



Osceola Harbor Extension, AR Sec. 107



Draft Feasibility Report with Integrated EA CAP Section 107 – Navigation Improvements

September 2025

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Executive Summary

Introduction

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), Memphis District (MVM), Regional Planning and Environment Division South (RPEDS), prepared this Draft Feasibility Report with Integrated Environmental Assessment (EA) for the Osceola Harbor Extension under Section 107 of the Continuing Authorities Program (CAP). The proposed project is located in Mississippi County at Mississippi River Mile 785 on the right descending bank near Osceola, Arkansas. The Arkansas/Tennessee state line runs through the harbor channel. The Main Report and EA include input from the Non-federal Sponsor (NFS), other Federal and non-Federal agencies, and the public.

Purpose and Need

The underlying purpose and need, in accordance with all applicable regulations, for the Osceola Harbor Extension study is to alleviate critical congestion within Osceola Harbor, enhance the efficiency of barge traffic, and support continued economic growth in Mississippi County, AR. This proposed project directly addresses the escalating strain on existing harbor infrastructure resulting from a significant increase in barge traffic driven by the burgeoning steel industry and sustained agricultural commodity transport.

Osceola Harbor is a vital transportation hub for both agricultural products and a rapidly expanding steel industry located along a bend in the Mississippi River. Poinsett Rice and Grain currently utilizes the harbor, moving approximately 500,000 tons of grain annually. However, with the addition to the harbor of Hybar Steel (summer 2025) and the expansion of Big River Steel (a steelmaking company operating a little over 2 miles southeast from the harbor), congestion has become a problem. Hybar Steel anticipates handling over 1.5 million tons of inbound scrap steel and outbound finished product annually, and Big River Steel's recently built second mill will add about 4 million tons inbound and 3.2 million tons outbound. Since both Hybar Steel and Big River Steel's second mill are in their initial stages of operation, the tonnage amounts stated above will likely be reached in about two to three years.

Big River Steel currently does not stage its barges in Osceola Harbor; rather, it stages them along the Mississippi River a couple of miles downstream. Barges servicing Poinsett Rice and Grain during its peak harvest season of September, October, and November occupy much of the available space in the harbor itself, combined with Big River Steel's increased output occupying all available staging spaces along the Mississippi River, results in Hybar Steel expecting these operational constraints to translate to elevated transportation costs as well as to risks to both agricultural and industrial supply chains.

A Federal Interest Determination (FID) conducted in November 2024 determined the Osceola Harbor Extension efforts met Federal interest criteria.

Plan Formulation

The study objective is to increase harbor capacity and reduce transportation costs. Three alternatives were identified to address the problems and objective and are described below in Table ES-1.

Table ES-1. Initial Array of Alternatives

Alternative	Description
Alternative 1 – No Action	No changes to the harbor; maintains existing conditions.
Alternative 2 – Osceola Harbor Extension with Open Water Dredge Material Placement	Extend harbor 3,000 feet upstream with a new turning basin. Maintains existing turning basin and places dredge material in Open Water, Transitional Placement, downstream of the harbor, consistent with current harbor practices.
Alternative 3 – Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use	Extends harbor as in Alternative 2 and considers beneficial use of dredged material and using former upland site for placement.

The following screening criteria, derived from the Planning Policy and Guidance (PP&G) framework of Completeness, Effectiveness, Efficiency, and Acceptability, were applied to the initial array of alternatives to identify which alternatives would be carried forward for more detailed analysis:

- **Completeness:** The alternative does not rely on actions by other parties for successful implementation.
- **Effectiveness:** The alternative meets study objectives and avoids identified study constraints.
- **Efficiency:** The alternative provides a favorable balance between benefits and costs, including implementation timeframe.
- **Acceptability:** The alternative is technically, environmentally (including avoidance of impacts to cultural and environmental resources), economically, and socially feasible.

Although Alternative 3 initially appeared promising, detailed analysis revealed critical flaws leading to its elimination from further consideration. Specifically, Alternative 3 failed to meet both the completeness and efficiency criteria. The lack of a defined beneficial use strategy rendered upland placement incomplete, as it lacked a viable plan for dredged material utilization. Furthermore, without such beneficial use, the associated costs became

prohibitively high, rendering the alternative economically inefficient. Consequently, only Alternatives 1 and 2 were carried forward for subsequent analysis.

Subsequently a comparison of all remaining alternatives including no action and a comprehensive assessment and comparison of the total benefits across all four accounts (National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), Other Social Effects (OSE)) led to the selection of Alternative 2 (Extend Channel and add a Turning Basin) as the Tentatively Selected Plan (TSP). Alternative 2 is also the NFS supported plan. The evaluation considered a range of social effects, including safety, productivity, and impacts on disadvantaged communities. This comprehensive evaluation demonstrated that Alternative 2 provides the greatest overall benefits across the four accounts while minimizing environmental impacts and adhering to project constraints.

Tentatively Selected Plan

Alternative 2 (Extend Channel and add a Turning Basin) is the TSP. Alternative 2 is also the NFS supported plan. The TSP has average annual net benefits of \$12,391,000 and a B/C ratio of 13.6 to 1 in FY 2025 dollars (Table ES-3).

Table ES-3. Average Annual Costs and Benefits of TSP (Alt. 2)

Investment Cost	
First Cost	\$ 6,445,000
Interest During Construction	\$ 8,000
Total Investment Cost	\$ 6,453,000
Average Annual Cost	
Average Annual First Cost	\$ 251,000
Average Annual Incremental OMRR&R	\$ 731,000
Total Average Annual Cost	\$ 982,000
Benefits	
Average Annual Benefits	\$ 13,373,000
Net Annual Benefits	\$ 12,391,000
BCR (computed at 3.0%)	13.6

*Values at FY25 price levels and are amortized at the 2025 Federal discount rate of 3.0 percent.

*All first costs occur in the year 2026. Benefits begin in the year 2027.

Environmental

To protect the pallid sturgeon, all in-water construction activities would be restricted during its spawning season (April 1st to June 30th). The proposed project is anticipated to have no lasting impacts on wetlands or woodlands, nor are significant adverse impacts to aquatic or terrestrial resources expected. Consequently, no additional mitigation measures beyond the spawning restriction are deemed necessary.

Views of the Public, Agencies, Stakeholders, and Tribes

The City of Osceola, AR requested assistance through the CAP 107 program in March 2024, and is the NFS. The NFS supported the proposed project through the FID and signed a Feasibility Cost Sharing Agreement in April 2025. The NFS supports the TSP and is prepared to cost-share the design and Implementation.

To date, no landowner or public opposition to the proposed project has been identified. Implementation of the TSP is anticipated to provide benefits to adjacent landowners, tenants, and harbor partners.



Figure ES-1. Alternative 2 – Osceola Harbor Extension with Open Water Dredge Material

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Section 1

Introduction*

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division (MVD), Memphis District (MVM) and Regional Planning and Environment Division, South (RPEDS), prepared this Draft Feasibility Study with Integrated Environmental Assessment (EA) for the Osceola, AR Harbor Extension. This study is authorized under Section 107 of the Continuing Authorities Program (CAP). The study area is located in Mississippi County AR, at Mississippi River Mile 785 on the right descending bank near Osceola, Arkansas. This Main Report is a presentation of the study results, which includes an overview of the plan formulation processes, summaries of the EA and economic analysis, and a recommendation of a Tentatively Selected Plan (TSP).

The technical appendices include Environmental, Engineering, Cost Engineering, and Real Estate Plan. These appendices support compliance with applicable regulations including National Environmental Policy Act (NEPA), Engineering Regulation (ER) 200-2-2 (Procedures for Implementing NEPA), Engineering Pamphlet (EP) 1105-2-58 (Continuing Authorities Program), ER 1105-2-100 (Planning Guidance Notebook) and ER 1105-2-103 (Policy for Conducting Civil Works Planning Studies). The Main Report and EA include input from the Non-federal Sponsor (NFS), other Federal and non-Federal agencies, and the public.

1.1 STUDY SCOPE

The scope of this feasibility study includes evaluation of alternatives, including a no-action alternative, to provide navigation improvements in Osceola Harbor. The goal is to identify an alternative that maximizes net benefits while minimizing environmental impacts, considering dredging depths, lengths and widths as discussed in Section 1.10 (Study Objectives and Constraints).

1.2 USACE PLANNING PROCESS

The USACE process incorporates SMART (Specific, Measurable, Attainable, Risk-Informed, and Timely) elements into feasibility studies to ensure an efficient feasibility study process and to install accountability across all functional working groups.

Throughout the feasibility study, the Project Design Team (PDT) followed USACE's six step planning process in accordance with ER 1105-2-103 (Figure 1-1). This structured approach quantitatively and qualitatively assesses water resource problems and opportunities leading to recommendations for solutions. The planning steps were iterative and concurrent, allowing the PDT to formulate and evaluate an efficient, effective, and reasonable array of alternative plans. Section 3 Plan Formulation and Evaluation, provides further details.

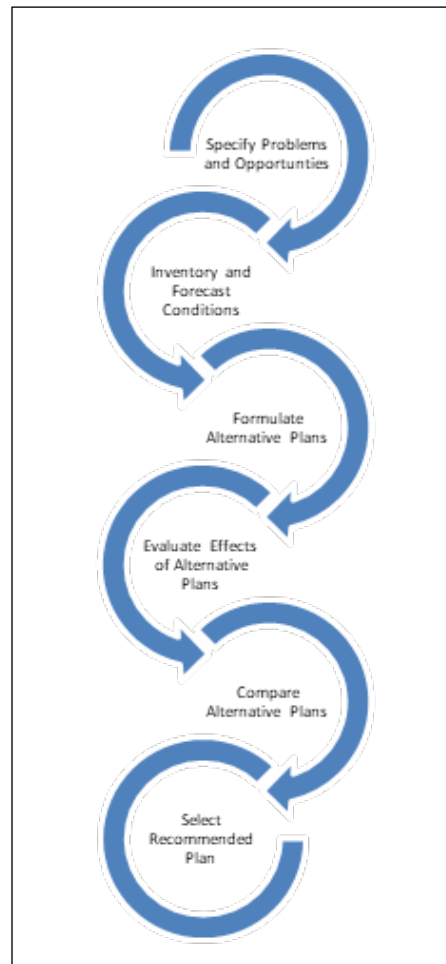


Figure 1-1. USACE Planning Process.

1.3 STUDY AUTHORITY

The study is authorized as a Small Navigation Project under CAP, specifically Section 107 of the Rivers and Harbors Act of 1960, as amended. The CAP authorizes USACE to plan, design, and construct small navigation improvement projects after a detailed investigation demonstrates engineering feasibility and economic justification.

1.4 NON-FEDERAL SPONSOR

The City of Osceola in Arkansas is the NFS for this study. In a Letter of Intent dated March 20, 2024, the City requested assistance from USACE under the Section 107 authority to investigate and construct navigation improvements. The City understands the provisions of the Section 107 and is willing to cost-share the project. The Feasibility Cost Sharing Agreement (FCSA) was executed on April 4, 2025.

1.5 STUDY AREA (PLANNING AREA)

The study area, encompassing Osceola Harbor, is located in Mississippi County, AR, at Mississippi River Mile 785 on the right descending bank near Osceola. The Arkansas/Tennessee state line runs through the middle of harbor channel. All of the land access and loading and unloading facilities are in Arkansas. The area is in the northeastern corner of the state, approximately 60 miles north of Memphis, TN, and 786 miles Above Head Passes (AHP), Louisiana. The City of Osceola adjoins Island No. 30, an old bendway separating the city waterfront from the main navigation channel. Osceola Harbor is a slackwater harbor channel providing year-round barge access to the municipal terminal that is primarily used by Poinsett Rice and Grain. The study area is within Arkansas Congressional District 1 and Tennessee Congressional District 8 (Figure 1-2).



Figure 1-2. Osceola Harbor Extension Study Area.

1.6 BACKGROUND AND HISTORY

The Osceola waterfront has a long history of river commerce, serving as a port of call for Mississippi River packet boats and later as a terminal for barge traffic. Historically, the bendway of Island No. 30 functioned as the main navigation channel before shifts in the river's alignment. From 1931-1936, USACE utilized the harbor area as a landing and staging area for its revetment layup and casting fleet.

1.6.1 Osceola Harbor Authorities and Associated Reports

The Osceola Harbor channel was authorized under Section 107 of the River and Harbor Act of 1960, (Public Law 86-645). The detailed study report was submitted to the Chief of Engineers with 1st endorsement on June 26, 1970. The 1975 Water Resources Development in Arkansas Report by USACE Southwestern Division outlined the planned improvements:

The harbor at Osceola will be improved by construction of a channel 250 feet wide and 9 feet deep beginning at the downstream end of the harbor channel and extending upstream 6,500 feet to the old chute through Island No. 30, to Mile 785.4 AHP, with a 250-foot-radius turning basin at the upstream end. A 97-acre flood-free industrial park will be developed by the city of Osceola. The first phase of development will provide a levee constructed by local interests to protect the industrial area from flooding until the second stage of development will utilize dredged material to raise the elevation of the area to above the project flood flow line. Local interests will be responsible for construction of all necessary bulkheads and dikes, prior to dredging to contain the dredge material. Construction began in fiscal year 1975.

An Environmental Statement supporting the 1970 study report was finalized in January 1971 by USACE-MVM. This statement emphasized the need for measures to minimize turbidity and prevent pollution during construction, including dredge material placement on land and careful handling of oils and other pollutants.

The Osceola Harbor authority was amended by Section 3010 of the Water Resource Development Act (WRDA) of 2007. This amendment allows non-Federal interests to construct a mooring facility within the existing authorized harbor channel, subject to all necessary permits and certifications, while maintaining USACE's responsibility for maintaining the general navigation features, including a bottom width of 250 feet.

The most relevant studies and reports in the study area are listed in Table 1-1.

Table 1-1. Relevant Documents in Study Area

	Study/Report/Environmental Document Title	Document Type	Study Applicability
1960	River and Harbor Act (Section 107 - Authorization of Osceola Harbor Channel)	Public Law	Study Authority
1970	Detailed Study Report - Osceola Harbor Channel	Study Report	Existing Conditions
1971	Environmental Statement (Supporting 1970 Study Report)	Environmental Statement	Existing Conditions
1975	Water Resources Development in Arkansas Report (USACE Southwestern Division)	Report	Existing Conditions
1978	Construction of Stone Dikes - Lake Neark (Section 4, Flood Control Act of 1944)	Project Record/Report	Existing Conditions
2007	Water Resource Development Act (WRDA) - Amendment to Osceola Harbor Authority (Section 3010)	Public Law	Study Authority
2022	USACE-MVM Navigation Bulletin NO 1	Navigation Bulletin	Existing Conditions
2022	Short Term Activity Authorization (STAA) No. 20220114 by Arkansas Department of Energy and Environment, Division of Environmental Quality (ADEQ)	Permit/Authorization	Existing Conditions
2023	§401 Water Quality Certification and Aquatic Resource Alteration Permit (NRS18.121-23); navigation channel maintenance dredging, Mississippi River in Tennessee, by the State of Tennessee	Permit/Authorization (Please note, this permit is currently being modified to call out Osceola)	Existing Conditions

1.6.2 USACE Constructed Projects in the Study Area

Further modifications that impacted the harbor occurred in 1978 with the construction of two stone dikes (authorized under Section 4 of the Flood Control Act of 22 December 1944, as amended) to create Lake Neark. These structures, built with approximately 47,000 cubic yards of stone and 6,000 cubic yards of excavated material, restrict flows through the former chute Island No. 30, creating a recreational area (Figure 1-3).

The Mississippi River channel near Osceola Harbor is protected by multiple USACE-constructed structures. The Keyes Point Dikes and Plum Point Dikes were constructed to stabilize the riverbanks and improve navigation. The Kate Aubrey Towhead - Island 30 revetment protects the shoreline north of the harbor entrance, and the Lower Bullerton Revetments protect the shoreline south of the harbor entrance. All of these structures – the dikes and the revetments – are subject to navigation regulations outlined in Title 33 C.F.R. Part 207, as detailed in the USACE-MVM Navigation Bulletin No. 1 of 2022. These

regulations generally restrict anchoring adjacent to these structures and limit landings to established commercial areas to protect the integrity of the bank stabilization works.

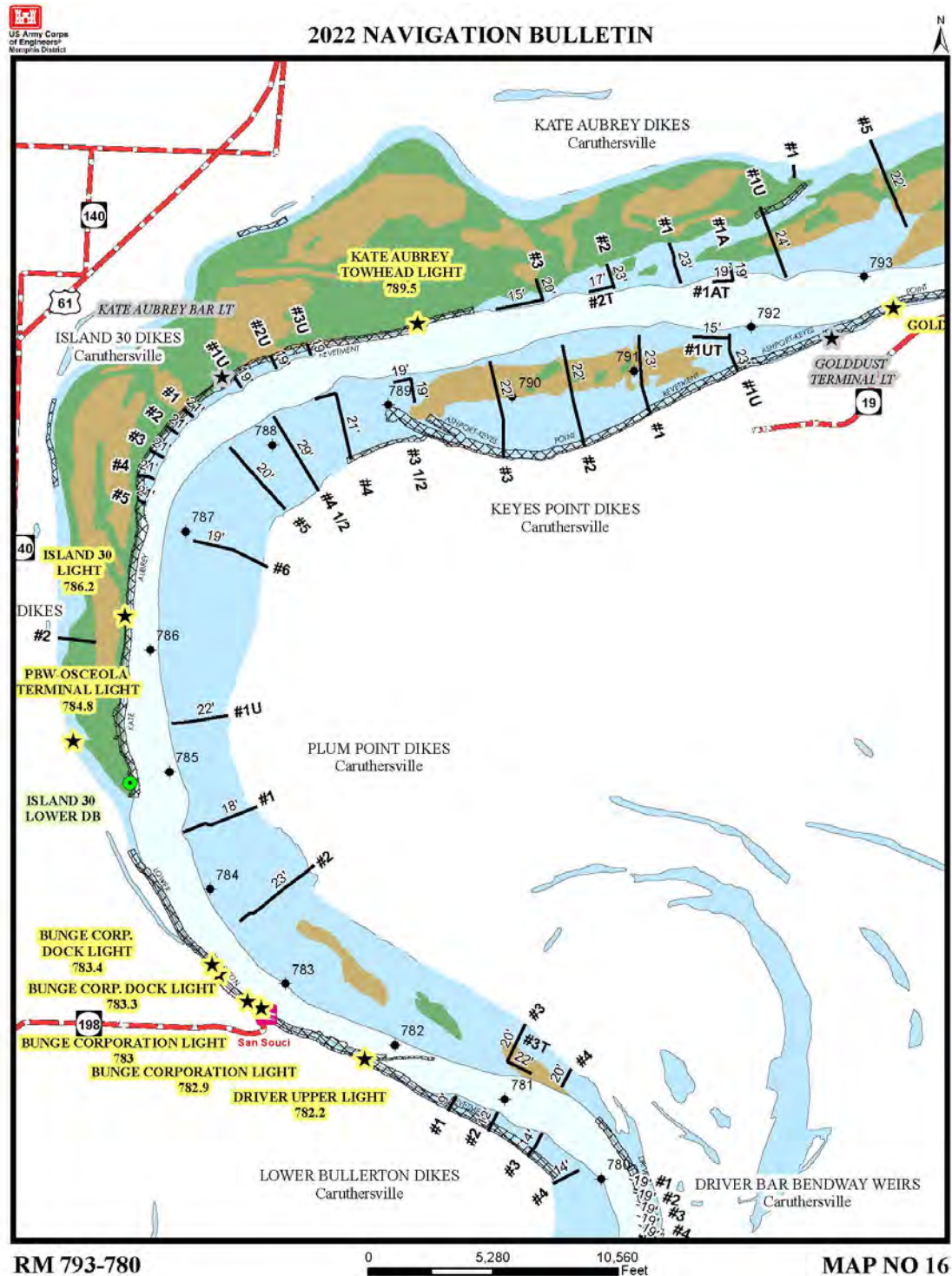


Figure 1-3. Study Area Navigational Features.

1.6.3 Current Dredge Operations

Maintaining navigable depths within Osceola Harbor requires ongoing dredging. Historical sediment deposition, coupled with the natural dynamics of the Mississippi River, necessitates periodic removal of accumulated material to ensure continued barge access to the municipal terminal. The USACE-MVM maintains the federally authorized channel to a minimum dredge depth of -9 feet Low Water Reference Plane (LWRP).

Recent maintenance dredging is conducted under Short Term Activity Authorization (STAA) No. 20220114, issued by the ADEQ on April 4, 2022. This STAA authorizes reissuance of USACE's existing maintenance dredging authorization, allowing for dredging "on an as-needed basis to maintain minimum project channel dimensions." Dredging operations utilize dustpan hydraulic dredges for the main channel and cutterhead hydraulic dredges for the harbor itself. Approximately 145,000 cubic yards of sediment are removed annually from the Osceola Harbor. The current dredging maintenance schedule costs \$870,000 annually.

Dredged material is placed in open water downstream of the harbor mouth, with an upland placement site also available at Osceola Harbor. In addition to the ADEQ permit, dredging activities are also authorized under a §401 Water Quality Certification and Aquatic Resource Alteration Permit (NRS18.121-23) issued by the State of Tennessee, effective July 13, 2023, and expiring July 12, 2028. This Tennessee permit covers maintenance dredging within the Mississippi River between River Miles 715 and 905, as well as in Wolf River Harbor and McKellar Lake Harbor, to maintain a navigation channel 12 feet deep and 300 feet wide (though current funding limits portions to 9 feet deep and 300-500 feet wide).

1.7 PURPOSE AND NEED*

The underlying purpose and need, in accordance with all applicable regulations, for the Osceola Harbor Extension study is to alleviate critical congestion within Osceola Harbor, enhance the efficiency of barge traffic, and support continued economic growth in Mississippi County, AR. This study directly addresses the escalating strain on existing harbor infrastructure resulting from a significant increase in barge traffic driven by the burgeoning steel industry and sustained agricultural commodity transport.

Osceola Harbor is a vital transportation hub for both agricultural products and a rapidly expanding steel industry located along a bend in the Mississippi River. Poinsett Rice and Grain currently utilizes the harbor's full capacity, shipping approximately 500,000 tons of grain annually. However, with the addition of Hybar Steel (summer 2025) and the expansion of Big River Steel (a steelmaking company operating a little over 2 miles southeast from the harbor), congestion has become a problem. Hybar Steel anticipates handling over 1.5 million tons of inbound scrap steel and outbound finished product annually, and Big River Steel's recently built second mill will add about 4 million tons inbound and 3.2 million tons outbound. Since both Hybar Steel and Big River Steel's second mill are in their initial stages of operation, the tonnage amounts stated above will likely be reached in about two to three years.

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Grain during its peak harvest season of September, October, and November occupy much of the available space in the harbor itself, combined with Big River Steel's increased output occupying all available staging spaces along the Mississippi River, results in Hybar Steel expecting these operational constraints to translate to elevated transportation costs as well as to risks to both agricultural and industrial supply chains.

1.8 FEDERAL INTEREST

Preceding this Feasibility Study, a Federal Interest Determination (FID) was conducted in November 2024 to determine whether the Osceola Harbor Extension efforts provide sufficient benefits to demonstrate a Federal Interest. The Federal interest was determined by comparing the overall cost of applying navigational improvement measures within the study area as compared to the overall public benefits.

For the purpose of determining a potential Federal Interest in this study the No Action plan and a plan identified as being most likely to meet the necessary criteria were preliminarily considered:

- *FID Alternative 1 - No Action* – This alternative would maintain existing conditions with no harbor improvements. It carries no additional cost but provides no benefits. This alternative was deemed unacceptable as the harbor is already at capacity and would be further strained by the new Hybar facility.
- *FID Alternative 2 – Osceola Harbor Extension* – This alternative would involve excavating for approximately 3,000 feet upstream of the existing federally authorized project in addition to construction of a new turning basin at the upper end of the proposed project area. The existing harbor dimensions are as follows: 6,500-foot length, 250-foot width and 9-foot depth.

The First Cost of FID Alternative 2 was \$4,746,000 (FY24 dollars). The average annual benefit for this plan was \$10,439,000.

Annualized costs at time were \$178,000 per year at a Federal Discount rate of 2.75 percent for the 50-year study of analysis period. The annual operation and maintenance (O&M) costs for FID Alternative 2 was approximately \$375,000 per year. The Total Annual Cost summed to \$553,000 while total average annual benefits totaled \$10,439,000. This resulted in \$9,886,000 in excess benefits and a Benefit-Cost Ratio (BCR) of 18.9:1.

Because the Osceola Harbor Extension had a BCR above 1.0 and FID Alternative 2 showed positive Net Excess Benefits, the FID Alternative 2 demonstrated a Federal interest. The USACE recommended continued evaluation of the study at the feasibility level.

1.9 PROBLEMS AND OPPORTUNITIES

1.9.1 Problems

The Osceola Harbor Extension CAP Section 107 study assessed solutions to mitigate increasing navigational challenges within the Port of Osceola. Several key problems have been identified:

- *Increased Barge Traffic:* Hybar Steel (1.5 million tons annually) and Big River Steel's expansion (projected 7.2 million tons over 2-3 years) will significantly increase barge traffic at Osceola Harbor.
- *Insufficient Harbor Capacity:* The current harbor is operating at full capacity, with Poinsett Rice and Grain handling approximately 500,000 tons of grain annually, leaving no room for additional traffic. This is further compounded by the existing harbor being too small to efficiently manage current and expected traffic volume. Specifically, there is insufficient space to safely maneuver barges for loading and assembling tows – typical tows in this section of the Lower Mississippi River consist of 30-60 barges. A critical need exists to stage approximately 100 barges upstream of the existing grain dock, requiring roughly 15-16 acres of staging area (considering standard barge dimensions of 195ft x 35ft).
- *Limited Maneuverability:* The addition of two new steel mills (Big Steel #1 and #2) downstream has increased tonnage by approximately 2.4 million tons, resulting in a critical lack of maneuverability and increased transportation costs.
- *Harbor Overcrowding:* The new Hybar rebar plant, with its planned loading and offloading facility, will add over 1.5 million tons of inbound scrap steel and outbound finished product annually, further exacerbating overcrowding within the harbor and adjacent main channel.
- *Impeded Industry Operations:* This overcrowding threatens to impede the working rate of cargo handling where additional time is needed to retrieve empty barges being staged a greater distance from the harbor increasing the handling time by the tow industry per shipment, potentially causing significant economic impacts to the community.
- *Logistic Inefficiencies:* The current infrastructure cannot efficiently accommodate barge movements, resulting in logistic inefficiencies, increased costs, and reduced productivity for harbor users.

1.9.2 Opportunities

To address these problems, several opportunities were identified for the Harbor:

- *Logistics and Transportation Optimization:* Implementing more efficient logistics and transportation systems, improved cargo handling, and enhanced transportation infrastructure, to reduce costs and increase productivity.
- *Economic Growth and Workforce Development:* Creating new jobs and stimulating economic growth in the region through the expansion of the port.

- *Leveraging Natural Channel Alignment:* Utilizing the existing natural channel alignment around Island No. 30 would minimize environmental impacts.
- *Aligning with Existing Authorizations and Federal Infrastructure:* The Osceola harbor extension study alternatives can be aligned with the existing federal authorization-including the established dimensions of a 250-foot width and 9-foot depth- to and accelerate any alternative timeline. This approach respects existing infrastructure and minimizes potential regulatory hurdles.

1.10 OBJECTIVE AND CONSTRAINTS

1.10.1 Objective

For the Osceola Harbor Extension, the study planning objective, over the 50-year period of analysis, is to increase harbor capacity to reliably accommodate barges for staging upstream of the existing grain dock, thereby enhancing harbor operational efficiencies and reducing transportation costs for harbor operators.

The current harbor operates at full capacity, handling approximately 500,000 tons of grain annually with Poinsett Rice and Grain, and is insufficient to efficiently manage current and expected traffic volume. Specifically, there is insufficient space to safely maneuver barges for loading and assembling tows – typical tows in this section of the Lower Mississippi River consist of 30-60 barges. This study would propose a project that would address the critical need for a roughly 15-16 acre staging area (based on standard barge dimensions of 195ft x 35ft) to support increased barge traffic. This objective aims to quantify the economic benefits of increased efficiencies through transportation cost savings.

1.10.2 Constraints

The Study planning constraints included:

- The CAP project maximum cost cap is \$15 million Federal expenditure (institutional cost constraint)

While the following are not constraints based on law or USACE guidance, for the purposes of this study and the rationale provided, the formulation of plans will be limited by the following constraints.

- *Depth:* The harbor extension must be designed to maintain the existing authorized project depth of 9 feet. No federal funding or NFS interest exists to deepen the harbor beyond this depth, precluding any plan requiring increased dredging.
- *Length Constraint:* Extending the harbor beyond the 3,000 feet would necessitate modification of the Lake Neark Dike #2 structure. This dike is a separate federal project located immediately upstream, and alterations require a separate justification and approval process.
- *Navigational Servitude:* Widening the harbor beyond the existing Navigational Servitude is prohibited by policy would require resource and prohibitive measures.

Construction outside of this defined area would require additional permitting and potentially impact existing navigational rights.

1.10.3 Considerations

The following factors may inform plan formulation but do not represent absolute constraints. These considerations will be carefully evaluated during the development and comparison of alternative plans.

- *Real Estate Costs*: Potential widening of the harbor is anticipated to incur substantial real estate acquisition costs. These costs will be a significant factor in evaluating the economic feasibility of alternatives involving increased harbor width.
- *Environmental Protection*: Plan formulation will prioritize avoidance and minimization of negative impacts to the following resources:
 - o *Threatened and Endangered (T&E) Species and Protected Species*: The study area is known to support a variety of federally listed and proposed T&E species, including:
 - o Mammal: Tricolored Bat (Proposed Endangered)
 - o Birds: Eastern Black Rail (Threatened), Piping Plover (Threatened), Rufa Red Knot (Threatened)
 - o Fish: Pallid Sturgeon (Endangered)
 - o Insect: Monarch Butterfly (Proposed Threatened)
 - o Reptile: Alligator Snapping Turtle (Proposed Threatened)
 - o Mussel: Fat Pocketbook (Endangered)
 - o Flowering Plant: Pondberry (Endangered)
 - o *Critical Habitat*: Potential impacts to designated critical habitat for these species will be thoroughly assessed.
 - o *Water Quality*: Construction and operation of the harbor extension must maintain existing water quality standards and conditions.
 - o *Cultural, Historic, and Tribal-Trust Resources*: Potential impacts to these resources will be identified and mitigated in accordance with applicable regulations.
- *Agency Coordination*: Close coordination with the United States Fish and Wildlife Service (USFWS) is ongoing. All comments and recommendations from the USFWS regarding T&E species and their critical habitat will be fully considered during plan evaluation.

Section 2

Existing and Future Without Project Conditions

Please refer to Section 4: Environmental Effects and Consequences for future-without project scenario of the environmental effects and consequences.

2.1 PERIOD OF ANALYSIS

This study investigated alternatives to address navigation problems in Osceola Harbor over a 50-year period of analysis. Economic analysis assumed that construction was completed in one year, Fiscal Year (FY) 2026 with benefits beginning in the FY 2027.

2.2 GENERAL SETTING

The area is located on the right descending bank of the Mississippi River at River Mile 785 near Osceola, Mississippi County, AR – a region characterized by its importance as a transportation corridor providing access to the Gulf of America. The area is approximately 60 miles north of Memphis, TN, and features the City of Osceola adjoining Island No. 30, an old bendway separating the city waterfront from the main navigation channel.

2.3 NAVIGATION

The Osceola Harbor serves as a critical transportation hub for agricultural commodities and steel products in the region. This section examines the existing navigational challenges within the harbor and the potential impacts of those challenges on future operations, particularly in light of projected increases in industrial activity.

Existing: Osceola Harbor's natural curvature around Island No. 30 creates a challenging navigation environment, demanding precise maneuvering, especially for long tow configurations. Barge traffic within the harbor is further complicated by the co-location of barge staging areas and cargo transfer operations. These factors contribute to existing navigational constraints that are expected to intensify. Data from Wepfer Marine, the primary harbor and fleet service provider, indicates that barge traffic within Osceola Harbor is subject to seasonal fluctuations, with the highest activity occurring during the three-month harvest season in the fall. Wepfer Marine estimates that about 288 barges utilize the harbor during this peak three-month season and that the average staging days per barge is 16.2 days per barge. Calculating the estimated barges per day to be a little over 50 barges per day, traffic does not exceed the harbor's capacity to accommodate approximately 100 barges at any given time.

Future Conditions with No Action: Without planned improvements, the existing navigational challenges at Osceola Harbor will be significantly exacerbated over the next 50 years. While

increasing demand for the port's services is anticipated, the channel's capacity will not keep pace, leading to a demonstrable decline in operational efficiency. Periods of low river stage, which currently coincide with peak demand, will become increasingly disruptive, forcing more frequent and prolonged operational adjustments and potentially restricting channel access to all but the smallest tows. Without targeted dredging or channel improvements, sedimentation and natural river processes will progressively reduce navigable depths and widths, increasing the frequency and severity of groundings and near-miss incidents. The projected increase in barge traffic will overwhelm the harbor's existing infrastructure, potentially exceeding staging capacity. Modeling suggests that, under these conditions, staging capacity will be reached when 267 barges in addition to the current 288 barges utilize the harbor during the three-month harvest season.

2.4 FACILITIES AND INFRASTRUCTURE

Osceola Harbor is a 6,500-foot-long slack water port that is 250 feet wide with a minimum of 9 feet draft.

2.4.1 Docks

There are two docks (North and South) for Poinsett Rice and Grain, each with 600 feet of continuous berthing space. There is also a floating dock which supports two conveyor belts and enables inbound bulk cargo like fertilizer and other materials.

2.4.2 Warehouses and Bins

There are two warehouses for grain storage with a total capacity of 700,000 bushels. Also available are eight grain bins with a total capacity of 675,000 bushels.

2.4.3 Equipment

Equipment includes three loading conveyors and one offloading conveyor.

2.5 CLIMATE

The climate in the study area is characterized by long, hot, humid summers and short moderate winters. The average annual temperature in the area is 62 degrees Fahrenheit with monthly normal fluctuations between 40 degrees Fahrenheit in January and 80 degrees Fahrenheit in July. Temperature extremes range from -13 degrees Fahrenheit to 108 degrees Fahrenheit. The frost-free period is approximately 210 days, with the first killing frost occurring around mid-October and the last around mid-April. The average annual precipitation is about 50 inches with January being the wettest month, averaging over five inches. October is the driest month, averaging approximately three inches. Approximately 58% of the annual rainfall occurs during April through November.

2.6 GEOLOGY

Behind the mainline levee is primarily Quaternary Age (Holocene) Stream Overbank Alluvium, which are alluvial sediments derived from a combination of deposits from small

streams, the overbank deposits of present-day significant streams, or older meander and flood plain deposits from ancient significant streams. These sediments would typically include unconsolidated gravels, sands, silts, clays and varying mixtures of any and all of these. The individual deposits are often lenticular and discontinuous. The division of this unit from other Holocene alluvial sediments is based primarily on geomorphic considerations (presence of natural levees and absence of meander scars, point bars, and abandon channels) rather than lithology or age (Arkansas Geological Survey, 2008). The batture consists of Quaternary Age (Holocene) Channel Meander Alluvium, which are alluvial sediments derived from typically older alluvial deposits that have been more recently reworked by channel meanders and include flood plain deposits of significant streams. Sediments would typically include unconsolidated gravels, sands, silts, clays and varying mixtures of any and all of these.

2.7 WATERSHED

The Mississippi River is the main stem of the world's most highly developed waterway system, and it measures approximately 2,340 miles in length. It has the third largest drainage basin in the world, exceeded in size only by the watersheds of the Amazon and Congo Rivers, and it discharges the headwater flows from about 41 percent of the contiguous 48 states. The basin covers more than 1,245,000 square miles, includes all or parts of 31 states and two Canadian provinces, and roughly resembles a funnel which has its spout at the Gulf of America. Waters from as far east as New York and as far west as Montana contribute to flows in the lower river. The lower alluvial valley of the Mississippi River is a relatively flat plain of about 35,000 square miles bordering on the river that would be flooded during times of high water if it were not for man-made protective works. This valley begins just below Cape Girardeau, Missouri, is roughly 600 miles in length, varies in width from 25 to 125 miles, and includes parts of seven states—Missouri, Illinois, Tennessee, Kentucky, Arkansas, Mississippi, and Louisiana.

Although the majority of the Mississippi River is not deep-draft navigation it is a major component of waterborne traffic on the river, and it is the key waterway for moving grain by barge from farm states to domestic export markets. Low water levels impact commerce by reducing the amount of the river with sufficient depth for barge navigation.

2.8 HYDROLOGY AND HYDRAULICS

From the levee on the Arkansas side to high ground on the Tennessee side, the average width of the Mississippi River flood plain in this reach is about 2 miles. The width of the old Island 30 Bend way ranges from 600 to 1,000 feet between banks and channel depths vary from 5 feet above to 20 feet below the LWRP. River stages at the Osceola, AR gage (Mile 783.5 AHP, gage zero = 209.55 ft Above Mean Sea Level (AMSL), NAVD88) since 1911 have ranged between -11.76 to 55.20 ft. High stages usually occur during winter and spring months, with low stages prevailing throughout the summer and fall. Minimum and maximum discharges at Memphis, TN, Mile 735 AHP, are 79,300 CFS (1937) and 2,213,000 CFS (2011), respectively.

For current dredge operations information, please refer to Section 1.6.3.

2.9 WETLAND RESOURCES

Dense alluvial clays dominate the Lower Mississippi River (LMR) backwater areas that historically supported extensive wetlands. Natural levees form along the banks of the LMR. The riverbank can be 10 to 15 feet higher than the lowlands farther back from the river. Because of these natural levees, drainage within the floodplain, frequently flows away from the Mississippi River to lower elevations near the valley walls, except near tributary confluences (Kleiss et al. 2000). Slackwater areas, access to backwaters, structurally complex riverbanks, and other habitats are important for biotic integrity of aquatic communities (Killgore 2012, Killgore et al. 2014). Robust emergent wetlands, also referred to as herbaceous wetlands, are identified in the Arkansas Wildlife Action Plan for research and monitoring as a critical habitat (<https://www.agfc.com/en/wildlife-management/awap/>). Emergent wetlands used by King Rails (*Rallus elegans*), a species of conservation concern in Tennessee and Arkansas, and other marsh birds have few to no invading trees and shrubs. These wetlands also have native emergent wetland vegetation such as rushes, sedges and cattails are interspersed with shallow open water. The interspersed open water and vegetation ideally approaches a ratio of 50 percent water to 50 percent emergent wetland vegetation. To maximize benefits to marsh birds, water depth should vary from 4 to 8 inches during wintering, migrating and breeding periods. During brood rearing, a depth that varies from exposed mudflats to no more than 6 inches deep maximizes chick survival.

The study area is located in the Mississippi Alluvial Valley (MAV), a region that has been highly altered by human activity. Understanding this historical context is critical because it establishes the baseline against which the potential impact of proposed alternatives must be assessed. Loss of connectivity, altered hydrology, altered geomorphology and changes in the biotic community all contribute to changes in the wetland vegetative mosaic of the LMR. From an estimated original area of 9 to 10 million hectares of forested wetlands, Lower Mississippi Valley forests had been reduced by about 50 percent by 1937, and 50 years later less than 25 percent of the original area remained forested (Smith et al. 1993). This drastic reduction in forested wetland underscores the vulnerability of these ecosystems and the importance of careful planning to avoid further degradation. Much of the remaining forest is highly fragmented, with the greatest degree of fragmentation occurring on drier sites (such as natural levees), and the largest remaining tracts being in the wettest areas (Rudis 1995). Nearly all of the remaining forests within the basin have been harvested at least once, and many have been cut repeatedly and are degraded due to past high-grading practices (Putnam 1951; Rudis and Birdsey 1986). This has made many hard mast producing species (e.g., oak species) that are valuable to wildlife being increasingly scarce, particularly within the batture. Cypress/tupelo swamps are another important wetland community that is also uncommon in the study area in part due to logging, changing hydrology, and land use. Therefore, any project proposed would need to add these changes on these diminishing areas. In many places, ditches excavated across the floodplain increase runoff and reduce ponding duration (Stanturf et al. 2000, Gardiner et al. 2005). Another native species that has become extremely rare in the study area (and LMR as a whole) is river cane. The presence of river cane is also important to the ecology and environmental needs of the location. Cane

is a disturbance adapted species forming dense stands in areas cleared by fire, flood, tornadoes, or ice storms that persist for 10 to 25 years before being replaced by other species (LMVJV 2007). These dense stands of cane are referred to as cane brakes. Agricultural conversion and forestry practices have eliminated most stands reducing the prevalence of cane breaks by approximately 98 percent (Brantley and Platt 2001). Cane brakes provide high quality habitat for the Louisiana black bear and Swainson's warbler and several species of butterflies require river cane to complete their life cycle (Platt & Brantley 1997, Brantley & Platt 2001, Hendershott 2002, LMVJV 2007). Remnant river cane stands appear to be mostly present in the understory of existing forest and not as the dense cane brakes that used to be present. Little science exists on river cane in the study area; however, groundwater wells have been installed on three different populations to improve our understanding of the relationship between cane and groundwater hydrology. Understanding the ecology will support future conditions.

As detailed in Section 4, a thorough understanding of these existing wetland conditions is essential for accurately predicting the potential impacts of the proposed alternatives on these valuable resources. The information presented in this section provides a foundation for evaluating the potential direct and indirect effects of the project, as well as identifying appropriate mitigation measures to minimize any adverse impacts to wetland ecosystems.

2.10 AQUATIC RESOURCES/FISHERIES

The study area includes riverine habitats exhibiting unidirectional flow like the Mississippi River main channel, tributary mouths, secondary channels, meander scarps, and floodplain habitats exhibiting bidirectional flow like sloughs, crevasses, and borrow areas with varying levels of connectivity. Seasonal hydrologic fluctuations support the numerous aquatic functions of these habitats such as providing spawning and rearing habitat for a variety of fish species. Over 90 species of fish are likely to occur in these habitats, including several species of conservation concern. Eighteen of these fish species are listed as S1 (State Critically Imperiled) or S2 (State Imperiled). Riverine species include shads, Striped Bass, Skipjack Herring, Goldeye, Paddlefish, and large benthic fishes like Shovelnose Sturgeon (*Scaphirhynchus platyrhynchus*), the endangered Pallid Sturgeon (*Scaphirhynchus albus*), Blue Sucker (*Cycleptus elongatus*), Carpsuckers Cyprinidae and Catostomidae, buffalofishes (*Ictiobus* spp.), and Freshwater Drum (*Aplodinotus grunniens*). Species utilizing those floodplain waterbodies with bidirectional flow, like sloughs, include Inland Silversides (*Menidia beryllina*), Brook Silversides (*Labidesthes sicculus*), Bluegill (*Lepomis macrochirus*), Mosquitofish (*Gambusia affinis*), Orangespotted Sunfish (*Lepomis humilis*), Pugnose Minnow (*Notropis emiliae*), Largemouth Bass (*Micropterus salmoides*), Redspotted Sunfish (*Lepomis punctatus*), and Warmouth (*Lepomis gulosus*). More isolated floodplain waterbodies, like borrow areas located adjacent to the mainline levee, are dominated by a wetland fish guild including species such as: Bluntnose Darter (*Etheostoma chlorosomum*), Blackspotted Topminnow (*Fundulus olivaceus*), Bantam Sunfish (*Lepomis symmetricus*), Cypress Darter (*Etheostoma proeliare*), Golden Topminnow (*Fundulus chrysotus*), Blackstripe Topminnow (*Fundulus notatus*), Flier (*Centrarchus macropterus*), Taillight Shiner (*Notropis maculatus*), Banded Pygmy Sunfish (*Elassma zonatum*), Spotted Gar (*Lepisosteus*

oculatus), and Mud Darter (*Ethostoma asprigene*). These floodplain waterbodies are likely filling in over time from localized sedimentation due to agricultural practices and flood water deposition. Borrow areas, specifically, have been shown to lose on average 17 percent of their depth over a 38-year period. Invasive carp such as bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys molitrix*), and black carp (*Cyprinus carpio*) are also abundant across aquatic habitats and detrimentally impact mussels and fish species due to competition of resources. Both Arkansas and Tennessee have open commercial fishing seasons. The primary groups of commercially targeted species include catfishes (*Ictaluridae*), buffaloes (*Catostomidae*), carps (*Cyprinidae*), suckers (*Catostomidae*), and drum (*Scianenidae*), paddlefish (*Polyodontidae*), bowfin (*Amiidae*), and gars (*Lepisostidae*).

Anadromous/catadromous aquatic species that routinely cross state boundaries as part of their reproductive life cycles and can be found in the study area include American eel (*Anguilla rostrata*), Alabama shad (*Alosa alabamiae*), and the Ohio Shrimp (*Macrobrachium ohione*).

The once diverse mussel fauna of the Mississippi River has drastically changed in the last 100 years due to large-scale navigation and flood risk management projects. These projects greatly reduced, and in some instances, eliminated the gravel shoal areas that are the preferred habitat of many riverine mussel species. As a result of these habitat alterations freshwater mussels are restricted to off channel habitats, such as, meander scarps, sloughs, and backwater areas that contain sand, silt, and clay or secondary channels with a courser substrate of a gravel and sand mixture. These habitats offer the flow refugia and substrate stability required for maintaining mussel populations at the local scale. Habitat alterations have resulted in a shift in the mussel community. With the loss of the riffle/shoal dwelling species, the mussel fauna is comprised mostly of habitat generalists such as: the bleufer (*Potamilus purpuratus*); threeridge (*Amblema plicata*); mapleleaf (*Quadrula quadrula*); butterfly (*Ellipsaria lineolata*); washboard (*Megaloniaias nervosa*); yellow sandshell (*Lampsilis teres*); fragile papershell (*Leptodea fragilis*); threehorn wartyback (*Obliquaria reflexa*); bankclimber (*Plectomerus dombeyanus*); pink papershell (*Potamilus ohioensis*); wartyback (*Quadrula nodulata*); ebonyshell (*Reginaia ebenus*); and deertoe (*Truncilla donaciformis*). This section of the Mississippi River contains at least 9 mussel species that are Species of Greatest Conservation Need in Arkansas or Tennessee. The federally endangered fat pocketbook (*Potamilus capax*) is known to occur in this section of the Mississippi River. Smaller secondary channels like meander scarps provide ideal habitat for the species due to refugia from high flows and the stable sand, silt, clay substrates. Meander scarps no longer form due to maintenance of the navigation channel in the Mississippi River. There are only 14 flowing meander scarps remaining in the entire LMR with 3 of these being located in the study reach located within the Sunrise-Island 34, Island 35-Deans Island, and Brandywine Geographic Complexes.

Macroinvertebrates are an important component of the LMR food web and serve as prey items for a variety of species, including the federally endangered pallid sturgeon. There are over 200 species of macroinvertebrates that can be found in the mosaic of habitats along the Mississippi River with the dominant family being Chironomidae (Harrison and Morse 2012, Baker et al. 1991). Large scale navigation and flood risk management activities in the LMR

have altered much of the available macroinvertebrate habitat in the LMR which now consists of a mosaic of natural (e.g., woody debris, vegetated shorelines, gravel bars, sands, silts, and clays) and artificial habitats (e.g., dikes, riprap revetment, and articulated concrete mattress). Reduced connectivity of secondary channels, meander scarps, and other floodplain waterbodies negatively affects those resident communities. Macroinvertebrate community compositions within the aquatic habitats are dependent on the level of hydrologic connectivity (both time and space) and the substrate compositions present. Larger secondary channels with unidirectional flow are dominated by sand substrates with chironomid species and oligochaetes being the dominant species. These channels also contain some silt, clay, and limited bank vegetation preferred by oligochaetes and mayfly species (Ephemerae). Artificial rock structures such as riprap dikes and revetments are typically dominated by net spinning caddisflies (Hydropsychidae). Areas with a high diversity of substrates and increased structural complexity (e.g., meander scarps and areas with a mixture of woody debris, gravel, leaves, clay, silt, and sand) exhibit higher macroinvertebrate species richness.

2.11 WILDLIFE

The study area consists of a mosaic of floodplain habitats supporting a diverse assemblage of wildlife species, including five species of conservation concern listed as S1 (State Critically Imperiled) or S2 (State Imperiled). Common mammalian species utilizing the floodplain forests and interspersed aquatic habitats include raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), mink (*Neogale vison*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), white tailed deer (*Odocoileus virginianus*), muskrat (*Ondatra zibethicus*), river otter (*Lutra canadensis*), beaver (*Castor canadensis*), and several bat species. Bats roost during the day in snags, exfoliating bark, tree hollows, and foliage, and forage in open habitats, floodplain waterbodies, forest edges, and riparian habitats. Forested habitat in the study area is degraded compared to historic conditions. There are fewer hard mast producing species, cypress/tupelo swamp habitats, and river cane habitats present due to ponding from floodplain obstructions (e.g., improperly sized culverts), and other impacts as described in the wetlands section above. Bat species utilizing the study area for foraging or roosting include eastern red bat (*Lasiurus borealis*), Seminole bat (*Lasiurus seminolus*), southeastern myotis (*Myotis austroriparius*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), evening bat (*Nycticeius humeralis*), and tricolored bat (*Periomyotis subflavus*). White-nose syndrome (WNS) is a fungal disease that kills bats. This emerging disease was first detected in the United States in 2006. It has since spread to 33 states and 7 Canadian provinces and has caused severe decline in bat populations resulting in several new species being listed or proposed for Federal and state protection.

The mosaic of floodplain habitats in the study area supports a wide variety of birds including, waterfowl, songbirds, shorebirds, and raptors, and several species of conservation concern. The Arkansas and Tennessee Wildlife Action Plans identify 83 bird species that could potentially exist in the study area. Of these bird species, 43 are S1 (State Critically Imperiled) or S2 (State Imperiled) for either or both of the states. The study area is within the Mississippi flyway, an important bird migration route that connects central Canada to the

region surrounding the Gulf of America. Nearly 40 percent of the Mississippi Flyway's waterfowl and 60 percent of all U.S. bird species migrate or winter in the MAV. The MAV is identified as the most important wintering location for Mallard (*Anas platyrhynchos*) and Wood Duck (*Aix sponsa*) populations. Additionally, the MAV winters significant numbers of Green-winged Teal (*A. crecca*), Northern Shoveler (*A. clypeata*), and Gadwall (*A. strepera*). Accordingly, the MAV was identified as a priority non-breeding site for waterfowl in the original North American Waterfowl Management Plan (1986) and became a part of one of the first established Joint Ventures (Lower Mississippi Valley Joint Venture – LMVJV). These habitats also provide critical resting areas and food sources for migratory birds while traveling to northern nesting grounds in the spring and to southern overwintering locations in the fall. The floodplain forests provide important nesting sites and forage for a number of neotropical migratory birds. Forest breeding species are one of the most important components of the avifauna in the MAV, despite the loss of nearly 80 percent of the forested wetlands in this region (LMVJV 2007). At least 70 species utilize bottomland hardwoods as a primary habitat. Almost 30 percent of the breeding populations of the S1 (State critically imperiled) Prothonotary Warbler are found within forests in the MAV. Other typical state listed species include Northern Parula (*Setophaga americana*), Swainson's Warbler (*Limnithlypis swainsonii*), Red-shouldered Hawk (*Buteo lineatus*), and Red-headed Woodpecker (*Melanerpes erythrocephalus*).

The herpetofaunal community in the LMR is predominantly composed of wide ranging, generalist species. There are no federally listed species that occur within the study area; however, the Alligator snapping turtle (*Macrochelys temminckii*) was proposed for listing in 2021. There are also several species of conservation concern including three species of amphibians and four species of reptiles that are listed as S1 (State Critically Imperiled) or S2 (State Imperiled) in Tennessee and Arkansas. While the main channel of the river has been significantly altered to optimize navigation, the peripheral backwater, secondary channel, and meander scarp habitats that remain could harbor a variety of aquatic and semi-aquatic reptiles and amphibians. Water depth, velocity, and the presence of snags and logjams strongly influence whether or not these species would be present. Similarly, riparian areas composed of structurally diverse areas like floodplain forest, canebrakes, seasonal herbaceous wetlands, or other vegetative cover would provide optimal conditions for the presence of herpetofauna species. Frogs can be found along the banks, in riparian forests, or floodplain wetlands such as: Fowler's Toads (*Anaxyrus fowleri*); Cricket Frogs (*Acris blanchardi*); Bullfrogs (*Lithobates catesbeianus*); Southern Leopard Frogs (*Lithobates sphenoccephalus*); and Gray Treefrog (*Dryophytes chrysoscelis*). Several species of watersnakes inhabit floodplain waterbodies where water flow is minimal. These include the Banded Watersnake (*Nerodia fasciata*), Diamondback Watersnake (*N. rhombifer*), and Plainbelly Watersnake (*N. erythrogaster*). Aquatic turtles, such as: Ouachita Map Turtle (*Graptemys ouachitensis*), Mississippi Map Turtle (*G. kohni*), Redear Slider (*Trachemys scripta*), River Cooter (*Pseudemys concinna*), Alligator Snapping Turtle, Snapping Turtle (*Chelydra serpentina*), and Musk Turtle (*Sternotherus odoratus*), reside in floodplain waterbodies with snags and rootwad debris. Two species of softshell turtles, Smooth Softshell (*Apalone mutica*) and Spiny Softshell (*A. spinifera*), can be very abundant, where they can be seen basking in numbers on sand or silt bars in or adjacent to the Mississippi

River. Lizard species are mostly restricted to riparian forests and limited in diversity. Five-lined Skinks (*Plestiodon fasciatus*), Broadhead Skinks (*P. laticeps*), and possibly Fence Lizards (*Sceloporus consobrinus*) can be found in the study area. Intact swampy or marshy wetlands that persist in riparian areas could provide the necessary habitat for the eel-like Three-toed Amphiuma (*tridactylum*), Lesser Siren (*intermedia*), and the Mudsnake (*Farancia abacura*) that feeds on them. While this section of the Mississippi River is within the northern range of the American Alligator (*mississippiensis*) observations in the study area are rare.

2.12 THREATENED, ENDANGERED & PROTECTED SPECIES

There is one federally listed mammal species that are known to have ranges that include the study area, the federally proposed endangered Tricolored Bat (*Perimyotis subflavus*). There are three bird species, the federally threatened Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*), the federally threatened Piping Plover (*Charadrius melodus*), and the federally threatened Rufa Red Knot (*Calidris canutus rufa*). There is one fish species, the federally endangered Pallid Sturgeon. There is one insect species, the federally proposed threatened Monarch Butterfly (*Danus plexippus*). There is one reptile species, the federally proposed threatened Alligator Snapping Turtle (*Macrochelys temminckii*). There is one mussel species, the federally endangered Fat Pocketbook (*Potamilus capax*). There is one flowering plant species, the federally endangered Pondberry (*Lindera melissifolia*). This proposed project will be coordinated with the USFWS. Any comments they may have regarding endangered or threatened wildlife or plants, or their critical habitat, will be considered in the evaluation of the described work.

2.13 WATER QUALITY

The harbor is physically located in the State of Arkansas while the discharge material from the selected alternative construction and dredging activities is in the State of Tennessee. The ADEQ does not conduct water quality testing on the Mississippi River. No fish consumption advisories exist for Arkansas' section of the Mississippi. Tennessee currently has a fish consumption advisory for the Mississippi River and tributaries near Memphis, TN. However, based on fish tissue data, all sections of the Mississippi River are considered contaminated by organics.

2.14 AIR QUALITY

The study area is in attainment with all air quality standards. Although air emissions would not require a permit, best management practices (BMP) shall be used throughout construction to minimize air pollution.

2.15 RECREATION

This resource is institutionally important because of the Federal Water Project Recreation Act of 1965, as amended and the Land and Water Conservation Fund Act of 1965 (LWCF),

as amended. Recreational resources are technically important because of the high economic value of these recreational activities and their contribution to local, state, and national economies.

Recreation areas were examined in and around the study area. The study area is in proximity to two National Wildlife Refuges (NWR), two Tennessee Wildlife Management Areas (WMA), two state parks, as well as other significant recreation areas located along the Mississippi River and within Memphis city limits. Lower Hatchie NWR is approximately 6 miles downstream on the opposite bank with Chickasaw NWR adjacent to and downstream of Anderson Tully WMA. Anderson Tully WMA is directly across the river from the study area while Moss Island is approximately 15 miles upstream on the opposite bank. These areas are visited annually for recreational purposes and include miles of trails for hiking and biking, boat ramps, fishing piers, visitor centers or classroom spaces, and wildlife observation. These recreation areas provide opportunities for consumptive-use (hunting and fishing activities), as well as non-consumptive-use (hiking, biking, boating, bird watching, education, camping, picnicking, and sport activities). Outside of these parks, functional boat ramps remain scarce in the LMR, (LMRRA 2015).

2.16 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

A HTRW report and assessment was developed through records review and site reconnaissance of the existing authorized channel and areas considered for potential channel extension at the Port of Osceola. The following conclusions are based on, or are reasonably ascertainable from, published information and field observations documented within this report. This report presents information for consideration and does not constitute a proposed work plan or commitment to specific actions. The record search identified six facilities within a 1-mile radius of the study area; currently, these facilities do not appear to pose a significant HTRW risk to the study area. Site reconnaissance did not reveal any findings that would appear to pose a significant HTRW risk to the study area. Sample collection and analysis of the proposed soil to be removed as part of the alternatives within the study area for organics, inorganics, and pesticides, and no findings from the sample appear to pose a significant HTRW risk to the study area. Follow-up supplemental water quality analysis would be conducted at the request and to the satisfaction of the governing environmental agencies of the study area. At this time, there is little reason to believe there exists a significant HTRW risk to the intended use of this proposed area.

2.17 CULTURAL RESOURCES

The study area is located in Mississippi County, AR at the Osceola Harbor. In addition to the proposed alternatives direct Area of Potential Effects (APE), USACE-MVM reviewed cultural resources within a 1-mile buffer around the proposed undertaking. Historic properties in the study area vicinity were identified based on a review of the National Register of Historic Places (NRHP) database, the Automated Management of Archaeological Site Data in Arkansas (AMASDA) historic aerial photography, historic map research, and a review of cultural resources survey reports.

Three cultural resources surveys (Table 2-1) have been conducted on behalf of USACE-MVM and one other sponsor over the last 21 years in association with a cultural resource of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023). Table 2-2 documents previously recorded cultural resources located approximately within a 1-mile (1.6 km) radius of the APE. All of the cultural resources revealed by these studies and within the table residing near the study area are late 19th to early 20th century historic scatter sites all of which are ineligible.

Review of current cultural resources maps revealed several historic properties within the APE and relatively few known cultural resources adjacent to the APE. According to the AMASDA, in Mississippi County, AR, there are eight previously recorded archaeological sites, consisting of four historic scatter sites, a Civil War artifact cache, and three 1843 historic homes. (Table 2-2 at end of this section), The Hale Avenue Historic District is within one mile of the APE and is on the National Register of Historic Properties but would not be affected by the proposed study alternatives. There are no other NRHP sites within or adjacent to the APE.

Table 2-1. Previously Recorded Cultural Resources Surveys within 1.6 km radius of the APE.

Report No.	Title	Author/Principal Investigator	Date
4893 (AR)	Cultural Resources Survey of Approximately 700 Acres South of Osceola, Mississippi County, Arkansas	PanAmerican Consultants	2004
5939 (AR)	Luxora Relief Wells Mississippi County, Arkansas	PanAmerican Consultants	2009
8098 (AR)	Hybar MicroMill Survey, Mississippi County, Arkansas	Commonwealth Heritage Group.	2023

Table 2-2. Previously Recorded Cultural Resources Located within 1.6 km Radius of the APE

Resource Designation	Period(s)	Date Recorded	NRHP Status
<u>3MS0999</u>	<u>Historic Scatter early to mid 20th century</u>	<u>04/2023</u>	<u>Not Eligible</u>
<u>3MS0998</u>	<u>Historic Scatter early to mid 20th century</u>	<u>04/2023</u>	<u>Not Eligible</u>
<u>3MS0713</u>	<u>Historic Scatter late 19th to early 20th century</u>	<u>08/2004</u>	<u>Not Eligible</u>
<u>3MS0705</u>	<u>Historic Scatter late 19th to early-mid 20th century</u>	<u>08/2004</u>	<u>Not Eligible</u>
<u>3MS0238</u>	<u>Historic house, ca 1843, Anglo-American</u>	<u>02/1976</u>	<u>Not Eligible</u>
<u>3MS0237</u>	<u>Historic house, ca 1843, Anglo-American</u>	<u>02/1977</u>	<u>Not Eligible</u>
<u>3MS0236</u>	<u>Historic house, ca 1843, Anglo-American</u>	<u>02/1977</u>	<u>Not Eligible</u>

2.18 SOCIOECONOMIC (OTHER SOCIAL EFFECTS)

The study area includes one county in Arkansas and one county in Tennessee that may be directly impacted by the study alternatives. The parameters used to describe the demographic and socioeconomic environment include recent trends in population, employment, and wage earnings by sectors. Other social characteristics such as age distribution and poverty are also examined.

2.18.1 Population

Arkansas and Tennessee rank as the 33rd and 15th largest states in the Union, respectively, in terms of resident population as of 2023 figures.

Between the years of 1990 and 2023, Arkansas's population increased by 29 percent from 2.4 million to 3.0 million persons, less than the national average of 34 percent. Mississippi County, however, experienced a decrease of 31 percent during that same time, indicating a significant decrease in population.

The state of Tennessee saw its population grow from 4.9 million to 7.0 million persons in the years 1990 to 2023, an increase of 43 percent that is much greater than the 34 percent national average. Lauderdale County, on the other hand, experienced a very modest increase of only 6 percent (Table 2-3).

Table 2-3. Population Trends for Selected Arkansas and Tennessee Counties – 1990 to 2023

County/City	Population					Percentage Change			
	1990	2000	2010	2020	2023	1990 to 2000	2000 to 2010	2010 to 2020	1990 to 2023
United States	248,709,873	281,421,906	308,745,538	326,569,308	332,387,540	13%	10%	6%	34%
Arkansas	2,350,725	2,673,400	2,921,606	3,011,873	3,032,651	14%	9%	3%	29%
Mississippi County	57,525	51,979	46,815	41,396	39,749	-10%	-10%	-12%	-31%
Blytheville	22,906	18,272	15,874	13,735	13,026	-20%	-13%	-13%	-43%
Osceola	8,930	8,875	7,857	6,786	6,807	-1%	-11%	-14%	-24%
Tennessee	4,877,185	5,689,283	6,356,897	6,772,268	6,986,082	17%	12%	7%	43%
Lauderdale County	23,491	27,101	27,745	25,689	24,933	15%	2%	-7%	6%

Source: American Community Survey, Demographic Characteristics, 2023 5-Year Estimates

2.18.2 Employment

The State of Arkansas employment in 2023 totaled about 1.3 million. Of the major industry sectors within the state, the educational services and health care and social assistance sector employs the most persons at 318,000. This industry is followed by retail trade (177,000) and manufacturing (171,000).

The State of Tennessee employment in 2023 totaled about 3.3 million. Similar to the State of Arkansas, the greatest number of workers are found in the educational services and health care and social assistance sector and total 735,000. The next largest sectors are manufacturing and retail trade at 422,000 and 380,000 workers, respectively (Table 2-4).

Table 2-4. Employment by Industry – 2023

Industry	United States	Arkansas	Mississippi County	Tennessee	Lauderdale County
Agriculture, forestry, fishing, hunting, and mining	2,552,148	31,796	754	28,819	239
Construction	11,064,175	96,635	1,062	229,486	446
Manufacturing	15,912,421	171,391	4,489	422,176	2,463
Wholesale trade	3,678,210	28,370	163	75,681	398
Retail trade	17,368,629	176,537	1,986	379,511	1,055
Transportation and warehousing, and utilities	9,373,191	82,589	911	236,125	759
Finance and insurance	2,998,298	15,562	81	52,153	20
Real estate: rental and leasing	10,673,893	69,541	751	199,077	257
Professional, scientific, management, administrative and waste management services	19,763,960	108,651	733	347,931	433
Educational services, health care and social assistance	37,381,621	318,308	3,383	734,869	1,544
Arts, entertainment, and recreation, accommodation and food services	14,010,750	104,596	1,655	298,539	456
Other services, except public administration	7,514,289	64,752	541	159,068	314
Public administration	7,516,950	59,012	618	137,717	703
TOTAL	159,808,535	1,327,740	17,127	3,301,152	9,087

Source: American Community Survey, Economic Characteristics, 2023 5-Year Estimates

2.18.3 Median Household Income for Selected Counties

Median household incomes for the counties in 2023 are shown in Table 2-5. The median household income for Mississippi County is \$53,428, which is lower than the state median of \$58,773 and the national median of \$78,538. Likewise, the median household income of Lauderdale County in Tennessee at \$49,205 is below the state median of \$67,097 as well as that of the nation.

Table 2-5. Median Household Income – 2023

Geography	Median Household Income	% of State Median Household Income	% of National Median Household Income
United States	\$ 78,538	-	-
Arkansas	\$ 58,773	-	75%
Mississippi County	\$ 53,428	91%	68%
Tennessee	\$ 67,097	-	85%
Lauderdale County	\$ 49,205	73%	63%

Source: American Community Survey, Economic Characteristics, 2023 5-Year Estimates

As shown in Table 2-6, the unemployment rate for Mississippi County is 8.4 percent which is about 65 percent higher than the Arkansas state unemployment rate of 5.1 percent. Lauderdale County's unemployment rate of 5.1 percent is also higher than the Tennessee state unemployment rate of 4.7 percent. Both states' rates are below the national rate of 5.2 percent.

Table 2-6. Unemployment Rate – 2023

Geography	Unemployment Rate
United States	5.2%
Arkansas	5.1%
Mississippi County	8.4%
Tennessee	4.7%
Lauderdale County	5.1%

Source: American Community Survey, Economic Characteristics, 2023 5-Year Estimates

2.18.4 Age Distribution

The age characteristics of the counties are shown in Table 2-7 and Table 2-8. The median age for Mississippi County is 36.9 years and is a year and a half less than the state median of 38.4 years. The Tennessee county of Lauderdale has a median age of 39.4 years and is a half a year greater than the state median of 38.9 years. The median age of the United States is 38.7 years.

Table 2-7. Age Characteristics (Number) – 2023

Age	United States	Arkansas	Mississippi County	Tennessee	Lauderdale County
Under 18 years	73,645,238	705,879	10,393	1,558,006	5,481
18 - 65 years	202,772,255	1,801,128	23,307	4,255,336	15,394
65 years and older	55,970,047	525,644	6,049	1,172,740	4,058
Median age	38.7	38.4	36.9	38.9	39.4
Total population	332,387,540	3,032,651	39,749	6,986,082	24,933

Source: American Community Survey, Demographic Characteristics, 2023 5-Year Estimates

Table 2-8. Age Characteristics (Percent) – 2023

Age	United States	Arkansas	Mississippi County	Tennessee	Lauderdale County
Under 18 years	22%	23%	26%	22%	22%
18 - 65 years	61%	59%	59%	61%	62%
65 years and older	17%	17%	15%	17%	16%
Total population	100%	100%	100%	100%	100%

Source: American Community Survey, Demographic Characteristics, 2023 5-Year Estimates

2.18.5 Income and Poverty

Income and poverty data for the counties are summarized in Table 2-9 for the year 2023. Both counties and states have median household income levels and per capita income less than the national average. Additionally, both counties and states have a greater percentage of persons below the poverty level compared to the national average of 12.4 percent. Mississippi County in Arkansas has the highest percentage at 21.0 percent.

Table 2-9. Income and Poverty Data – 2023

Income and Poverty	United States	Arkansas	Mississippi County	Tennessee	Lauderdale County
Persons per Household	2.61	2.55	2.58	2.52	2.71
Median Household Income	\$78,538	\$58,773	\$53,428	\$67,097	\$49,205
Per Capita Income	\$43,289	\$33,147	\$30,350	\$37,866	\$25,716
Persons Below Poverty Level	12.4%	16.0%	21.0%	13.8%	18.7%

Source: American Community Survey, Economic Characteristics, 2023 5-Year Estimates

2.18.6 Education

The educational attainment levels for the counties in 2023 are presented in Table 2-10 and Table 2-11. Both counties' averages for the levels of high school graduate or higher and bachelor's degree or higher fall below the national averages. Lauderdale County has both the lowest average for high school graduate or higher and for bachelor's degree or higher at 82.8 percent and 10.9 percent, respectively.

Table 2-10. Educational Attainment for Persons 25 Years or Older (Percent) – 2023

Education	United States	Arkansas	Mississippi County	Tennessee	Lauderdale County
High School Graduate					
or Higher	204,204,444	1,809,922	22,196	4,306,036	14,032
Bachelor's Degree					
or Higher	79,954,302	513,221	3,676	1,460,501	1,851

Source: American Community Survey, Social Characteristics, 2023 5-Year Estimates

Table 2-11. Educational Attainment for Persons 25 Years or Older (Percent) – 2023

Education	United States	Arkansas	Mississippi County	Tennessee	Lauderdale County
High School Graduate					
or Higher	89.4%	88.6%	85.6%	89.6%	82.8%
Bachelor's Degree					
or Higher	35.0%	25.1%	14.2%	30.4%	10.9%

Source: American Community Survey, Social Characteristics, 2023 5-Year Estimates

Section 3

Plan Formulation and Evaluation

3.1 PLANNING FRAMEWORK

Plan formulation supports the USACE water resources development mission. A systematic and repeatable planning approach was used to ensure that sound decisions were made. Engineering Regulation 1105-2-103 describes the planning process for Federal water resource projects. This publication requires formulating Alternative plans that support Federal objectives. Each Alternative plan is composed of one or more management measures. A management measure is a feature or activity that can be implemented at a specific geographic site to address one or more planning objectives. Section 3 presents an evaluation of multiple plans formulated to meet project objectives, including the no-action alternative, a National Economic Development (NED) plan, a plan maximizing total net benefits, a plan maximizing net benefits consistent with the shallow navigation study purpose, and the Least Environmentally Damaging Practicable Alternative (LEDPA), as required by ER 1105-2-103 2-4.c.(6). This framework will guide the formulation, evaluation, and comparison of alternatives presented in subsequent sections.

3.2 ASSUMPTIONS

The following assumptions were applied throughout the planning process including alternative evaluation.

- Extreme unforeseen events that may impact cost estimates, such as a pandemic, were not included in cost estimates.
- Construction Procurement – Would require one contract action in order to complete.
- Design and Administration of Construction – The design and construction oversight would primarily be performed by the USACE Vicksburg District.
- Plans and Specifications (P&S) would be fully developed by USACE personnel.
- For estimating purposes, a single subcontractor was utilized. In the field it is possible that multiple subcontractors and vendors would be used; however, it is assumed that they would have a similar markup scheme.

3.3 MANAGEMENT MEASURES

A comprehensive set of structural and nonstructural measures were initially identified by the PDT, in collaboration with the NFS and stakeholders, to address the planning objectives. The PDT in collaboration with the NFS and stakeholders initially developed a set of structural and nonstructural measures to address the planning objectives.

Structural Measures: These include physical changes to the environment that alter natural processes and typically involve construction of engineered works. The following measures within this category were analyzed:

- Widening the harbor
- Extending the harbor by less than 3,000 feet with additional turning basin
- Extending the harbor by 3,000 feet with additional turning basin
- Beneficial use of dredged material
- Open Water Placement consistent with current harbor dredging practice

Nonstructural Measures: These are actions that do not involve physical alteration of the environment. The following measure within this category was analyzed:

- Utilize Mississippi River for making tows and staging barges.

3.3.1 Measure Screening

The PDT established decision criteria to screen measures and formulate viable alternatives. The following screening criteria were applied to measures and the array of alternatives:

- Meets study objective
- Avoids study constraints
- Environmental resources impacted
- Rough order of magnitude cost (ROM) estimates

The following measures were screened out and justification for screening these measures is described in the subsections below.

- Widening the harbor
- Extending the harbor by less than 3,000 feet with additional turning basin
- Utilize Mississippi River for making tows and staging barges

3.3.1.1 Widening the Harbor

The measure to widen Osceola Harbor was considered for its potential to significantly increase staging capacity and reduce congestion. A wider harbor could accommodate more barges simultaneously, improving operational efficiency for Poinsett Rice and Grain and potentially attracting additional commerce. However, this measure was ultimately screened out due to substantial logistical and environmental hurdles. The right descending bank is already heavily developed with industrial infrastructure, necessitating costly relocation of existing facilities. Expanding onto the left bank would impact Island No. 30, a former bendway with significant ecological and economic value.

Island No. 30 functions as a critical habitat for a variety of species, including migratory birds, fish, and native vegetation. As a former bendway, it retains a complex floodplain ecosystem characterized by backwater areas and oxbow lakes, providing essential spawning and nursery grounds for several fish species utilized by both commercial and recreational fisheries. The island also supports a diverse assemblage of bottomland hardwood forest,

offering crucial habitat for migratory waterfowl and other wildlife. Furthermore, Island No. 30 is currently privately owned, and acquisition of the land would entail substantial real estate costs. These acquisition costs, combined with the expense of relocating any existing structures or easements, represent a cost that exceeds the justified expenditure for this study. Disturbance to Island No. 30 would result in the loss of this valuable habitat, potential impacts to water quality due to increased sedimentation, and disruption of the natural floodplain functions. Furthermore, any alteration to the island would require extensive permitting and mitigation efforts, substantially increasing the alternative costs and timelines. Given these significant environmental and economic constraints, and associated costs, the potential benefits of harbor widening did not outweigh the challenges.

3.3.1.2 Extending the Harbor Less Than 3,000 Feet with Additional Turning Basin

As outlined in Section 1.10.1, the study planning objective is to increase harbor capacity to reliably accommodate barges for staging upstream of the existing grain dock, thereby enhancing harbor operational efficiencies and reducing transportation costs for harbor operators. To achieve this objective, this alternative considered extending the harbor by various increments up to 3,000 feet: 500 feet, 1000 feet, 1500 feet, 2000 feet, 2500 feet, and 3000 feet, with the addition of a turning basin.

While a range of lengths were evaluated to determine the optimal solution, analysis revealed that only the 3,000-foot extension would fully achieve the project's objective (as stated in section 1.2) of reliably accommodating barges for staging and assembling tows and growing with these changes. Shorter extension lengths, while potentially offering some incremental benefits, were ultimately deemed insufficient to fully address the existing capacity constraints and projected future demands. As a result, these shorter extension lengths were not carried forward for detailed analysis.

3.3.1.3 Utilizing the Mississippi River for Making Tows and Staging Barges

The potential benefit of utilizing the Mississippi River for assembling tows and barge staging to reduce congestion within the harbor and potentially lowering costs was considered. However, this measure was screened out due to significant safety and logistical constraints. Critically, there is no available physical space along this stretch of the river to safely accommodate barge staging operations needed to support the industry along the harbor. The harbor's location on an outside bend near Island No. 30, coupled with the proximity of other substantial commercial operations just upstream – including Bunge Corporation, Consolidation Grain and Barge Co, Mid River Terminal (Table 3-1), and the expanding operations of Big River Steel would create a hazardous navigational environment if used for staging (Figure 3-1). These downstream facilities already contribute to significant congestion on the Mississippi River. Furthermore, the presence of the Kate Aubrey Towhead revetment and associated navigation regulations restrict activity and increase risk, outweighing any potential benefits.

Table 3-1. Commercial Navigation Docks in and Near Osceola Harbor

NAV Unit ID	Company Name	Latitude	Longitude	River Mile
0FS3*	Bunge (X Cargill)	35.658254	-89.919028	783
0FS4*	PBW-Osceola-Terminal	35.68694	-89.95417	783
0Q2K*	Bunge Corp-Osceola Docks	35.66083	-89.93333	783
0QDS*	Poinsett Rice & Grain Docks (CWIS 13430)	35.687667	-89.95629	785
0TP3*	Bunge Corp., Osceola Landside Dock	35.660833	-89.93333	783.5
0TP4*	Bunge Corp., Osceola Landside Dock	35.656667	-89.9275	783
120Y*	Consolidated Grain and Barge Co.	35.658044	-89.930951	783.5
1215*	Mid-River Terminal LLC (aka Big River Steel)	35.652032	-89.917092	782.5
None	Hybar	35.68425833	-89.9531138	785.1

*Data Source: Waterborne Commerce Statistics Center <https://www.iwr.usace.army.mil/About/Technical-Centers/WCSC-Waterborne-Commerce-Statistics-Center/> on May 30, 2025



Figure 3-1. Commercial Operations using the Mississippi River near Osceola Harbor

3.4 INITIAL ARRAY OF ALTERNATIVES

Following the measure screening process, three alternatives were identified, combining the remaining measures, including two focused on dredge material placement. These measures were combined into the Array of Alternatives (Table 3-2).

Table 3-2. Initial Array of Alternatives

Alternative	Description
Alternative 1 – No Action	No changes to the harbor; maintains existing conditions.
Alternative 2 – Osceola Harbor Extension with Open Water Dredge Material Placement	Extend harbor 3,000 feet upstream, with a new turning basin. Maintains existing turning basin and places dredge material in Open Water, Transitional Placement, downstream of the harbor, consistent with current harbor practices.
Alternative 3 – Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use	Extends harbor as in Alternative 2 and considers beneficial use of dredged material and using former upland site for placement.

3.4.1 Alternative 1 – No Action

The No Action alternative is synonymous with no Federal action. In accordance with all applicable NEPA regulations, a No-Action alternative is required to be carried forward for evaluation and comparison with other action alternatives. Under this alternative, the future without project conditions would likely occur; the Harbor would continue to experience increasing navigation challenges as harbor and the adjacent Mississippi River traffic increases, especially during low water periods. Navigation risks would remain high and would continue to increase. Transportation cost and time would continue to increase, resulting in negative impacts to the Osceola Harbor and the City of Osceola economy.

