BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

Hickman-Fulton Co. Riverport

Catlett Street, Hickman, Kentucky 42050

Preliminary Engineering Report

Submitted to:

Hickman-Fulton County Riverport Authority

c/o: Mr. Greg Curlin

625 Catlett Street

Hickman, KY 42050

Submittal Date:

June 8, 2022

May 2022
BFW Ref. # 21183

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17th STREET | PADUCAH, KY 42003

June 3, 2022

Mr. Greg Curlin
Executive Director
Hickman-Fulton Co. Riverport
625 Catlett Street
Hickman, KY 42050

Re: Preliminary Engineering Report
625 Catlett Street, Hickman, KY 42050

Dear Mr. Curlin:

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) is pleased to submit the Preliminary Engineering Report for the Hickman-Fulton Co. Riverport, Catlett Street, Hickman, KY 42050. This preliminary engineering report includes conceptual design elements for the replacement of the 30-inch conveyor system. Included herein is a cost projection to be used for planning purposes, estimated schedule, a grant program overview, an environmental overview, and other pertinent content regarding this project.

If you have questions concerning this report or require further clarification of the report findings, please call our office at (270) 443-1995.

Sincerely,

Maegan Mansfield

Maegan Mansfield, PE
Project Manager

Enclosure: Preliminary Engineering Report

TABLE OF CONTENTS

Acronyms

ASTM	American Society for Testing and Materials
BFW	Bacon Farmer Workman Engineering & Testing, Inc.
CRISI	Consolidated Rail Infrastructure and Safety Improvement
CWA	Clean Water Act
DRA	Delta Regional Authority
ESA	Endangered Species Act
FEMA	Federal Emergency Management Act
FWS	U.S. Fish and Wildlife Service
HFCRA	Hickman-Fulton County Riverport Authority
INFRA	Infrastructure for Rebuilding America
KDOW	Kentucky Division of Water
KRI	Kentucky Riverport Improvement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOFO	Notice of Funding Opportunity
NOI	Notice of Intent
NRCS	Natural Resource Conservation Service
PIDP	Port Infrastructure Development Program
RAISE	Rebuilding American Infrastructure with Sustainability
SHPO	State Historic Preservation Office
SPT	Split Spoon (Disturbed)
T&E	Threatened and Endangered
TIFIA	Transportation Infrastructure Finance and Innovation Act of 1998
USDA	United States Department of Agriculture
WFIA	Waterfront Facilities Inspections and Assessments

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1. INTRODUCTION AND SITE HISTORY

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) has prepared all the necessary research and assessments for the Hickman-Fulton County Riverport Authority (HFCRA) replacement of the 1,200-ft conveyor system and expansion of the 20-ft diameter mooring cell. A topographic survey was prepared and is attached in Appendix B, outlining all marked utilities and exhibiting contours at one-ft intervals for the conveyor plus approximately 60' beyond site limits. Boring locations were calculated and staked in the field, and a preliminary subsurface investigation was performed using hollow stem augers in accordance with American Society for Testing and Materials (ASTM) methods D1452 and D1586. Further subsurface investigations were conducted by collecting split spoon (disturbed) SPT samples at regular intervals, and a report and assessment showing the finding of poor-quality soils is included herein and in Appendix C.

Design alternatives were analyzed for upgrading the existing 1,200-ft conveyor system, taking land requirements, constructability, sustainability, environmental impacts, and costs into consideration. The 20-ft diameter mooring cell, attached to the conveyor system, was inspected by divers provided by the client, and the divers' findings were used to assess the expansion of the cell. The mooring cell report can be found in Appendix G. Preliminary project design and project schedules were created for all upgrades, expansions, and construction on the site, and an opinion of cost is provided for the design alternatives. An environmental overview of the site was conducted with design alternatives in mind. Environmental maps, risks, and potential permitting requirements are included in this preliminary engineering report.

Grant opportunities available to the HFCRA were researched and a list of the opportunities is provided. Opportunities discussed are common programs that would be an avenue for funding on federal, regional, and state levels. One or more grant opportunities may be pursued to fund the project in totality. Grant items presented are based on current Notice of Funding Opportunities, which may be expanded or modified in the future.

The HFCRA has a general cargo conveyor system, for offloading product to storage or to a railcar, and a grain handling conveyor system. The grain handling conveyor is approximately 1,200 feet long and has a belt width of 30 inches. HFCRA has one (1) crane cell and five (5) mooring cells, including a 20' diameter mooring cell connected to the 1,200-ft grain conveyor, shown in Appendix A, Plan 15. The current conveyor system was designed by Florence and Hutcheson in 1989 and constructed around the same time. At the time of this design, the attached 20' diameter mooring cell was an existing structure. Originally, the riverport was constructed in 1978, when the 20' diameter mooring cell was assumed to be constructed as well.

2. PROJECT DESCRIPTION AND IMPACTS

The HFCRA is located at 625 Catlett Street, Hickman, Kentucky 42050 (36.56892° N, 89.20556° W). The riverport is located by land about 25 minutes from Union City, Tennessee and is located by water on the lower Mississippi River. It is inside the Elvis J. Stahr Harbor at mile 922. The surrounding agricultural area is a major grain producer. During the harvest season, conveyor operations are typically 16 hours a day but can be up to 24 hours. The grain handling conveyor system may be used for miscellaneous purposes during non-harvest seasons. The existing elevator on the site can handle the upgrades without excessive costs and construction. The elevator has sufficient capacity to be able to accommodate a larger conveyor.

Given the location of the riverport and its proximity to farmland yielding grain crops, replacing the grain handling conveyor system will result in higher productivity and economic gain. Design for the conveyor system includes replacing the 30-inch belt system with a 48-inch belt system in an optimal location. The existing 30-inch conveyor is currently operated at the high end of recommended belt speed for maximum capacity. The increase in the width of the conveyor system requires an expansion and immediate repair to the attached 20-ft mooring cell and tower, based on the review of the Waterfront Facilities Inspections and Assessments (WFIA) report performed by Marine Solutions.

Figure 2-1 – Site Location – Hickman-Fulton County Riverport

Figure 2-2 – Surrounding Farmland Producing Grain Crops – Hickman-Fulton Co. Riverport Outlined in Blue

Figure 2-3 – 1,200' Conveyor and 20-ft Diameter Mooring Cell (Outlined in red) Hickman-Fulton Co. Riverport Outlined in Blue

3. SUBSURFACE INVESTIGATIONS

Bacon Farmer Workman Engineering & Testing, Inc. (BFW) performed three (3) test borings, in accordance with ASTM D-1452 and ASTM D-1586. The original design for the subsurface exploration consisted of five (5) boring locations but only three (3) locations were tested, as shown in the Boring Location Map and Subsurface Boring Logs in Appendix C. Two (2) boring locations were eliminated from the original design and the remaining three (3) drilling footage was used to advance borings deeper, because soft soils were hit at depth. Borings showed existing fill soils at the surface, likely due to past development of the site. A review of the Natural Resource Conservation Service (NRCS) soil database resulted in a categorization of the soil as Hydrologic Soil Group B/D (Convent silt loam) and Hydrologic Soil Group A (Robinsonville fine sandy loam). Further field observations exhibited groundwater at depths ranging from 10 to 26.5 feet while drilling, but groundwater level is dependent on several factors and may be encountered during some footing excavations. Samples from the boring locations were tested in a laboratory for natural moisture content, Atterberg Limits, and grain size analysis. Laboratory tests evaluate potential for volumetric changes.

Considerations of both field and laboratory observations yield an in-situ near surface soil of soft clay with varying amounts of sand. The presence of construction traffic and moisture content can lead this soil to become unsuitable for development and can increase the potential of subgrade degradation. An effort must be made to obtain optimum moisture content, including discing and aerating, cement/lime stabilization, or other methods as needed. In addition, soft consistency shallow soils may be present, especially during wetter periods. Since it is anticipated that soft soils will be present near planned foundation bearing elevations and is expected that soils across the proposed area have uniform bearing characteristics, it is recommended to strip the foundation area of organics and any upper soft soil zones prior to placement of any fill or foundations. In addition, prior to placement of fill materials, the area should be proof-rolled and any identified, unsuitable soil should be excavated and replaced.

With shallow foundations being the desirable option, it is important to note that the site is within an area of high seismicity and has a potential of failure during a seismic event, due to the presence of very soft and loose soils. Should shallow foundations be utilized, they should be seated in existing in-situ soils or in properly compacted engineered fill, bearing at least at a depth of 24-inches below ground surface. Net allowable soil bearing pressures of 1,800 lbs/square feet (psf) should be used for both continuous and spread foundations, with a minimum width of 24 inches and 36 inches, respectively. In the event that soft, unsuitable soils are encountered during footing excavations, it is recommended to include a contingency in the construction budget for over excavations.

General site preparations include clearing, grubbing, and stripping, with the understanding that under no circumstances should this stripped material be used as fill. After clearing, grubbing, and stripping, the site should be examined, and unsuitable soils should be excavated and replaced. As aforementioned, proof-rolling should be performed and repeated until all soft soils are removed or other recommended stabilization methods are instated. Once the in-situ soils are stripped, it should be suitable for use as engineered fill. However, it is recommended that proposed fill material be collected and tested. Suitable fill materials will result in a plasticity index of less than 30 and a maximum dry density of at least 100 pcf. During site preparation, surface water should not pond on the building subgrade surfaces. A more detailed and thorough explanation of the subsurface investigation, including all collected data and corresponding interpretations, can be found in the delivered Geotechnical Exploration Report.

4. CIVIL/STRUCTURAL DESIGN

4.1 WATERFRONT FACILITIES INSPECTIONS AND ASSESSMENTS

Upon review of the inspection and assessment of the HFCRA mooring cells, dolphin, and floating dock, it was determined Cell 3 and Cell 6 are in poor condition and in need of high priority repairs. Cell 3 has a substantial loss of ballast 22.6 feet below the top of the cap. Recommendations include replacement of the 22.6 feet of ballast. Cell 6 has severe corrosion. The high priority recommendations for this cell include a 24-ft full circumference band installed from elevation 288 feet to 264 feet NGVD29 (Appendix G).

4.2 1,200-FT CONVEYOR SYSTEM

Initial discussion of design for the 1,200-ft conveyor system included the potential to upgrade the system from a 30-inch belt to a 48-inch belt, while using the existing supports. However, this design alternative was not feasible structurally due to lack of capacity in the existing supports. The conveyor system will require a total replacement. Once this determination was made, the new location of the system and termination point was established through careful evaluation of the advantages and disadvantages. The preparatory design of this system resulted in three options: Use of the same termination point, an additional or attached mooring cell to the right (upstream) of the existing mooring cell, or an additional or attached mooring cell to the left (downstream) of the existing mooring cell.

Using the same termination point was dependent upon the findings of the WFIA performed by Marine Solutions (Appendix G). After review of the inspections and assessments report, it was discovered an attached or additional mooring cell would be required. Between that and the considerable down time the HFCRA would experience during the demolition and reconstruction process of the conveyor system, use of the same location was deemed to be a nonviable option.

When assessing the design and construction needs of adding or attaching a mooring cell to the right of the existing cell, it was discovered that the conveyor system would have to cross to the original path for the discharge system at the cross conveyor located at Station 10+75.00. The discharge system could potentially be modified to be on the left side, eliminating the need to cross over, but it would limit the traffic flow in that area. This cross over would result in taller supports, raising the cost of the conveyor system. Based on the significant increase in cost, this option was considered impractical.

Attaching the mooring cell to the left of the existing 20-ft mooring cell would have no known disadvantages to the HFCRA. A preliminary elevation profile, shown in Appendix E, was designed for this option based on the elevations provided in the topographic survey (Appendix B). With the center of the 20-ft mooring cell defined as Station 0+00.00, the following structures and equipment are proposed for the replacement of the 1,200-ft conveyor system as shown in Table 4-1.

Table 4-1 – Conveyor Structures and Equipment Proposed Stations/Elevations

Station	Structure Type/Equipment	Top Elevation (Ft)	Bottom Elevation (Ft)	Height (Ft)
0+02.00	Head Pulley	TBD	TBD	TBD
0+86.00	Support	338	286	52
1+64.00	Support	338	292	46
2+42.00	Support	338	302	36
3+20.00	Support	338	322	16
4+05.00	Support	338	322	16
4+80.00	Support	335	312	23
5+50.00	Support	334	305	29
6+20.00	Support	330	304	26
6+90.00	Support	329	303	26
7+70.00	Support	326	301	25
8+50.00	Gravity Take-up	TBD	TBD	TBD
8+45.00 to 8+55.00	Equipment Tower	TBD	TBD	TBD
8+55.00	Drive Pulley	TBD	TBD	TBD
9+30.00	Support	322	302	20
10+10.00	Support	318	302	16
10+50.00	Belt Scale	TBD	TBD	TBD
10+75.00	Modify Load Chute	TBD	TBD	TBD
10+90.00	Support	316	302	14
10+90.00	Tail Pulley	TBD	TBD	TBD

Further design needs for the proposed conveyor system include a belt scale, modifying the load chute, and a wireless multi-switch controller. The belt scale will be placed in the conveyor frame under the belt. The load chute is found at the existing cross conveyor around station 10+75.00. The load chute will not be modified in such a way that it will impact traffic flow, as in the aforementioned right-side option. One of the discussed disadvantages to the current conveyor system involves the inability to communicate the need to shut off the feed in a timely manner. This results in a loss of material. A recommended solution to this problem is a wireless multi-switch controller.

4.3 DISCHARGE HEAD

The proposed 48-inch conveyor system will require a discharge system that can handle an approximately 45-ft difference in water elevation from the normal low water (elevation 268.50 feet) to the point where operations are ceased at river gauge 50 feet. At the normal low water elevation, the discharge system utilizes a cone stack. During times of high water, the cone stack is easily removed, as the tubes are constructed from a low-weight material. The pivoting tube has a preliminary design of 24 inches with a first tube that meets the desired length needed for the elevation difference. A 36-inch inlet and a skirt with intrinsic safe tilt probes and an auto-raise feature will be utilized on the end of the spout.

The discharge system is also designed to be electrically moved from side to side to access the hatches on each side of the barge. The unit will be able to rotate approximately 350 degrees.

4.4 SUPPLEMENTARY MOORING CELL

The 20-ft mooring cell at Station 0+00.00 of the 1,200-ft conveyor system, also known as Cell 6 in the WFIA report, was assessed to determine its design and construction needs. Initial planning involved a discussion of adding a ring to the landside of the existing cell. The addition would have to be landside, as the docking side needs to always be clear for the accessibility of the barges. In this scenario, the HFCRA would experience significant downtime, because it would require the dismantling of a portion of the conveyor during construction.

After evaluating the report on the mooring cells, it was decided the 20-ft mooring cell needed a full 24-ft-tall circular band from elevation 288 feet to elevation 264 feet. In addition, a supplementary mooring cell would need to be attached. The attachment style mimics that of a circular-type cofferdam. This supplementary mooring cell would also be 20-feet in diameter from north to south. On the east side of the cell, it would attach to the existing 20-ft cell, affecting a distance of 17 feet from the east to west side of the new cell.

The existing mooring cell, from an elevation of 234 feet to an elevation of 320 feet, has a 12-ft by 12-ft tower. A 36-feet high, multiple braced frame tower, extending from elevation 356 feet to elevation 320 feet, will be built on the proposed mooring cell with an elevation of 204 feet to an elevation of 320 feet. The existing tower meets the required capacities and the only recommended modification to it is a walkway to the new tower.

4.5 PRELIMINARY SCHEDULE

The proposed project schedule for the recommendations for the HFCRA are shown in Figure 5-1. The Obion Creek/Mississippi River side work will need to be performed during a time when the water is low. This time is likely mid-summer, but further research is needed to determine a more exact time.

Figure 5-1 – Preliminary Project Schedule

PROJECT SCHEDULE		CLIENT:	HICKMAN-FULTON CO. RIVERPORT AUTHORITY
HICKMAN-FULTON CO. RIVERPORT AUTHORITY REPLACEMENT OF 1200-FT CONVEYOR AND EXPANSION OF 20' DIAMETER MOORING CELL		ADDRESS:	625 CATLETT STREET HICKMAN, KY 42050

START	START OF MONTH 1	START OF MONTH 2	START OF MONTH 3	START OF MONTH 4	START OF MONTH 5	START OF MONTH 6	START OF MONTH 7	START OF MONTH 8	START OF MONTH 9	START OF MONTH 10	START OF MONTH 11	START OF MONTH 12	PROJECT END
COMPLETION	END OF MONTH 1	END OF MONTH 2	END OF MONTH 3	END OF MONTH 4	END OF MONTH 5	END OF MONTH 6	END OF MONTH 7	END OF MONTH 8	END OF MONTH 9	END OF MONTH 10	END OF MONTH 11	END OF MONTH 12	
CONSTRUCTION	IMPROVEMENTS TO CELL 3 AND CELL 6												
			INSTALLATION OF SHEET PILING ON MOORING CELL										
					CONSTRUCTION OF TOWER ON PROPOSED CELL								
								CONSTRUCTION OF 48" WIDE CONVEYOR SYSTEM					

5. OPINIONS OF COSTS FOR RECOMMENDED ALTERNATIVES

Based on the assessments of the existing conditions and in accordance with the current needs of HFCRA, the proposed recommendations and associated costs are listed in the following tables. These opinions of costs should be considered with the following qualifications:

- All opinion of costs were established in May of 2022 and costs of inflation or increases in unit costs of materials or labor were not considered.
- Costs do not include general conditions or overhead and profit for the general contractor.

A contingency of 30% is included since the repairs and design are based on a preliminary engineering assessment of the site. To allow for grant funding acquisition, bid procurement, and other foreseen or unforeseeable delays, a cost was estimated for future construction in 2025.

Table 5-1 – Cell 6 Recommendations and Costs

ITEM NUMBER	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	24' Full Circumference Band Installed from Elevation 288' To 264'	1	EA	$ 100,000	$ 100,000

Table 5-2 – Cell 3 Recommendations of Costs

ITEM NUMBER	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	Replacement of Lost Ballast	425	CY	$ 30.00	$ 12,750

Table 5-3 – 1,200-Ft Conveyor System Recommendations and Costs

ITEM NUMBER	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	48" B.W. x 1,100'-0" Lg. 5'-0" Dp. truss conveyor w/ Ramsey 1/2% accuracy belt scale, primary & secondary belt cleaner, full length walkway one side, 180-degree belt covers full length and 100 HP Dodge drive package.	1	LS	$ 1,550,467	$ 1,550,467
2	Conveyor Foundations	1	LS	$ 170,551	$ 170,551
3	Electrical Infrastructure	1	LS	$ 200,000.00	$ 200,000.00
4	Remote Control Technology: Wireless Multi-Switch Controller	1	EA	$ 10,000.00	$ 10,000.00

Table 5-4 – Discharge Head Recommendations and Costs

ITEM NUMBER	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	Electrically Movable Discharge Head Located at Proposed Mooring Cell	1	LS	$ 325,000	$ 325,000

Table 5-5 – Supplementary Mooring Cell Recommendations and Costs

ITEM NUMBER	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	Proposed Attached Mooring Cell (20’ diameter with a 3’ overlap on the east side)	1	LS	$ 410,000	$ 410,000
2	Proposed Tower (12’ wide x 12’ long x 36’ High)	15,840	LB	$ 2.00	$ 32,000

Table 5-6 – Total Costs of Recommendations for HFCRA

REPAIR LOCATION	TOTAL COST
CELL 6	$ 100,000
CELL 3	$ 12,750
1,200-Ft Conveyor System	$ 1,931,018
Discharge Head	$ 325,000
Supplementary Mooring Cell	$ 442,000
30% Contingency	$ 843,230.51
Adjustment for Estimated Future Construction Costs (2025)	$ 211,490.64
***Total Cost for the HFCRA:**	**$ 3,865,489.53**

*Total cost does not include engineering services, environmental services, or other professional design services.

