks would contain any chemical, biological, or other pollutants. Additionally, prior experience indicates that commercially available rock fill would be free from chemical, biological, or other pollutants.

b. Chemical, biological, and physical evaluation and testing: The fill material meets the testing exclusion based on the fact that it would consist of local earthen materials, and clean rock fill obtained from a commercial

source. There is no reason to believe that the earthen material or the clean rock fill would be a carrier of harmful contaminants.

6. DISPOSAL SITE DELINEATION (§230.11 f)

The fill locations would consist of portions of the Thompson River adjacent to the Highway N Bridge. Local earthen material and clean rock fill with minimal fines would be used to stabilize the river banks in order to protect the integrity of the bridge. The amount of fill that would be used has been determined to be the minimum amount necessary to provide the desired level of protection to the bridge. The depth of the water, the current velocity, direction, and variability, the degree of turbulence, and the rate of discharge at the disposal site has been considered in determining the acceptability of the mixing zone.

7. ACTIONS TO MINIMIZE ADVERSE EFFECTS (SUBPART H)

The construction contractor would be required to obtain a Section 402 NPDES stormwater permit from Missouri Department of Natural Resources. As part of the NPDES permit, Best Management Practices (BMPs) would be required to minimize the incidental fallback of material into the waterway and to minimize the introduction of fuel, petroleum products, or other deleterious material from entering the waterway. Such measures could include the use of erosion control fences; storing equipment, solid waste, and petroleum products above the ordinary high water mark and away from areas prone to runoff; and requiring that all equipment be clean and free of leaks. To prevent fill from reaching water sources by wind or runoff, fill would be covered, stabilized or mulched, and silt fences would be used as required. Additional measures to minimize adverse effects would include using clean rock fill with minimal fines, stabilizing the earthen material with rock, using appropriate construction equipment, minimizing the amount of time that equipment would be in the river channel, and not placing fill in the river during unusual high water events.

8. FACTUAL DETERMINATIONS (§230.11)

A review of the information in items 4 through 7 of this report indicates that there is minimal potential for long-term environmental effects of the proposed discharge. Additionally, there are not expected to be any cumulative or long-term secondary impacts as a result of the project.

9. FINDINGS (§230.12)

The proposed Highway N Bridge, Section 14 Emergency Streambank Stabilization Project has been evaluated and determined to be in compliance with Clean Water Act Section 404(b)(1) guidelines, with the inclusion of appropriate and practical conditions to minimize pollution and adverse effects on the aquatic ecosystem. Furthermore, the project would result in an overall net benefit to the aquatic ecosystem, as determined by the Missouri Stream Mitigation Method.

Prepared by: _____ _____
Mr. Rick Morrow Date
Biologist
Planning Branch

Reviewed by: _____ _____
Ms. Jennifer Switzer Date
Chief, Environmental Resources Section
Planning Branch

Approved by: _____ _____
Anthony J. Hofmann Date
Colonel, Corps of Engineers
District Commander

APPENDIX V

MISSOURI STREAM MITIGATION METHOD WORKSHEETS

ADVERSE IMPACT FACTORS FOR RIVERINE SYSTEMS WORKSHEET

Stream Type Impacted	Ephemeral 0.1			Intermittent 0.4			Perennial 0.8			
Priority Area	Tertiary 0.1			Secondary 0.4			Primary 0.8			
Existing Condition	Functionally Impaired 0.1			Moderately Functional 0.8			Fully Functional 1.6			
Duration	Temporary 0.05			Recurrent 0.1			Permanent 0.3			
Activity	Clearing 0.05	Utility Crossing/Bridge Footing 0.15	Below Grade Culvert 0.3	Armor 0.5	Detention 0.75	Morphologic Change 1.5	Impoundment (dam) 2.0	Pipe 2.2	Fill 2.5	
Linear Impact	<100' 0.0	100'-200' 0.05	201'-500' 0.1	501'-1000' 0.2	>1000 linear feet (LF) use 0.1 for each 500' of impact					

	Alternative 2	Alternative 3	Alternative 4	Alternative 5	
Stream Type Impacted	0.8	0.8	0.8	0.8	
Priority Area	0.1	0.1	0.1	0.1	
Existing Condition	0.1	0.1	0.1	0.1	
Duration	0.3	0.3	0.3	0.3	
Activity	0.5	0.5	0.5	0.5	
Linear Impact	0.2	0.2	0.2	0.2	
Sum of Factors M=	2.0	2.0	2.0	2.0	
Linear Feet of Stream Impacted in Reach LF=	740	740	740	740	
M x LF	1480	1480	1480	1480	

Total Mitigation Credits Required* = (M x LF)= 1480

*This value may be applied to mitigation at a mitigation bank at a 1:1 ratio, when the impact area is within the service area of an approved mitigation bank. An increased multiplier will be used at the Corps discretion when an impact occurs outside of the service area of an approved mitigation bank, or when mitigation is proposed through an in-lieu fee program.

In-Stream Work

Stream Channel/Stream Restoration or Enhancement and Relocation Worksheet

Stream Type	Ephemeral	Intermittent	Perennial Stream			
			<15'	15' - 30'	30' - 50'	>50'
	0.05	0.4	0.4	0.6	0.8	1

Priority Area	Tertiary 0.05	Secondary 0.2	Primary 0.4
Existing Condition	Not Applicable 0	Functionally Impaired 0.4	Moderately Functional 0.05

Net Benefit	Stream Relocation 0.1	Stream Channel Restoration / Stream Enhancement			
		Relocated Stream w/In-Stream Features 0.5	Moderate 1.0	Good 2.0	Excellent 3.5

Monitoring/ Contingency	Level I 0.05	Level II 0.3	Level III 0.5

Control / Site Protection	Corps approved site protection without third party grantee 0.1	Corps approved site protection recorded with third party grantee, or transfer of title to a conservancy 0.4

Mitigation Construction Timing	Schedule 1 0.3	Schedule 2 0.1	Schedule 3 0

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Stream Type	1	1	1	1
Priority Area	.05	.05	.05	.05
Existing Condition	0.4	0.4	0.4	0.4
Net Benefit	2	2	2	2
Monitoring / Contingency	.05	.05	.05	.05
Control / Site Protection	.1	.1	.1	.1
Mitigation Construction Timing	.1	.1	.1	.1
Sum Factors = M	3.7	3.7	3.7	3.7
Stream Length in Reach = LF do not count each bank separately	740	740	740	740
Credits C = M x LF	2738	2738	2738	2738
Total CreditsGenerated C x Mitigation Factor (MF)=	2738	2738	2738	2738

Total Channel Restoration/Relocation Credits Generated = 2738

APPENDIX VI

CLEAN WATER ACT SECTION 401 PERMIT

APPENDIX VII

PUBLIC COMMENTS