3.4.2 Alternative 2 – Osceola Harbor Extension with Open Water Dredge Material Placement

Under this alternative, the Osceola Harbor would be extended approximately 3,000 feet upstream, consistent with one of the two plans evaluated as part of the 1971 Report. This extension would include the construction of a new turning basin at the upstream end, centered at approximately UTM Zone 16 (X,Y) ft = (762,762, 12,973,129) The existing turning basin would be maintained for continued operational use.

The harbor extension would require dredging to a depth of -9.0 LWRP and an elevation of 193.51 ft AMSL. Dredging would encompass an area of approximately 24 acres, extending

the channel 3,000 ft with a width of 250 ft. Dredged material would be placed in the Mississippi River, consistent with current harbor maintenance practices. No changes to the existing channel limits are proposed beyond the extension area.



Figure 3-2. Alternative 2 – Osceola Harbor Extension with Open Water Dredge Material Placement

3.4.3 Alternative 3 – Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use

This alternative, like Alternative 2, would extend the Osceola Harbor. However, unlike Alternative 2, this alternative would beneficially reuse dredged material in accordance with the USACE memo on "Expanding Beneficial Use of Dredged Material" (August 28, 2023), exploring how that reuse could offset negative impacts. This approach aligns with the USACE's emphasis on maximizing the beneficial use of dredged material beyond simple placement. A 97-acre upland placement area was originally designated for the Osceola Harbor project (authorized in 1960, initiated in 1975) and intended for flood risk reduction and industrial park development (Figure 3-3, 1975 Water Resources Development in Arkansas Report and 1971 Environmental Statement).

While this historical precedent and the USACE memo suggest potential beneficial use opportunities, the site's current condition presents challenges that limit beneficial use opportunities. These include deteriorated protective berms (now the responsibility of the City of Osceola), an outlet structure in disrepair, changes in land use (including a road and powerlines), and private land ownership. Consequently, utilizing the entire 97-acre site as originally intended is impractical.

To address these limitations, the PDT considered the existing site conditions and assessed the feasibility of utilizing a reduced portion of the original area for potential upland placement and beneficial use. Figure 3-4 illustrates this reduced area, which excludes land privately owned, areas with existing infrastructure, and areas potentially requiring mitigation. The current considered placement site is 15 acres.

New berm construction would be necessary within this area. However, even with new berm construction, the limited size of the 15-acre site, combined with the complexities and costs associated with dewatering and stacking the dredged material, presents significant challenges to effectively utilizing the site. This includes the amount of space that can fit dredged material.

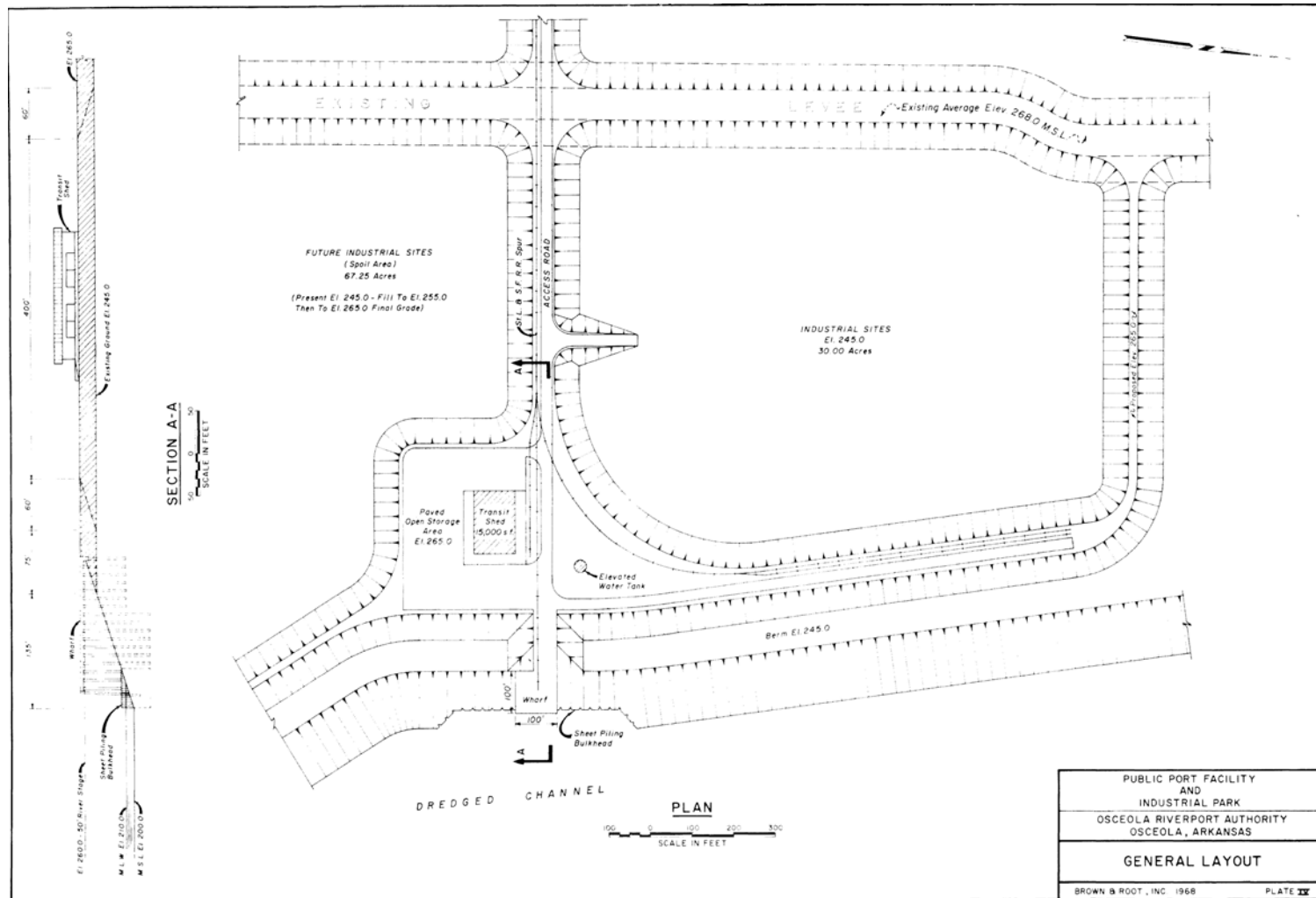


Figure 3-3. Historical – Upland Dredge Material Placement Area from the USACE 1971 Environmental Statement



Figure 3-4. Alternative 3: Existing Conditions— Upland Dredge Material Placement Area Proposed

3.5 EVALUATION OF ALTERNATIVES

The Initial Array of Alternatives was preliminarily evaluated using the Planning and Guidance (P&G) criteria (completeness, effectiveness, efficiency, and acceptability) in accordance with ER 1105-2-103. These criteria are used to evaluate each alternative plan for:

- *Acceptability* is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies (P&G Section VI.1.6.2(c)(4)). Acceptability means a measure or plan is technically, environmentally, economically, and socially feasible. Measures or plans that are clearly not feasible should be dropped from consideration.
- *Completeness* is a determination of whether or not the plan includes all elements necessary to achieve the objectives of the plan. It is an indication of the degree that the outputs of the plan are dependent upon the actions of others.
- *Effectiveness* is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities (P&G Section VI.1.6.2(c)(2)). Alternative plans that clearly make little or no contribution to the planning objectives should be dropped from consideration.
- *Efficiency* is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment (P&G Section VI.1.6.2(c)(3)). Benefits can be both monetary and non-monetary. Alternative plans that provided little benefit relative to cost should be dropped from consideration.

Table 3-3 below summarizes the results of the P&G Criteria evaluation for the Initial Array of Alternatives.

Table 3-3. Alternatives Evaluated Against P&G Criteria

		P&G Criteria			
Alternative		Complete	Effective	Efficient	Acceptable
1	No Action	Yes – No action would result in same navigation conditions.	No — No action would not achieve planning objectives.	No -- Benefits would not be realized without an investment in the harbor; navigation costs in the harbor would continue to rise due to lost time to due navigation challenges.	No – No action is not acceptable to government entities, or the public. No action is feasible from a technical, environmental, financial, legal, institutional, and social perspective.
2	Osceola Harbor Extension with Open Water Dredge Material Placement	Yes – All necessary investments would be available for the desired effect.	Yes – Achieves the study objective to increase harbor capacity and reduce transportation costs.	Yes – Benefit to cost ratio (BCR) is positive based on the ROM cost estimates and the preliminary projected project benefits.	Yes – Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public.
3	Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use	No – Lacks a complete plan for material utilization due to the absence of identified beneficial use.	Yes – Achieves the study objective to increase harbor capacity and reduce transportation costs.	No – Does not meet the efficiency criterion due to the absence of a viable beneficial use.	Yes – Plan is feasible from technical, environmental, economic, financial, political, legal, institutional and social perspective. Satisfies government entities and the public.

3.5.1 Screening of Alternative 3: Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use

Alternative 3 (Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use) was subject to further evaluation using the P&G criteria, specifically completeness, effectiveness, efficiency, and acceptability. This evaluation considered the implementation and satisfaction aspects of acceptability, as outlined in ER 1105-2-103.

Based on this evaluation, Alternative 3 is screened from further consideration because it fails to meet the completeness and efficiency criteria.

3.5.1.1 Completeness

Per the Planning Guidance (P&G), completeness is defined as *“the extent to which the alternative plans provide and account for all necessary investments or other actions to ensure the realization of the planning objectives, including actions by other federal and non-federal entities. Completeness must consider the sustainability and long-term aspects of the plans and whether all resource requirements are included. Completeness does not mean that all planning objectives are fully realized—only that the required resources and actions are included to achieve the estimated benefits.”* (USACE, ER 1105-2-103). In the case of Alternative 3, a critical element for completeness, aligning with USACE guidance on promoting beneficial use for dredged material management, is the identification of a viable beneficial use for the dredged material placed in the upland site. Despite investigations by the NFS, no such beneficial use could be identified. This absence of a defined and achievable beneficial use represents a gap in the necessary actions and resources to achieve the plan's estimated benefits, rendering the alternative incomplete.

3.5.1.2 Efficiency

Per the P&G, efficiency is defined as *“the extent to which the alternative plans contribute to achieving the planning objectives. Benefit metrics reflect the effectiveness of each alternative. Effectiveness does not mean that all planning objectives need to be addressed or fully realized. The degree of effectiveness will be used to illustrate trade-offs between plans when compared.”* (USACE, ER 1105-2-103). Alternative 3's efficiency is questionable because the increased costs associated with upland placement, compared to open water placement, are only justified if they contribute to achieving planning objectives through corresponding benefits from beneficial use. In the absence of a beneficial use, these increased costs do not demonstrably contribute to realizing the plan's benefits, making Alternative 3 an inefficient use of resources.

3.5.1.3 Other Considerations

While the factors below were not the primary reason for screening of Alternative 3, the additional factors below support this determination.

- The NFS was unable to identify any current opportunities for beneficial use of the dredged material.
- The proposed upland site is unusable due to existing breaches, a road, and powerlines, requiring extensive remediation or avoidance.
- Restoration of the site would have cost approximately 1\$ to \$3 million, assuming USACE design and construction.
- Restoring the site would have added two years to the alternative implementation timeline compared to open water placement.
- Maintaining the restored upland site would have significantly increase Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) costs compared to current open water placement practices.

3.5.1.4 Conclusion

Based on the deficiencies outlined above, specifically the failure to meet the P&G criteria of completeness and efficiency due to the lack of a viable beneficial use and with consideration of the USACE memo "Expanding Beneficial Use of Dredged Material", Alternative 3: Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use, is removed from further consideration. A full comparison of the remaining alternatives (No Action and Osceola Harbor Extension with Open Water Dredge Material Placement) will be conducted in Section 5, following the Environmental Effects and Consequences in Section 4.

Section 4

Environmental Effects and Consequences

4.1 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental effects and consequences for the future-without project scenario (Alternative 1 - No Action) and for Alternative 2 in accordance with all applicable regulations.

4.1.1 Watershed

Future Conditions with No Action: With the No Action alternative, this slack water harbor would still operate as noted in the Existing Conditions, assuming the adjacent river channel and banks remain stable along with future dredging activities. The overall effect on the Mississippi River watershed would be negligible.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With the implementation of this action, there is expected to be more barge traffic in the immediate area. Increased construction as a result of the harbor extension could affect the local watershed, but these activities would primarily be land side of the mainline levee, which already regulates watershed activities. The increased barge traffic could reduce truck and train activity and thereby lessen impact to infrastructure. The lower river already manages large amounts of barge traffic and could easily incorporate the increased activity.

4.1.2 Hydrology and Hydraulics

Future Conditions with No Action: With the No Action alternative, this is a slack water harbor without inflow from creeks or streams. The existing harbor experiences regular sedimentation at the mouth, but the impacts of this sedimentation are routinely mitigated with the ongoing harbor dredging operations. Neither the flowrate or volume, nor the sedimentation rate would be altered.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With implementation of this action, would have no impact on the hydraulics of the main channel of the Mississippi River. Sedimentation of the harbor extension area would also be controlled with ongoing harbor maintenance dredging. While the Vulnerability Assessment identified a vulnerability to sedimentation for HUC-4 0802 (Lower Mississippi-St. Francis), the extension would not increase that vulnerability above the future without project alternative (see Appendix B. Engineering). As a result, no substantive hydraulic analysis was performed.

4.1.3 Wetland Resources

Future Conditions with No Action: With the No Action alternative, wetland habitats within the project area are expected to remain as noted in Existing Conditions, provided that the adjacent channel and banks remain stable.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With implementation of this action, wetland habitats within the project area are expected to remain as noted in Existing Conditions as construction would be limited to the existing side channel to the Mississippi River.

4.1.4 Aquatic Resources/Fisheries

Future Conditions with No Action: With the No Action alternative, aquatic resources within the project area would be limited to the existing River as noted in Existing Conditions. Continued sediment deposition would further reduce available habitat, primarily at the mouth of the harbor.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With implementation of this action, construction dredging activities would have some temporary impacts within the immediate project area. *It is important to note that routine maintenance dredging is already a Functioning Without Project (FWOP) condition in this harbor. Therefore, fish and other mobile aquatic species are already subject to temporary disturbance and displacement during these routine dredging events. The alternative would temporarily increase the frequency and extent of these disturbances, but these species are still likely to avoid the immediate project area but would be expected to re-colonize the area after the project is complete. Benthic species are already affected by the maintenance dredging, with recolonization post-dredging possible. There could be more potential open water habitat created by the addition of the harbor extension. After project completion, the area would return to a similar dredging cycle that is currently done under a FWOP condition.

4.1.5 Wildlife

Future Conditions with No Action: With the No Action alternative, the wildlife resources within the project area are expected to remain as noted in Existing Conditions.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: Although the study area consists of a mosaic of floodplain habitats, no permanent terrestrial habitat loss is anticipated because the dredging and placement activities will occur within the existing harbor footprint and open water disposal area. Furthermore, best management practices will be implemented during construction to minimize any indirect impacts, such as erosion or sedimentation, on adjacent terrestrial habitats.

4.1.6 Threatened, Endangered, and Protected Species

Future Conditions with No Action: With the No Action alternative, threatened and endangered species within the project area are expected to remain as noted in existing conditions.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action:

Pursuant to Section 7 of the Endangered Species Act, as amended, USACE has determined that the alternative action associated with the project area would have no effect on Eastern Black Rail, Piping Plover, Rufa Red Knot, Pondberry, Alligator Snapping Turtle, Monarch Butterfly, and Tricolored Bat. Additionally, no evidence of bald eagles, or their nests, were observed within the project location. The bald eagle is no longer listed as a threatened species but is still protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act.

The alternative action may affect but is not likely to affect the federally endangered Fat Pocketbook mussel and Pallid Sturgeon. However, during construction activities the Pallid sturgeon could use mainstem habitat adjacent to the project area and adverse impacts could be avoided by performing work activities outside the spawning season (01 April – 30 June). The Fat Pocketbook would not be expected to be in this portion of the side channel as dredging would create frequent disturbances and create unstable habitat.

This alternative will be coordinated with the United States Fish and Wildlife Service if identified as the TSP. Any comments they may have regarding endangered or threatened wildlife or plants, or their critical habitat, will be considered in our evaluation of the described work.

4.1.7 Water Quality

Future Conditions with No Action: With the No Action alternative, hydrology and water quality within the project area would be as noted in Existing Conditions.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With implementation of this action, impacts to water quality within the Mississippi River would be minimal or have no effect, as the river normally carries a heavy sediment load, and the project action would be conducted during high water periods. Turbidity and suspended solids would be increased to minor degrees during construction. Any temporary impacts to water quality would be anticipated to return to normal shortly after construction ceases. Thus, no significant impacts to water quality would occur as a result of project implementation. USACE is addressing the proposed activities under several existing state permits (STAA No. 20220114), issued by ADEQ and a §401 Water Quality Certification and Aquatic Resource Alteration Permit (NRS18.121-23) issued by TDEC.

This alternative would be conducted in accordance with the conditions of these permits. The USACE Regulatory team tracks and provides documentation for all states renewal processes for Water Quality Certification, including these permits for dredging activities on the Mississippi River.

4.1.8 Air Quality

Future Conditions with No Action: With the No Action alternative, no change in air quality would occur.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action:

Overall, minor short-term adverse effects would occur due to the emissions from the construction equipment; however, these effects are expected to return to normal post-construction. With the expected increase in barge traffic a slight decrease in air quality may occur but should not violate any state or Federal standards or cause the region to be in a non-attainment status.

4.1.9 Recreation

Future Conditions with No Action: With the No Action alternative, recreation and aesthetics are expected to remain as noted in Existing Conditions.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With implementation of this alternative, impacts to recreation would be minimal, temporary, or have no affect as individuals would have to trespass to visit the site or access the site via boat. Nearby recreational boat ramps exist upstream and downstream to the construction area and would not be blocked by any construction related activity.

4.1.10 Cultural Resources

Future Conditions with No Action: With the No Action alternative, cultural resources are expected to remain as noted in Existing Conditions.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: With implementation of this action, no historic properties are anticipated to be effected. Additionally, there are no historic properties listed in or determined eligible for inclusion in the National Register of Historic Places in the project's APE. No additional cultural resources investigations are recommended prior to project implementation. However, should an inadvertent discovery be made during construction, the resource would be evaluated, assessed for effects, avoided if possible, and mitigated in accordance with federal statutes and regulations (36 C.F.R., Part 800) and corresponding state guidelines for Arkansas and Tennessee.

A literature review and cultural resources survey within the project's APE were completed by the USACE-MVM archaeologist in the summer of 2025. The investigation revealed no significant cultural resources within the study area. Given the absence of cultural material within the alternative project area, as evidenced by previously noted cultural resources surveys, USACE proposed a No Historic Properties Affected Section 106 determination for this undertaking. Concurrence consultation with this determination is in progress and will be updated here as it progresses.

4.1.11 Socioeconomic Considerations

Future Conditions with No-Action: With the No Action alternative, while direct disproportionate social impacts to disadvantaged communities are not anticipated, it could exacerbate existing challenges related to economic opportunity in Mississippi County, Arkansas, and Lauderdale County, Tennessee. Specifically, stymied growth in the

agricultural, steel, and recycling industries may lead to increased financial strain on households and increased traffic congestion impacting daily life. This could effectively create an indirect disproportionate social impact through reduced quality of life and limited access to economic advancement.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: As discussed in Section 2, "Identification of Potential Disadvantaged Communities," both Mississippi County and Lauderdale County exhibit socioeconomic characteristics that may indicate the presence of disadvantaged communities. However, this project would be a temporary construction. It was determined that the construction of this project would not have any disproportionate effects on communities experiencing poverty in the surrounding area. No disproportionate socioeconomic impacts are expected to occur with implementation of this project.

4.1.12 Hazardous, Toxic and Radioactive Waste

Pursuant to ER 1165-2-132, USACE assumes responsibility for the reasonable identification and evaluation of all HTRW contamination within the vicinity of proposed actions. The HTRW policy is to avoid the use of project funds for HTRW removal and remediation activities.

Future Conditions with No Action: Under the No Action alternative, the existing HTRW conditions in the project area, as detailed in Section 2, would remain unchanged. There would be a continuing, low-level risk of encountering HTRW during routine maintenance activities in the harbor.

Future Conditions with Osceola Harbor Extension and Open Water Placement Action: As described in Section 2, a record search and site reconnaissance identified six facilities within a 1-mile radius of the project area, none of which appear to pose a significant HTRW risk. The FWOP condition is one of low, but non-zero, HTRW risk. The primary HTRW concern with Alternative 2 would be the potential for encountering previously unidentified contamination during dredging activities associated with the harbor extension. However, based on the prior assessments, the probability of encountering HTRW is considered low. If any hazardous waste/substance is encountered during construction activities, the proper handling and placement of these materials would be coordinated with the Environmental Protection Agency (EPA) and applicable state agencies. This would result in only a temporary additional step needed to do construction.

4.1.13 Section 404(b)(1) Considerations

Dredging activities are allowed under both the ADEQ §401 Water Quality Certification, issued on April 4, 2022 (STAA No. 20220114) and the TDEC §401 Water Quality Certification and Aquatic Resource Alteration Permit issued on July 12, 2023 (NRS18.121-23).

4.1.14 Reasonably Foreseeable Effects

Development and channelization have been the primary impacts within the Mississippi River basin and continues through the present day. This continues to be a concern within the basin as more and more people and industries realize the potential of the area except for portions of the upper Mississippi River basin that are protected from land use change. As future construction activities occur within the non-protected areas, land use would change with the concurrent effects on air and water quality. At this larger scale, the proposed harbor expansion is expected to cause minimal, if not negligible temporary impacts, to the Mississippi River basin.

Within the immediate geographical location, Mississippi County, AR, impacts of the proposed action would be similar to actions in efforts to protect critical infrastructure, businesses, and residences. This proximate portion of the Mississippi River basin is already heavily impacted by urbanization, industrialization, and stream control measures. With the proposed action the harbor would be extended. There would be additional temporary increases in turbidity and suspended solids from harbor maintenance activities, but this section of river already experiences high sediment loads. Fish and other mobile aquatic species would likely avoid the harbor during construction and maintenance activities, but, along with benthic species would recolonize after activities cease. Any terrestrial species within and near the project footprint would be expected to temporarily disperse during activities but would be expected to return to the area. Temporary decreases in air quality would occur during construction and maintenance activities but would return to pre-construction levels soon after construction or maintenance ends.

4.2 MITIGATION

Alternative 2 would have no lasting impacts to wetlands or woodlands. Also, no significant impacts to aquatic or terrestrial resources would occur. Therefore, no mitigation would be required.

Section 5

Plan Comparison and Selection

This section presents the comparison of the final array of alternatives and the selection of the TSP for the Study. The goal of the CAP Section 107 is navigation to enhance the efficient use of the nation's waterways. This section will discuss alternatives costs and benefits, potential environmental impacts, explain the rationale for the TSP selection, demonstrates its compliance with ER 1105-2-103 and identify contributions to the Federal objective of maximizing net economic benefits.

Following the measure screening process (Section 3), three alternatives were identified and carried forward for detailed evaluation (Table 3-2). Alternative 1, the no-action alternative, directly addresses the requirement for a no-action plan. Alternative 2, the Osceola Harbor Extension with Open Water Dredge Material Placement, fulfills the requirements for both the NED plan and the LEDPA. While Alternative 3, Osceola Harbor Extension with Upland Dredge Material Placement for Beneficial Use, was initially considered for its potential to maximize net benefits and align with USACE guidance on beneficial reuse of dredged material, it was screened out due to failing to meet Planning and Guidance (P&G) criteria for completeness and efficiency (Section 3.5.1). Specifically, despite investigation, no viable beneficial use for the dredged material could be identified, rendering the plan incomplete (Section 3.5.1.1). Furthermore, the increased costs associated with upland placement were not justified without corresponding benefits from beneficial use, resulting in an inefficient use of resources. Therefore, the remaining alternatives for the final array address all required plan types for evaluation.

5.1 PLAN COMPARISON

Alternatives 1 and 2 (including the No Action alternative) comprised the Final Array of alternatives (Table 5-1) and were evaluated and compared using benefit and cost economic analysis, development of conceptual designs, ROM quantities, and parametric cost estimates. Detailed below are the following accounts that meet study objectives with minimal impact and cost that required its assessment:

Table 5-1. Final Array of Alternatives

Alternative	Description
1	No Action
2	Osceola Harbor Extension with Open Water Dredge Material Placement

5.1.1 System of Accounts

To facilitate the evaluation and display of effects of the alternative plans, ER 1105-2-103 calls for an evaluation of the “four accounts” established in the P&G. The four accounts include:

- The NED Account, which displays changes in the economic value of the national output of goods and services.
- The Regional Economic Development (RED) Account, which displays changes in the distribution of regional economic activity, such as income and employment.
- The Environmental Quality (EQ) Account displays non-monetary effects on ecological, cultural, and aesthetic resources including the positive and adverse effects of ecosystem restoration plans.
- The Other Social Effects (OSE) Account displays plan effects on social aspects such as community impacts, health and safety, displacement, energy conservation, etc.

The following sections describe the evaluation of the four accounts in further detail.

5.1.2 National Economic Development Evaluation

5.1.2.1 NED Costs

Financial costs of Alternative 2 consist of construction costs, planning/engineering/design costs, and construction management costs. Cost estimates for Alternative 2 were developed at July 2025 price levels, using a Class 3 level of effort. Detailed cost estimation methods, including the use of parametric unit prices and various data sources, are described in Appendix D, Cost Engineering. The major cost components are:

- Dredging and Harbor Excavation
- Planning, Engineering, and Design
- Construction Management

The development of Abbreviated Risk Analysis (ARA) resulted in a total composite risk contingency.

Interest During Construction (IDC) is the cost of the foregone opportunity to invest the money required to construct a project for another use. The hypothetical return on another investment, measured as IDC, is counted as an NED cost. Table 5-2 summarizes Alternative 2 Project First Costs. A summary of the annual costs, average benefits, and BCR (including IDC) are located in Table 5-3.

Table 5-2. Project First Cost for Alternative 2.

Item	Base Cost	Contingency	Midpoint Escalation	Total
Construction	\$4,579,059	\$985,023	\$215,918	\$5,780,000
PED	\$368,000	\$33,253	\$11,747	\$413,000
Construction Management	\$230,000	\$16,100	\$5,900	\$252,000
Total	\$5,177,059	\$1,034,376	\$233,565	\$6,445,000

*Values at FY25 price levels.

*All Project First Costs occur in the year 2026. Benefits begin in the year 2027.

Table 5-3. Average Annual Costs and Benefits of Alternative 2

Investment Cost	
First Cost	\$ 6,445,000
Interest During Construction	\$ 8,000
Total Investment Cost	\$ 6,453,000
Average Annual Cost	
Average Annual First Cost	\$ 251,000
Average Annual Incremental OMRR&R	\$ 731,000
Total Average Annual Cost	\$ 982,000
Benefits	
Average Annual Benefits	\$ 13,373,000
Net Annual Benefits	\$ 12,391,000
BCR (computed at 3.0%)	13.6

*Values at FY25 price levels and are amortized at the 2025 Federal discount rate of 3.0 percent.

*All first costs occur in the year 2026. Benefits begin in the year 2027.

The cost estimates presented in this section include contingency allowances to account for the risks and uncertainties identified in Section 6.9. A more detailed discussion of these risks and their potential impact on the project can be found in that section.

5.1.2.2 NED Benefits

In the FWOP, Poinsett Rice and Grain will continue to ship agricultural commodities by barge with their busiest time occurring during the three-month harvest season in the fall. During this three-month period, Hybar Steel will shift significant tonnage from barge to rail/truck due to lack of available barge space in Osceola Harbor and lack of staging areas on the Mississippi River.

In the Future With Project (FWP) condition, Osceola Harbor would be extended by 3,000 feet (to a total of 9,500 feet) which would double the harbor's capacity from approximately 100 barges at any given time to 200 barges. This extension would allow the harbor to

accommodate all projected excess barges and accompanying tonnage during the three-month harvest season, thus eliminating the added cost of shifting tonnage from barge to the more expensive mode of rail/truck.

The intention of this analysis is to describe the benefits associated with the alternative under consideration for Osceola Harbor which is to extend the harbor by 3,000 feet. NED benefits were estimated by calculating the reduction in transportation costs for this alternative.

5.1.2.3 NED Benefits Benefit/Cost Analysis

Having identified the costs and benefits, this section summarizes how Alternative 2 will provide value given its benefits. Alternative 2 will bring in a Total Average Annual benefit of \$13,373,000. Given its investment cost of \$6,445,000 and subsequent Interest During Construction cost of \$8,000 the analysis is completed. The Net Annual benefits of \$12,391,000 and a BCR of 13.6 means the project is viable.

This demonstrates that it will have considerable return, and thus why it is viable to be completed.

5.1.3 Regional Economic Development

The USACE Institute for Water Resources, Louis Berger, and Michigan State University developed a regional economic impact modeling tool, RECONS (Regional ECONomic System), that provides estimates of jobs and other economic measures such as labor income, value added, and sales that are supported by USACE programs, projects, and activities. This modeling tool automates calculations and generates estimates of jobs, labor income, value added, and sales through the use of IMPLAN®'s multipliers and ratios, customized impact areas for USACE project locations, and customized spending profiles for USACE projects, business lines, and work activities. The RECONS tool allows the USACE to evaluate the regional economic impact and contribution associated with USACE expenditures, activities, and infrastructure.

A RECONS analysis was conducted for Alternative 2 to estimate the local, state, and national economic impacts of Alternative 2. The analysis considered the direct and secondary impacts of the project.

Table 5-4. Local, State, and National Impacts: Alt 2

Area	Local Capture	Output	Jobs*	Labor Income	Value Added
Local					
Direct Impact		\$33,335	0.4	\$24,851	\$20,973
Secondary Impact		\$19,684	0.1	\$5,757	\$11,314
Total Impact	\$33,335	\$53,019	0.5	\$30,608	\$32,287
State					
Direct Impact		\$39,301	0.5	\$28,027	\$25,090
Secondary Impact		\$33,176	0.2	\$9,844	\$17,831
Total Impact	\$39,301	\$72,477	0.6	\$37,871	\$42,920
US					
Direct Impact		\$52,594	0.6	\$35,001	\$33,638
Secondary Impact		\$95,561	0.4	\$29,824	\$51,666
Total Impact	\$52,594	\$148,155	1.0	\$64,824	\$85,304

* Jobs are presented in full-time equivalence (FTE)

"Value Added" calculations include the sum of Local Capture, Output, Jobs presented in FTE, labor income. "Total Impact" includes the sum of direct and indirect impacts.

It is important to note, that a significant amount of the construction will occur in and around the State of Arkansas, so this state would be a benefactor of this project's economic value.

5.1.4 Environmental Quality Evaluation

Because Alternative 2 has no lasting impacts to wetlands or woodlands, and no significant impacts to aquatic or terrestrial resources are anticipated (Section 4), no mitigation is required. Overall project-related impacts would be temporary in nature. These negligible impacts are described in Section 4 and any reasonably foreseeable effects of the environment is not a project concerns.

5.1.5 Other Social Effects Evaluation

Alternative 2 was evaluated with considering metrics such as safety, productivity, benefits, and project area. A list of other factors considered, but found not to be impacts: Recreational Life Safety, Commercial Life Safety, Productivity, Energy Conservation, Disproportionate Impacts, Aesthetics, Recreational/Leisure, and Community Connectivity.

Future Conditions with No-Action: With the No Action alternative, while direct disproportionate social impacts to disadvantaged communities are not anticipated, it could exacerbate existing challenges related to economic opportunity in Mississippi County, Arkansas, and Lauderdale County, Tennessee. Specifically, stymied growth in the agricultural, steel, and recycling industries may lead to increased financial strain on households and increased traffic congestion impacting daily life. This could effectively create an indirect disproportionate social impact through reduced quality of life and limited access to economic advancement.

Future Conditions with Alt 2: As discussed in Section 2, "Identification of Potential Disadvantaged Communities," both Mississippi County and Lauderdale County exhibit socioeconomic characteristics that may indicate the presence of disadvantaged communities. However, this project would be a temporary construction. It was determined that the construction of this project would not have any disproportionate effects on communities experiencing poverty in the surrounding area. No disproportionate socioeconomic impacts are expected to occur with implementation of this project.

This review showed the project is temporary in nature. Because it is temporary, and any disproportionate socioeconomic impacts are not expected to occur with implementation of this project. It is for these reasons that the OSE is reviewed to have no change.

5.1.6 Comprehensive Benefits - Four Accounts Comparison

The evaluation of alternatives included a comprehensive assessment and comparison of the total benefits across all four accounts (NED, NER, EQ, OSE). Table 5-5 summarizes the monetary and qualitative benefits for each alternative, providing a clear comparison of their overall performance.

Table 5-5. Table of Effects

	Metrics	Alt. 1 – No Action	Alt. 2 - Extension with new Turning Basin	Uncertainty Consideration
FOUR ACCOUNTS				
NED	Net Excess Benefits	No Benefits (No Action)	\$12,391,000	Benefits are sensitive to fluctuations in commodity shipping volumes and global trade patterns. See Section 6.9 and Appendix D (Cost Engineering) for a detailed discussion of these risks.
	B/C Ratio	0	13.6 to 1	The B/C Ratio is sensitive to cost estimates, potentially affected by unforeseen site conditions or material price increases. See Section 6.9 and Appendix D (Cost Engineering) for a detailed discussion of these risks.
RED	Local Total Impact Value Added	No Change	\$32,287	Local economic benefits depend on local hiring rates and sourcing of materials, with the possibility of lower benefits if external contractors are used.
	State Total Impact Value Added	No Change	\$42,920	State-level impacts depend on the availability of state-level suppliers, which may fluctuate.

	Metrics	Alt. 1 – No Action	Alt. 2 - Extension with new Turning Basin	Uncertainty Consideration
	U.S. Total Impact Value Added	No Change	\$85,304	National impacts depend on the global supply chain and the overall health of the U.S. economy, factors subject to change.
EQ	Wetlands Impacted	No Change	0 acres	
	Terrestrial Habitat Cleared	No Change	0 acres	
	Assessment	No Change	Overall project-related impacts would be temporary in nature as no impacts to the environment were identified.	
OSE	Safety, Productivity, Benefits or Disproportionate Community Impacts	Due to the No Action Alternative, there are the current risks and limited productivity as the existing economic and socioeconomic issues will persist; but it's also a known circumstance which doesn't pose a higher health risk.	This was reviewed and any changes was determined to not have a detrimental result to any of these conditions. As shown from Section 2 (Socioeconomic data), both Mississippi County and Lauderdale County exhibit socioeconomic characteristics that may indicate the presence of disadvantaged communities, the work of the port would result in increased safety and benefit and economic value.	The OSE benefits rely on continued community engagement and equitable distribution of benefits by Project Proponents and the Community.
PRIMARY OBJECTIVE: INCREASE HARBOR CAPACITY & REDUCE COSTS				
	Meet Study Objectives	No	Yes	
	Meet Study Constraints	Yes	Yes	
	Staging Area Capacity	Existing (Insufficient)	15-16 acres	

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	Metrics	Alt. 1 – No Action	Alt. 2 - Extension with new Turning Basin	Uncertainty Consideration
	Reduction in Transportation Costs	0	\$12,391,000	The dredge site has geotechnical uncertainty. See Section 6.9 and Appendix D (Cost Engineering) for a detailed discussion of these risks.
	Impact on Federal Expenditures	0	\$6,445,000	

*Values at FY 2025 price levels and are amortized at the 2025 Federal discount rate of 3.0 percent.

*All Project First Costs occur in the year 2026. Benefits begin in the year 2027

5.2 SELECTION OF THE TENTATIVELY SELECTED PLAN

Following a comprehensive comparison of alternatives formulated in accordance with ER 1105-2-103, Alternative 2 is determined to be the most advantageous option for the nation, ranking highest across all four accounts NED, EQ, OSE and RED. This systematic planning approach ensures sound decision-making consistent with the USACE water resources development mission. Alternative 2 provides a secure and efficient operating environment for vessels utilizing this port.

The No-Action Alternative would result in the continued deterioration of existing infrastructure, leading to increased vessel delays, higher transportation costs, and reduced economic competitiveness. While avoiding any new construction impacts, this alternative fails to address the underlying issues of channel capacity and navigational safety. Critically, the No-Action Alternative provides no net economic benefit.

Justification for Selecting Alternative 2

The NED evaluation demonstrates that Alternative 2 generates substantial net economic benefits, totaling \$12,391,000, with a high benefit-cost ratio of 13.6 to 1. These benefits directly support the federal objective of maximizing national economic development through enhanced waterway transportation efficiency.

The EQ evaluation indicates minimal long-term impacts to wetlands, aquatic resources, and terrestrial habitats resulting from Alternative 2. While temporary, localized impacts may occur during construction, these will be mitigated through the implementation of established environmental commitments and operating principles (detailed in Sections 6.7 and 6.8). All open-water discharge will adhere to established guidance and regulations. The selection of Alternative 2 represents a deliberate balance between maximizing NED plan and minimizing environmental impacts, fulfilling the requirements of the LEDPA as outlined in ER 1105-2-

103. While other alternatives may have offered slightly different economic outcomes, Alternative 2 demonstrably achieves a superior balance by incorporating mitigation measures and operating principles that significantly reduce potential environmental harm. This approach ensures that the project is not only economically viable but also environmentally responsible.

The OSE evaluation considered a range of social effects, including safety, productivity, and impacts on disadvantaged communities. Alternative 2 is expected to improve vessel safety and enhance productivity without causing disproportionate adverse impacts to any communities.

Based on the comprehensive evaluation summarized in Table 5-5, Alternative 2 provides the greatest overall benefits across the Four Accounts while minimizing environmental impacts and adhering to project constraints. For these reasons, Alternative 2 is selected as the TSP.

Section 6

Tentatively Selected Plan

6.1 TSP PLAN COMPONENTS

6.1.1 Primary Port Modifications

The TSP proposes a single primary modification to the existing Osceola Harbor footprint to address the critical capacity constraints that limit the harbor's ability to efficiently handle current and projected barge traffic volumes. The current harbor operates at full capacity, processing approximately 500,000 tons of grain annually, with insufficient space to safely maneuver barges for loading and assembling tows that typically consist of 30-60 barges in this section of the Lower Mississippi River. The primary components of the TSP include harbor extension and new turning basin.

6.1.1.1 Harbor Extension

The TSP extends the existing navigation channel an additional 3,000 feet upstream from its current terminus, creating the necessary staging area to accommodate approximately 100 barges upstream of the existing grain dock. This extension would be constructed within the existing Navigational Servitude and would maintain the authorized channel dimensions of 250 feet in width, providing approximately 15-16 acres of additional operational space based on standard barge dimensions of 195 feet x 35 feet.

6.1.1.2 New Turning Basin Configuration

A new turning basin would be constructed at the upstream end of the extension, centered at approximately UTM Zone 16 coordinates (X,Y) ft = (762,762, 12,973,129). The existing turning basin would be maintained and remain operational, providing enhanced operational flexibility for barge staging, loading operations, and tow assembly activities.

6.1.1.3 Dredging Requirements:

The harbor extension maintains the existing authorized project depth of 9 feet, requiring dredging to -9.0 feet LWRP, corresponding to an elevation of 193.51 feet AMSL. Dredging operations would encompass approximately 24 acres, creating the 3,000-foot extension necessary to achieve project objective. w

6.1.1.4 Design Considerations:

The geometry of the proposed harbor extension will mimic the geometry of the existing harbor. The extension will have a 250' bottom width, 3H:1V side slopes, and will be excavated to -9.0 ft LWRP. Figure 5-1 shows a project location map with the proposed harbor extension

identified. Additional design information including typical sections and detailed layout can be found in Appendix B. *Engineering*.



Figure 6-1. TSP (Alternative 2) – Osceola Harbor Extension with Open Water Dredge Material Placement

6.1.2 Dredged Material Placement

A cutterhead hydraulic dredge would be utilized to excavate material from the 3,000-foot navigation channel extension and the new turning basin, consistent with current harbor maintenance practices. All dredged material would be pumped from the cutterhead dredge and transported via dredge pipeline for open water placement downstream of the harbor mouth in the Mississippi River.

The dredged material placement would follow the same transitional placement methodology currently employed for the harbor's annual maintenance dredging operations, which remove approximately 145,000 cubic yards of sediment. Material would be discharged into the Mississippi River where natural river currents will carry and disperse the dredged sediment downstream of the project area, maintaining consistency with existing STAA No. 20220114 and associated environmental permits.

The dredge pipeline would be positioned along the eastern side of the navigation channel to avoid interference with harbor ingress and egress operations. During active dredging hours, a workboat would be stationed at the discharge pipeline to facilitate movement of the line for passing tows as needed. A booster pump will not be required to maintain adequate pumping pressure throughout the pipeline system.

The discharge location into the Mississippi River would be determined based on pre-construction hydrographic surveys to ensure adequate water depth and avoid impacts to Mississippi River navigation. The placement area would remain consistent with the existing open water placement site currently utilized for harbor maintenance dredging operations (Figure 6-2).

All woody material encountered during construction dredging would be segregated and relocated outside of the navigation project area, consistent with standard environmental practices.

The existing turning basin would be maintained in its current configuration and would continue to serve operational needs alongside the new upstream turning basin, providing enhanced operational flexibility for the expanded harbor capacity.

All dredging and material placement activities would be conducted under existing environmental authorizations, including the current ADEQ permits and Tennessee §401 Water Quality Certification (effective through July 12, 2028).

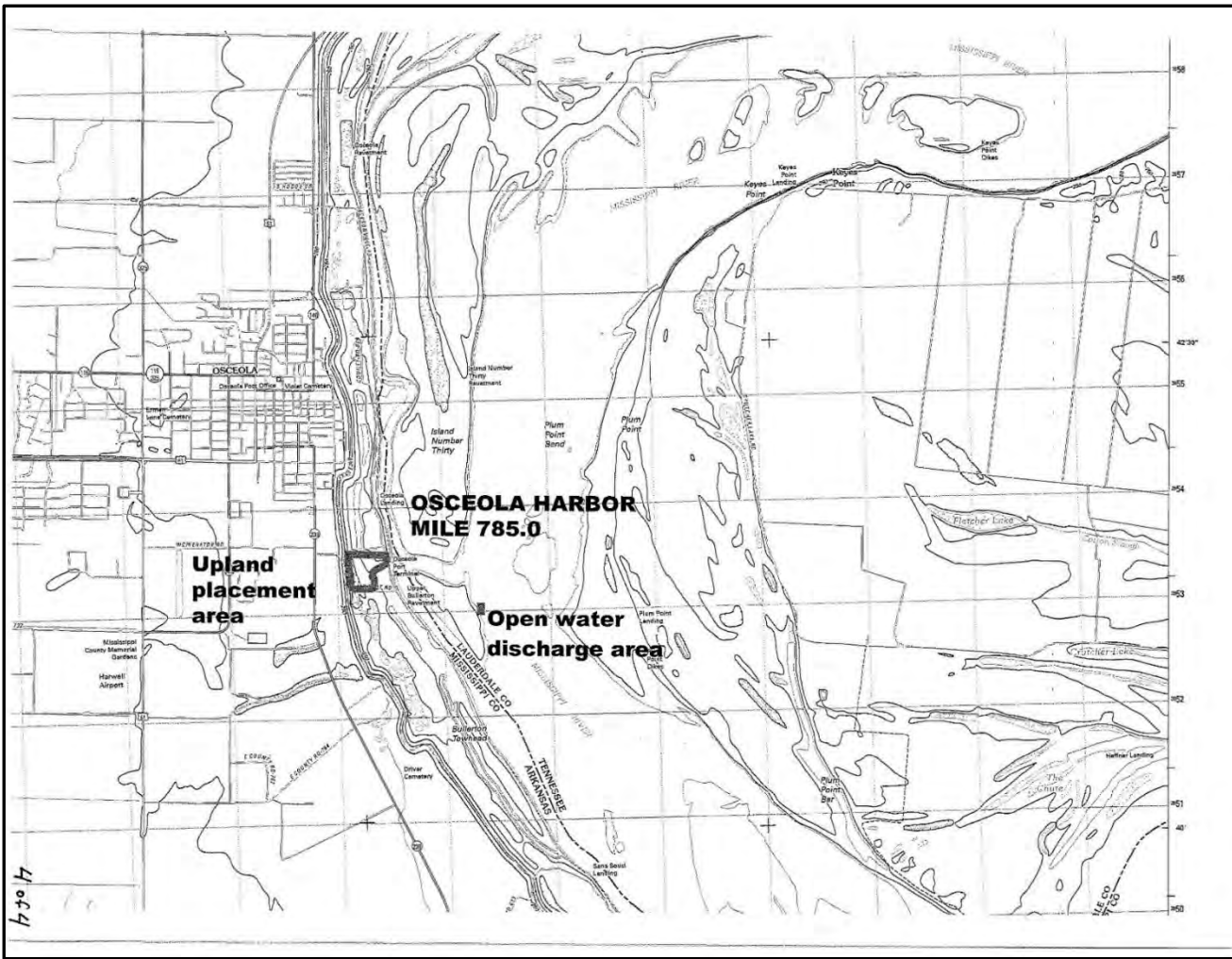


Figure 6-2. ADEQ Permitted Dredge Material Placement Locations

6.2 Lands, Easements, Rights-of-Way, Relocations, and Disposal (LERRDS)

Any dredge/excavated material will be deposited in the Mississippi River channel and taken downstream, negating the need for a placement area.

Since there is no LERRDS acquisition required for the construction, operation or maintenance of this project, Real Estate cost are expected to be minimal. Federal costs are estimated at \$10,000.00 to include Real Estate oversight and support.

There would be no induced flooding as a result of implementing of the project. No homes, businesses, or farms would be displaced as a result of the proposed work; therefore, no relocation assistance payments would be required. There are no known mineral recovery activities currently ongoing or anticipated, or oil/gas wells present on the project and the immediate vicinity that would impact the construction, operation, or maintenance of the

project. No acquisition of any mineral interest from the surface owner or rights outstanding in third parties will be required.

Navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution (U.S. CONST.art.I, §8,cl.3) to use, control and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes including navigation, flood control, and hydro-electric power. In tidal areas, the servitude extends to all lands below the mean high water mark or the ordinary high water line (OHWL). In non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the OHWL.

In order to apply Navigational Servitude, the following two criteria must be met:

1. The project must serve as an aid to commerce, such being recognized as navigation, flood control, and hydro-electric power.
2. The land required for project purposes must be located below the mean or high ordinary water mark of the navigable waterway.

The project is clearly capable and currently used for interstate commerce. The LERRD area of the project falls under the ordinary high-water mark. The Osceola Harbor channel is therefore considered “Navigable Waters.” The 24+/- acres of the project’s construction LEERD is subject to Navigation Servitude and considered non-creditable.

6.3 OPERATIONS, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION (OMRR&R)

Pursuant to Section 3010 of the Water Resource Development Act (WRDA) of 2007, the Osceola Harbor authority was amended to allow non-Federal interests to construct mooring facilities within the existing authorized harbor channel, subject to all necessary permits and certifications. Under this framework OMRR&R of the general navigation features of the project, including the port channel and turning basin with a bottom width of 250 feet, remains a Federal cost and USACE responsibility. The OMRR&R of non-Federal facilities, including any mooring facilities constructed by non-Federal interests within the authorized channel, is a non-Federal cost and thus a NFS responsibility.

6.3.1 Current Maintenance Operations

Osceola Harbor has been maintained annually by USACE-MVM, and would continue to be maintained annually, at a minimum dredge depth of -9 feet LWRP. Historical sediment deposition, coupled with the natural dynamics of the Mississippi River, necessitates periodic removal of accumulated material to ensure continued barge access to the municipal terminal. Approximately 145,000 cubic yards of sediment are removed annually from Osceola Harbor at a current annual cost of \$870,000.

Dredging operations are conducted under Short Term Activity Authorization (STAA) No. 20220114, issued by the ADEQ on April 4, 2022, which authorizes maintenance dredging

"on an as-needed basis to maintain minimum project channel dimensions." Operations utilize dustpan hydraulic dredges for the main channel and cutterhead hydraulic dredges for the harbor itself. Dredged material is placed in open water downstream of the harbor mouth, with an upland placement site also available at Osceola Harbor.

6.3.2 Future Maintenance Under the TSP

The TSP would increase dredging costs by 28% (\$731,000 Average Annual Incremental Cost, Table 5-3), resulting in a total annual dredging cost of \$2,161,920. This Average Annual Incremental Cost is a key factor in the economic analysis, as it represents the ongoing OMRR&R expense attributable to the harbor extension, beyond what is currently authorized and funded to maintain the existing harbor.

6.4 COST SHARING

The City of Osceola in Arkansas is serving as the NFS for the project. As the NFS, the City of Osceola would be required to execute formal assurances in the form of a Project Partnership Agreement (PPA) with the Federal government. The PPA would define the roles and responsibilities of both agencies in the cost sharing and execution of work.

Cost sharing of navigation projects is dependent on the depth and maintenance of intended channels and navigable waterways. Cost sharing provisions for the PED and Construction Management and Construction phase has been determined to be 90% federal and 10% non-federal (EP 1105-2-58 Chapter 3.31.c(1)).

Generally, the NFS would be required to contribute 10% of the total project implementation cost as 5% cash, work-in-kind, relocations, and/or LERRD. If the value of these contributions fails to equal or exceed 10% of the total project cost, the City of Osceola must pay additional cash in the amount necessary to attain the 10% cost sharing requirement. The City of Osceola would also be responsible for the performance and cost of all relocations, alterations, or modifications to any public utilities or facilities required.

Table 6-1. NFS Cost Sharing

Item	Federal Cost	Non-Federal Cost	Total Cost
FID	\$100,000	\$0	\$100,000
Feasibility Study (50/50)	\$350,000	\$350,000	\$700,000
PED/ (90/10)	\$371,700	\$41,300	\$413,000
Construction Management and Construction (90/10)	\$5,428,800	\$603,200	\$6,032,000
LERRD	\$0	\$0	\$0
Total	\$6,250,500	\$994,500	\$7,245,000

* Values at FY25 price levels

6.5 DESIGN AND CONSTRUCTION

The estimated design and construction schedule for the TSP (Alternative 2) selected for the Osceola Harbor Extension is described below.

Following the successful submission of this Feasibility Report and its acceptance, the PDT estimates the following timeline to be conducted in Fiscal Year 2026:

- 2 months for PED.
- 1 month for construction.

PED activities are not anticipated to be long due to the use of existing permits and this study includes a 65% level of Design Maturity. Therefore, the level of effort for PED activities would be low. Additionally, prior contracting terms and specs for OMRR&R are planned to be used for this effort.

6.6 ENVIRONMENTAL COMMITMENTS

No work activities would occur during the spawning season of the Pallid sturgeon (01 April - 30 June).

6.7 ENVIRONMENTAL OPERATING PRINCIPLES

The USACE Environmental Operating Principles (EOPs) were developed to ensure that USACE missions include totally integrated sustainable environmental practices. The EOPs, introduced in 2022, provided corporate direction to ensure the workforce recognizes USACE's role in, and responsibility for, sustainable use, stewardship, and restoration of natural resources across the nation.

The re-energized Environmental Operating Principles (EOP) include:

- Foster sustainability as a way of life throughout the organization.

- Proactively consider environmental consequences of all USACE activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by USACE, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

The concepts embedded in the original EOPs remain vital to the success of USACE and its missions.

In this Study, the PDT considered the USACE EOPs throughout the planning process. For example, beneficial use of dredged material was seriously considered as a measure in an effort to enhance environmental sustainability. The PDT ensured NEPA compliance and collaborated with State Historic Preservation Office (SHPO), USFWS, and other environmental and cultural resources partners. The PDT investigated potential HTRW concerns. The PDT considered environmental risks when conducting risk assessments.

The PDT made every effort to ensure the proposed project is economically sustainable. For example, the PDT opted to maintain the existing authorized project depth of 9 feet to ensure that future dredging maintenance operations could maintain the entire length of the Osceola Harbor.

The PDT leveraged scientific, economic and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.

6.8 VIEWS OF THE NON-FEDERAL SPONSOR

The City of Osceola, AR requested assistance through the CAP 107 program in March 2024. The NFS supported the proposed project through the FID and signed a FCSA in April 2025. The NFS supports the TSP and is prepared to cost-share the design and implementation.

To date, no landowner or public opposition to the proposed project has been identified. Implementation of the TSP is anticipated to provide benefits to adjacent landowners, tenants, and harbor partners.

6.9 RISK AND UNCERTAINTY

Risk and uncertainty are intrinsic in water resources planning and design. This section describes various risks that could later impact construction schedule or costs. Risks were initially identified and assessed qualitatively. The USACE Abbreviated Cost Risk Analysis (ARA) program was then used to further assess these risks and develop contingencies for the alternatives. The ARA (Appendix D) assessed key risk concerns for major features of

work, considering their potential impact on cost and schedule drivers such as project scope growth, acquisition strategy, construction elements, quantities, specialty fabrication or equipment, cost estimate assumptions, and external project risks. These risks were accounted for in cost and schedule contingency estimates and have therefore been factored into the total cost of the TSP. While none of the risks identified below are serious enough to jeopardize the project's overall viability, they could potentially affect the project's cost, schedule, and environmental impacts. These risks are summarized in the Table of Effects (Table 5-5) and have been factored into our evaluation of the project's performance against the four accounts.

6.9.1 Planning, Engineering and Design, Construction Schedule and Cost Risks

Medium Risk

If the amount of dredge material increases, then costs could increase. LiDAR and hydrographic surveys were taken. The PDT is confident in the LiDAR data; however, some time has passed since these surveys were taken.

- Fuel rates, inflation, and access to material and labor are issues that could increase cost and extend schedule.
- Severe weather could affect work and lead to a delayed schedule and increase cost.

Low Risk

- Dredging restrictions for sturgeon spawning are known and would be included in the contract, so it is unlikely to affect cost.
- The lack of geologic and geotechnical site characterization during feasibility results in some uncertainty and the risk of materially differing site condition Request for Equitable Adjustments (REAs) and Claims during construction.
- A low-water event could cause additional mobilization/demobilization costs.

6.9.2 ARA Summary

The analysis resulted in a total composite risk contingency for Alternative 2 (TSP) of 21.5% for total construction costs, 9.04% for total Planning, Engineering, and Design costs, and 7.00% for total Construction Management costs. This contingency accounts for a broad range of risks identified through the ARA process. A significant cost overrun resulting from any of these risks, including (but not limited to) increased dredge material, severe weather, or differing site conditions, could reduce the project's overall efficiency and its ability to maximize net economic benefits (NED account).

6.10 INFRASTRUCTURE AND INSTALLATION RESILIENCE

An Infrastructure and Installation Resilience analysis was conducted. Results are presented in Appendix B *Engineering*. The available literature and USACE Infrastructure and Installation

Resilience Assessment tools do not reach a clear consensus on trends in observed temperatures, precipitation, or streamflow, but there is a high consensus in literature on projected trends in temperature increases throughout the Lower Mississippi River Basin due to long-term persistent trends. The USACE CHAT shows a statistical significance in the trend of increased precipitation and temperatures. CHAT also shows a statistically significant trend in increased streamflow for the Representative Concentration Pathway (RCP) 8.5 future scenario. Due to this lack of consensus, any potential risks to the study area from changes in temperature, precipitation, and changes in streamflow were determined to be unlikely.

Geomorphic changes were identified as an additional resiliency concern. As discussed in Appendix B. *Engineering*, the riverbed of the Lower Mississippi River is undergoing large-scale geomorphic changes that, depending on location, increase or decrease its elevation. Osceola Harbor is located adjacent to a reach that is currently experiencing channel bottom degradation. It is expected that this degradation trend would continue. To comply with the requirements of ER 1105-2-103, data from existing MRG&P reports was analyzed to determine the potential change to the elevation of the river bottom in the project vicinity over a 100-year timeline. This analysis resulted in a potential change of 4 feet in the project area. The project geometry was tailored to accommodate for this 4-foot change while still maintaining an acceptably stable slope on the right descending (levee-side) bank. To further decrease potential risks to project resiliency, it is recommended that no underground utilities be located beneath the proposed harbor extension.

Section 7

Environmental Compliance

7.1 ENVIRONMENTAL COMPLIANCE TABLE

Environmental compliance for the proposed action would be achieved based upon coordination of this EA and FONSI (Appendix A) with all appropriate agencies, organizations, and individuals for their review and comments. The FONSI would not be signed until the proposed action achieves environmental compliance with applicable laws and regulations.

This section contains a description of relevant resources that could be impacted by the proposed project. The important resources described are those recognized by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the public. Table 7-1 provides summary information of the institutional, technical, and public importance of these resources.

The following relevant resources are discussed in this report: wetlands, scrub-shrub, wildlife, aquatic resources/fisheries, threatened and endangered species, water quality, air quality, cultural resources, and socioeconomic concerns.

Table 7-1. Relevant Resources and Their Institutional, Technical, and Public Importance

Resource	Institutionally Important	Technically Important	Publicly Important
Wetlands	Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968., EO 11988, and Fish and Wildlife Coordination Act.	Wetlands provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The high value the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes.
Aquatic Resources/ Fisheries	Fish and Wildlife Coordination Act of 1958, as amended; Clean Water Act of 1977, as amended; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968.	Aquatic resources/Fisheries are a critical element of many valuable freshwater and marine habitats; they are an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources.	The high priority that the public places on their esthetic, recreational, and commercial value.

Resource	Institutionally Important	Technically Important	Publicly Important
Wildlife	Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act of 1918	Wildlife is a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The high priority that the public places on the esthetic, recreational, and commercial value of wildlife.
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; the Marine Mammal Protection Act of 1972; and the Bald and Golden Eagle Protection Act of 1940.	USACE, USFWS, NMFS, NRCS, EPA, State Wildlife and Water Quality agencies cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979	State and Federal agencies document and protect sites. Their association or linkage to past events, to historically important persons, and to design and construction values; and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection and enhancement of historical resources.
Water Quality	Clean Water Act of 1977, Fish and Wildlife Coordination Act, Coastal Zone Mgt Act.	USACE, USFWS, NMFS, NRCS, EPA, and State DNR and wildlife/fishery offices recognize value of fisheries and good water quality and the national and state standards established to assess water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water.
Air Quality	Clean Air Act of 1963, as amended.	State and Federal agencies recognize the status of ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS).	Virtually all citizens express a desire for clean air.

The following resources have been considered and found to not be affected by the alternatives under consideration: agricultural lands; essential fish habitat; beaches; floodplain management; Coastal Zone; Gulf water bottoms, Public Use; Prime or Unique Farmland; Unique or Rare Wildlife Habitat; Indian Trust Resources; and Soundscapes/Noise.

7.2 PUBLIC INVOLVEMENT

7.2.1 Scoping

All the proposed changes and dimensions incorporated into the alternatives were determined based on input from the NFS and existing harbor customers. The NFS was included in the initial charrette.

7.2.2 Coordination

This draft EA and draft FONSI (Appendix A) are being coordinated with appropriate congressional, federal, state, and local interests, as well as environmental groups and other interested parties, including:

- United States Department of Interior, U.S. Fish and Wildlife Service, Cookeville, TN and Conway, AR
- United States EPA, Regions IV and VII, Atlanta, GA and Kansas City, KS
- Natural Resources Conservation Service, Nashville, TN and Little Rock, AR
- Arkansas Natural Heritage Commission, Little Rock, AR
- Arkansas Game and Fish Commission, Little Rock, AR
- Arkansas Division of Environmental Quality, Little Rock, AR
- Tennessee Historical Commission, Department of Environment and Conservation, Nashville, TN
- Tennessee Department of Environment and Conservation, Nashville, TN
- Tennessee Wildlife Resources Agency, Nashville, Tennessee

A public notice was issued that describes the proposed action and states that the Draft EA would be made available for a 30-day review and comment period. Comments will be used by the Corps of Engineers in deciding the level of significance for the proposed action. Both Arkansas and Tennessee regulatory agencies issued water quality certifications for dredging operations in the proposed project area (TDEC NRS18.121-23; ADEQ, STAA 20220114).

7.2.3 Tribal Consultation

As a federal agency, USACE is required to assume responsibility for the preservation of historic properties or resources that fall under USACE jurisdiction and that such properties are maintained and managed in a way that considers the preservation of the historic, archeological, architectural and cultural values (EO 13175, NEPA, as amended (42 U.S.C. §§ 4321 et seq.), Sections 106 and 110 of the NHPA, as amended (54 U.S.C. § 306108) and its implementing regulations, (38 C.F.R. Part 800). The NHPA Section 106 process, implemented by regulations of the Advisory Council on Historic Preservation (ACHP), 36 CFR § 800, requires agencies to define a proposed project's APE, identify historic properties in that area that may be directly or indirectly affected by the proposed project, assess the potential for adverse effects, resolve those adverse effects, and provide the ACHP a reasonable opportunity to comment on the undertaking.

The consideration of impacts to historic and cultural resources is mandated under § 101(b)(4) of NEPA. The statute calls for the consideration of a broad range of historic and cultural resources, including sites of religious and cultural importance to federally recognized Tribal governments. Cultural resources include historic properties, archeological resources, and Native American resources including sacred sites and traditional cultural properties. Common cultural resource sites include prehistoric Native American archeological sites, historic archeological sites, shipwrecks, and structures such as bridges and buildings. Historic properties have a narrower meaning and are defined in § 101(a)(1)(A) of the NHPA; they include districts, sites (archeological and religious/cultural), buildings, structures, and objects that are listed in or determined eligible for listing in the NRHP. Historic properties are identified by qualified agency representatives in consultation with the SHPO and Tribes. Executive Order 13175 requires all federal agencies to formulate “an accountable process to ensure meaningful and timely input by tribal officials in the development of the regulatory policies that have tribal Implications.” The USACE Civil Works Tribal Consultation Policy provides guidance to USACE Civil Works on consultation, coordination, and consensus building when working with Tribal Nations; USACE applies the Tribal Consultation Policy to its Civil Works programs. Specifically, USACE incorporates the following six Tribal Policy Principles into its planning processes:

1. Tribal Sovereignty;
2. Trust Responsibility;
3. Government-to-Government and Nation-to-Nation Relations;
4. Consultation Elements;
5. Supporting Tribal self-determination, self-reliance, and capacity building to the fullest extent permitted by law and policy; and
6. Protection of natural and cultural resources.

Each Tribe has a Tribal Historic Preservation Officer (THPO) who assumes the responsibilities of the SHPO for cultural resources within their Tribal lands and consults with federal agencies on activities that may impact archaeological sites of interest on or off Tribal lands [as defined in 36 CFR § 800.16(x)].

Each district provided a Tribal Liaison (TL) to assist the Tribal Liaison Lead in complying with the updated USACE Tribal Consultation Policy. A database of resident/removed Tribes with interests in the study area was developed with primary, secondary, and tertiary points of contact (POCs), preferred method of communication, and the Tribal designated decision maker POC. The Tribes listed below were consulted on the determination based upon the Phase I cultural resources survey. All consultations will also be entered into the USACE Tribal Consultation Database record.

AR/TN SHPO and Tribes Consultation

In compliance with NHPA Section 106, USACE-MVM initiated Section 106 consultation for a No Historic Properties Affected determination for the Proposed Action (Proposed Undertaking) as described in the USACE-MVM correspondence dated July 22, 2025 (Appendix A), to the AR and TN SHPO and the following Tribes:

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Alabama-Quassarte Tribal Town
- Apache Tribe of Oklahoma
- Cherokee Nation
- Coushatta Tribe of Louisiana
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Kialegee Tribal Town
- Ponca Nation of Oklahoma
- Quapaw Nation
- Seminole Nation of Oklahoma
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee

Concurrence responses to USACE's determination of No Historic Properties Affected were received from the following consulting parties to date: the Tennessee SHPO on July 23, 2025, Arkansas SHPO on August 20, 2025, Quapaw Nation on July 22, 2025, Shawnee Nation on August 20, 2025. USACE considers the Section 106 consultation process complete.

7.2.4 Public Comments Received and Responses

The Draft Feasibility Report and EA will be out for public review comment period beginning September 17, 2025 and ending October 20, 2025. This section will be updated for the FINAL Feasibility Report and EA.

To date, no landowner or public opposition to the proposed project has been identified. Implementation of the TSP is anticipated to provide benefits to adjacent landowners, tenants, and harbor partners.

7.2.5 Conclusion

The proposed project involves extending the Osceola Harbor approximately 3,000 feet upstream of the current channel. This extension would include the construction of a new turning basin at the upstream end. The existing turning basin would be maintained for continued operational use. The harbor extension would require dredging to a depth of 9.0 LWRP and an elevation of 193.51 feet AMSL. Dredging material would be placed in open water within the Mississippi River, consistent with current harbor maintenance practices.

This office has assessed the environmental impacts of the proposed action and has determined that the proposed work is expected to have only minor impacts on wildlife, air quality, and hydrology. Impacts to wildlife and air quality would be temporary and would be expected to return to existing conditions after completion of the proposed project action. The proposed project would have little to no impacts upon freshwater marshes, freshwater lakes, state designated scenic streams, prime and unique farmlands, cultural resources,

municipal facilities, municipal utilities, roadways, recreation, aesthetics, or socio-economic issues.

Also, no significant adverse impacts would occur to wetlands, aquatic resources/fisheries, wildlife, threatened and endangered species, hydrology/water quality, air quality, or the human environment. Therefore, an EIS is not required.

Section 8

District Engineer Recommendation

A CAP Section 107 Feasibility Study and Environmental Assessment was conducted to evaluate alternatives for increasing harbor capacity at Ocesola Harbor, Mississippi County, Arkansas (Mississippi River Mile 785). The study focused on reliably accommodating increased barge staging upstream of the existing grain dock to improve harbor operational efficiencies and reduce transportation costs. The Main Report and EA incorporate input from the NFS, with further feedback to be solicited from Federal agencies, non-Federal agencies, and the public as outlined in Section 6.2.4.

This proposed project addresses escalating strain on Osceola Harbor's infrastructure due to a projected 2.4 million ton increase in barge traffic, driven by growth in the steel industry (including Big River Steel and the forthcoming Hybar plant) and sustained agricultural commodity transport (Poinsett Rice and Grain currently ships 500,000 tons annually). This growth creates an acute shortage of maneuverability and staging space, increasing transportation costs and jeopardizing operational efficiency, particularly during the low-water season (August-November).

The TSP proposes extending the harbor channel and a new turning basin to address these navigation challenges and safety risks. Dredged material would be cast to the Mississippi River downstream of the channel mouth. The TSP is the NFS supported plan and does not impact the existing original CAP Section 107 project or alter existing OMRR&R responsibilities. It is considered a separate enhancement to the original 1977 project.

The TSP demonstrates strong economic justification with Net Excess Benefits of \$12,391,000 and a Benefit-Cost Ratio (BCR) of 13.6:1 at FY 2025 price levels, using a 3.0 percent Federal discount rate. Construction is anticipated to begin in 2026, with benefits realized starting in 2027.

An environmental analysis has been conducted by the MVM District for the with-project alternatives to address the impacts associated with the harbor extension. The potential impacts of the TSP were considered, and it was determined that the TSP would not result in significant impacts to navigation, wetlands, aquatic resources/fisheries, wildlife, or recreation. Any impacts to water quality would be minor and temporary during construction but should return to ambient conditions after construction. Minor, temporary impacts from construction activity emissions would be expected to reduce air quality. With the increased barge traffic, a slight decrease in air quality would be expected, but no violations to state criteria are expected. Construction activities may affect but are not likely to adversely affect threatened and endangered species, including the Fat Pocketbook mussel and Pallid Sturgeon. Construction and operational activities would have no effect on the other proposed, threatened, and endangered species. There were no significant concerns with HTRW, cultural resources, or socioeconomic issues. Therefore, no mitigation is required.

The recommendations contained herein reflect the information available at this time and current USACE policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the national Civil Works construction program nor the perspective higher review levels within the Executive Branch. Consequently, these recommendations may be modified before implementation. However, the NFS, the State, interested Federal agencies and other parties would be advised of any modifications and would be afforded an opportunity to comment further.

COL John L. Morrow
Colonel, U.S. Army
District Commander

Section 9

List of Preparers

This Draft Feasibility Report with Integrated EA CAP Section 107 was prepared by the USACE Lead Planner (New Orleans District; Regional Planning and Environment Division South, MVN-PD; 7400 Leake Avenue, New Orleans, Louisiana 70118) and Environmental Manager (Memphis District, 167 N Main Street B202, Memphis, TN 38103), respectively.

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Section 10

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Section 11

List of Acronyms and Abbreviations

ADEQ	Arkansas Department of Environmental Quality
AR	State of Arkansas
AMSL	Above Mean Sea Level
APE	Area of Potential Effect
ARA	Abbreviated Cost Risk Analysis
BCR	Benefit-Cost Ratio
CAP	Continuing Authorities Program
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWA	Clean Water Act of 1972
CZMA	Coastal Zone Management Act of 1972
DCAR	Draft Coordination Act Report
EA	Environmental Assessment
EO	Executive Orders
EP	Engineering Pamphlet
EPA	Environmental Protection Agency
ER	Engineering Regulation
ERDC	U.S. Army Engineer Research and Development Center
ESA	Environmental Site Assessment
EQ	Environmental Quality
FCSA	Feasibility Cost Share Agreement
FID	Federal Interest Determination
FTE	Full-Time Equivalency

FWCA	Fish and Wildlife Coordination Act
HTRW	Hazardous, Toxic, and Radioactive Waste
LERRD	Lands, Easements, Rights-of-Way, Relocations, and Dredged or Excavated Material Disposal Areas
LWRP	Low Water Reference Plane
LMR	Lower Mississippi River
MAV	Mississippi Alluvial Valley
MVM	Memphis District
NED	National Economic Development
NEPA	National Environmental Policy Act
NFS	Non-federal Sponsor
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
OHWM	Ordinary High Water Mark
OMRR&R	Operations, Maintenance, Repair, Replacement and Rehabilitation
OSE	Other Social Effects
PPG	Planning Policy and Guidance
P&G	Planning and Guidance
PED	Preconstruction Engineering and Design
PPA	Project Partnership Agreement (PPA)
RCP	Representative Concentration Pathway
RECONS	Regional ECONomic System
RED	Regional Economic Development
ROM	Rough Order of Magnitude



Osceola Harbor Extension, Mississippi County, Arkansas Feasibility Study



Appendix A - Environmental

September 2025

The U.S. Department of Defense is committed to making its electronic and information technologies accessible to individuals with disabilities in accordance with Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended in 1998. For persons with disabilities experiencing difficulties accessing content, please use the form @ <https://dodcio.defense.gov/DoDSection508/Section-508-Form/>. In this form, please indicate the nature of your accessibility issue/problem and your contact information so we can address your issue or question. For more information about Section 508, please visit the DoD Section 508 website. <https://dodcio.defense.gov/DoDSection508.aspx>.

Continuing Authorities Program, Section 107 – OSCEOLA HARBOR EXTENSION, MISSISSIPPI COUNTY, ARKANSAS



Finding of No Significant Impact

September 2025

FINDING OF NO SIGNIFICANT IMPACT

**OSCEOLA HARBOR EXTENSION, MISSISSIPPI COUNTY, ARKANSAS
INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT**

The U.S. Army Corps of Engineers (USACE), Memphis District (MVM) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The final Integrated Feasibility Report and Environmental Assessment (IFR/EA) dated **TBD**, for the Osceola Harbor Extension, Mississippi County, Arkansas addressed the expansion of the existing Osceola Harbor to alleviate critical congestion within the Osceola Harbor, enhance the efficiency of barge traffic, and to support continued economic growth in Mississippi County, Arkansas.

The Final IFR/EA, incorporated herein by reference, evaluated various alternatives that would reduce logistical inefficiencies and costs while improving productivity and safety in the study area. The Recommended Plan includes:

- Expanding the existing Osceola Harbor approximately 3,000 feet upstream, consistent with one of the two plans evaluated as part of the 1971 Environmental Statement and 1970 Detailed Study Report;
 - Dredging to a depth of 9.0 on the Low Water Reference Plane and an elevation of 193.5 feet Above Mean Sea Level;
 - All dredging material would be placed in the Mississippi River, consistent with current harbor maintenance practices;
- Constructing a new turning basin at the upstream end of the expansion;
- Maintaining the existing turning basin for continued operational use;
- Conducting periodic harbor maintenance dredging in the future.

In addition to a “no action” plan, two other alternatives were evaluated. The alternatives included a No Action Alternative (No changes to the current harbor, maintains existing conditions) and extending the harbor with open water dredge material placement or placement in an upland area. The placement of material in an upland area appeared to initially meet Planning and Guidance criteria during preliminary screening. Further investigation revealed deficiencies in the completeness criterion and the efficiency criterion, core components of the planning process leading to it being screened out. Widening the harbor was screened out due to substantial logistical and environmental hurdles. Lengthening the harbor less than the 3,000 feet proposed was also screened out as it would not meet proposed project objectives. Similarly, using the Mississippi River for making tows and staging barges was also screened out due to significant safety and logistical constraints.

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1.

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) as detailed in the IFR/EA will be implemented, if appropriate, to minimize impacts. These BMPs are detailed in Sections 2 and 4 of the IFR/EA and include:

- Avoidance of excessive impacts of pollutants to waters of the state,

DRAFT Finding of No Significant Impact

- Prevent, using all reasonable measures, the spillage or leakage of chemicals, oil, grease, gasoline, diesel, or other fuels,
- Limiting construction to low flow periods as much as possible to minimize adverse effects on water quality and aquatic life, and
- Any measures that pose a safety concern to navigation would be added to the navigation charts.

Table 1: Summary of Potential Effects of the Recommended Plan

	Less than significant effects	Less than significant effects as a result of mitigation*	Resource unaffected by action
Land Use	☒	☐	☐
Wetlands	☒	☐	☐
Aquatic resources/Fisheries	☒	☐	☐
Wildlife	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Invasive Species	☒	☐	☐
Recreation	☒	☐	☐
Aesthetics	☒	☐	☐
Greenhouse Gases	☒	☐	☐
Hazardous, toxic & radioactive waste	☒	☐	☐
Water Quality	☒	☐	☐
Historic properties	☒	☐	☐
Other cultural resources	☒	☐	☐
Tribal trust resources	☒	☐	☐
Air Quality	☒	☐	☐
Socio-economics	☒	☐	☐
Environmental justice	☒	☐	☐

Public review of the draft IFR/EA and FONSI was completed on **TBD**. No objections or adverse comments to the proposed project were received.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers anticipates the proposed activities would have no effect on Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*), Piping Plover (*Charadrius melodus*), Rufa Red Knot (*Calidris canutus rufa*), Pondberry (*Lindera melissifolia*), Alligator Snapping Turtle (*Macrochelys temminckii*), Monarch Butterfly (*Danaus plexippus*), and Tricolored Bat (*Perimyotis subflavus*), and may affect but not likely to adversely affect the Pallid Sturgeon (*Scaphirhynchus alba*), and Fat Pocketbook mussel (*Potamilus capax*). The U.S. Fish and Wildlife Service (FWS) concurred with the Corps' determinations on **TBD**.

DRAFT Finding of No Significant Impact

Pursuant to section 106 of the National Historic Preservation Act of 1966, as amended, the USACE determined that no historic properties are anticipated to be affected by the tentatively selected plan. USACE received concurrence with the effect determination from the Tennessee State Historic Preservation Office (23 July 2025) and the Arkansas State Historic Preservation Office (20 August 2025), the Quapaw Nation (22 July 2025), and the Shawnee Tribe (20 August 2025).

A Section 401 Water Quality Certification (DEQ No. 20220114) from Tennessee Department of Environmental and Conservation and Short-Term Activity Authorization Request (STAA No. 20220114) was obtained from the Arkansas Department of Energy and Environment, Division of Environmental Quality. All conditions of the water quality certification, STAA, and Nationwide Permit will be implemented in order to minimize adverse impacts to water quality.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

Technical, environmental, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, public input, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date

John L. Morrow
Colonel, Corps of Engineers
District Commander



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
167 NORTH MAIN STREET B-202
MEMPHIS, TN 38103-1894

July 14, 2025

Environmental Compliance Branch
Regional Planning and Environmental Division South

Ms. Jessica Cogburn
Archeologist / Section 106 Program Manager
Arkansas Historic Preservation Program
1100 North Street
Little Rock, AR 72201

RE: Section 106 Review Consultation

Undertaking: Continuing Authorities Program (CAP)
Section 107, River and Harbor Act of 1960 (Small Navigation Project)
Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale
County, Tennessee.

Location	Latitude	Longitude
Beginning of Proposed Harbor Extension	35.411995° N	-89.572061° W
End of Proposed Harbor Extension	35.415404° N	-89.572633° W

Determination: No Historic Properties Affected

Dear Ms. Cogburn:

The U.S. Army Corps of Engineers, Memphis District (USACE MVM), is proposing extension of the existing Osceola Harbor in Mississippi County, Arkansas under the auspices of the Continuing Authorities Program (CAP) (Figure 1). The purpose of CAP is to establish and provide authority for USACE to plan and implement projects of limited size, cost, scope, and complexity. The Osceola Harbor extension project intends to alleviate critical congestion within Osceola Harbor, enhance the efficiency of barge traffic, and support continued economic growth in Mississippi County, Arkansas. The project area is located as follows on the *Osceola, AR* and 7.5-minute USGS quadrangle maps: Sections 6 and 7 in Township 12 N and 13 N, Range 11E (Arkansas) (Figure 2).

Study Authority

The study authority is authorized under Small Navigation Project under CAP, specifically Section 107 of the Rivers and Harbors Act of 1960, as amended. CAP authorizes USACE to plan, design, and construct limited-scope water resource and ecosystem restoration projects without additional Congressional authorization. Section 107 specifically enables USACE to develop and construct small navigation projects after a detailed investigation demonstrates engineering feasibility and economic justification.