6. ENVIRONMENTAL OVERVIEW

Roughly 30 acres of land was reviewed for environmental compliance for the HFCRA. This portion of land encompasses the 1,200-ft conveyor system which is slated for replacement as well as surrounding land and riverfront improvement areas. The property was reviewed for flood plains, soils, wetlands and streams, and T&E. This is not a full environmental assessment of the site, but it is intended as an overview of the environmental considerations needed for the project. The scope of this project indicates that an environmental assessment will be required in order to meet local and federal laws and regulations as well as meet the federal grant requirements. A NEPA checklist for MARAD was completed for the project and has been included with the full Environmental Report in Appendix F. An environmental assessment will identify possible environmental effects and establish all the impacts either positive or negative with regards to the project and will consist of technical evaluation, economic impact, and social results that the project will bring. It will include individual reviews of such topics which include but are not limited to:

- City Zoning
- Public Services/Utilities
- Noise Ordinance
- Public Health and Safety
- Clean Air Act
- Environmental Justice Section 4(f)
- Climate Change and Greenhouse gases
- National Historic Preservation Act (NHPA) Section 106
- Rivers and Harbors Act Section 10
- Endangered Species Act (ESA) Section 9
- Tribal Consultation

It should be determined if the Environmental Assessment should be performed prior to grant submittal or be included as a fee within the grant request.

6.1 FLOODPLAIN

According to the Federal Emergency Management Act (FEMA) map, 21075C0154D (eff. Date 6/02/2011), most of the site is protected from flooding by the levee, Zone X. The northern boundary of the site, adjacent to the Mississippi River, lies within Zone AE – the 100-year flood zone. Any fill placed within the floodplain will require a permit with the Kentucky Division of Water (KDOW) Surface Water branch.

6.2 SOIL ASSESSMENT

According to the United States Department of Agriculture (USDA), there were two (2) soil types located at the HFCRA project site:

- Convent silt loam (0 to 2% slopes)
- Robinsonville fine sandy loam (0 to 3% slopes)

6.3 WETLAND DELINEATION AND STREAM ASSESSMENT

According to various satellite images and databases, the site appears to contain one (1) pond located southwest of the review area. This pond receives much of the area's stormwater runoff. There appears to be one (1) or two (2) streams that may drain to this pond but would require an onsite inspection to determine if they are jurisdictional. There are no wetlands present on the sight. The Mississippi River lies north of the site. No wetlands exist onsite. The instream work associated with the mooring cells will require a permit with the Memphis USACE and with KDOW.

6.4 THREATENED & ENDANGERED SPECIES

According to the U.S. Fish and Wildlife Service (FWS) review, there is a potential to encounter three (3) bat species (Gray bat, Indiana Bat, and Northern Long-eared Bat), one (1) fish species (Pallid Sturgeon), one (1) clam species (Fat Pocketbook), one (1) insect species (Monarch Butterfly), and six (6) migratory birds (Bald Eagle, Lesser Yellowlegs, Prothonotary Warbler, Red-headed Woodpecker, Rusty Blackbird, and Wood Thrush). However, there is no designated critical habitat. Final design plans will be required for USFWS to evaluate if there is a potential impact to threatened and endangered species. It is possible that in water work may require a mussel survey if current data is not available. However, this will be evaluated once the project is reviewed by USFWS.

6.5 CULTURAL RESOURCES

The scope of this project will require a Section 106 Review which allows the State Historic Preservation Office (SHPO) to review and comment on the effects to above ground historic properties and archaeological resources prior to the expenditure of any federal funds. The project description and boundary map will be submitted to SHPO for determination. If any previously identified resources have been documented, they will advise at time of submittal and an Area of Potential Impact will be established. Based on initial findings, mitigation efforts may be required if adverse effects are determined on any of the resources.

6.6 ENVIRONMENTAL PERMITTING REQUIREMENTS

Project site development will dictate if permits are required at the HFCRA. Based on the replacement of the conveyor and the mooring cell maintenance and supplementary mooring cell addition, several permits will be required:

- Clean Water Act (CWA) Section 404-Memphis USACE Permit
- FEMA Permit for Floodplain Development
- Kentucky Division of Water (KDOW) Permit
- Notice of Intent (NOI) – Construction Stormwater Permit

A more detailed and thorough explanation of the environmental review can be found in the delivered Environmental Summary Report (Appendix F).

7. GRANT OPPORTUNITIES

7.1 PORT INFRASTRUCTURE DEVELOPMENT PROGRAM (SMALL PORTS)

The Port Infrastructure Development Program (PIDP), administered by the US Maritime Administration, is a discretionary grant program. Selection criteria for the PIPD includes projects improving safety, efficiency, or reliability of the movement of goods into, out of, around, or within a port.

- Minimum Project Award: $1,000,000
- Maximum for Small Ports: $11.25 million
- Funds Available for Small Ports (25% of Total Funds): $171,077,500
- Match Requirement: 20%
- Release of Notice of Funding Opportunity: February 14
- Application Due Date: May 15

7.2 DELTA REGIONAL AUTHORITY (DRA)

The Delta Regional Authority (DRA) invests federal funds into improving transportation and basic public infrastructure. The westernmost counties of Kentucky are included in the Delta Region, Fulton County being one of them. DRA's focus on port and harbor infrastructure is an important part of strengthening the economy of the Delta region. Half of the designated funds are targeted to transportation and basic infrastructure improvements. DRA will not fund items that are considered deferred maintenance.

- Maximum grant award: $400,000
- A call for projects opens in March of each fiscal year.
- Funding requests are directed through the local PADD office.
- Funds must be leveraged with other funding partners or sources.

7.3 KENTUCKY RIVERPORT IMPROVEMENT (KRI)

The Kentucky Riverport Improvement (KRI) Program provides grants to public riverport authorities for dredging or maintenance of access and critical material handling – which includes the improvement of conveyor systems. Criteria for the KRI grant program includes improving infrastructure of critical material handling equipment. For a project to meet the eligibility requirements of this grant program, the project must be part of a long-range plan by the Riverport Authority or be part of the county/city's project list. Similarly, applicants need firm project scopes, schedules, and quotes/estimates before applying. The State total allocated funds are $500,000 per year for all projects in KY.

- Match Requirement: 50% up to allowed amount of designated funds
- A call for funding will be issued to local Riverports as soon as funding is available (usually) April - Application Due Date: End of May.

7.4 REBUILDING AMERICAN INFRASTRUCTURE GRANT (RAISE)

The Rebuilding American Infrastructure with Sustainability (RAISE) Discretionary Grant program allows the US Department of Transportation to invest in road, rail, transit, and port projects with national objectives. One benefit of RAISE is its ability to directly fund

public entities, including port authorities, as opposed to traditional Federal programs. Selection criteria is based upon the following: safety, environmental sustainability, quality of life, economic competitiveness and opportunity, state of good repair, partnership, innovation, and mobility and community connectivity (new as of 2022). An emphasis is placed on how well the project will increase mobility for freight and supply chain efficiency. Additional criteria – addressing climate change, ensuring racial equity, removing barriers to opportunity, and creating workforce development opportunities – are encouraged by the Department.

- Maximum Grant Award: $25 million
- Amount Set Aside for Areas of Persistent Poverty and Historically Disadvantaged Communities: $15 million
- Applications are typically due around early April.

7.5 TRANSPORATION INFRASTRUCTURE FINANCE AND INNOVATION ACT (TIFIA)

The Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA) provides Federal credit assistance to major transportation investments of critical national importance, such as: highway, transit, passenger rail, certain freight facilities, and certain port projects with regional and national benefits.

- Type of Financial Assistance: Secured (direct) loan, loan guarantee, and standby line of credit

7.6 AMERICA'S MARINE HIGHWAY PROGRAM

America's Marine Highway Program uses grants to develop and expand marine highway service options and facilitate their further integration into the current U.S. surface transportation system, especially where water-based transport is the most effective and sustainable option. Marine Highway Grant funds can be used for material handling/container handling equipment as well as minor port improvements such as lighting or laydown areas. The program seeks to procure zero or near-zero emission equipment when available and practical.

Note: This grant requires a project to be listed as a "Designated Project."

- Funding Amount Available: $25 million
- Release of Notice of Funding Opportunity (NOFO): usually mid-February
- Match Requirement: 20%

7.7 CONSOLIDATED RAIL INFRASTRUCTURE AND SAFETY IMPROVEMENT (CRISI)

The Consolidated Rail Infrastructure and Safety Improvement (CRISI) grant's purpose is to leverage private, state, and local investments to support safety enhancements and general improvements to infrastructure for both intercity passenger and freight railroads. An eligible project includes projects enhancing multimodal connection or facilitating service integration between rail service and other modes.

- Funding Amount Available: $25 million
- Release of Notice of Funding Opportunity (NOFO): usually mid-February

8. GENERAL GRANT CONSIDERATIONS

8.1 SAFETY, EFFICIENCY, OR RELIABILITY

The HFCRA is upgrading the grain handling conveyor system from a 30-inch width to a 48-inch width, effectively improving the efficiency of the port when transferring product from barge to storage facilities or, conversely, from storage facilities to barge. The current conveyor system was designed and constructed around 1989 – over 30 years ago. The upgrade or replacement of the conveyor system will reduce down-time due to maintenance and increase reliability for producers and transporters. Reducing maintenance increases the safety of the workers at the Riverport. The expansion of the mooring cell enlarges the footprint of the cell, allowing for the larger conveyor system.

The prime usage of the grain handling conveyor system is dependent upon harvest times of local farmland. This season runs from mid-August to April. During these times, usage of the conveyor system and attached 20-ft diameter mooring cell may be up to 24 hours a day. The conveyor system averages 16 hours a day during this time and takes approximately 5 hours to load a barge. The upgrade/replacement of the conveyor system with a larger belt width will drastically improve the time spent loading product from facilities and storing product.

8.2 REGIONAL ECONOMIC ENHANCEMENTS

With the location of the port and lack of locks south of St. Louis, Missouri, improvements to the port will allow faster unloading times and enhance the savings on waterborne shipping. The HFCRA is geographically located in the center of a major crop-producing area. The Riverport's main products are grain: corn, soybeans, wheat, and occasionally milo. The increased reliability and efficiency of a conveyor system dealing with these grain crops will draw more producers to the riverport as a means of transporting their products and will, in turn, stimulate the local economy and create job opportunities.

8.3 ENVIRONMENTAL JUSTICE AND CLIMATE CHANGE

Upgrading or replacing the outdated conveyor system to a more efficient system will reduce the idle times of barges, reducing emissions. In addition, the increased efficiency of the riverport will incentivize barge usage over freight trucks, thus cutting back on greenhouse gas emissions and matter and noise in the region. Transitioning the hauling of materials from freight trucks to barges on waterways will have another important effect: reduction in road congestion and therefore a reduction in collisions. The switch to waterways as a means of transporting goods reduces the need of construction on roadway and rail infrastructure, lowering the carbon footprint.

8.4 RACIAL EQUALITY

Fulton county does not meet the definition of an Area of Persistent Poverty, but Census Tract 9602, encompassing the HFCRA, meets the definition of an Area of Persistent Poverty and the definition of a Historically Disadvantaged Community. Improving a Historically Disadvantaged Community fosters equality among all members of the surrounding area, regardless of race.

8.5 PROJECT READINESS

Currently there is a small area which is not owned by the HFCRA, but acquisition of the property is in progress and is anticipated to be complete at the time of the grant application submittal.

The electricity for the conveyor has 480 volts running along the existing conveyor to the cell. With the drive motor away from the cell, this may be sufficient power and might not require a transformer at the cell. This reduces the time needed for further design and construction on the conveyor upgrade.

The capacity of affected facilities, notably the loading elevator, is sufficient to handle the upgraded grain handling conveyor system. The project will not require extensive construction to the other structures and facilities in order to utilize the upgraded system and mooring cell. However, it will greatly impact the efficiency of the Riverport as a whole by decreasing barge loading and unloading times.

9. CONCLUSION

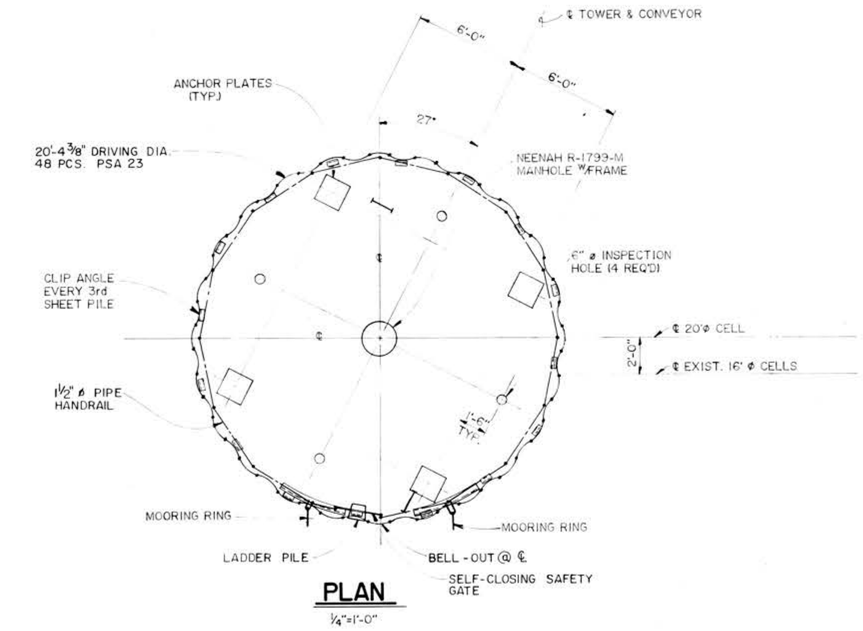
The HFCRA is in a prime location for import along the Mississippi River and export from local grain-yielding farmland. The existing 1,200-ft conveyor system is 30-inches wide and is operated for up to 24 hours a day during harvest season. Widening the conveyor system to 48 inches will result in higher productivity and economic gain, both for the HFCRA and the surrounding communities. BFW has researched and assessed the necessary geotechnical explorations, civil/structural designs, environmental assessments, and grants and merit criteria associated with the HFCRA 1,200-ft conveyor replacement and 20-ft diameter mooring cell expansion.

The project is estimated to cost approximately $3.5 million, including contingency for current unforeseeable project needs and inflation for future construction. The project schedule for the HFCRA is dependent upon the time of the year when the water level is lowest. This is anticipated to be mid-summer and last approximately a year.

The improvements to the existing cells and construction of a more efficient conveyor system and attached mooring cell will have a tremendous positive impact on the economic gain and time efficiency of the companies utilizing the riverport. Grant funding for this project will prove to be advantageous to the development of the local communities.

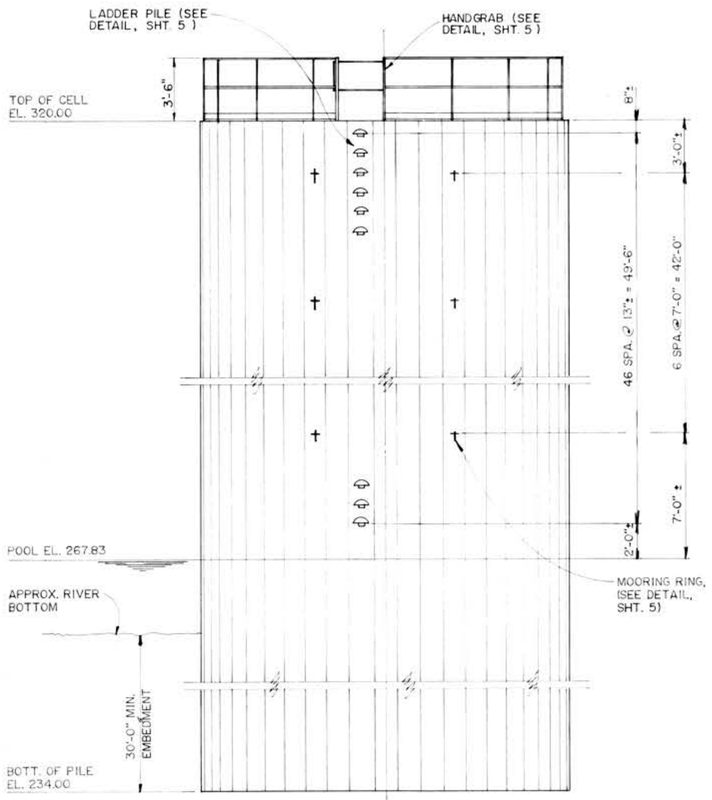
Appendix A

Past Site Plans



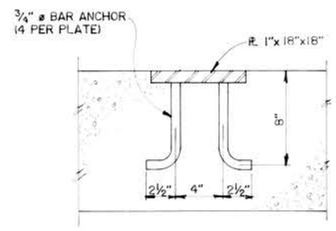
PLAN

¼"=1'-0"



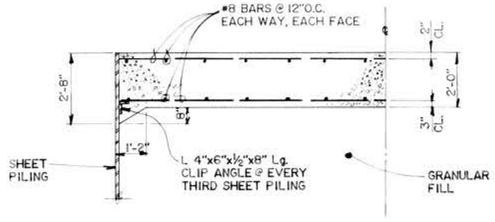
ELEVATION

¼"=1'-0"

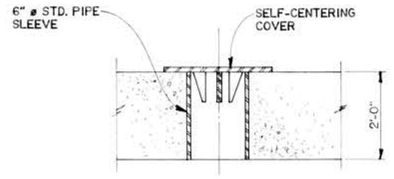


DETAIL - ANCHOR PLATE

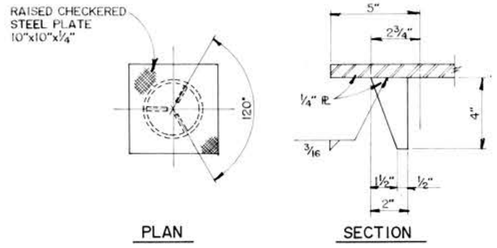
N.T.S.



SECTION THRU CELL CAP



TYPICAL SECTION



PLAN SECTION

DETAIL - INSPECTION HOLE

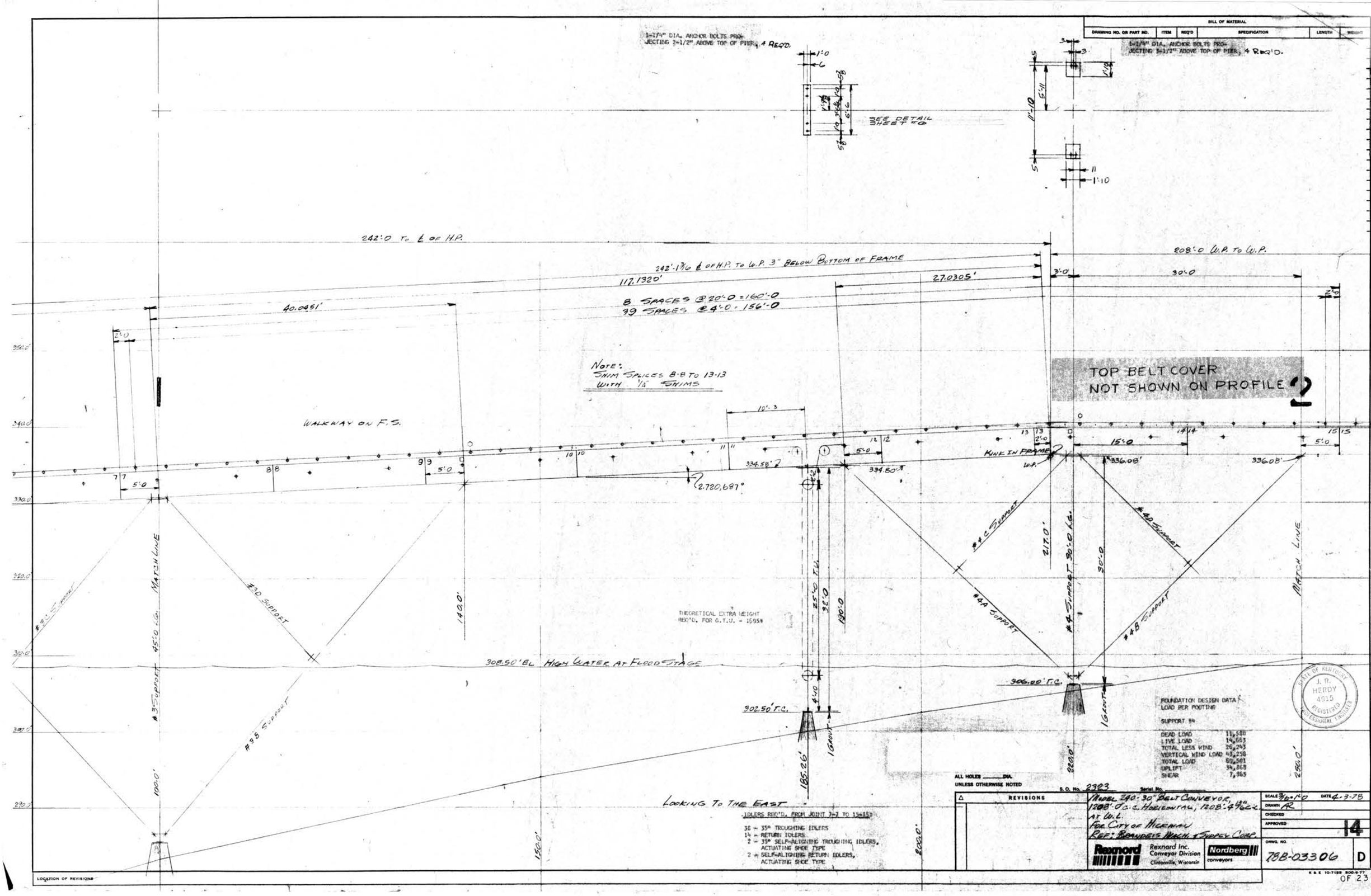
N.T.S.

FLORENCE & HUTCHESON, INC.
Consulting Engineers

MOORING CELL - 20' DIA.
PLAN & DETAILS
HICKMAN-FULTON CO. RIVERPORT
HICKMAN, KENTUCKY

Drawn: SCB	Check: WSU	Mechanical: ——	Electrical: ——	Project No.: 88135	4
Civil: JHM	Project: JHM	Approved: WSU	Date: 8-89	Scale: SHOWN	OF 5

Plan 1: Mooring Cell - 20' Diameter Plan & Details



Plan 2: 30" 1,200-FT Conveyor System
Station 1 to Station 2

Plan 3: 30" 1,200-FT Conveyor System
Station 2 to Station 3

Plan 4: 30" 1,200-FT Conveyor System
Station 3 to Station 4

BILL OF MATERIAL				
DRAWING NO. OR PART NO.	ITEM	REQ'D	SPECIFICATION	LENGTH

1-1/4" DIA. ANCHOR BOLTS PROJECTING 2-1/2" ABOVE TOP OF PIER, 4 REQ'D.

280'-0 W.P. TO W.P.

280'-1 3/16 W.P. TO W.P. 3" BELOW BOTTOM OF FRAME
8 SPACES @ 20'-0 = 160'-0
38 SPACES @ 4'-0 = 152'-0

NOTE:
SHIM SPACES 31-31 TO 37-37
WITH 12 GA. SHIMS

WALKWAY ON F.S.

TOP BELT COVER
NOT SHOWN ON PROFILE

4

5

1738,802°

331.01'

929.19'

KINK IN FRAME

W.P.

FOUNDATION DESIGN DATA
LOAD PER FOOTING

SUPPORT #10

DEAD LOAD	4,995
LIVE LOAD	6,405
TOTAL LESS WIND	11,100
VERTICAL WIND LOAD	28,617
TOTAL LOAD	39,717
UPLIFT	25,362
SHEAR	4,290

#10 SUPPORT 26'-0 C.G.

26'-0

304.93' T.C.

1 GROUT

FOUNDATION DESIGN DATA
LOAD PER FOOTING

SUPPORT #11

DEAD LOAD	4,930
LIVE LOAD	6,405
TOTAL LESS WIND	11,335
VERTICAL WIND LOAD	28,280
TOTAL LOAD	39,615
UPLIFT	25,090
SHEAR	4,290

#11 SUPPORT 25'-0

25'-0

309.11' T.C.

1 GROUT

MATCH LINE

MATCH LINE

#12 SUPPORT 24'-0

24'-0

1 GROUT

DITCH

LOOKING TO THE EAST

IDLERS REQ'D. FROM JOINT 30-30 TO 38-38:

38 - 35° TROUGHING IDLERS
14 - RETURN IDLERS
2 - 35° SELF-ALIGNING TROUGHING IDLERS, ACTUATING SHOE TYPE
2 - SELF-ALIGNING RETURN IDLERS, ACTUATING SHOE TYPE

ALL HOLES ____ DIA.
UNLESS OTHERWISE NOTED

S. O. No. 2383 Serial No. ____

REVISIONS
Δ

MODEL 240-30' BELT CONVEYOR, 1208'-0" C-C. HORIZONTAL, 1208'-9 3/16 C-C. AT W.P.
FOR CITY OF HICKMAN
REF'S BRANDEIS MACH. & SUPPLY CORP.

Rexnord Inc. Conveyor Division Clintonville, Wisconsin

Nordberg conveyors

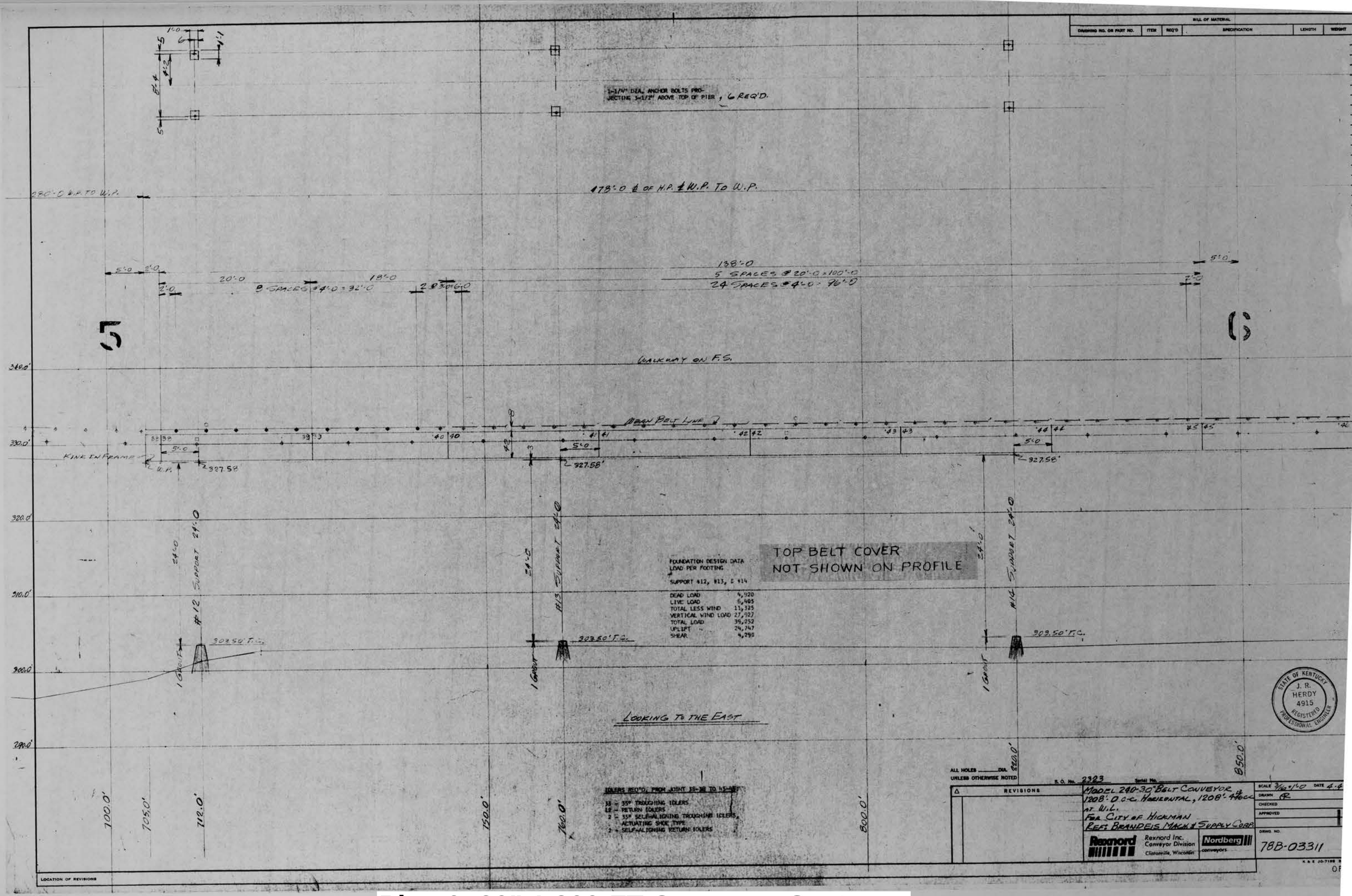
SCALE 3/16"=1'-0 DATE 6
DRAWN R
CHECKED
APPROVED
DRWG. NO. 78B-03310

STATE OF KENTUCKY J. R. HERDY 4915 REGISTERED PROFESSIONAL ENGINEER

LOCATION OF REVISIONS

R & E 10-71

Plan 5: 30" 1,200-FT Conveyor System
Station 4 to Station 5



Plan 6: 30" 1,200-FT Conveyor System
Station 5 to Station 6

1-1/4" DIA. ANCHOR BOLTS PROJECTING 3-1/2" ABOVE TOP OF PIER - 6 REQ'D.

478'-0 ℄ OF H.P. & W.P. TO W.P.

8 SPACES @ 20'-0 = 160'-0
39 SPACES @ 4'-0 = 156'-0

6

7

WALKWAY OF F.S.

TOP BELT COVER NOT SHOWN ON PROFILE

NORDBERG

FOUNDATION DESIGN DATA
LOAD PER FOOTING

SUPPORT #15, #16 & #17

DEAD LOAD	4,920
LIVE LOAD	6,403
TOTAL LESS WIND	11,323
VERTICAL WIND LOAD	27,987
TOTAL LOAD	39,252
UPLIFT	24,747
SHEAR	4,290

#15 SUPPORT 24'-0 — 303.50 T.C. — 1 GROUT
#16 SUPPORT 24'-0 — 303.50 T.C. — 1 GROUT
#17 SUPPORT 24'-0 — 303.50 T.C. — 1 GROUT

LOOKING TO THE EAST

IDLERS REQ'D. FROM JOINT 44-45 TO 53-53:

38 - 35° TROUGHING IDLERS
14 - RETURN IDLERS
2 - 35° SELF-ALIGNING TROUGHING IDLERS, ACTUATING SHOE TYPE
2 - SELF-ALIGNING RETURN IDLERS, ACTUATING SHOE TYPE

ALL HOLES ____ DIA.
UNLESS OTHERWISE NOTED

S.O. No. 2323 Serial No.

REVISIONS	
Δ	

MODEL 240-30" BELT CONVEYOR
1208'-0 C-C HAULOUTAS, 1208'-4 HOCC
AT W.L.
FOR CITY OF HICKMAN
REF: BRANDEIS MACH & SUPPLY CORP.

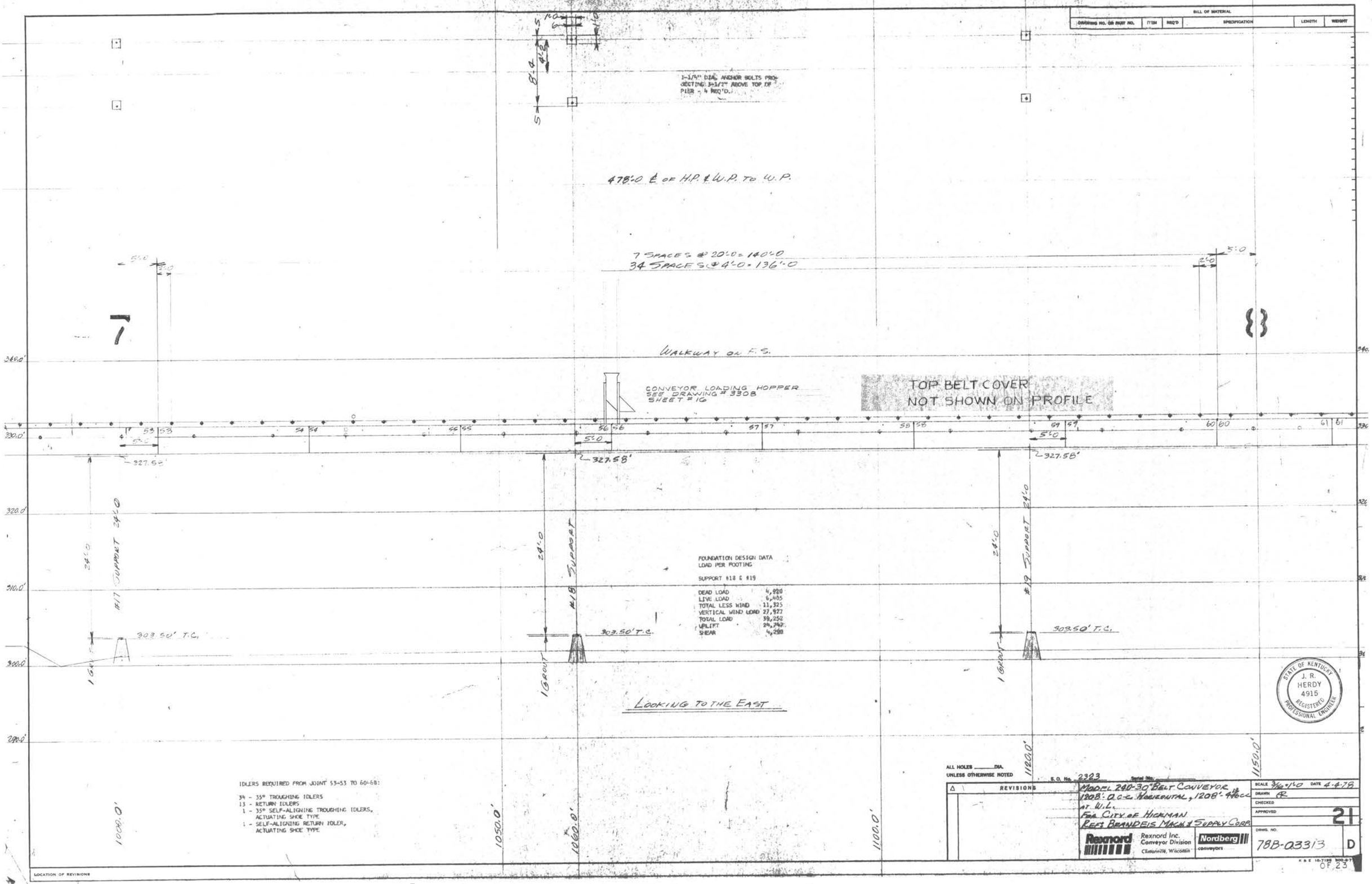
Rexnord Rexnord Inc. Conveyor Division Clintonville, Wisconsin — Nordberg conveyors

SCALE 3/16"=1'-0 DATE 4-4-78
DRAWN R
CHECKED
APPROVED
DRWG. NO. 78B-03312 D

K & E 10-7188 800-672
OF 23

LOCATION OF REVISIONS

Plan 7: 30" 1,200-FT Conveyor System
Station 6 to Station 7



Plan 8: 30" 1,200-FT Conveyor System
Station 7 to Station 8

BILL OF MATERIAL					
DRAWING NO. OR PART NO.	ITEM	REQ'D	SPECIFICATION	LENGTH	WEIGHT

APPROXIMATE WEIGHTS

Conveyor:

20 ft. section of frame w/idlers:	1,500#
20 ft. section of walkway:	580#
Total for 20 ft. section:	2,080#
Total per 1,208 ft. conveyor:	126,000#

Stacker:

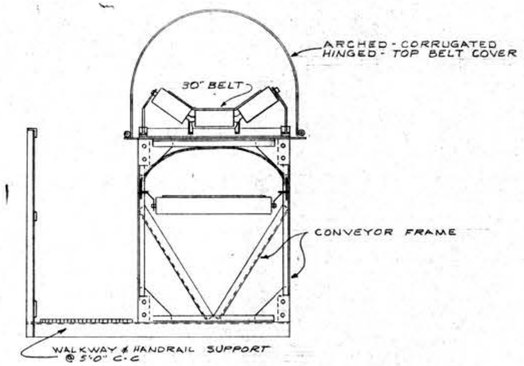
125 ft. of conveyor, towers, frame wheels, etc.:	29,000#

Supports:

Nos. 5 thru 19, inclusive, total, (fifteen welded assembled units ranging from 500# to 1,000#):	12,000#
Nos. 3 and 4, knocked down in components:	18,000#

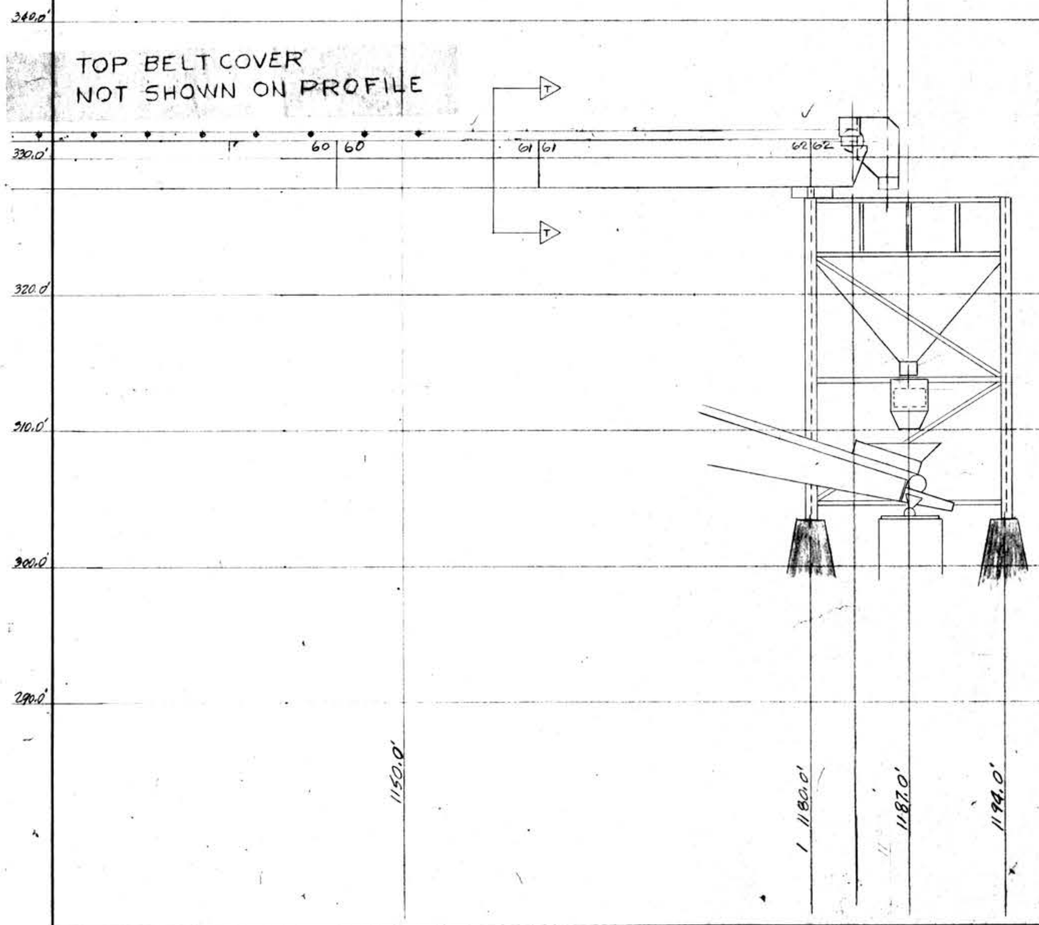
Hoppers:

At river end of main conveyor:	6,000#
At land end of main conveyor:	12,000#



SECTION T-T (TYP.)
NOT TO SCALE

TOP BELT COVER
NOT SHOWN ON PROFILE



ALL HOLES ____ DIA. UNLESS OTHERWISE NOTED

S.O. No. 2323 Serial No.