Description of Undertaking

The Osceola waterfront has a long history of river commerce, serving as a port of call for Mississippi River packet boats and later was used as a terminal for barge traffic. Historically, the bendway of Island No. 30 functioned as the main navigation channel before shifts in the river's alignment. From 1931-1936, USACE utilized the harbor area as a landing and staging area for its revetment layup and casting fleet.

The Osceola Harbor channel was authorized under Section 107 of the River and Harbor Act of 1960, (Public Law 86-645). The detailed study report was submitted to the Chief of Engineers with 1st endorsement on June 26, 1970. The 1975 Water Resources Development in Arkansas Report by USACE Southwestern Division outlined the planned improvements:

The harbor at Osceola will be improved by construction of a channel 250 feet wide and 9 feet deep beginning at the downstream end of the harbor channel and extending upstream 6,500 feet to the old chute through Island No. 30, to Mile 785.4 AHP, with a 250-foot-radius turning basin at the upstream end. A 97-acre flood-free industrial park will be developed by the city of Osceola. The first phase of development will provide a levee constructed by local interests to protect the industrial area from flooding until the second stage of development will utilize dredged material to raise the elevation of the area to above the project flood flow line. Local interests will be responsible for construction of all necessary bulkheads and dikes, prior to dredging to contain the dredge material. Construction began in fiscal year 1975.

An Environmental Statement supporting the 1970 study report was finalized in January 1971 by MVM. This statement emphasized the need for measures to minimize turbidity and prevent pollution during construction, including land disposal of spoil and careful handling of oils and other pollutants.

The Osceola Harbor authority was amended pursuant to Section 3010 of the Water Resource Development Act (WRDA) of 2007. This amendment allows non-Federal interests to construct a mooring facility within the existing authorized harbor channel, subject to all necessary permits and certifications, while maintain the USACE's responsibility for maintaining the general navigation features of the project, including a bottom width of 250 feet.

Further modifications that impacted the harbor occurred in 1978 with the construction of two stone dikes (authorized under Section 4 of the Flood Control Act of 22 December 1944, as amended) to create Lake Neark. These structures, built with approximately 47,000 cubic yards of stone and 6,000 cubic yards of excavated material, restrict flows through the former chute Island No. 30, creating a recreational area.

The Mississippi River channel near Osceola Harbor is protected by multiple USACE-constructed structures. The Keyes Point Dikes and Plum Point Dikes were constructed to stabilize the riverbanks and improve navigation. The Kate Aubrey Towhead - Island 30 revetment protects the shoreline north of the harbor entrance, and the Lower Bullerton Revetments protect the shoreline south of the harbor entrance. All of these structures – the dikes and the revetments – are subject to navigation regulations outlined in Title 33 CFR Part 207, as detailed in MVM Navigation Bulletin NO 1 of 2022. These regulations generally restrict anchoring adjacent to these structures and limit landings to established commercial areas to protect the integrity of the bank stabilization works.

The proposed plan, *Osceola Harbor Extension with Open water Dredge Material Placement*, includes extending the Osceola Harbor approximately 3,000 feet upstream, consistent with one of the two plans evaluated as part of the 1971 Report. This extension would include the construction of a new turning basin at the upstream end, centered at approximately UTM Zone 16 (X,Y) ft = (762,762, 12,973,129). The existing turning basin would be maintained for continued operational use. The harbor extension would require dredging to a depth of -9.0 LWRP and an elevation of 193.51 ft AMSL. Dredging would encompass an area of approximately 24 acres, extending the channel 3,000 ft with a width of 250 ft. Dredged material would be placed in the Mississippi River, consistent with current harbor maintenance practices. No changes to the existing channel limits are proposed beyond the extension area (Figure 3).

Area of Potential Effects (APE)

The APE is defined as the proposed expansion, and the open water disposal area in the MS River where the spoil will be dispersed (Figures 1-2). The APE totals approximately 24 acres (9.71246 hectares) for the harbor extension. Access routes and the open water disposal area are not included in this calculation, as they are either public roads, heavily used agricultural roads, or already utilized waterways.

Identification and Evaluation of Historic Properties

Historic properties in the project vicinity were identified based on a review of the National Register of Historic Places (NRHP) database, the Automated Management of Archaeological Site Data in Arkansas (AMASDA), historic aerial photography, historic map research, and a review of cultural resources survey reports (Figure 3). Review of current cultural resources map revealed no historic properties within and relatively few known cultural resources adjacent to the APE.

According to the Automated Management of Archaeological Site Data in Arkansas (AMASDA), in Mississippi County, AR, there are seven previously recorded archaeological sites, consisting of four historic scatter sites, a Civil War artifact cache, and three 1843 historic homes (Table 1). The Hale Avenue Historic District is within one mile of the APE and is on the National Register of Historic Properties but will not be affected by the project. There are no other National Register of Historic Properties (NRHP) sites within or adjacent to the APE.

Three cultural resources surveys have been conducted on behalf of the MVM and one other sponsor over the last 21 years in association with a cultural resources survey of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023) (Table 2).

According to data from the Tennessee Site File Map View for Lauderdale County, Tennessee, APE, there are no previously recorded archaeological sites in the vicinity. Furthermore, there have been no cultural resources surveys conducted in or adjacent to the APE in Lauderdale County. There are no NRHP sites within or adjacent to the Tennessee APE (Figure 4).

Table 1. Previously recorded cultural resources located within an approximately 1-mile (1.6 km) radius of the APE.

Resource Designation	Period(s)	Date Recorded	NRHP Status
3MS0999	Historic Scatter early to mid 20 th century	04/2023	Not Eligible
3MS0998	Historic Scatter early to mid 20 th century	04/2023	Not Eligible
3MS0713	Historic Scatter late 19 th to early 20 th century	08/2004	Not Eligible
3MS0705	Historic Scatter late 19 th to early-mid 20 th century	08/2004	Not Eligible
3MS0238	Historic house, ca 1843, Anglo-American	02/1976	Not Eligible
3MS0237	Historic house, ca 1843, Anglo-American	02/1977	Not Eligible
3MS0236	Historic house, ca 1843, Anglo-American	02/1977	Not Eligible

Table 2. Previously recorded cultural resources surveys conducted within an approximately 1-mile (1.6 km) radius of the APE.

Report No.	Title	Author/Principal Investigator	Date
4893 (AR)	Cultural Resources Survey of Approximately 700 Acres South of Osceola, Mississippi County, Arkansas	PanAmerican Consultants	2004
5939 (AR)	Luxora Relief Wells Mississippi County, Arkansas	PanAmerican Consultants	2009
8098 (AR)	Hybar MicroMill Survey, Mississippi County, Arkansas	Commonwealth Heritage Group.	2023

Cartographic Analysis

The landscape that constitutes the study area has historically been part of the Mississippi River or part of a sandbar within the Mississippi River since the 1800s (Figures 5-6). Analysis of available historic maps from the 19th-century indicate that the Mississippi River channel flowed exactly where the current APE is established. (Figure 5). Congress created the Mississippi River Commission in 1879 to centralize flood-fighting measures along the Mississippi River, coordinating efforts with the U.S. Army Corps of Engineers to provide protection against flood devastation as well as facilitate the river shipping frequently hindered by alluvial deposits. By the late nineteenth century, arguments over the most appropriate method of controlling the river led to a “levees-only” policy. Despite the constant construction of levees, the man-made structures failed to harness the river.

According to the published 1880s Mississippi River Commission Maps, the section of the Mississippi River near Osceola was almost braided, depositing sand regularly and creating various islands in and around the bend at Osceola. Attempts to control the main channel of the Mississippi River had been taking place as early as the 1800s by placing dikes in strategic locations. Nevertheless, sand kept being deposited near the Osceola Harbor channel which will need to be removed in order to create the new harbor extension.

Previous Cultural Resources Investigations

Three cultural resource surveys have been conducted on behalf of the MVM and one other sponsor over the last 21 years in association with a cultural resources survey of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023).

Given the absence of identified historic properties, existing survey coverage, previous construction, development, and maintenance activities, and the low probability of the presence of unidentified resources, USACE has determined that the existing surveys constitute a reasonable and good faith effort at identification and evaluation of historic properties and that it is unlikely that any unidentified historic properties are present in the currently proposed APE; therefore, no further cultural resources investigation is recommended.

Assessment of Effects to Historic Properties

Based on the information presented in this letter, USACE MVM has determined that there are no historic properties, as defined in 36 CFR 800.16 (l) in the APE, for the CAP Section 107, River and Harbor Act of 1960 (Small Navigation Project) Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale County, Tennessee. Therefore, USACE MVM is making a finding of **No Historic Properties Affected** for this undertaking and submitting it to you for review and comment. This project will be subject to the standard change in scope of work, unexpected discovery, and unmarked human burial sites act provisions. USACE MVM requests your comments within 30 days, per 36 CFR 800.5(c).

If you have any questions or require additional information concerning these undertakings, please contact Pamela D. Lieb, District Archaeologist and Tribal Liaison of this office at (901) 544-0710 or via e-mail Pamela.D.Lieb@usace.army.mil.

Sincerely,

SMITH.MARK.
R.1219443621

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SMITH.MARK.R.1219443621
Date: 2025.07.22 09:37:11
-05'00'

Mark Smith
Chief, Environmental Compliance Branch
Regional Planning and Environmental Division
South

List of Recipients:

Absentee-Shawnee Tribe of Indians of Oklahoma
Alabama Coushatta Tribe of Texas
Cherokee Nation
Coushatta Tribe of Louisiana
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Kialegee Tribal Town
Osage Nation
Ponca Nation of Oklahoma
Quapaw Nation
Seminole Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town

Tunica-Biloxi Tribe of Louisiana

United Keetoowah Band of Cherokee

Arkansas State Historic Preservation Office (AR SHPO)

Tennessee State Historic Preservation Office (TN SHPO)



Figure 1. Osceola Harbor Extension Project Area Overview (Aerial).



Figure 2. Osceola Harbor Extension Project Area Overview (Topo).

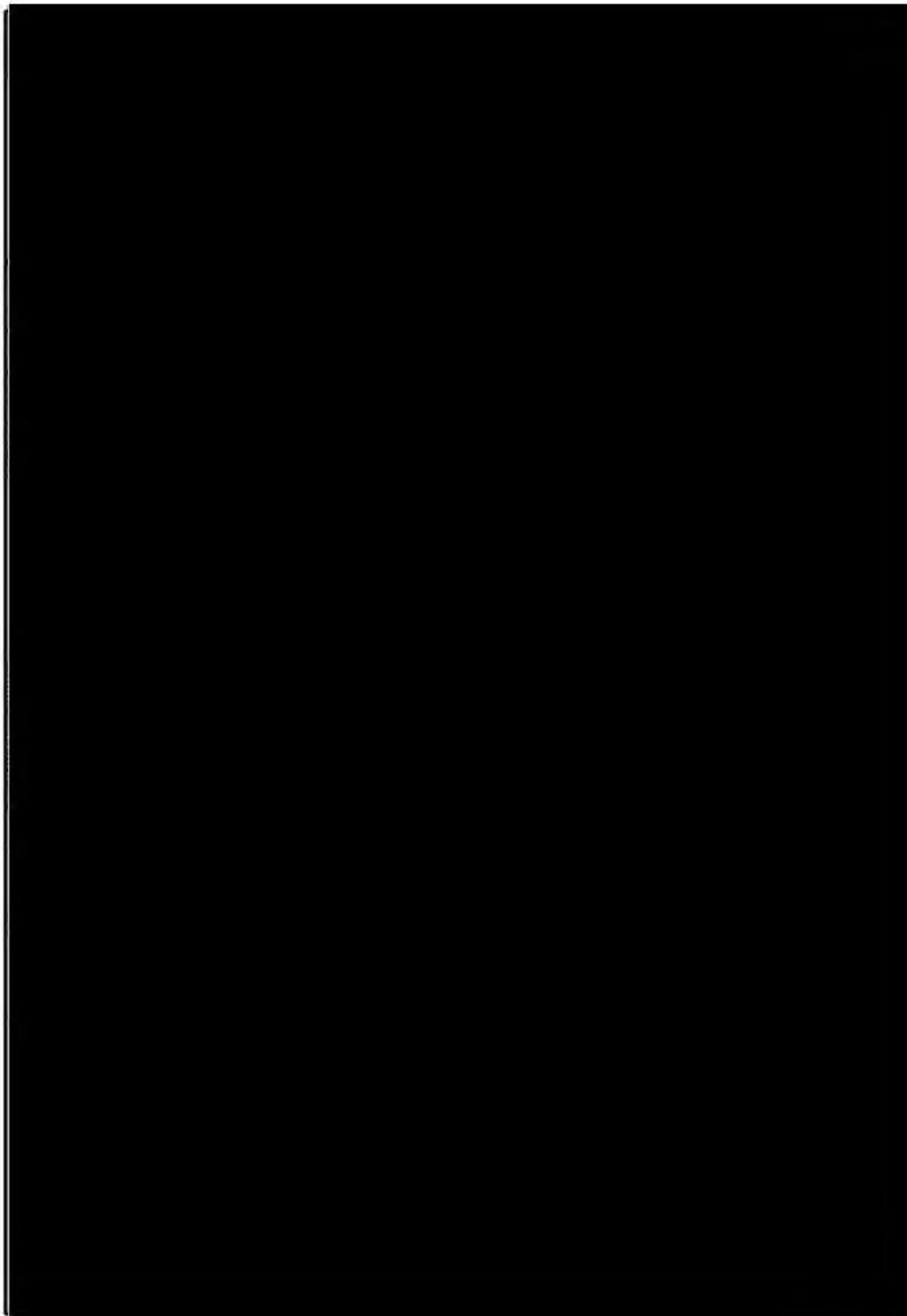


Figure 3. USGS Topographic Map Displaying existing Arkansas Cultural Resources and Cultural Resources Surveys and NRHP data with a 1-mile (1.6 km) radius of the APE.

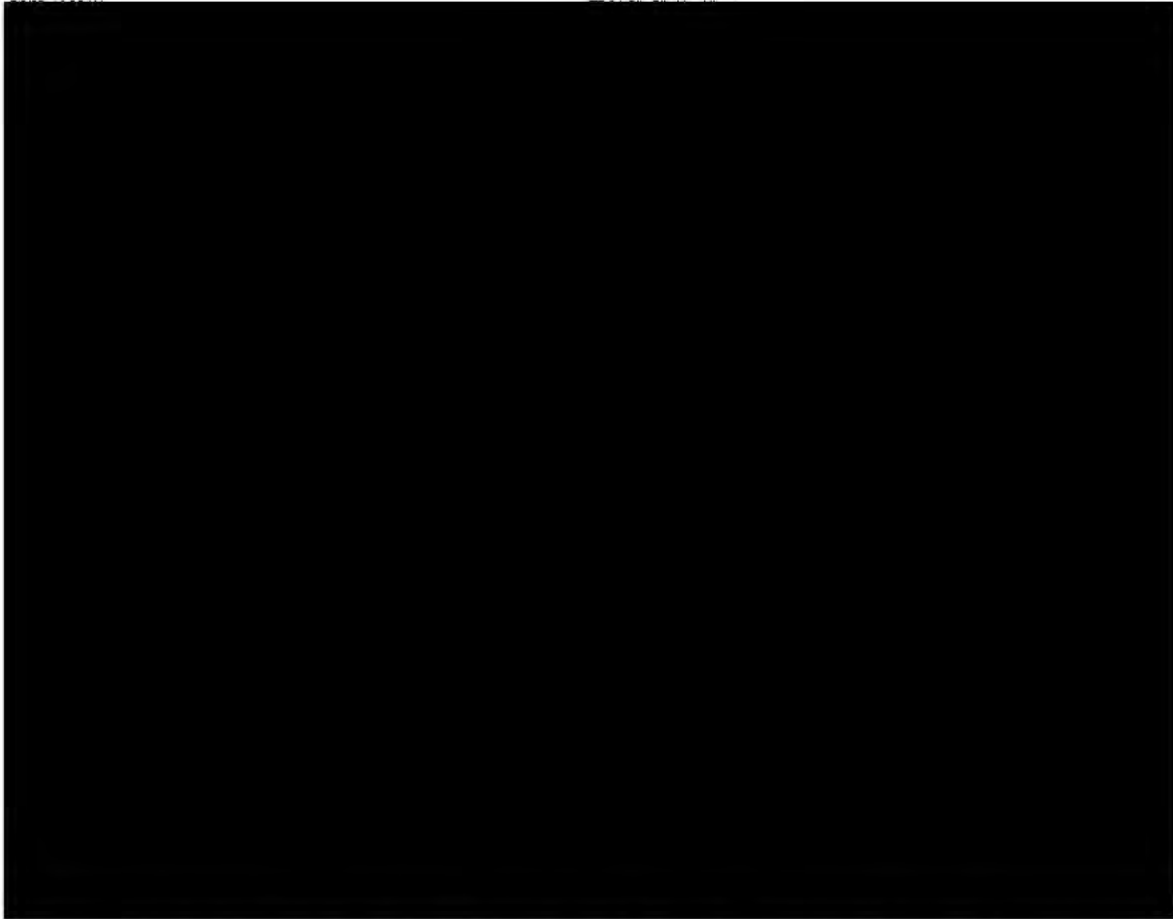


Figure 4. USGS Topographic Map Displaying Existing Tennessee Cultural Resources and Cultural Resources Surveys and NRHP Data within a 1-mile (1.6 km) radius of the APE.

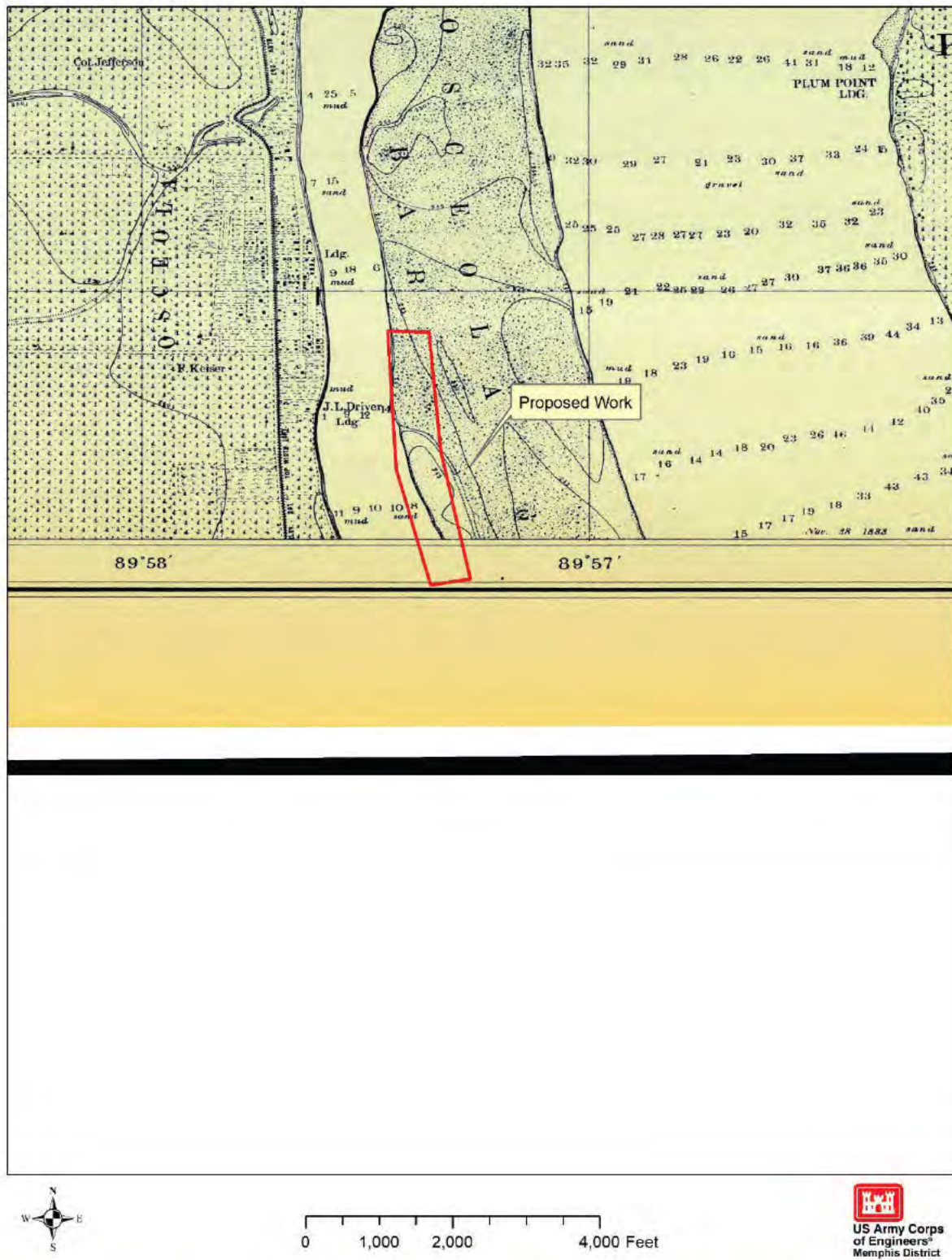


Figure 5. The 1879-1880 Mississippi River Commission Navigation Map with the APE indicated (red).

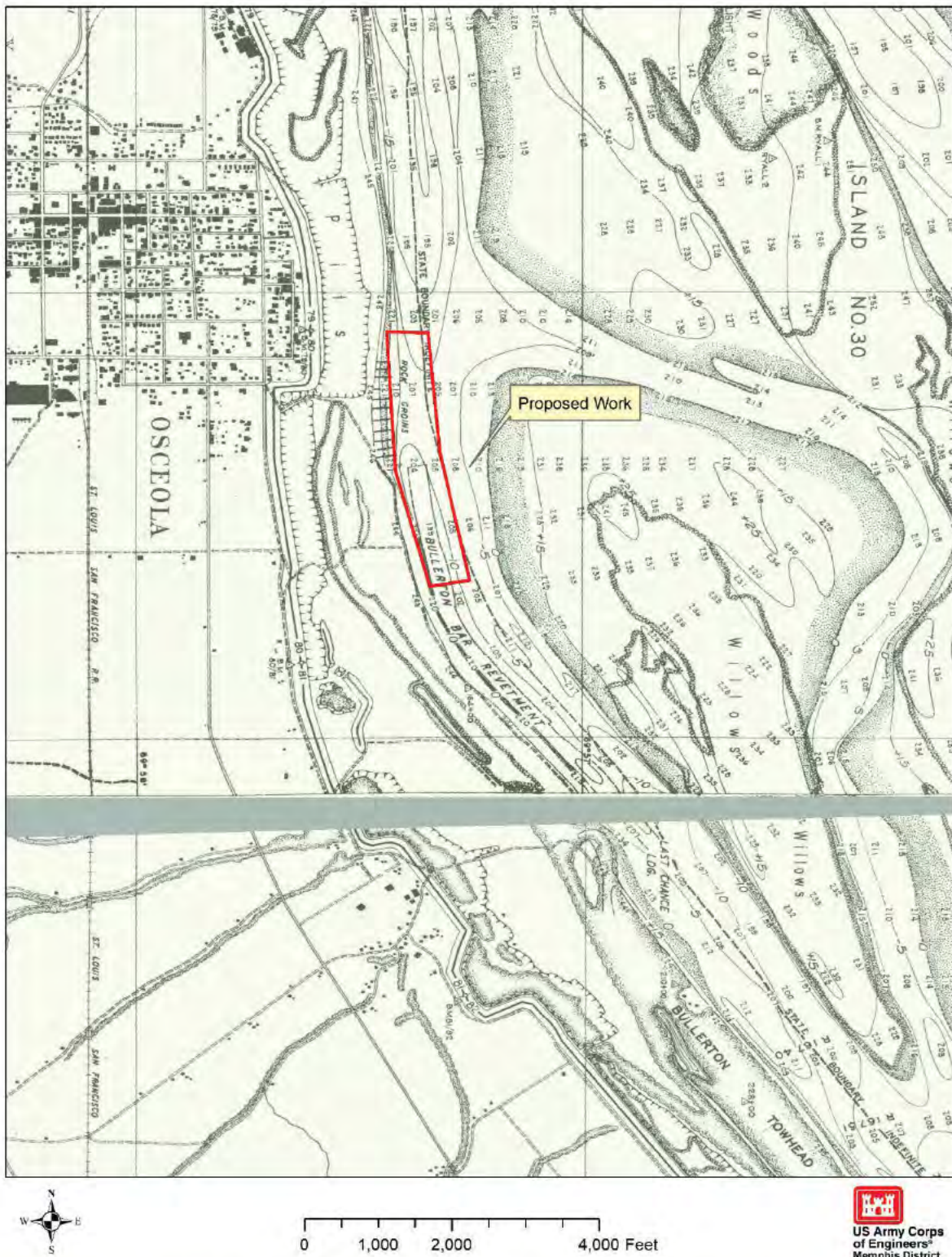


Figure 6. The 1937 Navigation Map with the APE indicated (red).



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
167 NORTH MAIN STREET B-202
MEMPHIS, TN 38103-1894

July 10, 2025

Environmental Compliance Branch
Regional Planning and Environmental Division South

Ms. Billie Burtrum
Tribal Historic Preservation Officer
Quapaw Nation
P. O. Box 765
Quapaw, Ok 74363

RE: Section 106 Review Consultation

Undertaking: Continuing Authorities Program (CAP)
Section 107, River and Harbor Act of 1960 (Small Navigation Project)
Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale
County, Tennessee.

Location	Latitude	Longitude
Beginning of Proposed Harbor Extension	35.411995° N	-89.572061° W
End of Proposed Harbor Extension	35.415404° N	-89.572633° W

Determination: No Historic Properties Affected

Dear Ms. Burtrum:

The U.S. Army Corps of Engineers, Memphis District (USACE MVM), is proposing extension of the existing Osceola Harbor in Mississippi County, Arkansas under the auspices of the Continuing Authorities Program (CAP) (Figure 1). The purpose of CAP is to establish and provide authority for USACE to plan and implement projects of limited size, cost, scope, and complexity. The Osceola Harbor extension project intends to alleviate critical congestion within Osceola Harbor, enhance the efficiency of barge traffic, and support continued economic growth in Mississippi County, Arkansas. The project area is located as follows on the *Osceola, AR* and 7.5-minute USGS quadrangle maps: Sections 6 and 7 in Township 12 N and 13 N, Range 11E (Arkansas) (Figure 2).

Study Authority

The study authority is authorized under Small Navigation Project under CAP, specifically Section 107 of the Rivers and Harbors Act of 1960, as amended. CAP authorizes USACE to plan, design, and construct limited-scope water resource and ecosystem restoration projects without additional Congressional authorization. Section 107 specifically enables USACE to develop and construct small navigation projects after a detailed investigation demonstrates engineering feasibility and economic justification.

Description of Undertaking

The Osceola waterfront has a long history of river commerce, serving as a port of call for Mississippi River packet boats and later was used as a terminal for barge traffic. Historically, the bendway of Island No. 30 functioned as the main navigation channel before shifts in the river's alignment. From 1931-1936, USACE utilized the harbor area as a landing and staging area for its revetment layup and casting fleet.

The Osceola Harbor channel was authorized under Section 107 of the River and Harbor Act of 1960, (Public Law 86-645). The detailed study report was submitted to the Chief of Engineers with 1st endorsement on June 26, 1970. The 1975 Water Resources Development in Arkansas Report by USACE Southwestern Division outlined the planned improvements:

The harbor at Osceola will be improved by construction of a channel 250 feet wide and 9 feet deep beginning at the downstream end of the harbor channel and extending upstream 6,500 feet to the old chute through Island No. 30, to Mile 785.4 AHP, with a 250-foot-radius turning basin at the upstream end. A 97-acre flood-free industrial park will be developed by the city of Osceola. The first phase of development will provide a levee constructed by local interests to protect the industrial area from flooding until the second stage of development will utilize dredged material to raise the elevation of the area to above the project flood flow line. Local interests will be responsible for construction of all necessary bulkheads and dikes, prior to dredging to contain the dredge material. Construction began in fiscal year 1975.

An Environmental Statement supporting the 1970 study report was finalized in January 1971 by MVM. This statement emphasized the need for measures to minimize turbidity and prevent pollution during construction, including land disposal of spoil and careful handling of oils and other pollutants.

The Osceola Harbor authority was amended pursuant to Section 3010 of the Water Resource Development Act (WRDA) of 2007. This amendment allows non-Federal interests to construct a mooring facility within the existing authorized harbor channel, subject to all necessary permits and certifications, while maintain the USACE's responsibility for maintaining the general navigation features of the project, including a bottom width of 250 feet.

Further modifications that impacted the harbor occurred in 1978 with the construction of two stone dikes (authorized under Section 4 of the Flood Control Act of 22 December 1944, as amended) to create Lake Neark. These structures, built with approximately 47,000 cubic yards of stone and 6,000 cubic yards of excavated material, restrict flows through the former chute Island No. 30, creating a recreational area.

The Mississippi River channel near Osceola Harbor is protected by multiple USACE-constructed structures. The Keyes Point Dikes and Plum Point Dikes were constructed to stabilize the riverbanks and improve navigation. The Kate Aubrey Towhead - Island 30 revetment protects the shoreline north of the harbor entrance, and the Lower Bullerton Revetments protect the shoreline south of the harbor entrance. All of these structures – the dikes and the revetments – are subject to navigation regulations outlined in Title 33 CFR Part 207, as detailed in MVM Navigation Bulletin NO 1 of 2022. These regulations generally restrict

anchoring adjacent to these structures and limit landings to established commercial areas to protect the integrity of the bank stabilization works.

The proposed plan, *Osceola Harbor Extension with Open water Dredge Material Placement*, includes extending the Osceola Harbor approximately 3,000 feet upstream, consistent with one of the two plans evaluated as part of the 1971 Report. This extension would include the construction of a new turning basin at the upstream end, centered at approximately UTM Zone 16 (X,Y) ft = (762,762, 12,973,129). The existing turning basin would be maintained for continued operational use. The harbor extension would require dredging to a depth of -9.0 LWRP and an elevation of 193.51 ft AMSL. Dredging would encompass an area of approximately 24 acres, extending the channel 3,000 ft with a width of 250 ft. Dredged material would be placed in the Mississippi River, consistent with current harbor maintenance practices. No changes to the existing channel limits are proposed beyond the extension area (Figure 3).

Area of Potential Effects (APE)

The APE is defined as the proposed expansion, and the open water disposal area in the MS River where the spoil will be dispersed (Figures 1-2). The APE totals approximately 24 acres (9.71246 hectares) for the harbor extension. Access routes and the open water disposal area are not included in this calculation, as they are either public roads, heavily used agricultural roads, or already utilized waterways.

Identification and Evaluation of Historic Properties

Historic properties in the project vicinity were identified based on a review of the National Register of Historic Places (NRHP) database, the Automated Management of Archaeological Site Data in Arkansas (AMASDA), historic aerial photography, historic map research, and a review of cultural resources survey reports (Figure 3). Review of current cultural resources map revealed no historic properties within and relatively few known cultural resources adjacent to the APE.

According to the Automated Management of Archaeological Site Data in Arkansas (AMASDA), in Mississippi County, AR, there are seven previously recorded archaeological sites, consisting of four historic scatter sites, a Civil War artifact cache, and three 1843 historic homes (Table 1). The Hale Avenue Historic District is within one mile of the APE and is on the National Register of Historic Properties but will not be affected by the project. There are no other National Register of Historic Properties (NRHP) sites within or adjacent to the APE.

Three cultural resources surveys have been conducted on behalf of the MVM and one other sponsor over the last 21 years in association with a cultural resources survey of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023) (Table 2).

According to data from the Tennessee Site File Map View for Lauderdale County, Tennessee, APE, there are no previously recorded archaeological sites in the vicinity. Furthermore, there have been no cultural resources surveys conducted in or adjacent to the APE in Lauderdale County. There are no NRHP sites within or adjacent to the Tennessee APE (Figure 4).

Table 1. Previously recorded cultural resources located within an approximately 1-mile (1.6 km) radius of the APE.

Resource Designation	Period(s)	Date Recorded	NRHP Status
3MS0999	Historic Scatter early to mid 20 th century	04/2023	Not Eligible
3MS0998	Historic Scatter early to mid 20 th century	04/2023	Not Eligible
3MS0713	Historic Scatter late 19 th to early 20 th century	08/2004	Not Eligible
3MS0705	Historic Scatter late 19 th to early-mid 20 th century	08/2004	Not Eligible
3MS0238	Historic house, ca 1843, Anglo-American	02/1976	Not Eligible
3MS0237	Historic house, ca 1843, Anglo-American	02/1977	Not Eligible
3MS0236	Historic house, ca 1843, Anglo-American	02/1977	Not Eligible

Table 2. Previously recorded cultural resources surveys conducted within an approximately 1-mile (1.6 km) radius of the APE.

Report No.	Title	Author/Principal Investigator	Date
4893 (AR)	Cultural Resources Survey of Approximately 700 Acres South of Osceola, Mississippi County, Arkansas	PanAmerican Consultants	2004
5939 (AR)	Luxora Relief Wells Mississippi County, Arkansas	PanAmerican Consultants	2009
8098 (AR)	Hybar MicroMill Survey, Mississippi County, Arkansas	Commonwealth Heritage Group.	2023

Cartographic Analysis

The landscape that constitutes the study area has historically been part of the Mississippi River or part of a sandbar within the Mississippi River since the 1800s (Figures 5-6). Analysis of available historic maps from the 19th-century indicate that the Mississippi River channel flowed exactly where the current APE is established. (Figure 5). Congress created the Mississippi River Commission in 1879 to centralize flood-fighting measures along the Mississippi River, coordinating efforts with the U.S. Army Corps of Engineers to provide protection against flood devastation as well as facilitate the river shipping frequently hindered by alluvial deposits. By the late nineteenth century, arguments over the most appropriate method of controlling the river led to a “levees-only” policy. Despite the constant construction of levees, the man-made structures failed to harness the river.

According to the published 1880s Mississippi River Commission Maps, the section of the Mississippi River near Osceola was almost braided, depositing sand regularly and creating various islands in and around the bend at Osceola. Attempts to control the main channel of the Mississippi River had been taking place as early as the 1800s by placing dikes in strategic

locations. Nevertheless, sand kept being deposited near the Osceola Harbor channel which will need to be removed in order to create the new harbor extension.

Previous Cultural Resources Investigations

Three cultural resource surveys have been conducted on behalf of the MVM and one other sponsor over the last 21 years in association with a cultural resources survey of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023).

Given the absence of identified historic properties, existing survey coverage, previous construction, development, and maintenance activities, and the low probability of the presence of unidentified resources, USACE has determined that the existing surveys constitute a reasonable and good faith effort at identification and evaluation of historic properties and that it is unlikely that any unidentified historic properties are present in the currently proposed APE; therefore, no further cultural resources investigation is recommended.

Assessment of Effects to Historic Properties

Based on the information presented in this letter, USACE MVM has determined that there are no historic properties, as defined in 36 CFR 800.16 (l) in the APE, for the CAP Section 107, River and Harbor Act of 1960 (Small Navigation Project) Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale County, Tennessee. Therefore, USACE MVM is making a finding of **No Historic Properties Affected** for this undertaking and submitting it to you for review and comment. This project will be subject to the standard change in scope of work, unexpected discovery, and unmarked human burial sites act provisions. USACE MVM requests your comments within 30 days, per 36 CFR 800.5(c).

If you have any questions or require additional information concerning these undertakings, please contact Pamela D. Lieb, District Archaeologist and Tribal Liaison of this office at (901) 544-0710 or via e-mail Pamela.D.Lieb@usace.army.mil.

Sincerely,

THRON.JOHN.M.

1255783382

Mike Thron

Chief, Environmental Compliance Section

Regional Planning and Environmental Division South

Digitally signed by
THRON.JOHN.M.1255783382
Date: 2025.07.10 21:48:06 -05'00'

List of Recipients:

Absentee-Shawnee Tribe of Indians of Oklahoma
Alabama Coushatta Tribe of Texas
Cherokee Nation
Coushatta Tribe of Louisiana
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Kialegee Tribal Town
Osage Nation

Ponca Nation of Oklahoma
Quapaw Nation
Seminole Nation of Oklahoma
Shawnee Tribe
Thlopthlocco Tribal Town
Tunica-Biloxi Tribe of Louisiana
United Keetoowah Band of Cherokee
Arkansas State Historic Preservation Office (AR SHPO)
Tennessee State Historic Preservation Office (TN SHPO)



Figure 1. Osceola Harbor Extension Project Area Overview (Aerial).



Figure 2. Osceola Harbor Extension Project Area Overview (Topo).



Figure 3. USGS Topographic Map Displaying existing Arkansas Cultural Resources and Cultural Resources Surveys and NRHP data with a 1-mile (1.6 km) radius of the APE.



Figure 4. USGS Topographic Map Displaying Existing Tennessee Cultural Resources and Cultural Resources Surveys and NRHP Data within a 1-mile (1.6 km) radius of the APE.

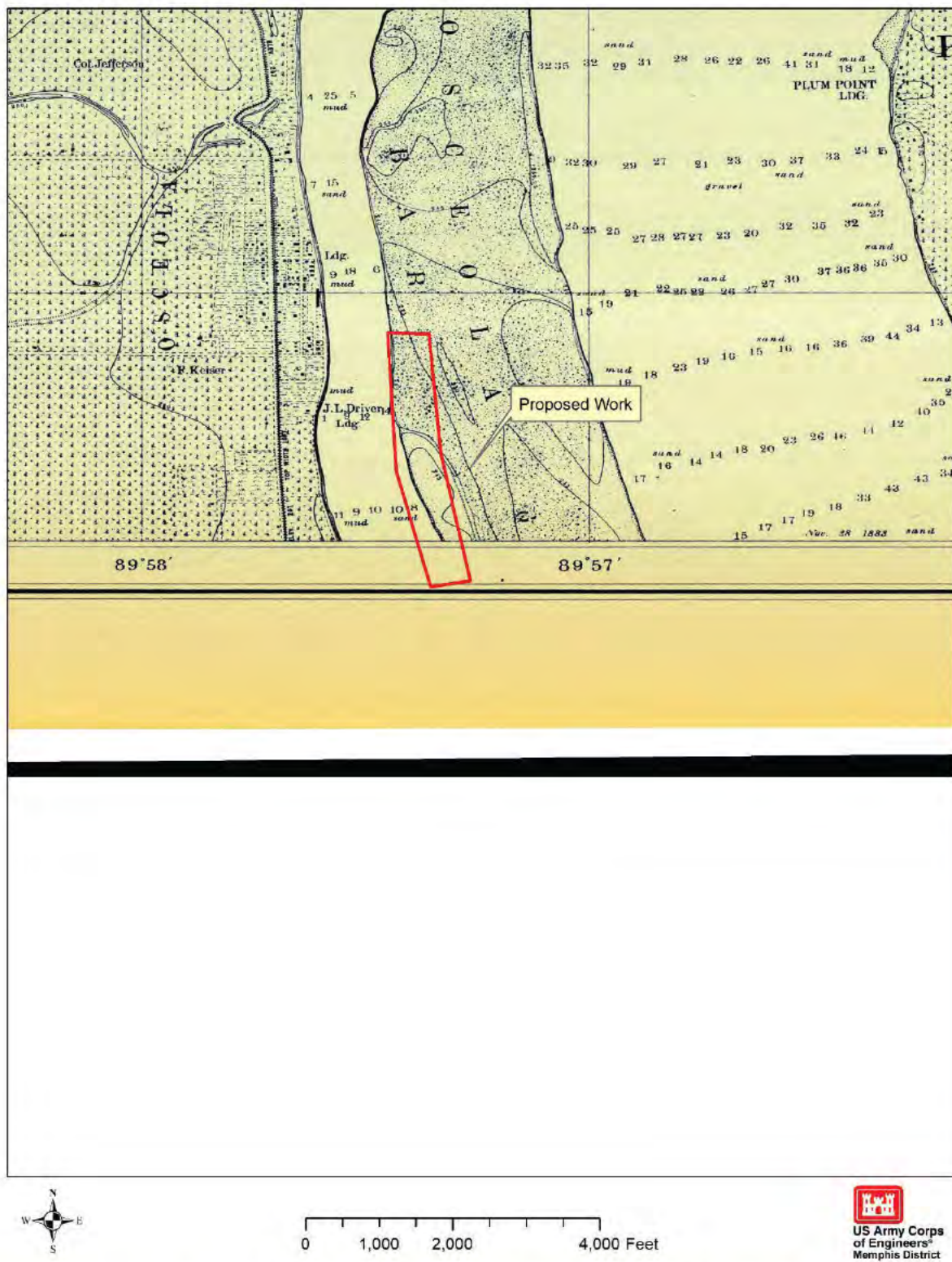


Figure 5. The 1879-1880 Mississippi River Commission Navigation Map with the APE indicated (red).

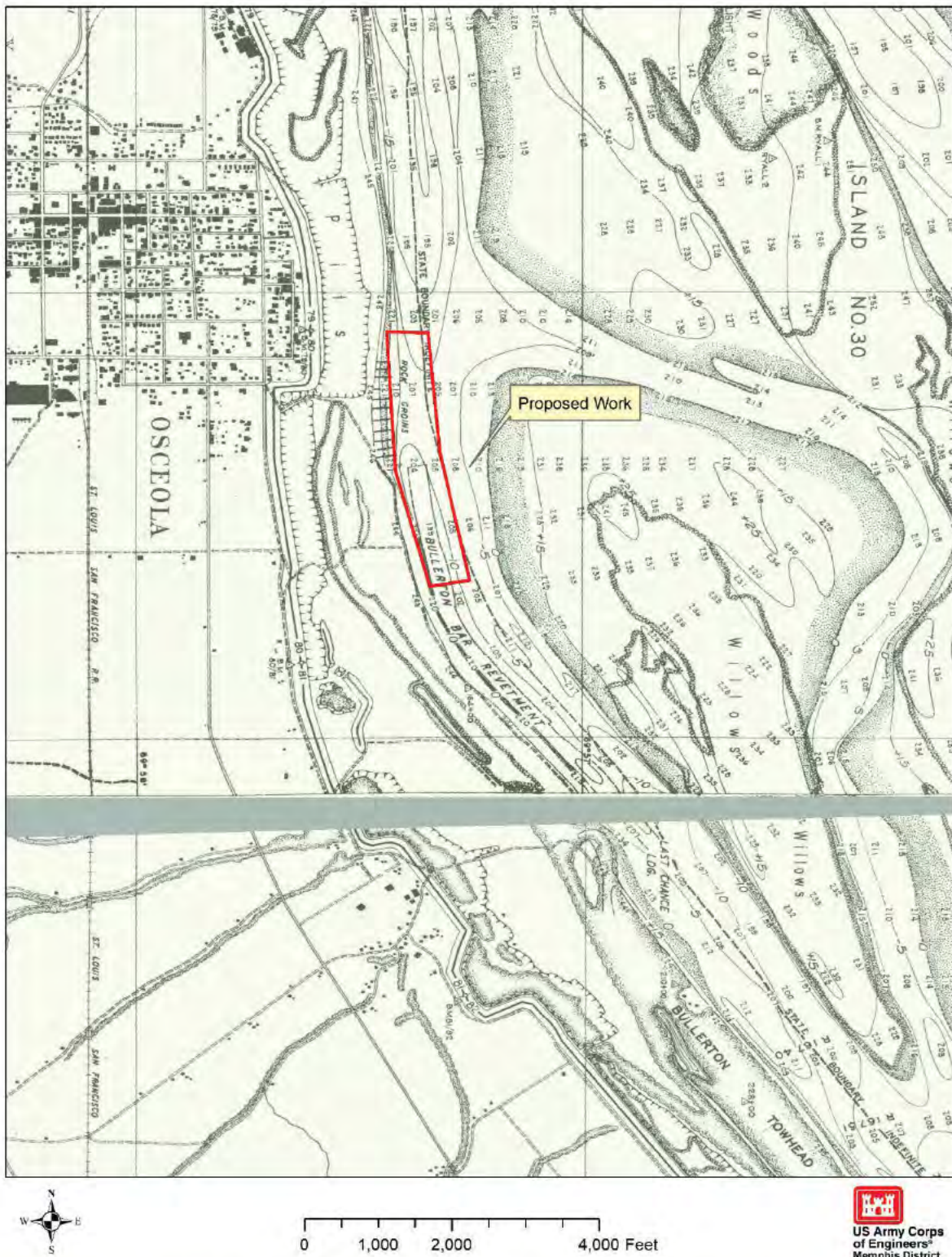


Figure 6. The 1937 Navigation Map with the APE indicated (red).



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
MEMPHIS DISTRICT
167 NORTH MAIN STREET B-202
MEMPHIS, TN 38103-1894

July 10, 2025

Environmental Compliance Branch
Regional Planning and Environmental Division South

Ms. Casey Lee
Historic Preservation Specialist, Section 106
Tennessee Historical Commission
State Historic Preservation Office
2941 Lebanon Pike
Nashville, TN 37214

RE: Section 106 Review Consultation

Undertaking: Continuing Authorities Program (CAP)
Section 107, River and Harbor Act of 1960 (Small Navigation Project)
Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale
County, Tennessee.

Location	Latitude	Longitude
Beginning of Proposed Harbor Extension	35.411995° N	-89.572061° W
End of Proposed Harbor Extension	35.415404° N	-89.572633° W

Determination: No Historic Properties Affected

Dear Ms. Lee:

The U.S. Army Corps of Engineers, Memphis District (USACE MVM), is proposing extension of the existing Osceola Harbor in Mississippi County, Arkansas under the auspices of the Continuing Authorities Program (CAP) (Figure 1). The purpose of CAP is to establish and provide authority for USACE to plan and implement projects of limited size, cost, scope, and complexity. The Osceola Harbor extension project intends to alleviate critical congestion within Osceola Harbor, enhance the efficiency of barge traffic, and support continued economic growth in Mississippi County, Arkansas. The project area is located as follows on the *Osceola, AR* and 7.5-minute USGS quadrangle maps: Sections 6 and 7 in Township 12 N and 13 N, Range 11E (Arkansas) (Figure 2).

Study Authority

The study authority is authorized under Small Navigation Project under CAP, specifically Section 107 of the Rivers and Harbors Act of 1960, as amended. CAP authorizes USACE to plan, design, and construct limited-scope water resource and ecosystem restoration projects without additional Congressional authorization. Section 107 specifically enables USACE to develop and construct small navigation projects after a detailed investigation demonstrates engineering feasibility and economic justification.

Description of Undertaking

The Osceola waterfront has a long history of river commerce, serving as a port of call for Mississippi River packet boats and later was used as a terminal for barge traffic. Historically, the bendway of Island No. 30 functioned as the main navigation channel before shifts in the river's alignment. From 1931-1936, USACE utilized the harbor area as a landing and staging area for its revetment layup and casting fleet.

The Osceola Harbor channel was authorized under Section 107 of the River and Harbor Act of 1960, (Public Law 86-645). The detailed study report was submitted to the Chief of Engineers with 1st endorsement on June 26, 1970. The 1975 Water Resources Development in Arkansas Report by USACE Southwestern Division outlined the planned improvements:

The harbor at Osceola will be improved by construction of a channel 250 feet wide and 9 feet deep beginning at the downstream end of the harbor channel and extending upstream 6,500 feet to the old chute through Island No. 30, to Mile 785.4 AHP, with a 250-foot-radius turning basin at the upstream end. A 97-acre flood-free industrial park will be developed by the city of Osceola. The first phase of development will provide a levee constructed by local interests to protect the industrial area from flooding until the second stage of development will utilize dredged material to raise the elevation of the area to above the project flood flow line. Local interests will be responsible for construction of all necessary bulkheads and dikes, prior to dredging to contain the dredge material. Construction began in fiscal year 1975.

An Environmental Statement supporting the 1970 study report was finalized in January 1971 by MVM. This statement emphasized the need for measures to minimize turbidity and prevent pollution during construction, including land disposal of spoil and careful handling of oils and other pollutants.

The Osceola Harbor authority was amended pursuant to Section 3010 of the Water Resource Development Act (WRDA) of 2007. This amendment allows non-Federal interests to construct a mooring facility within the existing authorized harbor channel, subject to all necessary permits and certifications, while maintain the USACE's responsibility for maintaining the general navigation features of the project, including a bottom width of 250 feet.

Further modifications that impacted the harbor occurred in 1978 with the construction of two stone dikes (authorized under Section 4 of the Flood Control Act of 22 December 1944, as amended) to create Lake Neark. These structures, built with approximately 47,000 cubic yards of stone and 6,000 cubic yards of excavated material, restrict flows through the former chute Island No. 30, creating a recreational area.

The Mississippi River channel near Osceola Harbor is protected by multiple USACE-constructed structures. The Keyes Point Dikes and Plum Point Dikes were constructed to stabilize the riverbanks and improve navigation. The Kate Aubrey Towhead - Island 30 revetment protects the shoreline north of the harbor entrance, and the Lower Bullerton Revetments protect the shoreline south of the harbor entrance. All of these structures – the dikes and the revetments – are subject to navigation regulations outlined in Title 33 CFR Part 207, as detailed in MVM Navigation Bulletin NO 1 of 2022. These regulations generally restrict

anchoring adjacent to these structures and limit landings to established commercial areas to protect the integrity of the bank stabilization works.

The proposed plan, *Osceola Harbor Extension with Open water Dredge Material Placement*, includes extending the Osceola Harbor approximately 3,000 feet upstream, consistent with one of the two plans evaluated as part of the 1971 Report. This extension would include the construction of a new turning basin at the upstream end, centered at approximately UTM Zone 16 (X,Y) ft = (762,762, 12,973,129). The existing turning basin would be maintained for continued operational use. The harbor extension would require dredging to a depth of -9.0 LWRP and an elevation of 193.51 ft AMSL. Dredging would encompass an area of approximately 24 acres, extending the channel 3,000 ft with a width of 250 ft. Dredged material would be placed in the Mississippi River, consistent with current harbor maintenance practices. No changes to the existing channel limits are proposed beyond the extension area (Figure 3).

Area of Potential Effects (APE)

The APE is defined as the proposed expansion, and the open water disposal area in the MS River where the spoil will be dispersed (Figures 1-2). The APE totals approximately 24 acres (9.71246 hectares) for the harbor extension. Access routes and the open water disposal area are not included in this calculation, as they are either public roads, heavily used agricultural roads, or already utilized waterways.

Identification and Evaluation of Historic Properties

Historic properties in the project vicinity were identified based on a review of the National Register of Historic Places (NRHP) database, the Automated Management of Archaeological Site Data in Arkansas (AMASDA), historic aerial photography, historic map research, and a review of cultural resources survey reports (Figure 3). Review of current cultural resources map revealed no historic properties within and relatively few known cultural resources adjacent to the APE.

According to the Automated Management of Archaeological Site Data in Arkansas (AMASDA), in Mississippi County, AR, there are seven previously recorded archaeological sites, consisting of four historic scatter sites, a Civil War artifact cache, and three 1843 historic homes (Table 1). The Hale Avenue Historic District is within one mile of the APE and is on the National Register of Historic Properties but will not be affected by the project. There are no other National Register of Historic Properties (NRHP) sites within or adjacent to the APE.

Three cultural resources surveys have been conducted on behalf of the MVM and one other sponsor over the last 21 years in association with a cultural resources survey of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023) (Table 2).

According to data from the Tennessee Site File Map View for Lauderdale County, Tennessee, APE, there are no previously recorded archaeological sites in the vicinity. Furthermore, there have been no cultural resources surveys conducted in or adjacent to the APE in Lauderdale County. There are no NRHP sites within or adjacent to the Tennessee APE (Figure 4).

Table 1. Previously recorded cultural resources located within an approximately 1-mile (1.6 km) radius of the APE.

Resource Designation	Period(s)	Date Recorded	NRHP Status
3MS0999	Historic Scatter early to mid 20 th century	04/2023	Not Eligible
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3MS0705	Historic Scatter late 19 th to early-mid 20 th century	08/2004	Not Eligible
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3MS0236	Historic house, ca 1843, Anglo-American	02/1977	Not Eligible

Table 2. Previously recorded cultural resources surveys conducted within an approximately 1-mile (1.6 km) radius of the APE.

Report No.	Title	Author/Principal Investigator	Date
4893 (AR)	Cultural Resources Survey of Approximately 700 Acres South of Osceola, Mississippi County, Arkansas	PanAmerican Consultants	2004
5939 (AR)	Luxora Relief Wells Mississippi County, Arkansas	PanAmerican Consultants	2009
8098 (AR)	Hybar MicroMill Survey, Mississippi County, Arkansas	Commonwealth Heritage Group.	2023

Cartographic Analysis

The landscape that constitutes the study area has historically been part of the Mississippi River or part of a sandbar within the Mississippi River since the 1800s (Figures 5-6). Analysis of available historic maps from the 19th-century indicate that the Mississippi River channel flowed exactly where the current APE is established. (Figure 5). Congress created the Mississippi River Commission in 1879 to centralize flood-fighting measures along the Mississippi River, coordinating efforts with the U.S. Army Corps of Engineers to provide protection against flood devastation as well as facilitate the river shipping frequently hindered by alluvial deposits. By the late nineteenth century, arguments over the most appropriate method of controlling the river led to a “levees-only” policy. Despite the constant construction of levees, the man-made structures failed to harness the river.

According to the published 1880s Mississippi River Commission Maps, the section of the Mississippi River near Osceola was almost braided, depositing sand regularly and creating various islands in and around the bend at Osceola. Attempts to control the main channel of the Mississippi River had been taking place as early as the 1800s by placing dikes in strategic

locations. Nevertheless, sand kept being deposited near the Osceola Harbor channel which will need to be removed in order to create the new harbor extension.

Previous Cultural Resources Investigations

Three cultural resource surveys have been conducted on behalf of the MVM and one other sponsor over the last 21 years in association with a cultural resources survey of approximately 700 acres south of Osceola (2004), installation of the Luxora Relief Wells (2009), and a survey for the Hybar Micromill (2023).

Given the absence of identified historic properties, existing survey coverage, previous construction, development, and maintenance activities, and the low probability of the presence of unidentified resources, USACE has determined that the existing surveys constitute a reasonable and good faith effort at identification and evaluation of historic properties and that it is unlikely that any unidentified historic properties are present in the currently proposed APE; therefore, no further cultural resources investigation is recommended.

Assessment of Effects to Historic Properties

Based on the information presented in this letter, USACE MVM has determined that there are no historic properties, as defined in 36 CFR 800.16 (l) in the APE, for the CAP Section 107, River and Harbor Act of 1960 (Small Navigation Project) Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale County, Tennessee. Therefore, USACE MVM is making a finding of **No Historic Properties Affected** for this undertaking and submitting it to you for review and comment. This project will be subject to the standard change in scope of work, unexpected discovery, and unmarked human burial sites act provisions. USACE MVM requests your comments within 30 days, per 36 CFR 800.5(c).

If you have any questions or require additional information concerning these undertakings, please contact Pamela D. Lieb, District Archaeologist and Tribal Liaison of this office at (901) 544-0710 or via e-mail Pamela.D.Lieb@usace.army.mil.

Sincerely,

THRON.JOHN.M.1255
783382

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THRON.JOHN.M.1255783382
Date: 2025.07.13 08:12:35 -05'00'

Mike Thron

Chief, Environmental Compliance Section
Regional Planning and Environmental Division South

List of Recipients:

Absentee-Shawnee Tribe of Indians of Oklahoma
Alabama Coushatta Tribe of Texas
Cherokee Nation
Coushatta Tribe of Louisiana
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Kialegee Tribal Town
Osage Nation

Ponca Nation of Oklahoma

Quapaw Nation

Seminole Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town

Tunica-Biloxi Tribe of Louisiana

United Keetoowah Band of Cherokee

Arkansas State Historic Preservation Office (AR SHPO)

Tennessee State Historic Preservation Office (TN SHPO)



Figure 1. Osceola Harbor Extension Project Area Overview (Aerial).



Figure 2. Osceola Harbor Extension Project Area Overview (Topo).



Figure 3. USGS Topographic Map Displaying existing Arkansas Cultural Resources and Cultural Resources Surveys and NRHP data with a 1-mile (1.6 km) radius of the APE.



Figure 4. USGS Topographic Map Displaying Existing Tennessee Cultural Resources and Cultural Resources Surveys and NRHP Data within a 1-mile (1.6 km) radius of the APE.

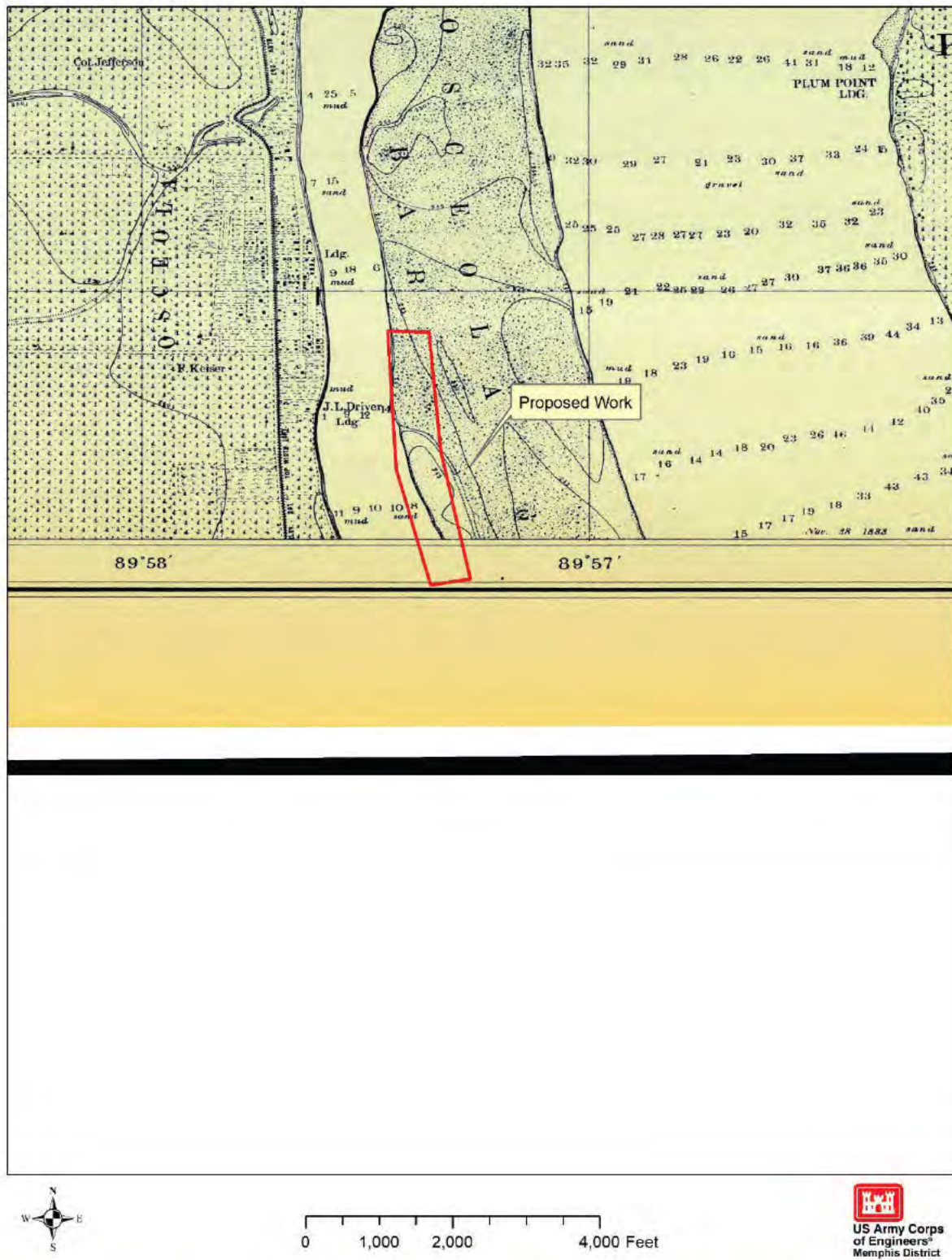


Figure 5. The 1879-1880 Mississippi River Commission Navigation Map with the APE indicated (red).

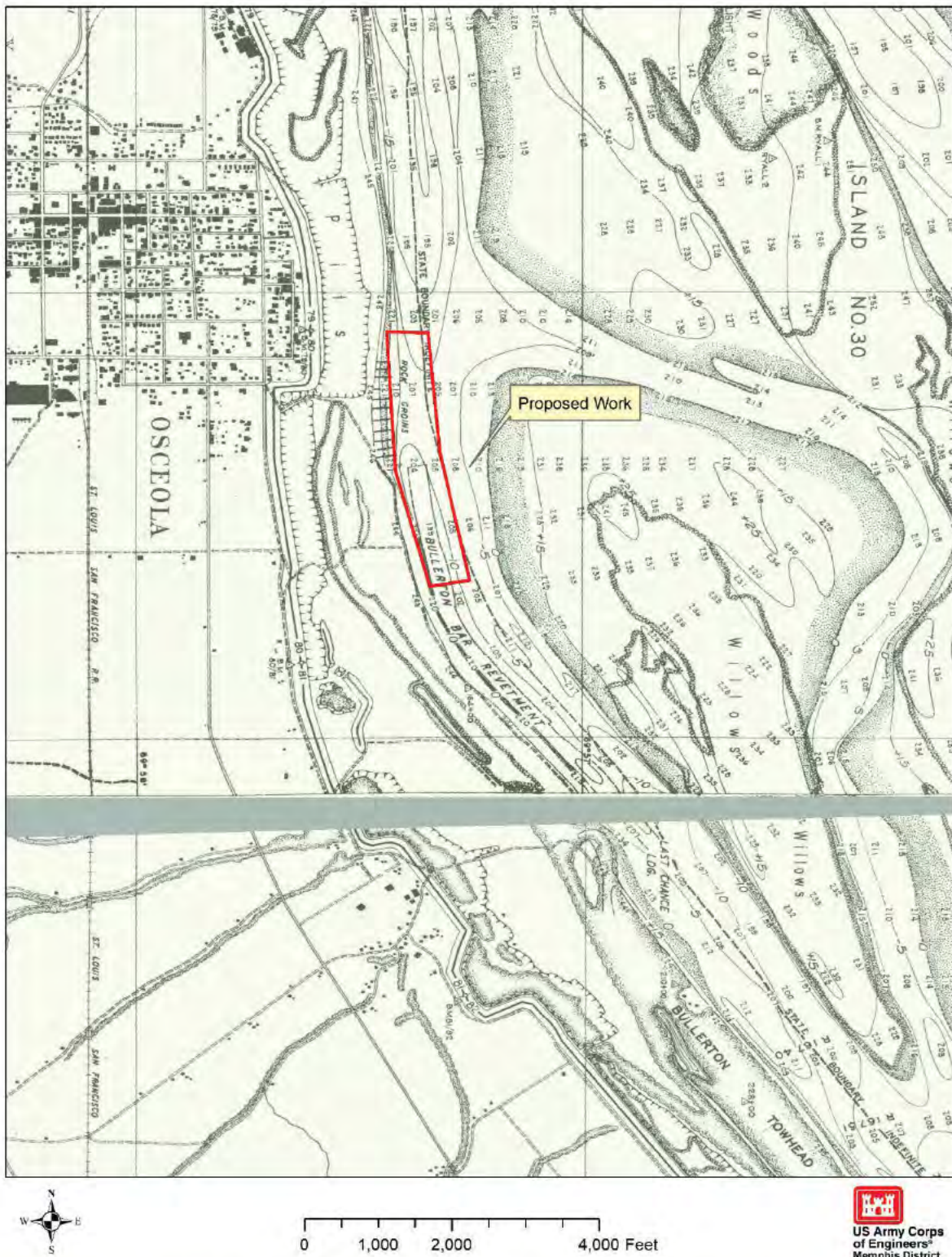


Figure 6. The 1937 Navigation Map with the APE indicated (red).

From: [TN Help](#)
To: [Lieb, Pamela D CIV USARMY CEMVM \(USA\)](#)
Subject: [Non-DoD Source] Osceola Harbor Extension - Project # SHPO0007486
Date: Wednesday, July 23, 2025 9:02:02 AM
Attachments: [image](#)
[image](#)



TENNESSEE HISTORICAL COMMISSION
STATE HISTORIC PRESERVATION OFFICE
2941 LEBANON PIKE
NASHVILLE, TENNESSEE 37243-0442
OFFICE: (615) 532-1550
www.tnhistoricalcommission.org

2025-07-23 08:59:38 CDT

Pamela Lieb
USACE MVM
Pamela.D.Lieb@usace.army.mil

RE: Corps of Engineers/Memphis District (COE-M), Osceola Harbor Extension,
Project#: SHPO0007486, , Lauderdale County, TN

Dear Pamela Lieb:

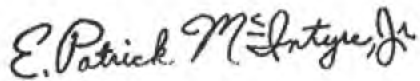
In response to your request, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicants for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739).

After considering the documentation submitted, it is our opinion that there are no National Register of Historic Places listed or eligible properties affected by this undertaking. We have made this determination because either: no National Register listed or eligible Historic Properties exist within the undertaking's area of potential effects, the specific location, size, scope and/or nature of the undertaking and its area of potential effects precluded affects to Historic Properties, the undertaking will not alter any characteristics of an identified eligible or listed Historic Property that qualify the property for listing in the National Register, or it will not alter an eligible Historic Property's location, setting or use. We have no objections to your proceeding with your undertaking.

If your agency proposes any modifications in current project plans or discovers any

archaeological remains during the ground disturbance or construction phase, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act. If you are applying for federal funds, license or permit, you should submit this letter as evidence of consultation under Section 106 to the appropriate federal agency, which, in turn, should contact us as required by 36 CFR 800. If you represent a federal agency, you should submit a formal determination of eligibility and effect to us for comment. Please provide your Project # when submitting any additional information regarding this undertaking. You may direct questions or comments to Casey Lee, who drafted this response, at Casey.Lee@tn.gov, +16152533163.

Sincerely,

A handwritten signature in black ink that reads "E. Patrick McIntyre, Jr." in a cursive script.

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

Ref:MSG17926337_Msbi6IYX5ljcR4a1oql

From: [Julia Pebeahsy](#)
To: [Lieb, Pamela D CIV USARMY CEMVM \(USA\)](#)
Cc: [section 106](#)
Subject: [Non-DoD Source] Response to (Small Navigation Project) Osceola Harbor Extension in Mississippi County, Arkansas and Lauderdale County, Tennessee
Date: Tuesday, July 22, 2025 2:33:05 PM

Tuesday, July 22, 2025

Attn: Pamela D. Lieb, District Archaeologist and Tribal Liaison
U.S Army Corps of Engineer
Memphis District
167 North Main Street B-202
Memphis, Tennessee 38103-1894

Re: (Small Navigation Project) Osceola Harbor Extension in Mississippi County,
Arkansas and Lauderdale County, Tennessee

Dear Pamela D. Lieb,

The Quapaw Nation Historic Preservation Program (QHPP) has received and reviewed the information you have provided. Based upon the information you provided we believe that the (Small Navigation Project) Osceola Harbor Extension in Mississippi County, Arkansas and Lauderdale County, Tennessee, will have no effect on known properties of cultural or sacred significance to the Quapaw Nation.

In accordance with the National Historic Preservation Act, (NHPA) [16 U.S.C. 470 §§ 470-470w-6] 1966, undertakings subject to the review process are referred to in S101 (d) (6) (A), which clarifies that historic properties may have religious and cultural significance to Indian tribes. Additionally, Section 106 of NHPA requires Federal agencies to consider the effects of their actions on historic properties (36 CFR Part 800) as does the National Environmental Policy Act (43 U.S.C. 4321 and 4331-35 and 40 CFR 1501.7(a) of 1969).

We do not anticipate that this project will adversely impact any cultural resources protected under the NHPA. If, however, artifacts or human remains are discovered during project construction, we ask that work cease immediately and that you contact the Quapaw Nation Historic Preservation Office.

Should you have any questions or need any additional information, please feel free to contact Julia Pebeahsy at Julia.pebeahsy@quapawnation.com, please copy section106@quapawnation.com to ensure additional information requests are reviewed

in a timely manner. Thank you for consulting with the Quapaw Nation on this matter.

Sincerely,

Julia Pebeahsy

On behalf of

-Ms. Billie Burtrum

Preservation Officer/ QNHPP Director

Quapaw Nation

P.O. Box 765

Quapaw, OK 74363

(w) 918-238-3100

(f) 918-674-2456

From: [Landfill Notification](#)
To: [Jedi, Pamela D CIV \(USARMY CEMMUN \(USA\)\)](#)
Subject: (Non-DoD Source) Section 106 Consultation - Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale County, Tennessee
Date: Wednesday, August 20, 2025 1:25:52 PM

This email is in response to Osceola Harbor Extension, Mississippi County, Arkansas and Lauderdale County, Tennessee.

The Shawnee Tribe's Tribal Historic Preservation Department concurs that no known historic properties will be negatively impacted by this project. However, there is still potential for the discovery of unknown resources.

We have no issues or concerns at this time. Please continue with the project as planned, but in the event archaeological materials are encountered during construction, use, or maintenance of this location, please re-notify us at that time as we would like to resume immediate consultation under such a circumstance.

If you have any questions, you may contact me via email at Section106@shawnee-tribe.com.

Thank you for giving us the opportunity to comment on this project.



Erin Paden

TRIBAL HISTORIC PRESERVATION
SPECIALIST

Office: (918) 542-2441, x140

Email: epaden@shawnee-tribe.com

29 S Hwy 69A

Miami, OK 74354

shawnee-tribe.com



Sarah Huckabee Sanders
Governor
Shea Lewis
Secretary

August 20, 2025

Mark Smith
Chief, Environmental Compliance Branch
Memphis District, U.S. Army Corps of Engineers
167 North Main Street B-202
Memphis, TN 38103

RE: Mississippi County: Osceola
Section 106 Review: COE
Proposed Undertaking: Osceola Harbor Extension
AHPP Tracking Number: 114071

Dear Mr. Smith:

The staff of the Arkansas Historic Preservation Program (AHPP) has reviewed the submission for the above-referenced project in Section 6, Township 12 North, Range 11 East and Section 7, Township 13 North, Range 11 East in Mississippi County, Arkansas. The proposed project entails the extension of the existing Osceola Harbor by approximately 3,000 feet upstream and includes the construction of a new turning basin and dredging.

Though there are multiple previously recorded archeological sites located near the area of potential effect (APE), none are eligible for listing on the National Register of Historic Places. Additionally, there are no previously recorded archeological sites within the APE.

Based on the provided information, the AHPP concurs with the finding of **no historic properties affected pursuant to 36 CFR § 800.4(d)(1)** for the proposed undertaking.

Tribes that have expressed an interest in the area include the Cherokee Nation, the Osage Nation, the Quapaw Nation, and the Shawnee Tribe. We recommend consultation in accordance with 36 CFR § 800.2(c)(2).

Thank you for the opportunity to review this undertaking. Please refer to the AHPP Tracking Number listed above in all correspondence. If you have any questions, call Kathryn Bryles at 501-324-9784 or email Kathryn.Bryles@arkansas.gov.

Sincerely,

Kathryn
Bryles

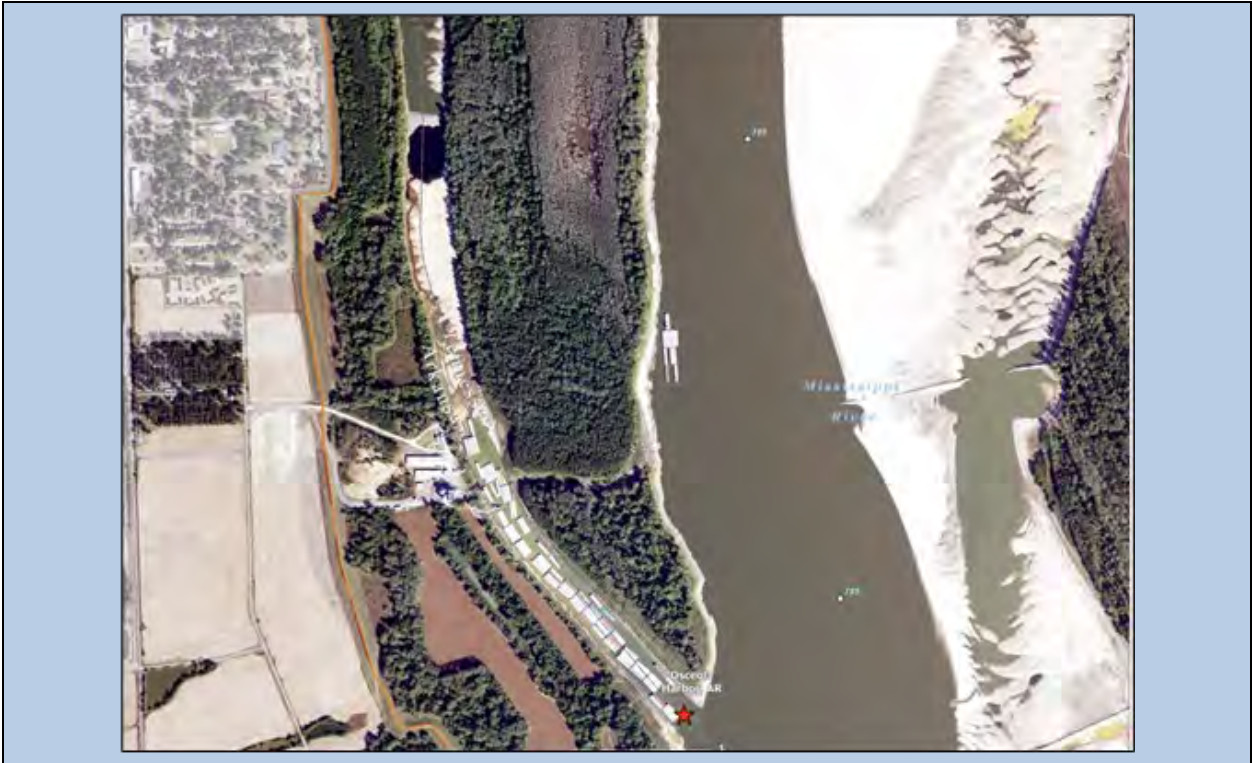
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for
Scott Kaufman
AHPP Director and State Historic Preservation Officer

cc: Dr. Melissa Zabecki, Arkansas Archeological Survey



Osceola Harbor Extension, Mississippi County, Arkansas Feasibility Study



Appendix B – Engineering

September 2025

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SECTION 1

General

1.1 PURPOSE

This Engineering Appendix presents the design assumptions and assessment of alternatives for improvement of capacity of Osceola Harbor located in Osceola, AR at river mile 785 on the right descending bank of the Mississippi River. The purpose of this Engineering Appendix is to document the methodology used and results of the analysis performed in order to establish project alternative measures and recommendations that would meet the project needs of the Government and the non-federal sponsor.

SECTION 2

Existing Data

Two data sources were combined to construct a digital elevation model (DEM) of the existing ground surface. This DEM was used to obtain cross sections and visualizing the existing site conditions. Aerial LiDAR obtained by USACE Memphis District in 2022 was combined with a hydrographic and topographic survey of the harbor that was obtained for this study. While somewhat dated, the data is high density and has been very reliable in recent experience if no major construction activities have taken place in the area of interest since the data was collected. No such construction has occurred in the vicinity of Osceola Harbor since LiDAR collection.

Hydrographic and topographic survey data was collected by a contractor for USACE Memphis District Geotechnical Branch in August 2024. Given the dynamic nature of sedimentation in the Mississippi River, these two data sources were selected as they would provide a reasonable basis for determining rough order of magnitude quantities and visualization for the purposes of this study. Figure 1 shows the hydrographic survey Figure 2 shows the topographic survey, and Figure 3 shows a combined composite of LiDAR, topographic, and hydrographic surveys.

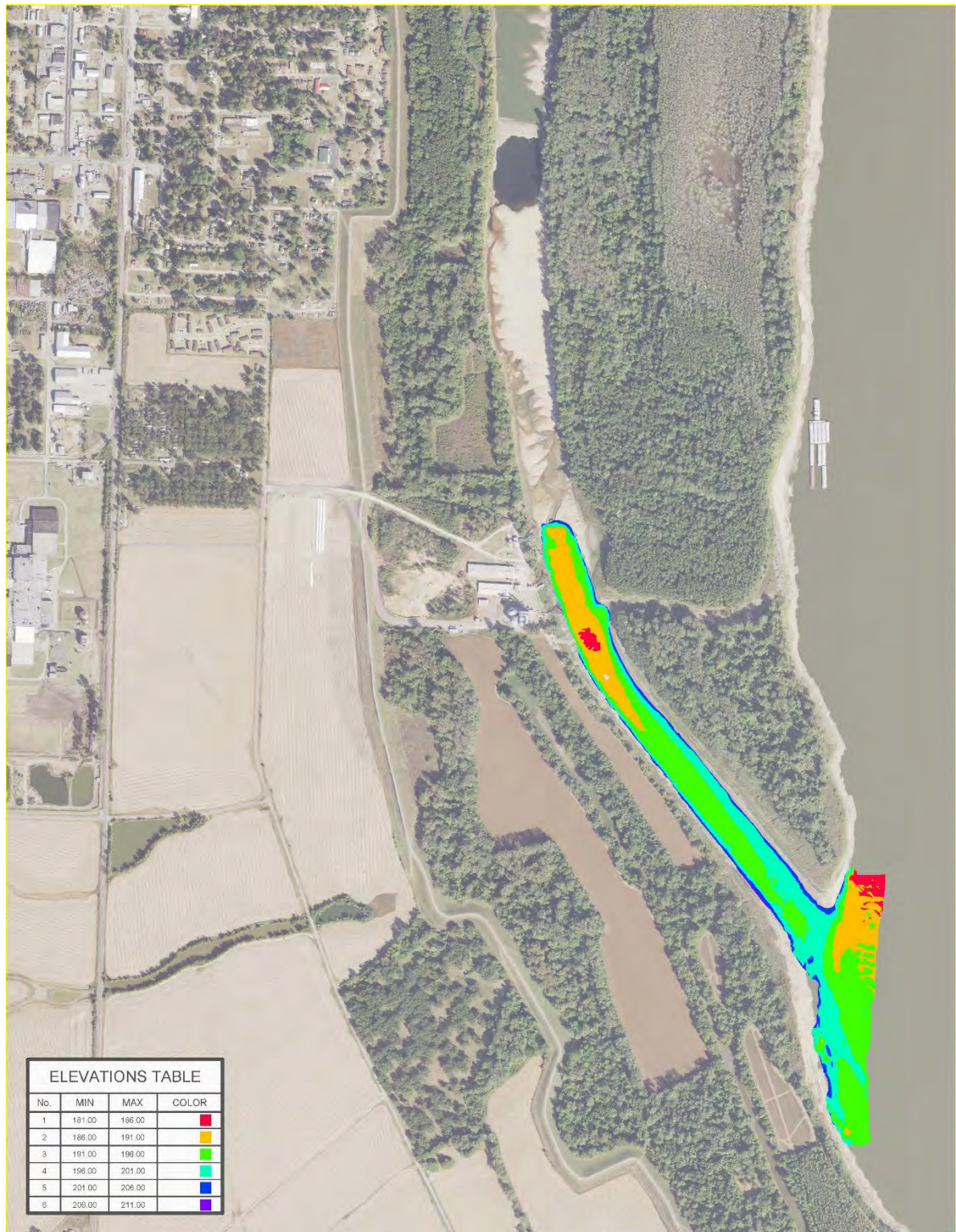


Figure 1. Hydrographic Survey.