REVISIONS
Δ

MODEL 240-30" BELT CONVEYOR
1208'-0 C-C HORIZONTAL, 1208'-4½" C-C AT M.L.
FOR CITY OF HICKMAN
REF: BRANDEIS MACH & SUPPLY CORP.

Rexnord Inc. Conveyor Division Chilton, Wisconsin — Nordberg conveyors

SCALE 3/16"=1'-0 DATE 4-4-78
DRAWN GR
CHECKED
APPROVED
DRWG. NO. 78B-03314 D

K & E 10-7155 500-6-77

LOCATION OF REVISIONS

STATE OF KENTUCKY J. R. HERDY 4915 REGISTERED PROFESSIONAL ENGINEER

Plan 9: 30" 1,200-FT Conveyor System
Station 8

Plan 10: Community Program Consultants Site Plan

PANEL-M

120/240 VOLTS - 1Ø - 3W - 60 AMP MAINS - 40 AMP MAIN BKR - MT'D IN M.C.C.

WIRE	POLES	BKR	DESCRIPTION	CKT NO.	LOAD A	LOAD B	CKT NO.	DESCRIPTION	BKR	POLES	WIRE
12'S	1	20	BIN GATE MTR.	1	700 / 700		2	BIN GATE MTR.	20	1	12'S
8'S	1	20	WALKWAY RCPT'S.	3		600 / 600	4	WALKWAY RCPT'S.	20	1	8'S
12'S	1	20	LTG	5	360		6	SPARE	20	1	—
—	1	20	SPARE	7		—	8	SPARE	20	1	—

PANEL-RI (NEMA 3R ENCLOSURE)

120/240 VOLTS - 1Ø - 3W - 60 AMP MAINS - 40 AMP MAIN BKR - SURFACE MT'D

WIRE	POLES	BKR	DESCRIPTION	CKT NO.	LOAD A	LOAD B	CKT NO.	DESCRIPTION	BKR	POLES	WIRE
12'S	1	20	BIN GATE MTR.	1	700 / 700		2	BIN GATE MTR.	20	1	12'S
8'S	1	20	WALKWAY RCPT'S.	3		600 / 600	4	WALKWAY RCPT'S.	20	1	8'S
—	1	20	SPARE	5			6	SPARE	20	1	—
12'S	1	20	LTG.	7		600	8	SPARE	20	1	—

PANEL-R (NEMA 3R ENCLOSURE)

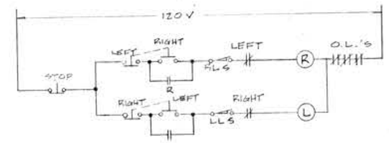
480/277 VOLTS - 3Ø - 4W - 200 AMP MAINS - 200 AMP MAIN BKR - SURFACE MT'D

WIRE	POLES	BKR	DESCRIPTION	CKT NO.	LOAD A	LOAD B	LOAD C	CKT NO.	DESCRIPTION	BKR	POLES	WIRE
4'S / 8	3	90	40 H.P. CONVEYOR	1	4.8 / 1.2			2	XFRMR - PANEL-RI	2	20	12'S
—	—	—	—	—		1.2 / 1.2		—	—	—	—	—
—	—	—	—	—			15K	6	FUTURE MAGNET	3	60	—
—	3	30	SPARE	7	—			—	—	—	—	—
—	—	—	—	—		—		—	—	—	—	—
—	—	—	—	—			—	12	SPACE ONLY	—	—	—

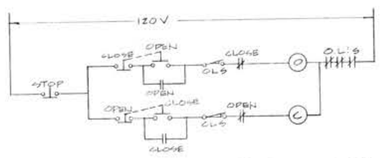
MOTOR CONTROL CENTER

TAG	BREAKER	STARTER	FEEDER	DESCRIPTION
1	3P400AT W/SHUNT TRIP	——	4 #600 MCM'S 3½" CONDUIT	MAIN
2	3P90AT	5	3 #4 & 1 #8 GND 1¼" CONDUIT	40 H.P. MAIN CONVEYOR
3	3P80AT	3	3 #6 & 1 #8 GND 1" CONDUIT	30 H.P. RADIAL STACKER
4	3P25AT	1	3 #12'S & 1 #12 GND 3/4" CONDUIT	10 H.P. TRANSFER CONVEYOR
5	3P20AT	1 REV.	3 #12'S & 1 #12 GND 3/4" CONDUIT	7½ H.P. HOIST
6	3P15AT	1 REV.	5 #12'S & 1 #12 GND 3/4" CONDUIT	2 H.P. STACKER TRAVEL
7	2P20AT	——	3 #12'S 3/4" CONDUIT	7½ KVA DRY TRANSFORMER (FOR PANEL-M)
8	3P200AT	——	3 #2/0 MCM'S 2½" CONDUIT	PANEL-R (AT RIVER)
9	3P60AT	1 (SPACE)	——	SPARE
10	3P30AT	1 (SPACE)	——	SPARE
11	——	——	——	——
12	——	——	——	——
13	——	——	——	——

PANEL-M & TWO(2) MOTOR STARTERS FOR ¼ H.P. BIN GATE MOTORS SHALL BE MOUNTED IN THIS AREA.

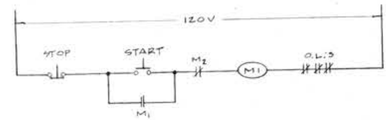


CONTROL DIAGRAM 2 H.P. RADIAL STACKER TRAVEL
NO SCALE

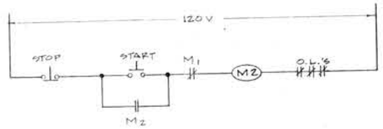


CONTROL DIAGRAM (TYPICAL OF 4) ¼ H.P. BIN GATE MOTORS
NO SCALE

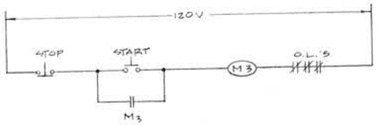
NOTE:
(1) ALL STARTERS SHALL INCLUDE CONTROL BUTTONS IN THE FACE & SHALL INCLUDE 120V COILS & CONTROL TRANSFORMERS AS NECESSARY.
(2) FURNISH & INSTALL 120 V-20 AMP RECEPTACLES @ 100' INTERVALS ALONG THE CONVEYOR WALKWAY. TOTAL OF 12 - 3/CIRCUIT.
(3) FURNISH & INSTALL RED MUSHROOM HEAD PUSHBUTTON ON MAIN BREAKER DOOR FOR EMERGENCY SHUTDOWN OF MOTOR CONTROL CENTER.



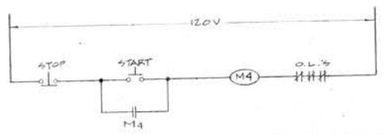
CONTROL DIAGRAM 40 H.P. CONVEYOR (LAND END)
NO SCALE



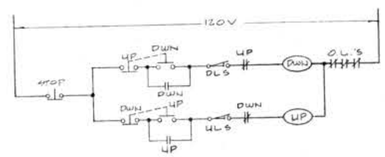
CONTROL DIAGRAM 40 H.P. CONVEYOR (RIVER END)
NO SCALE



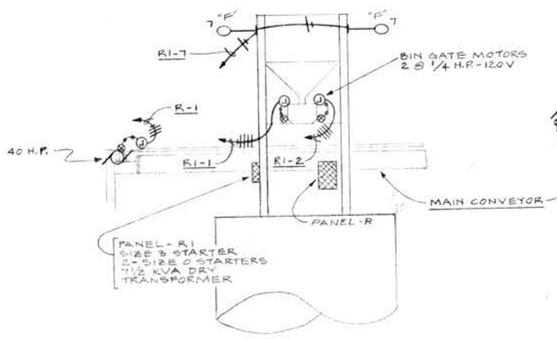
CONTROL DIAGRAM 30 H.P. RADIAL STACKER
NO SCALE

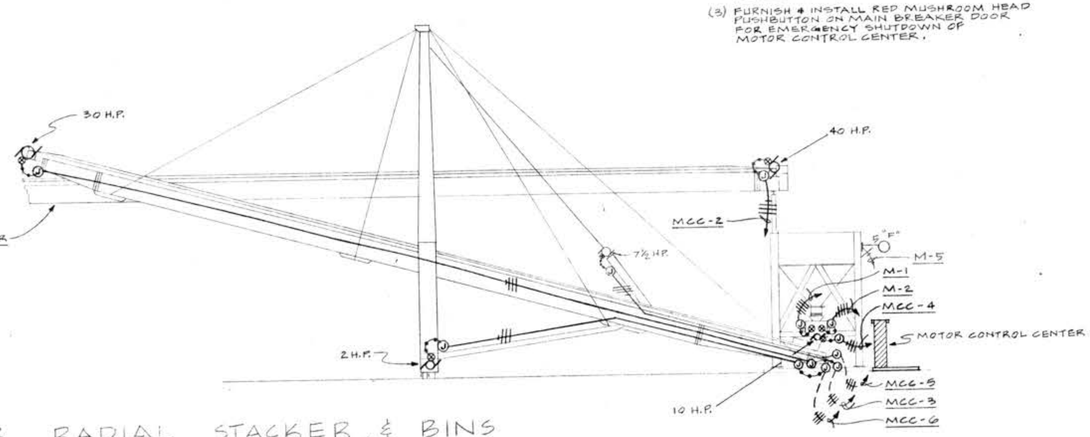


CONTROL DIAGRAM 10 H.P. TRANSFER CONVEYOR
NO SCALE

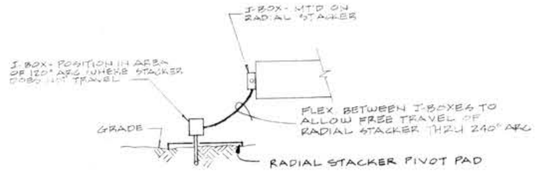


CONTROL DIAGRAM 7½ H.P. RADIAL STACKER HOIST
NO SCALE

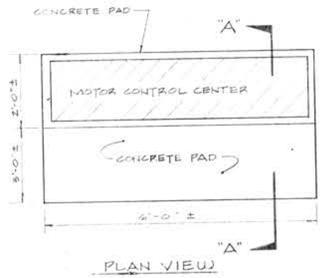




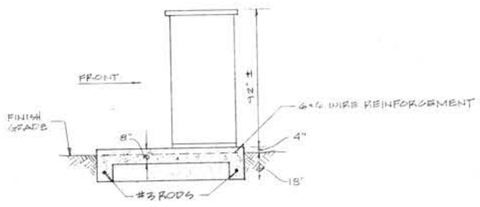
CONVEYOR, RADIAL STACKER, & BINS
NO SCALE



BASIC DETAIL FOR FLEX CONNECTIONS TO RADIAL STACKER (TYPICAL OF 3)
NO SCALE



PLAN VIEW



SECTION "A-A"

MOTOR CONTROL CENTER
NO SCALE

CONVEYOR & STACKER - ELECTRICAL
HICKMAN-FULTON COUNTY
RIVERPORT AUTHORITY
HICKMAN, KENTUCKY

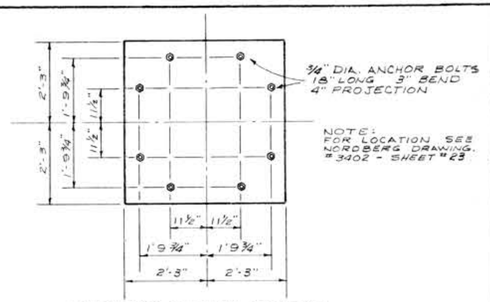
Community Program Consultants
ENGINEERS PLANNERS
700 JEFFERSON — PADUCAH, KENTUCKY 42001
10
OF 23

Plan 11: Electrical Plans

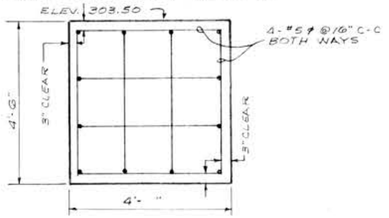
CONVEYOR FOOTING SCHEDULE

PEIR #	STATION	ELEV.	PEIR A	PEIR B	PEIR C	PEIR E	PEIR F	PEIR G	PEIR H	FOOTING L	FOOTING W	FOOTING D	FOOTING X	FOOTING Y
3 *	1+00.0	285.44	15'-7"	15'-0"	6'-0"	24"	24"	4-#9 ø	#3 ø @18" C-C	30'-0"	8'-0"	2'-4"	8-#9 ø @18⅝" C-C	30-#7 ø @12⅛" C-C
4 **	2+20	306.00	11'-10"	11'-6"	5'-0"	22"	22"	4-#8 ø	#3 ø @18" C-C	24'-0"	6'-0"	2'-0"	6-#9 ø @13" C-C	24-#6 ø @12⅛" C-C
5	3+00	321.00	6'-10"	6'-7"	3'-0"	12"	12"	4-#6 ø	#3 ø @12" C-C	14'-8"	4'-0"	1'-3"	4-#8 ø @13⅝" C-C	18-#5 ø @10" C-C
6	3+60	319.00	7'-2"	6'-11"	4'-0"	16"	16"	4-#8 ø	#3 ø @16" C-C	16'-0"	4'-0"	1'-4"	4-#8 ø @13⅝" C-C	20-#5 ø @9⅞" C-C
7	4+20	321.00	6'-10"	6'-7"	3'-0"	12"	12"	4-#6 ø	#3 ø @12" C-C	14'-8"	4'-0"	1'-3"	4-#8 ø @13⅝" C-C	18-#5 ø @10" C-C
8	4+72	313.57	7'-10"	7'-7"	4'-3"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-0"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C
9	5+32	305.75	8'-10"	8'-6"	3'-9"	16"	16"	4-#8 ø	#5 ø @16" C-C	18'-0"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	21-#5 ø @10⅜" C-C
10	5+92	304.98	8'-8"	8'-4"	3'-9"	16"	16"	4-#8 ø	#3 ø @16" C-C	18'-0"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	21-#5 ø @10⅜" C-C
11	6+52	304.11	8'-6"	8'-3"	7'-0"	16"	9'-7"	8-#8 @12" C; 10-#5 @14½" C	#3 ø @12" C-C	14'-0"	6'-0"	1'-6"	7-#7 ø @11" C-C	14-#6 ø @12⅛" C-C
12	7+12	303.50	8'-4"	8'-1"	8'-0"	16"	9'-7"	8-#8 @12" C; 10-#5 @14½" C	#3 ø @16" C-C	14'-0"	6'-0"	1'-6"	7-#7 ø @11" C-C	14-#6 ø @12⅛" C-C
13	7+60	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C
14	8+20	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C
15	8+80	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C
16	9+40	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C
17	10+00	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C
18	10+60	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#5 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝"	20-#5 ø @10⅜" C-C
19	11+20	303.50	8'-4"	8'-1"	4'-6"	16"	16"	4-#8 ø	#3 ø @16" C-C	17'-6"	4'-0"	1'-6"	4-#8 ø @13⅝" C-C	20-#5 ø @10⅜" C-C

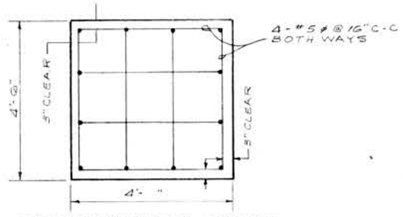
NOTE:
** 3 ANCHOR BOLTS REQUIRED PER PIER - SEE NORDBERG DRAWING "3305 - SHEET "13
** 2 ANCHOR BOLTS REQUIRED PER PIER - SEE NORDBERG DRAWING "3302 - SHEET "14
ALL CONCRETE TO BE CLASS A



ANCHOR BOLT DETAIL

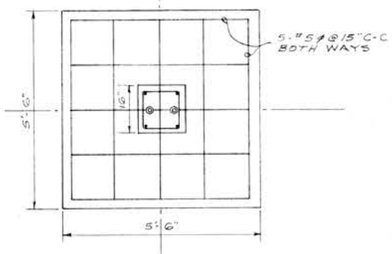


REINFORCING DETAIL
TOP & BOTTOM

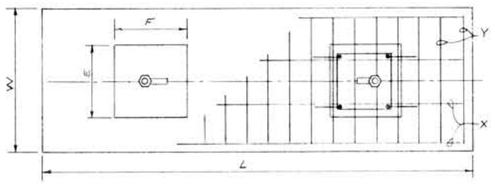


REINFORCING DETAIL
ALL SIDES (4)

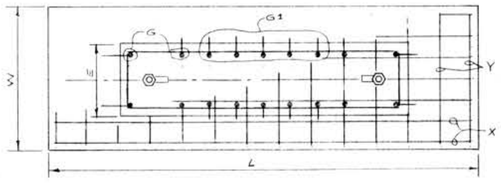
FOOT PIVOT FOUNDATION
SCALE ½" = 1'-0" ONE REQUIRED



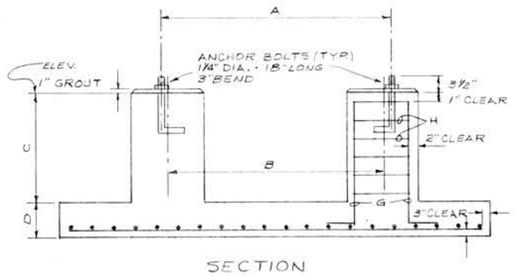
PLAN



PLAN

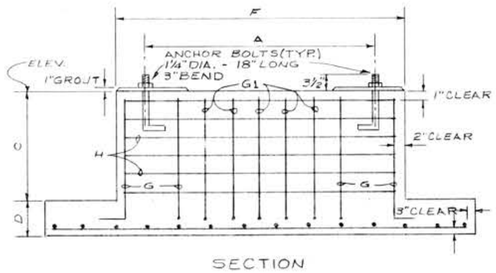


PLAN



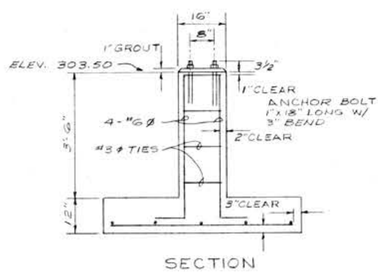
SECTION

TYPICAL PIER
PIERS # 3-4-5-6-7-8-9-10
13-14-15-16-17-18-19
NOT TO SCALE



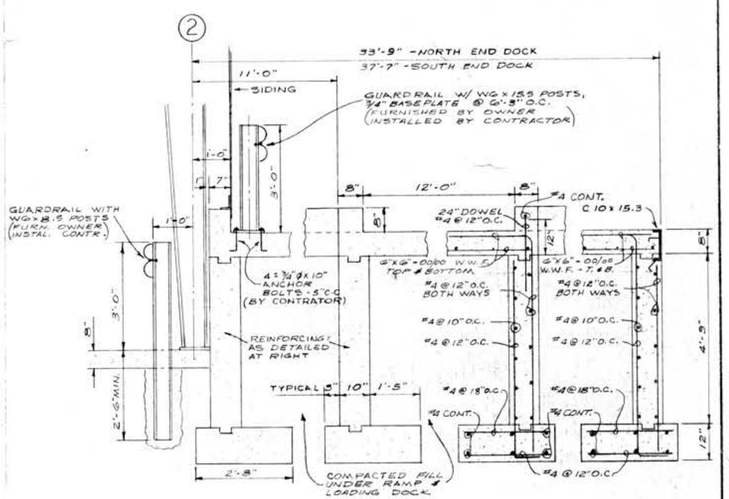
SECTION

SPECIAL PIER
PIERS # 11 & 12
NOT TO SCALE

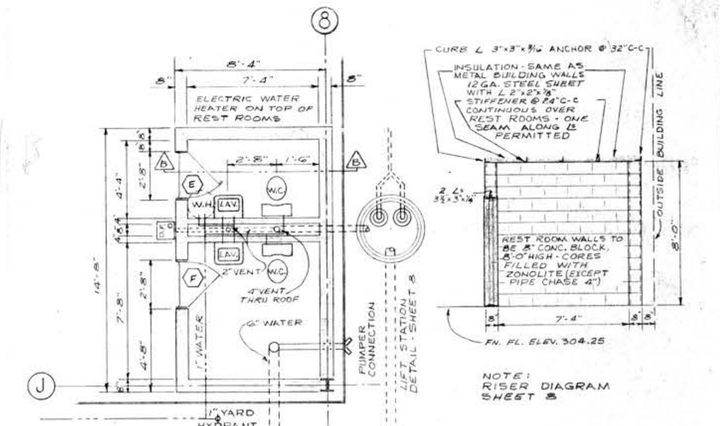


SECTION

HOPPER FOOTING
4 - REQUIRED
SCALE ½" = 1'-0"