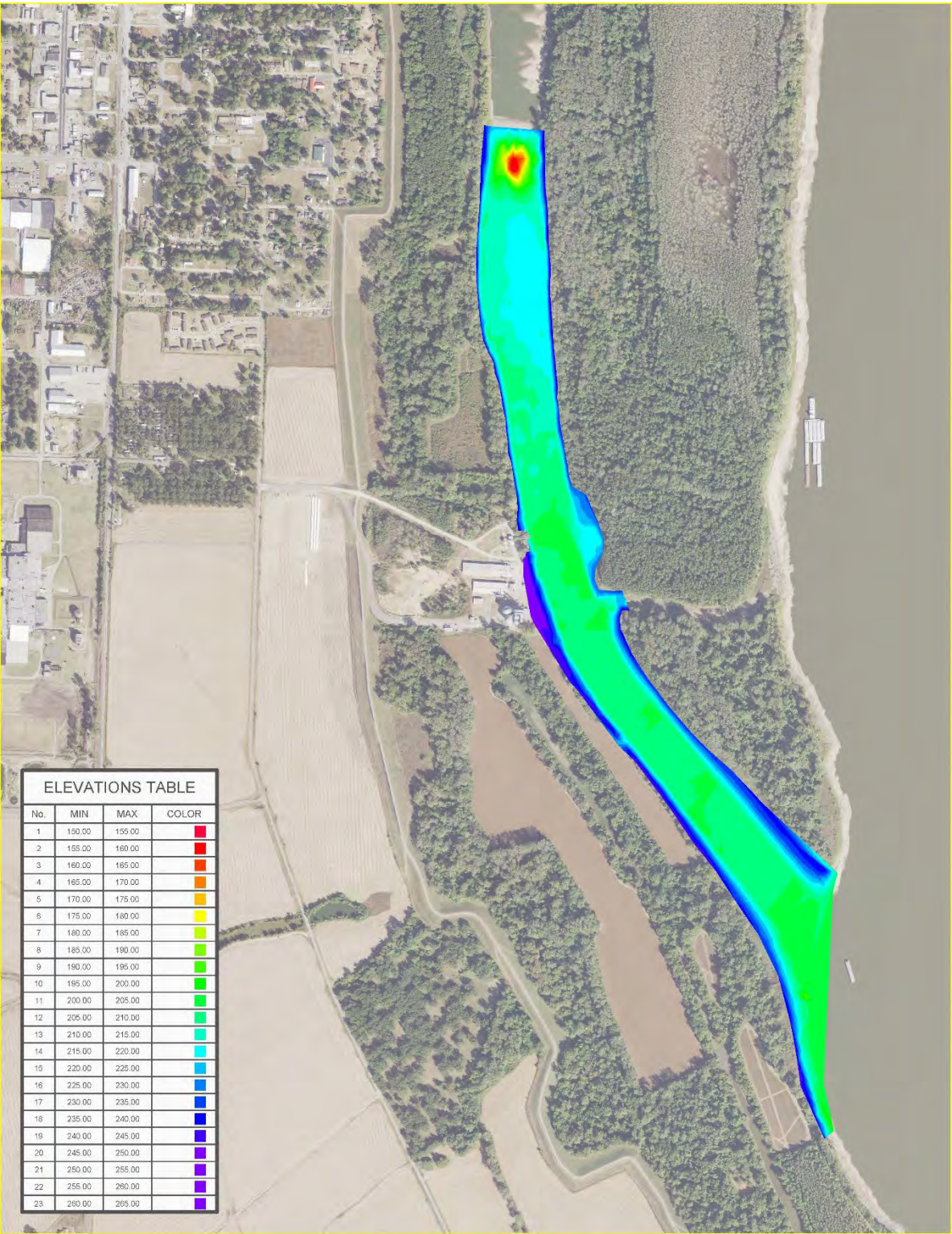


Figure 2. Topographic Survey.

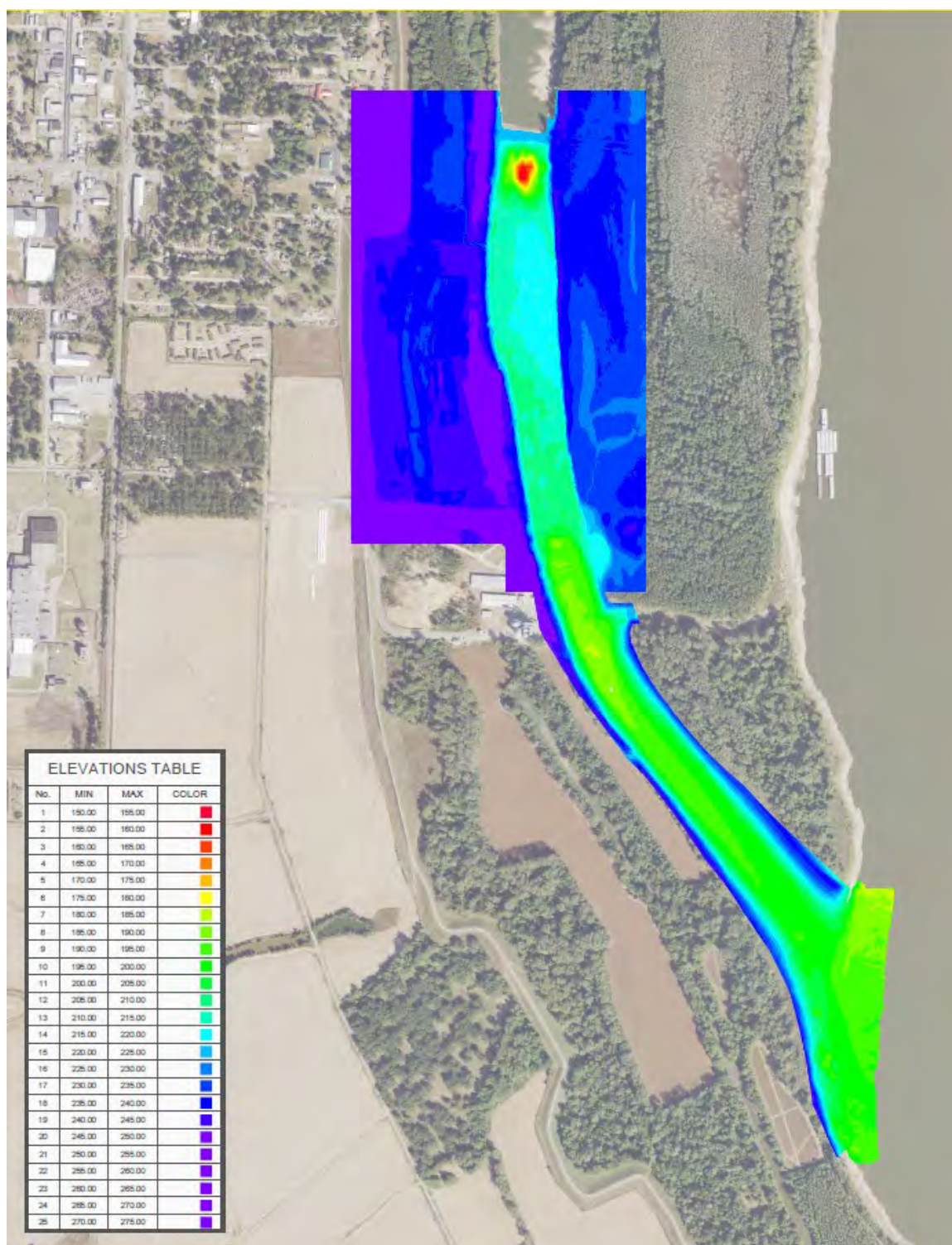


Figure 3. Composite Survey.

SECTION 3

Infrastructure Resilience Assessment

3.1 INTRODUCTION

Engineering and Construction Bulletin (ECB) 2018-14, rev. 2 (August 19, 2022) provides guidance for incorporating climate change information in hydrologic analyses in accordance with the USACE overarching climate preparedness and resilience policy and ER 1105-2-101. The ECB guides a qualitative analysis of potential hydrometeorological variability threats and impacts that may be relevant to USACE hydrologic analyses taking into consideration shifting natural climate variability. Given its similarities to the Osceola Harbor Extension Feasibility Study, the Port of Rosedale Feasibility Study, Bolivar County, Mississippi (USACE 2023) was referenced for this section.

The climate of Mississippi County, Arkansas is generally subtropical and mild. The long, hot, humid summers provide a long growing season. Summer temperatures range from the mid-80 degrees F to the high 91 degrees F. Winters are usually short and moderate. Winter temperatures range from the low 30 degrees F to mid-50 degrees F. The average annual temperature is about 62 degrees F. The basin lies in a moderate to heavy rainfall belt with an average annual rainfall total of about 51 inches.

3.2 PHASE 1 – INITIAL SCOPING

The project site is located in the Lower Mississippi River basin at Mississippi river mile 785 on the right descending bank. The City of Osceola lies just west of the project site. The site is approximately 16 miles south of Blytheville, Arkansas, and approximately 40 miles north of Memphis, Tennessee. The project site is located in a historic channel of the Mississippi River. Lake Neark is an existing Federal project located above Osceola Harbor on the same historic channel and is impounded by a closure structure (Lake Neark Dike #2).

The hydrology of the project area is impacted by local rainfall runoff and flow over Lake Neark Dike #2 when the Mississippi River is at high stages. Sea level rise is not being considered because the project site is located nearly 800 river miles from the Gulf of Mexico along the path of the Mississippi River. For assessment of infrastructure resilience against climate variability, only a quantitative hydrology assessment will be conducted. The primary relevant variables for this project are streamflow and stage. These variables are influenced by precipitation. This review focuses on observed and projected changes in streamflow and precipitation, but will also analyze observed and projected trends in mean temperature.

3.3 PHASE 2 – VULNERABILITY ASSESSMENT

To understand potential effects of climate variability, and to increase resilience/decrease vulnerability of navigation alternatives to that variability, the relative vulnerability of the basin to various factors was analyzed. In accordance with ECB 2018-14, the USACE Watershed Climate Vulnerability Assessment tool (National Standard) was used to identify vulnerabilities to climate variability on a HUC-4 watershed scale relative to other HUC-4 basins across the nation.

Vulnerability with respect to the Navigation Business Line is presented in this analysis as it was the most applicable. Figure 4 shows a summary of the climate risk analysis for the Navigation Business Line for HUC-4 basins 0802 (Lower Mississippi-St. Francis) and 0801 (Lower Mississippi-Hatchie). For future date 2050 wet and dry epochs and future date 2085 dry epoch, both basins no vulnerability to any of the indicators considered. For future date 2085 wet epoch, HUC-4 basin 0802 shows vulnerability of the Navigation business line for Indicator 156_Sedimentation (ratio of the future sediment load to the present sediment load) with an indicator value of 1.812.

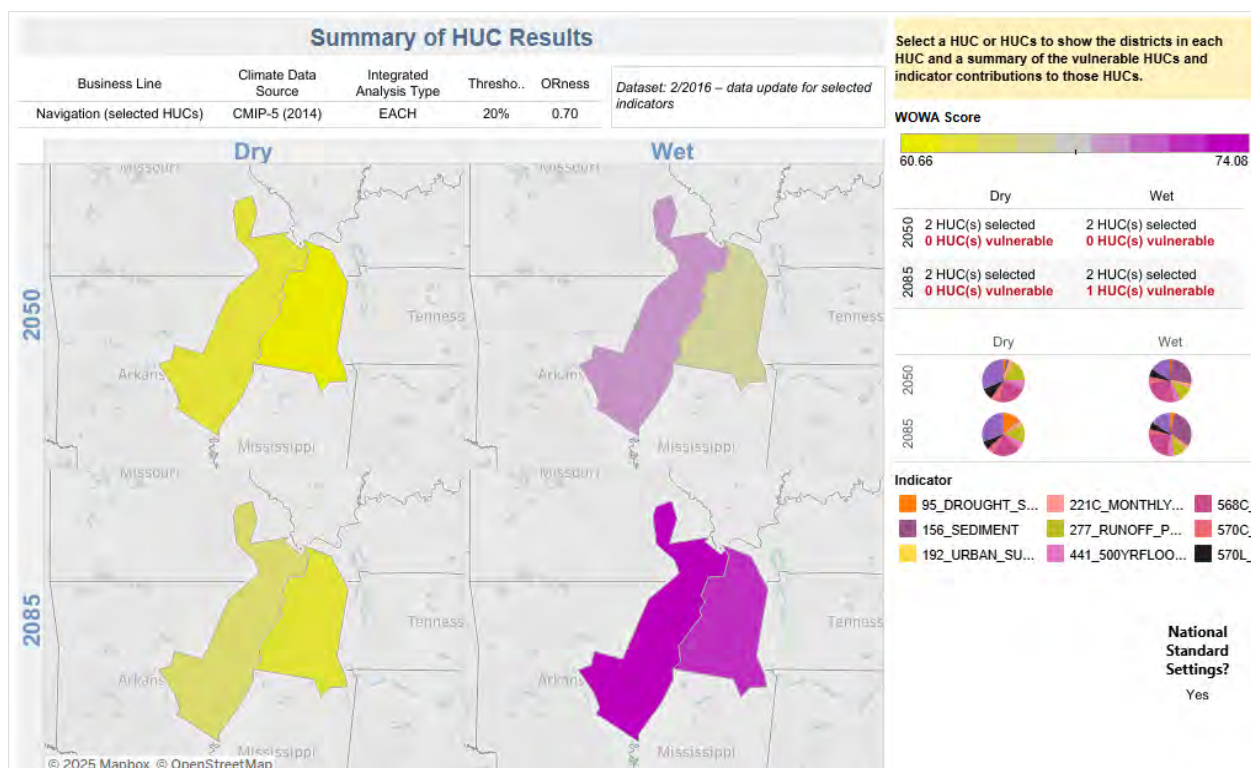


Figure 4. Summary of Climate Risk Analysis for MVM HUC-4 Basins.

An additional vulnerability for this project stems from a growing problem not directly related to climate. The Mississippi River Geomorphology and Potamology (MRG&P) Program addresses the need for the U.S. Army Corps of Engineers (USACE) to have access to the most up-to-date and technically competent scientific data and analysis for providing navigation and flood risk management in an environmentally responsible manner. Significant geomorphology has been observed on the main-stem Mississippi River.

Using the results of a 1944 study of Mississippi River meanders by Harold Fisk, BR Winkley concluded in a 1970 study that during the 500-year period from the 13th to the 18th century, an average of 14 natural channel cutoffs occurred every 100 years. When a cutoff of a river bend occurs, the slope of the river bottom at the point of the cutoff is increased significantly. Winkley observed that local adjustments to any individual natural cutoff took anywhere from 20 to 80 years. As part of this geomorphic adjustment, as the river naturally tries to achieve equilibrium slope again, degradation and aggradation of material occurs.

In the 13-year period from 1929 to 1942, the Mississippi River and Tributaries Project (MR&T) created 16 artificial cutoffs of the lower Mississippi River. Based on Winkley's observations, it would take at least 55 years (1997) for the river to adjust from these 16 artificial cutoffs. A 2017 MRG&P study titled Large-scale Geomorphic Change in the Mississippi River from St. Louis, MO, to Donaldsonville, LA, as Revealed by Specific Gage Records developed specific gage records for 25 stations on the Middle and Lower Mississippi River. Figure 5 below shows the specific gage record at Osceola. Stages for all flows show a decreasing trend that persists between the 1930s and 1980s. From the 1980s to present day, stages for high flows appear to stabilize, while stages for lower flows continue to follow the decreasing trend.

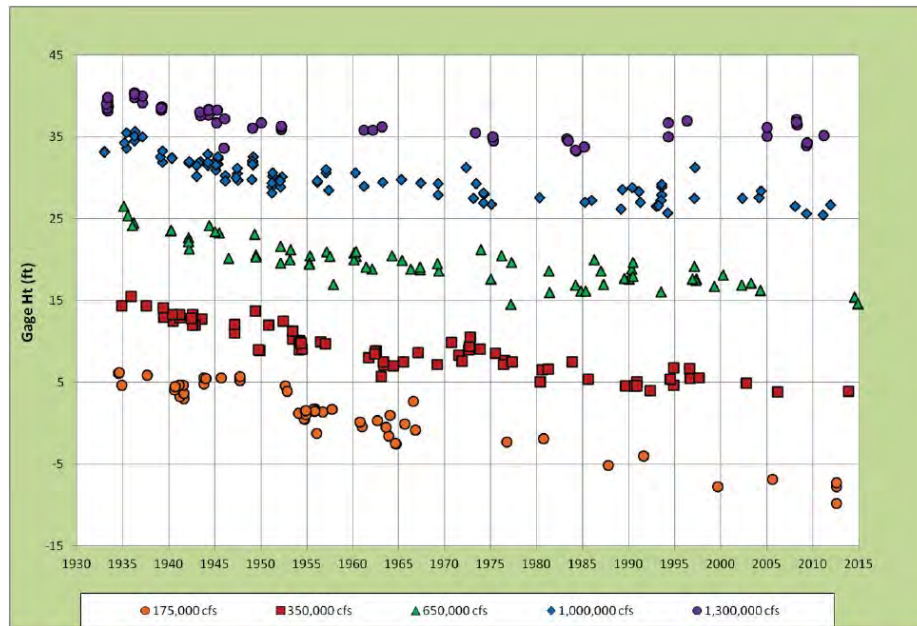


Figure 5. Specific Gage Record at Osceola.

Based on other specific gage records from the 2017 study, this trend of continually decreasing low-flow stage values is observed as far downstream as the Greenville, MS gage. As part of the 2017 study, a composite figure depicting the large-scale geomorphic trend of the channel was developed and is shown in Figure 6 below. As the Lower Mississippi River continues to naturally seek dynamic equilibrium post-cutoffs, there is a high likelihood that the channel bottom at Osceola will continue to degrade.

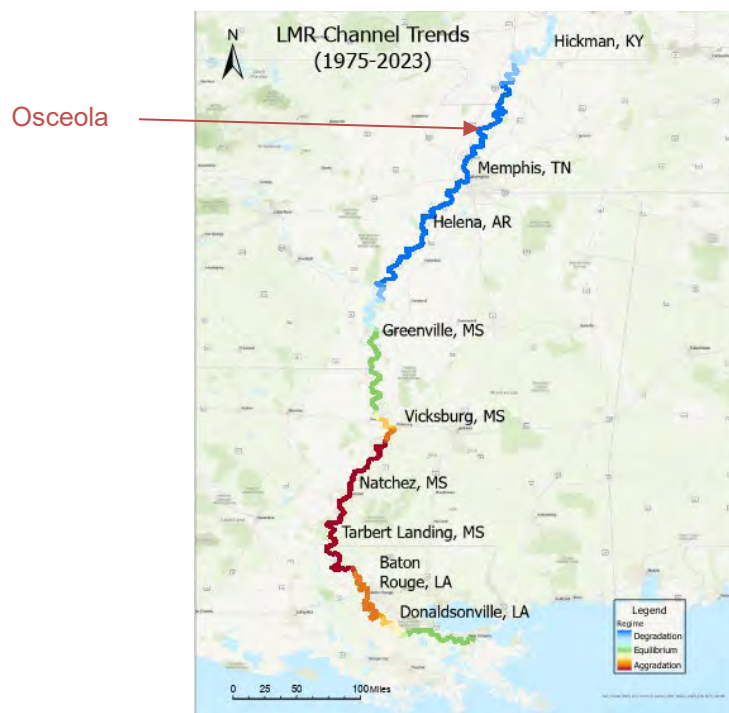


Figure 6. Large-Scale Geomorphic Trend of Mississippi River Bottom.

3.4 PHASE 3 – RISK ASSESSMENT

Table 1 identifies impacts on features of the Recommended Plan. Harbor Extension is the only component of the Recommended Plan.

While the potential for increased streamflow and sediment carrying capacity is identified for the wet epoch, future date 2085, the potential harm to the proposed project is no greater than the potential harm to the existing harbor. Increasing the length of the harbor will not increase the likelihood for future sediment deposition, nor will it increase the rate of potential future sedimentation.

The potential for channel bottom degradation in the project area is likely. As the channel bottom degrades, the water surface elevation will also decrease. This decrease could have an impact on harbor operations, specifically at loadout facilities, elevators, and docks. Over time, and with future updates to low water reference plane, the authorized elevation of the harbor bottom will also decrease. This will require dredging to a lower elevation to maintain navigability within the harbor.

To better understand the trend in possible channel bottom degradation, a previously published report and a sediment transport analysis for the recent Lower Mississippi River Comprehensive feasibility study were referenced. MRG&P Report 24, Volume 4, published

December 2018, used a HEC-6T sediment transport simulation to investigate trends in channel bottom change, and concluded that there is no evidence that an equilibrium condition will be achieved in the next 100 years. More recently, the Lower Mississippi River Comp Study Sediment Bed Change RAS Model predicted future bed change over a 10, 25, and 50-year period. From these two data sources, Figure 7 was produced.

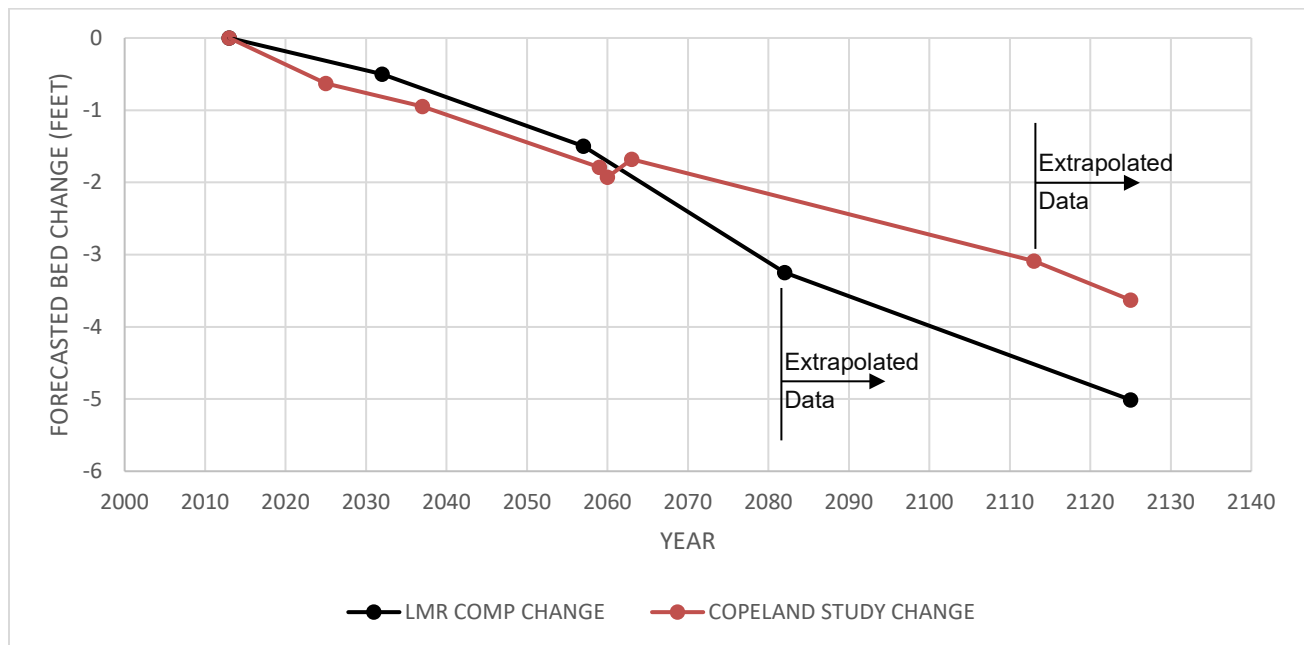


Figure 7. Forecasted Bed Change at RM 785.

Extrapolating the data obtained from the LMR Comp Study and MRG&P Report 24 resulted in a potential future bed change of -3.62 to -5 feet for future year 2125 (100-year analysis period). For the purposes of this feasibility study, impacts of a 4-foot decrease in riverbed elevation were analyzed. Figure 8 shows a cross section at the most constrained location for the proposed harbor extension.

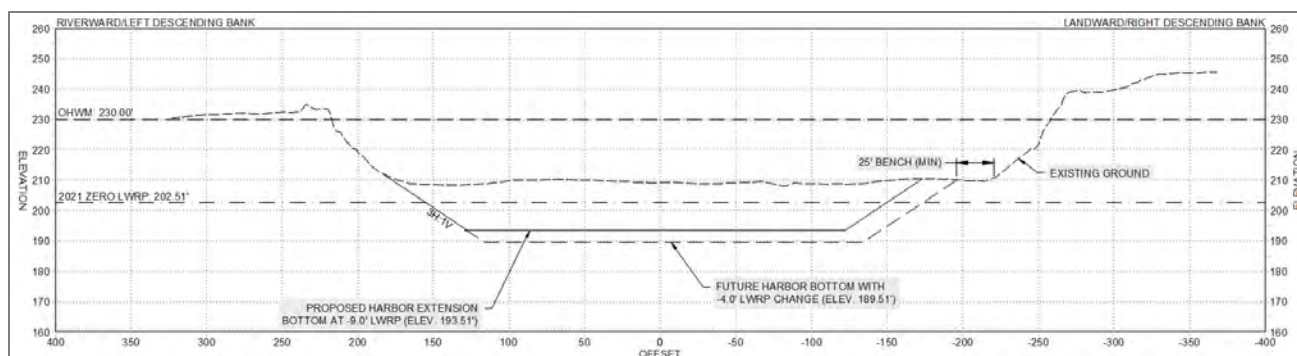


Figure 8. Harbor Extension Cross Section with Initial and Future Dredging Requirements.

As shown in Figure 8, even with consideration for a future change in LWRP of -4.0 feet, the proposed harbor extension will fit within the confines of the existing topography and meet preliminary geotechnical slope requirements, leaving a 25-ft wide bench on the landward/right descending bank/levee side.

To further bolster installation resilience, prohibiting future underground utility installations beneath the harbor will reduce the risk to future harbor operations that may arise due to conflicts between future lowering of LWRP (and therefore, allowable harbor dredge depth) and underground utilities.

Table 1. Impacts on Features of the Recommended Plan.

Feature or Measure	Trigger	Hazard	Harm	Qualitative Likelihood
Harbor Extension	Increased Streamflow	Potential for increased sediment carrying capacity	Higher rate of sediment deposition within port requires more frequent dredging	Unlikely
Harbor Extension	Channel Bottom Degradation	Potential for decreased channel bottom and water surface elevations	Impacts to harbor operations and any future underground utilities	Likely

3.5 LITERATURE REVIEW

A literature review was performed to summarize climate variables relevant to the study area and highlight both observed and projected assessments of relevant climate variables. This literature review used the following resources: Fourth National Climate Assessment

(NCA4); USACE Civil Works Technical Report CWTS-2015-13; and state and watershed-specific resources published by the National Oceanic and Atmospheric Administration (NOAA). These resources summarize trends in historic temperature, precipitation, and streamflow records and provide for an indication of future climate variability-influenced hydrology based on the outputs from Global Climate Models (GCMs) and Earth Systems Models (ESMs).

The NCA4 considers climate variability research at both a national and regional scale (USGCRP, 2018). The Civil Works Technical Report CWTS-2015-13 was published as part of a series of regional summary reports covering peer-reviewed climate literature. The 2015 USACE reports cover 2-digit, United States Geological Survey (USGS), hydrologic unit code (HUC) watersheds in the United States. Osceola Harbor is located in 2-digit HUC 08, the Lower Mississippi Region (USACE, 2015) and in the NCA4 Southeast climate region.

3.5.1 Observed Temperature Trends

The Fourth National Climate Assessment (USGCRP, 2017) states that observed temperatures in the United States have increased as much as 1.9 degrees Fahrenheit since 1895, with the increase in temperatures accelerating since the 1970s. The National Climate Assessment also states that warming is projected for all parts of the United States. The 2015 review conducted by the USACE Institute for Water Resources (IWR) summarizes the available literature on climate variability for the Lower Mississippi River Region, which includes the Osceola Harbor area. In general, studies have found varying trends in observed air temperature. Overall, this region differs from the national results observed in the Fourth National Climate Assessment, as there is not a consistent overall warming trend since the early 1900s in the Lower Mississippi (USGCRP, 2017).

In addition, the IWR's Climate Change Literature Review notes that there is a statistically significant increasing trend in the number of one day extreme minimum temperatures in the Lower Mississippi Region. Note there is not a statistically significant trend for the number of one day extreme maximum temperatures. The consensus from the Climate Change Literature Review indicates only mild increases in annual temperature in the region over the past century with significant variability. However, there is consensus that the extreme minimum daily air temperatures are increasing.

3.5.2 Projected Temperature Trends

Global Climate Models (GCMs) have been used to project future climate conditions in the U.S. including the Lower Mississippi River Region. Results show a significant warming trend at a national and regional scale.

3.5.3 Observed Precipitation Trends

Annual Precipitation since the beginning of the last century has increased across most of the northern and eastern U.S, whereas decreases have been observed across much of the

southern and western U.S. There is much more regional variation in observed precipitation change as compared with observed temperature change, as the influence of temperature on precipitation varies greatly based upon terrain, elevation, and proximity to moisture sources. The IWR report (USACE, 2015) shows that there is a general increase in precipitation for the Lower Mississippi River region; however, it is highly variable.

Most studies analyzed by the IWR (USACE, 2015) suggest that significance in increasing precipitation (the severity and frequency) trends in observed storms are not definitive; however, some analyzed literature shows mild increasing trends in these parameters. For instance, Liu et al. (2011) investigated anomalous precipitation (based on deviation from the mean) in summer months in the southeastern U.S. and found that a greater number of climate stations within the region did not exhibit increasing trends in frequency of occurrence of heavy rainfall than those that did. Wang and Killick (2013) also investigated anomalous precipitation, but only detected a statistically significant positive trend for the 10th percentile (low precipitation) and none in the 90th percentile (high precipitation). Though there is not a strong consensus regarding trends in observed extreme precipitation events, it is important to remain mindful of the identified increasing trends in intensity and frequency of rainfall within the region.

3.5.4 Projected Precipitation Trends

Projected future changes in precipitation for the Lower Mississippi River region are variable and lack consensus. The Liu et al. study (2013) quantified significant increases in spring precipitation associated with a 2055 future condition for the Lower Mississippi River Region. Other seasons showed almost no increase or a slight decrease in precipitation. The Liu et al. study also projected increases in the severity of future droughts, as projected temperature and evapotranspiration impacts outweigh the increases in precipitation.

In contrast, the Simon et al. (2020) study identifies increasing trends in most seasons for the Lower Mississippi Basin with the largest increases over the past 100 years exceeding 150 mm (6 in.). Based on these findings it is reasonable to conclude that the project area will continue to see increases in annual precipitation from more frequent intense storms producing more intense runoff events.

3.5.5 Observed Streamflow Trends

Generalized observations of streamflow trends in the Lower Mississippi River Region lack a clear consensus, with some models showing positive trends in some areas and others showing negative trends for areas in the southeast. Generally, most studies in the Lower Mississippi River Region indicated an increasing trend in streamflow.

3.5.6 Projected Streamflow Trends

No regional studies of future hydrology projections specific to the Lower Mississippi River Region were discussed in the IWR report (USACE, 2015). Overall, the IWR literature

review lacks consensus for projected streamflow, but did note that some studies suggest that streamflow may be decreasing over the next century in the Lower Mississippi River Region (USACE, 2015).

3.5.7 Summary of Findings

Figure 9 shows a summary matrix taken from the IWR literature review that graphically summarizes the climate findings.

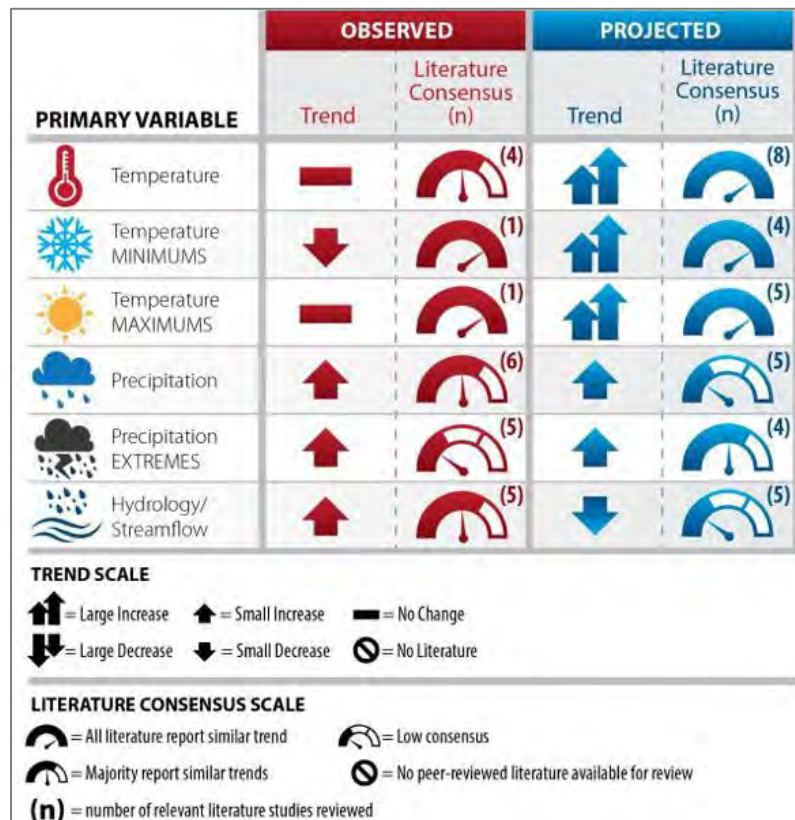


Figure 9. Summary Matrix of Climate Trends.

As shown in Figure 9, a strong consensus is seen with respect to decrease in observed temperature minimums and “no change” in temperature maximums, but the single study reviewed does not provide high confidence in the consensus. A strong consensus with a high number of reviewed studies exists in the projected trend of “large increases” in temperature, temperature minimums, and temperature maximums.

A moderate consensus is seen for the increasing trend in observed precipitation and for the increasing trend in projected precipitation extremes, while a low consensus is seen for the increasing trend in future precipitation. Additionally, a moderate consensus is seen for

projected increase in precipitation extremes, while a low consensus is seen for increasing trends of projected precipitation and increasing trends in observed precipitation extremes.

With respect to hydrology and streamflow, a moderate consensus is noted for an increase in observed streamflow, while a low consensus is seen for the trend of projected decreasing streamflow.

3.6 NONSTATIONARITY DETECTION AND TREND ANALYSIS

Many traditional hydrologic analyses assume hydrologic timeseries are stationary (their statistical characteristics are unchanging) in time. The assumption can be tested using the techniques in the USACE Engineer Technical Letter (ETL) 1100-2-3, Guidance for Detection of Nonstationarities (2017). The USACE Time Series Toolbox (TST) is a web-based tool that performs the statistical tests described in the guidance.

The hydrologic timeseries examined for this application are annual instantaneous peak streamflow and annual maximum gage stage. For annual peak streamflow, data from USACE Gage MS126, Mississippi River at Memphis, Tennessee and MS113, Mississippi River at Hickman, Kentucky were analyzed. For maximum stage, MS121 Mississippi River at Osceola was analyzed in addition to MS126 and MS113.

3.6.1 Mississippi River at Memphis

The Memphis gage (MS126) captures 932,800 square miles of drainage area and has a period of record from 1932 to 2024 (also the period of analysis). Figure 10 shows a trend analysis for annual peak streamflow at the Memphis gage. Table 2 shows a matrix of test results for trend hypothesis tests as well as slope fit/trend line coefficients. It should be noted that no statistical significance was found in any trend hypothesis test. The slight upward trend in streamflow aligns with the observed increase in precipitation, precipitation extremes, and streamflow shown in the literature review.

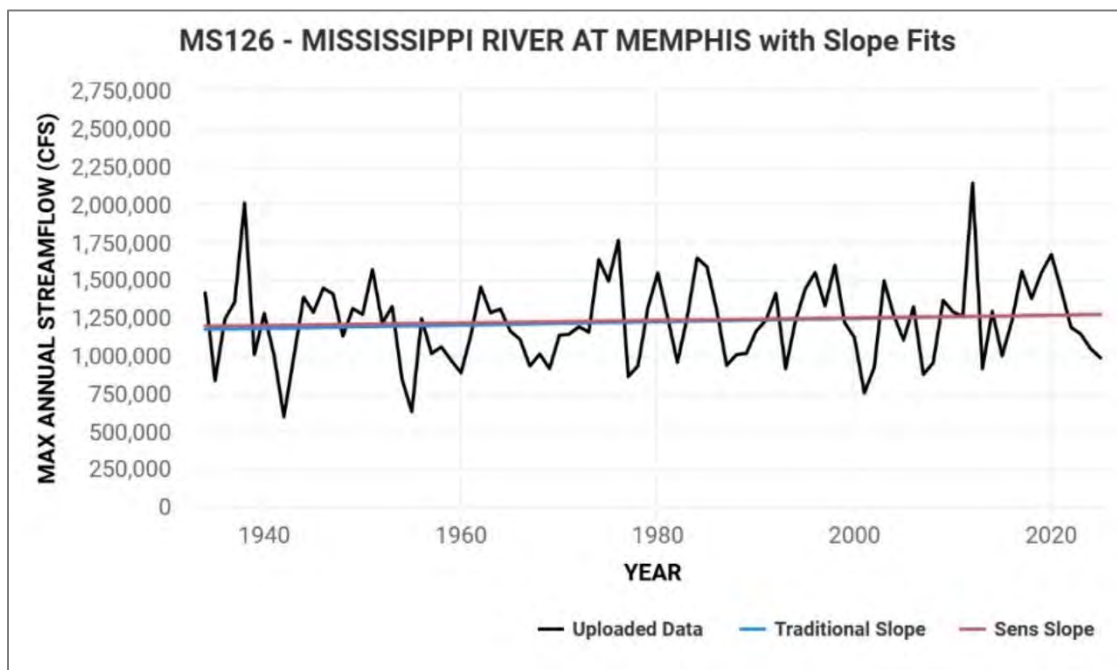


Figure 10. Annual Peak Streamflow Trend Analysis at Memphis Gage.

Table 2. Matrix of Statistical Test Results and Slopes for Streamflow at Memphis.

Statistical Test/Method	Results
t-Test	P-value = 0.312 Not Statistically Significant
Mann-Kendall	P-value = 0.412 Not Statistically Significant
Spearman Rank Order	P-value = 0.427 Not Statistically Significant
Traditional Slope	1090 (Positive)
Sen's Slope	841 (Positive)

Figure 11 displays the results of the nonstationarity analysis for annual peak streamflow at the Memphis gage. As shown, the Nonstationarity Detection tool indicates 2 abrupt nonstationarities, 1973 (Energy Divisive Method) and 2014 (Lombard Wilcoxon).

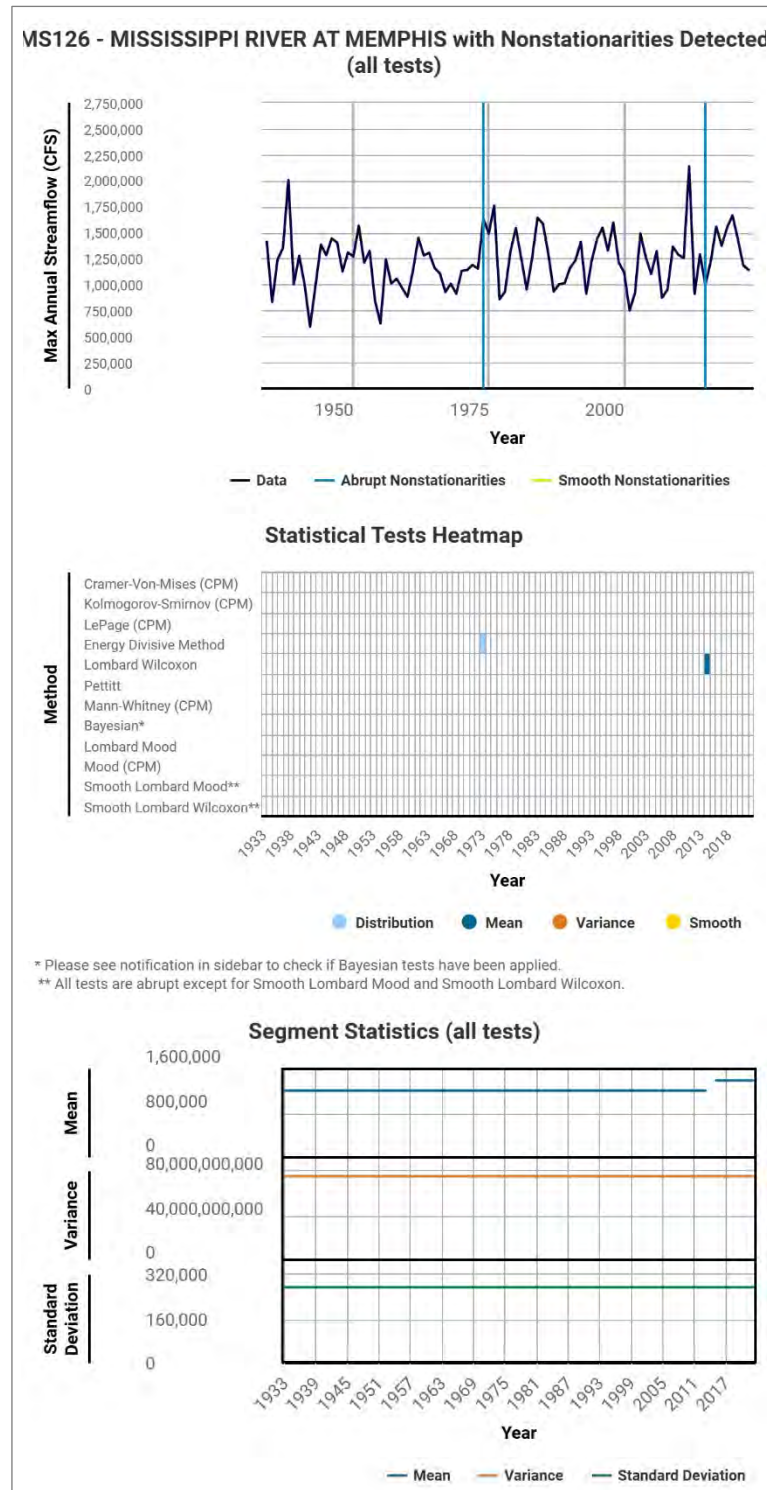


Figure 11. Nonstationarity Detection Test Results for Streamflow at Memphis.

The flood of 1973 is the third largest on record and, at the time, was the largest flow volume in the Mississippi River since the 1927 flood. The 1973 event was caused by a combination of an already saturated drainage basin, extensive above-average rainfall over several months, and extremely high levels of snowmelt from the Rocky Mountains. Another notable high water event occurred in April 1975. These events likely explain the detection of nonstationarity for 1973. The second nonstationarity detected for 2014 corresponds to an increase in mean annual maximum streamflow from 1.2M CFS to 1.35M CFS. This can likely be tied to the overall increasing trend in streamflow observed throughout the period of record, and no breakpoints were detected by the nonstationarity detection tool. Considering this information, it can be said that the single-test indication of nonstationarity for both the 1973 and 2014 dates lack consensus with other tests and therefore cannot be considered robust.

3.6.2 Mississippi River at Hickman

The Hickman gage (MS113) has a period of record from 1928 to 2024 (also the period of analysis). Figure 12 shows a trend analysis for annual peak streamflow at the Hickman gage.

Table 3 shows a matrix of test results for trend hypothesis tests as well as slope fit/trend line coefficients. It should be noted that no statistical significance was found in any trend hypothesis test. The slight upward trend in streamflow aligns with the observed increase in precipitation, precipitation extremes, and streamflow shown in the literature review.

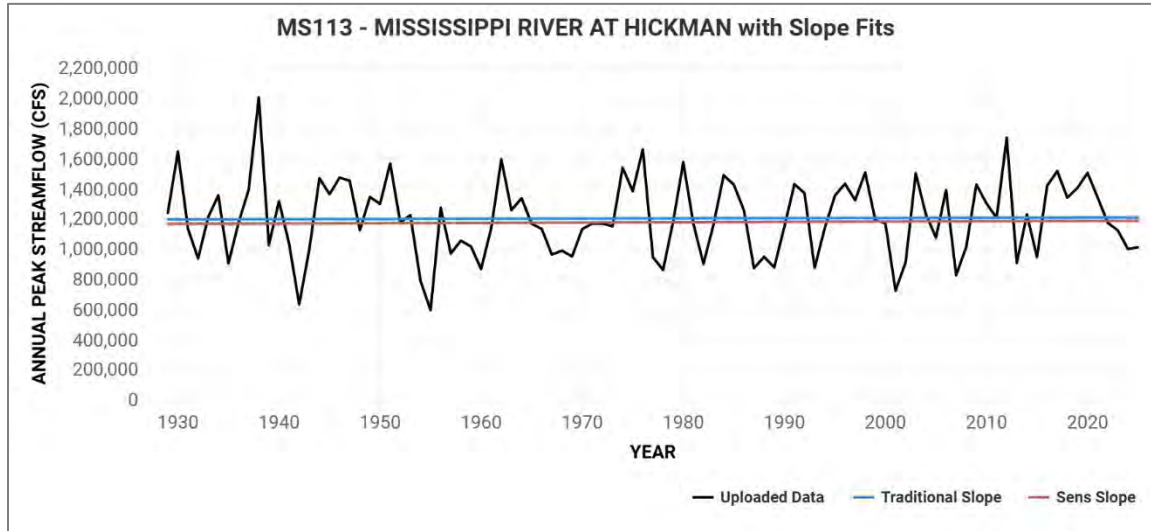
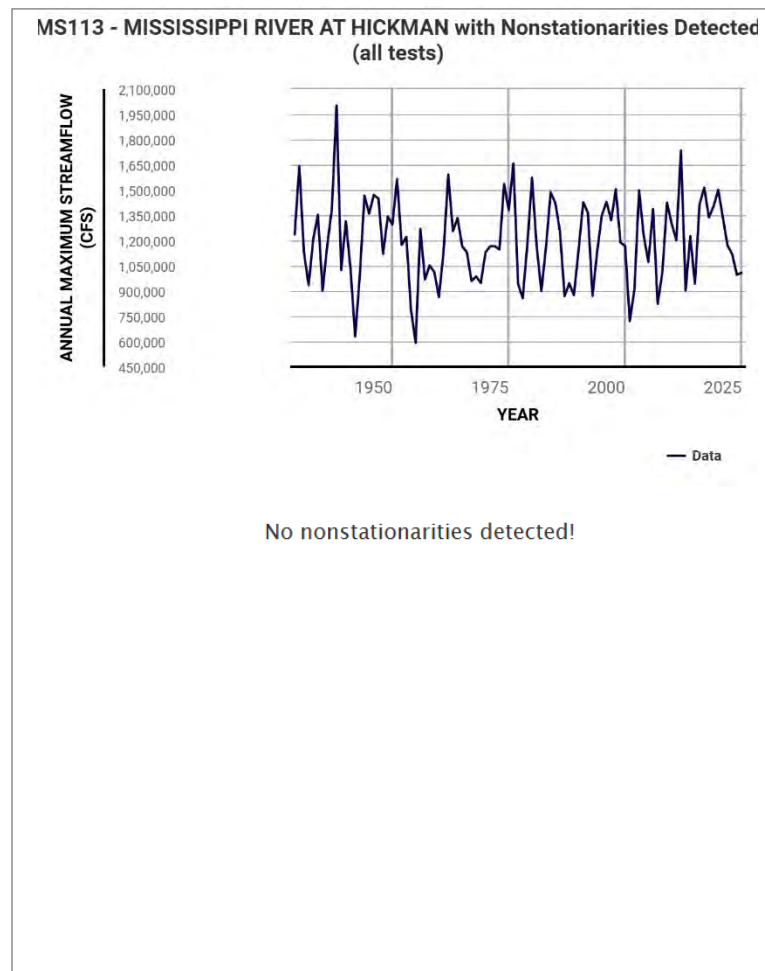


Figure 12. Annual Peak Streamflow Trend Analysis at Hickman.

Table 3. Matrix of Statistical Test Results and Slopes for Streamflow at Hickman.

Statistical Test/Method	Results
t-Test	P-value = 0.874 Not Statistically Significant
Mann-Kendall	P-value = 0.798 Not Statistically Significant
Spearman Rank Order	P-value = 0.757 Not Statistically Significant
Traditional Slope	147 (Positive)
Sen's Slope	210 (Positive)

Figure 13 displays the results of the nonstationarity detection analysis for annual peak streamflow at the Hickman gage. As shown, no nonstationarities were detected by the tool. This aligns with the lack of robust nonstationarities for peak annual streamflow detected at Memphis and Osceola.



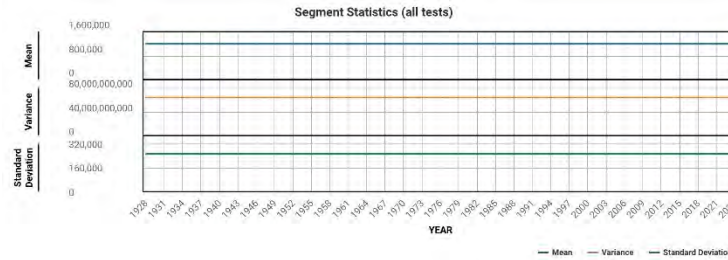


Figure 13. Nonstationarity Detection Test Results for Streamflow at Hickman.

3.6.3 Maximum Annual Gage

Trends in maximum annual gage height (stage) were assessed for the Memphis (MS126) and Osceola (MS121) gages. Figure 14 and Figure 15 show results of trend analysis for max annual stage at Osceola and Memphis, respectively. Table 4 contains results of statistical tests and slopes for the trendlines shown in the trend analysis figures. It should be noted that a statistically significant trend (at the alpha = .05 level) was not detected by any trend hypothesis test, and that the slight downward trend aligns with literature review results as well as information obtained from various reports investigating changes to riverbed elevation in the vicinity of the Memphis and Osceola gages.

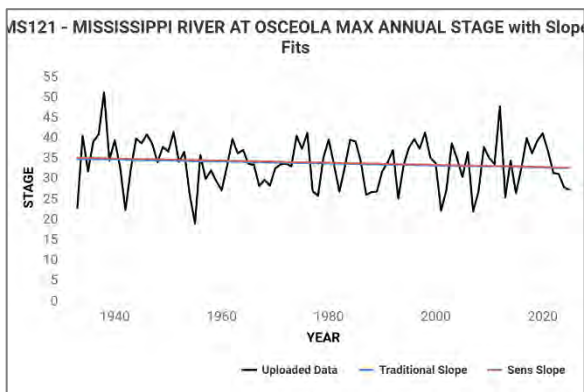


Figure 14. Max Annual Stage at Osceola.

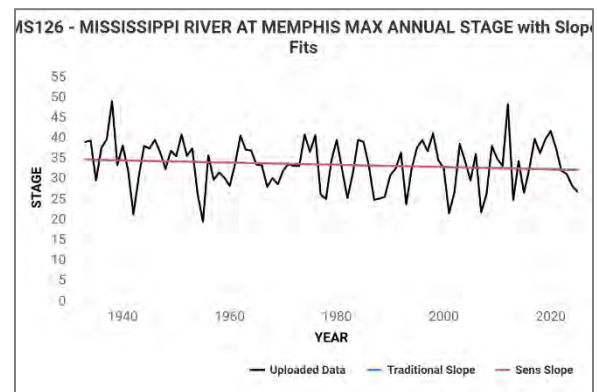


Figure 15. Max Annual Stage at Memphis.

Table 4. Statistical Test Results for Maximum Annual Stage.

Gage	t-Test	Mann-Kendall	Spearman Rank Order	Traditional Slope	Sens Slope
Osceola	0.292	0.227	0.258	-0.024	-0.026
Memphis	0.247	0.197	0.244	-0.026	-0.028

Nonstationarity detection was performed for the period of record for maximum annual stage at the Memphis (MS126) and Osceola (MS121) gages. The results of this detection are shown in Figure 16 and Figure 17 below.

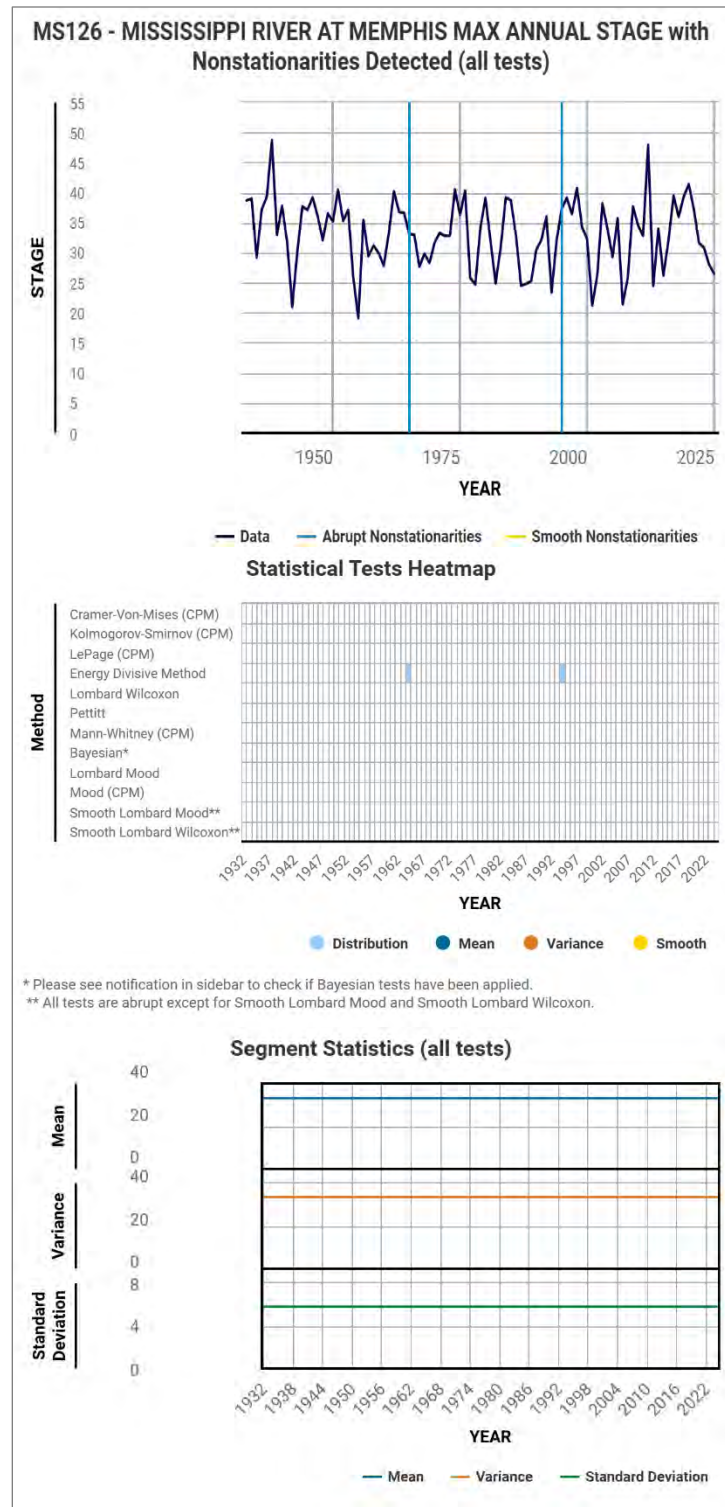


Figure 16. Nonstationarity Detection Results for Max Annual Stage at Memphis.

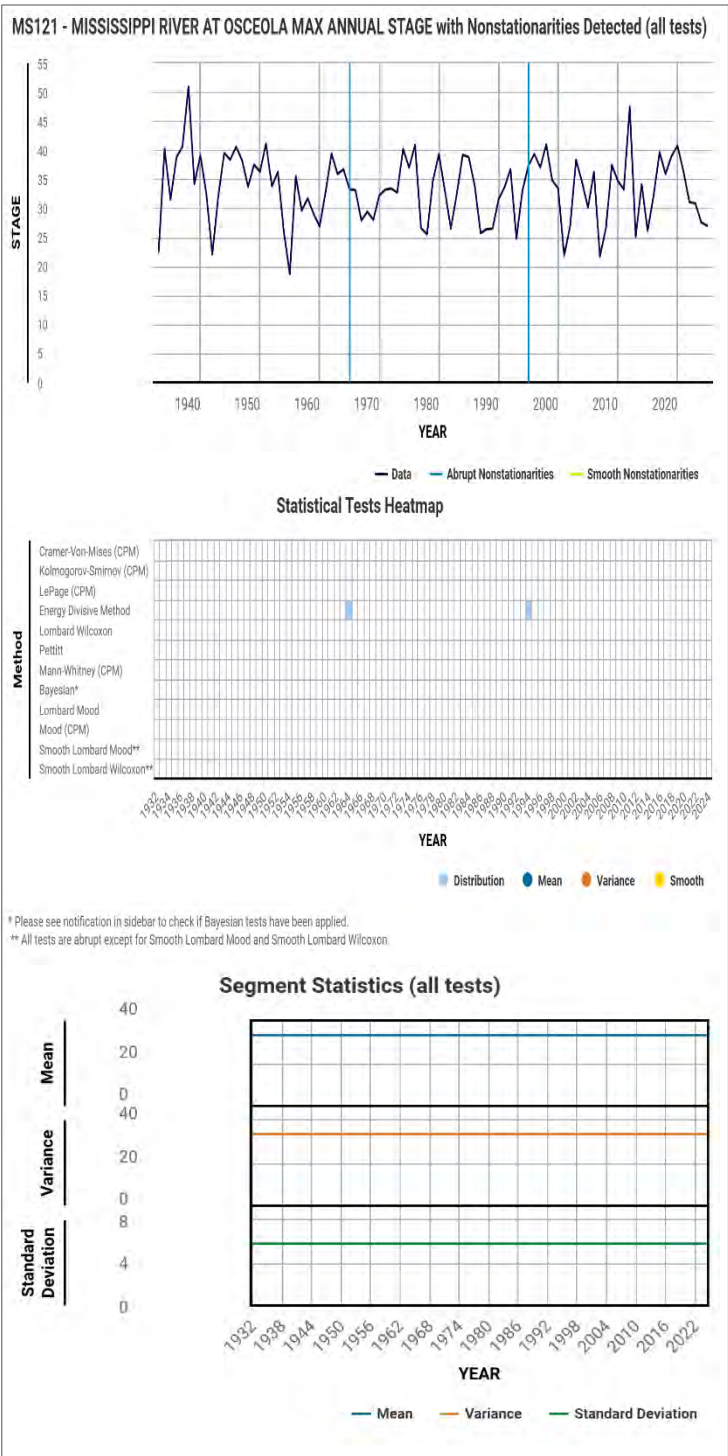


Figure 17. Nonstationarity Detection Results for Max Annual Stage at Osceola.

Given that only the Energy Divisive Method detected nonstationarity for years 1964 and 1994 (for distribution), the nonstationarity does not have consensus with other tests, and therefore cannot be deemed robust.

3.7 COMPREHENSIVE HYDROLOGY ASSESSMENT TOOL ANALYSIS

The USACE Comprehensive Hydrology Assessment Tool (CHAT) displays various simulated historic and future climate-influenced streamflow, temperature, and precipitation outputs derived from 32 GCMs. The CHAT uses Coupled Model Intercomparison Project Phase 5 (CMIP5) GCM meteorological data outputs that have been statistically downscaled using the Localized Constructed Analogs (LOCA) method. The CHAT produces projected results for 2006 to 2099 using two future scenarios for greenhouse gas concentrations: Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. The tool uses a reconstitution of historic greenhouse gas emissions to simulate output for the historic period of 1951 to 2005.

To analyze runoff, the tool uses LOCA-downscaled GCM outputs to force an unregulated, Variable Infiltration Capacity (VIC) hydrologic model. Areal runoff from VIC is then routed through a stream network using MizuRoute. Outputs represent the daily in-channel, routed streamflow for each stream segment—valid at the stream segment endpoint. Since the runoff is routed, the streamflow value associated with each stream segment is a representation of the cumulative flow, including all upstream runoff, as well as the local runoff contributions to that specific segment. Within the CHAT, the user can select streamflow output by stream segment. The user can also select precipitation/temperature output for a given 8-digit HUC watershed.

The CHAT application did not have information for the slackwater harbor area, therefore, the closest available stream segment (08000125) was analyzed. The Location Map of the Lower Mississippi-Memphis basin shown in Figure 18 was generated by the CHAT application. The selected stream (yellow) is directly adjacent to the project site.

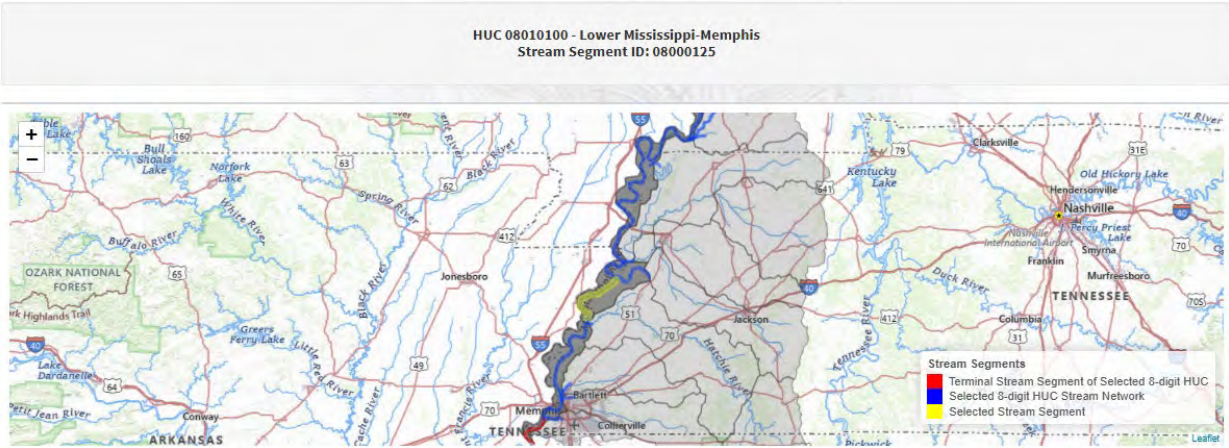


Figure 18. USACE CHAT Location Map.

Figure 19, Figure 20, and Figure 21 are CHAT outputs of the Range & Mean of Historic & Future Model Outputs for Annual-Maximum of Mean Monthly Streamflow, Annual-Maximum 1-day Precipitation, and Annual-Mean 1-day Temperature, respectively.

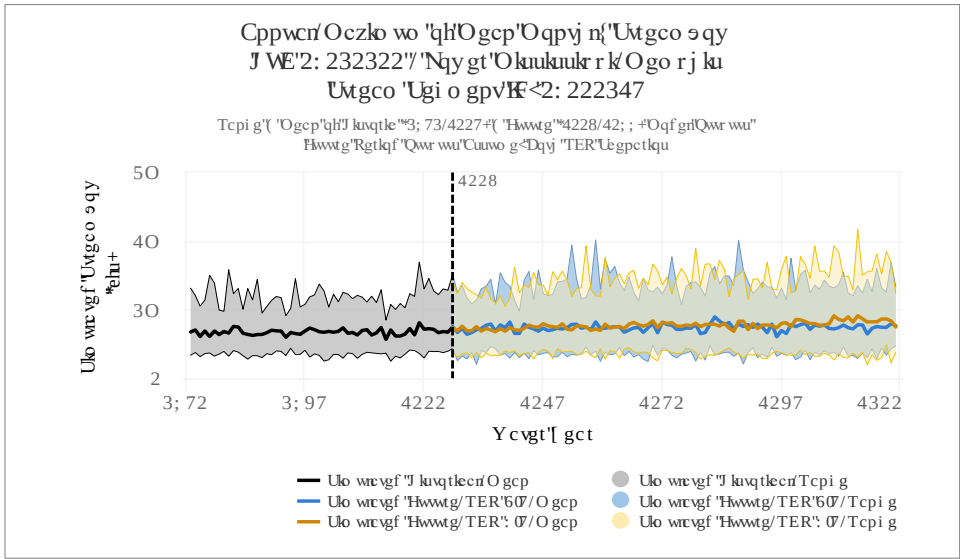


Figure 19. Annual-Maximum of Mean Monthly Streamflow.

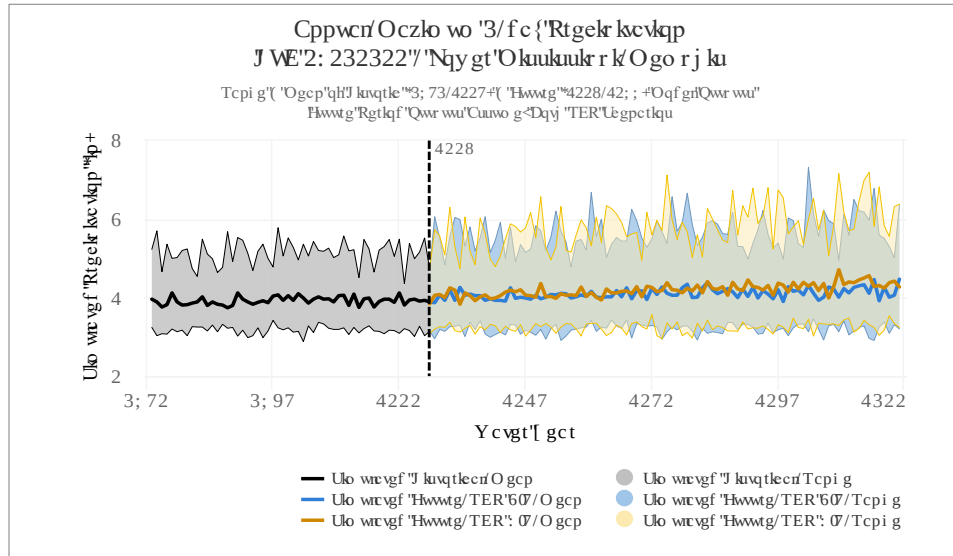


Figure 20. Annual-Maximum 1-day Precipitation.

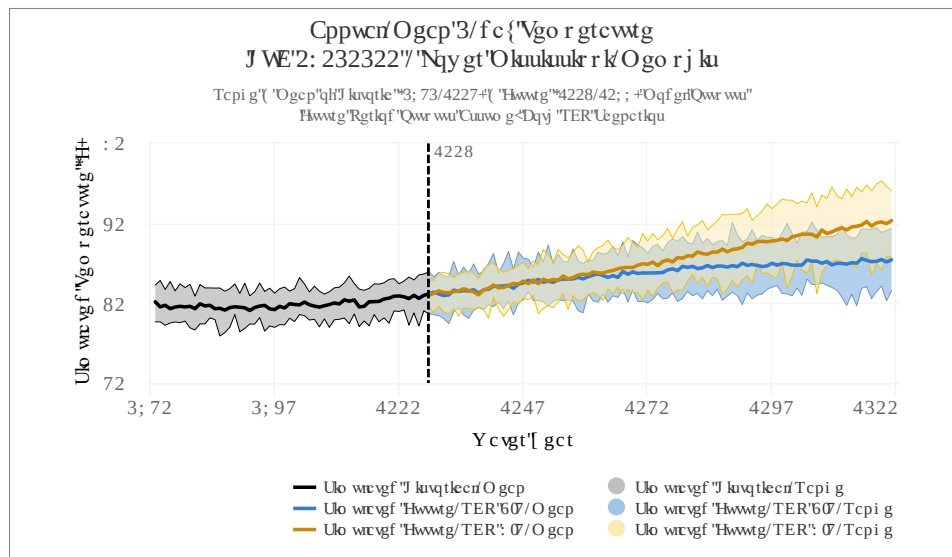


Figure 21. Annual-Mean 1-day Temperature.

3.7.1 Streamflow

For the Lower Mississippi Memphis watershed (HUC 08010100), this analysis evaluated trends in mean model output using the t-Test, Mann-Kendall, and Spearman Rank-Order tests. For all three statistical tests, this assessment applied a 0.05 level of significance (p-

values <0.05 are considered statistically significant). Figure 22 shows the results for Annual-Maximum of Mean Monthly Streamflow of the Simulated Trends in Mean Model Outputs, while Table 5 summarizes the test results.

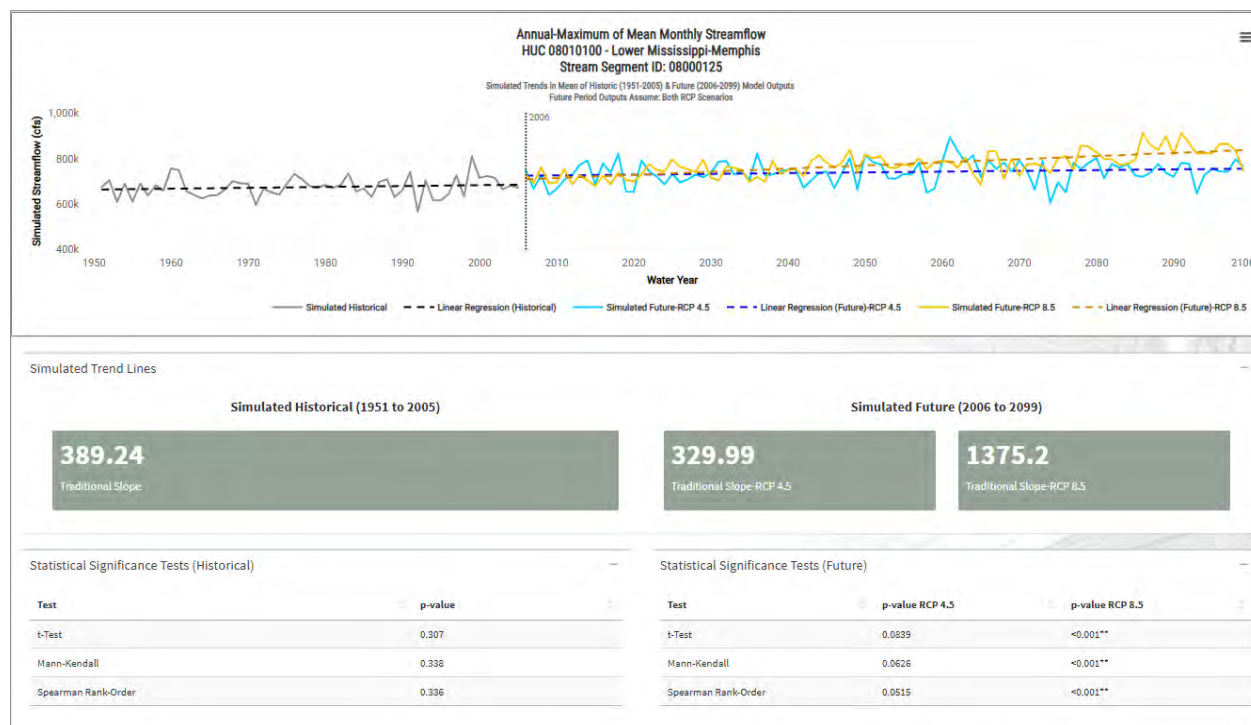


Figure 22. Annual-Maximum of Mean Monthly Streamflow.

Table 5. Matrix of Statistical Test Results for Streamflow.

Statistical Test	Historic (1951–2005)	Future (2006–2099) RCP 4.5	Future (2006–2099) RCP 8.5
t-Test	P-value = 0.307 Not Statistically Significant Slope = 389.24	P-value = .0839 Not Statistically Significant Slope = 329.99	P-value < 0.001 Statistically Significant Slope = 1375.2
Mann-Kendall	P-value = 0.338 Not Statistically Significant Slope = 389.24	P-value = .0626 Not Statistically Significant Slope = 329.99	P-value < 0.001 Statistically Significant Slope = 1375.2
Spearman Rank Order	P-value = 0.336 Not Statistically Significant Slope = 389.24	P-value = .0515 Not Statistically Significant Slope = 329.99	P-value < 0.001 Statistically Significant Slope = 1375.2

3.7.1.1 Historical Streamflow

The p-values for all tests for the simulated historical period (1951 to 2005) are all greater than 0.05, which indicates there is not a significant historical trend of increase for the annual-maximum mean monthly streamflow to more current times. This is inconsistent with the increase in hydrology/streamflow trend found in the literature review where a majority report a similar trend.

3.7.1.2 Projected Streamflow

The p-values for all tests for the RCP 4.5 scenario shows p-values greater than 0.05, indicating there is no statistical significance in the simulated trend of an increase in annual-maximum mean monthly streamflow. This is not true for the RCP 8.5 scenario, however, wherein all tests show values significantly lower than 0.05. This indicates a statistically significant simulated trend of an increase in annual-maximum mean monthly streamflow. This is inconsistent with the projections found in the literature, however, there is low consensus on this trend in the literature.

3.7.2 Precipitation

Figure 23 is a CHAT output of the simulated mean of annual-maximum 1-day precipitation from 1950 through the year 2100 for both RCP scenarios. Table 6 summarizes the statistical test results.

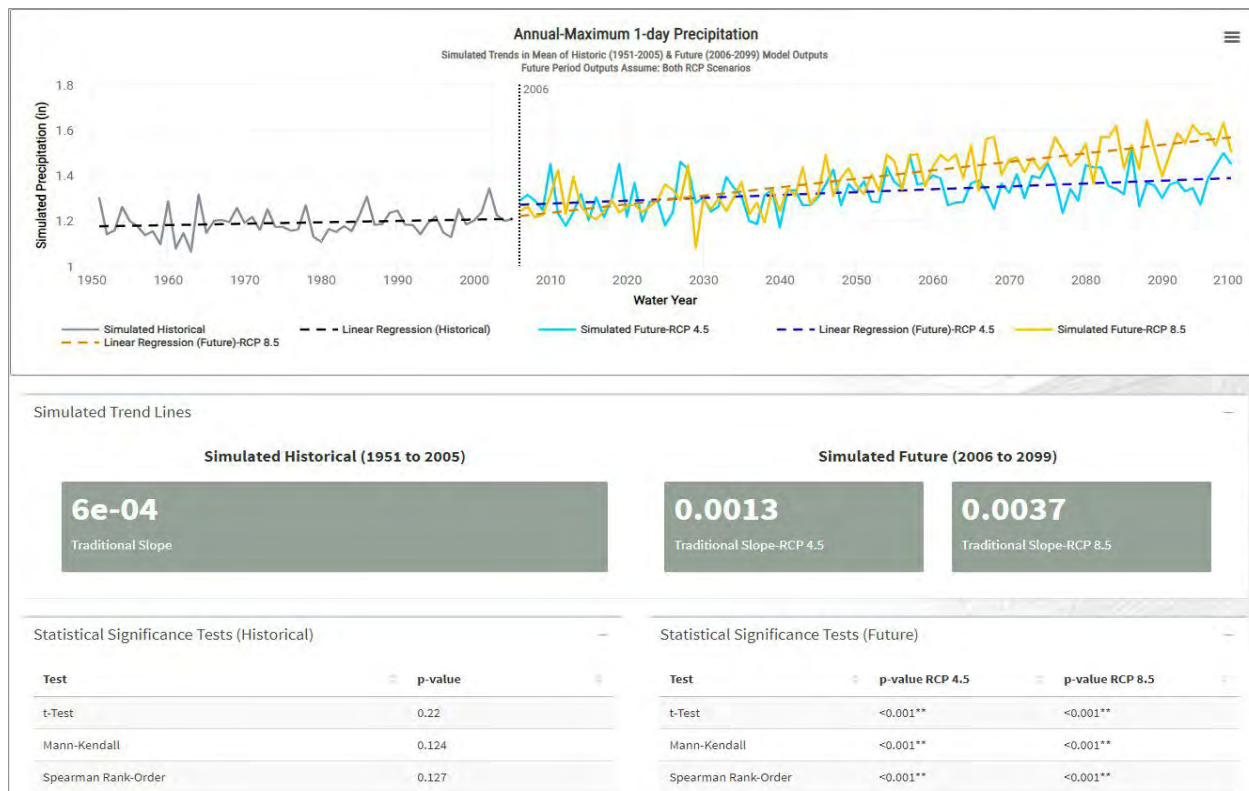


Figure 23. USACE CHAT Annual-Maximum 1-day Precipitation Trend Analysis.

Table 6. Matrix of Statistical Test Results for Precipitation.

Statistical Test	Historic (1951–2005)	Future (2006–2099) RCP 4.5	Future (2006–2099) RCP 8.5
t-Test	P-value = 0.22 Not Statistically Significant Slope = 6e-04	P-value < 0.001 Statistically Significant Slope = 0.0013	P-value < 0.001 Statistically Significant Slope = 0.0037
Mann-Kendall	P-value = 0.124 Not Statistically Significant Slope = 6e-04	P-value < 0.001 Statistically Significant Slope = 0.0013	P-value < 0.001 Statistically Significant Slope = 0.0037
Spearman Rank Order	P-value = 0.127 Not Statistically Significant Slope = 6e-04	P-value < 0.001 Statistically Significant Slope = 0.0013	P-value < 0.001 Statistically Significant Slope = 0.0037

3.7.2.1 Historical Precipitation

The p-values for all tests for the simulated historical period (1951 to 2005) are all greater than 0.05, which indicates there is not a historical trend of increase for the annual-maximum 1-day precipitation. This is inconsistent with the small increase found in the literature review, though there is a low consensus on the trend in the literature.

3.7.2.2 Projected Precipitation

The p-values for all tests and both RCP scenarios are less than 0.001, indicating a statistically significant simulated trend of an increase in annual-maximum 1-day precipitation. This generally agrees with what was found in the literature review.

3.7.3 Temperature

Figure 24 is a CHAT output of the simulated annual-mean 1-day temperature from 1950 through the year 2100 for both RCP scenarios. Table 7 summarizes the statistical test results.

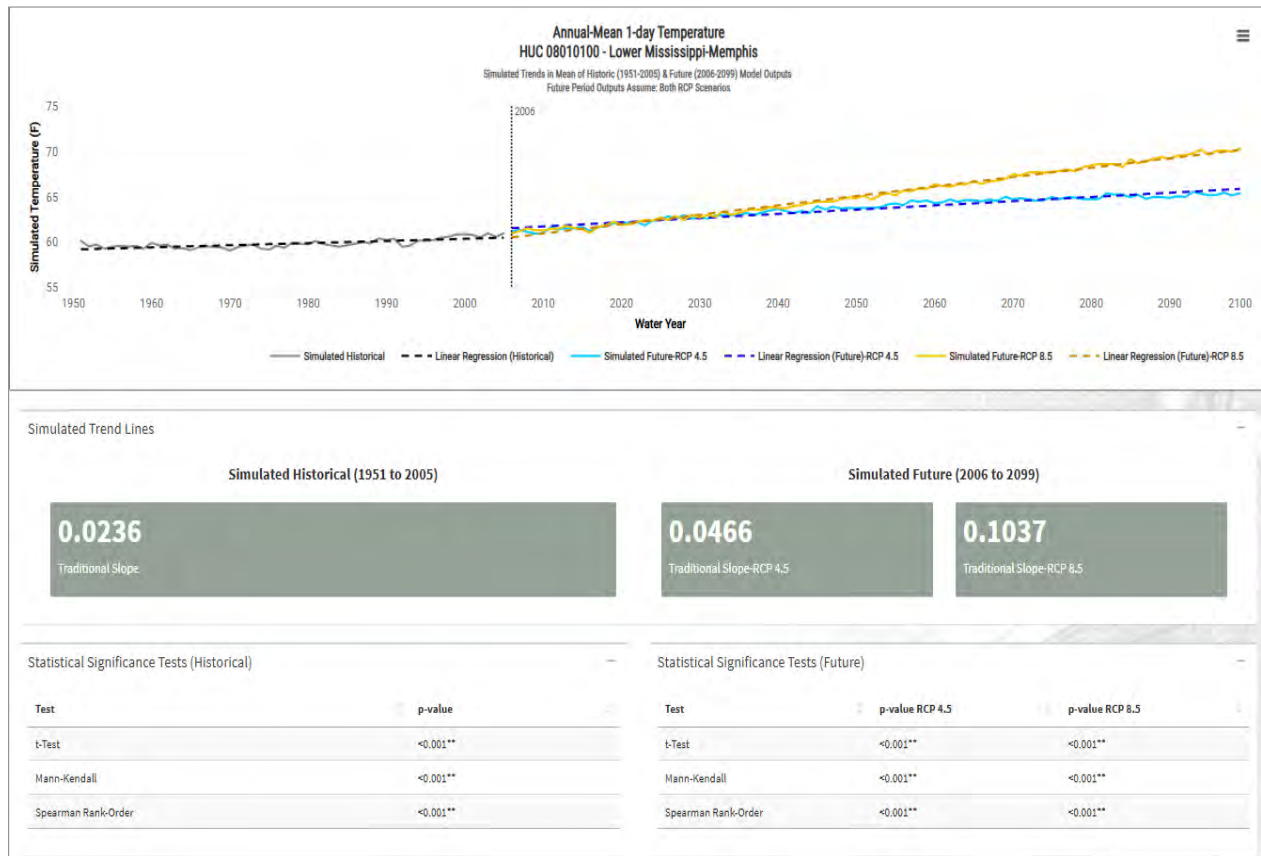


Figure 24. USACE CHAT Annual-Mean 1-day Temperature Trend Analysis.

Table 7. Matrix of Statistical Test Results for Temperature

Statistical Test	Historic (1951–2005)	Future (2006–2099) RCP 4.5	Future (2006–2099) RCP 8.5
t-Test	P-value < 0.001 Statistically Significant Slope = 0.0236	P-value < 0.001 Statistically Significant Slope = 0.0466	P-value < 0.001 Statistically Significant Slope = 0.1037
Mann-Kendall	P-value < 0.001 Statistically Significant Slope = 0.0236	P-value < 0.001 Statistically Significant Slope = 0.0466	P-value < 0.001 Statistically Significant Slope = 0.1037
Spearman Rank Order	P-value < 0.001 Statistically Significant Slope = 0.0236	P-value < 0.001 Statistically Significant Slope = 0.0466	P-value < 0.001 Statistically Significant Slope = 0.1037

3.7.3.1 Historical Temperature

The p-values for all tests for the simulated historical period (1951 to 2005) are all less than 0.001, which indicates there is a significant historical trend of increase for the annual-mean 1-day temperature. This is inconsistent with the no change in temperature trend found in the literature review where a majority report a similar trend.

3.7.3.2 Projected Temperature

The p-values for all tests and both RCP scenarios are less than 0.001, indicating a statistically significant trend of an increase in simulated annual-mean 1-day temperature. This agrees strongly with what was found in the literature review.

3.7.4 Conclusions

To summarize the literature review, a strong consensus exists that air temperatures will increase in the region over the next century. The studies were less conclusive on a trend for that of precipitation and hydrologic projections. There is a slight consensus that the projected changes in temperature and evapotranspiration will outweigh the changes in precipitation and other effects with respect to impacts on soil moisture, runoff, and drought conditions in the region. Overall, the results of the climate assessment show generally mild changes in the region and were not relevant to the design of the proposed harbor extension. The future without project site will possibly but not likely be affected by climate variability in the future.

SECTION 4

Hydraulics

Since Osceola Harbor operates primarily as a slack water harbor with no significant inflow from creeks or streams, the proposed harbor extension will have no impact on the hydraulics of the mainstem Mississippi River. Sedimentation of the harbor is well controlled with current dredging operations, and no alternatives considered altering the bottom grade of the existing harbor channel. Therefore, neither the flow nor the sedimentation rate would be substantially altered by any of the alternatives considered herein. For this reason, no substantive hydraulic analysis was performed.

A hydrodynamic model is deemed unnecessary for this harbor extension due to the following being true of all alternatives for which a detailed analysis was performed:

- No change in flow between with project and without project conditions.
- No change in water surface elevations between with project and without project conditions.

Thus, a pre-takings analysis is unnecessary since inundated area, inundated depth, and inundated duration, will remain unchanged when comparing the with and without project conditions. Since the proposed alternatives do not alter flooding depth, spatial extent, or duration, life safety is unaffected. The proposed alternative involves dredging the existing channel upstream/north of the existing harbor limits. The proposed dredging will be done within the limits of the back chute (historic channel), and with depths and side slopes that will remain stable based on geotechnical assessment and the past performance/stability of existing, steeper side slopes. Given that the proposed improvement only increases conveyance area, velocities will reduce by inspection.

It is important that the harbor remains open even during low water seasons for the long-term viability of the harbor and the proposed extension. Since the new harbor extension will be of equal geometry and depth to the existing harbor, there will be no difference in response to low stages on the Mississippi River. A previous study completed under the Lower Mississippi River 12-ft Navigation Reconnaissance Effort under the Lower Mississippi River Comprehensive Study completed a stage duration and cyclic analysis was performed at the Osceola gage. Working with MVM Channel Improvement and Water Control staff, and considering frequency of warranted dredging efforts, the study identified a “Performance Stage” that was assumed to correlate to a 12-foot channel depth. This was reported to be +3.0 LWRP for the Memphis District. The results of the duration analysis and percent exceedance for LWRP and Performance Stage are presented in Table 8 and Table 9 below.

Table 8. Duration Analysis for MS121 Osceola Gage.

Gage	Stage (ft)		Days Below Given Stage				
			Annual	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
MS121 Osceola	LWRP	-7.9	5	0	0	2	2
	Performance Stage	-4.9	15	1	1	6	7

Table 9. Percent Exceedance for MS121 Osceola Gage.

Gage	Stage (ft)		% Exceedance (Annual)	% Exceedance (Quarterly)			
				Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
MS121 Osceola	LWRP	-7.9	98.7	99.5	99.8	97.7	98.3
	Performance Stage	-4.9	96.0	98.8	99.4	93.6	92.1

For the Osceola gage, the study concluded that above a stage of -4.9-ft, it is likely that only minimal dredging efforts are required to maintain the navigation channel at a depth of 12-ft, and that below a stage of -7.9-ft, it is highly likely that dredging efforts are required to maintain the navigation channel at a depth of 12-ft.

The study's Cyclic Analysis revealed similar seasonal results as those presented in the Quarterly Duration Analysis, and that roughly 5% of the time, stages would be low enough to warrant increased dredging efforts from August to January to maintain the navigation channel. These overall findings show that there will be minimal annual impacts to the harbor in regards to low stages impacting draft depth.

The following exhibits are taken from the LMR 12-ft Navigation Tiered Study and were used in the development of the study conclusions previously discussed. Figure 25 is daily stage data at the Osceola gage, Figure 26 and Table 10 show the Quarterly Duration Analysis and Stage Exceedance Percentage, by quarter, for the Osceola gage, and Figure 27 displays the results of the Daily Stage Cyclic Analysis for the Osceola gage.

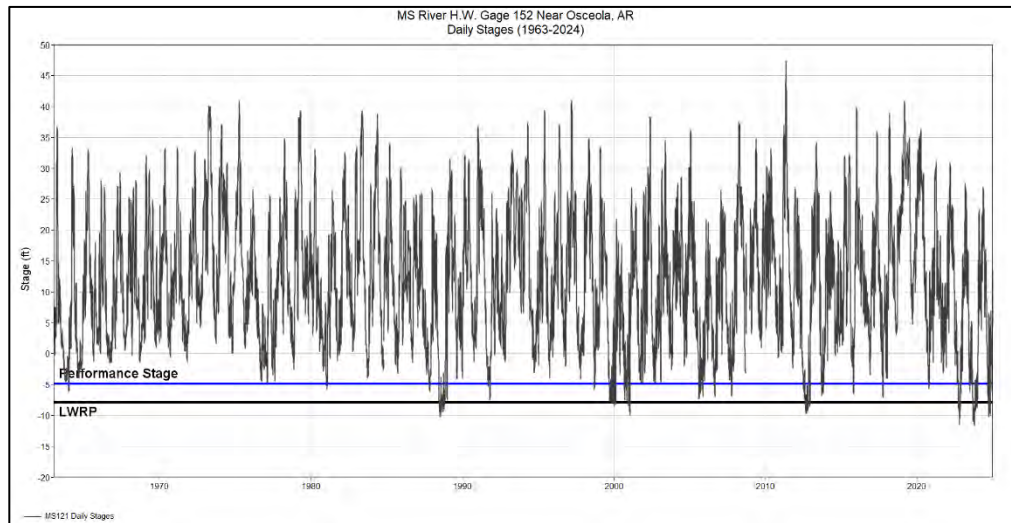


Figure 25. Daily Stages, Osceola Gage (1963 - 2024).

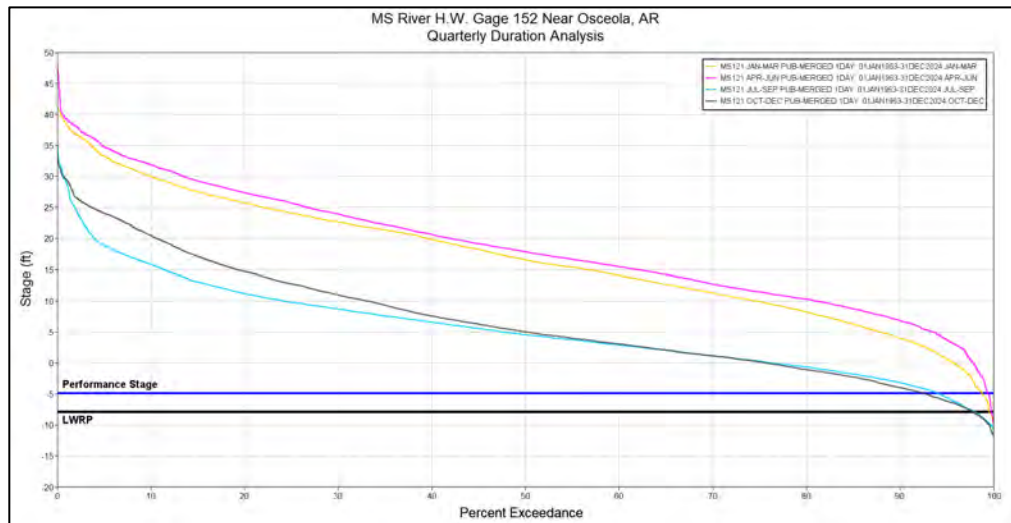


Figure 26. Quarterly Duration Analysis, Osceola Gage.

Table 10. Stage Exceedance Percentage Per Quarter, Osceola Gage.

Exceedance	Stage (ft)			
	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC
90	4.00	6.80	-3.19	-4.00
95	0.60	3.81	-5.59	-6.15
97	-1.44	1.69	-7.20	-7.27
99	-5.39	-3.01	-9.14	-9.16

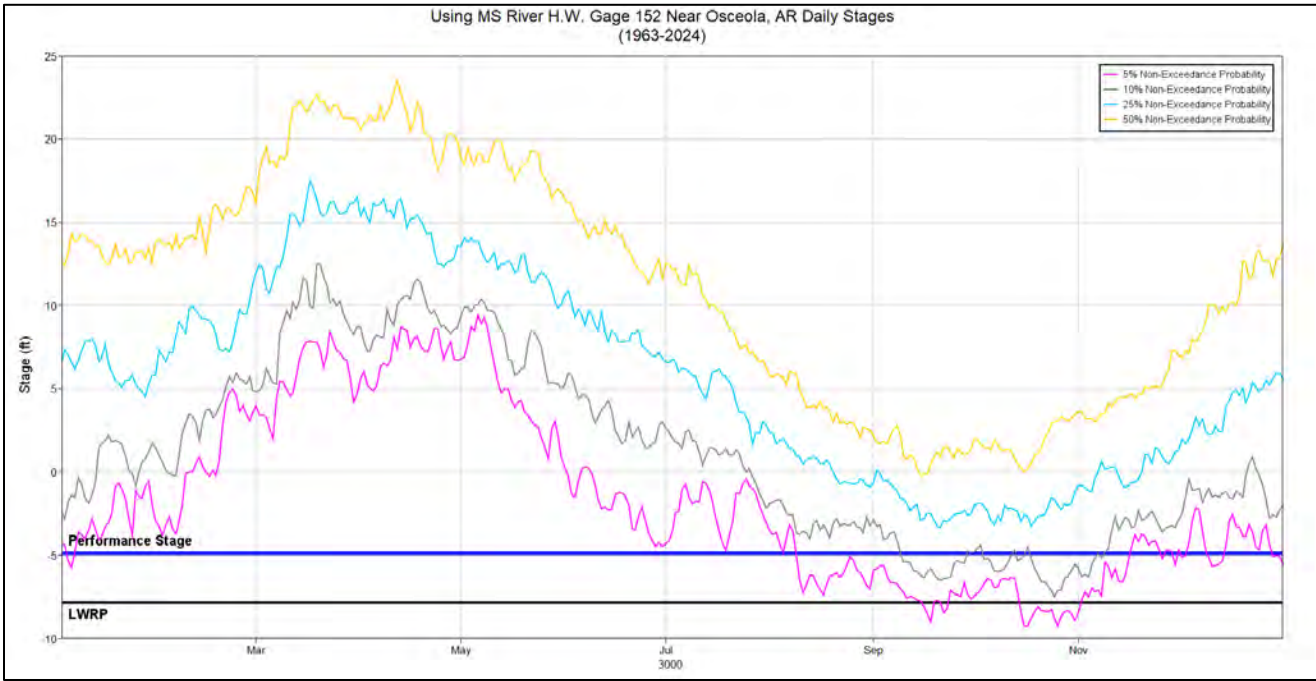


Figure 27. Daily Stage Cyclic Analysis, Osceola Gage.

SECTION 5

Alternatives Analysis

5.1 INTRODUCTION

The following alternatives were analyzed in detail for development of this project. Additional alternatives other than those discussed below were considered but were screened out prior to the TSP milestone. For the alternatives analyzed, Autodesk Civil 3D was utilized to create a digital elevation model (DEM) of the project area. This DEM was used to determine required volumes of dredging (cut) required to achieve the necessary geometry for navigation use.

5.1.1 Alternative 1 - No Action

The existing authorized harbor consists of a 250' wide (bottom) navigation channel which extends 6,500 ft upstream from the mainstem Mississippi River Channel in the slackwater harbor to the existing turning basin. This alternative required no computations or analysis. The footprint shown in red in Figure 26 below was provided to the PDT by the Operations Dredging unit. It shows the existing harbor limits that are currently dredged for maintenance, and this footprint was used as the basis for all alternatives described hereafter.



Figure 28. Current Harbor Dredging Limits.

5.1.2 Selected Alternative - Alternative 2 – Osceola Harbor Extension with Open Water Dredge Material Placement

The selected alternative extends the existing harbor upstream, within the historic channel, to just downstream of the existing Lake Neark Dike #2. This alternative extends the harbor approximately 3,000 feet and carries the same dimensions as the existing harbor. A new turning basin at the upstream end of the harbor extension is also proposed. A typical section of the harbor extension is shown in Figure 29.

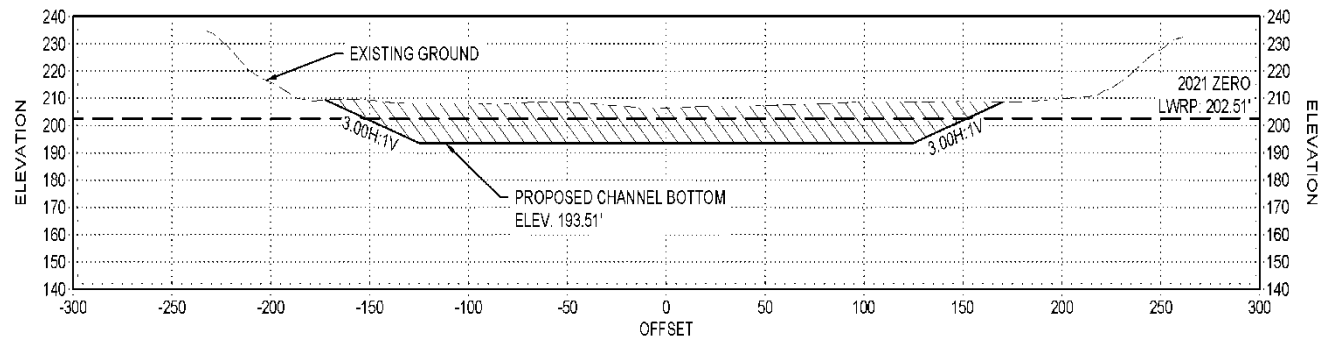


Figure 29. Harbor Extension Typical Section.

The design geometry of the harbor extension incorporates a 250' bottom width at -9.0 ft LWRP (193.51 AMSL) and 1V:3H side slopes. The approximate limits of the proposed extension and location of the turning basin are shown in red in Figure 30.



Figure 30. Limits of Harbor Extension and Turning Basin.

The selected alternative results in a total dredged material volume of approximately 620,000 cubic yards. Dredged material will be cast as transitional placement in the main stem Mississippi River channel downstream of the project location.

Annex 1 Geotechnical Engineering Design & Criteria

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1.2 Geology and Subsurface Investigation	2
1.3 Soil Parameters Determination	2
1.4 Slope Stability Analysis	3
1.5 Conclusion/Recommendations	5

Attachment List

1A	Geology Map
1B	Boring Location and Boring Logs
1C	Historical Boring Logs and Lab Test Reports
1D	Critical Cross Sections
1E	GeoStudio Slope Stability Calculations
1F.....	Site Pictures

1.1 Introduction

1.1.1 Design Guidance and Reference

All design, guidance, regulations, and project references are listed below:

- EM 1110-2-1902 Slope Stability, USACE Engineering and Design, October 2003
- Division Regulation (DIVR) 1110-1-400 Section 5 - Sliding Stability of Slopes and Structures, Lower Mississippi Valley Division (LMVD), March 1973

1.1.2 Project Description

This project is in Mississippi County, Arkansas near river mile 786 of the Mississippi River. The project area is located regionally in the northeast section of the St. Francis River Basin in southeast United States. The purpose of this project is to dredge the bottom of the harbor north of the existing harbor to 9 feet below current Low Water River Profile (LWRP) to expand the current bounds. The goal of the PDT is to determine the cost effectiveness of this proposal and to provide preliminary recommendations to the design based on the existing data we currently have. The geotechnical goals of this project are to provide preliminary recommendations for the stability of the side slopes and soil stratigraphy within the bounds of this project for the proposed and potential future work. The Geotechnical engineer will also address any scour or other disturbances within this report.

1.1.3 Site Description

The existing harbor has been in use for over 60 years. Wave/prop wash and surface runoff appears to contribute to erosion at the existing harbor resulting in local instability, but global instabilities have not been documented or are not visible. This is assessed to be acceptable and no issues raised since operation of harbor. The design of the existing harbor in the late 1960s did not armor the banks but did cut back the slopes to a 3H:1V. The PDT visited the site on 04-SEP-2025 and observed existing surficial slides on the slopes every 50 to 100 ft not only at the project site. The levee is 700-1000 feet away from the top bank of the harbor extension. Refer to Annex 1F to see pictures of the slides (1-3 are on the levee side at the proposed harbor site and 4-5 are at the existing harbor on the levee side).

1.2 Geology and Subsurface Investigation

This feasibility project lies within the Mississippi Embayment and geomorphically, is comprised of point bar meander scrolls and abandoned channels of ancestral Mississippi River with the alluvial deposits primarily made of sands in the channel with some clays and silts. Osceola Harbor is in Mississippi County located near the town of Osceola, AR. The surface material for the levee side (west) generally consists of approximately 0 to 35 feet of silty clay overlaying sand. The surface material for the island side (east) generally consists of approximately 0 to 15 feet of silty clay overlaying silty sand for another 20 feet before it goes to sand. The top of the Tertiary layer is around 50 - 75 ft Mean Sea Level (MSL). Five borings were drilled in 1967 and two borings (one a Tertiary boring) were drilled in 1981.

1.3 Soil Parameters Determination

The soil parameters analyzed are only to be used in this feasibility study for preliminary design due to the borings being relatively old and lacking strength data. The two borings with strength

data (1981 borings) are at the very upmost portion of the project and were used as the basis for the preliminary soil parameters for the analyses downstream. The stratigraphy of the downstream sections of the project were based on the closest borings (1967 borings). Borings will need to be acquired in the future to verify the preliminary recommendations in this feasibility design. This design is assessed to be conservative to account for uncertainty in the parameters.

1.4 Slope Stability Analysis

The two preliminary stability cases run were AC and LT using recommendations from DIVR 1973 using the "Type B Criteria". GeoStudio 2024 SLOPE/W software was used to calculate these factors of safety using Spencer's Method. Stability analysis results can be found in Tables 2 and 3. Block analyses were not performed as a part of this feasibility design. The two reaches chosen were at the turning basin (STA 82+00) and at the narrowest section of the harbor at section (63+00).

1.4.1 Design Objectives

- 1) Long term FS of 1.0 for the new dredge cut slopes (DIVR Case).
- 2) Long term FS unchanged for the existing banks above LWRP is existing condition and will not be impacted by dredge project.
- 3) After construction FS for global stability above the required FS of 1.3 assuming a box cut (DIVR Case)
- 4) After construction FS unchanged for the existing banks above LWRP is existing condition and will not be impacted by dredge project.

After Construction (AC): Utilizes drained shear strength for coarse-grained soil and undrained shear strength for fine-grained soil. In general, failures resulting from this scenario are more global issues and can result in large volumes of failure and property loss near top bank.

Long Term (LT): This case assumes that the loading has been applied for long enough for the excess porewater pressures generated by the loading to dissipate. Thus, drained shear strengths are used for both cohesive and non-cohesive soils. In general, failures resulting from this scenario are surficial in nature.

The DIVR recommends a minimum factor of safety (FS) of 1.3 for AC global case (refer to sentence four in figure 3 below) and a FS of 1.0 for LT case. The channel slopes are not being "excavated to neat lines" so the method used is comparing the existing FS to the proposed dredge FS (refer to Figure 3 below). With the preliminary design, we wanted to check that the removal of the dredge material would not change the existing critical factors of safety and cause a deeper global failure. As shown in the stability tables below, there are instances of being at or near a FS of 1.0 for LT. This is acceptable per the DIVR. These conditions currently exist and are not affected when comparing the FS of existing vs proposed for AC and LT. After accounting for the uncertainty in soil parameters and reviewing of slope stability analyses, a minimum bench of 25 feet is recommended for the levee side of the harbor. The FS for the Long Term and Short Term conditions of the Island side of the harbor do not decrease as a result of the dredging according to our preliminary analysis. Partial pool (PP) water level was run for all analyses provided in this report to identify the critical cases. LWRP case was also ran to check for the proposed and a case showing potential future lowering of the LWRP over the next 50-100 years. Both cases provided adequate FS.

B. TYPE B PROJECTS.

The channel and spoil bank section will be designed on the assumption there will be no failures during construction, but that some sloughing and bank caving will occur later. For such cases, the analysis usually will be for the end-of-construction case with factors of safety of about 1.3.

For detailed requirements, see para 8.

Figure 1: Description of Type B Project per DIVR

b. For type B projects, as defined in paragraph 3b, channel slopes to be excavated to neat lines should be designed to have factors of safety of about 1.3 for the construction case using Q strengths for clay, R strengths for silt or clayey silt and S strengths for sands and silty sands. The factor of safety for long term stability of the channel slope should be about 1.0 using S strengths with $c' = 0$. The location and height of spoil should be determined to provide a minimum factor of safety of 1.3 for the construction case. When the design is based on the channel being excavated as a box cut with a dredge, or to a section equivalent to that with neat channel side slopes, the spoil height and location will be determined to provide a minimum factor of safety of 1.3 for the construction case, assuming that the channel has been excavated to full depth with vertical side slopes through the mid-point of the theoretical neat slope. The minimum berm width of 30 feet should be measured from the point where the theoretical neat slope intersects the berm surface. The use of a box cut or equivalent section cut should be avoided in channel reaches where the resulting subsequent slides would adversely affect channel capacity and the stability of the spoil bank. This can be expected in areas where the foundation contains thick deposits of weak clay. Box cuts and equivalent section cuts will not be used at type A projects as defined in paragraph 3a.

Figure 2: Highlighted text from DIVR that is applicable to this "Type B" project

Table 1: DIVR Minimum Factors of Safety for Type B Project

Loading Case	Minimum Factor of Safety
After Construction (AC)	1.3
Long Term (LT)	1.0

Table 2: Stability Analysis – Levee Side

		Design FS	Station 63+00	Station 82+00
			FS	FS
1	AC – Existing Upper Bank	N/A	1.2	1.2
2	AC - Proposed Upper Bank	Unchanged from 1 (AC – Existing)	1.2	1.2
3	AC - Proposed Global Vertical	1.3	1.9	1.7
4	(Upper Bank) LT – Existing/Proposed	1.0	~1.0*	1.1
5	(Dredged) LT - Proposed Sand	1.0	1.6	1.4

Table 3: Stability Analysis – Island Side

		Design FS	Station 63+00	Station 82+00
			FS	FS
6	AC - Proposed Global Vertical	1.3	1.6	1.7
7	(Upper Bank) LT – Existing/Proposed	1.0	~1.0*	~1.0*

*Factor of safety is at or around 1.0. This will be further verified with future borings and survey data.

1.5 Harbor Bank Geometry

The harbor will be dredged as dredge box which could temporarily leave near vertical or sloughed sides. The angle of repose will more than likely give a slope of 2H:1V but to account for uncertainties we analyzed for 3H:1V on both sides of the dredge box. The slope of east side dredge slough will continue down to required elevation 9 ft below LWRP for any future dredging below the proposed design (i.e. 4-5 ft of potential LWRP lowering). We analyzed the levee side (west) with no bench and then with a minimum bench to determine no change in existing global stability. A minimum bench was provided for the west side to satisfy design objectives in 1.4.2. (Other considerations are as follows: the existing slopes do not have rip rap and is performing to a satisfactory level, the harbor is likely to aggrade rather than erode, and the 25 ft bench will also provide protection from wave/ prop wash). The levee side (west) has more real estate considerations than the island side (east) so we chose to include a bench on just the levee side as the existing FS for island side meets required FS of 1.0 for LT.

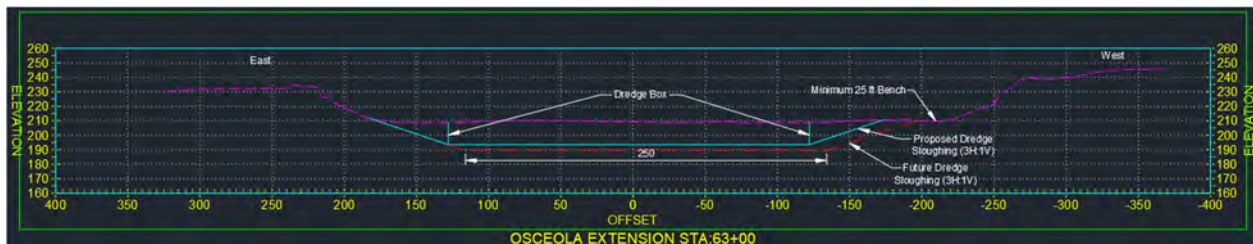


Figure 3: Harbor Geotech Recommendations

1.6 Conclusion/Recommendations

It is important to recognize that the FS of the existing harbor slopes is at or near a LT FS of 1.0, but the purpose of the preliminary investigation and recommendations are to check if the removal of dredge material will cause global instability. The conclusion is that the removal of the dredge material will not cause global instability of the slopes. The dredged harbor slopes will have surficial slides as they do now. The 25 foot bench is a minimum requirement on the levee side for proposed and for future design until further analyses have been performed with updated subsurface data. During PED, borings will need to be acquired on the west and east bank spaced at 1000 linear feet provided there are no major access or environmental issues (around 4-6 additional borings). Every other boring should go to a depth of at least 70 ft to

gather strength, unit weight and relative density data. If the adjacent landowners decide to develop the property along the bank and it requires a permit from USACE, then the bank will need to be further analyzed at the developer's expense to verify that the new construction does not adversely affect the harbor project. There are some uncertainties with access to obtain borings (environmental clearance and access to island bank).

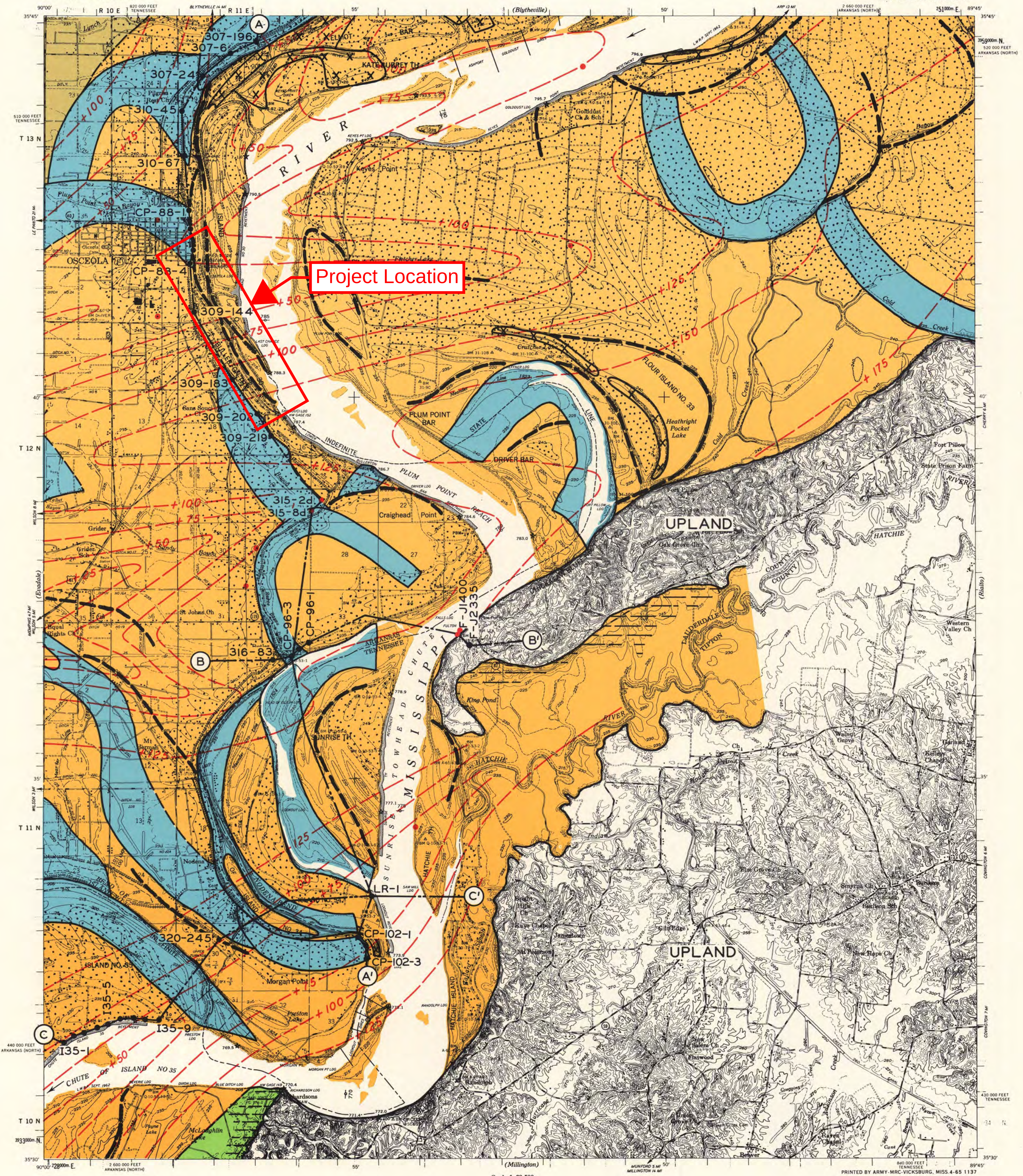


Figure 4: Existing slide on Levee side of proposed harbor expansion



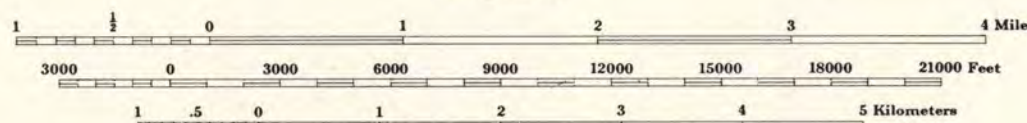
Figure 5: Existing slide on Levee side of proposed harbor expansion

Annex 1A Geology Map



LEGEND

- | | | | |
|--|--|--|---|
| | ALLUVIAL APRON | | SELECTED MAJOR SWALES |
| | NATURAL LEVEE | | SELECTED SWALES ILLUSTRATING TRENDS OF MEANDERS |
| | POINT BAR | | INDEFINITE CONTACT |
| | BACKSWAMP | | CORPS OF ENGINEER BORINGS |
| | ABANDONED CHANNEL | | BORINGS BY OTHER AGENCIES |
| | BRAIDED-RELICT ALLUVIAL FAN | | BORINGS USED TO CONTOUR BURIED TERTIARY SURFACE |
| | ELEVATION OF TOP OF TERTIARY IN FEET MSL | | |

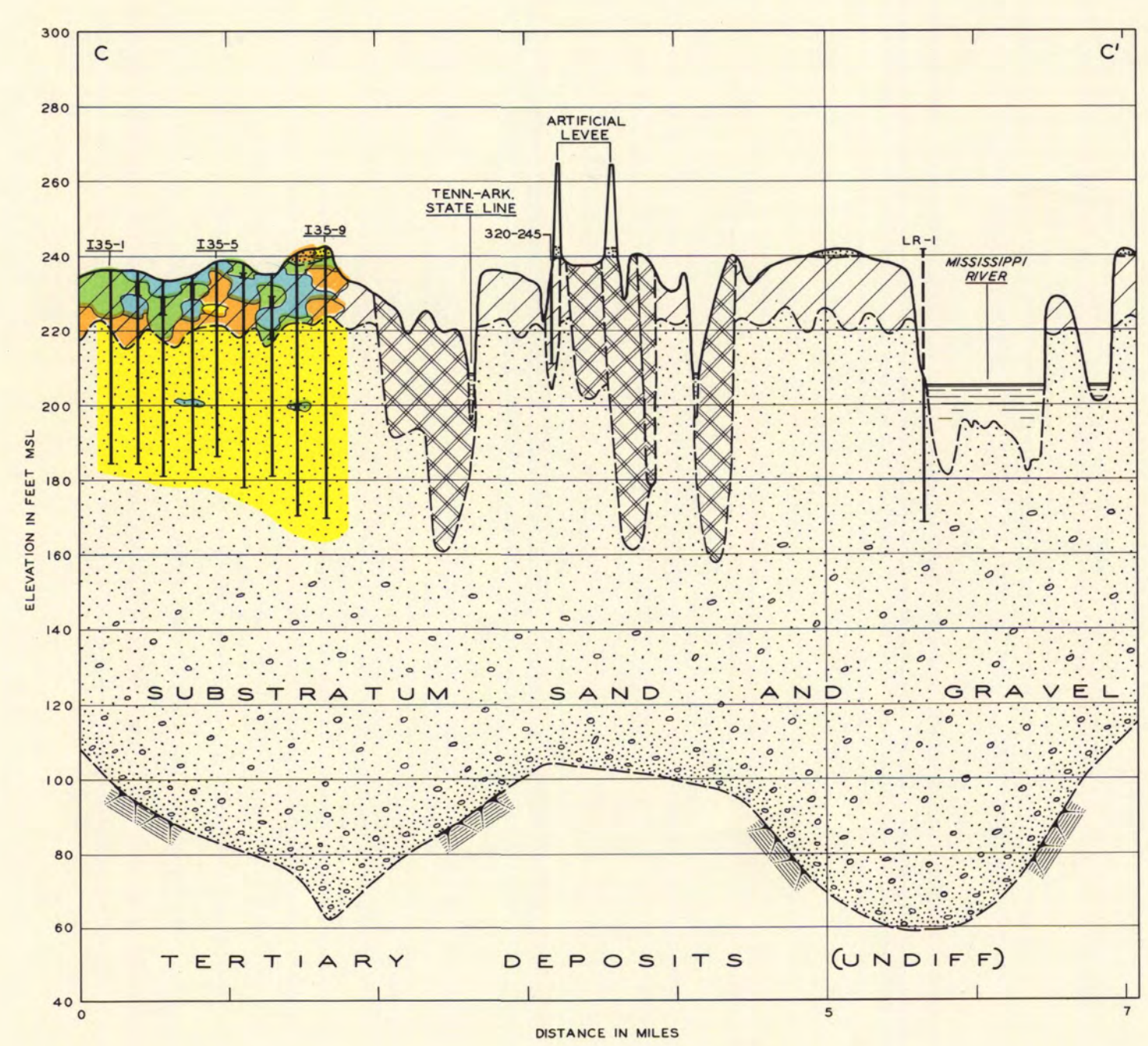
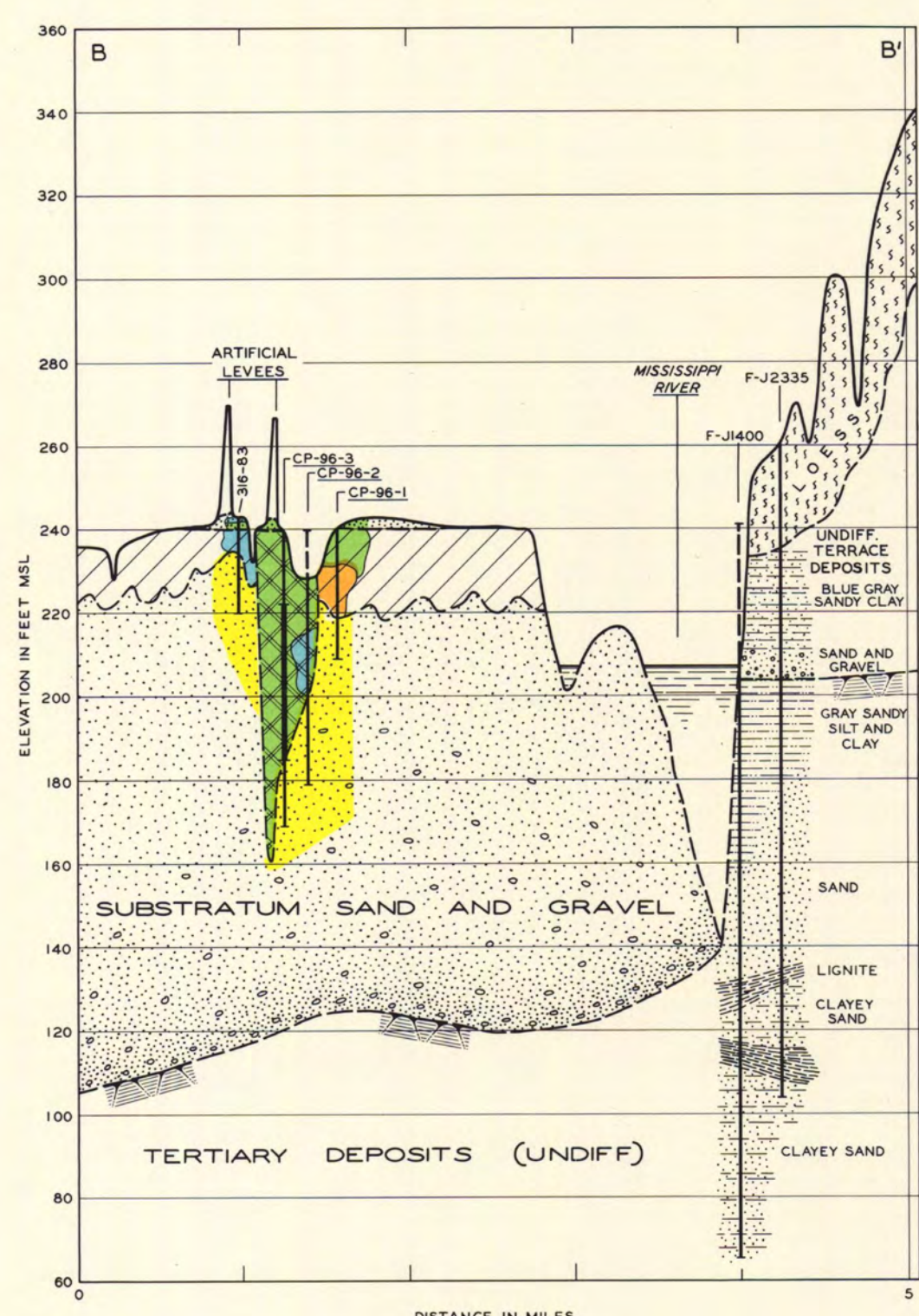
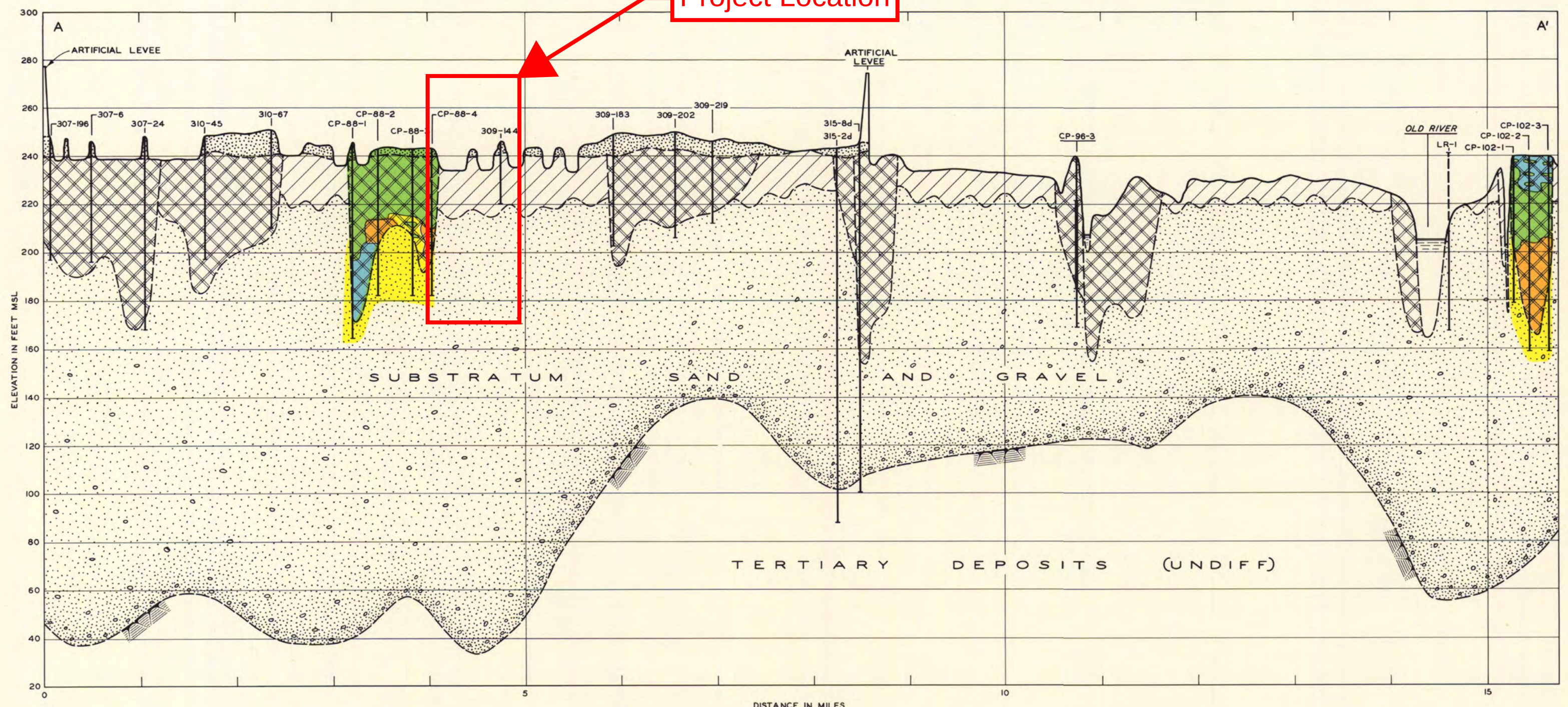


Contour Interval 10 feet changing at the 280 foot contour line to a 20 foot interval
Dashed lines represent half interval contours.

DATUM IS MEAN SEA LEVEL

GEOLOGICAL INVESTIGATION
ST. FRANCIS BASIN
DISTRIBUTION OF ALLUVIAL DEPOSITS
OSCEOLA, ARK-TENN

Project Location



LEGEND

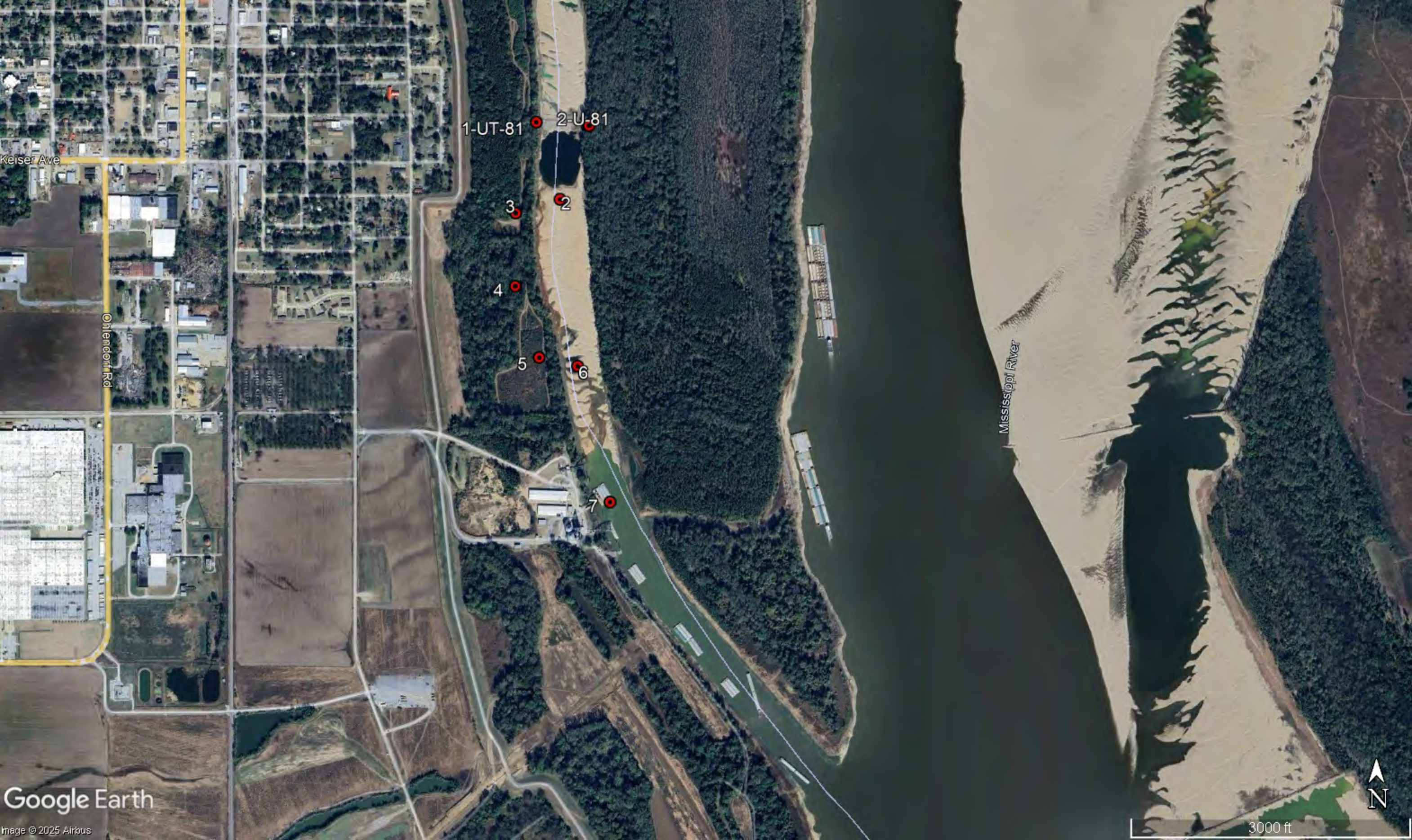
TOPSTRATUM	PRE-1950 CE SOILS CLASSIFICATION	PROBABLE EQUIVALENTS IN UNIFIED SOIL CLASSIFICATION SYSTEM
NATURAL LEVEE	SAND	SAND (SP, SW)
POINT BAR	SAND & GRAVEL	GRAVEL (GP, GW)
ABANDONED CHANNEL	SILTY SAND	SILTY SAND (SM)
UNDIFFERENTIATED SAND AND GRAVEL	CLAY SAND	CLAYEY SAND (SC)
TERTIARY SURFACE	SANDY CLAY	SILT & VERY FINE SAND (ML)
	SILT	SILT (MH)
	SANDY SILT	
	CLAY	FAT CLAY (CH)
	BLUE MUD	LEAN CLAY (CL)
	SILTY CLAY	ORGANIC CLAYS (OH)
	CLAY SILT	

SOIL TYPES ARE SHOWN TO THE MAXIMUM DEPTH OF DETAILED BORING INFORMATION.

7A - BORING NUMBER
CLAY ZONES WITH WATER CONTENTS OVER 40% DRY WEIGHT (INDICATED IN BORINGS IN WHICH BORING NUMBER IS UNDERLINED)

GEOLOGICAL INVESTIGATION
ST. FRANCIS BASIN
SECTIONS A-A', B-B', AND C-C'
OSCEOLA, ARK-TENN

Annex 1B
Boring Locations



1-UT-81

2-U-81

3

2

4

5

6

7

Mississippi River

Annex 1C
Historical Boring Logs and Lab Test Reports

FIELD BORING LOG

1-U-T-87
HOLE NO. _____

SHEET 1 OF 2

PROJECT LAKE NEAR (DIKE 2) LOCATION _____

DRILL RIG INT F-1500 INSPECTOR CROSS OPERATOR JACKSON

DEPTH OF WATER _____ DATE _____ TABLE _____ DATE _____

ELEVATION OF GROUND _____

Sample Number	Date	Sample		Stratum		Classification — Remarks	MUD Type Sampler
		From	To	From	To		
1	12-14-81	0.5	1.0	0.5		Silt BR moist	Dep Auger
2	"	4.5	5.0	0.5		" " "	"
3	"	5.0	5.5	0.5	2.5	① piston stuck in tube	5" TUBE
4	"	8.0	10.5	7.5		Silty clay wknd OR MED	"
5	"	11.0	13.6	7.5	14.0	" " " "	"
6	"	14.0	14.5	14.0		SANDY silt GR moist	"
J2V sample - Most of sample shipped from tube							
7	"	17.0	18.8	14.0	20.0	SANDY silt GR Wet	"
8	"	20.0	22.5	20.0	23.0	Silty clay BR med	"
9	"	23.0	25.7	23.0		FINE SAND BR moist	"
10	"	26.0	27.5	23.0		" " " "	Blow Count split 8-9-9 spade
11	"	29.0		23.0		lost sample	8-6-8 "
12	"	32.0	33.5	23.0		FINE/MED SAND OR SAT	18-11-16 "
13	"	35.0	36.5	23.0	38.0	" " " " LIFT	9-10-13 "
14	"	38.0	39.5	38.0		Silty SAND OR SAT	7-5-8 "
15	"	44.0	45.5	38.0	46.0	" " " "	11-9-13 "
16	"	49.0	49.5	49.0	49.5	FAT clay GR soft	3- "
17	"	49.5	50.5	49.5		FINE/MED SAND E.G. GR SAT	12-14 "
18	"	59.0	60.5	49.5		" " " " " "	17-12-10 "
19	"	69.0	70.5	49.5		" " " " " " Wet	28-30-41 "
20	12-15-81	79.0	80.4	49.5		FINE/MED SA GR SAT	44-40-50+ "
21	"	89.0	90.3	49.5		" " " " E.G. GR "	37-39-50+ "
22	"	99.0	100.5	49.5		" " " " " " " " Wet	36-37-50 "
23	"	109.0	109.8	49.5		" " " " " " " "	54-50+ "
24	"	119.0	120.5			" " " " " " " "	36-48-44 "
25	"	129.0				IN HEAVY GRAVEL @ 129.0' continuing with	

LMM 650
JAN 64

FIELD BORING LOG

HOLE NO.

SHEET 2 OF 2

PROJECT LAKE NEARK (Dike-2) LOCATION _____

DRILL RIG Int F-1500 INSPECTOR CROSS OPERATOR JACKSON

DEPTH OF WATER _____ DATE _____ TABLE _____ DATE _____

ELEVATION OF GROUND_____

MUD

Sample Number	Date	Sample		Stratum		Classification - Remarks	Type Sampler
		From	To	From	To		
24	12-15-91	138.0	139.0	49.5		FINE/MED SAND BR MOIST (12")	Blow Count Split 68-114 SPADN
"	"	no sample 149.0				OUT of Heavy Gravel @ 134.5'	
"	"	no sample 159.0				Still in FINE/MED SAND - Continue Wash	
"	"	no sample 159.0				Back in Heavy Gravel @ 154.5'	
"	"	no sample 169.0				Still in Heavy Gravel - Continue Wash	
"	"	no sample 179.0				OUT of Heavy Gravel @ 168.0'	
"	"	no sample 179.0				FINE/MED SAND (no Gravel?) Continue Wash	
"	"	no sample 179.0				FINE/MED SAND continue Wash	
25	"	183.0	184.0	49.5		FINE/MED SAND BR Wet 65-50	REFUSED

FIELD BORING LOG

HOLE NO. 2-4-81

SHEET _____ OF _____

PROJECT LAKE NEARK, AR. LOCATION ~~PA 2~~ See below

DRILL RIG E-1500 GMC INSPECTOR Whitaker OPERATOR Myche

DEPTH OF WATER 8 DATE 2/2/81 TABLE 14.1 DATE 2/2/81

ELEVATION OF GROUND_____

MUD 13.2

[illegible]

DEC 16 1981

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>Lake Near Ark. Dike 2</u>			Location: <u>114 FT. East of B/L Sta. 113+00 - Dike #2</u>		
Date of Boring: <u>12-14 + 15-81</u>	Date Received:	Date Classified: <u>DEC 16 1981</u>	Type of Boring: <u>3" A. 5" Tube, Split S.</u>	Elevation of Top: <u>245.4</u>	Hole No.: <u>1-UT-81</u>
W = Water Content in % of Dry Weight		L.L. = Liquid Limit		ϕ = Angle of Internal Friction c = Cohesion in Tons/Sq. Ft. γ_d = Dry Density in Lbs./Cu. Ft.	
		P.L. = Plastic Limit			

U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES						
		GRAVEL			SAND	
		Course	Fine	Course	Medium	Fine
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm
						FINES (Clay or Silt)

R.F.

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
1	0.5-1.0	Br. Sandy Silt, moist	0.0	X							
2	1.5-5.0	Br. Do.	ML	15						32	
3	5.0-7	Br. sandy silt, moist		17						44	
4	9.0-10.5	Br. sandy silt, lenses of clay organic matter	11.0	25						39	
5	10.5-12.0	Gr. fat clay, lenses of silt, moist	12.0	34	51	20		0.31	84.4		
	12.0-13.6	Br. sandy silt		28						30	
6	14-14.5	Br. Sandy Silt, lens of moist.	ML	25							

20.0

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: Lake Nark Ark. Dike 2

Location:

Date of Boring:

Date Received:

Date Classified:

Type of Boring:

Elevation of Top:

Hole No.:

DEC 16 1981

1-4T-81

W = Water Content in % of Dry Weight

L.L. = Liquid Limit

 ϕ = Angle of Internal Friction

c = Cohesion in Tons/Sq. Ft.

P.L. = Plastic Limit

 γ_d = Dry Density in Lbs./Cu. Ft.

U. S. STANDARD SIEVE 3"

3/4"

4

10-

40

200

COBBLES

GRAVEL

SAND

FINES

Course

Fine

Course

Medium

Fine

(Clay or Silt)

GRAIN SIZE

3"

3/4"

4.75mm

2.0mm

0.42mm

0.075mm

R.

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
7	17-19.8	Mo. sandy silt, lenses of clay	12.0	30						42	
8	20.7-22.5	Bn. fat clay, moist + med fat clay	20.0	46	57	24		580 lbs 0.29	80.0		
	20.7-22.5	Gr. silt, lenses of clay	CH	47	50	20		520 lbs 0.26	74.4		
9	23-25.7	Bn. fat clay, lenses of sand, med wet + moist	26.0	25	81	29		540 lbs 0.40	65.9		
S 10	26-27.5	Bn. fine sand, moist.		X							8 9 9 D ₁₀ = 0.075
11	29-	Lost sample	SP								8 11 16
8 11	32-33.5	Bn. fine sand, sat.	34.0	X							18 11 18 D ₁₀ = 0.16

31.0

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: Lake Neeruk Ark. Dike 2

Location:

Date of Boring:

Date Received:

Date Classified:

DEC 16 1981

Type of Boring:

Elevation of Top:

Hole No.:

1-47-81

W = Water Content in % of Dry Weight

L.L. = Liquid Limit

 ϕ = Angle of Internal Friction

c = Cohesion in Tons/Sq. Ft.

P.L. = Plastic Limit

 γ_d = Dry Density in Lbs./Cu. Ft.

U. S. STANDARD SIEVE

3"

3/4"

4

10-

40

200

COBBLES

GRAVEL

Course

Fine

Course

SAND

Medium

Fine

FINES

(Clay or Silt)

GRAIN SIZE

3"

3/4"

4.76mm

2.0mm

0.42mm

0.075mm

R.F.

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
S 12	35-36.5	med. fine Sand, lignite, Sat.	38.0	X							9 10 13 $D_{10} = 0.20$
13	38-39.5	Med. Silty Sand Sat.	42.0	X							7 5 8 $D_{10} = 0.37$
S 14	44-45.5	Med. fine Sand, Sat.	47.0	X							11 9 13 $D_{10} = 0.091$
15	49-49.5	Med. Fat Clay, Wet & soft.	49.5	58	80	22					3
S 16	49.5-50.5	Med. fine Sand, lignite Sat.	51.0	X							12 14 $D_{10} = 0.13$
17	52-64.5	Med. Do. Sat.	85.0	X							17 12 15

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>lake near Ark. Dike 2</u>			Location:			
Date of Boring: <u>12-14-15-81</u>	Date Received:	Date Classified: <u>DEC 16 1981</u>	Type of Boring:	Elevation of Top:	Hole No.: <u>1-UT-81</u>	
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	ϕ = Angle of Internal Friction c = Cohesion in Tons/Sq. Ft. γ_d = Dry Density in Lbs./Cu. Ft.			
		P.L. = Plastic Limit				
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND		FINES	
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.075mm

R.F.

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
18	69-70.5	Med. fine sand, lignite	42.5	X							29 30 41
		Do. wet									
S19	79-80.4	Med. fine sand, lignite		X							44 48 50+ 17"
		Sat.	80.0								$D_{10} = 0.13$
S20	89-90.3	Med. sand, lignite		X							37 39 50+ 16"
		Sat.									$D_{10} = 0.28$
S21	99-100.5	Med. fine sand, lignite		X							36 39 50
		Sat.	SP								$D_{10} = 0.19$
22	109-109.8	Do.		X							54 50+ 10"
S23	119-120.5	Med. fine sand, lignite		X							36 48 44
		Sat.									$D_{10} = 0.17$

SOIL LABORATORY

Location:

Date of Boring:

Date Received:

Date Classified:

Type of Boring:

Elevation of Top:

Hole No.:

12-15-81

1-UT-8

W = Water Content in % of Dry Weight

L.L. = Liquid Limit

ϕ = Angle of Internal Friction

c = Cohesion in Tons/Sq. Ft.

P.L. = Plastic Limit

γ_d = Dry Density in Lbs./Cu. Ft.

U. S. STANDARD SIEVE

3^o

3/4"

4

10-

40

200

COBBLES

GRAVEL

SAND

PINES

Course

Fide

Course

Medium

Fine

(Clay or Silt)

GRAIN SIZE

3^o

3/4"

4.76mm

2.0.

0.42

0.074

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	Ø	c	γ _d	Sand	Remarks
24	138-139	Gr. ^{med} sand, SAT.	85.0	X							D ₁₀ = 0.19
25	183-184	Do	184.0	X							
26	220-220.5	Gr. Fine sand (slightly silty but less than 12%) MSA	220.5								N = 90 for G _{irches} then terminated

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>Lake Nærsk Ark. Left Bank Dike 2</u>			Location: <u>651 FT. East of S. B/L Sta. 113+00 - Dike No. 2</u>		
Date of Boring: <u>12-15-14-81</u>	Date Received:	Date Classified:	Type of Boring: <u>BA-5" Tube S.S.</u>	Elevation of Top: <u>234.4</u>	Hole No.: <u>2-U-81</u>
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	φ = Angle of Internal Friction		
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.		
			γ _d = Dry Density in Lbs./Cu. Ft.		

U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES						
		GRAVEL			SAND	FINES
		Course	Fine	Course	Medium	Fine
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.075mm
						(Clay or Silt)

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	φ	c	γ _d	Sand	Remarks
1	0.5-1.0	Br. lean clay, lenses of sand & silt, roots, moist & med.	0.0	✓							Mud-13.2' wt Table 14.1 12-16-81
2	3.5-4.0	Br. lean clay, lenses of sand & silt, moist & med.	5.0	18							
3	5.0-7.3	Br. ^{silty sand} sand silt, lenses of clay & sand.	SM 8.0							60	
4	9.0-10.4	Br. ^{FINE} coarse sand, lenses of clay	SP								D ₁₀ = 0.070
5	11-13.2	Br. ^{FINE} silty sand	14.0								D ₁₀ = 0.12
6	14-15.5	Br. silty sand, wet.	SM	✓							D ₁₀ = 0.0040

23.0

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

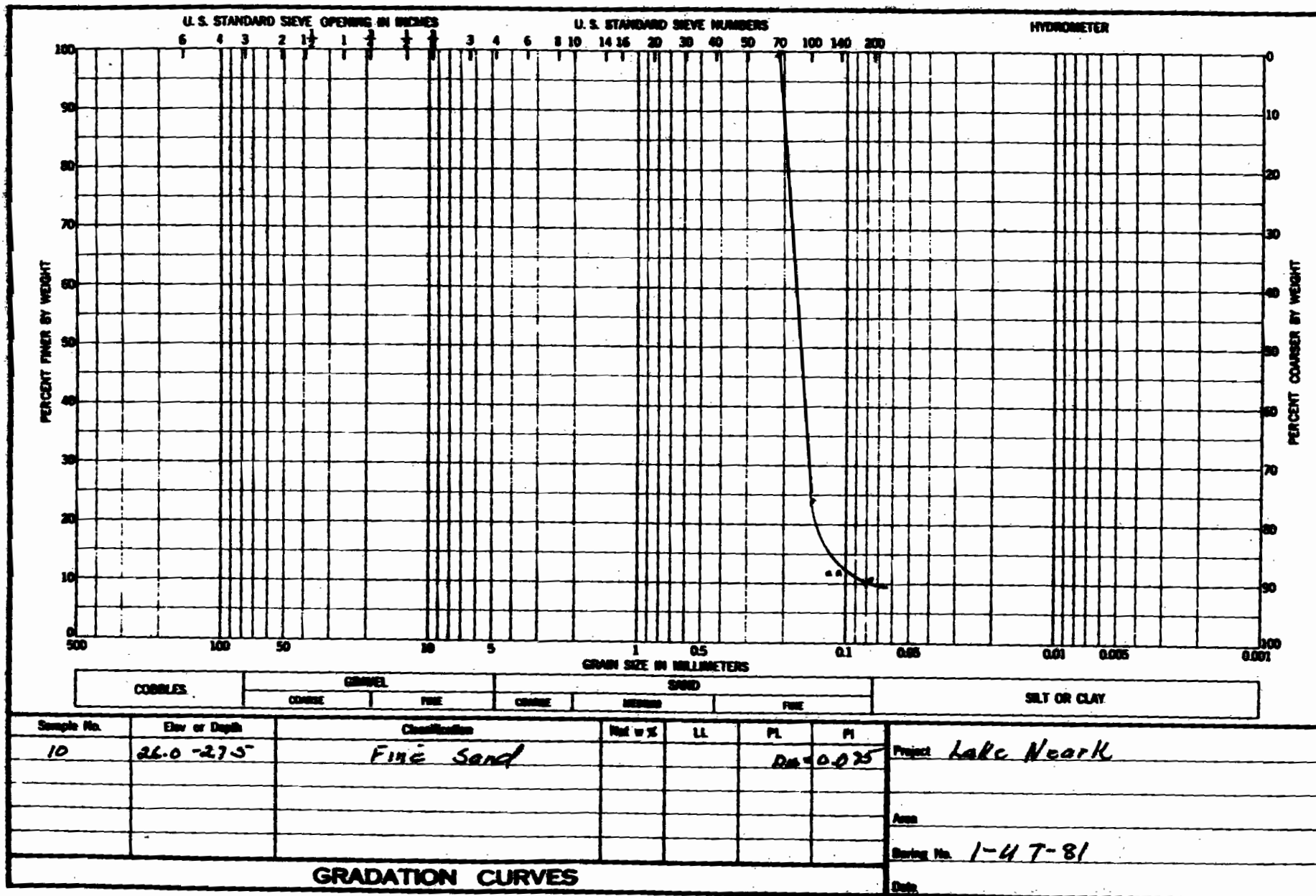
Site: <u>Lake Newk Ark. Dike 2</u>			Location:		
Date of Boring: <u>12-15-16-81</u>	Date Received:	Date Classified:	Type of Boring:	Elevation of Top:	Hole No.: <u>2-4-81</u>
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	Ø = Angle of Internal Friction		
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.		
			γ _d = Dry Density in Lbs./Cu. Ft.		