SECTION A-A
LOADING DOCK AND RAMP
SCALE ½" = 1'-0"



DETAIL - REST ROOMS
SCALE ¼" = 1'-0"

NOTE:
RISER DIAGRAM
SHEET 8

SECTION B-B
SCALE ¼" = 1'-0"

DOOR SCHEDULE

DOOR	SIZE	TYPE	FRAME	HARDWARE
A	18'-2" x 18'-1"	OVERHEAD 20GA. STEEL SECTION	BY BUILDING MANUFACTURER	¾ H.P. ELECTRIC OPERATED
B	14'-2" x 16'-1"	OVERHEAD 20GA. STEEL SECTION	BY BUILDING MANUFACTURER	¾ H.P. ELECTRIC OPERATED
C	3070 x 1¾	HOLLOW METAL ½ GLASS	BY BUILDING MANUFACTURER	SET "1
D	3070 x 1¾	HOLLOW METAL FULL FLUSH	BY BUILDING MANUFACTURER	SET "1
E	2668 x 1¾	HOLLOW METAL FULL FLUSH	16 GA. x 8¾"	SET "2
F	2668 x 1¾	HOLLOW METAL FULL FLUSH	16 GA. x 8¾"	SET "2

HARDWARE

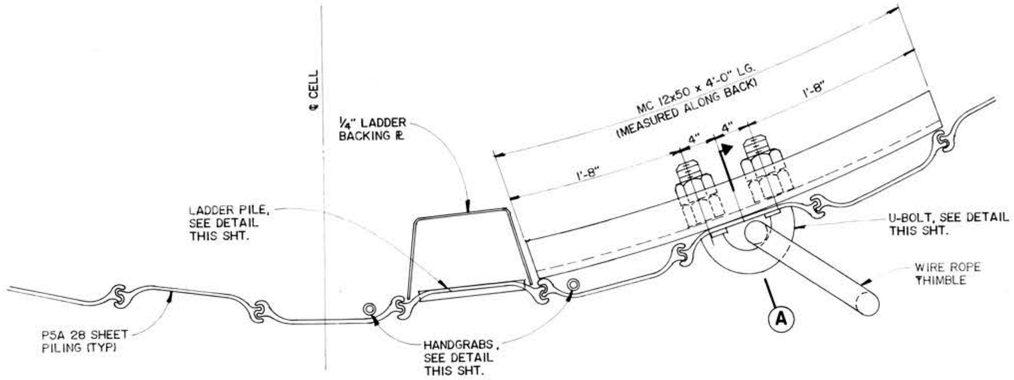
SET "1	HINGES	1½ PR. BB1279 - 4½ x 4½ x USP x NRP
	LATCH	SARGENT "7725 - MRL x US10, KEY ALIKE
	CLOSER	SARGENT "1245 x P.A.
	THRESHOLD	NTL. GD. "887
SET "2	HINGES	1½ PR. 1279 - 4½ x 4½ x USP
	LATCH	SARGENT "7 U 65 - DC x US 26D
	BUMPER	BALDWIN "521 x US 26D

CONVEYOR FOOTING & DETAILS
HICKMAN-FULTON COUNTY
RIVERPORT AUTHORITY
HICKMAN, KENTUCKY

Community Program Consultants
ENGINEERS PLANNERS
700 JEFFERSON — PADUCAH, KENTUCKY 42001
7
OF 23

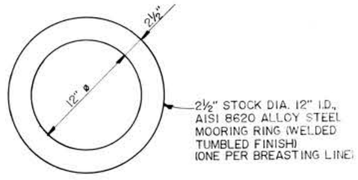
CONVEYOR FOOTINGS

Plan 12: Conveyor Footing Schedule & Details



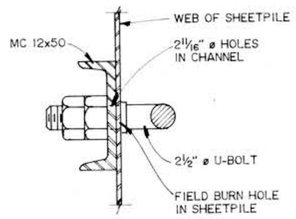
CELL ACCESSORIES - LOCATION PLAN

1½"=1'0"

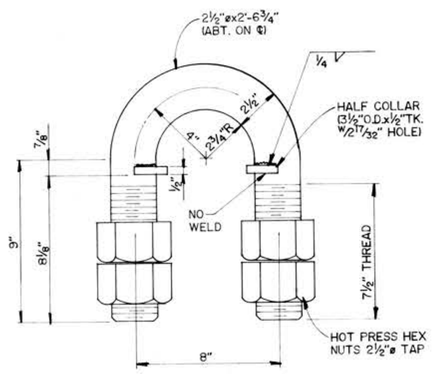


DETAIL - MOORING RING

N.T.S.

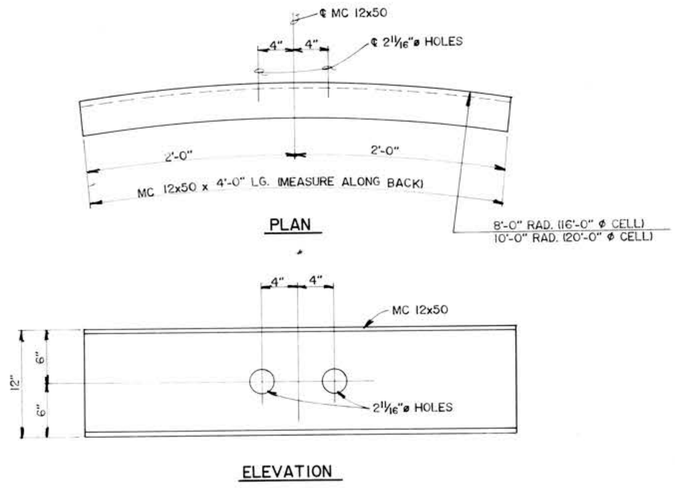


SECTION 'A-A'



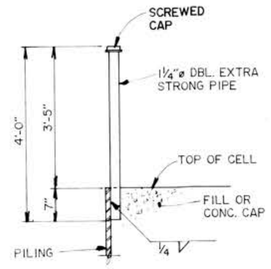
DETAIL - MOORING UNIT U-BOLT

3"=1'-0"



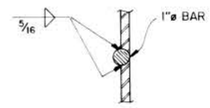
DETAIL - MOORING UNIT BACK-UP CHANNEL

1½"=1'-0"

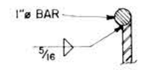


DETAIL - HANDGRAB

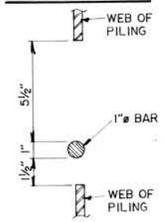
N.T.S.



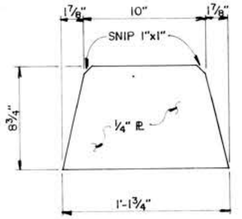
SECTION 'D-D'



SECTION 'C-C'

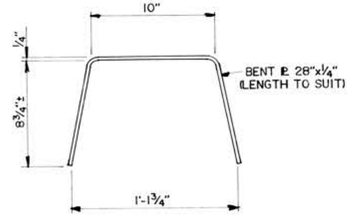


SECTION 'B-B'



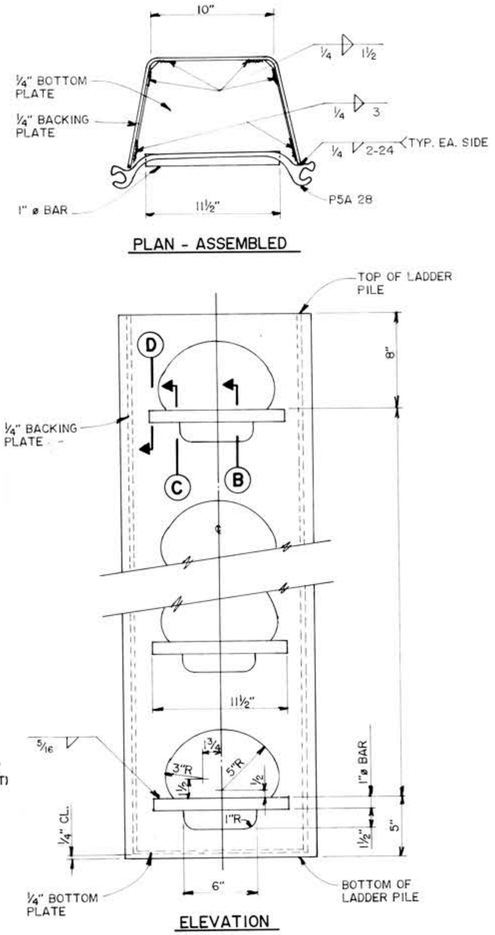
DETAIL - BOTTOM PLATE

2"=1'-0"



DETAIL - LADDER BACKING

2"=1'-0"



DETAIL - LADDER PILE

2"=1'-0"

FLORENCE & HUTCHESON, INC.
Consulting Engineers

MOORING CELL MISC. DETAILS

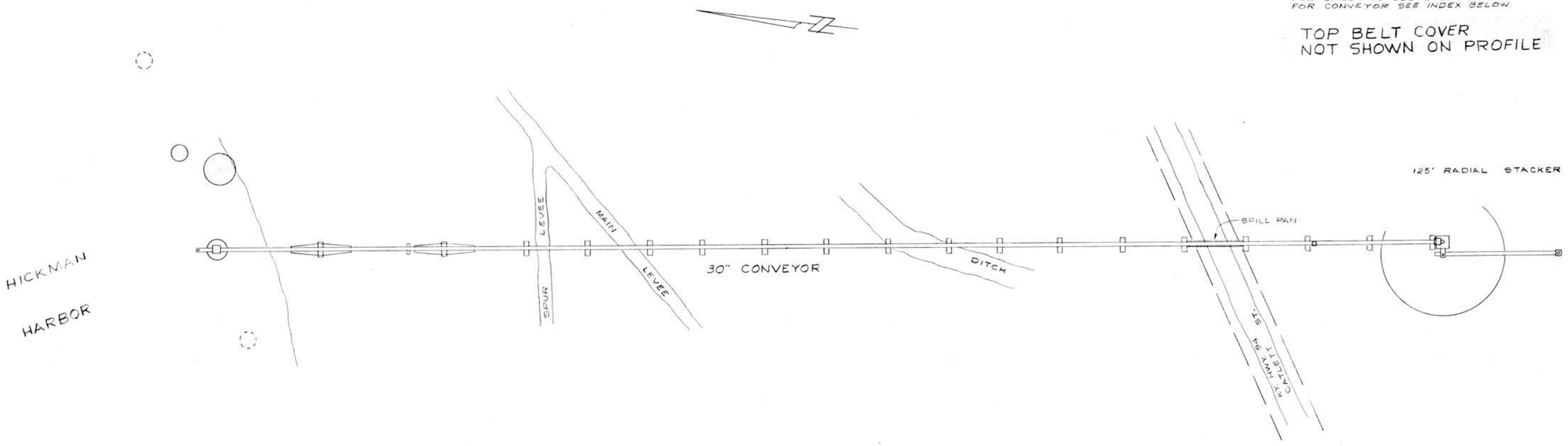
HICKMAN-FULTON CO. RIVERPORT
HICKMAN, KENTUCKY

Drawn: SCB	Check: WSU	Mechanical: ——	Electrical: ——	Project No.: 88135	5
Civil: JHM	Project: JHM	Approved: WSU	Date: 8-89	Scale: SHOWN	OF 5

Plan 13: Mooring Cell Misc. Details

NOTE:
ALL CONVEYOR MATERIALS (EXCEPT- FOUNDATIONS, ANCHOR BOLTS, AND SPILL PAN) FURNISHED BY OWNER AND TO BE INSTALLED BY CONTRACTOR.
FOR ANCHOR BOLTS SEE SHEET 7
FOR SPILL PAN SEE SHEET 3
FOR CONVEYOR SEE INDEX BELOW

TOP BELT COVER
NOT SHOWN ON PROFILE



NORDBERG ERECTION DRAWINGS

" 3305 SHEET " 13	" 3306 SHEET " 14	" 3307 SHEET " 15	" 3309 SHEET " 17	" 3310 SHEET " 18	" 3311 SHEET " 19	" 3312 SHEET " 20	" 3313 SHEET " 21	" 3314 SHEET " 22	RADIAL STACKER " 3402 SHEET " 23

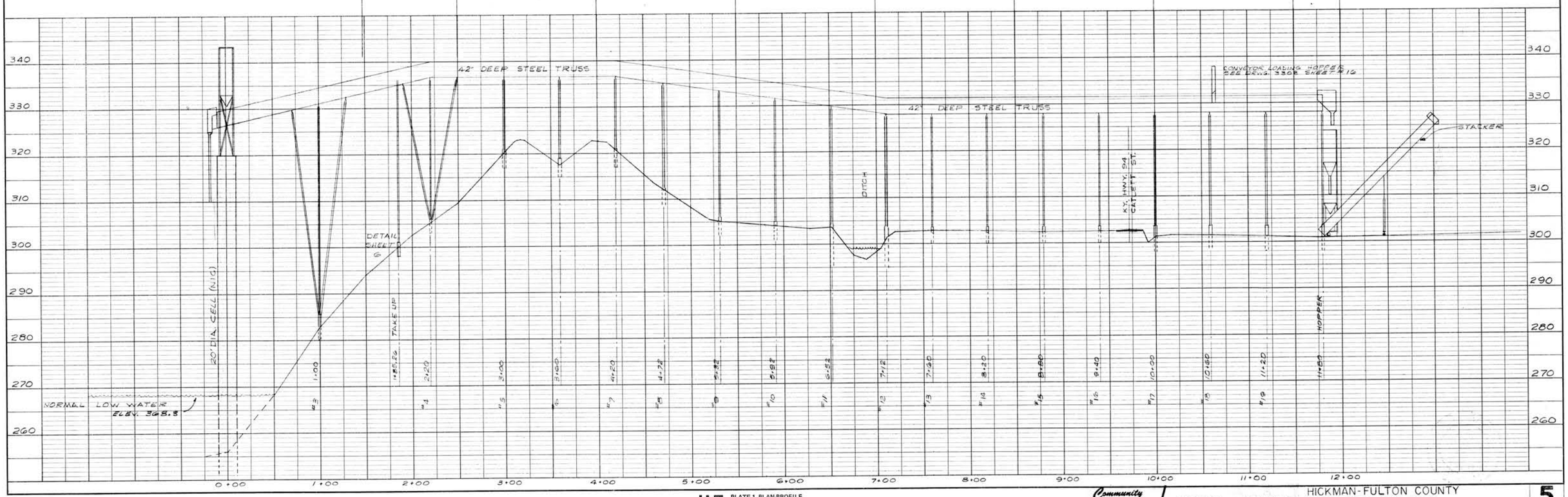


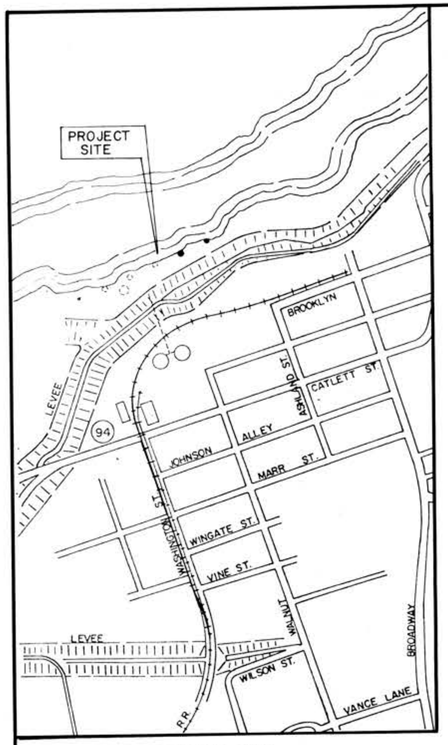
PLATE 1, PLAN-PROFILE
KEUFFEL & ESSER CO.

Community Program Consultants
ENGINEERS PLANNERS
700 JEFFERSON — PADUCAH, KENTUCKY 42001

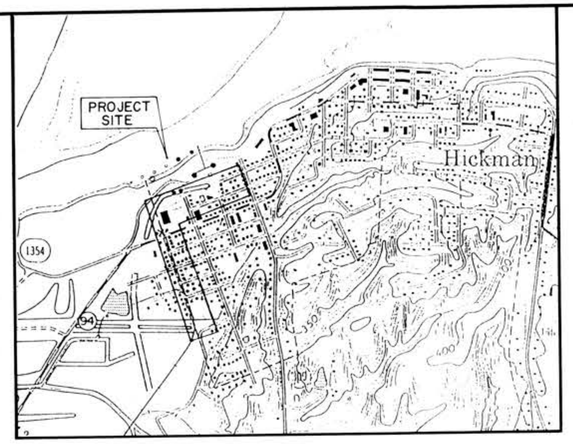
HICKMAN-FULTON COUNTY
RIVERPORT AUTHORITY
HICKMAN, KENTUCKY

5
OF 23

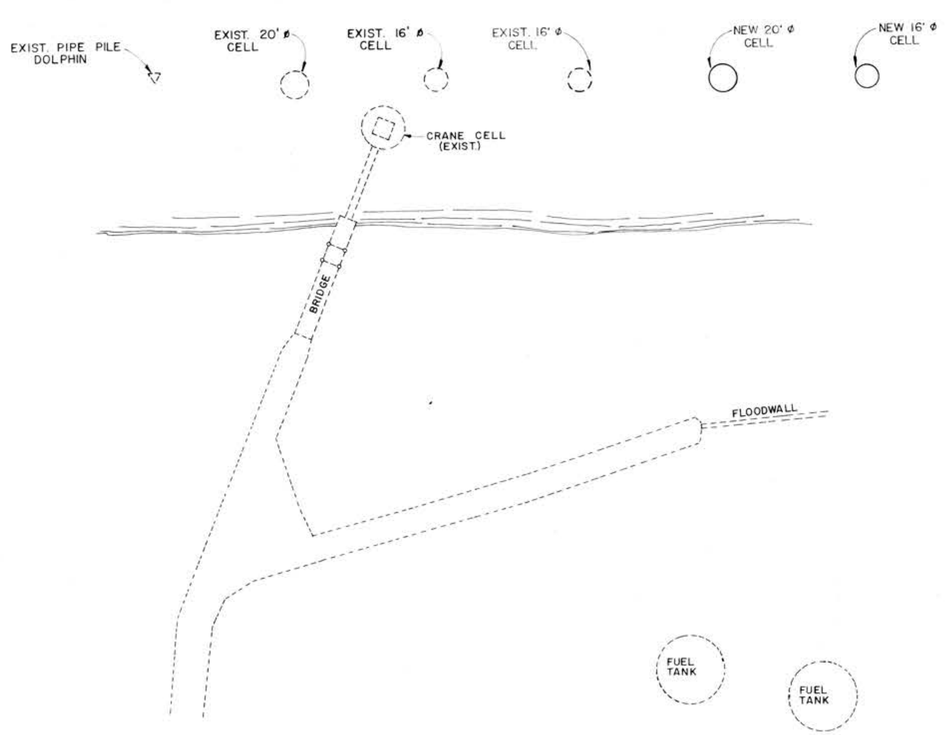
Plan 14: Community Program Consultants Site Plan with Profile Plan View



SITE LOCATION MAP
N.T.S.