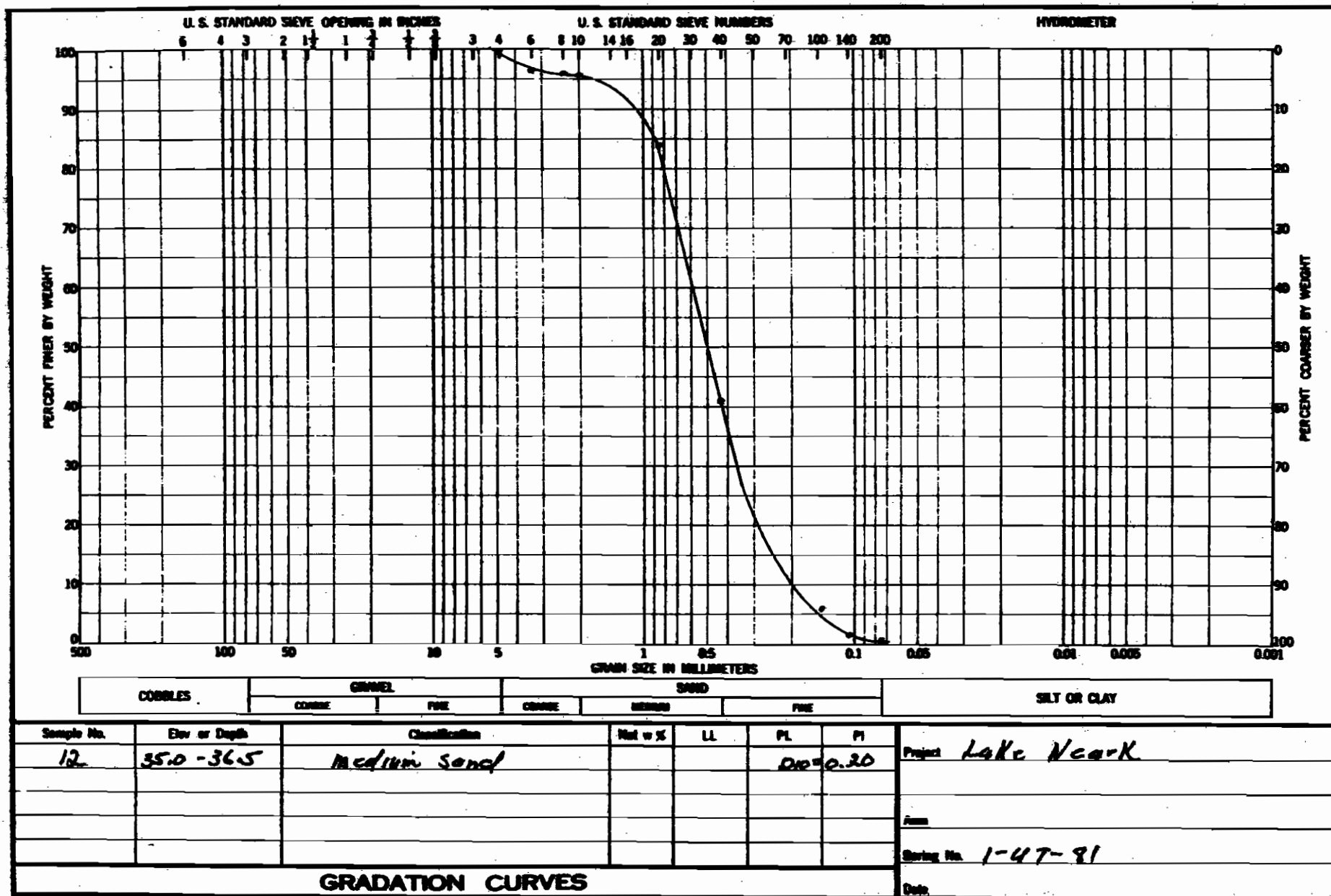
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND		FINES	
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.075mm

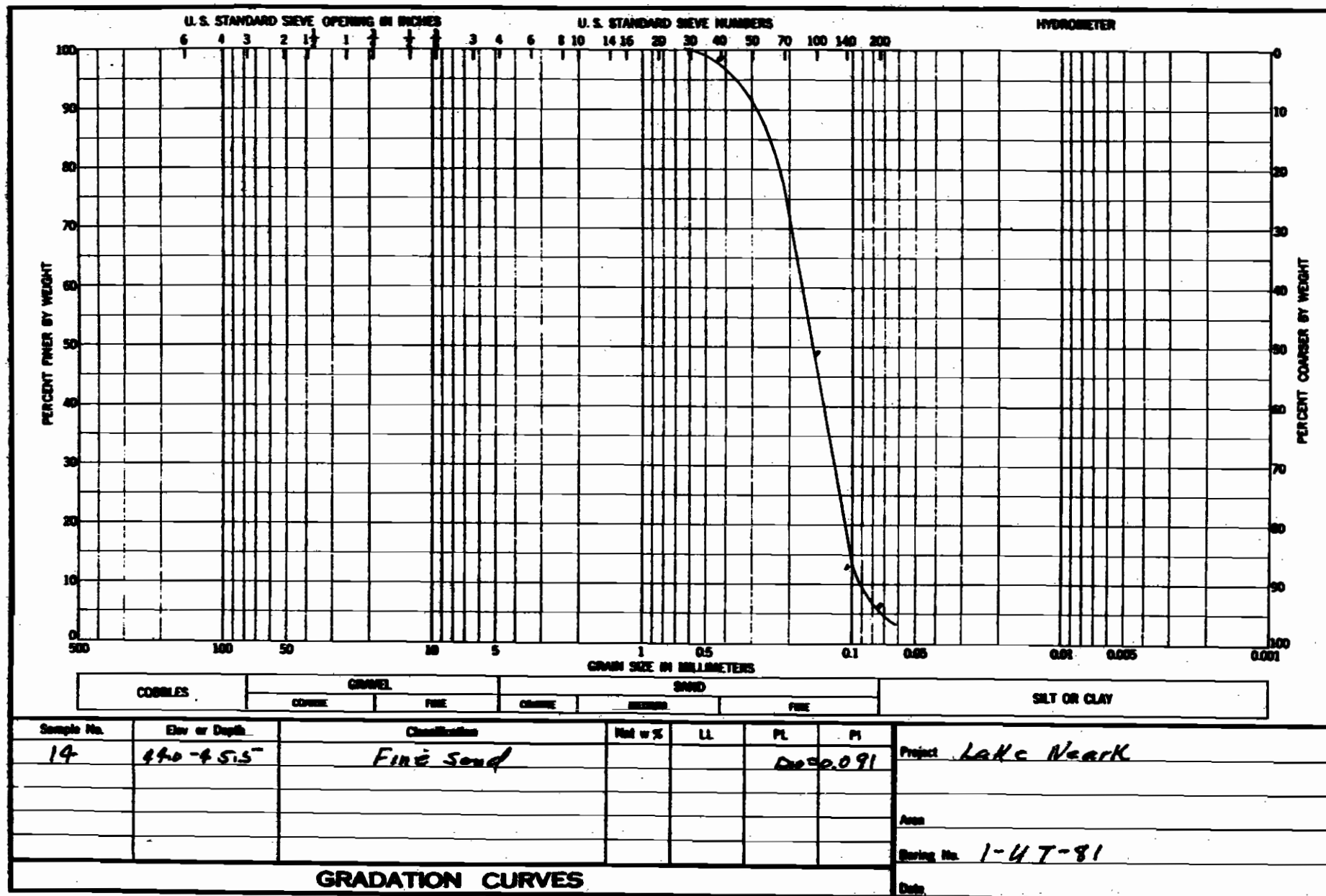
Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	Ø	c	γ _d	Sand	Remarks
7	12-18.5	Br. silty sand, wet.	14.0	X							$\frac{4}{D_{10}} = 0.013$
8	20-26.5	Br. silty sand, wet.	23.0	X							$\frac{4}{D_{10}} = 0.017$
9	23-24.5	Br. fine sand, SAT lignite	SP	X							$\frac{8}{D_{10}} = 0.13$
10	26-22.5	Do		X							$\frac{11}{D_{10}} = 0.15$
11	29-30.5	Br. & Br. fine sand, SAT lignite		X							$\frac{11}{D_{10}} = 0.17$
12	32-33.5	Br. & Br. fine sand, SAT lignite		X							$\frac{11}{D_{10}} = 0.18$
			35.0								
			40.0								

SOIL LABORATORY

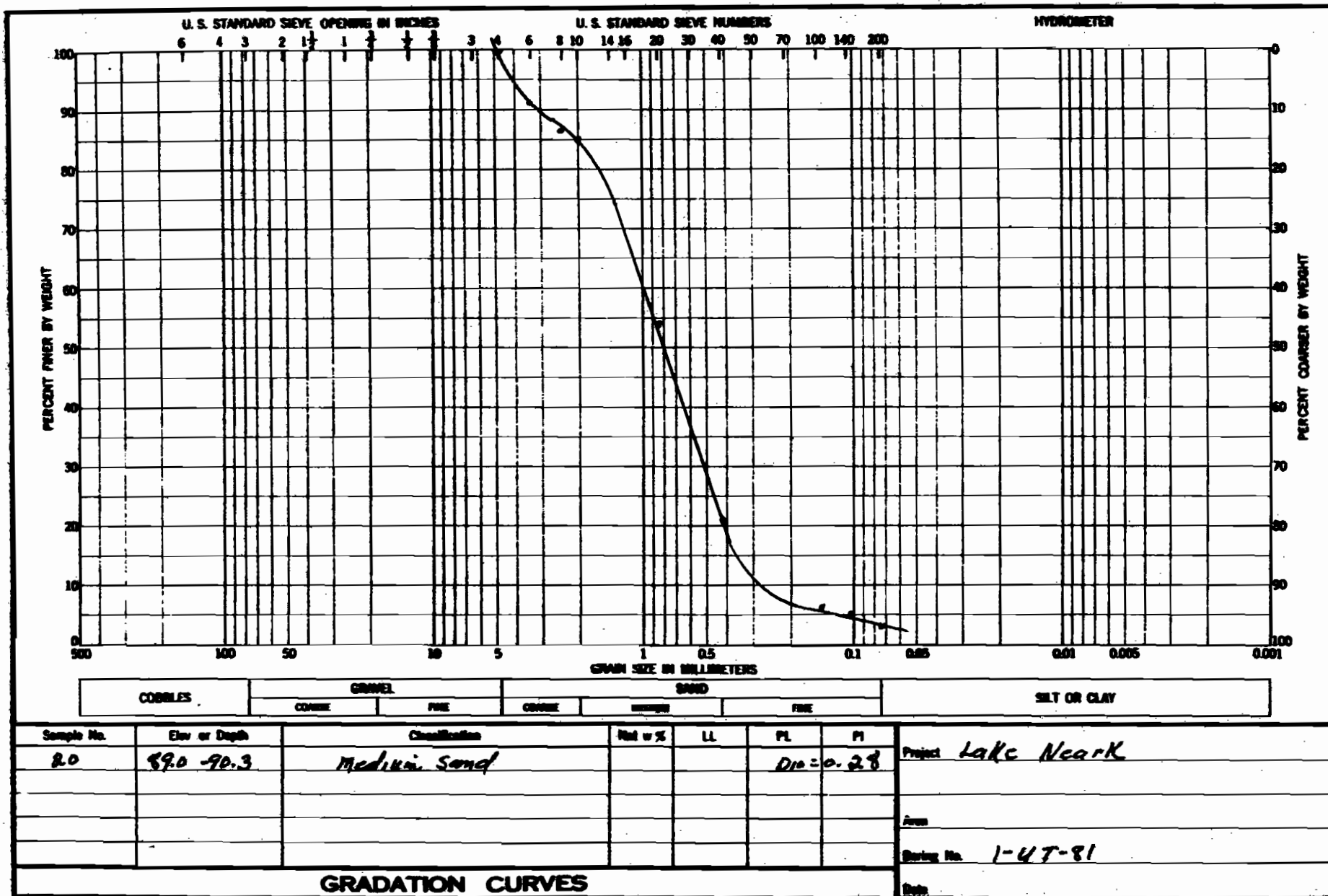
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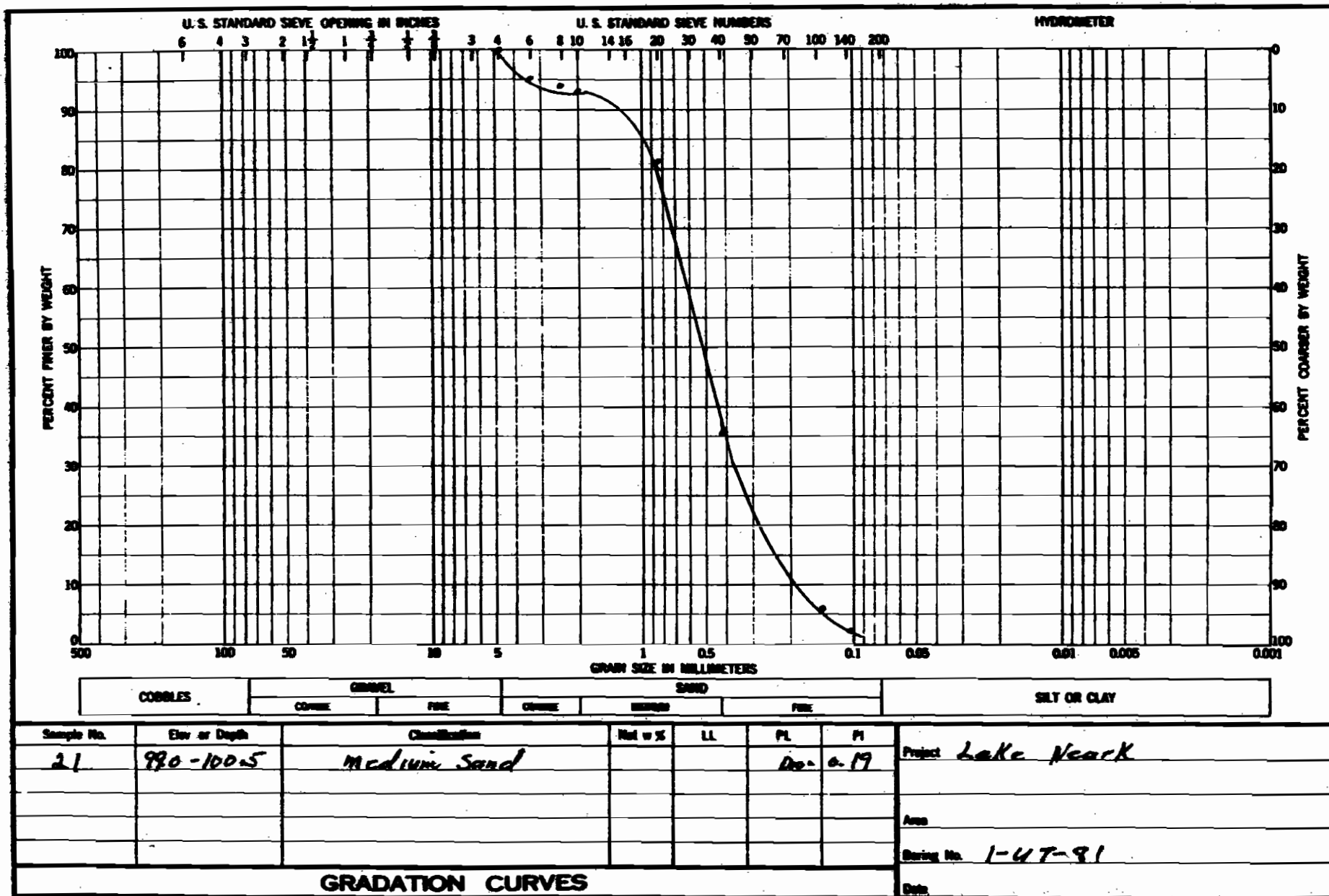


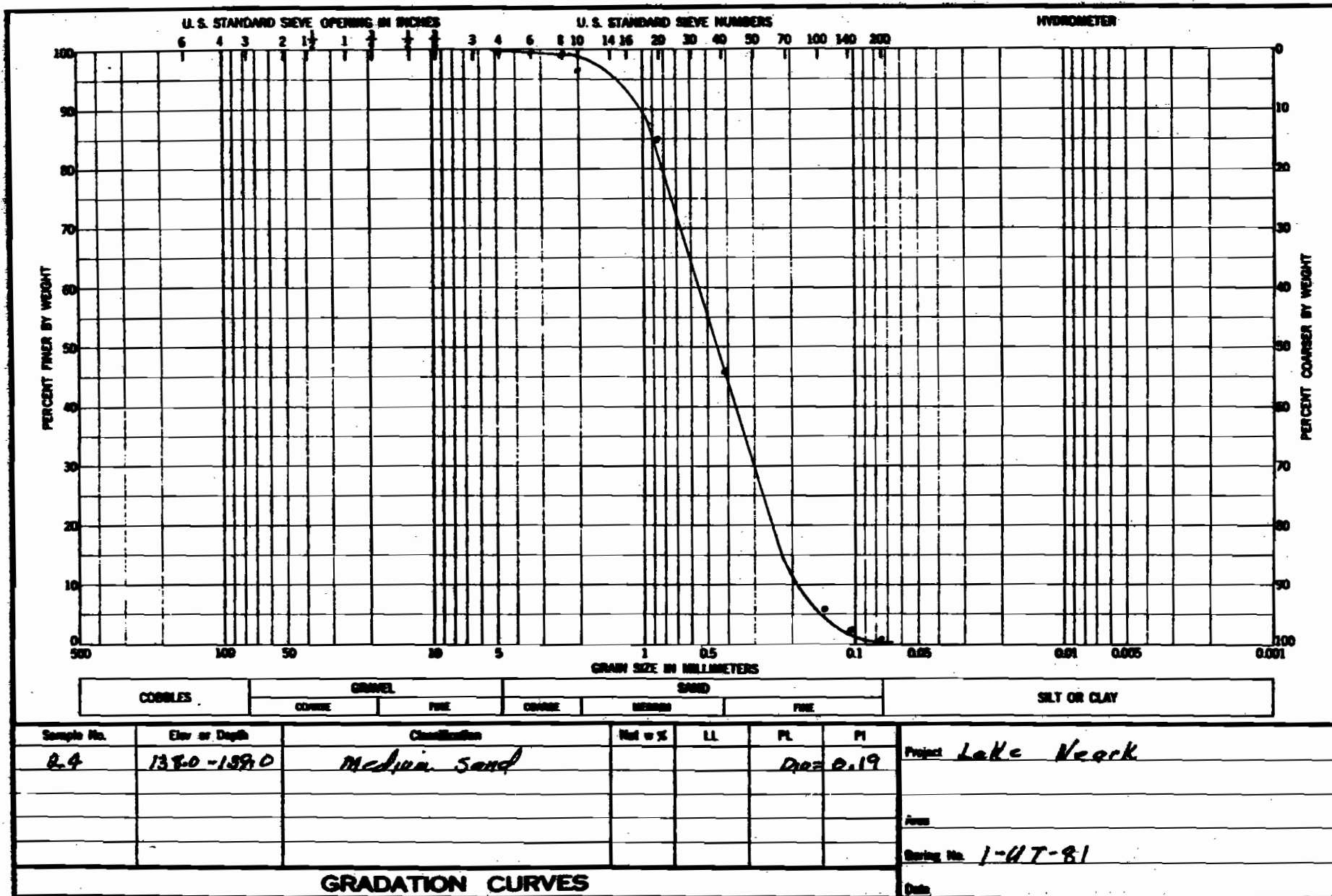


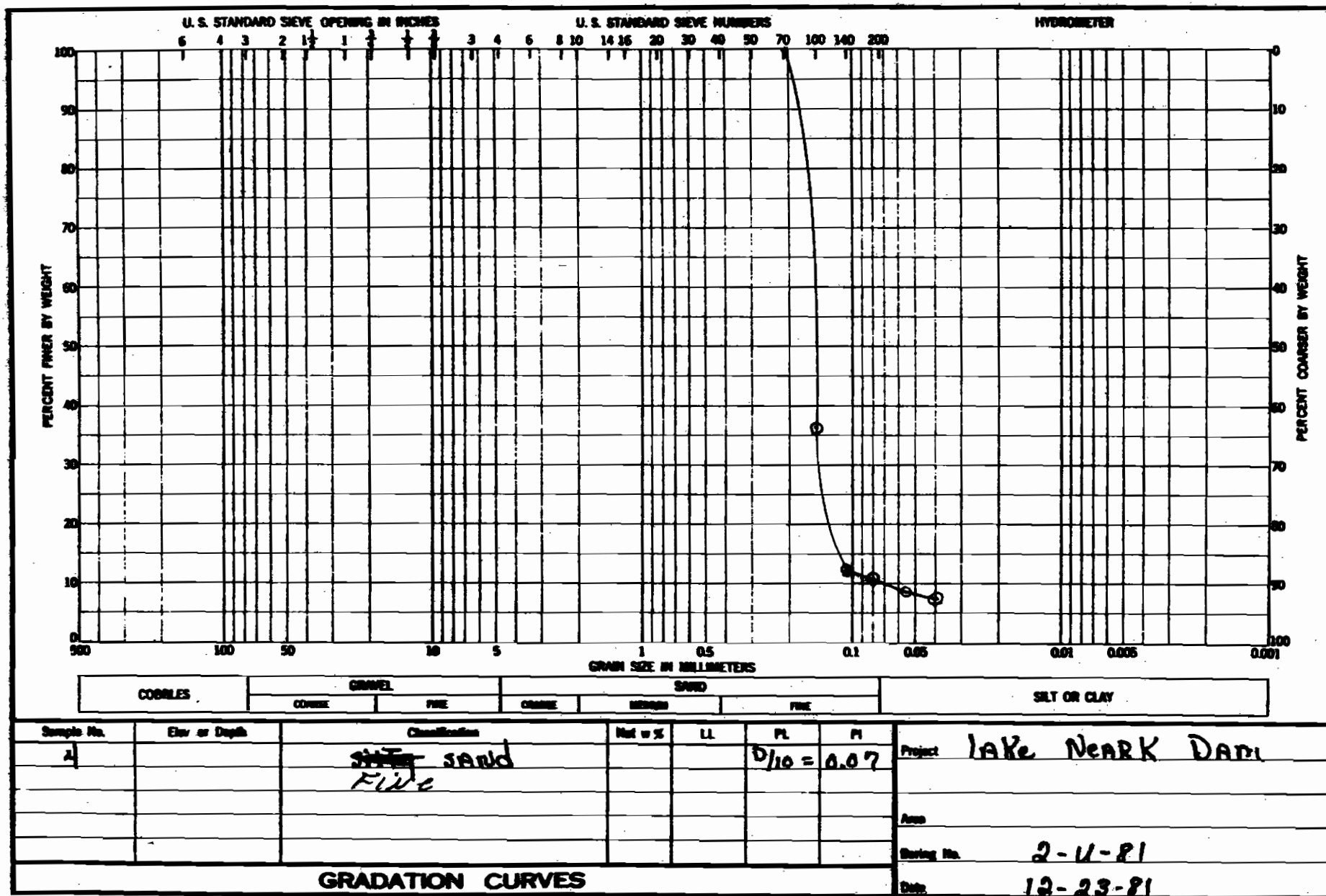


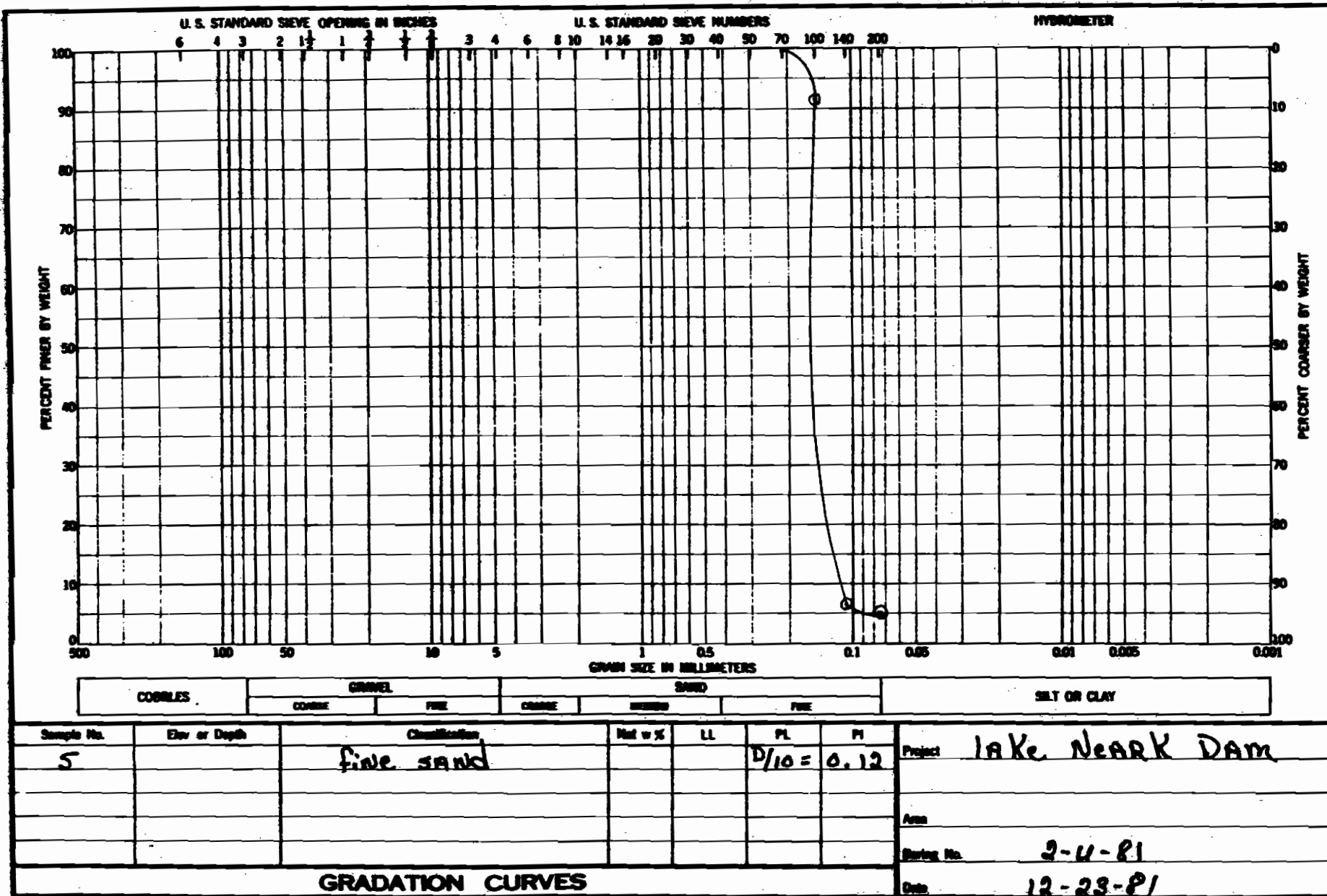


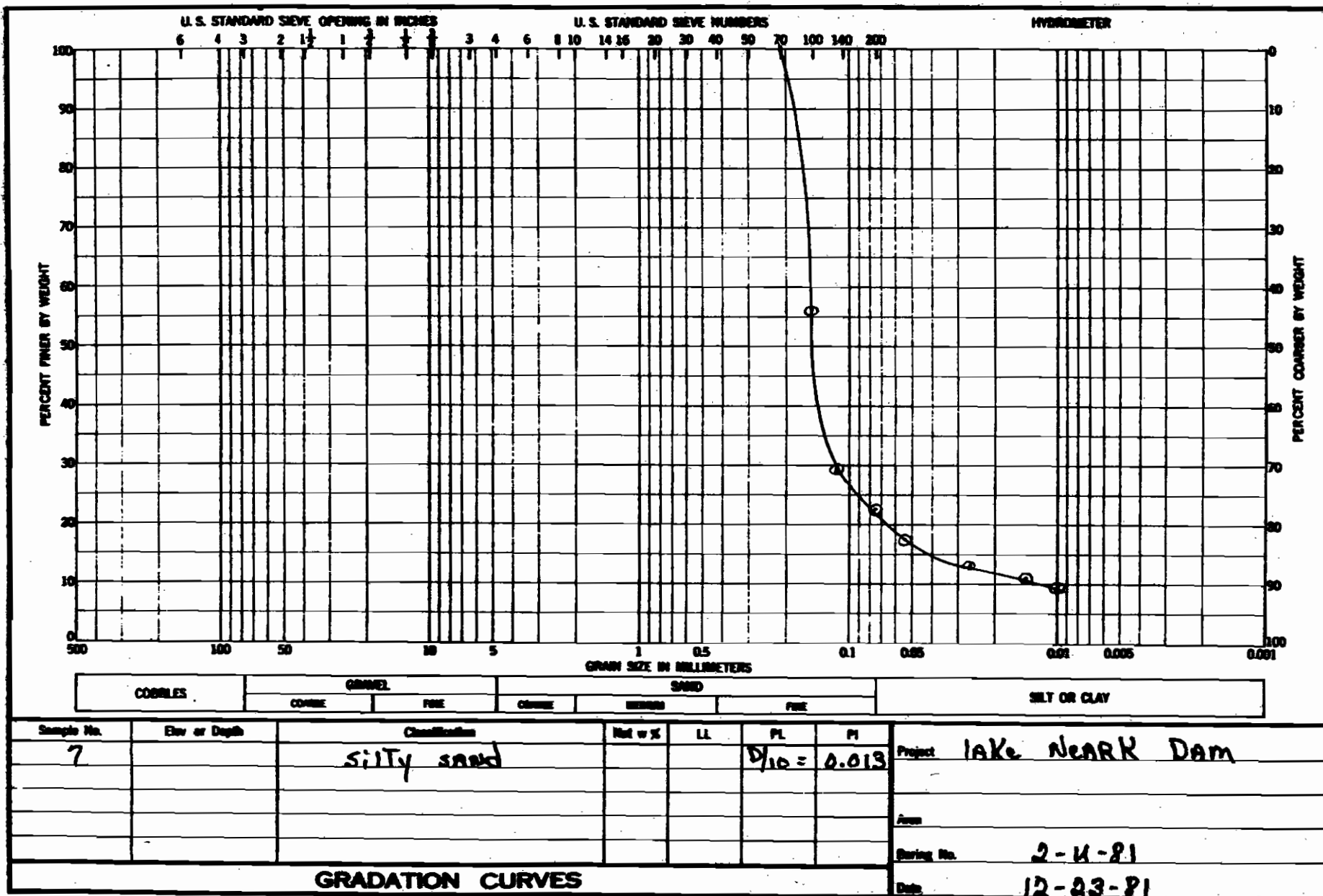


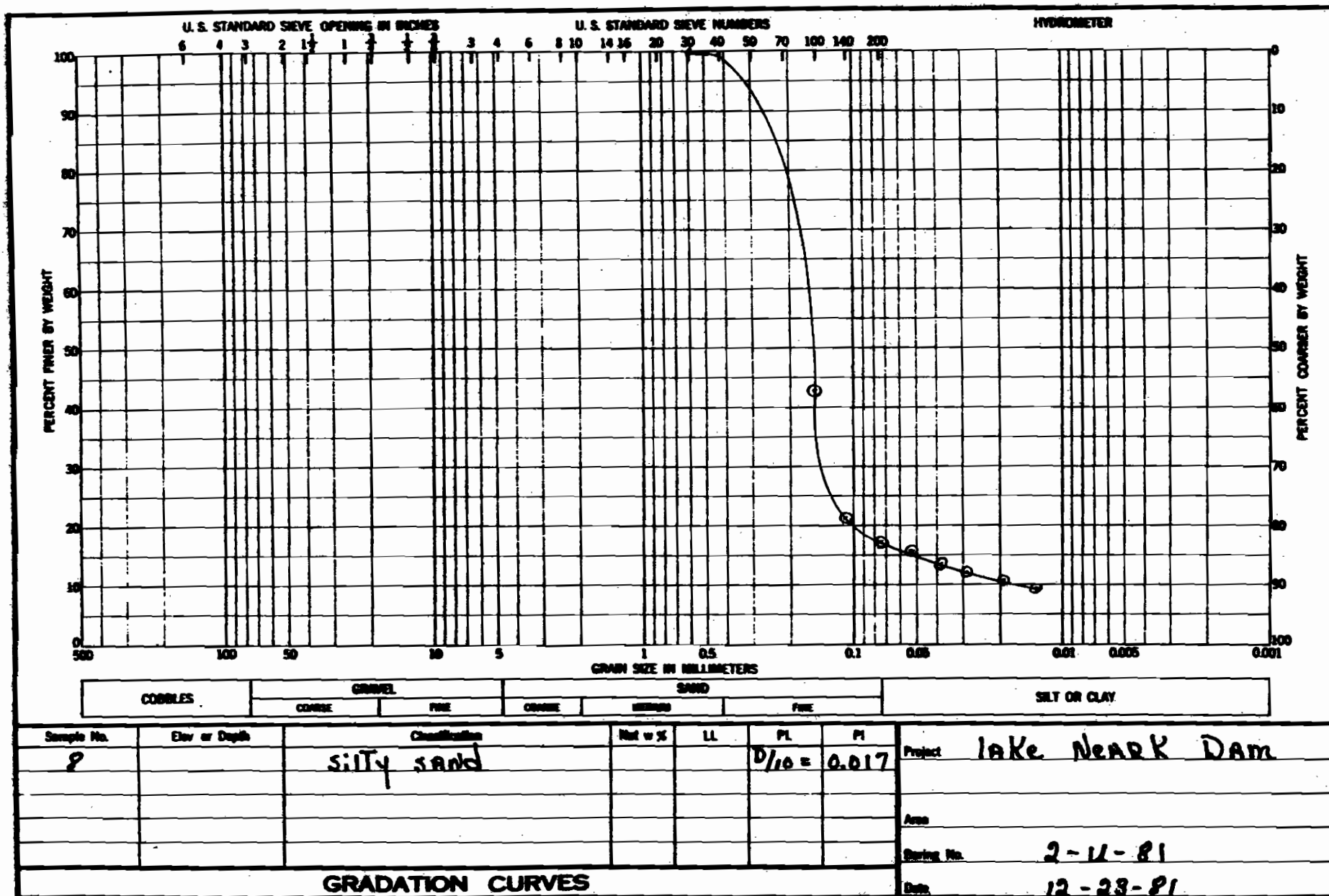


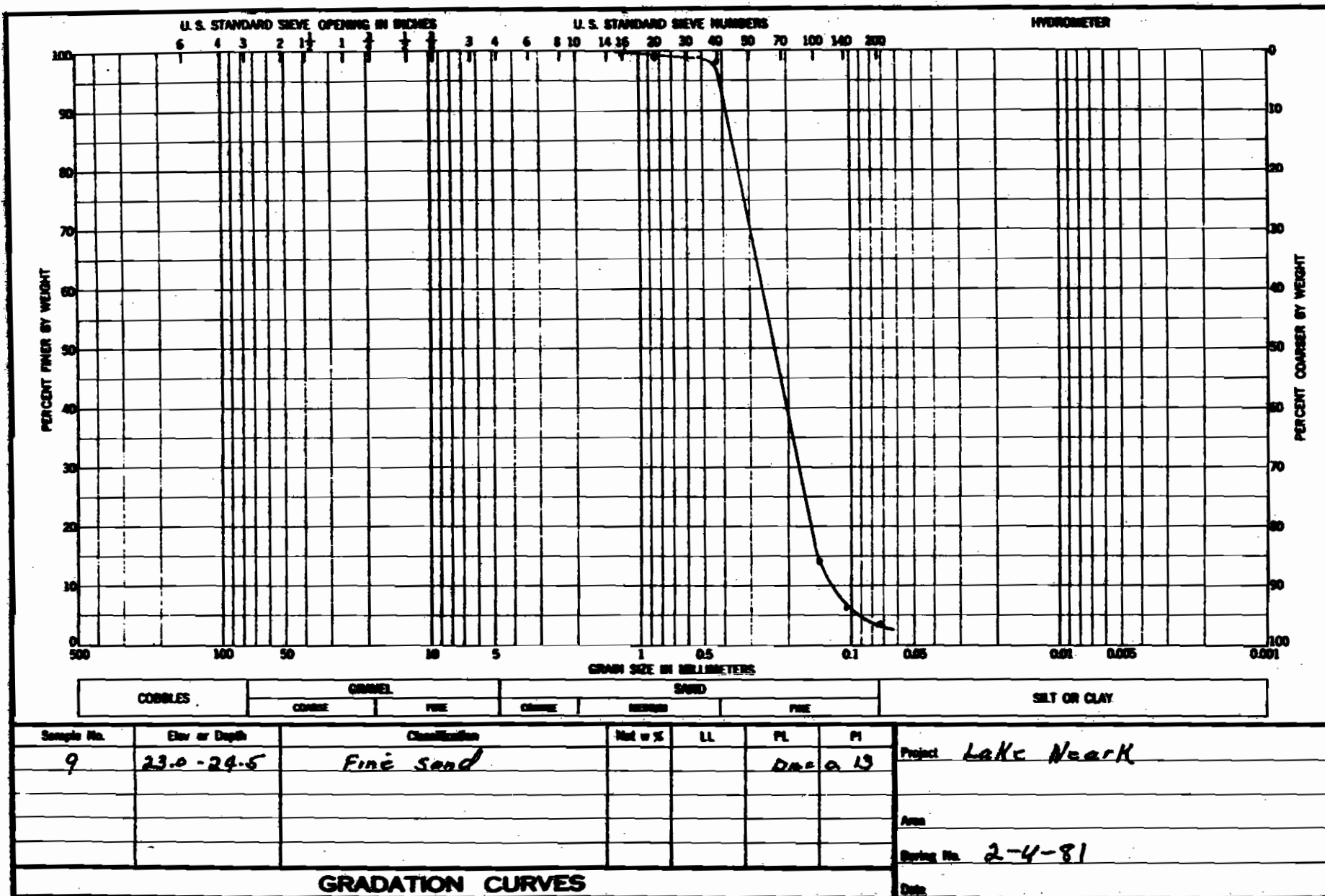






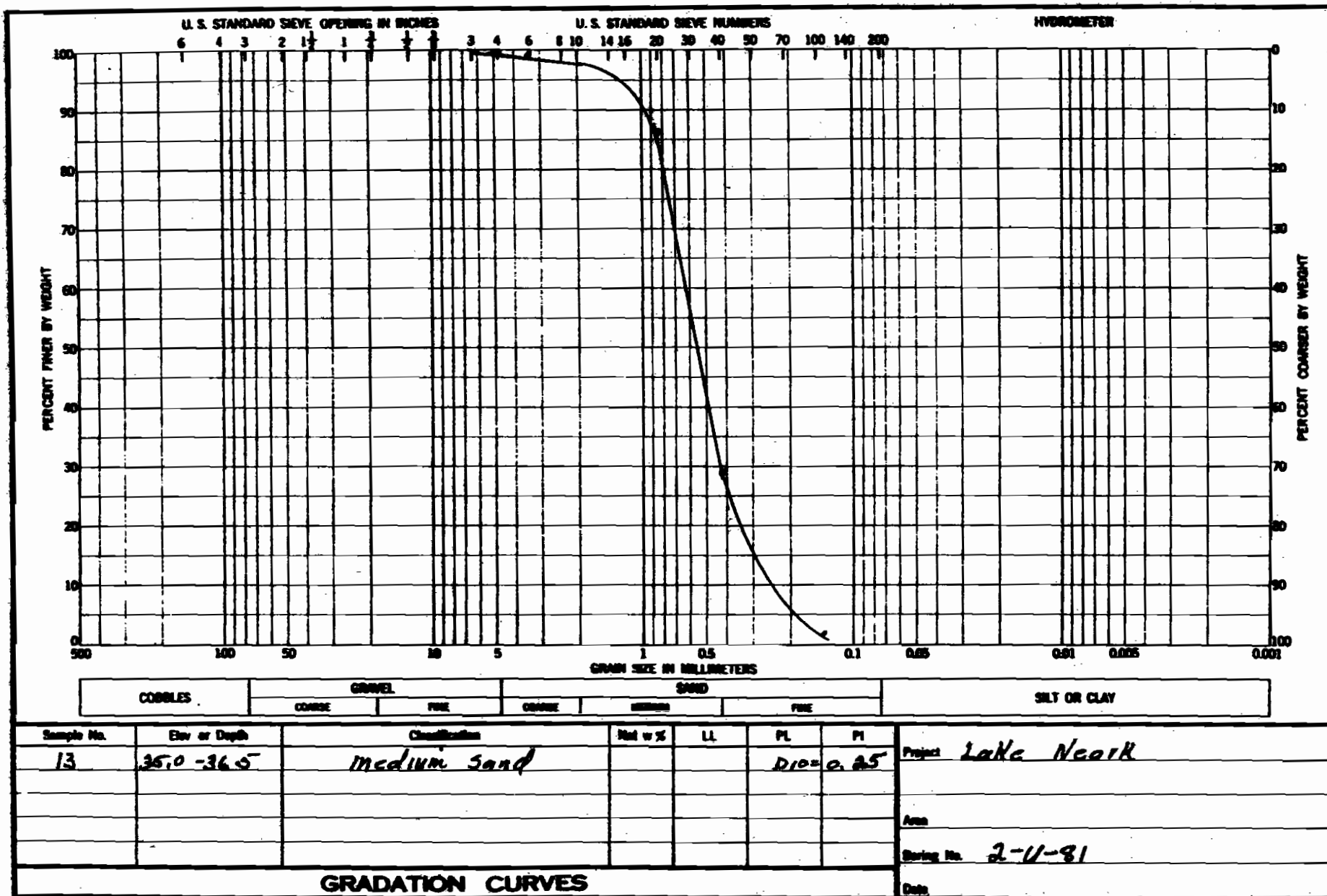


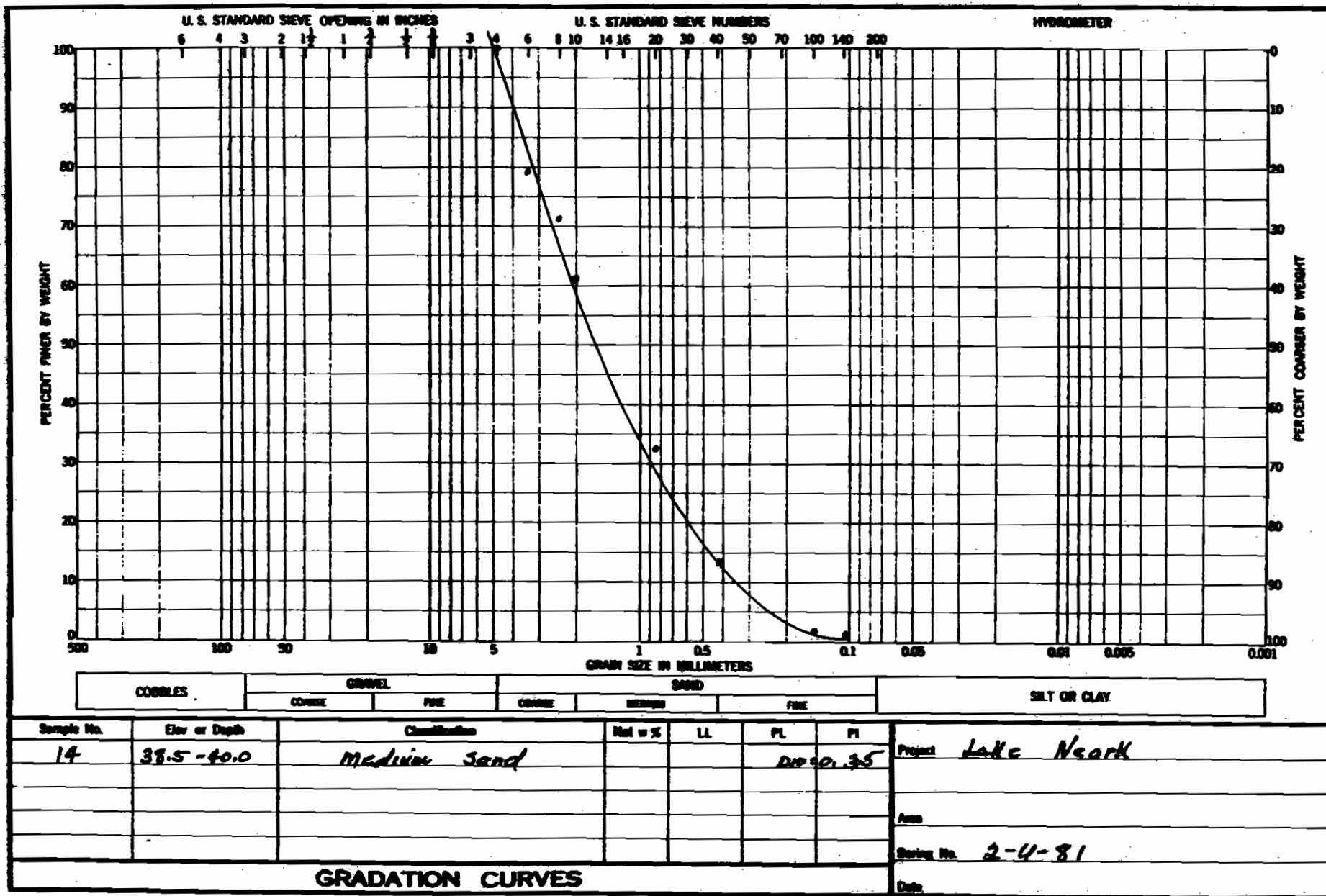








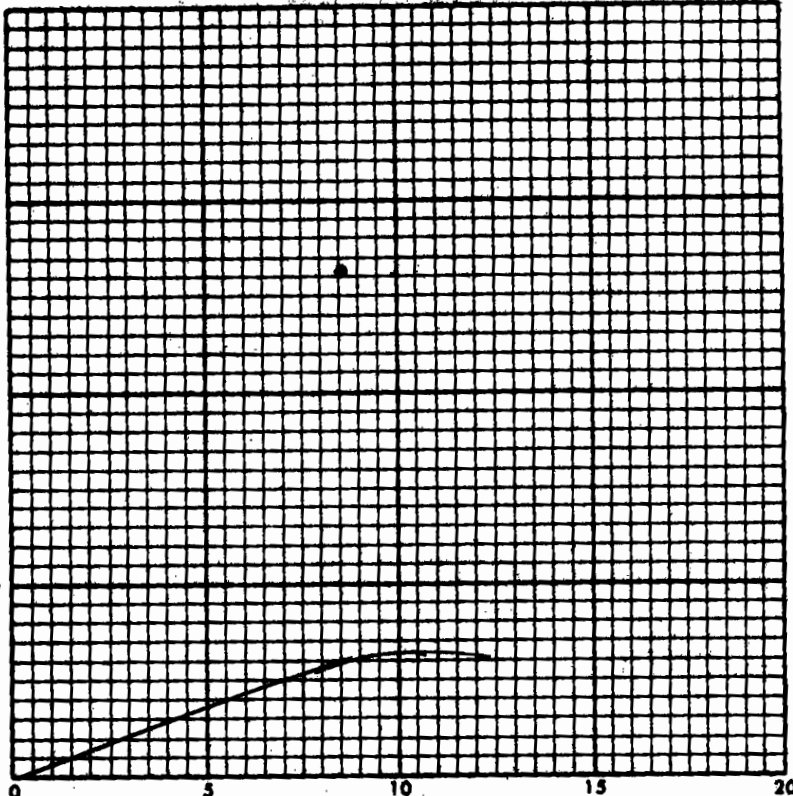




FAILURE SKETCHES

COMPRESSIVE STRESS, T/SQ FT

1.0



AXIAL STRAIN, %

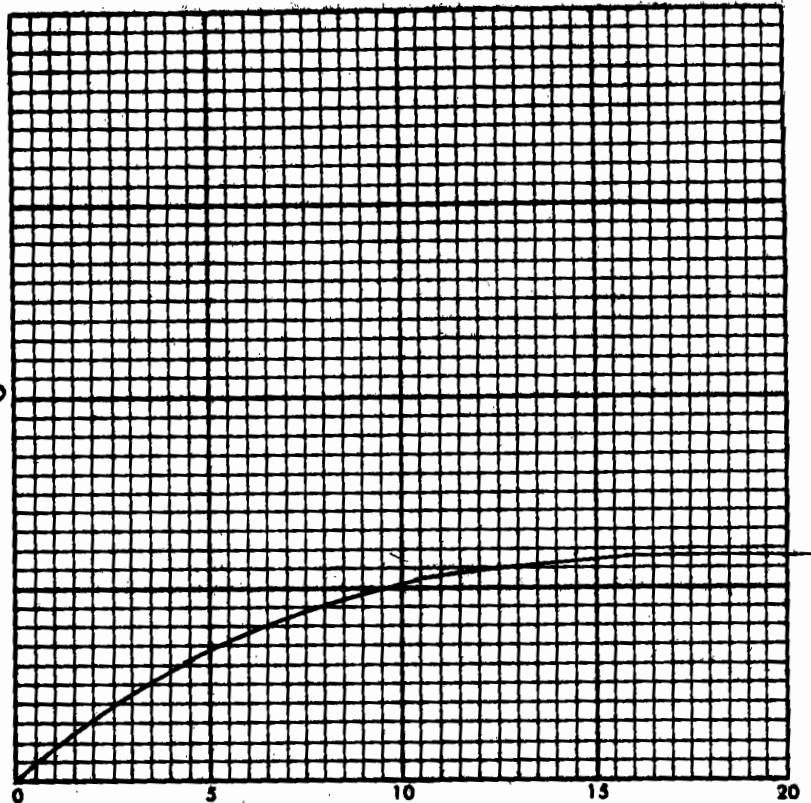
☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.					
TYPE OF SPECIMEN		Undisturbed			
INITIAL	WATER CONTENT	w_o	35.8	%	
	VOID RATIO	e_o	0.99		
	SATURATION	S_o	97.5	%	
	DRY DENSITY, LB/CU FT	γ_d	84.4		
TIME TO FAILURE, MIN		t_f	13.0		
UNCONFINED COMPRESSIVE STRENGTH, T/SQ FT		q_u	0.62		
UNDRAINED SHEAR STRENGTH, T/SQ FT		s_u	0.31		
SENSITIVITY RATIO		S_i			
INITIAL SPECIMEN DIAMETER, IN		D_o	1.394		
INITIAL SPECIMEN HEIGHT, IN.		H_o	3.000		
CLASSIFICATION Gr. clay (CH) fat, lenses of silt, slickenside.					
LL	51	PL	20	PI	31
				G.	2.70
REMARKS		PROJECT Lake Neark Dam Dike # 2			
		AREA			
		BORING NO. 1-UT-81		SAMPLE NO. 5	
		DEPTH 11.0 - 12.0		DATE December - 1981	
UNCONFINED COMPRESSION TEST REPORT					

FAILURE SKETCHES

COMPRESSIVE STRESS, T/SQ FT



AXIAL STRAIN, %

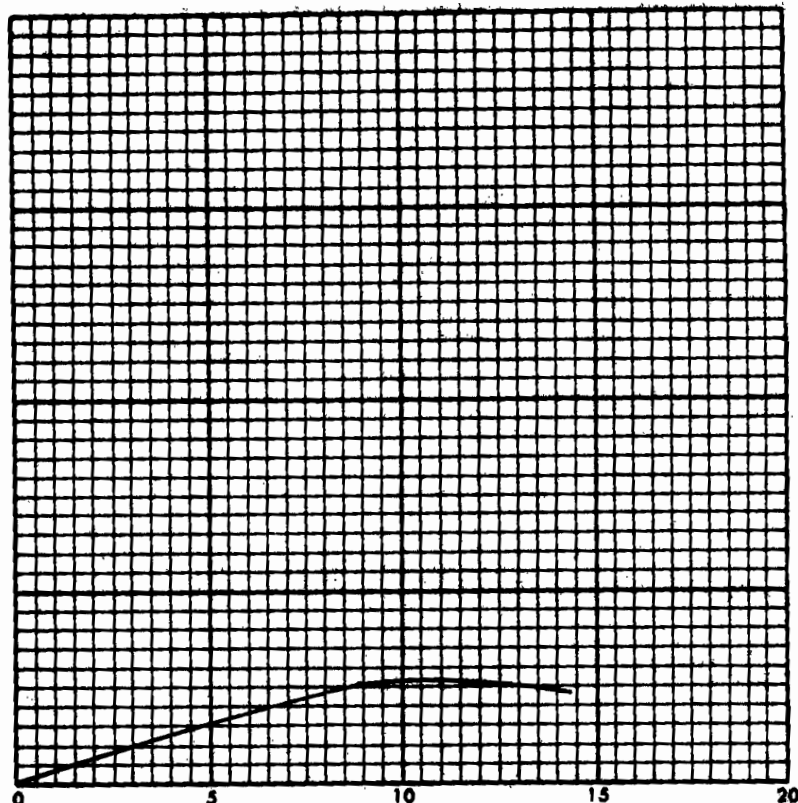
- ☐ CONTROLLED STRESS
☒ CONTROLLED STRAIN

TEST NO.					
TYPE OF SPECIMEN		Undisturbed			
INITIAL	WATER CONTENT	w_o	%	%	%
	VOID RATIO	e_o	41.4		
	SATURATION	S_o	1.099	%	%
	DRY DENSITY, LB/CU FT	γ_d	100 +		
TIME TO FAILURE, MIN		t_f	80.0		
UNCONFINED COMPRESSIVE STRENGTH, T/SQ FT		q_u	17.5		
UNDRAINED SHEAR STRENGTH, T/SQ FT		s_u	0.58		
SENSITIVITY RATIO		S_i	0.29		
INITIAL SPECIMEN DIAMETER, IN		D_o	1.386		
INITIAL SPECIMEN HEIGHT, IN.		H_o	3.000		
CLASSIFICATION		Gr. clay (CH) fat, laminated lenses of silt.			
LL	57	PL	24	PI	33
				G.	2.70
REMARKS		PROJECT Lake Nearek Dam Dike #2			
		AREA			
		BORING NO. 1-UT-81		SAMPLE NO. 8	
		DEPTH 20.0 - 20.7		DATE December - 1981	
		UNCONFINED COMPRESSION TEST REPORT			

FAILURE SKETCHES

COMPRESSIVE STRESS, T/SQ FT

1.0



AXIAL STRAIN, %

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.

TYPE OF SPECIMEN

Undisturbed

INITIAL	WATER CONTENT	w_o	45.9	%	%	%	%
	VOID RATIO	e_o	1.26				
	SATURATION	S_o	98.4	%	%	%	%
	DRY DENSITY, LB/CU FT	γ_d	74.4				
TIME TO FAILURE, MIN		t_f	13.0				
UNCONFINED COMPRESSIVE STRENGTH, T/SQ FT		q_u	0.52				
UNDRAINED SHEAR STRENGTH, T/SQ FT		s_u	0.26				
SENSITIVITY RATIO		S_i					
INITIAL SPECIMEN DIAMETER, IN		D_o	1.391				
INITIAL SPECIMEN HEIGHT, IN.		H_o	3.000				

CLASSIFICATION

Br. clay (CH) fat, laminated lenses of silt.

LL 57 PL 24 PI 33 G. 2.70

REMARKS

PROJECT

Lake Mead Dam Dike #2

AREA

BORING NO.

1-UT-81

SAMPLE NO.

8

DEPTH

20.7 - 22.5

DATE

December - 1981

UNCONFINED COMPRESSION TEST REPORT

ENG FORM
1 JUN 68

3659

(EM 1110-2-1906)

(TRANSLUCENT)

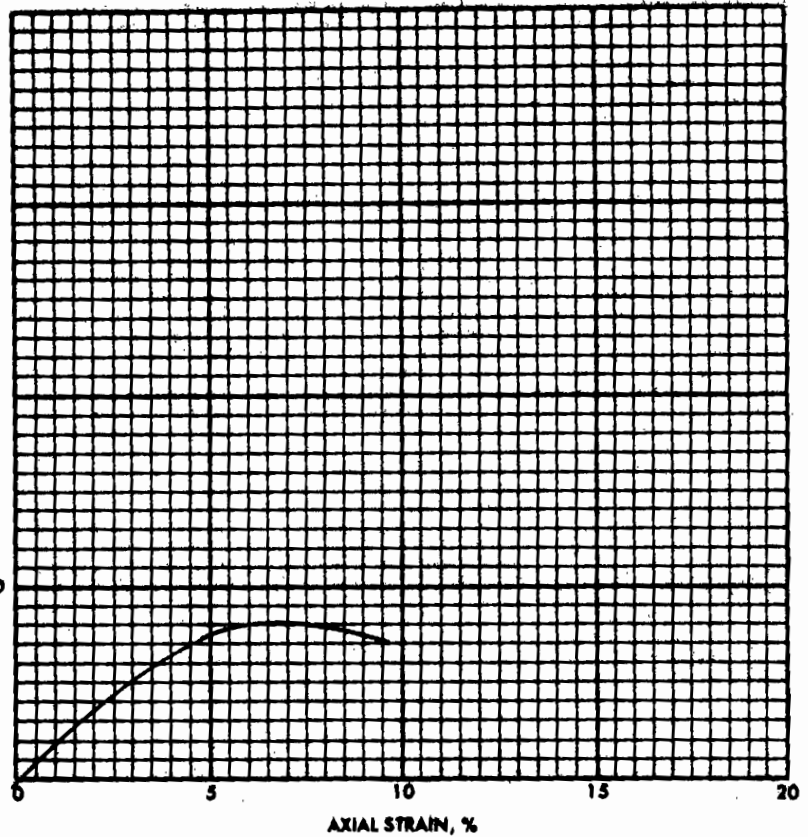
SPD 1006 OF -214-946

PLATE XI-2

FAILURE SKETCHES

COMPRESSIVE STRESS, T/SQ FT

1, 0



☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.					
TYPE OF SPECIMEN		Undisturbed			
INITIAL	WATER CONTENT	w_o	57.3	%	%
	VOID RATIO	e_o	1.55		
	SATURATION	S_o	99.4	%	%
	DRY DENSITY, LB/CU FT	γ_d	65.9		
TIME TO FAILURE, MIN		t_f	8.0		
UNCONFINED COMPRESSIVE STRENGTH, T/SQ FT		q_u	0.80		
UNDRAINED SHEAR STRENGTH, T/SQ FT		s_u	0.40		
SENSITIVITY RATIO		S_i			
INITIAL SPECIMEN DIAMETER, IN		D_o	1.400		
INITIAL SPECIMEN HEIGHT, IN.		H_o	3.000		
CLASSIFICATION Gr. clay (CH) fat, lenses of sand.					
LL	81	PL	29	PI	52
				G.	2.70
REMARKS		PROJECT Lake Neark Dam Dike #2			
		AREA			
		BORING NO. 1-UT-81		SAMPLE NO. 9	
		DEPTH 23.0 - 25.7		DATE December - 1981	
UNCONFINED COMPRESSION TEST REPORT					

"Lake Neata" ocean
CLASSIFICATION OF EXTRUDED
UNDISTURBED TUBE SAMPLES

Rush

1-UT-81

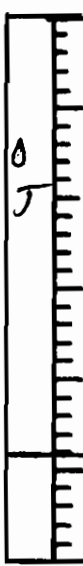
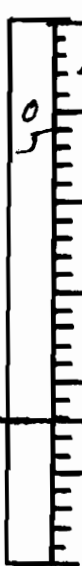
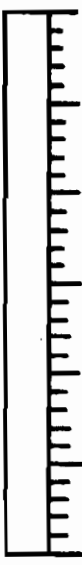
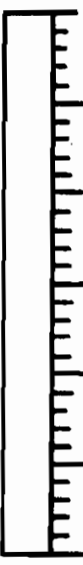
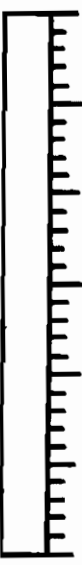
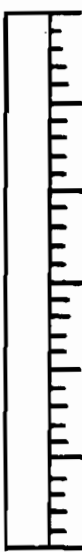
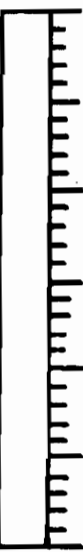
DATE 12-15-81

1-UT-81

SITE _____ HOLE _____ SAMPLE <u>4</u> 8.0 Bt sandy silt, lenses clay organic matter w = 25.0 39% 10.5 TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE <u>5</u> 11.0 Gt fat clay, lenses silt L.L. = 51.0 12.0 P.L. = 20.0 Gt silt w = 28.0 30% 13.6 TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE <u>7</u> 17.0 Gt sandy silt, lenses clay w = 30 42% 18.8 TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____
SITE _____ HOLE _____ SAMPLE <u>8</u> 20.0 fat Gt silt, clay L.L. = 57.0 20.7 P.I. = 24.0 Gt silt, lenses clay w = 47 22.5 TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE <u>9</u> 23.0 Gt fat clay, lenses sand L.L. = 81.0 P.I. = 29.0 25.7 TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____ TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____
SITE _____ HOLE _____ SAMPLE <u>3</u> 6.0 Rod sample Bt sandy silt, 44% w = 17 6.5 TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____ TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____ TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____

CLASSIFICATION OF EXTRUDED *Lake Neark* UNDISTURBED TUBE SAMPLES *2-4-81*

DATE _____

SITE _____ HOLE <i>2-4</i> SAMPLE <i>3</i> <i>5.0</i>  <i>BT sandy silt, lenses clay, & sand</i> <i>W2 570</i> <i>570</i> <i>7.3</i> TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE <i>2-4</i> SAMPLE <i>4</i> <i>8.0</i>  <i>BT silt & sand, lenses clay</i> <i>10.4</i> TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE <i>2-4</i> SAMPLE <i>5</i> <i>11.0</i>  <i>BT silt & sand</i> <i>13.2</i> TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____
SITE _____ HOLE _____ SAMPLE _____  TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____  TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____  TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____
SITE _____ HOLE _____ SAMPLE _____  TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____  TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____	SITE _____ HOLE _____ SAMPLE _____  TUBE LGTH. _____ TOP _____ BOT. _____ SAMPLE LGTH. _____ EXTRUDED LGTH. _____

FIELD BORING LOG

HOLE NO. 2

ISL #30 chute.

SHEET 1 OF 1

PROJECT Proposed Harbor, Osceola, Ark **LOCATION** 360' R.S. 1B 120+00

DRILL RIG Failing 1500 **INSPECTOR** Lumpicin **OPERATOR** Robotham

DEPTH OF WATER _____ DATE _____ TABLE _____ DATE _____

ELEVATION OF GROUND 213.5

River bed.

MUD 14.0

Sample Number	Date	Sample		Stratum		Classification — Remarks	Type	Sampler
		From	To	From	To			
						Water surface 237.0		
						Depth water 23.5		
						213.5		
1	3/21/67	0.5	1.0	0.0		Brown Gravelly sand	Sat.	Bailer
2	"	3.5	4.0	0.0	6.0	" " "	"	"
3	"	6.5	7.0	6.0		Gray " "	"	"
4	"	9.5	10.0	6.0	11.0	" " "	"	"
5	"	11.5	12.0	11.0		" Fat clay w/ lens ^s OF silt Plastic, 3" Tube		
6	"	14.0	14.5	11.0	14.5	" " " " ^y " " "	"	"
7	"	17.0	17.5	14.5	18.0	" Gravelly SAND	SAT.	"
8	"	19.5	20.0	18.0	Bottom	" Mud "	"	"
						Samples 1 Thru 4 had TO BE TAKEN WITH BAILER. Hole would NOT hold mud. TOO MUCH GRAVEL.		
LMM 650 JAN '64								

LMM 630
JAN '64

D

SHEET 1 OF 1

DRILL RIG Exiling 1500 INSPECTOR Lumpkin OPERATOR Robottom

ELEVATION OF GROUND 243.1

MUD 16.0

LMM 850
JAN '64

FIELD BORING LOG

HOLE NO. 4

SHEET 1 **OF** 1

PROJECT Osceola, Ark. Proposed Harbor LOCATION On E sta 130+14

DRILL RIG Edling 1500 INSPECTOR McGinnis OPERATOR Robertson

DEPTH OF WATER 18.0 DATE 3-14-67 TABLE 12.5 DATE 3-15-67

ELEVATION OF GROUND 245.1

MUD 19.0

[illegible]

FIELD BORING LOG

HOLE NO. 5

SHEET **OF**

PROJECT OSCOLA, Ark. Proposed Harbor LOCATION On L³ sta 135+34

DRILL RIG FRIDGING 1200 INSPECTOR Lumpkin OPERATOR John

DEPTH OF WATER 16.0 DATE 3-14-67 TABLE 14.0 DATE 3-15-67

ELEVATION OF GROUND 246.8

MUD 16.0

[illegible]

FIELD BORING LOG

HOLE NO. 4

SHEET 1 **OF** 1

PROJECT Proposed Harbor, Oscola, Ark. **LOCATION** 305' R.S. @ 135+00

DRILL RIG Failing 1500 INSPECTOR Lumpkin OPERATOR Rubertson

DEPTH OF WATER _____ DATE _____ TABLE _____ DATE _____

ELEVATION OF GROUND 207.1

River bed.

MUD 13.0

[illegible]

LMM 650
JAN 64

Isl. Boquete.

SHEET 1 OF 1

PROJECT Proposed Highway Improv. Rte. LOCATION 535' R.S. @ 155+00

DRILL RIG Trinity 1500 INSPECTOR Amick OPERATOR Emerson

DEPTH OF WATER _____ DATE _____ TABLE _____ DATE _____

ELEVATION OF GROUND 200.7 River Bed

MUD 10.0

[illegible]

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>Osceola, Ark. - Harbor (Isl. # 30 chute)</u>			Location: <u>360' Riverside R. Sta 120+00</u>		
Date of Boring: <u>21 March 1967</u>	Date Received:	Date Classified:	Type of Boring: <u>Bailer & 3" Tube</u>	Elevation of Top: <u>213.5</u>	Hole No.: <u>2</u>
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	ϕ = Angle of Internal Friction		
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.		
			γ_d = Dry Density in Lbs./Cu. Ft.		

U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND			FINES
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
1	0.5-1.0	Bl gravelly sand, sat	0.0	X							$D_{10} = 0.32$ Bailer
2	3.5-4.0	Bl gravelly sand, sat	5.0	X							$D_{10} = 0.40$ drill mud used in hole @ 14.0' depth
3	6.5-7.0	Bl gravelly sand, sat		X							$D_{10} = 0.46$
4	9.5-10.0	DO		X							
5	11.5-12.0	Bl fat clay, lenses of silt, wet & medium	11.0	44.8							10.5 in 11.5 3" Tube
6	14.0-14.5	DO	14.5	40.4							
			18.0								

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <i>Osceola, Ark. - Natbot</i>			Location: <i>25' L.S. of Sta 122+33</i>		
Date of Boring: <i>3-15-67</i>	Date Received:	Date Classified: <i>MAR 16 1967</i>	Type of Boring: <i>Auger</i>	Elevation of Top: <i>243.1</i>	Hole No.: <i>3</i>
W = Water Content in % of Dry Weight		L.L. = Liquid Limit		ϕ = Angle of Internal Friction	
		P.L. = Plastic Limit		c = Cohesion in Tons/Sq. Ft.	
				γ_d = Dry Density in Lbs./Cu. Ft.	
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40
COBBLES	GRAVEL		SAND		FINES
	Course	Fine	Course	Medium	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification R.H.B.	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
			0.0								
1	0.5-1.0	Br lean clay, moist & medium	CL	X							Water Encountered at 13.0' Depth 9/15/67
			3.0								Water Table at 9.1' Depth 3-20-67
2	3.5-4.0	Br. Silty Clay, lenses of sand, moist & medium	CH	30.5							mud @ 16.0'
3	6.5-7.0	Br. Silty Clay, moist & medium		29.7	54.1	19.0					
			9.0								
4	9.5-10.0	Br. lean clay, lenses of sandy silt, moist & medium	CL	27.4							
5	12.5-13.0	Gr. lean clay, lenses of silty sand, sat		X							
			14.0								
6	15.5-16.0	Gr. Sandy silt, sat	ML	X						33	3" Tube
			17.5								
			19.5								

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>OSCEOLA, ATK. - HAKBOT</u>				Location:				
Date of Boring:		Date Received:		Date Classified:		Type of Boring:	Elevation of Top:	Hole No.: <u>3</u>
W = Water Content in % of Dry Weight				L.L. = Liquid Limit		Ø = Angle of Internal Friction		
				P.L. = Plastic Limit		c = Cohesion in Tons/Sq. Ft.		
						γ _d = Dry Density in Lbs./Cu. Ft.		
U. S. STANDARD SIEVE		3"	3/4"	4	10-	40	200	
COBBLES		GRAVEL		SAND			FINES	
		Course	Fine	Course	Medium	Fine	(Clay or Silt)	
GRAIN SIZE		3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm	

Sample No.	Depth Feet	Laboratory Classification	TH Strata Feet	W	L.L.	P.L.	Ø	c	γ _d	Sand	Remarks
7	18.0-18.5	Gr. fat clay, lenses of silt, moist & medium	CH 17.5	53.3							
8	20.5-21.0	Gr. Sandy silt, sat	ML 19.5	X						49	
9	23.0-23.5	Gr. Silty clay, lenses of silt, moist & medium	CH 22.0	38.0							
10	25.5-26.0	Gr. fat clay, lenses of silt, moist & medium	CH 24.5	58.0							
11	28.0-28.5	Gr. Silty clay, lenses of silt, moist & medium	CH 27.0	39.5							
12	30.5-31.0	Gr. Sandy silt lenses of clay, sat	ML 30.0	X							
			33.0								

43.0

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>OSCEOLA, ALA. - HARBOR</u>			Location: <u>On Rsta. 130+14</u>			
Date of Boring: <u>3-14-67</u>	Date Received:	Date Classified: <u>MAR 16 1967</u>	Type of Boring: <u>Auger & 3" Tube</u>	Elevation of Top: <u>245.1</u>	Hole No.: <u>4</u>	
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	ϕ = Angle of Internal Friction			
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.			
			γ_d = Dry Density in Lbs./Cu. Ft.			
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND		FINES	
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
		R.H.B.	0.0								
1	0.5-1.0	Br silty clay, moist & medium	CH 3.0	X							Water Encountered at 18.0' Depth 3/14/67
2	3.5-4.0	Br. Sandy Silt, lenses of clay, moist	ML 5.0	11.8							Water Table at 12.5' Depth 3/15/67
3	6.5-7.0	Br. Sandy Silt ^{silty sand} , moist		X						61	Mud @ 19.0'
4	9.5-10.0	Br. Sandy Silt ^{silty sand} , moist	SM	X						62	
5	12.5-13.0	Br. Sandy Silt ^{silty sand} , wet		X							
6	15.5-16.0	Gr. silty clay, wet & medium	CL 16.0	42.0	46.6	20.0					

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>Osceola ARK Harbor</u>				Location:									
Date of Boring:		Date Received:		Date Classified:		Type of Boring:		Elevation of Top:		Hole No.: <u>4</u>			
W = Water Content in % of Dry Weight				L.L. = Liquid Limit				Ø = Angle of Internal Friction					
				P.L. = Plastic Limit				c = Cohesion in Tons/Sq. Ft.					
								γ _d = Dry Density in Lbs./Cu. Ft.					
U. S. STANDARD SIEVE		3"		3/4"		4		10-		40		200	
COBBLES				GRAVEL				SAND				FINES	
		Course		Fine		Course		Medium		Fine		(Clay or Silt)	
GRAIN SIZE		3"		3/4"		4.76mm		2.0mm		0.42mm		0.074mm	

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	Ø	c	γ _d	Sand	Remarks
7	19.0-19.5	Gr fat clay, lenses of silt, moist & medium	16.0	52.3							3" tube
8	21.5-22.0	Gr. fat clay, moist & medium	CH	54.7	75.2	26.4					
9	24.0-24.5	Do		53.0							
10	26.5-27.0	Gr fat clay, lenses of silt, moist & medium		42.4							lenses in water
11	30.0-30.5	Gr fine sand, sat	29.0	X							D ₁₀ = 0.16
12	32.5-33.0	Do		X							

SOIL LABORATORY

Hole No.:	
-----------	--

200

(Clay or Silt)

0.074mm

Bottom of Hole 420' Depth

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>Osceola Atk Harbor</u>			Location: <u>On R Sta 135+34</u>			
Date of Boring: <u>3-14-67</u>	Date Received: <u>✓</u>	Date Classified: <u>MAR 16 1967</u>	Type of Boring: <u>Auger & 3" Tube</u>	Elevation of Top: <u>246.8</u>	Hole No.: <u>5</u>	
W = Water Content in % of Dry Weight		L.L. = Liquid Limit		ϕ = Angle of Internal Friction		
		P.L. = Plastic Limit		c = Cohesion in Tons/Sq. Ft.		
				γ_d = Dry Density in Lbs./Cu. Ft.		
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND		FINES	
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification	TH Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
		R.H.B.	0.0								
1	0.5-1.0	Br Silty clay, moist & medium	CL	X							Water Encountered at 16.0' Depth 3/14/67
2	3.5-4.0	Br Silty Sand, lumps of clay, wet	SM	X							Water Table at 14.0' Depth 3/15/67
3	6.5-7.0	Do	9.0	X							drill mud at 16.0'
4	9.5-10.0	Br. Sandy silt, lenses of clay, wet		14.2							
5	12.5-13.0	Gr Sandy silt, sat	ML	X						550	
6	15.5-16.0	sandy silt Gr sandy silt, lenses of clay, sat		X							

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>OSCEOLA Atk Harbor</u>			Location:			
Date of Boring:	Date Received:	Date Classified:	Type of Boring:	Elevation of Top:	Hole No.: <u>5</u>	
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	Ø = Angle of Internal Friction			
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.			
			γd = Dry Density in Lbs./Cu. Ft.			
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND		FINES	
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	Ø	c	γd	Sand	Remarks
7	18.0-18.5	Gr Sandy silt, sat	9.0	X						44	3" Test
8	20.5-21.0	Gr. fat clay, moist & medium	20.5								
			CH	48.0	65.9	23.8					
			22.0								
9	22.5-23.0	Gr silt, lenses of clay, sat	ML	X							
			24.0								
10	25.0-25.5	Gr fat clay, moist & medium	CH	54.1	84.9	22.2					
			27.0								
11	27.5-28.0	Br fine sand, sat		X							D ₁₀ = 0.068
12	31.0-31.5	Br. fine sand, sat		X							D ₁₀ = 0.15

43.0

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>Osceola, Ark. - Harbor I-1 #30 chute</u>			Location: <u>305' Riverside E 135+00</u>		
Date of Boring: <u>22 March 1967</u>	Date Received:	Date Classified: <u>MAR 28 1967</u>	Type of Boring: <u>Bailer & 3" Tube</u>	Elevation of Top: <u>207.1</u>	Hole No.: <u>6</u>
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	ϕ = Angle of Internal Friction		
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.		
			γ_d = Dry Density in Lbs./Cu. Ft.		

U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND			FINES
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
			0.0								
1	0.5-1.0	BT fine sand, wet	SP	X							Bailer
2	3.5-4.0	BT fine sand, sat		X							$D_{10}=0.22$ Drill mud used in hole @ 13.0' depth.
3	6.5-7.0	GL fine sand, sat		X							$D_{10}=0.22$ River bed
4	9.5-10.0	DO		X							
5	13.0-13.5	DO		X							3" Tube
6	15.5-16.0	GL fine sand, sat		X							$D_{10}=0.17$

SOIL LABORATORY

Location:

Type of Boring:	Elevation of Top:	Hole No.: 6
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Date Received:

Date Classified:

Type of Boring:

Elevation of Top:

Hole No.:

L.L. = Liquid Limit

ϕ = Angle of Internal Friction

c = Cohesion in Tons/Sq. Ft.

P.L. = Plastic Limit

γ_d = Dry Density in Lbs./Cu. Ft.

U. S. STANDARD SIEVE

3^{er}

3/4"

4

10-

40

200

COBBLES

GRAVEL

SAND

FINES

Course

Fine

Course

Medium

Fine

(Clay or Silt)

GRAIN SIZE

3¹¹

3/4"

4.76mm

2. Origin

0.42mm

0.074mm

Had to take samples
1 thru 4 with Barker,
Mud would Blow
out from bottom of
casing. Had to set
casing deeper before
using mud & wash out
hole & use 3" Tube.
This information
Taken from field logs.

CONDENSED SOIL DATA

WORK SHEET

SOIL LABORATORY

Site: <u>OSCEOLA Harbor ALA Isl #30 ch. 635' Riverside Sta. 155+00</u>			Location: <u>635' Riverside Sta. 155+00</u>			
Date of Boring: <u>3-28-67</u>	Date Received:	Date Classified: <u>MAR 29 1967</u>	Type of Boring: <u>Baillet & 3" Tube</u>	Elevation of Top: <u>200.7</u>	Hole No.: <u>7</u>	
W = Water Content in % of Dry Weight		L.L. = Liquid Limit	ϕ = Angle of Internal Friction			
		P.L. = Plastic Limit	c = Cohesion in Tons/Sq. Ft.			
			γ_d = Dry Density in Lbs./Cu. Ft.			
U. S. STANDARD SIEVE	3"	3/4"	4	10-	40	200
COBBLES	GRAVEL		SAND		FINES	
	Course	Fine	Course	Medium	Fine	(Clay or Silt)
GRAIN SIZE	3"	3/4"	4.76mm	2.0mm	0.42mm	0.074mm

Sample No.	Depth Feet	Laboratory Classification	Strata Feet	W	L.L.	P.L.	ϕ	c	γ_d	Sand	Remarks
1	0.5-1.0	Gr. same as ^{gravelly sand} lumps of clay, sat.	0.0	X							River bed
2	3.5-4.0	Gr. medium sand ^{gravelly sand} sat.	5.0	X							$D_{10}=0.38$ River Bed
3	6.5-7.0	Gr. fine sand, sat.	5.0	X							$D_{10}=0.26$ mud @ 10.0' - 0.6' fat clay at 9.0'
4	10.0-10.5	Gr. fine sand, sat.	5.0	X							$D_{10}=0.071$ 3" Tube -
5	12.5-13.0	Do		X							
6	15.0-15.5	Do		X							
			16.5								

21.0

SOIL LABORATORY

Site:

osceola Hatbot ATK

Location:

Date of Boring:

Date Received:

Date Classified:

Type of Boring:

Elevation of Top:

Hole No.:	
-----------	--

W = Water Content in % of Dry Weight

L.L. = Liquid Limit

ϕ = Angle of Internal Friction

c = Cohesion in Tons/Sq. Ft.

P.L. = Plastic Limit

γ_d = Dry Density in Lbs./Cu. Ft.

U. S. STANDARD SIEVE

3''

3/4"

4

10-

40

200

COBBLES

GRAVEL

SAND

FINES

Course

Fine

Course

Medium

Fine

(Clay or Silt)

GRAIN SIZE

3^{re}

3/4"

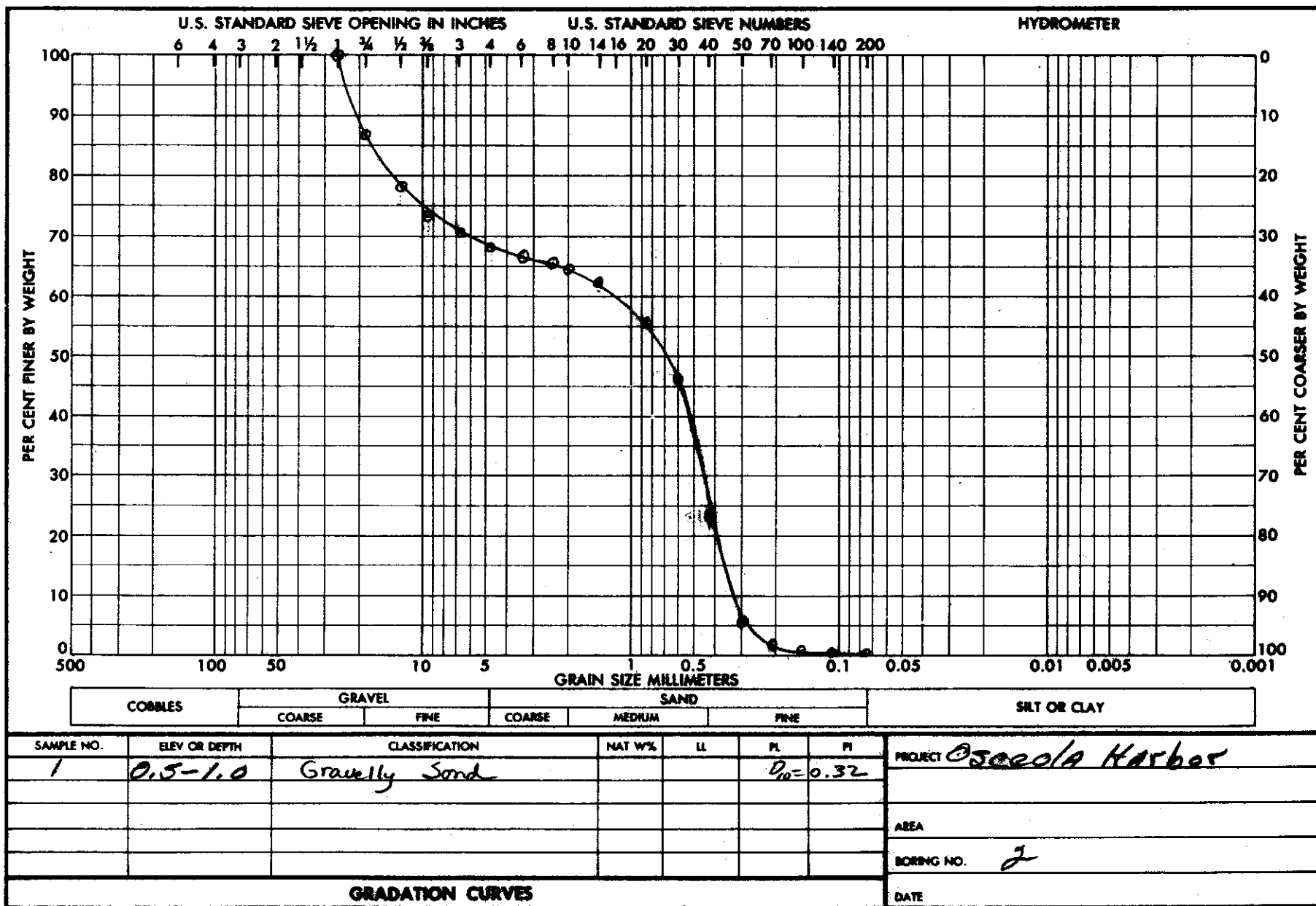
4.76mm

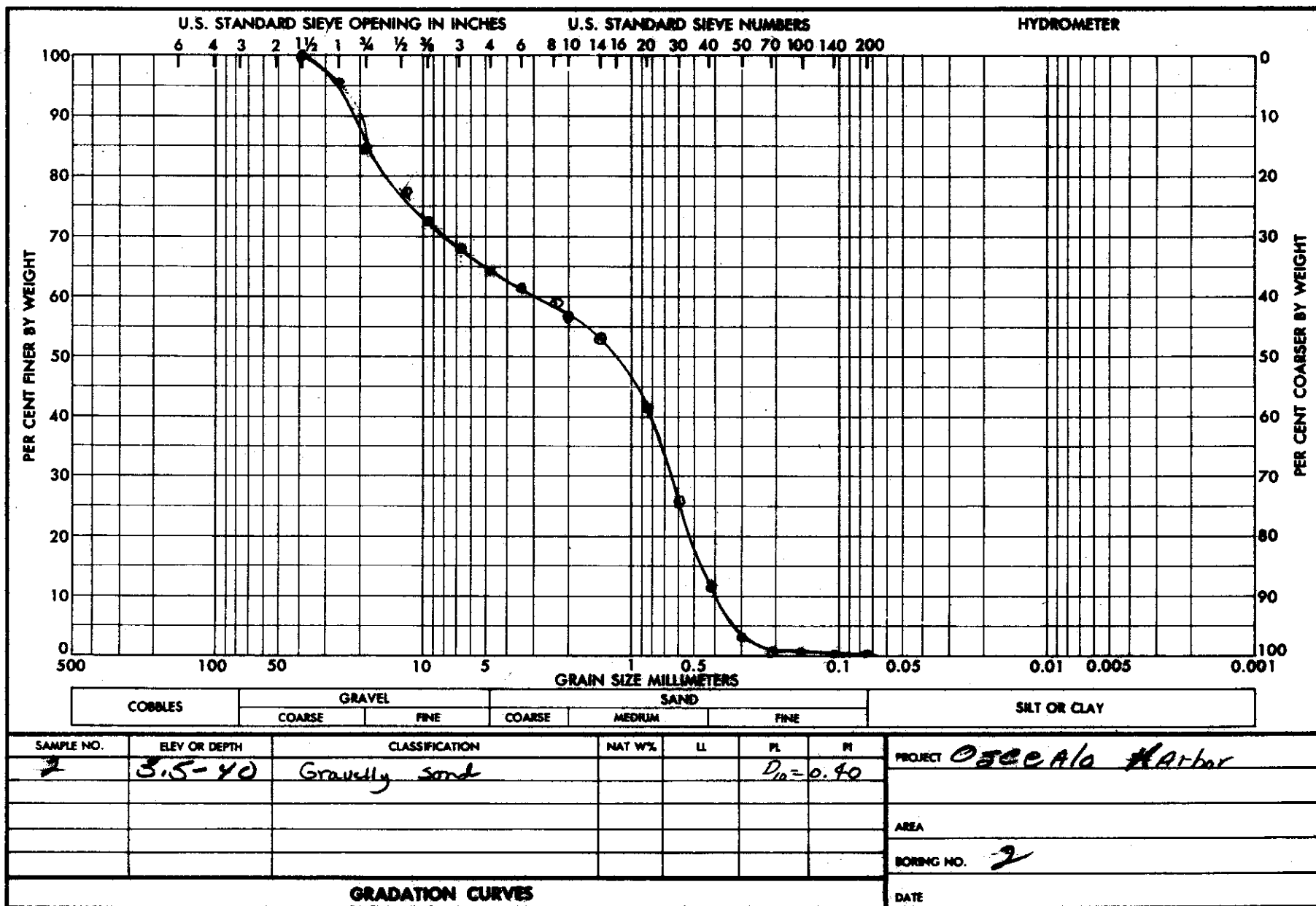
2.0mm

0.42mm

0.074mm

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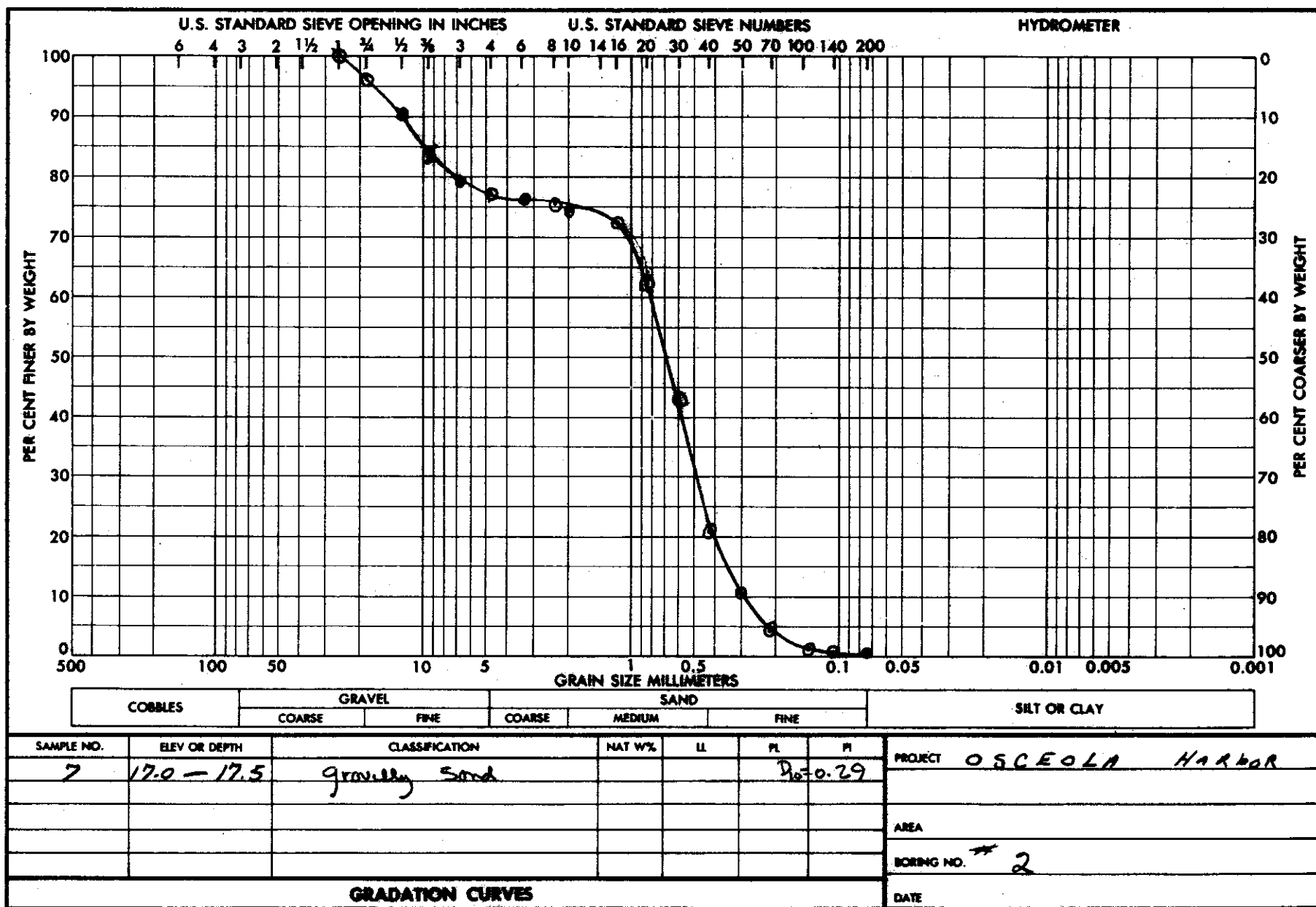




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(TRANSLUCENT)

U. S. GOVERNMENT PRINTING OFFICE : 1963 O-709-126

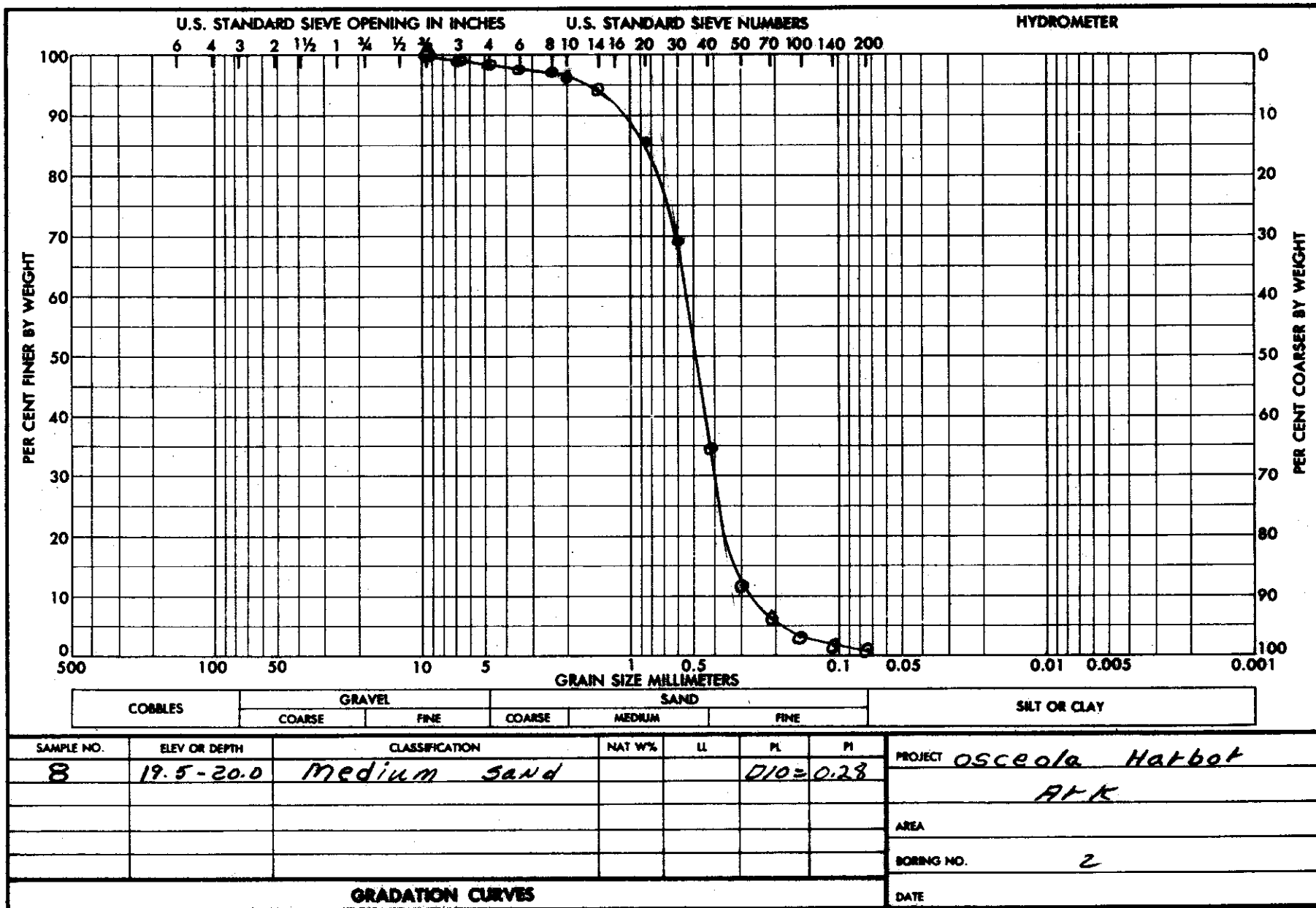


ENG FORM 2087
1 MAY 63

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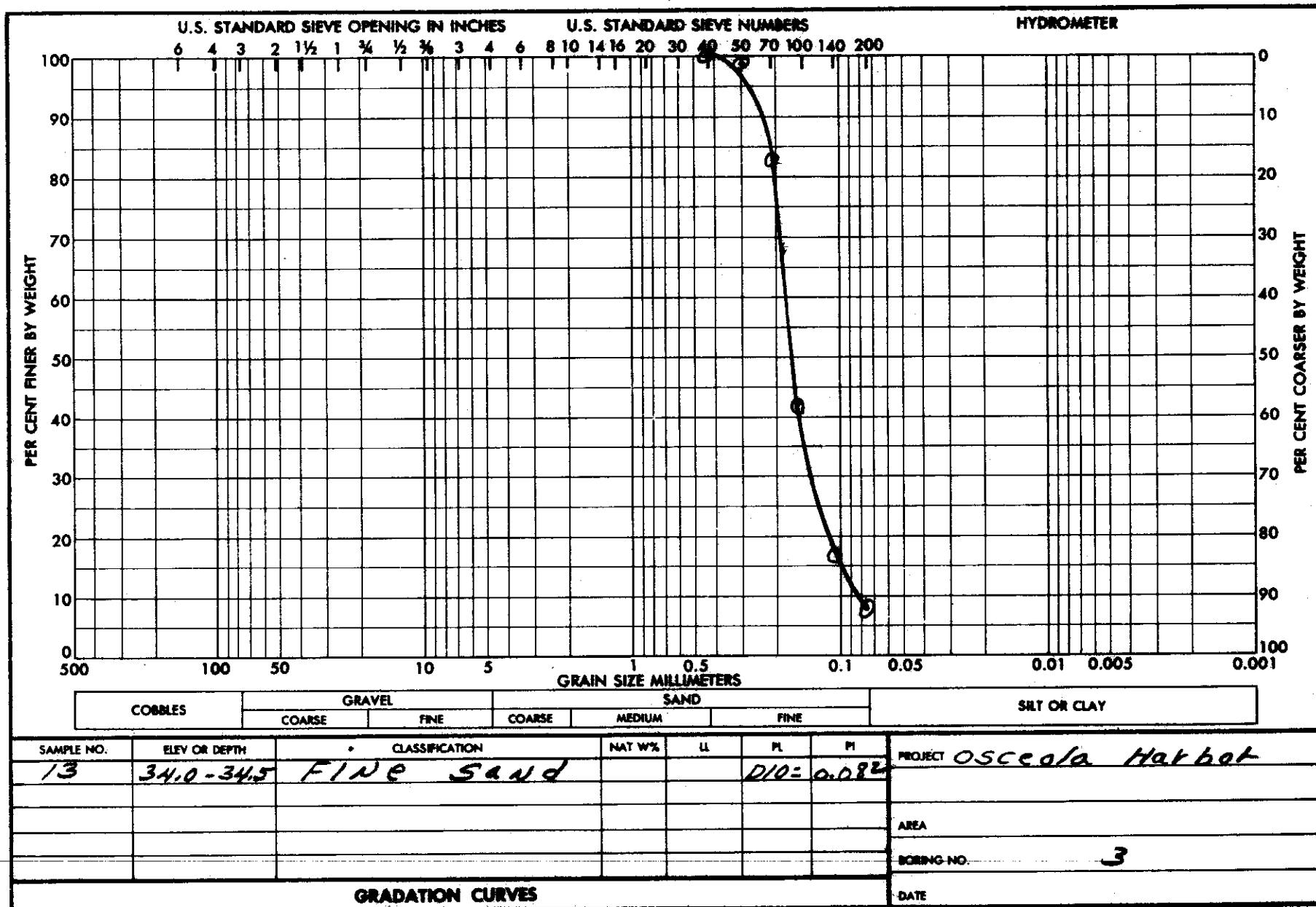


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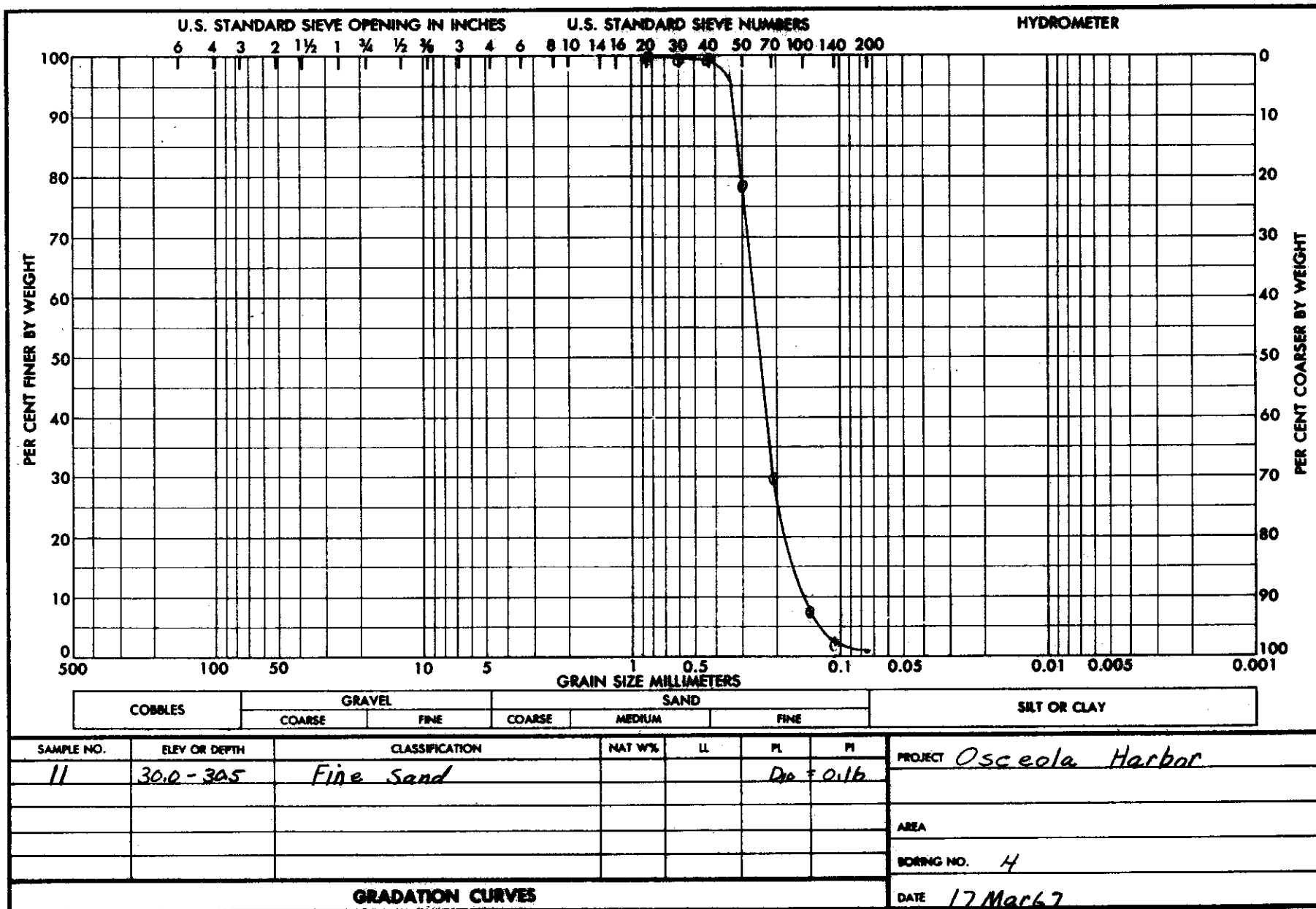


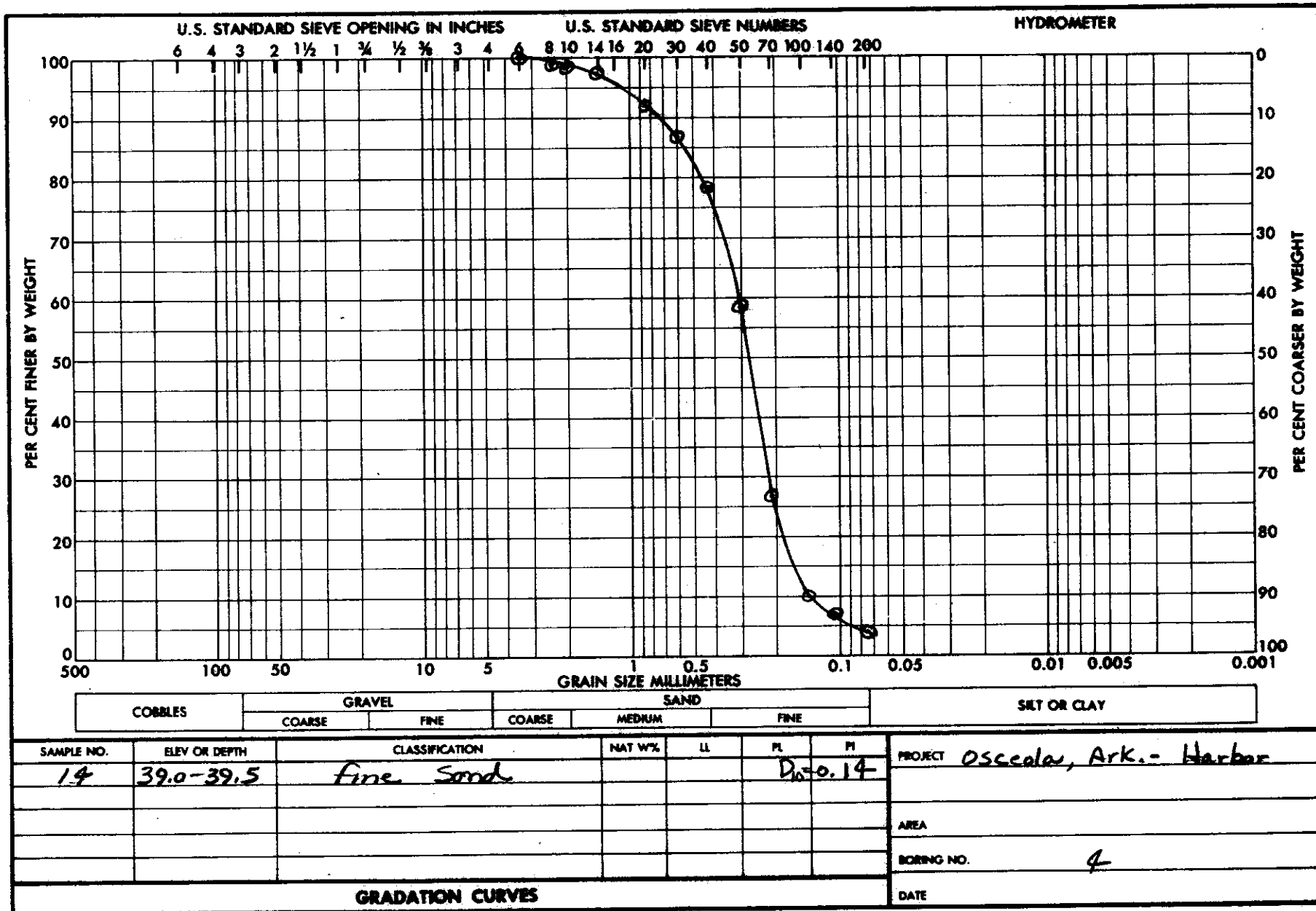
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1 MAY 63

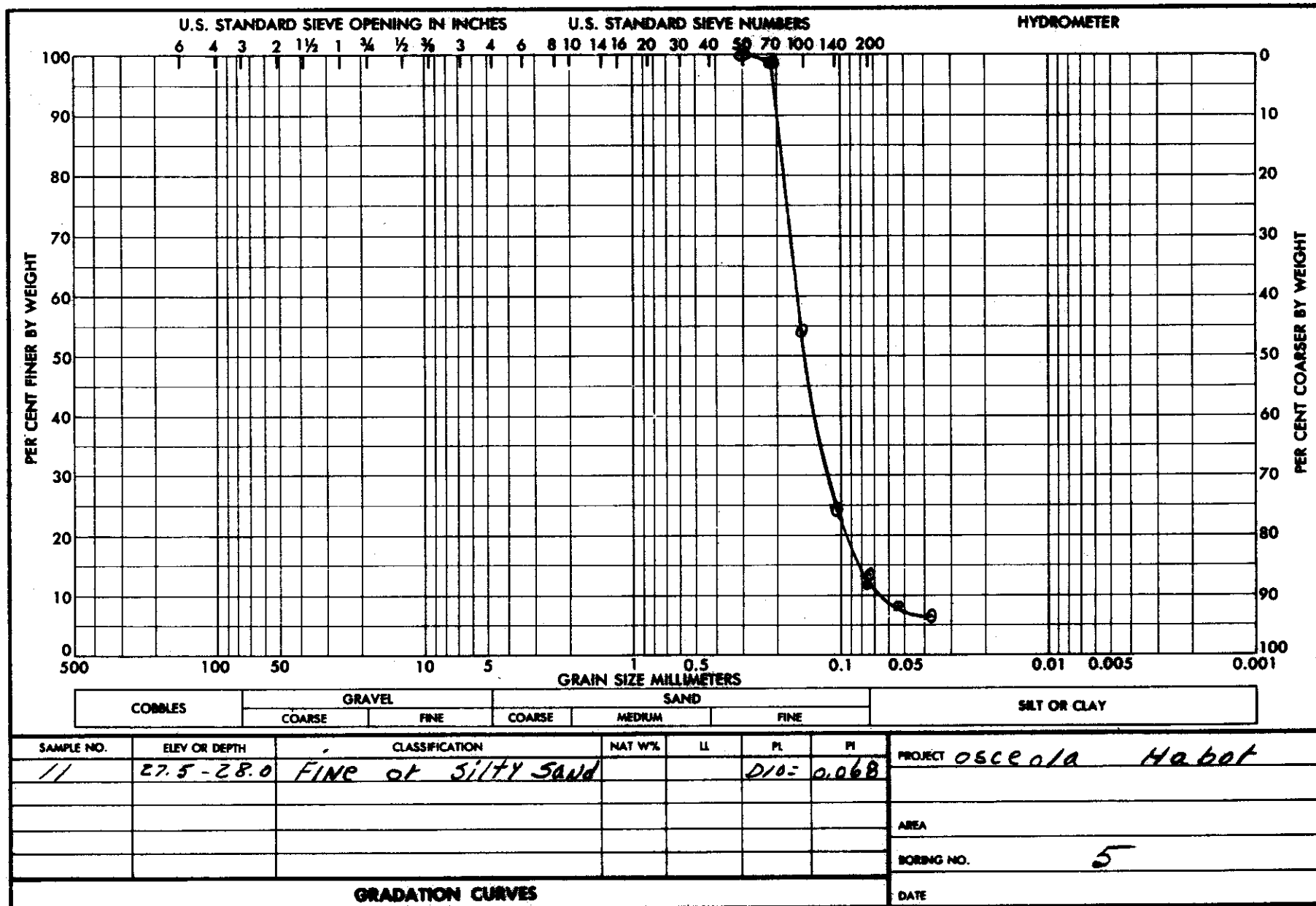
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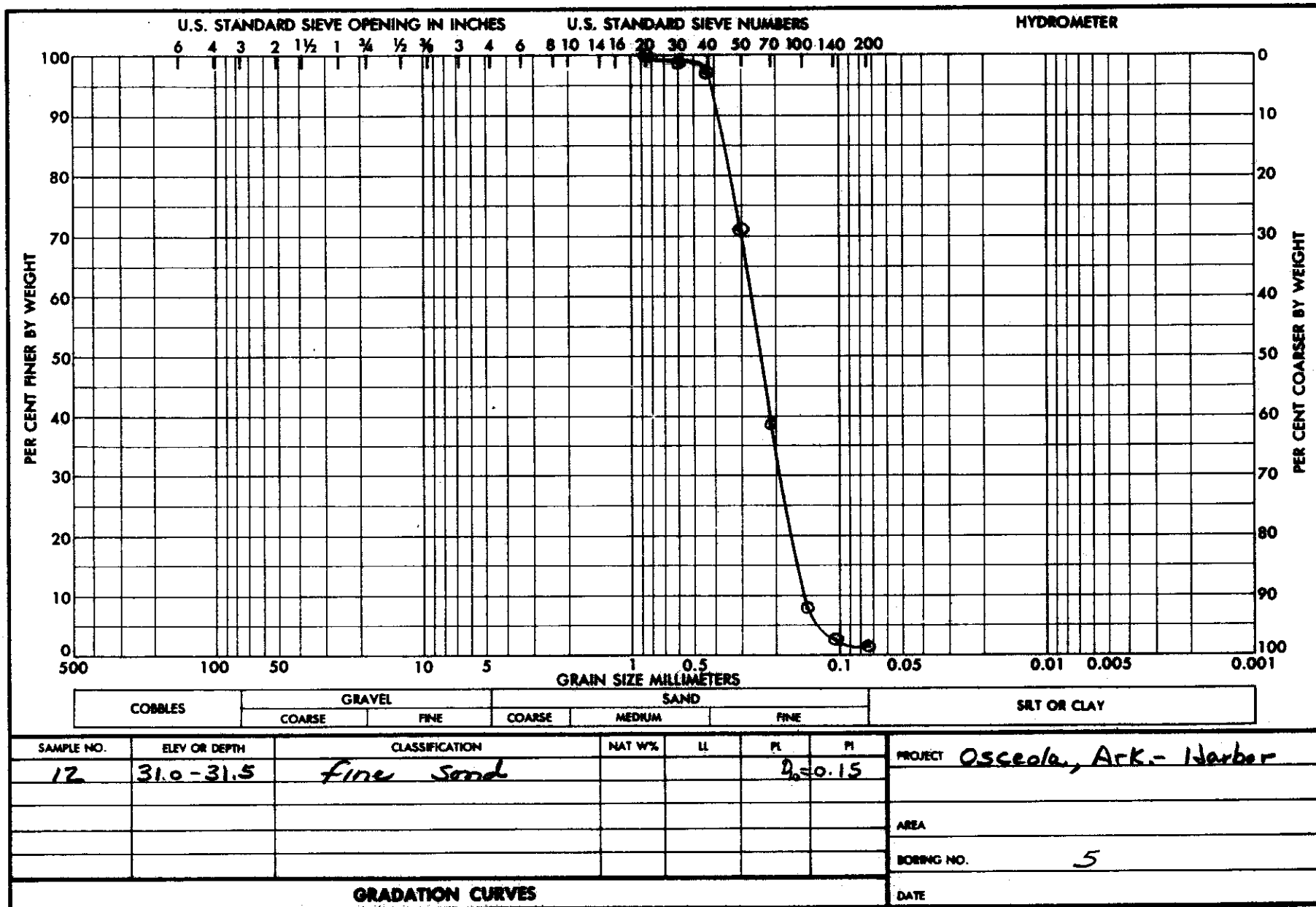
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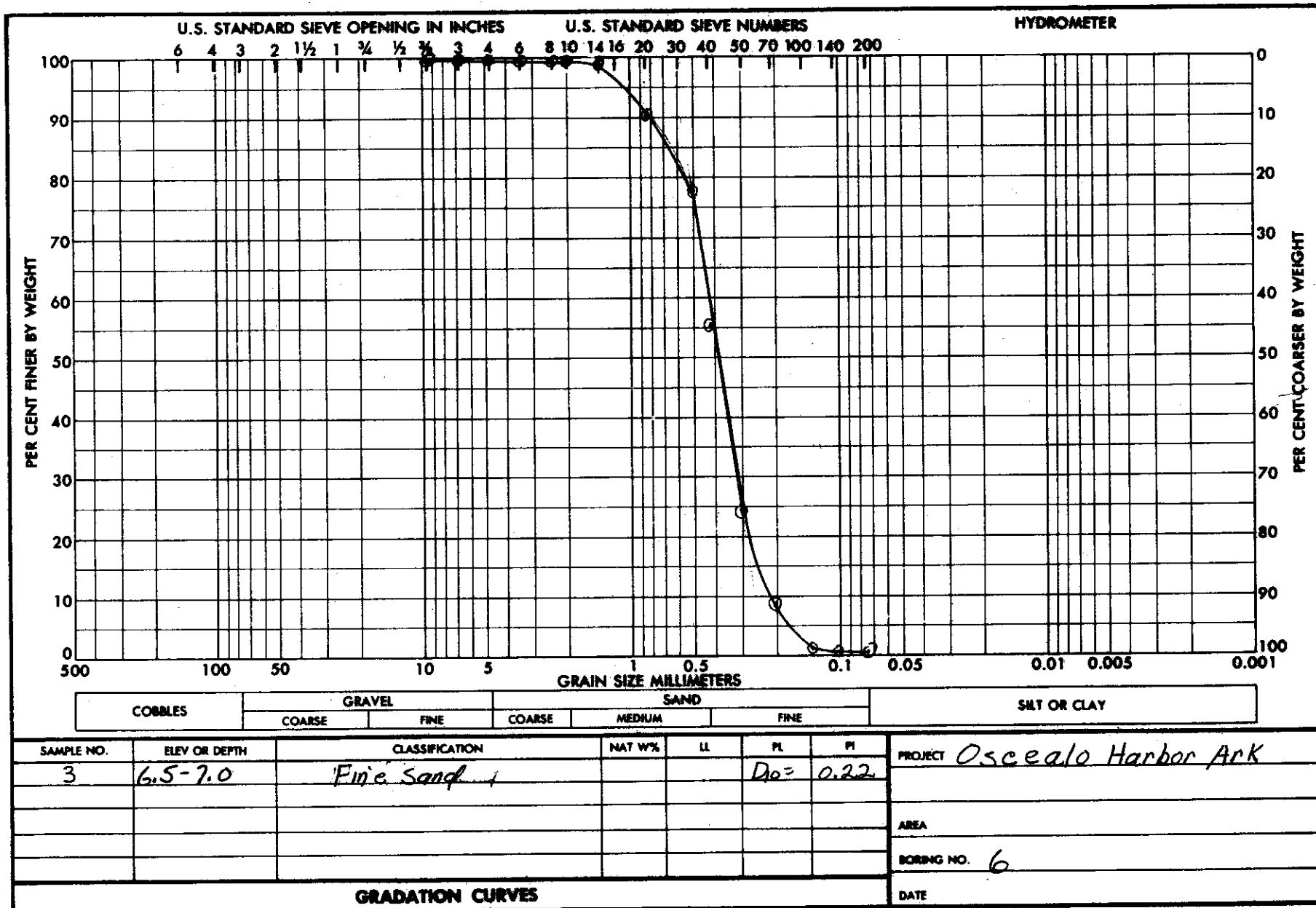
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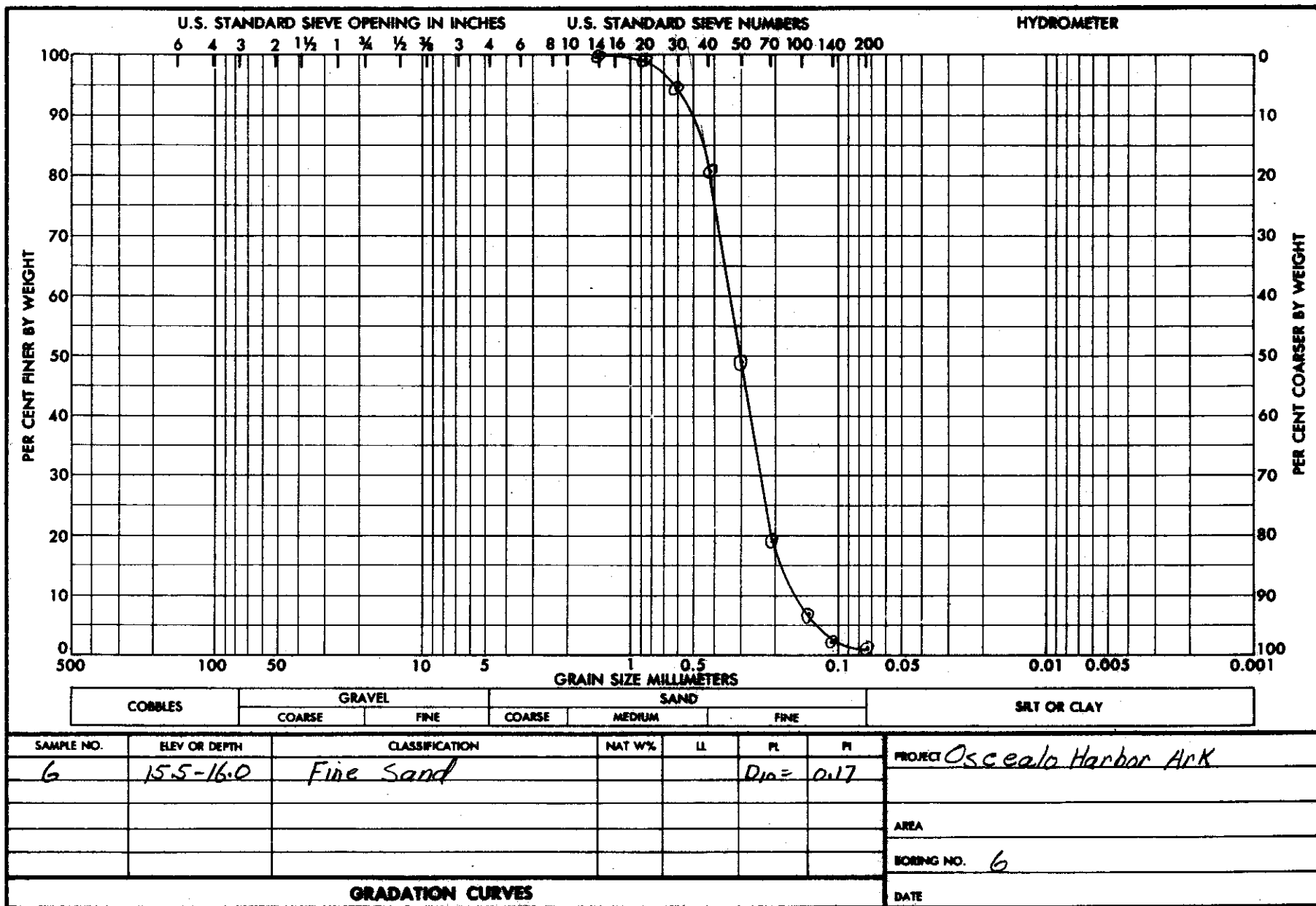


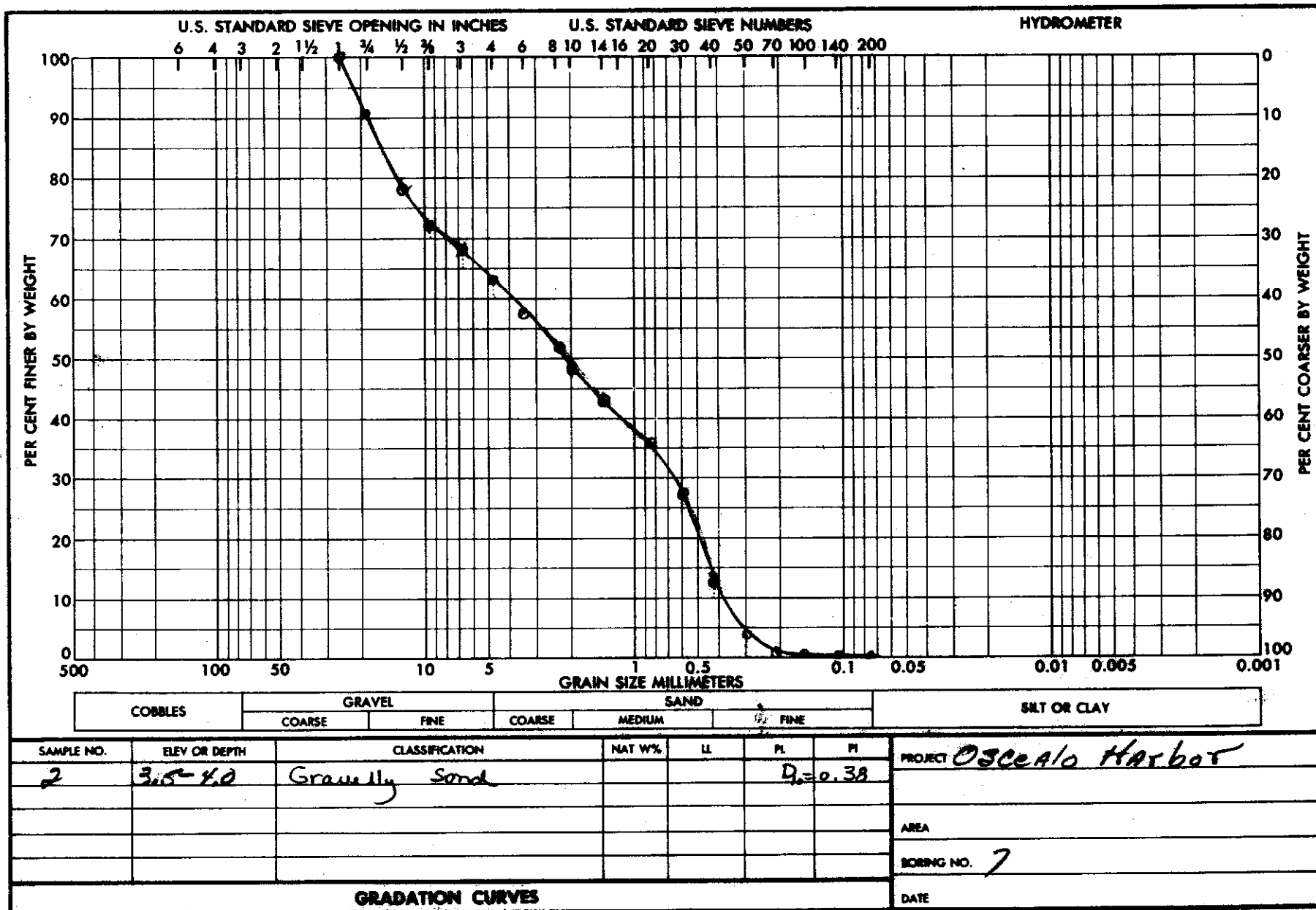
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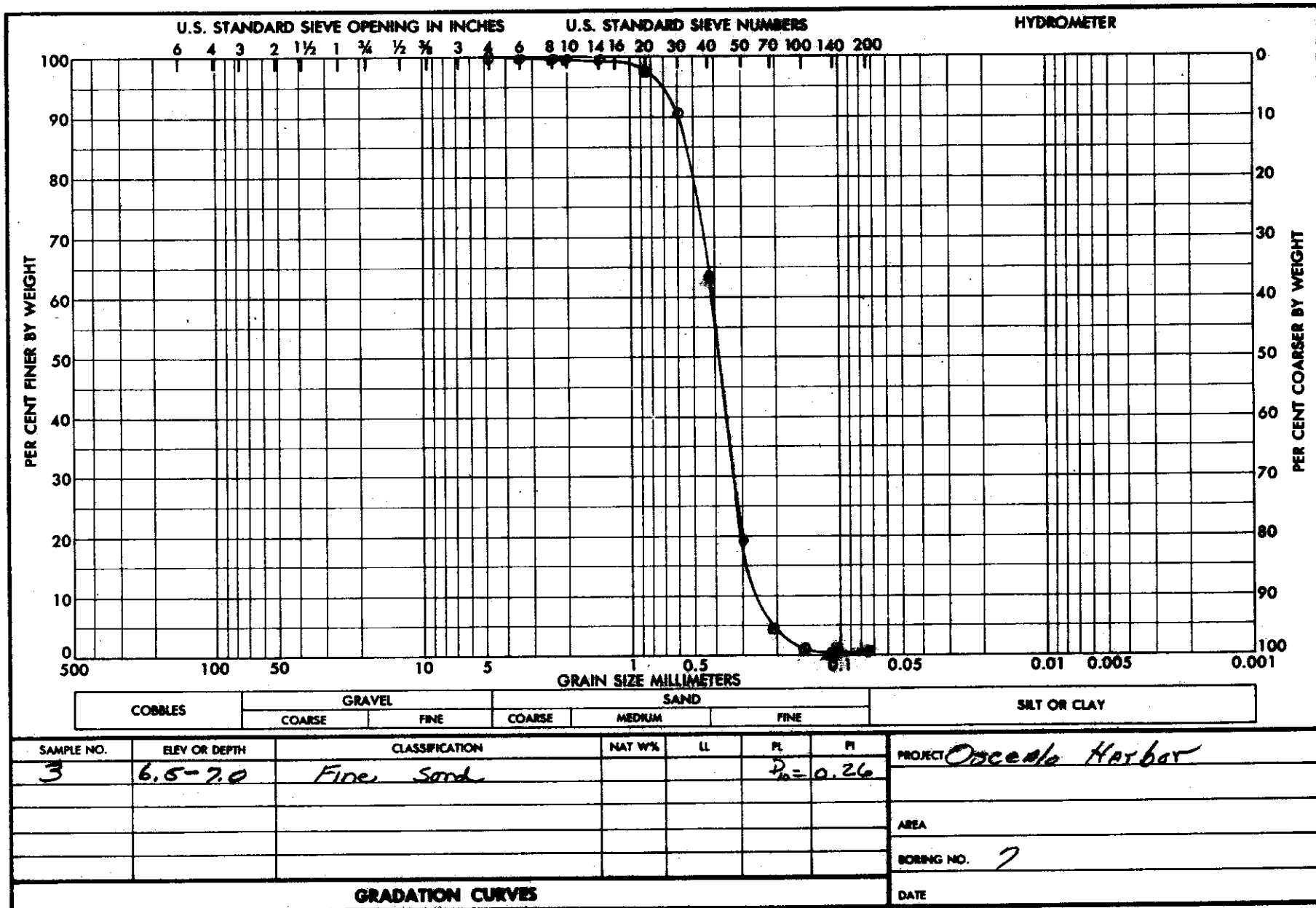
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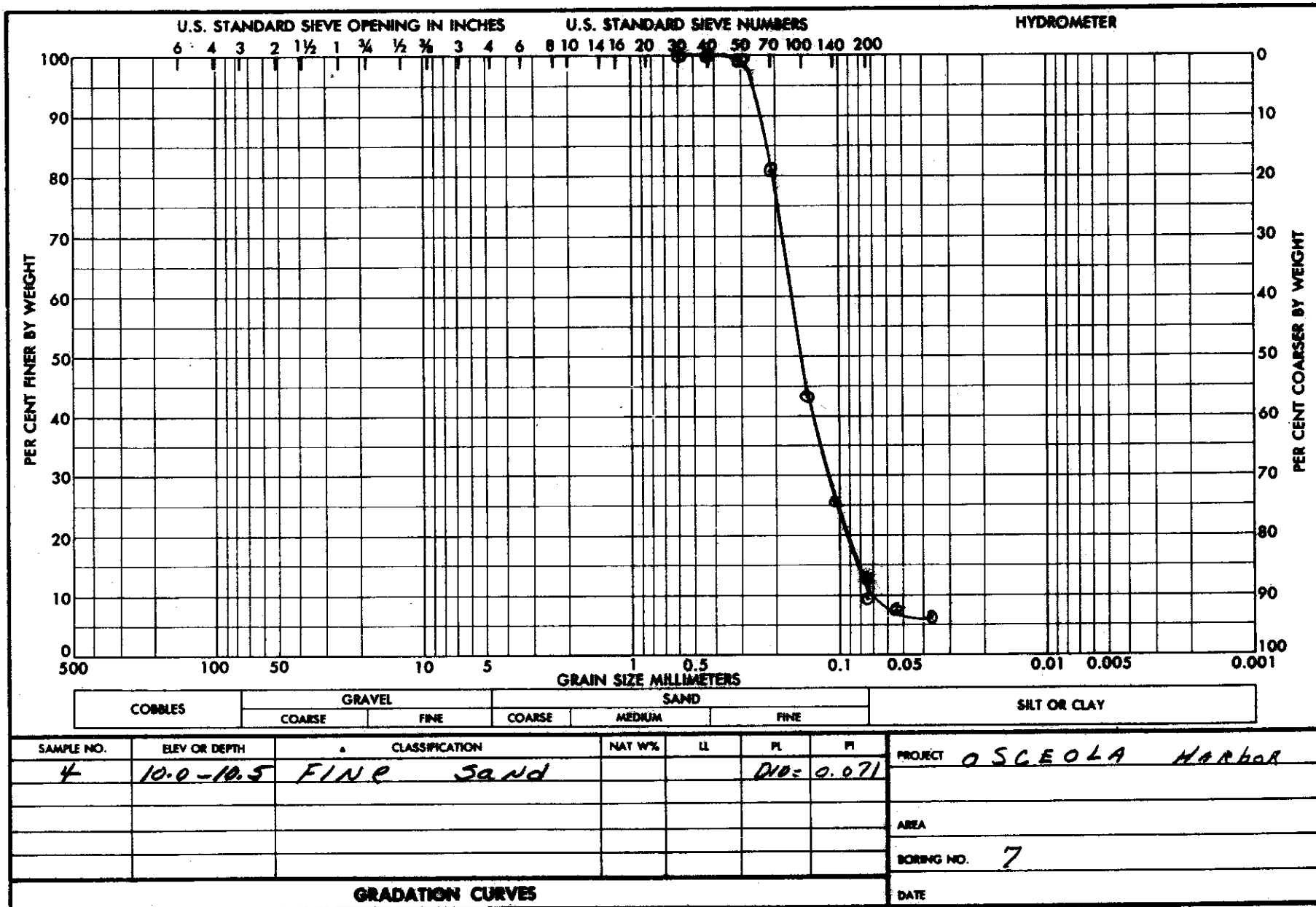


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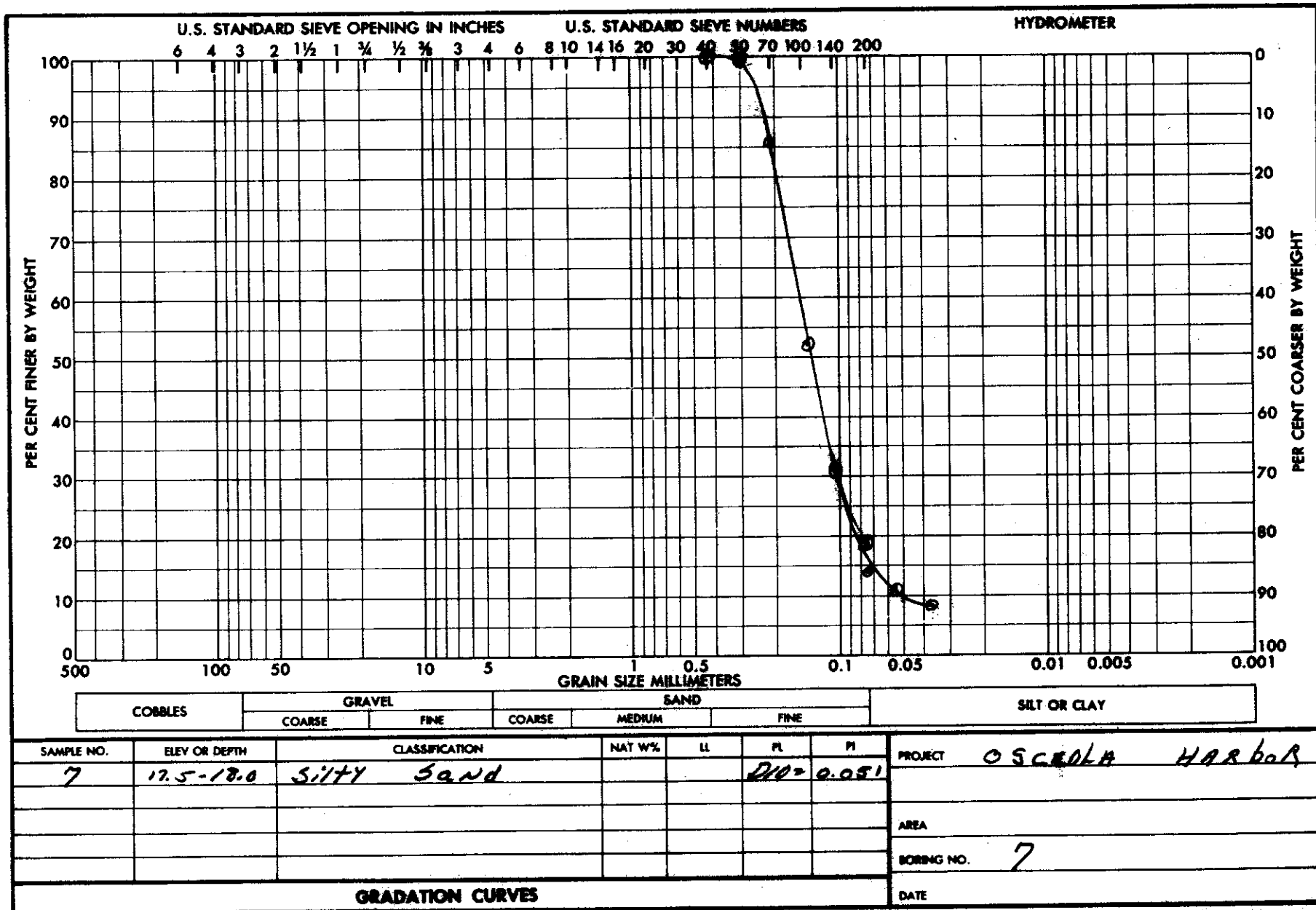
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1 MAY 63

2087

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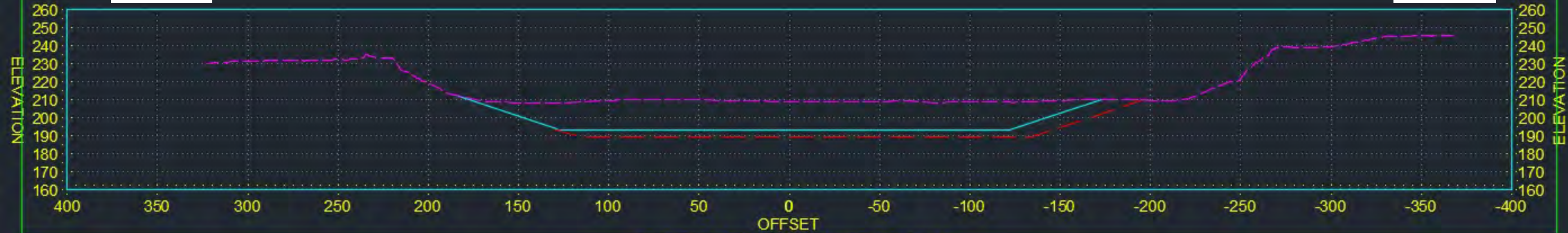
Annex 1D

Critical Cross Sections

Annex 1E
GeoStudio Slope Stability Calculations

Island Side

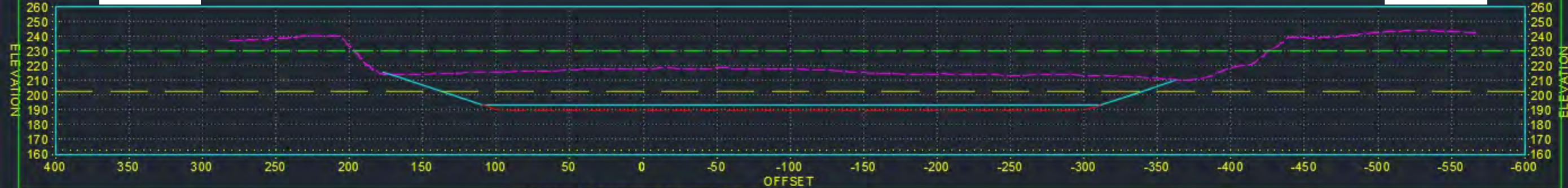
Levee Side



OSCEOLA EXTENSION STA:63+00

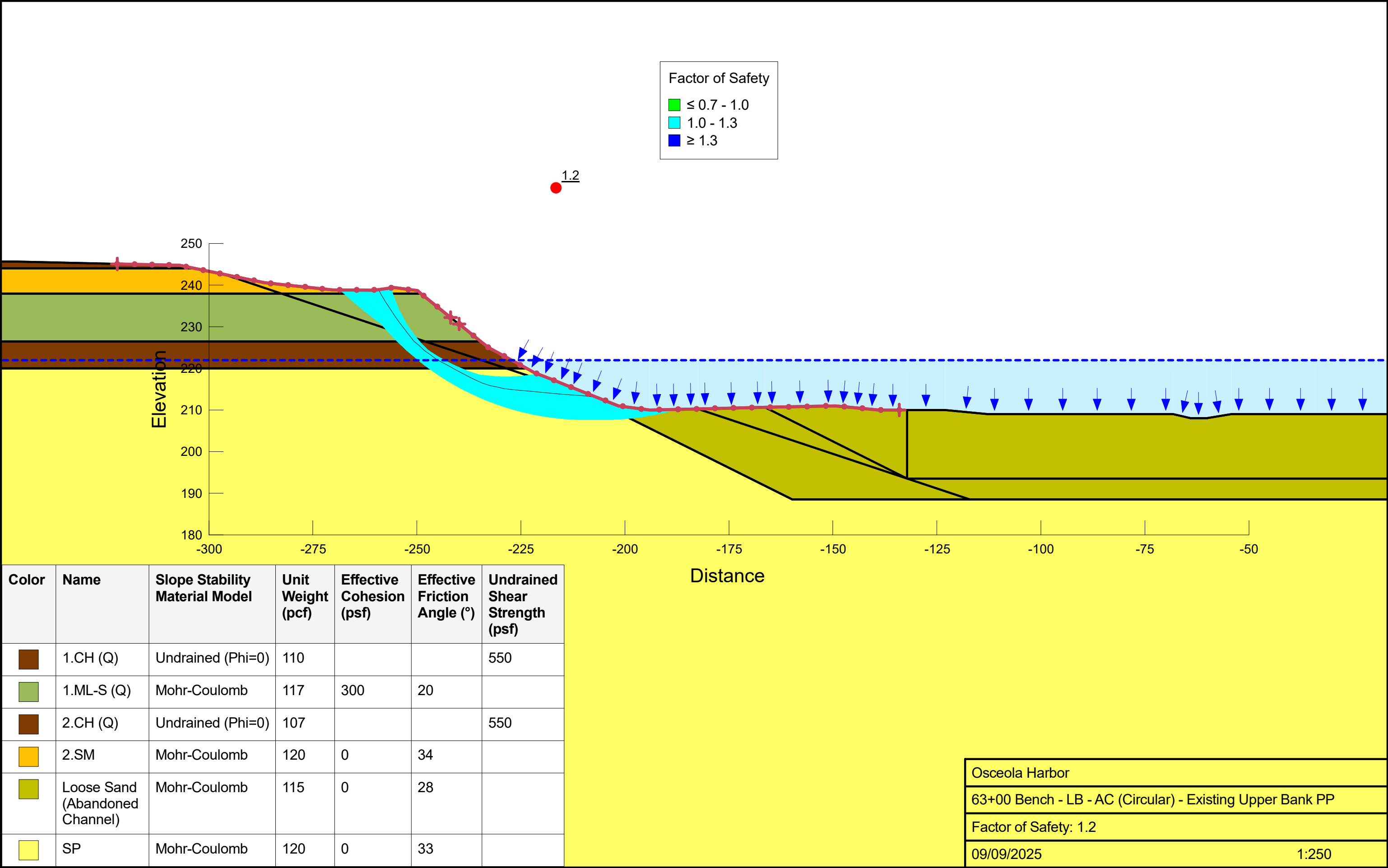
Island Side

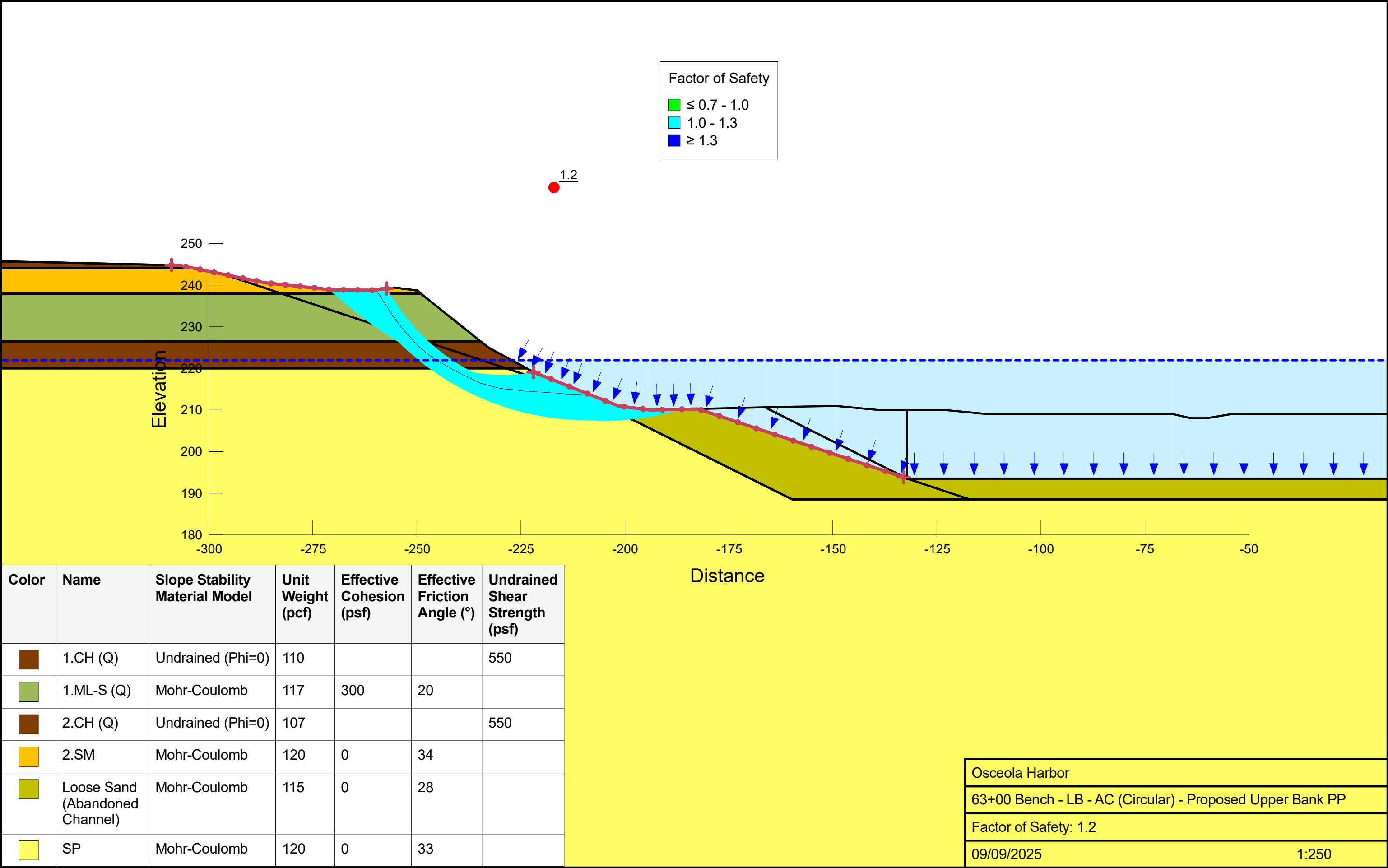
Levee Side

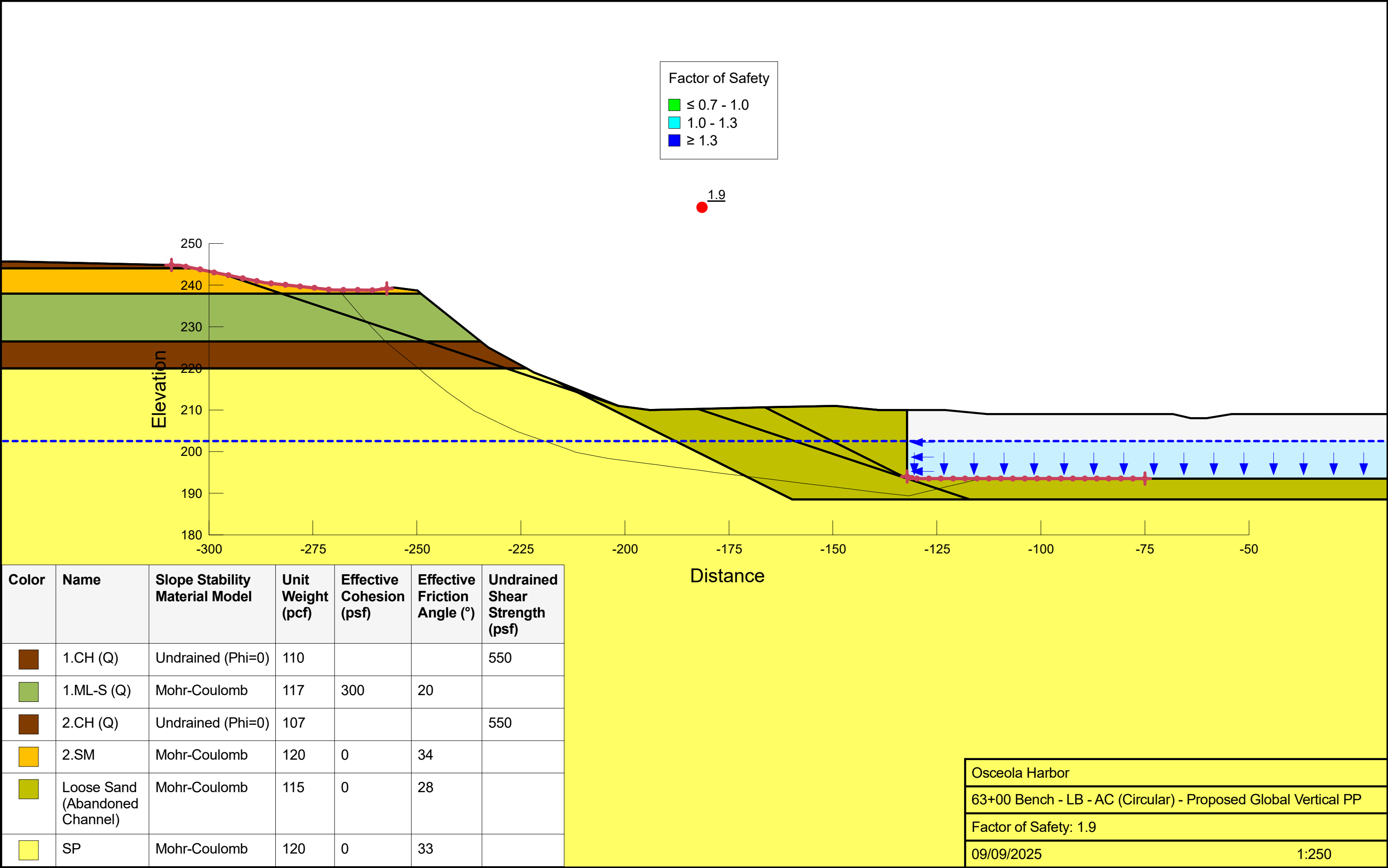


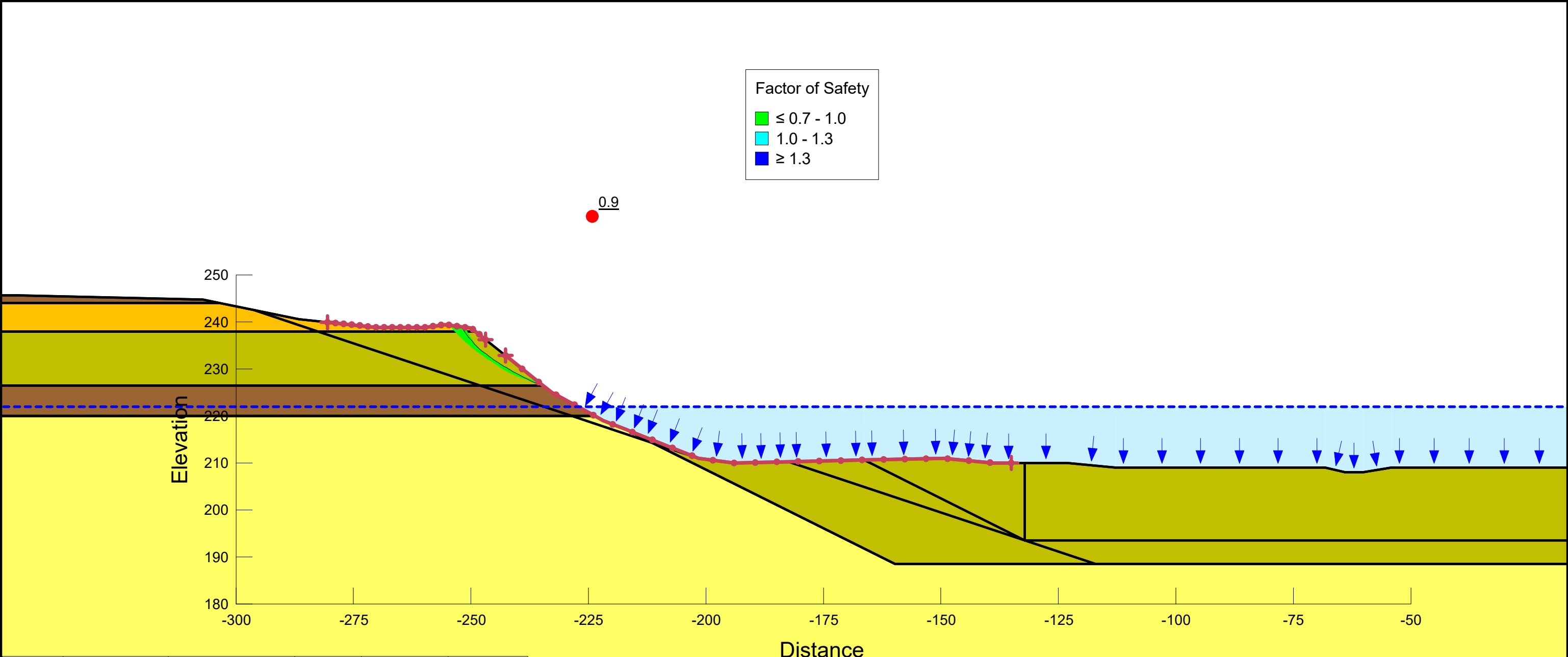
OSCEOLA EXTENSION STA:82+00

Appendix BVII
GeoStudio Slope Stability Calculations



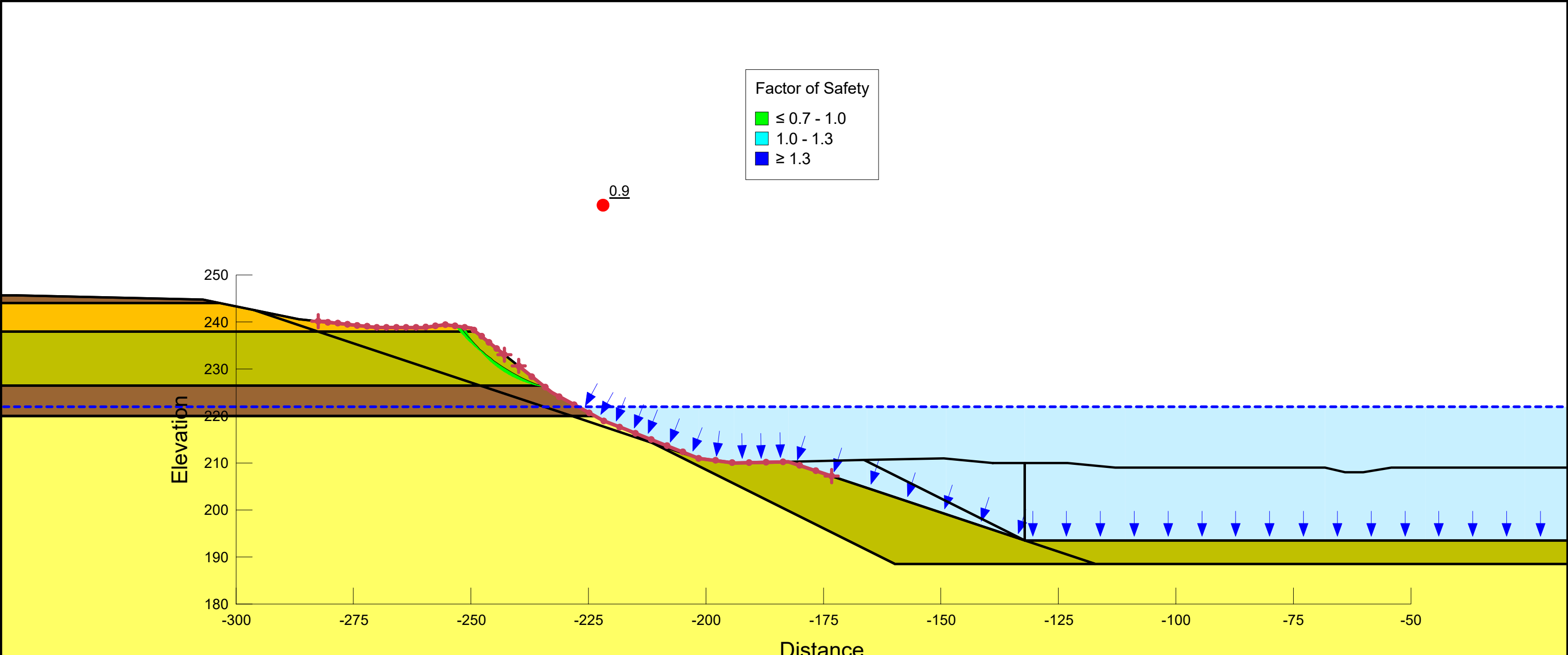






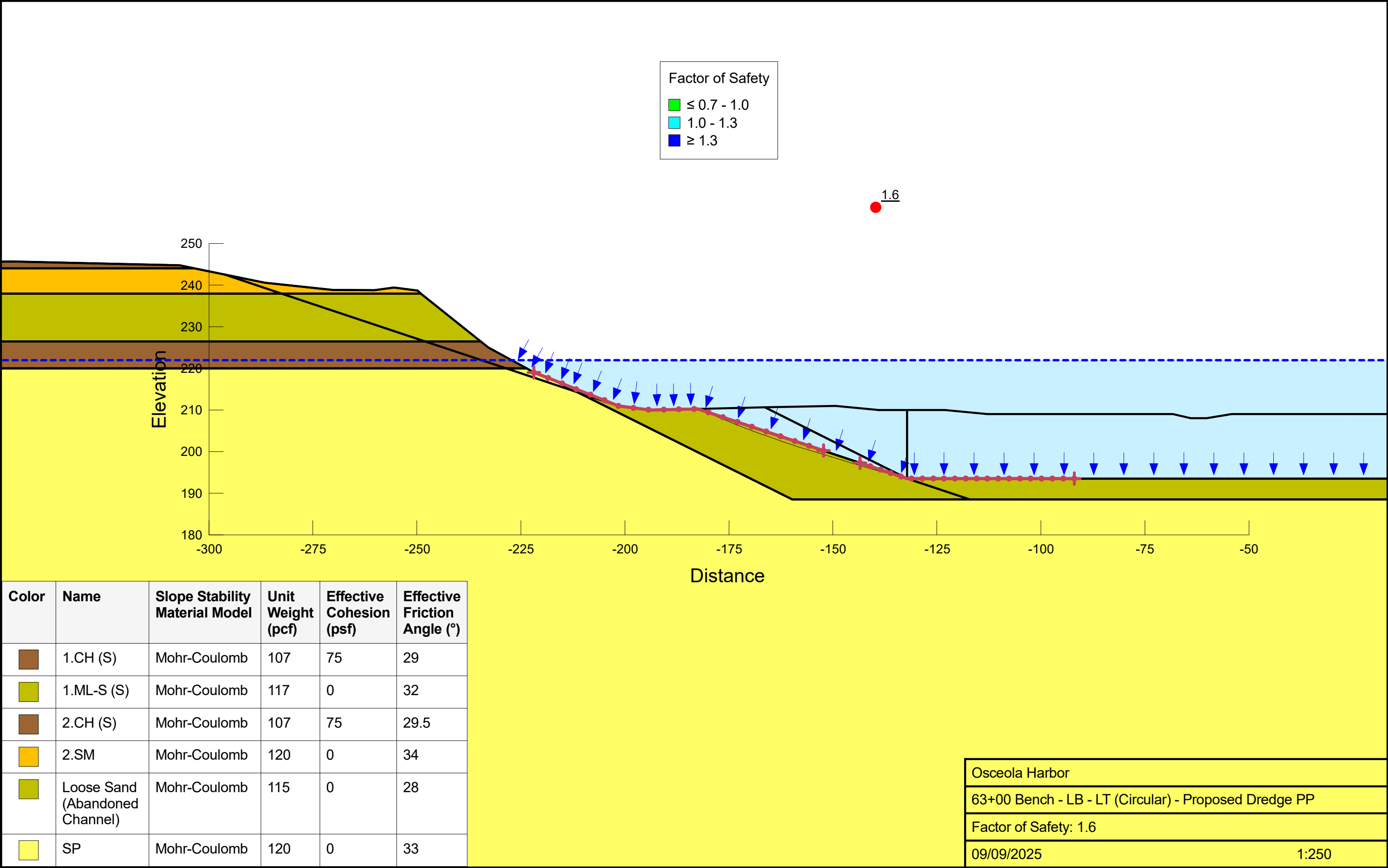
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
63+00 Bench - LB - LT (Circular) - Existing Upper Bank PP	
Factor of Safety: 0.9	
09/09/2025	1:250



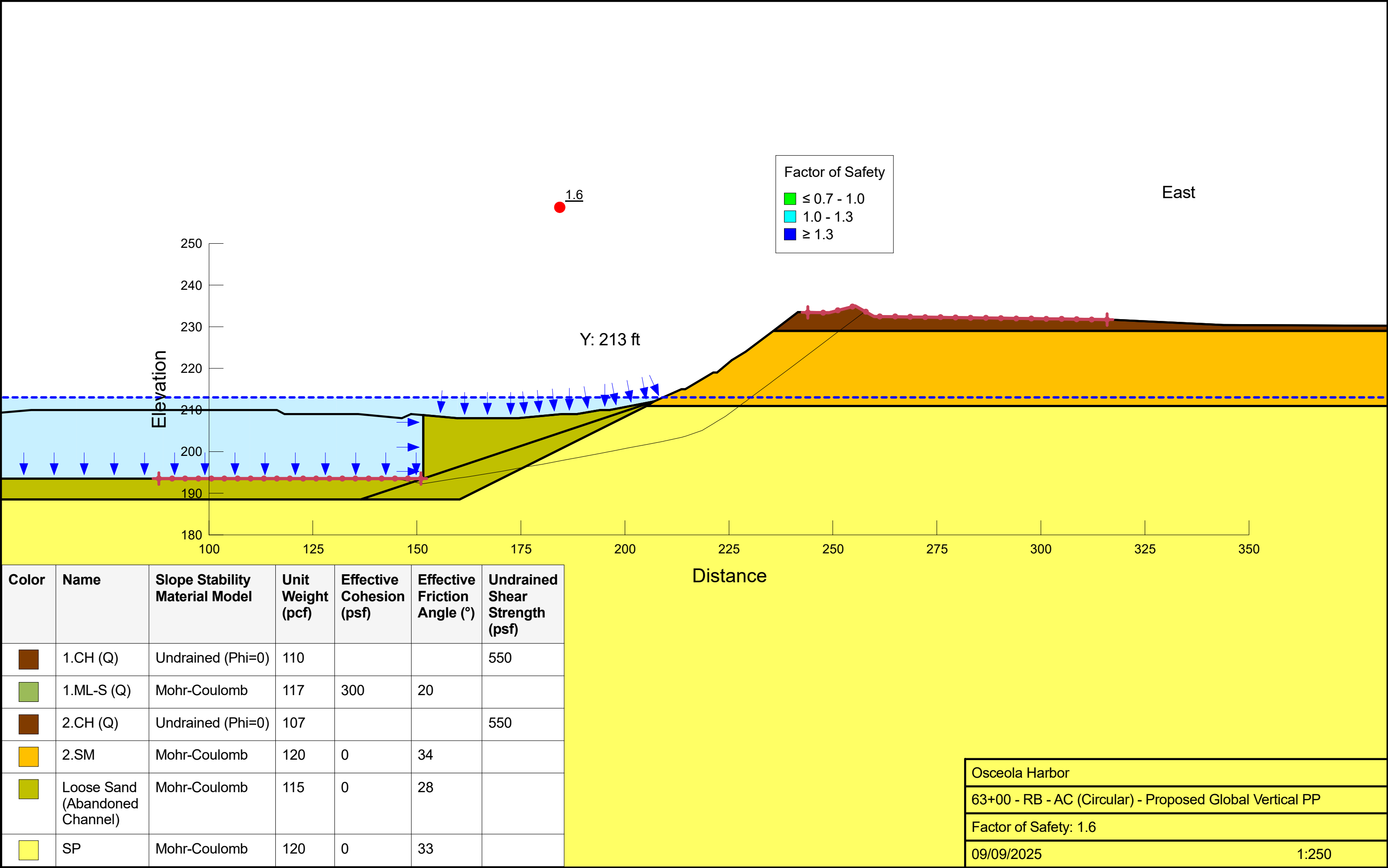
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
63+00 Bench - LB - LT (Circular) - Proposed Upper Bank PP	
Factor of Safety: 0.9	
09/09/2025	1:250