VICINITY MAP
SCALE: 1" = 1,000'



SITE PLAN

INDEX OF DRAWINGS	
SHEET NO.	DESCRIPTION
1	SITE PLAN
2	SUBSURFACE INVESTIGATION
3	MOORING CELL - 16' DIA.
4	MOORING CELL - 20' DIA.
5	MOORING CELL DETAILS

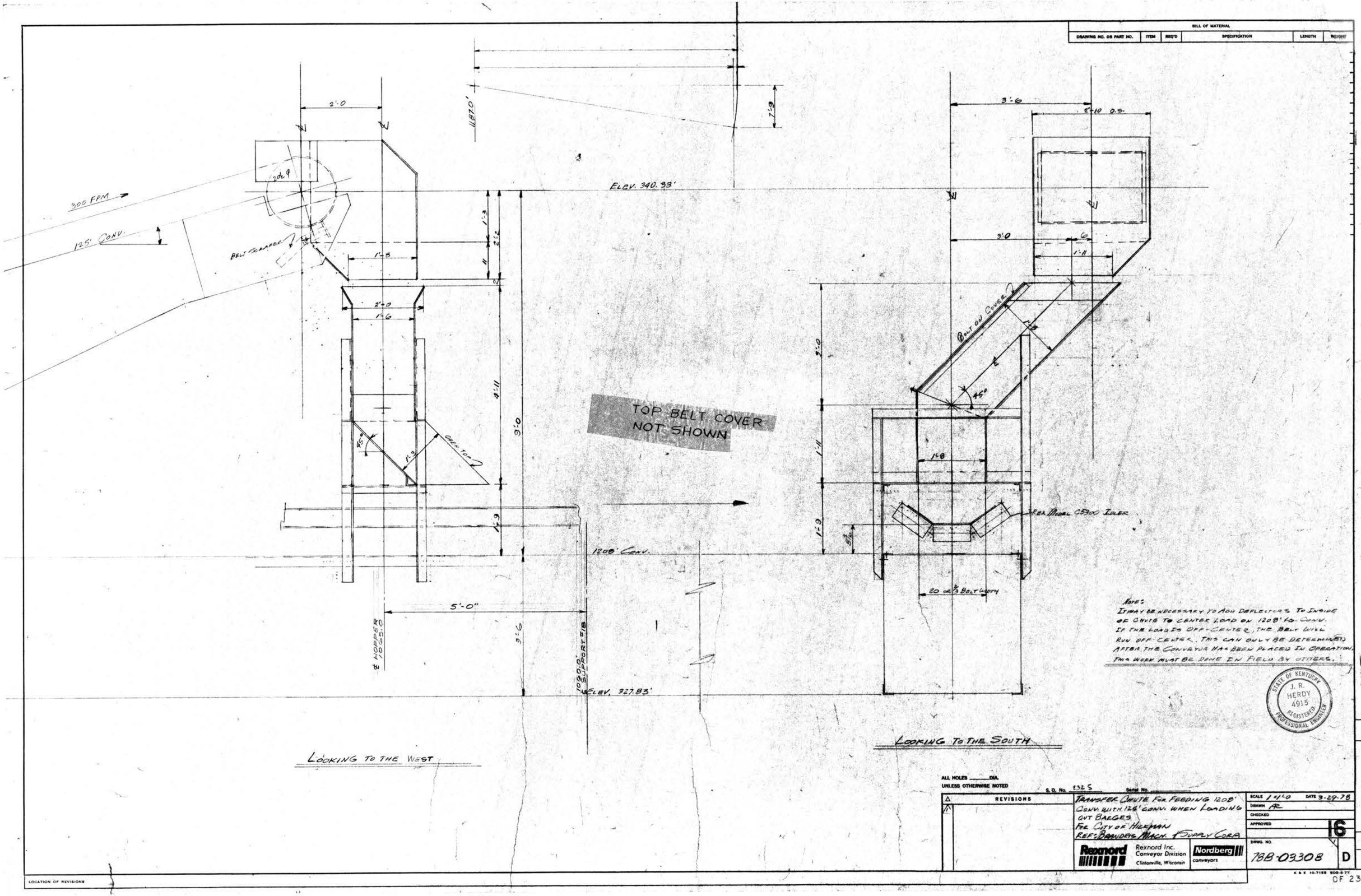
FLORENCE & HUTCHESON, INC.
Consulting Engineers

SITE PLAN

HICKMAN - FULTON CO. RIVERPORT
HICKMAN, KENTUCKY

Drawn:	Check:	Mechanical:	Electrical:	Project No.:	
SCB	WSU	—	—		1
Civil:	Project:	Approved:	Date:	Scale:	OF 5
RSB	RSB	WSU		N.T.S.	

Plan 15: F&H Site Plan with Site Maps



Plan 16: Transfer Chute Plans

Appendix B

Topographic Survey

CLIENT:
HICKMAN–FULTON COUNTY RIVERPORT
625 CATLETT STREET
HICKMAN, KENTUCKY 42050

OWNERS:
HICKMAN–FULTON COUNTY RIVERPORT
625 CATLETT STREET
HICKMAN, KENTUCKY 42050

THE INTENT OF THIS PLAT IS TO PROVIDE TOPOGRAPHIC INFORMATION FOR THE PROPERTY AS SHOWN HEREON.

THIS PROPERTY IS LOCATED IN FLOOD ZONE X, "AREA WITH REDUCED FLOOD RISK DUE TO LEVEE", AND FLOOD ZONE AE, "SPECIAL FLOOD HAZARD AREAS WITH BFE OR DEPTH", AS SHOWN ON THE NATIONAL FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NO. 21075C0154D, EFFECTIVE JUNE 2, 2011.

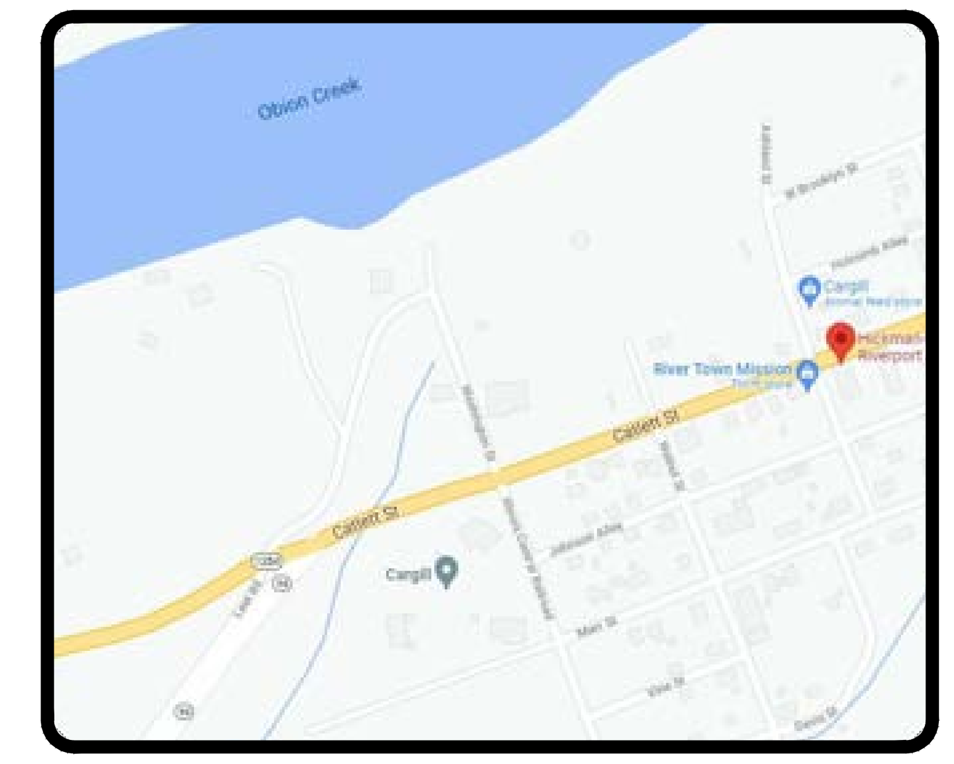
NOTE: ELEVATIONS ARE BASED FROM U.S.G.S. DATUM (NAVD 88)
RAILROAD SPIKE IN POWER POLE
ELEVATION = 319.11

CONTROL POINT COORDINATES:

CP–1
NORTHING: 1744683.020
EASTING: 625824.188
CP–2
NORTHING: 1744801.149
EASTING: 625837.936
CP–3
NORTHING: 1744935.546
EASTING: 625853.029
CP–4
NORTHING: 1743976.797
EASTING: 625644.493

N
W E
S

COORDINATES SHOWN HEREON BASED ON KENTUCKY STATE PLANE COORDINATE SYSTEM (SOUTH ZONE)



VICINITY MAP

BUILDING
EDGE OF GRAVEL
EDGE OF PAVEMENT
ROADWAY CENTERLINE
FENCE
WATER EDGE
STORM SEWER
OVERHEAD ELECTRIC
MAJOR CONTOUR
MINOR CONTOUR
EXISTING BUILDING
EXISTING CONCRETE PAVEMENT
UTILITY POLE

BURIED UTILITIES NOTE

BURIED UTILITIES ARE SHOWN AT THEIR APPROXIMATE LOCATION BASED UPON INFORMATION OBTAINED FROM UTILITY COMPANIES AND FIELD EVIDENCE. OTHER BURIED UTILITIES MIGHT EXIST ON THE SUBJECT SITE WHICH ARE NOT SHOWN ON THIS DRAWING. USE EXTREME CAUTION DURING EXCAVATION PROCEDURES AND CONTACT KENTUCKY 811 @ 811 OR 1–800–752–6007 FOR EXACT LOCATION OF BURIED FACILITIES PRIOR TO EXCAVATION OPERATIONS.

Kentucky 811
Know what's below. Call before you dig.

Call 811 or 800–752–6007
www.kentucky811.com
Two Business Days Before You Dig
IT'S THE LAW

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 INCH = 60 FT

I DO HEREBY CERTIFY THAT THE TOPOGRAPHIC INFORMATION SHOWN HEREON WAS PERFORMED UNDER MY DIRECT SUPERVISION BY THE METHOD OF RANDOM TRAVERSE AND GPS.
DATE OF SURVEY: JANUARY 4, 2022

K. JETT WOOD, P.L.S. #3445 DATE

THIS PROPERTY IS SUBJECT TO ALL PREVIOUSLY CONVEYED RIGHT–OF–WAYS AND EASEMENTS. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE OPINION.

21183
01/05/2022
KNM
KJW

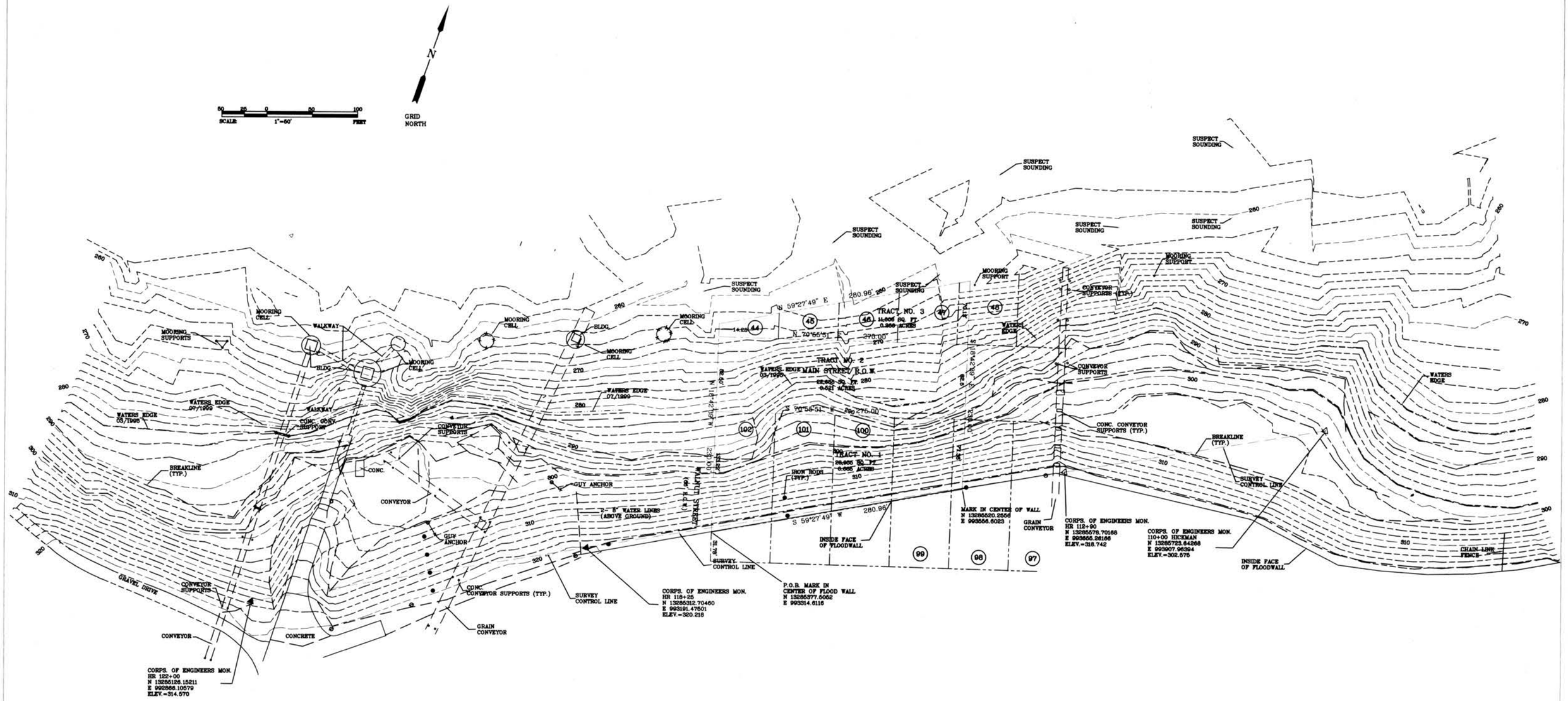
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

TOPOGRAPHIC SURVEY

FULTON–HICKMAN COUNTY RIVERPORT
CATLETT STREET
HICKMAN, FULTON CO., KENTUCKY 42050

FOR HICKMAN–FULTON COUNTY RIVERPORT

Plan 1: BFW Topographic Survey



LEGEND

SURVEY CONTROL	△
LIGHT POLE	o
POWER POLE	⊕
WATER	
INTERMEDIATE CONTOUR	
INDEX CONTOUR	310
FENCE LINE	
EDGE OF PAVEMENT	
EDGE OF GRAVEL	

NOTES:

1.) CONTOURS SHOWN HEREON ARE PLOTTED AT 2 FOOT INTERVALS.
2.) WATER LINE LOCATION TAKEN MARCH 26, 1995 & JULY 21,1999
3.) SOUNDINGS TAKEN USING HORIZON DEPTH SOUNDER, EQUIPMENT TOLERANCE +/- 2%
4.) SURVEY CONTROL SUPPLIED BY CORPS. OF ENGINEERS
5.) ELEVATIONS SHOWN HEREON ARE REFERENCED TO NGVD 1929.
6.) HORIZONTAL CONTROL TIED TO KENTUCKY STATE PLANE COORDINATES.

BOUNDARY NOTE:

BOUNDARY INFORMATION SHOWN HEREON TAKEN FROM SURVEY BY ROBERT L. NICHOLS & ASSOCIATES DATED 11/22/1995 STAMPED PRELIMINARY. NO BOUNDARY SURVEY WAS DONE BY THIS SURVEYOR AT THIS TIME, AND SAID SURVEYOR DOES NOT CERTIFY TO THE ACCURACY OF ANY BOUNDARY INFORMATION.

SURVEYORS' CERTIFICATE

TOPOGRAPHIC INFORMATION SHOWN HEREON IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DATE : JULY 25, 1999

SIGNED : _____
SCI SURVEYORS, INC.
JEFFREY K. CLARK, PLS#3117
100 FOUNTIAN AVE., SUITE 215
PADUCAH, KENTUCKY 42001

REV. 07/25/1999
TO SHOW POST DREDGING TOPOGRAPHIC INFORMATION IN AREA DIRECTED W.R. COLES & ASSOCIATES
REV. 07/18/97
TO SHOW BOUNDARY INFORMATION BY OTHERS.

TOPOGRAPHIC SURVEY
OF A PORTION OF THE
HICKMAN RIVERPORT AUTHORITY PROPERTY
HICKMAN, FULTON COUNTY, KENTUCKY

SCALE : 1" = 50'	DR : JKC	CHK : JKC	SHT. 1 OF 1

PREPARED FOR : W.R. COLES & ASSOCIATES
120 29TH AVENUE SOUTH
NASHVILLE, TENNESSEE 37212

SCI SURVEYORS, INC.
100 FOUNTAIN AVENUE, SUITE 215
PADUCAH, KENTUCKY 42001
(502) 444-9494

JOB : 95-116	FILE : 95-1162.DWG	DATE : 3

Plan 2: SCI Topographic Survey

Appendix C

Geotechnical Explorations

BACON | FARMER | WORKMAN

ENGINEERING & TESTING, INC.

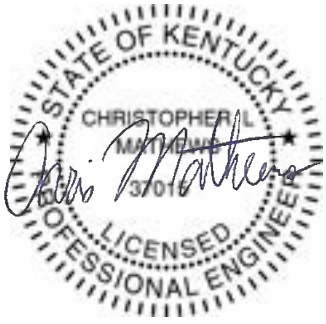
Hickman-Fulton Co. Riverport

Geotechnical Exploration Report

Hickman, Kentucky

Prepared For:

Mr. Greg Curlin, Executive Director
Hickman-Fulton Co. Riverport
625 Catlett Street
Hickman, KY 42050



4/15/2022
Exp. 6/30/2022

Submittal Date:

April 15, 2022

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

April 15, 2022

Mr. Greg Curlin, Executive Director
Hickman-Fulton Co. Riverport
625 Catlett Street
Hickman, KY 42050

Re: Geotechnical Exploration Report
Hickman-Fulton Co. Riverport
625 Catlett Street
Hickman, KY 42050

Dear Mr. Curlin:

Bacon Farmer Workman Engineering & Testing, Inc. (BFW), is pleased to present the attached Geotechnical Exploration Report for the referenced site. The geotechnical exploration was conducted in accordance with applicable ASTM Standards.

The attached report includes a review of pertinent project information provided to us, descriptions of site and subsurface conditions encountered and our general recommendations for foundations, site preparation and construction phase concerns. The Appendix contains a Boring Layout Map and results of all field and laboratory tests conducted for this project.

We appreciate the opportunity to serve you and look forward to future association with you on this and other projects. If you have questions concerning this report, please call our office.

Sincerely,

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

Christopher L. Mathews, P.E.
Geotechnical Engineer/Project Manager

Christopher N. Farmer, P.E.
Principal Engineer

Attachments: Geotechnical Exploration Report

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

ACRONYMS

ASTM	American Society for Testing and Materials
BFW	Bacon Farmer Workman Engineering & Testing, Inc.
bgs	below ground surface
LL	Liquid Limit
NRCS	Natural Resource Conservation Service
pcf	pounds per cubic foot
PI	Plasticity Index
PL	Plastic Limit
psf	pounds per square foot
psi	pounds per square inch
USCS	Unified Soil Classification System
USGS	United States Geologic Survey

1. PROJECT INFORMATION AND OBJECTIVE

This project involves the replacement of the 1,200-foot conveyor system and expansion of the adjacent mooring cell. The project is in its preliminary phases and detailed plans were not available at the time of this report. However, we understand that shallow foundations are desired for support of the conveyor. BFW is also providing a topographic survey, preliminary design recommendations and an Engineer's Opinion of Probable Cost for the conveyor system and cell

1.1 EXISTING SITE DESCRIPTION

The site is located at 625 Catlett Street, Hickman, KY 42050 (36.56892° N, 89.20556° W). The proposed replacement is at the location of the existing conveyor system. Based on publicly available LiDAR data, the approximate elevation of the site is 286 to 315 feet above mean sea level (amsl).