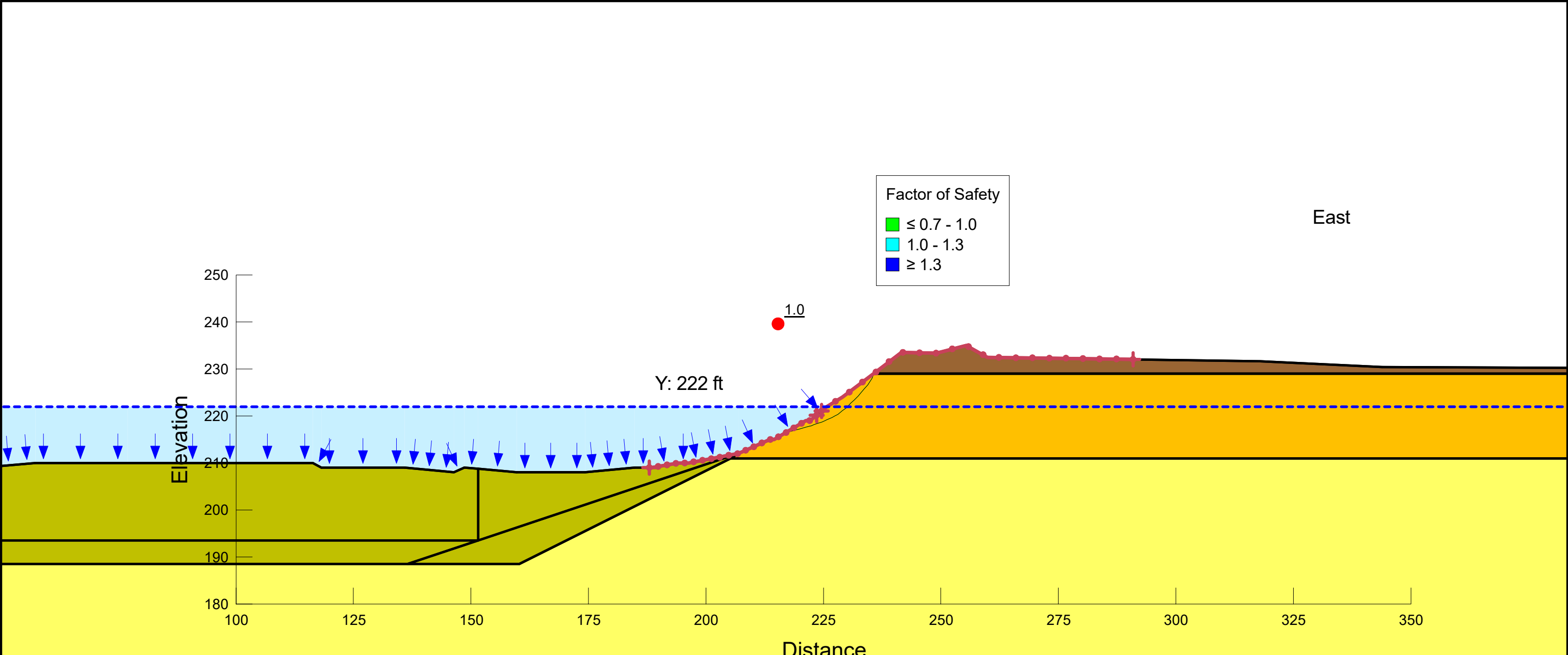
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
1.CH (S)	1.CH (S)	Mohr-Coulomb	107	75	29
1.ML-S (S)	1.ML-S (S)	Mohr-Coulomb	117	0	32
2.CH (S)	2.CH (S)	Mohr-Coulomb	107	75	29.5
2.SM	2.SM	Mohr-Coulomb	120	0	34
Loose Sand (Abandoned Channel)	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
SP	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
63+00 Bench - LB - LT (Circular) - Proposed Dredge PP	
Factor of Safety: 1.6	
09/09/2025	1:250



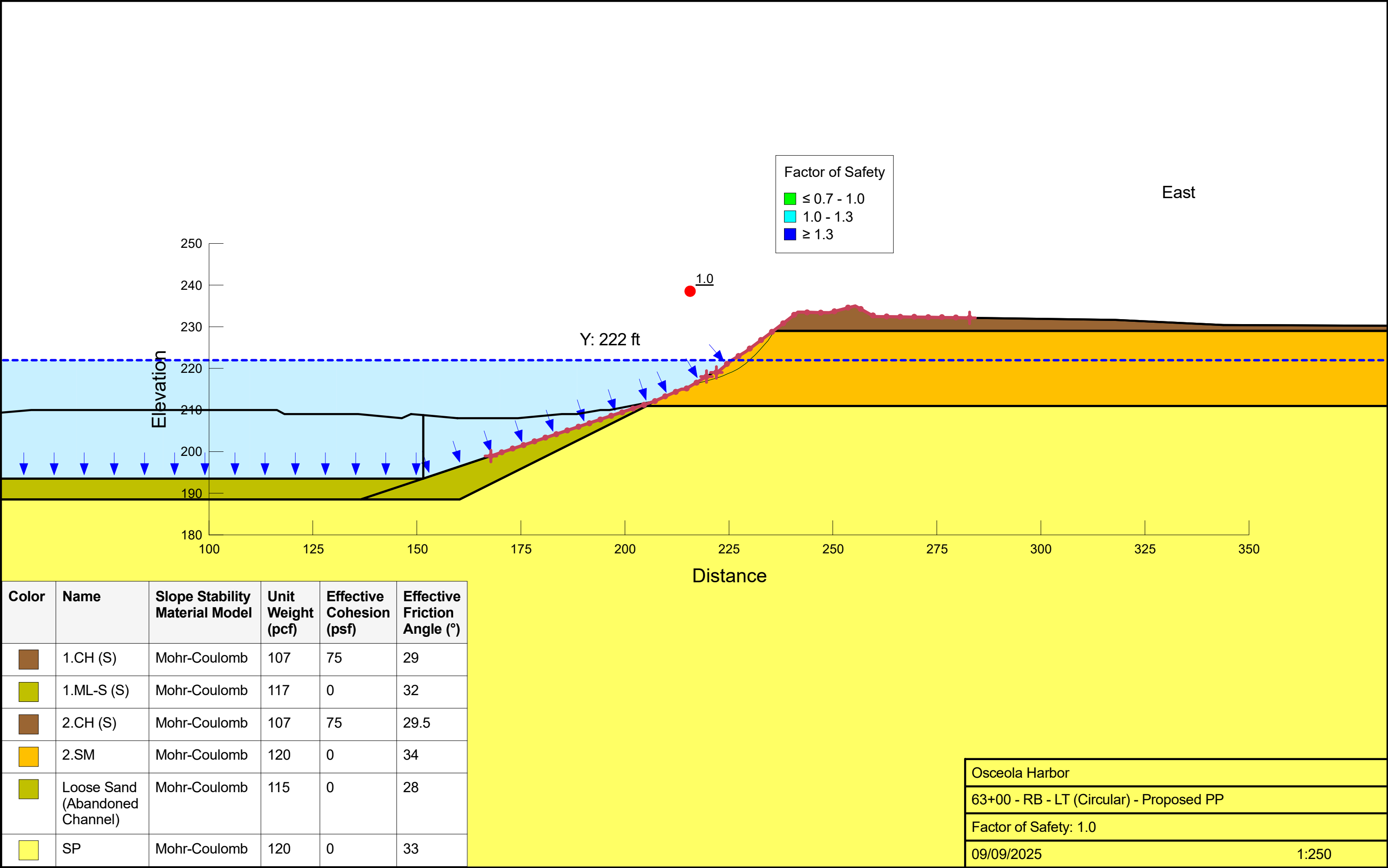
Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Undrained Shear Strength (psf)
	1.CH (Q)	Undrained (Phi=0)	110			550
	1.ML-S (Q)	Mohr-Coulomb	117	300	20	
	2.CH (Q)	Undrained (Phi=0)	107			550
	2.SM	Mohr-Coulomb	120	0	34	
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28	
	SP	Mohr-Coulomb	120	0	33	

Osceola Harbor	
63+00 - RB - AC (Circular) - Proposed Global Vertical PP	
Factor of Safety: 1.6	
09/09/2025	1:250



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
63+00 - RB - LT (Circular) - Existing PP	
Factor of Safety: 1.0	
09/09/2025	1:250



West

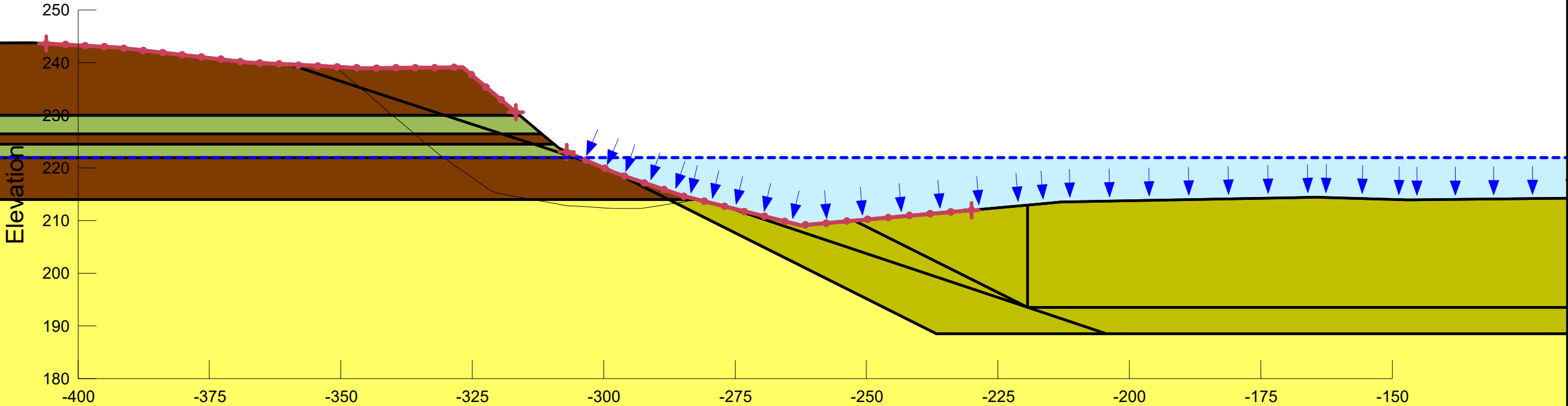
Factor of Safety

≤ 0.7 - 1.0

1.0 - 1.3

≥ 1.3

1.2



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Undrained Shear Strength (psf)
	1.CH (Q)	Undrained (Phi=0)	110			550
	1.ML-S (Q)	Mohr-Coulomb	117	300	20	
	2.CH (Q)	Undrained (Phi=0)	107			550
	2.SM	Mohr-Coulomb	120	0	34	
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28	
	SP	Mohr-Coulomb	120	0	33	

Osceola Harbor	
82+00 - LB - AC (Circular) - Existing Upper Bank PP	
Factor of Safety: 1.2	
09/09/2025	1:250

West

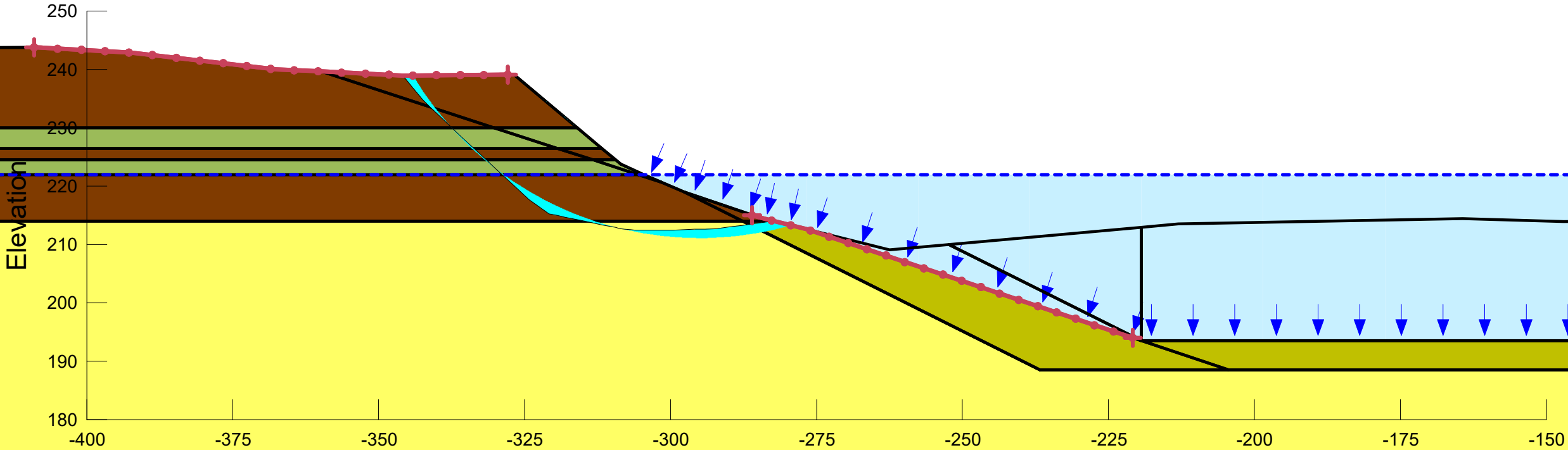
Factor of Safety

≤ 0.7 - 1.0

1.0 - 1.3

≥ 1.3

1.2



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Undrained Shear Strength (psf)
	1.CH (Q)	Undrained (Phi=0)	110			550
	1.ML-S (Q)	Mohr-Coulomb	117	300	20	
	2.CH (Q)	Undrained (Phi=0)	107			550
	2.SM	Mohr-Coulomb	120	0	34	
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28	
	SP	Mohr-Coulomb	120	0	33	

Osceola Harbor

82+00 - LB - AC (Circular) - Proposed Upper Bank PP

Factor of Safety: 1.2

09/09/2025

1:250

West

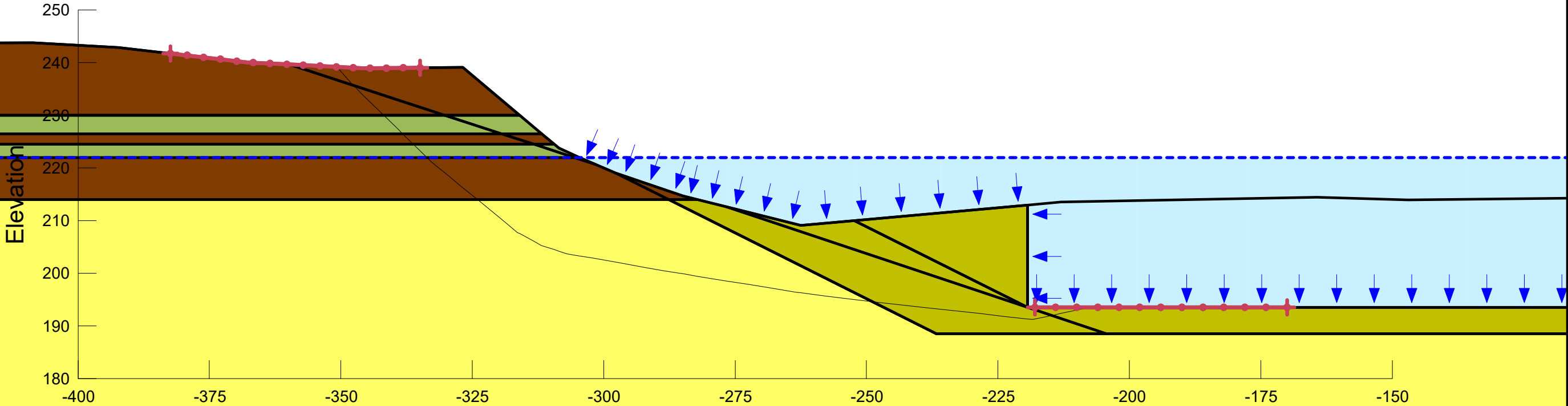
Factor of Safety

≤ 0.7 - 1.0

1.0 - 1.3

≥ 1.3

1.6



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Undrained Shear Strength (psf)
■	1.CH (Q)	Undrained (Phi=0)	110			550
■	1.ML-S (Q)	Mohr-Coulomb	117	300	20	
■	2.CH (Q)	Undrained (Phi=0)	107			550
■	2.SM	Mohr-Coulomb	120	0	34	
■	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28	
■	SP	Mohr-Coulomb	120	0	33	

Osceola Harbor

82+00 - LB - AC (Circular) - Proposed Global Vertical PP

Factor of Safety: 1.6

09/09/2025

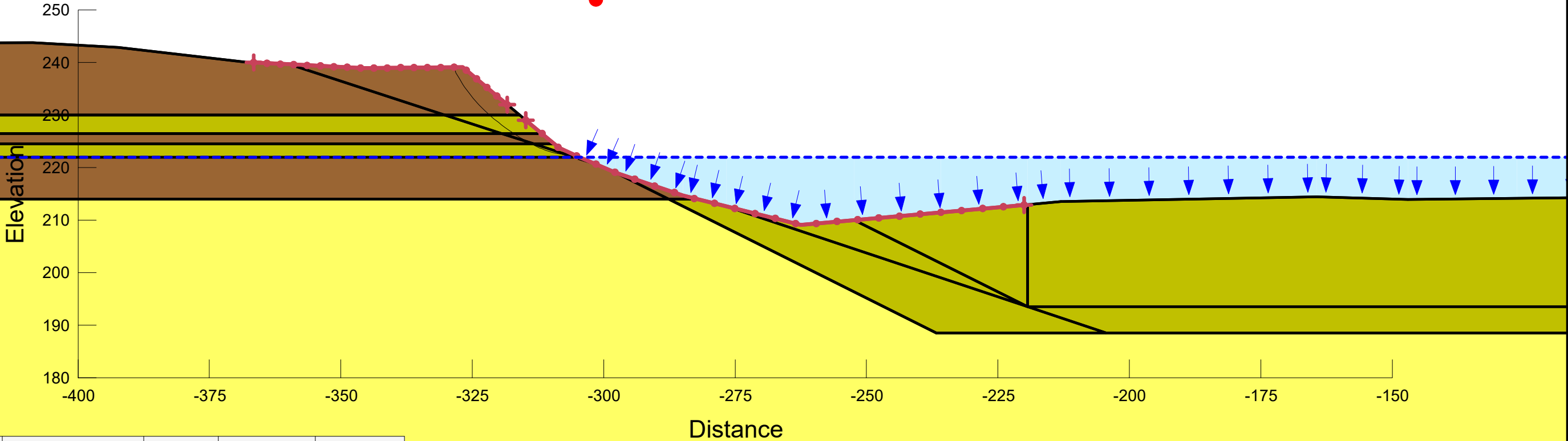
1:250

West

Factor of Safety

- ≤ 0.7 - 1.0
- 1.0 - 1.3
- ≥ 1.3

1.1



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
82+00 - LB - LT (Circular) - Existing Upper Bank PP	
Factor of Safety: 1.1	
09/09/2025	1:250

West

Factor of Safety

≤ 0.7 - 1.0

1.0 - 1.3

≥ 1.3

1.0

Elevation

Distance

Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
82+00 - LB - LT (Circular) - Proposed Upper Bank PP	
Factor of Safety: 1.0	
09/09/2025	1:250

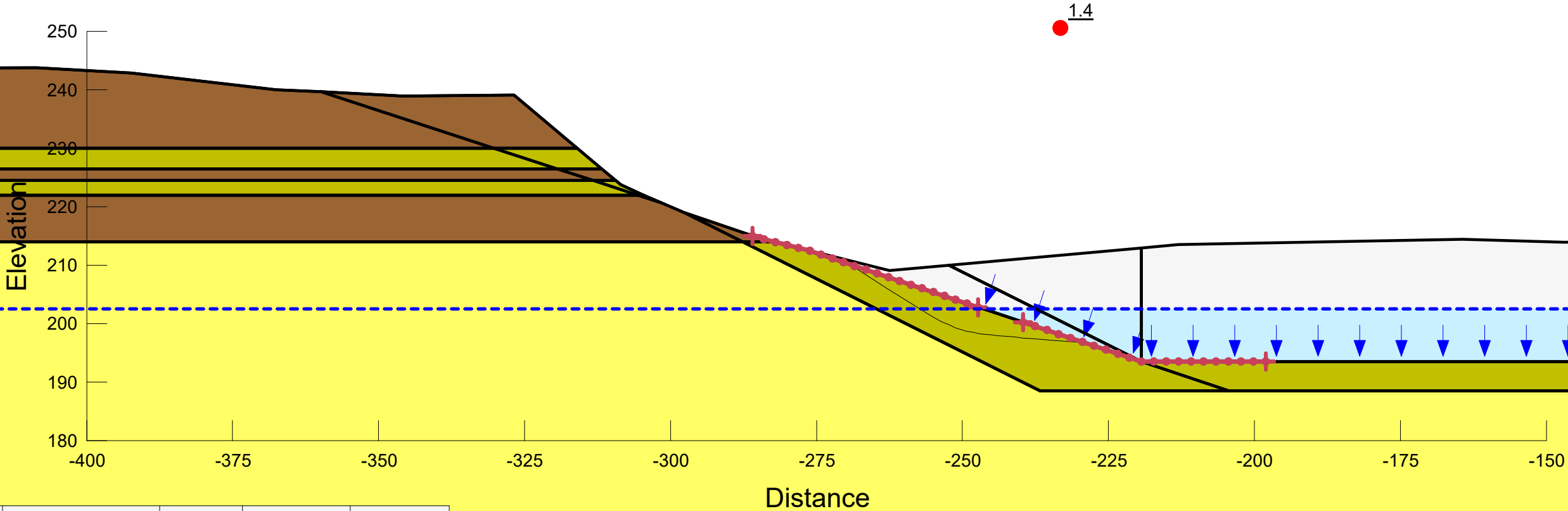
West

Factor of Safety

≤ 0.7 - 1.0

1.0 - 1.3

≥ 1.3



Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

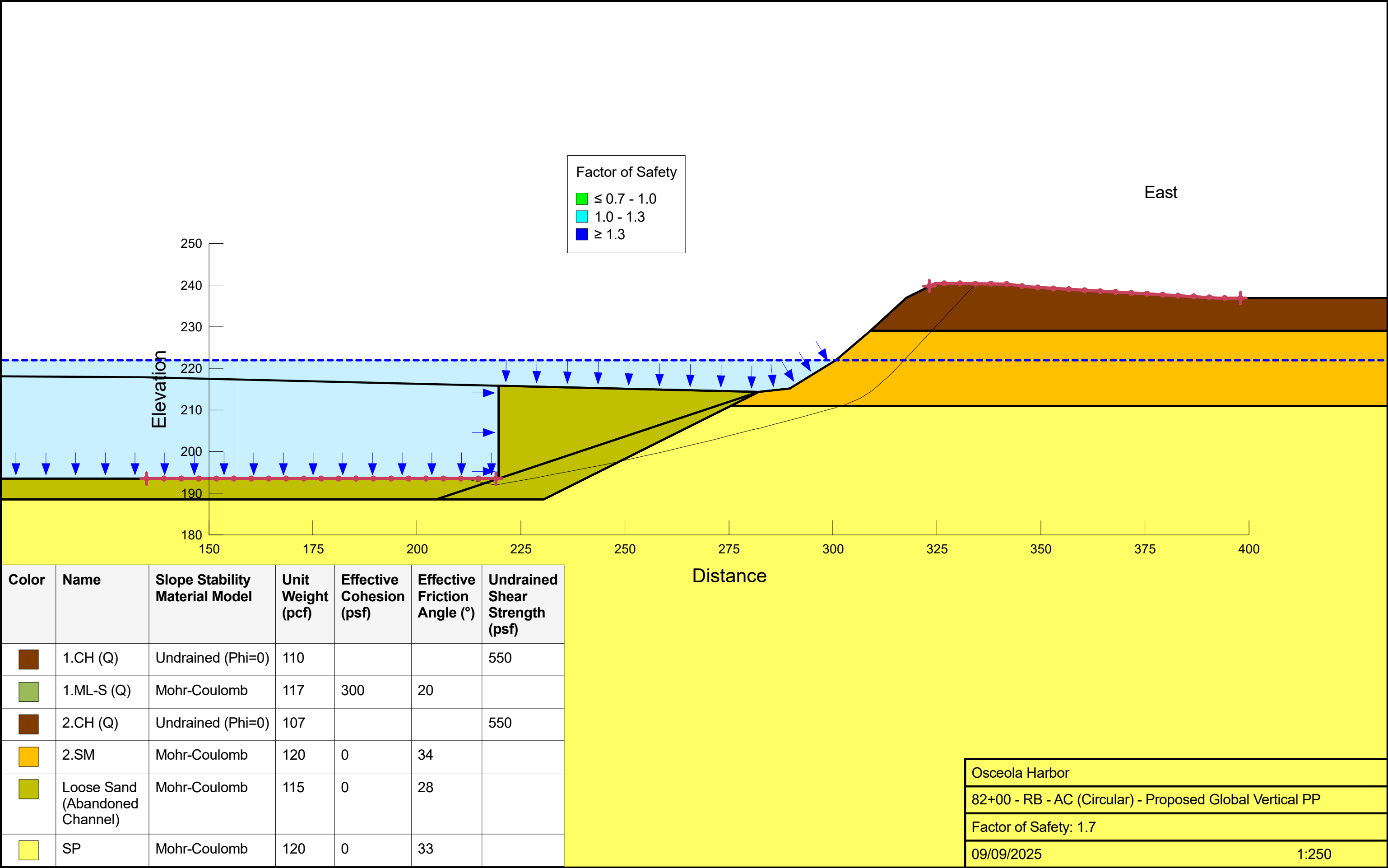
Osceola Harbor

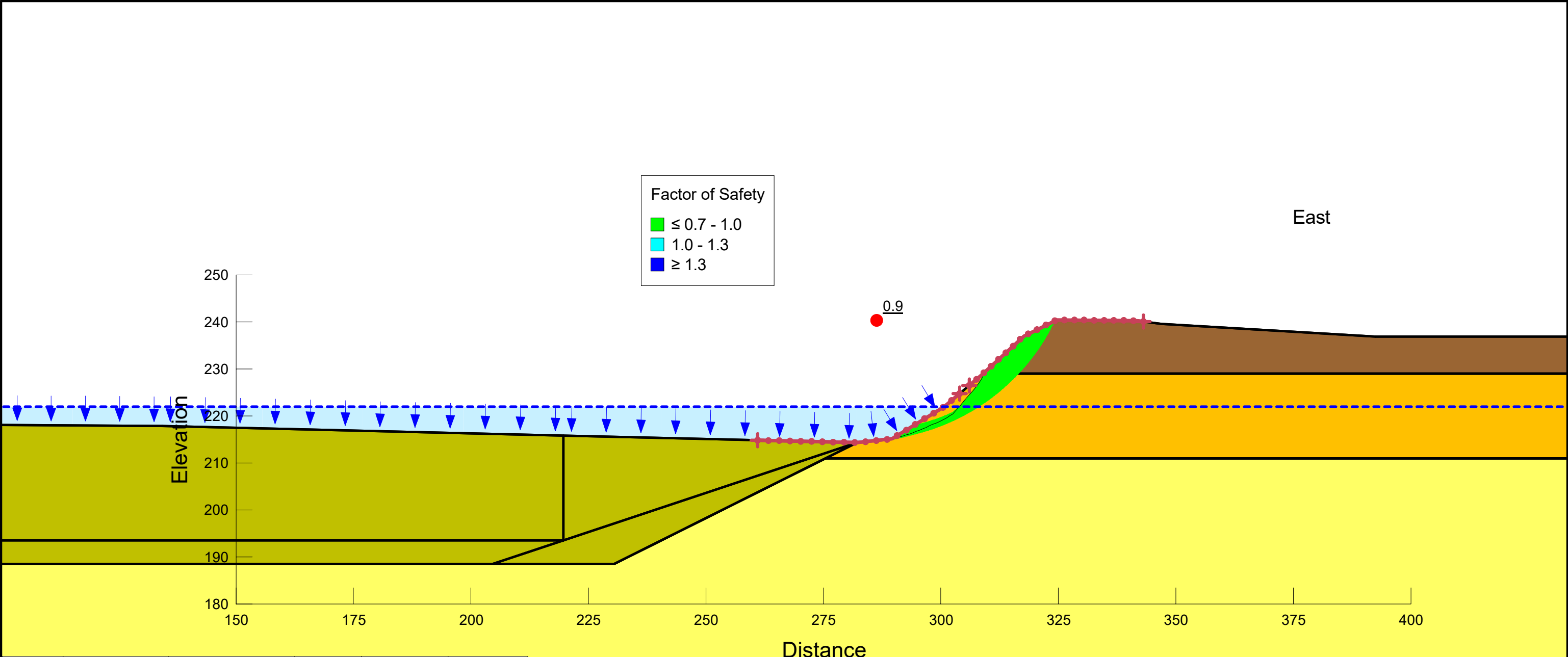
82+00 - LB - LT (Circular) - Proposed Dredge PP

Factor of Safety: 1.4

09/09/2025

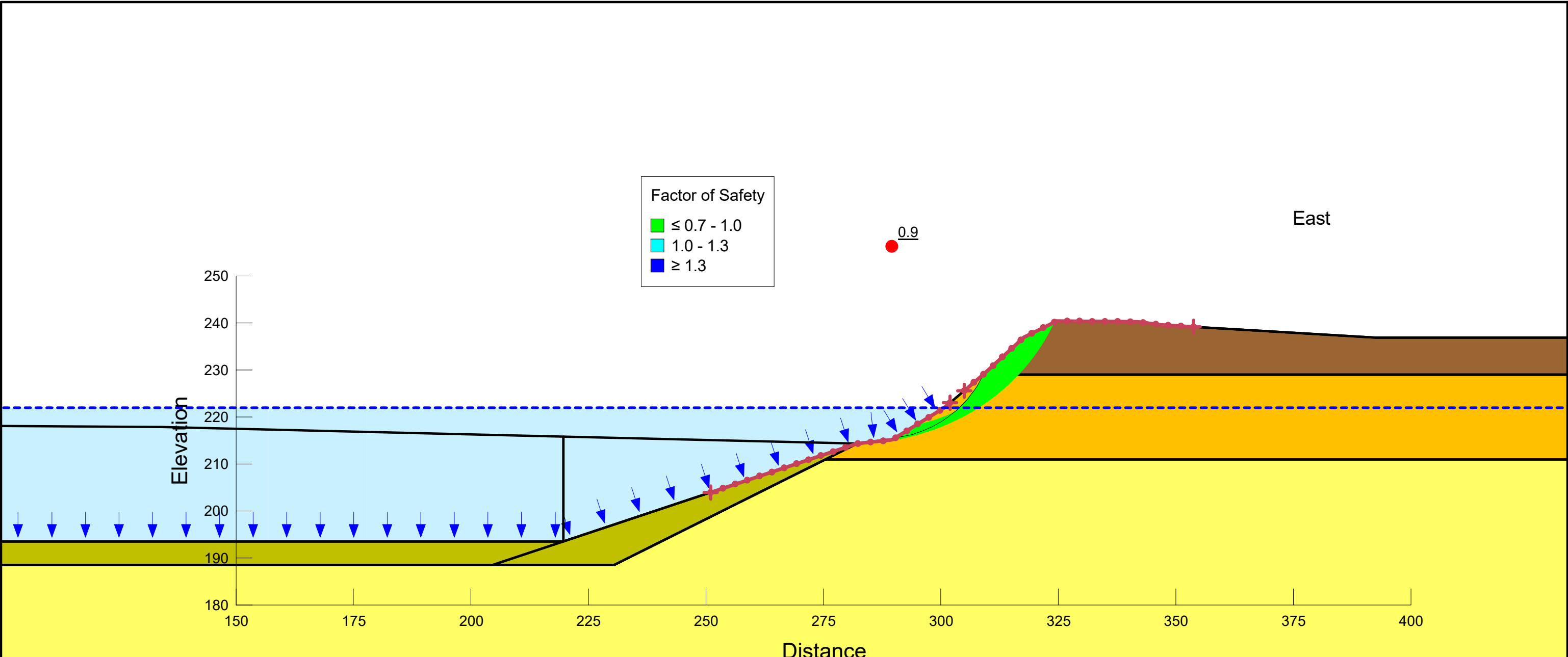
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Color	Name	Slope Stability Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
82+00 - RB - LT (Circular) - Existing PP	
Factor of Safety: 0.9	
09/09/2025	1:250



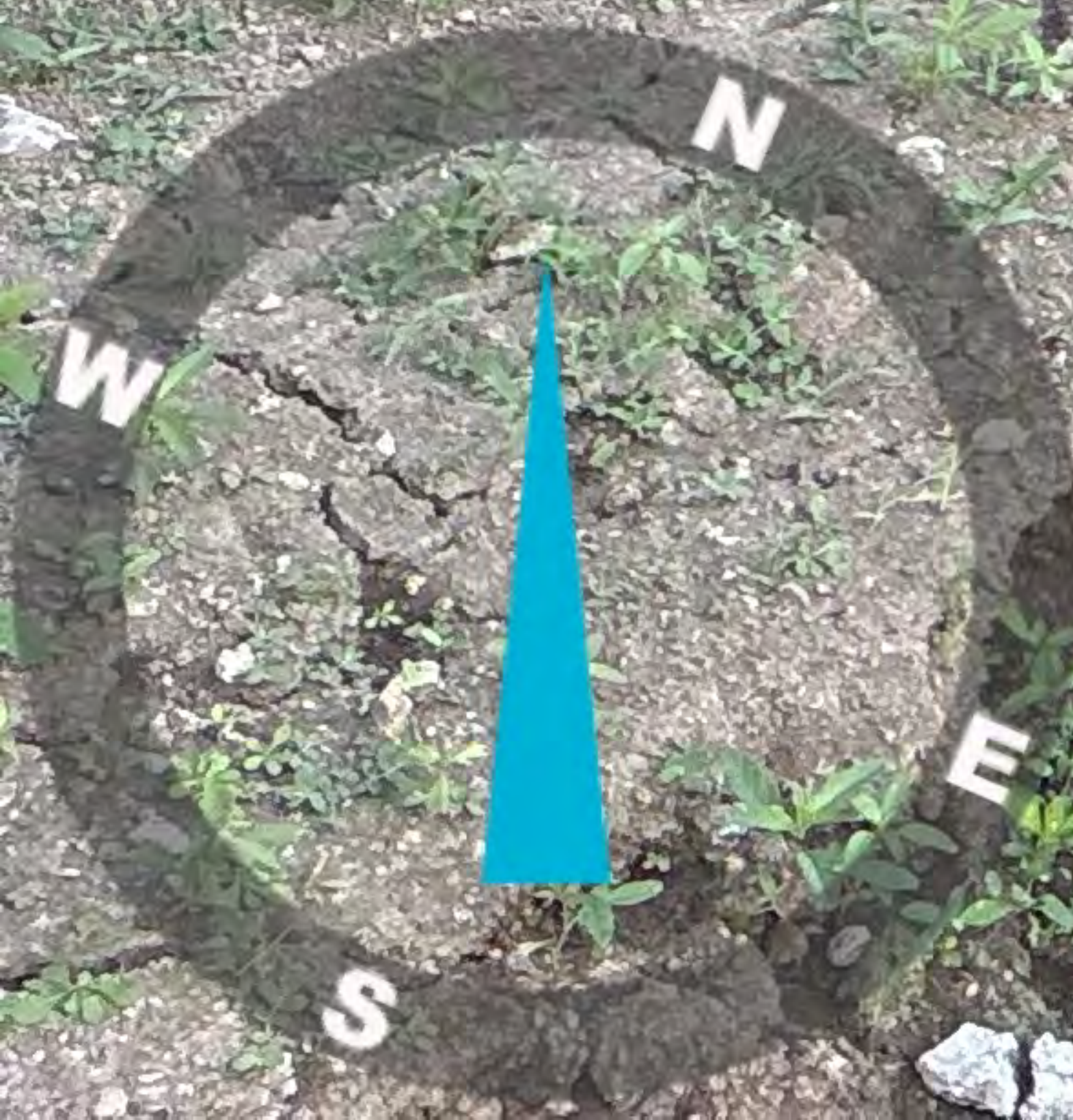
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	1.CH (S)	Mohr-Coulomb	107	75	29
	1.ML-S (S)	Mohr-Coulomb	117	0	32
	2.CH (S)	Mohr-Coulomb	107	75	29.5
	2.SM	Mohr-Coulomb	120	0	34
	Loose Sand (Abandoned Channel)	Mohr-Coulomb	115	0	28
	SP	Mohr-Coulomb	120	0	33

Osceola Harbor	
82+00 - RB - LT (Circular) - Proposed PP	
Factor of Safety: 0.9	
09/09/2025	1:250

Annex 1F
Site Pictures

1

Sep 4, 2025 at 7:15:04 AM
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337° NW



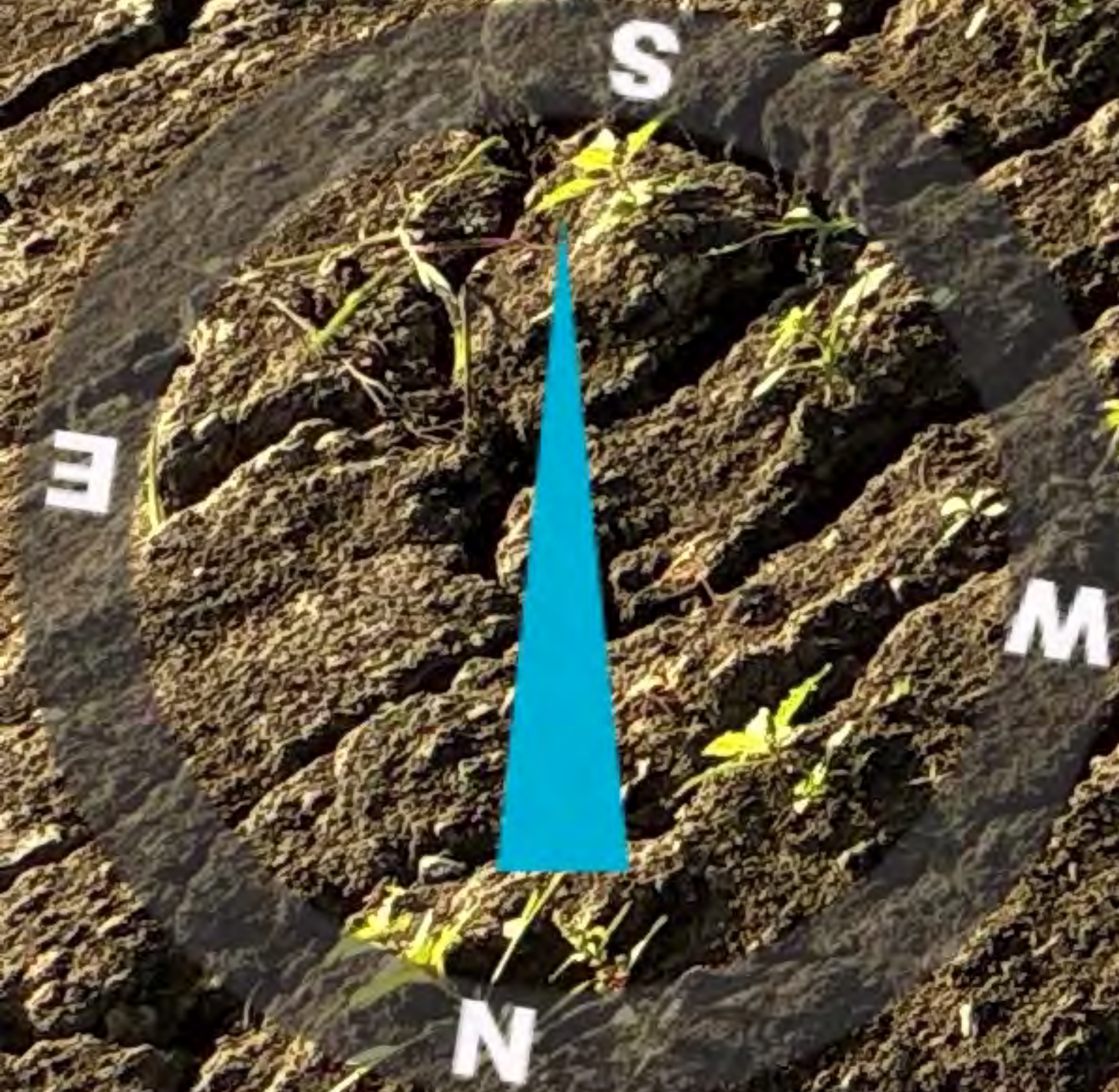
2

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343° N



3

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171° S



Sep 4, 2025 at 8:00:08 AM
+35.686143,-89.954604
160° S
Luxora AR 72358



5

Sep 4, 2025 at 8:00:43 AM
+35.686143,-89.954604
307° NW
Luxora AR 72358





Osceola Harbor Extension Feasibility Study



Appendix C – Real Estate Plan

August 2025

**REAL ESTATE PLAN
CONTINUING AUTHORITIES PROGRAM (CAP)
SECTION 107, SMALL NAVIGATION PROJECTS
OSCEOLA HARBOR EXTENSION, MISSISSIPPI COUNTY, ARKANSAS**

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**REAL ESTATE PLAN
CONTINUING AUTHORITIES PROGRAM (CAP)
SECTION 107, SMALL NAVIGATION PROJECTS
OSCEOLA HARBOR EXTENSION, MISSISSIPPI COUNTY, ARKANSAS**

1.0 PURPOSE AND GENERAL PROJECT INFORMATION.

1.1 This Real Estate Plan (REP) has been prepared to put forth the overall real estate requirements to include estimated real estate cost for the Tentatively Selected Plan (TSP) identified within the Feasibility Report and Integrated Environmental Assessment prepared for the above caption project. The objective of the TSP would be to extend and improve the Osceola Harbor's navigation channel and turning basin in Mississippi County, Arkansas, in order to maintain, support, and increase further interstate commerce in and along the Mississippi River and its tributaries.

Information provided within this REP is based on preliminary data, suitable only for planning purposes, and is subject to change even after approval of the REP and feasibility report.

1.2 The proposed project is located in Mississippi County, at Mississippi River Mile 785 on the right descending bank near Osceola, Arkansas. (Figure 1)



Figure 1. Vicinity Map

1.3 Authority for the project is contained in the River and Harbor Act of 1960, Section 107, dated 14 July 1960, Public Law 86-645, as amended. Work under Section 107 authority allows the U.S. Army Corps of Engineers (USACE) to develop and construct small navigation projects. The Corps adopts a project for constructions after detailed investigation clearly shows the engineering feasibility and economic justification for the improvement. Each project is limited to a federal cost of not more than \$15,000,000. This Federal cost limitation includes all project-related costs for feasibility studies, planning, engineering, construction, supervision, and administration.

1.4 The City of Osceola in Arkansas, has requested assistance from USACE to investigate and construct navigation improvements within the Osceola Harbor channel, hereinafter referred to as the Harbor. The original Harbor was designed and approved for construction in by USACE in June 1970. The Harbor has multiple tenants and partners that operate business within the boundaries including but not limited to Poinsett Rice and Grain, Big River Steel, and Hybar.

The underlying purpose and need for the Harbor extension is to alleviate critical congestion within the harbor channel, enhance the efficiency of barge traffic, and support continued economic growth in Mississippi County, Arkansas. This project directly addresses the escalating strain on existing harbor infrastructure resulting from a significant increase in barge traffic driven by the burgeoning steel industry and sustained agricultural commodity transport.

Osceola Harbor is a vital transportation hub for both agricultural products and a rapidly expanding steel industry located along a bend in the Mississippi River. Poinsett Rice and Grain currently utilizes the harbor's full capacity, shipping approximately 500,000 tons of grain annually. However, increased congestion on the Mississippi River from downstream users is projected to increase barge traffic by 2.4 million tons. This substantial growth has created an acute shortage of maneuverability and staging space within the Harbor, increasing transportation costs and jeopardizing the operational efficiency of local industries. This situation is further compounded by the coincidence of peak demand with the low-water season on the Mississippi River (typically August – November), which also represents the peak harvest and shipping season for agricultural products. The resulting combination of increased barge traffic and reduced channel capacity significantly elevates transportation costs and poses risks to both agricultural and industrial supply chains.

1.5 The City of Osceola requested assistance from USACE-MVM to investigate and construct navigational improvements within the Osceola Harbor. A Federal Interest Determination conducted in November 2024 determined the Osceola Harbor Extension efforts met Federal interest criteria. Three alternative options were considered, and a TSP (Tentatively Selected Plan) was designated. The three alternatives were: 1. No-action (maintain existing conditions); 2. Extending the harbor 3,000 feet upstream, as previously examined in the original 1971 Report, with a new turning basin with maintenance of the existing turning basin, and placement of dredged material into open water consistent with current harbor practices;

and 3. Extending the harbor as in Alternative 2 and prioritizing beneficial use of dredged material, potentially utilizing a former upland disposal area.

Based on the evaluation of the Four Accounts, Excess Benefits, and Benefit-Cost Ratio (BCR), Alternative 2 (Extend Channel and add a Turning Basin) is the Tentatively Selected Plan (TSP). Alternative 2 is also the Sponsor-supported plan.

1.6 No prior REP has been prepared for the project.

2.0 PROJECT LANDS, EASEMENTS, RIGHT-OF-WAYS, RELOCATIONS, AND DREDGE OR EXCAVATED MATERIAL DISPOSAL AREAS (LERRD).

2.1 The entirety of the project LERRDS used for construction (25+/- acres) of the proposed solution falls under the United States doctrine of Navigational Servitude and is therefore non-creditable to the NFS. Navigational Servitude will be further detailed below in this report. There is no LERRD acquisition required for the construction, operation or maintenance of this project, as all project LERRDs fall within Navigational Servitude. There are no known Federally owned lands or lesser interest that lie fully or partially within the proposed project area. There would be no induced flooding as a result of implementing of the project. No homes, businesses, or farms would be displaced as a result of the proposed work, therefore no relocation assistance payments would be required. There are no known mineral recovery activities currently ongoing or anticipated, or oil/gas wells present on the project LERRD and the immediate vicinity that would impact the construction, operation, or maintenance of the project. No acquisition of any mineral interest from the surface owner or rights outstanding in third parties will be required. Any dredge/excavated material will be deposited in the Mississippi River channel and taken downstream, negating the need for a disposal area.

3.0 NON-FEDERAL SPONSOR (NFS) LERRD.

3.1 The City of Osceola in Arkansas is serving as the NFS for the project. As the NFS, the City of Osceola would be required to execute formal assurances in the form of a Project Partnership Agreement (PPA) with the Federal government. The PPA would define the roles and responsibilities of both agencies in the cost sharing and execution of work.

3.2 The entirety of the project LERRDS used for construction (25+/- acres) of the proposed solution falls under the United States doctrine of Navigational Servitude.

4.0 ESTATES TO BE ACQUIRED.

4.1 There is no LERRD acquisition required for the project, as all project LERRDs either fall within Navigational Servitude or have been previously acquired by the NFS.

5.0 EXISTING FEDERAL OR OVERLAPPING PROJECTS.

5.1 The original Osceola Harbor is an existing Federal project. Due to fluctuating river conditions and economic considerations the original Federal project is being revised with this study.

6.0 FEDERALLY OWNED LANDS OR OTHER INTEREST.

6.1 There are no known Federally owned lands or lesser interest that lie fully or partially within the proposed project area.

7.0 NAVIGATION SERVITUDE.

7.1 Navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution (U.S. CONST.art.I, §8,cl.3) to use, control and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes including navigation, flood control, and hydro-electric power. In tidal areas, the servitude extends to all lands below the mean high water mark or the ordinary high water line (OHWL). In non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the OHWL.

In order to apply Navigational Servitude, the following two criteria must be met:

1. The project must serve as an aid to commerce, such being recognized as navigation, flood control, and hydro-electric power.
2. The land required for project purposes must be located below the mean or high ordinary water mark of the navigable waterway.

The project is clearly capable and currently used for interstate commerce. After review of the project footprint and scope of work, MVM Office of Counsel determined that the LEERD area of the project falls under the ordinary high-water mark and is therefore considered “Navigable Waters”. The 25+/- acres of the project’s construction LEERD is subject to Navigation Servitude and considered non-creditable.

8.0 PROJECT MAP.

8.1 A map depicting the preliminary project LERRD can be found in Exhibit A.

9.0 INDUCED FLOODING.

9.1 There would be no induced flooding as a result of implementing of the project. Section 4 of the Engineering Appendix states *“neither the flow nor the sedimentation rate would be substantially altered by any of the alternatives considered herein.”* After detailed analysis was performed the following results were found to be true:

- No change in flow between with project and without project conditions.
- No change in water surface elevations between with project and without project conditions.

Furthermore, “a pre-takings analysis is unnecessary since inundated area, inundated depth, and inundated duration, will remain unchanged when comparing the with and without project conditions. Since the proposed alternatives do not alter flooding depth, spatial extent, or duration, life safety is unaffected.”

10.0 **BASELINE COST ESTIMATE FOR REAL ESTATE (BCERE).**

10.1 Since there is no LERRD acquisition required for the construction, operation or maintenance of this project, Real Estate cost are expected to be minimal. Federal costs are estimated at \$10,000.00 to include Real Estate oversight and support. (Table 1.)

Table 1			
Summary of Estimated Real Estate Cost			
1. Real Estate Land Payments (NFS)			\$0.00
2. Public Law 91-646 Payments (NFS)			\$0.00
3. Acquisition Cost Mitigation Needs (Federal & NFS)			\$0.00
4. Real Estate Oversight & Support (Federal)			<u>\$10,000.00</u>
Total Estimated Real Estate Cost			\$10,000.00
<i>Note: The total real estate cost estimated is suitable for feasibility phase general planning purposes only and does not necessarily constitute the final amount of credit the NFS may or may not be entitled to for providing the project LERRD's as part of their costing sharing responsibilities.</i>			

11.0 **RELOCATION ASSISTANCE BENEFITS, PUBLIC LAW 91-646 (PL 91-646).**

11.1 No homes, businesses, or farms would be displaced as a result of the proposed work, therefore no relocation assistance payments would be required.

12.0 **MINERAL ACTIVITY.**

12.1 There are no known mineral recovery activities currently ongoing or anticipated, or oil/gas wells present on the project LERRD and the immediate vicinity that would impact the construction, operation, or maintenance of the project. No acquisition of any mineral interest from the surface owner or rights outstanding in third parties will be required.

12.2 There is no merchantable timber located within the project LERRD.

13.0 NFS REAL ESTATE ACQUISITION CAPABILITIES ASSESSMENT.

13.1 Although all project LERRDs fall within the United States Navigational Servitude Doctrine, an assessment of the City of Osceola real estate acquisition capabilities are being evaluated (Exhibit C). In case future design modifications may or may not require LERRD acquisition, the results of this assessment will show if the City has the legal authority, professional capability, and in-house or outside contract resources to acquire and make available all LERRD required for the project. Preliminary evaluations show that the City is considered as “Highly Capable” of fulfilling the responsibility of securing all the necessary LERRD for the projects TSP in accordance with Public Law 91-646.

14.0 ZONING ORDINANCE REQUIREMENTS.

14.1 No application or enactment of zoning ordinances is proposed in lieu of, or to facilitate, LERRD acquisition in connection with the project

15.0 PROJECT SCHEDULE.

15.1 Table 2 shows the primary milestones and estimated durations for providing the projects LERRD. Total acquisition duration is estimated to be approximately 14 days. All LERRDs needed for the project fall within Navigational Servitude, negating the need for negotiations and closing activities. Any needed adjustments to these tentative milestones because of the finalization of the right-of-way requirements and acquisition lines established during the Pre-Construction Engineering and Design (PED) activities will be fully coordinated with the NFS.

Table 2	
Real Estate Milestones	
Sponsor Notification of Real Estate Requirements	
Certify Real Estate (Navigational Servitude)	14 Days

16.0. PUBLIC UTILITY OR FACILITY RELOCATIONS, ALTERATIONS, OR REPLACEMENT.

16.1 No alterations, modification or relocation to any public utilities or facilities are anticipated. In the event that final project design identifies the need for such, an attorney’s opinion would be prepared to determine compensability. Any alterations, modification or relocation to any public utilities or facilities would be the responsibility of the NFS.

"ANY CONCLUSION OR CATEGORIZATION CONTAINED IN THIS REAL ESTATE PLAN, OR ELSEWHERE IN THIS PROJECT REPORT, THAT AN ITEM IS A UTILITY OR FACILITY RELOCATION TO BE PERFORMED BY THE NON-FEDERAL SPONSOR AS PART OF ITS LERRD RESPONSIBILITIES IS PRELIMINARY ONLY. THE GOVERNMENT WILL MAKE A FINAL DETERMINATION OF THE RELOCATIONS NECESSARY FOR THE CONSTRUCTION, OPERATION, OR MAINTENANCE OF THE PROJECT AFTER FURTHER ANALYSIS AND COMPLETION AND APPROVAL OF FINAL ATTORNEY'S OPINIONS OF COMPENSABILITY FOR EACH OF THE IMPACTED UTILITIES AND FACILITIES."

17.0 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW).

17.1 A Hazardous, Toxic, and Radioactive Waste (HTRW) assessment was performed and prepared by USACE employees and is included in this overall study (Appendix A). The purpose of the assessment was to evaluate if any potential hazardous, toxic, or radioactive wastes (HTRW) concerns are present that require further evaluation and remediation.

The proposed work involves both the dredging and the expansion of the of the currently authorized channel at the Osceola Harbor. The results of testing, site reconnaissance, and records review contained with the HTRW Appendix are as follows:

"The results of the record search identified six facilities within a 1-mile radius of the study area, none of which appear to pose a significant HTRW risk to the study area. Site reconnaissance did not reveal any findings that would appear to pose a significant HTRW risk to the study area. Based on the site visit, no significant HTRW risk to the study area was identified and the probability of encountering HTRW during the course of this proposed project is low."

18.0 LANDOWNER OPPOSITION.

18.1 There is no known landowner or public opposition to the project. Implementation of the TSP would be beneficial to all adjacent landowners, tenants, and Port partners.

19.0 LERRD ACQUISITION PRIOR TO PROJECT PARTNERSHIP AGREEMENT (PPA) EXECUTION.

19.1 No LERRD Acquisition is required for this project, therefore a letter warning the NFS of acquisition prior to the execution of the Project Partnership Agreement is not needed.

20.0 OTHER RELEVANT REAL ESTATE ISSUES.

20.1 There are no other real estate issues to report at this time.

Prepared By:

Clayton Burford
Realty Specialist, Planning and Acquisitions
Real Estate Division

Submitted By:

Brian S. Johnson
Deputy Chief, Real Estate
Real Estate Contracting Officer

Approved By:

Mark D. Harkison
Chief, Real Estate
Real Estate Contracting Officer

CONTINUING AUTHORITIES PROGRAM (CAP) SECTION 107, SMALL NAVIGATION PROJECTS

OSCEOLA HARBOR EXTENSION MISSISSIPPI COUNTY, ARKANSAS

EXHIBIT A PROJECT MAP



**REAL ESTATE DIVISION
U.S. ARMY CORPS OF ENGINEERS, MEMPHIS DISTRICT
26 August 2025**



CONTINUING AUTHORITIES PROGRAM (CAP) SECTION 107, SMALL NAVIGATION PROJECTS

OSCEOLA HARBOR EXTENSION MISSISSIPPI COUNTY, ARKANSAS

EXHIBIT B BASELINE COST ESTIMATE FOR REAL ESTATE (BCERE)



**REAL ESTATE DIVISION
U.S. ARMY CORPS OF ENGINEERS, MEMPHIS DISTRICT
26 August 2025**

Table 1			
Summary of Estimated Real Estate Cost			
1. Real Estate Land Payments (NFS)			\$0.00
2. Public Law 91-646 Payments (NFS)			\$0.00
3. Acquisition Cost Mitigation Needs (Federal & NFS)			\$0.00
4. Real Estate Oversight & Support (Federal)			<u>\$10,000.00</u>
Total Estimated Real Estate Cost			\$10,000.00
<i>Note: The total real estate cost estimated is suitable for feasibility phase general planning purposes only and does not necessarily constitute the final amount of credit the NFS may or may not be entitled to for providing the project LERRD's as part of their costing sharing responsibilities.</i>			

CONTINUING AUTHORITIES PROGRAM (CAP) SECTION 107, SMALL NAVIGATION PROJECTS

OSCEOLA HARBOR EXTENSION MISSISSIPPI COUNTY, ARKANSAS

EXHIBIT C NON-FEDERAL SPONSOR REAL ESTATE ACQUISITION CAPABILITY ASSESSMENT CHECKLIST



**REAL ESTATE DIVISION
U.S. ARMY CORPS OF ENGINEERS, MEMPHIS DISTRICT
26 August 2025**

OSCEOLA HARBOR EXTENSION
MISSISSIPPI COUNTY, ARKANSAS
CONTINUING AUTHORITIES
PROGRAM (CAP) SECTION 107
STUDY

ASSESSMENT OF NON-FEDERAL
SPONSOR'S REAL ESTATE
ACQUISITION CAPABILITY

NON-FEDERAL SPONSOR: City of Osceola, Arkansas

I. **Legal Authority:**

- a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? (yes/no)
- b. Does the sponsor have the power of eminent domain for this project? (yes/no)
- c. Does the sponsor have "quick-take" authority for this project? (yes/no)
- d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? (yes/no)
- e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? (yes/no)

II. **Human Resource Requirements:**

- a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91- 646, as amended? (yes/no)
- b. If the answer to II. a. is "yes," has a reasonable plan been developed to provide such training? (yes/no) NA
- c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? (yes/no)
- d. Is the sponsor's projected in-house staffing level sufficient considering its other workload, if any, and the project schedule? (yes/no)

- e. Can the sponsor obtain contractor support, if required in a timely fashion?
(yes/no) Will the sponsor likely request USACE assistance in acquiring real estate? (yes/no) (If "yes," provide description)

III. **Other Project Variables:**

- a. Will the sponsor's staff be located within reasonable proximity to the project site?
(yes/no)
- b. Has the sponsor approved the project/real estate schedule/milestones? (yes/no)

IV. **Overall Assessment:**

- a. Has the sponsor performed satisfactorily on other USACE projects?
(yes/no/not applicable)
- b. With regard to this project, the sponsor is anticipated to be highly capable/fully capable/moderately capable/marginally capable/insufficiently capable. (If sponsor is believed to be "insufficiently capable," provide explanation)

v. **Coordination:**

- a. Has this assessment been coordinated with the sponsor? (yes/no)
- b. Does the sponsor concur with this assessment? (yes/no) (If "no," provide explanation)
In progress...

Prepared by:



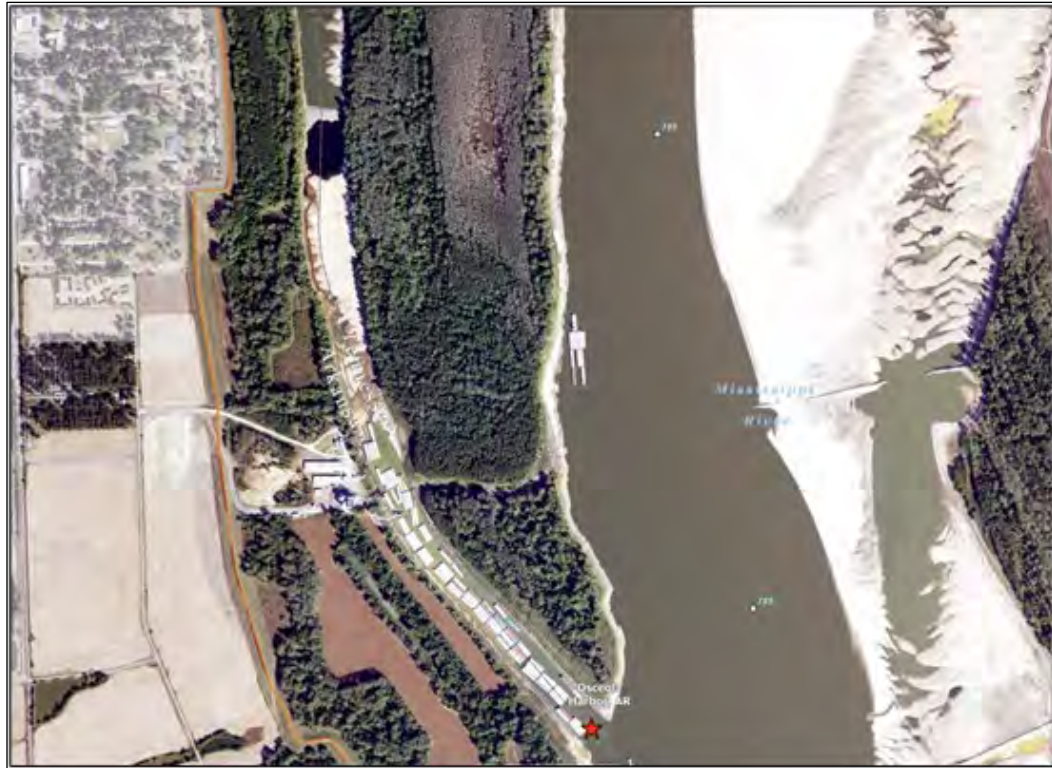
Clayton Burford
Realty Specialist

Reviewed and approved by:

Mark D. Harkison
Chief, Real Estate
Real Estate Contracting Officer



Osceola Harbor Extension, Mississippi County, Arkansas Feasibility Study



Appendix D – Cost Engineering

September 2025

The U.S. Department of Defense is committed to making its electronic and information technologies accessible to individuals with disabilities in accordance with Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended in 1998. For persons with disabilities experiencing difficulties accessing content, please use the form @ <https://dodcio.defense.gov/DoDSection508/Section-508-Form/>. In this form, please indicate the nature of your accessibility issue/problem and your contact information so we can address your issue or question. For more information about Section 508, please visit the DoD Section 508 website. <https://dodcio.defense.gov/DoDSection508.aspx>.

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SECTION 1

Classification of Estimate

This appendix contains a Total Project Cost Summary (TPCS) prepared for the Osceola Harbor Extension Project. The project cost estimate was developed in the MCACES MII cost estimating software and used the standard approaches for a feasibility estimate structure regarding labor, equipment, materials, crews, unit prices, quotes, sub-contractor markups and prime contractor markups. This philosophy was taken wherever practical within the time constraints. It was supplemented with estimating information from other sources where necessary such as from quotes, bid data, and Architect-Engineer (A-E) estimates. It is to be noted that after development of Abbreviated Risk Analysis (ARA), the costs within the Tentatively Selected Plan were further refined so some minor inconsistencies between the Cost Appendix and the Engineering Appendix may be present.

Cost estimates for the Tentatively Selected Plan were developed at a Class 3 level of effort utilizing largely parametric unit prices from sources such as historical Government and Commercial bid data, A-E cost estimates available from design reports, RS Means Cost Data Books and other available historical cost data sources.

SECTION 2

Project Description

Osceola Harbor is a vital transportation hub for both agricultural products and a rapidly expanding steel industry located along a bend in the Mississippi River. Poinsett Rice and Grain currently utilizes the harbor's full capacity, shipping approximately 500,000 tons of grain annually. However, increased congestion on the Mississippi River from downstream users – including Big River Steel #1 and # 2 mills (which will nearly double their fleeting requirements), along with the forthcoming Hybar rebar plant (operational January 2026) within the harbor, is projected to increase barge traffic by 2.4 million tons. Hybar alone anticipates handling over 1.5 million tons of inbound scrap steel and outbound finished product annually. This substantial growth has created an acute shortage of maneuverability and staging space *within Osceola Harbor*, increasing transportation costs and jeopardizing the operational efficiency of local industries. This situation is further compounded by the coincidence of peak demand with the low-water season on the Mississippi River (typically August – November), which also represents the peak harvest and shipping season for agricultural products. The resulting combination of increased barge traffic and reduced channel capacity significantly elevates transportation costs and poses risks to both agricultural and industrial supply chains.

The Tentatively Selected Plan (TSP) chosen to address these issues is to excavate approximately 3,000 feet up stream of the existing federally authorized project in addition to construction of a 250-foot radius turning basin at the upper end of the project area and to place dredge material in open water downstream of the harbor, consistent with current harbor practices.

SECTION 3

Cost Methodology

3.1 GENERAL

This Cost Estimate has been prepared to July 2025 price levels. The costs are considered to be fair and reasonable to a well-equipped and capable contractor and include overhead and profit. The preparation of this estimated was created in accordance with Engineering Regulation (ER) 1110-1-1300, Cost Engineering Policy and General Requirements (26 March 1993) and ER 1110-2-1302, Civil Works Cost Estimating (30 June 2021). This estimate was completed in accordance with Engineering Manual (EM) 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS), revised 30 September 2021.

The estimate was developed using Micro Computer Aided Cost Estimate System MII v4.4.4 cost estimating software. Applicable crews and equipment were applied in the estimate to correspond with the work being performed. The midpoint of construction is anticipated to be the 3rd quarter of FY26, which was used to determine the project costs.

3.2 DIRECT COSTS

Direct Costs are based on anticipated labor, equipment, and material necessary to construct this project based on the current scope of work. Direct costs were calculated independent of the contractor assigned to perform the work. Contractor assignments were determined after the formulation of the direct costs. The majority of the work is assumed to be done by a Prime Contractor. It is assumed the Prime Contractor will perform the project coordination and oversight with construction work.

3.2.1 Quantities

Quantities for this project were provided by MVM Design, H&H, and Geotechnical sections for the dredged material. (Land and Water based)

3.2.2 Labor

Labor Rates were developed comparing Region 3 labor rates, the Great Lakes Dredge & Dock Company (GLDD) payroll from previous work, and Davis-Bacon Wage Determination for Mississippi County, AR.

3.2.3 Equipment

All equipment rates are based on the MII Equipment Region 3 2024 and the 2024 MII English Cost Book. Equipment was chosen based on historical knowledge of similar projects.

3.2.4 Crews

This work is typical on the Mississippi River and is well understood by the cost engineers. The crews and productivity rates were checked by estimators and comparisons with historical cost data were referenced. Crew and productivity rates were adjusted as necessary based upon those findings to reflect reasonable crew sizes and production rates.

3.2.5 Work Schedule

It is assumed that the duration of the work being performed will be 31 days with the crews working 12-hour shifts, 7 days a week until project completion.

3.2.6 Productivity

Production rates were created based on historical rates used in the Memphis District's Cost Engineering Section and on what was determined to be reasonable by the Cost Estimator.

3.2.7 Sales Tax

Sales tax has not been included for material costs since no material is expected to be purchased for this project.

3.3 INDIRECT COSTS

3.3.1 Job Office Overhead (JOOH)

The estimated percentages for Field Office Overhead were based upon estimating and negotiation experience, and consultation with local construction representatives. The estimates used a field office overhead rate based on the average of relevant jobs with a similar scope and magnitude.

Different percentages are used when considering the scope of work for each feature. When reviewing historical cost pricing data, a range of 10-20% is typically used. However, a calculated field office overhead rate of 1.36% was used for the prime contractor for this estimate. Due to the nature of this work, the Prime Contractor will not have a physical field office and its associated costs.

3.3.2 Home Office Overhead (HOOH)

The estimated percentages vary based upon consideration of 8(a), small business and unrestricted prime contractors. The rates were based upon

estimating and negotiating experience, and consultation with local construction representatives. Different percentages are used when considering the contract acquisition strategy regarding small business 8(a), competitive small business and large business, high to low, respectively. For Home Office Overhead a percentage of 7% was assumed for the prime contractor.

3.3.3 Bonds

The Bond interest rate was assumed to be 0.94%, applied against the prime contractor.

3.3.4 Excise Tax

The state of Arkansas does not apply a business tax on work within the state.

3.3.5 Contingency

Contingencies for the alternatives were developed using the USACE Abbreviated Cost Risk Analysis (ARA) program. An ARA is a qualitative approach used by the PDT to address key risk concerns for major features of work and their impact to cost and schedule drivers such as Project Scope Growth, Acquisition Strategy, Construction Elements, Quantities, Specialty Fabrication or Equipment, Cost Estimate Assumptions, and External Project Risks. The development of the ARA resulted in a total composite risk contingency of 21.5% for total construction, 9.04% for the total PED, and 7.00% for the total Construction Management costs for the Tentatively Selected Plan (TSP), Alternative 2, considering all factors of the project.

SECTION 4

Project Feature Accounts

4.1 NAVIGATION, PORTS, AND HARBORS (CODE 12)

This feature code includes all the necessary direct costs (material, labor, and equipment) and indirect costs (JOOH, HOOH, Profit, Bonds, Contingency, and Escalation) for the clearing, snagging and dredging within the harbor.

4.2 PLANNING, ENGINEERING, AND DESIGN (CODE 30)

This feature includes all engineering, design, surveys, preparation of detailed plans and specifications, and related work required for the construction of the project, including relocations and is assumed to be approximately 8.7% of the construction cost.

4.3 CONSTRUCTION MANAGEMENT (CODE 31)

This feature includes such functions as inspection, supervision, project office administration, and distributive costs of area office and general overhead charged to the project and assumed approximately 12,000 + 8.0% of the construction Cost

SECTION 5

Total Project Cost Summary

The Total Project Cost Summary for the Osceola Harbor Extension is shown below on Table D-1. This includes Escalation to the midpoint of construction and Contingency for each Project Feature Account. The total Federal and Non-Federal cost for the project is \$6,445,000.

Table D-2. Total Project Cost for Alternative 2.

Item	Base Cost	Contingency	Midpoint Escalation	Total
Construction	\$4,579,059	\$985,023	\$215,918	\$5,780,000
PED	\$368,000	\$33,253	\$11,747	\$413,000
Construction Management	\$230,000	\$16,100	\$5,900	\$252,000
Total	\$5,177,059	\$1,034,376	\$233,565	\$6,445,000

SECTION 6

Major Assumptions

- Construction Procurement – Project will require only one contract action in order to complete the project.
- Design and Administration of Construction – The design and construction oversight will primarily be performed by the U.S. Army Corp of Engineers (USACE) Memphis District.
- Hazardous, Toxic, and Radioactive Waste (WTRW) – During HTRW surveys, the samples collected do not fall within range of contamination. At this time there is no reason to believe HTRW will be found, therefore, the estimates do not include costs for any potential HTRW. However, risks associated with the potential of HTRW being discovered were included in the ARA.
- Plans and Specifications – P&S will be fully developed by USACE personnel.
- For estimating purposes, a single prime contractor was utilized. It is assumed they will be able to perform 100% of the work.

SECTION 7

References and Resources

Cost Engineering References:

1. U.S. Army Corps of Engineers, 1993, Engineering and Design Cost Engineering Policy and General Requirements, Engineering Regulation 1110-1-1300, Department of the Army, Washington D.C., 26 March 1993.
2. Engineering Regulation 1110-2-1150, Department of the Army, Washington D.C., 31 August 1999.
3. U.S. Army Corps of Engineers, 2016, Civil Works Cost Engineering, Engineering Regulation 1110-2-1302, Department of the Army, Washington D.C., 30 June 2016.
4. U.S. Army Corps of Engineers, 2021, Construction Equipment Ownership and Operating Expense Schedule, Region III, Engineering Pamphlet 1110-1-8, Department of the Army, Washington D.C., August 2021.

5. U.S. Army Corps of Engineers, 2021, Civil Works Construction Cost Index System (CWCCIS), Engineering Manual 1110-2-1304, Department of the Army, Washington D.C., 30 September 2021.
6. U.S. Army Corps of Engineers, 2000, Planning Guidance Notebook, Engineering Regulation 1105-2-100, Department of the Army, Washington D.C., 22 April 2000.

Project References:



Osceola Harbor
Abbreviated Risk Ana



Osceola Harbor
Expansion 3018.pdf



P2 Schedule
Osceola Harbor Ext



23B00XX Marine
Equip Calc 27in.xls

Software:

MCACES MII, Microsoft Excel, Microsoft Word, and Adobe Acrobat

Appendix D-A

Abbreviated Risk Analysis

Abbreviated Risk Analysis

Project (less than \$40M): **Osceola Harbor Expansion, AR Sec 107**
Project Development Stage: **Feasibility (Alternatives)**
Risk Category: **Moderate Risk: Typical Project or Possible Life Safety**

Total Construction Contract Cost = \$ **4,454,580**

	<u>CWWBS</u>	<u>Feature of Work</u>	<u>Contract Cost</u>	<u>% Contingency</u>	<u>\$ Contingency</u>	<u>Total</u>
1	12 02 HARBORS	Mob & Demob	\$ 2,014,893	17.43%	\$ 351,181	\$ 2,366,074.02
2	12 02 HARBORS	Dredging	\$ 2,564,166	24.72%	\$ 633,842	\$ 3,198,008.39

Totals	Real Estate	\$ -	0.00%	\$ -	\$ -
	Total Construction Estimate	\$ 4,454,580	21.92%	\$ 976,310	\$ 5,430,890
	Total Planning, Engineering & Design	\$ 368,000	9.04%	\$ 33,253	\$ 401,253
	Total Construction Management	\$ 230,000	7.00%	\$ 16,100	\$ 246,100
	Total	\$ 5,052,580		\$ 1,025,663	\$ 6,078,243

Appendix D-B

Total Project Cost Summary (TPCS)

**** TOTAL PROJECT COST SUMMARY ****

Printed: 9/25/2025
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PROJECT: Osceola Harbor Extension
PROJECT NO: 518521
LOCATION: Mississippi County, Arkansas

DISTRICT: Memphis District

PREPARED: 7/10/2025

POC: CHIEF, COST ENGINEERING, Jeromy Carpenter

This Estimate reflects the scope and schedule in report. Report Name and date

Civil Works Work Breakdown Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)					TOTAL PROJECT COST FUNDED)				(FULLY
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	Program Year (Budget EC): Effective Price Level Date:			2025 1-Oct-24 Spent Thru: 1-Oct-15 (\$K)	TOTAL FIRST COST (\$K)	ESC (%)	COST (\$K)	CNTG (\$K)	FULL (\$K)	
						ESC (%)	COST (\$K)	CNTG (\$K)							REMAINING COST (\$K)
02	RELOCATIONS	\$4,579	\$1,004	22%	\$5,583		\$4,579	\$1,004	\$5,583		\$5,583	3.9%	\$4,756	\$1,043	\$5,799
	#N/A			-		-					-				
				-		-					-				
				-		-					-				
	CONSTRUCTION ESTIMATE TOTALS:	\$4,579	\$1,004		\$5,583		\$4,579	\$1,004	\$5,583		\$5,583	3.9%	\$4,756	\$1,043	\$5,799
01	LANDS AND DAMAGES			-		-					-				
30	PLANNING, ENGINEERING & DESIGN	\$368	\$33	9%	\$401		\$368	\$33	\$401		\$401	2.9%	\$379	\$34	\$413
31	CONSTRUCTION MANAGEMENT	\$230	\$16	7%	\$246		\$230	\$16	\$246		\$246	2.3%	\$235	\$16	\$252
	PROJECT COST TOTALS:	\$5,177	\$1,053	20%	\$6,230		\$5,177	\$1,053	\$6,230		\$6,230	3.8%	\$5,371	\$1,093	\$6,464

CHIEF, COST ENGINEERING, Jeromy Carpenter
PROJECT MANAGER, Marsha Raus
CHIEF, REAL ESTATE, XXX
CHIEF, PLANNING, Lesley Prochaska
CHIEF, ENGINEERING, Donald Callahan
CHIEF, OPERATIONS, Vickie Watson
CHIEF, CONSTRUCTION, Samantha Harper
CHIEF, CONTRACTING, Brian Johnson
CHIEF, PM-PB, XXXX
CHIEF, DPM, XXX

ESTIMATED TOTAL PROJECT COST: \$6,464
ESTIMATED FEDERAL COST: 90% \$5,817
ESTIMATED NON-FEDERAL COST: 10% \$646
22 - FEASIBILITY STUDY (CAP studies): \$2
ESTIMATED FEDERAL COST: 50% \$1
ESTIMATED NON-FEDERAL COST: 50% \$1
ESTIMATED FEDERAL COST OF PROJECT \$5,818

Filename: Osceola Harbor Expansion 3018
TPCS

Osceola Harbor Extension, Mississippi County, Arkansas Feasibility Study
Appendix D – Cost Engineering

**** TOTAL PROJECT COST SUMMARY ****

Printed: 8/25/2025
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**** CONTRACT COST SUMMARY ****

PROJECT: Osceola Harbor Extension
LOCATION: Mississippi County, Arkansas
This Estimate reflects the scope and schedule in report;

Report Name and date

DISTRICT: Memphis District
POC: CHIEF, COST ENGINEERING, Jeremy Carpenter

PREPARED: 7/10/2025

WBS Structure		ESTIMATED COST				PROJECT FIRST COST Dollar Basis)				(Constant	TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared:		6-Jul-25		Program Year (Budget EC):		2025							
		Estimate Price Level:		1-Oct-24		Effective Price Level Date:		1-Oct-24							
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	RISK BASED				ESC (%) G	COST (\$K) H	CNTG (\$K) I	TOTAL (\$K) J	Mid-Point Date P	ESC (%) L	COST (\$K) M	CNTG (\$K) N	FULL (\$K) O	
		COST (\$K) C	CNTG (\$K) D	CNTG (%) E	TOTAL (\$K) F										
PHASE 1 or CONTRACT 1															
12	NAVIGATION PORTS & HARBORS	\$4,579	\$1,004	21.9%	\$5,583		\$4,579	\$1,004	\$5,583	2028Q3	3.9%	\$4,756	\$1,043	\$5,799	
#N/A															
CONSTRUCTION ESTIMATE TOTALS:		\$4,579	\$1,004	21.9%	\$5,583		\$4,579	\$1,004	\$5,583			\$4,756	\$1,043	\$5,799	
01	LANDS AND DAMAGES			20.0%											
30	PLANNING, ENGINEERING & DESIGN														
1.0%	Project Management	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2026Q1	3.1%	\$47	\$4	\$52	
1.0%	Planning & Environmental Compliance	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2026Q1	3.1%	\$47	\$4	\$52	
1.0%	Engineering & Design	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2026Q1	3.1%	\$47	\$4	\$52	
1.0%	Reviews, ATRs, IEPRs, VE	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2026Q1	3.1%	\$47	\$4	\$52	
1.0%	Life Cycle Updates (cost, schedule, risks)	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2026Q1	3.1%	\$47	\$4	\$52	
1.0%	Contracting & Reprographics	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2025Q4	2.3%	\$47	\$4	\$51	
1.0%	Engineering During Construction	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2025Q4	2.3%	\$47	\$4	\$51	
1.0%	Planning During Construction	\$46	\$4	9.0%	\$50		\$46	\$4	\$50	2026Q1	3.1%	\$47	\$4	\$52	
1.0%	Adaptive Management & Monitoring			9.0%											
1.0%	Project Operations			9.0%											
	Real Estate (All Federal Labor)			25.0%											
31	CONSTRUCTION MANAGEMENT														
2.0%	Construction Management	\$92	\$8	7.0%	\$98		\$92	\$8	\$98	2025Q4	2.3%	\$94	\$7	\$101	
2.0%	Project Operation:	\$92	\$8	7.0%	\$98		\$92	\$8	\$98	2025Q4	2.3%	\$94	\$7	\$101	
1.0%	Project Management	\$46	\$3	7.0%	\$49		\$46	\$3	\$49	2025Q4	2.3%	\$47	\$3	\$50	
CONTRACT COST TOTALS:		\$5,177	\$1,053		\$6,230		\$5,177	\$1,053	\$6,230			\$5,371	\$1,093	\$6,464	

Filename: Osceola Harbor Expansion 3018
TPCS