Figure 1.1. Project Location

1.2 SUBSURFACE EXPLORATORY METHOD

The procedures used by Bacon Farmer Workman Engineering & Testing, Inc. (BFW), Inc. for field and laboratory sampling and testing are in general accordance with American Society for Testing and Materials (ASTM) procedures, and established engineering practice. One (1) test boring was advanced to a depth of 81.5 feet bgs, one (1) test boring was advanced to 51.5 feet bgs, and one (1) test boring was advanced to a depth of 31.5 feet bgs within the footprint of the proposed structure. It should be noted that five (5) borings were originally planned for the exploration; however, two the of the borings were eliminated and the drilling footage was used to advance borings deeper that encountered soft soils. See the Boring Location Map and Subsurface Boring Logs in Appendix B and C, respectively for more detail.

A CME-45 track-mounted rotary-drilling rig was used to advance the soil test borings and to obtain soil samples for laboratory evaluation. The test borings were advanced in accordance with geotechnical investigative procedures outlined in ASTM D-1452.

Disturbed samples were retrieved during Standard Penetration Tests (SPT) [ASTM D-1586] using an automatic hammer assembly at various depths in the underlying stratum. The SPT consists of driving a 2-inch outside diameter split-barrel sampler (split-spoon) into the soil with a 140-pound weight falling freely through 30 inches. The sampler was driven in three (3) successive 6-inch increments, with the number of blows per increment being recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). Borings were backfilled with native soil cuttings at the completion of the subsurface investigation.

The project manager observed and directed the drilling operations and visually classified soil samples obtained in accordance with Unified Soil Classification System (USCS) and ASTM D-2488 guidelines. Records of the conditions encountered, and visual soil classification were prepared and incorporated in Subsurface Boring Logs included in Appendix C.

The Subsurface Boring Logs represent BFW's interpretation of the conditions encountered within the soil test borings. It should be noted that strata changes may vary from those encountered within the soil test borings, transitions may be gradual or abrupt, and conditions may vary significantly at other locations. The groundwater information listed represents conditions at the time of drilling activities. Representative soil samples obtained from the boring were preserved in plastic bags, sealed, and taken to the laboratory for testing.

2. SUBSURFACE CONDITIONS

2.1 REGIONAL GEOLOGY

The Natural Resource Conservation Service (NRCS) online web soil database was reviewed to determine the type of soil underlying the area of interest. Based on the available data the subject property as containing Convent silt loam and Robinsonville fine sandy loam. The NRCS information describes the Convent silt loam as somewhat poorly drained silt loam derived from coarse-silty alluvium. The Convent silt loam belongs to Hydrologic Soil Group B/D. The Robinsonville fine sandy loam is described as a well-drained fine sandy loam derived from mixed coarse-loamy alluvium. The Robinsonville fine sandy loam belongs to the Hydrologic Soil Group A.

2.2 SITE-SPECIFIC SUBSURFACE CONDITIONS

Existing fill soils were encountered at the surface in borings B-1 and B-3. The existing fill is likely associated with previous development of the riverport and was relatively stiff in nature. The natural soils present on the site consisted of interbedded layers of lean clay, sandy clay, clayey sand and occasionally gravelly sand. SPT blow counts “N-values” in the cohesive soils ranged from 3 to 16, classifying them as very soft to very stiff. The N-values in the granular soils ranged from 2 to 16, classifying them very loose to medium dense. All borings were advanced to the planned depth of termination without encountering refusal.

2.3 SITE HYDROGEOLOGY

Groundwater was encountered at depths ranging from 10 to 26.5 feet during drilling and as shallow as 5 feet after drilling. The groundwater level is dependent upon seasonal and climatic variations, as well as the water level in the nearby Mississippi River, and may be present at different depths in the future. Groundwater may be encountering in some footing excavations, particularly during wetter times of the year.

3. LABORATORY TESTING

Laboratory soil tests were conducted in accordance with applicable ASTM Standards. Natural moisture contents were determined for all samples collected. Liquid limits (LL) and Plastic Limits (PL) tests were conducted for selected soil samples to verify field classification of the soils. In addition, these tests evaluate the potential for volumetric changes in the soil. Laboratory test results are tabulated in Appendix D.

3.1 LABORATORY RESULTS

3.1.1 Natural Moisture Contents

Natural moisture contents were determined for the soil samples collected. Table 1.1 provides average moisture content derived from the soil samples analyzed.

Table 1.1 – Natural Moisture Content

Depth	Minimum	Maximum
0.0-5’	6.7	33.2
5.0-10’	7.4	36.9
10.0-15’	21.7	41.3
15.0-20’	26.5	39.9
20.0-25’	27.3	36.7
25.0-30’	25.2	29.2
30.0-35’	24.8	29.9
35.0-40’	24.5	26.0
40.0-45’	27.3	34.1
45.0-50’	26.3	43.2
50.0-55’	25.6	29.3
55.0-60’	31.7	31.7
60.0-65’	35.7	35.7
65.0-70’	38.6	38.6
70.0-75’	24.9	24.9
75.0-80’	31.7	31.7
80.0-85’	28.4	28.4

3.1.2 Atterberg Limits Tests

Atterberg Limits testing was conducted on samples from B-3 and B-5. The results from the Atterberg Limits tests are summarized in Table 1.2.

Table 1.2 – Atterberg Limits

Sample	Depth	LL	PL	PI	Classification
B-3	5.0’	NP	NP	NP	NP
B-5	7.5’	29	20	9	SC
B-5	40.0’	NP	NP	NP	--

3.1.3 Grain Size Analysis

Grain size analysis testing was conducted samples from B-5 and the results of the grain size analyses are summarized in Table 1.3

Table 1.3 – Grain Size Analysis

Sample	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
B-5	7.5’	4.75	0.12	0.077	0.031	-	72.0	24.5	3.4
B-5	40.0	9.5	0.069	0.057	0.05	1.1	24.1	73.0	1.3

4. GEOTECHNICAL CONSIDERATIONS AND RECOMMENDATIONS

Based on the results of the subsurface exploration, current site conditions observed, and laboratory results, items of geotechnical interest and considerations are discussed in the following sections.

4.1 BASIS FOR RECOMMENDATIONS

The following recommendations are based on data from this exploration and the stated project information. In our evaluations, we have utilized both subsurface data from this exploration and our experience with similar structures and subsurface conditions. If the structural information is incorrect or changed after our reporting, if the siting or building components have been changed, or if the subsurface conditions encountered during the construction vary from those reported, our recommendations should be reviewed considering the changed conditions.

Experience indicates that the actual subsoil conditions at a site could vary from those generalized based on soil test borings made at specific locations. Therefore, it is essential that a geotechnical engineer be retained to provide soil-engineering services during the site preparation, excavation, and foundation construction phases of the proposed project. The geotechnical engineer should observe compliance with the design concepts, specifications, and recommendations, and to allow design changes in the event subsurface conditions differ from those anticipated prior to the start of construction.

4.1.1 Silty-Clayey Soils / Construction Traffic / Subgrade Degradation Asphalt

Based on the subsurface data encountered, the in-situ near surface soils consist of soft clay soils with varying amounts of sand. It should be noted these soils can be very susceptible to degrade to unsuitable soils in the presence of moisture and construction traffic. In addition, the soils are typically difficult to properly compact when significantly wet of optimum moisture content as determined by a Standard Proctor test. The importance of these characteristic of clay soils cannot be overstated. The contractor must fully understand the causes and effects of moisture versus compaction for silty clay/loamy soil and the detrimental effect of construction traffic on soil subgrades. A discussion of clay soils and some of the potential negative effects of moisture and construction traffic are provided below.

If the soils are too dry or wet (above or below the optimum moisture content) then the soils will typically not compact properly even with above normal compaction efforts. If the soils are too dry, then water can be added on site during the compaction activities, but the soils will need time to adsorb the added moisture. However, if the soil moistures are too high, as typically the case in the spring and winter months, then the soils must be manipulated to accelerate drying by discing and aerating or by other means that would require above routine efforts.

The contractor should understand that aerating the soil requires a concerted effort to overturn, disc and manipulate the soils multiple times during the drying process. Typically, overturning the soils and discing once or twice will not be enough effort to dry the soils. It is the process of continually overturning and exposing the soils to the sun and wind that causes the drying process. However, this process is less effective during the wet seasons of the year and would typically require longer drying times. If the project time constraints do not allow for aeration, then additional drying methods, such as cement/lime stabilization or other methods may be needed.

It is also important to note that at the end of each day or prior to any rainfall events that the soil must be smoothed (slicked) and rolled to minimize any surface water infiltration. The site grading should always provide for positive site drainage away from the project site even during construction activities. Surface water / storm water should not be allowed to pond on the surface or in tire ruts.

Another characteristic of these soils is the high potential of subgrade degradation in the presence of elevated moistures and construction traffic. As is common construction knowledge, extremely large tire loadings are typically present on construction sites from dump trucks, concrete trucks, masonry block and brick/masonry block forklifts (Pettybone). The tire loadings from these vehicles are usually the most significant concentrated loadings that the soil subgrades will most likely encounter. In many cases these tire loadings will exceed the overall shear strength of the in-situ soils and rutting/pumping will occur as a result. This is especially true during repeated heavy tire loadings occur when the soil subgrade wet or above its optimum moisture content. To reiterate, the contractor should be aware that repeated heavy construction traffic loadings will cause significant damage to the soil subgrade especially when the soils are wet or saturated.

4.1.2 Soft Shallow Soils

Soft consistency shallow soils may be present on the site, particularly during wetter times of the year. It is possible that variable shallow soil conditions may be present across the proposed bin footprint. It is anticipated that the soft soils will be present near the anticipated foundation bearing elevations. It is very important that the soils across the proposed bin foundation area have uniform bearing characteristics. Therefore, it is recommended that the foundation area be stripped of organics and any upper soft soil zones be removed prior placement of any fill or foundations. The area should be proof-rolled using a fully loaded tandem axle dump. Proof-rolling consists of driving the loaded truck slowly across the bin footprint at overlapping intervals using the truck weight to identify soft soils that are subject to pumping, rolling, moving, or rutting. Soils that are identified as soft should be excavated and completely removed. If area is too soft to proof-roll then it is recommended that a series of test pits be excavated in the areas of the soft soils in a circular pattern to identify the areas of unsuitable soils. Once identified, the unsuitable soils should be excavated, removed, and replaced with properly compacted engineered fill material or by other methods as determined by the geotechnical engineer or testing agency. It is important that all unsuitable soils be identified and remediated prior to placement of additional fill materials.

4.2 SHALLOW FOUNDATIONS

We understand that shallow foundations are the desired option for the support of the new conveyor system. **It should be noted that very soft and loose soils are present on the site. Due to the project being in an area of high seismicity, there is the potential for failure of the conveyor system during a seismic event due to the presence of the soft soils. The choice of using shallow foundations should be made by the structural engineer based on the understanding of acceptable level of risk versus the design category of the structure.** Shallow foundations should be seated in the existing in-situ soils or properly compacted engineered fill. Shallow foundations should bear at a minimum depth of 24-inches below ground surface for frost protection.

A net allowable soil bearing pressures of 1,800 pounds per square feet (psf) should be used for both continuous and spread foundations. Continuous and isolated footings should have minimum widths of at least 24 inches and 36 inches, respectively.

All foundation bearing seats should be inspected by BFW personnel prior to any steel or concrete placement to ensure bearing capacity recommendations are met. We anticipate that soft, unsuitable will be encountered in some footings excavations and we recommend including a contingency in the construction budget for select footing overexcavations. Water should not be allowed to accumulate in the foundation excavation prior to concrete placement.

4.2.1 Seismic Site Class (2018 International Building Code)

Based on requirements of the 2018 International Building Code, site classifications are required for the design of seismic elements of structures. Upon review of subsurface soil data obtained and the 2018 International Building Code and the subsurface conditions encountered a Site Class D is recommended for use in design.

4.3 GENERAL SITE PREPARATION RECOMMENDATIONS

4.3.1 Clearing / Grubbing / Stripping

The subject site should be cleared, stripped, and grubbed of topsoil/organics, old footings/foundations, basement walls/floors, historic septic systems, asphalt, deleterious materials, and soft/unsuitable soils. Any extensive soft soil deposits encountered should be evaluated by extensive proof rolling and/or shallow excavations to determine the amount of undercutting required. Under no circumstances should the stripped material (ie. old fill, trees, topsoil) be used as fill for any excavations, low-lying areas, or for any subsurface structural element.

4.3.2 Subgrade Preparation

After stripping and clearing, the areas intended to support floor slabs, new fill, and pavements should be carefully inspected by qualified geotechnical personnel. Any soft or unsuitable soils should be undercut and replaced with properly compacted engineered fill. Competent geotechnical personnel should be present during any undercutting activities to determine when adequate subgrade bearing has been achieved. It should be noted that soils below areas where asphalt is removed will likely have higher moisture contents due to trapped condensation. It is recommended that the soils below areas where asphalt is removed be allowed to dry prior to additional fill placement or heavy construction traffic.

The site subgrade should be proof-rolled in the presence of competent geotechnical personnel. Proof-rolling activities should occur after a suitable period of dry weather to avoid degrading the subgrade. Proof-rolling should be performed by making repeated passes over the subgrade with a 20 to 30-ton loaded truck or other pneumatic-tired vehicle of similar size and weight. The vehicle should make a sufficient number of passes in each of two perpendicular directions covering the proposed development area.

Any areas judged to deflect excessively during, proof rolling should be undercut and rerolled. This process should be repeated until all soft soils are removed or the geotechnical engineer recommends an alternate stabilization method such as lime or cement stabilization.

Any proof rolling activities should occur immediately before fill placement. If fill material is not immediately placed and subgrade is allowed to stand unprotected, then additional proof-rolling activities will be required in the same area to verify subgrade stability.

It is important to note that at the end of each day or prior to any rainfall events that the site subgrade be smoothed and rolled to minimize any surface water infiltration. The site grading should always provide for positive site drainage away from the project site even during construction activities. Surface water / storm water should not be allowed to pond on the surface or in tire ruts.

4.3.3 Engineered Fill Placement

Prior to any fill activities taking place, we recommend that representative samples of the proposed fill material be collected (minimum 5-gallon container of material) and tested to determine the laboratory compaction characteristics, plasticity, and natural moisture contents. The tests should be conducted to determine the suitability of proposed fill material. Based on the subsurface data obtained, the in-situ soils should be acceptable for use as engineered fill material once stripped of topsoil / organics and rootballs.

Proposed fill materials should be free of organics, deleterious debris, or rocks larger than 3 inches in diameter. Suitable fill soil should have a plasticity index (PI) of less than 30 and a maximum dry density according to the standard Proctor compaction test of at least 100 pounds per cubic foot (pcf). All fill soils and fill pads should be properly compacted and tested.

The fill should be compacted to at least 95 percent of the soil maximum dry density (ASTM D-698 “Standard Proctor”) under structures, building slabs and proposed paved areas. Fill materials in lawn area should be compacted to at least 92 percent of the soil’s maximum dry density. Moisture contents of the fill materials should be maintained to within ± 2 percent of the soil’s optimum moisture.

The soil should be placed in lifts of 8 inches or less for materials compacted by heavy equipment and not more than 4 inches loose depth for hand compaction equipment. Each lift should be compacted and tested by nuclear density gauge methods prior to placing additional lifts every 2,500 square feet. All fill pads should extend laterally at least 10 feet beyond the building before sloping down. In-place density testing should be conducted for each lift placed to check the compaction achieved.

Positive surface drainage should be maintained to prevent water from ponding on the surface during all earthwork operations. After each day’s work or prior to any anticipated rainfall, the subgrade should be rolled with a rubber-tired or steel-drummed roller to improve surface runoff. The geotechnical engineer should be notified if the subgrade soils become excessively wet, dry or frozen.

As is common construction knowledge, extremely large tire loadings are typically present on construction sites from dump trucks, concrete trucks, masonry block and brick/masonry block forklifts (Pettybone). The tire loadings from these vehicles are usually the most significant concentrated loadings that the soil subgrades will most likely be encountered. In many cases these tire loadings will exceed the overall shear strength of the in-situ soils or recently placed engineered fill and rutting and pumping will occur as a result. This is especially true during repeated heavy tire loadings occur when the soil subgrade wet or above its optimum moisture content. It is important that the site subgrade be properly maintained by the contractor for the

extent of the entire project. The site should not be allowed to become rutted or water allowed to pond.

4.3.4 Surface Water Control

Surface water should not be allowed to pond on the building subgrade surfaces. This is especially true during construction activities. Proper erosion and sedimentation control plans must be developed as per the City and State requirement.

4.4 OTHER DESIGN CONSIDERATIONS

4.4.1 Project Specifications

Specifications for this project should meet local building codes and OSHA guidelines. The observations, recommendations, and considerations presented in this report should be fully read and understood by the owner, project designer(s) and contractor(s) prior to final submittal of project plans and specifications.

4.4.2 Construction Monitoring

The implementation of a soil and concrete quality testing program aids in assuring that the end product is that which was designed. Thorough testing also allows opportunity for correction before major problems develop. For these reasons, Bacon Farmer Workman Engineering & Testing, Inc. (BFW), recommends the retainage of a qualified testing laboratory (by the Owner) to conduct quality tests on structural fill, aggregate base course, and concrete placement.

5. QUALIFICATIONS OF RECOMMENDATIONS

Our evaluation of foundation and pavement design and construction conditions has been based on our understanding of the site and on conditions encountered in the borings at the time of investigation. The general subsurface conditions used were based on our interpolation of the subsurface data between the borings. Regardless of the thoroughness of a subsurface investigation, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should observe earthwork and foundation construction to confirm that the conditions anticipated in design are noted. Otherwise, BFW assumes no responsibility for construction compliance with the design concepts, specifications, or recommendations.

The design recommendations in this report have been developed on the basis of the previously described project characteristics and subsurface conditions. If project criteria or locations change, a qualified geotechnical engineer should be permitted to determine whether the recommendations must be modified. The findings of such a review will be presented in a supplemental report.

The nature and extent of variations between the borings may not become evident until the course of construction. If such variations are encountered, it will be necessary to reevaluate the recommendations of this report after on-site observations of the conditions.

Our professional services have been performed, our findings derived, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. BFW is not responsible for the conclusions, opinions, or recommendations of others based on this data.

Appendix A

Boring Log / Laboratory Procedure Guide

BORING LOG / LABORATORY PROCEDURE GUIDE

SUBSURFACE EXPLORATION

Bacon Farmer Workman Engineering & Testing, Inc., conducts soil test borings, field sampling and laboratory analysis in general accordance with methods of the American Society for Testing Materials (ASTM) and generally accepted engineering practices. Soil test borings were advanced with truck or track mounted rotary-type drilling rig equipment. Hollow stem or solid flight augers were used to advance soil test borings (ASTM D 1452). A series of soil samples are typically obtained for visual inspection and laboratory analysis during drilling activities. The samples collected may include disturbed, undisturbed or auger cutting samples.

BORING LOCATIONS / ELEVATIONS

Boring Locations are either selected by our project manager or have been selected by the client. The borings are typically located in the field by estimating right angles and measuring distances from site landmarks. Because of the locating methods used, the boring locations indicated on the Boring Location Plan (In Appendix) are approximate unless specifically noted. When topographic plans of the site are provided, the project engineer estimates the surface elevation of the boring locations using available information. Surveying to determine the locations and elevations of the borings is typically beyond the scope of the typical geotechnical study. Therefore, the boring locations and elevations should be considered approximate unless specifically noted.

BORING LOGS / RECORDS

The Subsurface Boring Logs included in this report are our interpretation of the conditions encountered at each boring location. The Subsurface Boring Logs are prepared on the basis of the field crew's observations during drilling, engineering review of the soil samples obtained, and laboratory testing on selected samples. Soil descriptions are made using the Unified Soil Classification System and ASMT D 2488 as guides. The depths designating strata changes on the Boring Records are estimations. In many geologic settings, the transition between strata is gradual.

GROUNDWATER LEVEL READINGS

Groundwater levels are monitored in each borehole upon the completion of drilling. In low permeability soils such as silts and clays, the groundwater level in the boreholes may take several or more hours to stabilize. Therefore, when possible, water level readings are also made at least 24-hours after drilling activities cease. Groundwater levels may be dependent upon recent rainfall activity and other site specific factors. Since these conditions may change with time, the water level information presented on the Subsurface Boring Logs represents the conditions only at the time each measurement is taken.

SAMPLING TECHNIQUES

Soil samples are typically obtained at selected depths during the drilling activities. Representative portions of the soil samples obtained are placed in sealed containers, labeled, and transported to the laboratory. The soil samples obtained are used for visual classification, and for strength, index and consistency testing. Samples obtained from the drilling activities include: Disturbed, undisturbed and bulk samples. Disturbed samples are collected during the Standard Penetration Tests using a split spoon sampler and hammer as described in the following section. Undisturbed samples are obtained by advancing a thin-walled Shelby tube with hydraulic pressure as described in the following section. Bulk samples are obtained from the auger cuttings generated during the advancement of the augers.

The **STANDARD PENETRATION TEST** (**ASTM D 1586)** is a method to obtain disturbed soil samples for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D. / 2-inch O. D. split-barrel (split spoon) sampler is driven three 6-inch increments with a 140 lb. hammer falling 30 inches. The hammer can either be of a trip, free-fall design or actuated by a rope and cathead. The hammer blows required to drive the sampler the final foot is the *standard penetration resistance (N-value)*. Standard penetration resistance, when properly evaluated, is an index to the soil's strength, consistency and density. Upon completion of each standard penetration test, the sampler is brought to the surface and the tube is split open to expose the soils penetrated. Our project manager / engineer examines the soil and places a representative portion of the soil into a sealed container for transportation to our laboratory.

BFW BACON | FARMER | WORKMAN

BORING LOG / LABORATORY PROCEDURE GUIDE
(Continued)

UNDISTURBED SOIL SAMPLING (ASTM D 1587) is a method used to obtain a relatively undisturbed soil sample for more precise laboratory analysis including unconfined compressive strengths, compressibility or permeability. Undisturbed soil sampling is conducted by advancing a 3–inch O. D., 16 gauge, steel tube (Shelby Tube) with a sharpened edge slowly and uniformly into the underlying soil stratum under constant hydraulic pressure to the desired sampling elevation. The tube is then removed from the ground and both ends are sealed to prevent loss of moisture. The depth at which the undisturbed samples were collected is indicated on the Subsurface Boring Logs.

SOIL LABORATORY TESTS

The **MOISTURE CONTENT (ASTM D 2216)** of soils is an indicator of various physical properties, including strength and compressibility. Each test sample is weighed and then placed in an oven ($110^{\circ}C \pm 5^{\circ}C$). The sample remains in the oven until the free moisture has evaporated. The dried sample is removed from the oven, allowed to cool and then reweighed. The moisture content is computed by dividing the weight of evaporated water by the weight of the dry sample. The results are expressed as a percent.

ATTERBERG LIMITS (ASTM D 4318) tests are used to help define the relationship between behavior changes in fine-grained soils at different moisture contents values. Depending upon the moisture content, a fine-grained soil may occur in a liquid, plastic, semi-solid, or solid state. These set of tests are used to establish the approximate moisture contents at which the soil changes its state. **LIQUID LIMIT** – a soil specimen is wetted until it is in a viscous fluid state. A portion of the soil is then placed in a standardized dimension brass cup, and a groove is made through the middle of the soil specimen with a grooving tool of standardized dimensions. The cup is attached to a cam that lifts it 10 mm, and then allows it to freefall and strike a hard rubber base. The cam is rotated at about 2 drops per second until the two halves of the soil specimen come in contact at the bottom of the groove along a distance of 13 mm. The number of blows required to close the groove is recorded, and a portion of the specimen is subjected to moisture content determination. Additional water is added to the remainder of the specimen, and the grooving process and cam action process repeated. After the third trial, the number of blows versus moisture content is plotted on semi-logarithmic graph paper. The moisture content corresponding to 25 blows is designated as the Liquid Limit.

The **Plastic Limit** is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into threads 3 mm in diameter. It is determined by taking a pat of soil remaining from the liquid limit test, and repeatedly rolling, kneading, and air drying the specimen until the soil breaks into threads about 3 mm in diameter and 3 to 10 mm long. The moisture content of these soil threads is then determined, and is designated the Plastic Limit.

A **PARTICLE SIZE ANALYSIS** determines the distribution of particles sizes in soils. Distribution of particle sizes larger than the No. 200 sieve is determined by the sieving process, while the distribution of particles smaller than the No. 200 sieve are determined by a sedimentation process, using a hydrometer. In the sieving process the soil is prepared by air drying and crushing, to separate clusters that clump together. A series of sieves, that consist of a square mesh woven-wire cloth having different size openings as per ASTM specifications are each weighed individually. They are stacked with the greatest size opening at the top with each successive lower sieve having smaller openings. A pan is placed on the bottom of the stack to catch soil finer that the # 200 sieve (0.75 mm). The soil is placed into the top sieve of the stack and is covered. The nest of sieves is placed and locked into a sieve shaker which is then agitated for approximately 10 minutes. Each sieve is reweighed with the retained soil. A semi-logarithmic graph is created showing the percent passing each specific sieve size.

The **UNCONFINED COMPRESSIVE STRENGTH TEST, (ASTM D 2166)** is a relatively quick method to obtain the approximate compressive strength of soils that possess sufficient cohesion to allow testing in the unconfined state. An undisturbed sample is obtained from the borehole with a Shelby Tube sampler. The tube is sealed in the field to retain natural moisture content. Once in the laboratory the undisturbed sample is extruded from the tube and cut to a specified length. The sample measurements are recorded. The sample is placed in its natural state in a compressive strength load frame. The sample is compressed under increasing load. Measurements of the load applied and the sample strain are recorded. Upon specimen failure the test is concluded and a graph of stress versus strain is plotted. The maximum stress applied is defined as the unconfined compressive strength.

Subsurface Boring Log Legend

Standard Penetration Test (N-Value Tables)

Fine Grained Soils (Silts & Clays)

N	Consistency	Qu, (KSF) Estimate Only
0 - 1	Very Soft	0 – 0.25
2 – 4	Soft	0.25 – 0.5
5 – 8	Firm	0.5 – 1.0
9 – 15	Stiff	1.0 – 2.0
16 – 30	Very Stiff	2.0 – 4.0
Over 30	Hard	> 4.0

Coarse Grained Soils (Sands & Gravels)

N	Relative Density
0 – 4	Very Loose
5 – 10	Loose
11 – 20	Firm
21 – 30	Very Firm
31 – 50	Dense
Over 50	Very Dense

Particle Sizes

Boulders	Greater than 300 mm (12 in)
Cobbles	75 mm to 300 mm (3 to 12 in)
Gravel	4.74 mm to 75 mm (3/16 to 3 in)
Coarse Sand	2 mm to 4.75 mm
Medium Sand	0.425 mm to 2 mm
Fine Sand	0.075 mm to 0.425 mm
Silts & Clays	Less than 0.075 mm

Relative Proportions

Descriptive Term	Percent
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 - 50

Boring Log Symbols / Abbreviations

N: Blows per foot of a 140 lb. hammer falling 30-inches on a 2 inch O. D. split spoon

Qp: Unconfined compressive strength, hand penetrometer, tsf

Qu: Unconfined compressive strength, Shelby tube sample, ksf

Mc: Percent of water in sample (%)

Dd: Sample Dry Density, pcf

LL: Liquid Limit

PL: Plastic Limit

PI: Plasticity Index

-# 200: Percent of sample passing a # 200 sieve (0.075mm)

-#4: Percent of sample passing a # 4 sieve

BFW BACON | FARMER | WORKMAN ENGINEERING & TESTING, INC.

Appendix B

Boring Location Map

0 100 200 ft

1 inch : 175 feet

Figure 1: Boring Locations

Hickman Fulton Co. Riverport Hickman, Fulton County, KY

Project Number:	Drafted/Checked:	Date:
21183	HK/CF	2022-01-28

BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Appendix C

Subsurface Boring Logs

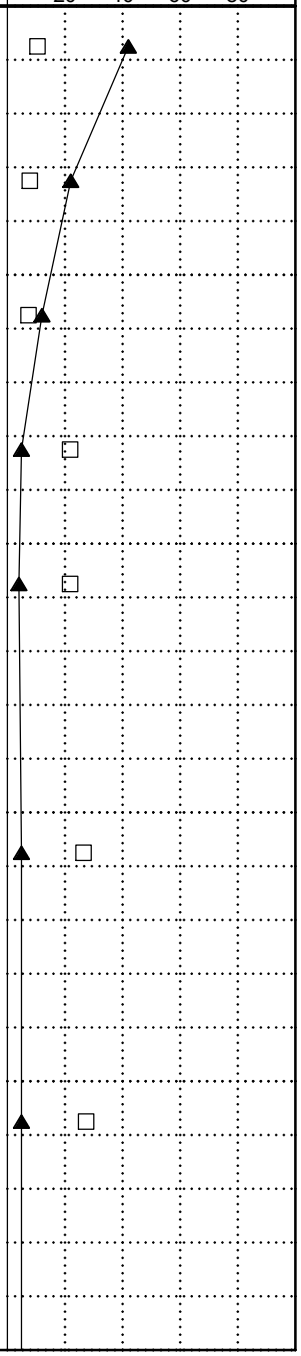
Bacon Farmer Workman Engineering & Testing Inc.
500 S 17th St
Paducah, KY 42003
Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-1

CLIENT Hickman Fulton Co. Riverport
PROJECT NAME Hickman Fulton Co. Riverport
PROJECT NUMBER 21183
PROJECT LOCATION Hickman, Kentucky
DATE STARTED 2/7/22 **COMPLETED** 2/7/22
GROUND ELEVATION 302.9 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR BFW **DRILLED BY** F. Woodard
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger (CME45, track-mounted)
AT TIME OF DRILLING 26.50 ft / Elev 276.40 ft
LOGGED BY F. Woodard **CHECKED BY** Lab
AT END OF DRILLING ---
NORTHING 3385528.559 **EASTING** 3906482.348
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)
0		FILL MATERIAL WITH GRAVELLY SAND: Brownish gray, medium dense to very dense	SPT SS1	72	8-18-24 (42)		
			SPT SS2	28	12-18-4 (22)		
5			SPT SS3	17	5-9-3 (12)		
		(SP) GRAVELY SAND WITH CLAY: Brownish gray, moist, loose	SPT SS4	39	3-2-3 (5)		
10		(CL) SANDY CLAY: Brown to grayish brown, moist, medium stiff	SPT SS5	67	2-2-2 (4)		
15			SPT SS6	100	3-2-3 (5)		
20			SPT SS7	94	1-3-2 (5)		
25							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
○ FINES CONTENT (%) ○
20 40 60 80



(Continued Next Page)

Bacon Farmer Workman Engineering & Testing Inc.
500 S 17th St
Paducah, KY 42003
Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-1

CLIENT Hickman Fulton Co. Riverport **PROJECT NAME** Hickman Fulton Co. Riverport

PROJECT NUMBER 21183 **PROJECT LOCATION** Hickman, Kentucky

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ○ FINES CONTENT (%) ○ 20 40 60 80
25		(SC) CLAYEY SAND: Grayish brown to gray, wet to moist, loose to medium dense	SPT SS8	72	0-2-3 (5)			
30			SPT SS9	100	6-3-4 (7)			
35			SPT SS10	100	7-6-6 (12)			
40			SPT SS11	78	0-2-3 (5)			
45			SPT SS12	94	4-5-8 (13)			
50			SPT SS13	100	4-6-9 (15)			

(Continued Next Page)

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500 S 17th St
Paducah, KY 42003
Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-1

CLIENT Hickman Fulton Co. Riverport

PROJECT NAME Hickman Fulton Co. Riverport

PROJECT NUMBER 21183

PROJECT LOCATION Hickman, Kentucky

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)
55		(SC) CLAYEY SAND: Grayish brown to gray, wet to moist, loose to medium dense *(continued)*					
			SPT SS14	100	0-1-2 (3)		
60			SPT SS15	100	0-0-3 (3)		
65			SPT SS16	100	0-0-2 (2)		
70			SPT SS17	100	5-7-9 (16)		
75			SPT SS18	100	4-7-4 (11)		
80			SPT SS19	100	2-1-2 (3)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
○ FINES CONTENT (%) ○
20 40 60 80

Bottom of borehole at 81.5 feet.

Bacon Farmer Workman Engineering & Testing Inc.
500 S 17th St
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Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-3

CLIENT Hickman Fulton Co. Riverport
PROJECT NAME Hickman Fulton Co. Riverport
PROJECT NUMBER 21183
PROJECT LOCATION Hickman, Kentucky
DATE STARTED 2/1/22 **COMPLETED** 2/1/22
GROUND ELEVATION 302.6 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR BFW **DRILLED BY** F. Woodard
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger (CME45, track-mounted)
AT TIME OF DRILLING 10.00 ft / Elev 292.60 ft
LOGGED BY F. Woodard **CHECKED BY** Lab
AT END OF DRILLING 5.00 ft / Elev 297.60 ft
NORTHING 3384817.5279211 **EASTING** 3906452.8740685
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)
0		FILL WITH GRAVELLY CLAY: Grayish brown, very stiff	SPT SS1	78	6-8-8 (16)		
		(CL) SANDY CLAY: Brown, moist, soft	SPT SS2	72	1-2-2 (4)		
5		(CL) LEAN CLAY: Gray, moist to wet, medium stiff	SPT SS3	100	1-3-2 (5)		
			SPT SS4	100	0-1-3 (4)		
10		(CL) SANDY CLAY: Gray, wet, soft to very stiff	SPT SS5	100	2-3-4 (7)		
15			SPT SS6	100	0-2-1 (3)		
20			SPT SS7	83	7-2-3 (5)		
25							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
○ FINES CONTENT (%) ○
20 40 60 80

(Continued Next Page)

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500 S 17th St
Paducah, KY 42003
Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-3

CLIENT Hickman Fulton Co. Riverport **PROJECT NAME** Hickman Fulton Co. Riverport

PROJECT NUMBER 21183 **PROJECT LOCATION** Hickman, Kentucky

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ○ FINES CONTENT (%) ○ 20 40 60 80
25		(CL) SANDY CLAY: Gray, wet, soft to very stiff *(continued)*	SPT SS8	100	3-6-8 (14)			
30			SPT SS9	100	4-4-12 (16)			

Bottom of borehole at 31.5 feet.

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500 S 17th St
Paducah, KY 42003
Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-5

CLIENT Hickman Fulton Co. Riverport
PROJECT NAME Hickman Fulton Co. Riverport
PROJECT NUMBER 21183
PROJECT LOCATION Hickman, Kentucky
DATE STARTED 2/1/22 **COMPLETED** 2/2/22
GROUND ELEVATION 303.2 ft **HOLE SIZE** 6.25 inches
DRILLING CONTRACTOR BFW **DRILLED BY** F. Woodard
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger (CME45, track-mounted)
AT TIME OF DRILLING ---
LOGGED BY F. Woodard **CHECKED BY** Lab
AT END OF DRILLING ---
NORTHING 3384511.3334674 **EASTING** 3906425.4938296
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)
0		(SP) GRAVELLY SAND: Grayish brown, moist, medium dense	SPT SS1	89	8-12-10 (22)		
		(CL) SANDY CLAY: Gray, moist, very soft to soft	SPT SS2	67	3-5-5 (10)		
5			SPT SS3	100	2-1-2 (3)		
			SPT SS4	67	0-0-1 (1)		
10		(CL) LEAN CLAY: Gray, moist to wet, very soft to soft	SPT SS5	100	0-1-2 (3)		
15			SPT SS6	100	2-1-2 (3)		
20			SPT SS7	39	0-0-2 (2)		
25							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
○ FINES CONTENT (%) ○
20 40 60 80

(Continued Next Page)

Bacon Farmer Workman Engineering & Testing Inc.
500 S 17th St
Paducah, KY 42003
Telephone: 2704431995
Fax: 2704431904

BORING NUMBER B-5

CLIENT Hickman Fulton Co. Riverport

PROJECT NAME Hickman Fulton Co. Riverport

PROJECT NUMBER 21183

PROJECT LOCATION Hickman, Kentucky

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. & (SHEAR) (tsf)	DRY UNIT WT. (pcf)
25		(CL) SANDY CLAY: Gray, wet, very soft to hard	SPT SS8	100	0-0-1 (1)		
30			SPT SS9	100	6-8-10 (18)		
35			SPT SS10	72	5-6-8 (14)		
40			SPT SS11	78	6-11-8 (19)		
45			SPT SS12	100	8-10-11 (21)		
50			SPT SS13	100	12-24-28 (52)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
○ FINES CONTENT (%) ○
20 40 60 80

Bottom of borehole at 51.5 feet.

GEOTECH BH PLOTS - GINT STD US LAB 2021.GDT - 4/15/22 13:20 - C:\USERS\CMATHEWS\DESKTOP\21183 - HICKMAN FULTON RIVERPORT.GPJ

Appendix D

Soil Laboratory Data

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17th STREET | PADUCAH, KY 42003

Laboratory Testing Summary – Page 1

Project Number:	21183
Project Name:	Hickman Fulton Co. Riverport
Date:	2/22/2022

Minimum & Maximum Moisture Content

Depth	Minimum	Maximum
0.0-5’	6.7	33.2
5.0-10’	7.4	36.9
10.0-15’	21.7	41.3
15.0-20’	26.5	39.9
20.0-25’	27.3	36.7
25.0-30’	25.2	29.2
30.0-35’	24.8	29.9
35.0-40’	24.5	26.0
40.0-45’	27.3	34.1
45.0-50’	26.3	43.2
50.0-55’	25.6	29.3
55.0-60’	31.7	31.7
60.0-65’	35.7	35.7
65.0-70’	38.6	38.6
70.0-75’	24.9	24.9
75.0-80’	31.7	31.7
80.0-85’	28.4	28.4

Atterberg Limits

Sample	Depth	LL	PL	PI	Classification
B-3	5.0’	NP	NP	NP	NP
B-5	7.5’	29	20	9	SC
B-5	40.0’	NP	NP	NP	ML

Grain Size and Hydrometer Analysis

Sample	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
B-5	7.5’	4.75	0.12	0.077	0.031	-	72.0	24.5	3.4
B-5	40.0	9.5	0.069	0.057	0.05	1.1	24.1	73.0	1.3

Bacon Farmer Workman Engineering & Testing Inc.
500 S 17th St
Paducah, KY 42001
Telephone: 270-443-1995
Fax: 270-443-1904

SUMMARY OF LABORATORY RESULTS

CLIENT Hickman Fulton Co. Riverport

PROJECT NAME Hickman Fulton Co. Riverport

PROJECT NUMBER 21183

PROJECT LOCATION Hickman, Kentucky

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
B-1	0.0							10.5			
B-1	2.5							7.7			
B-1	5.0							7.4			
B-1	7.5							21.7			
B-1	10.0							21.7			
B-1	15.0							26.5			
B-1	20.0							27.3			
B-1	25.0							29.2			
B-1	30.0							29.9			
B-1	35.0							24.5			
B-1	40.0							34.1			
B-1	45.0							26.3			
B-1	50.0							25.6			
B-1	55.0							31.7			
B-1	60.0							35.7			
B-1	65.0							38.6			
B-1	70.0							24.9			
B-1	75.0							31.7			
B-1	80.0							28.4			
B-3	0.0							33.2			
B-3	2.5							26.2			
B-3	5.0	NP	NP	NP				26.9			
B-3	7.5							36.9			
B-3	10.0							41.3			
B-3	15.0							32.8			
B-3	20.0							35.0			
B-3	25.0							27.0			
B-3	30.0							24.8			
B-5	0.0							6.7			
B-5	2.5							21.3			
B-5	5.0							28.9			
B-5	7.5	29	20	9	4.75	28	SC	31.4			
B-5	10.0							30.7			
B-5	15.0							39.9			
B-5	20.0							36.7			
B-5	25.0							25.2			
B-5	30.0							28.8			
B-5	35.0							26.0			
B-5	40.0	NP	NP	NP	9.5	74	ML	27.3			
B-5	45.0							43.2			
B-5	50.0							29.3			

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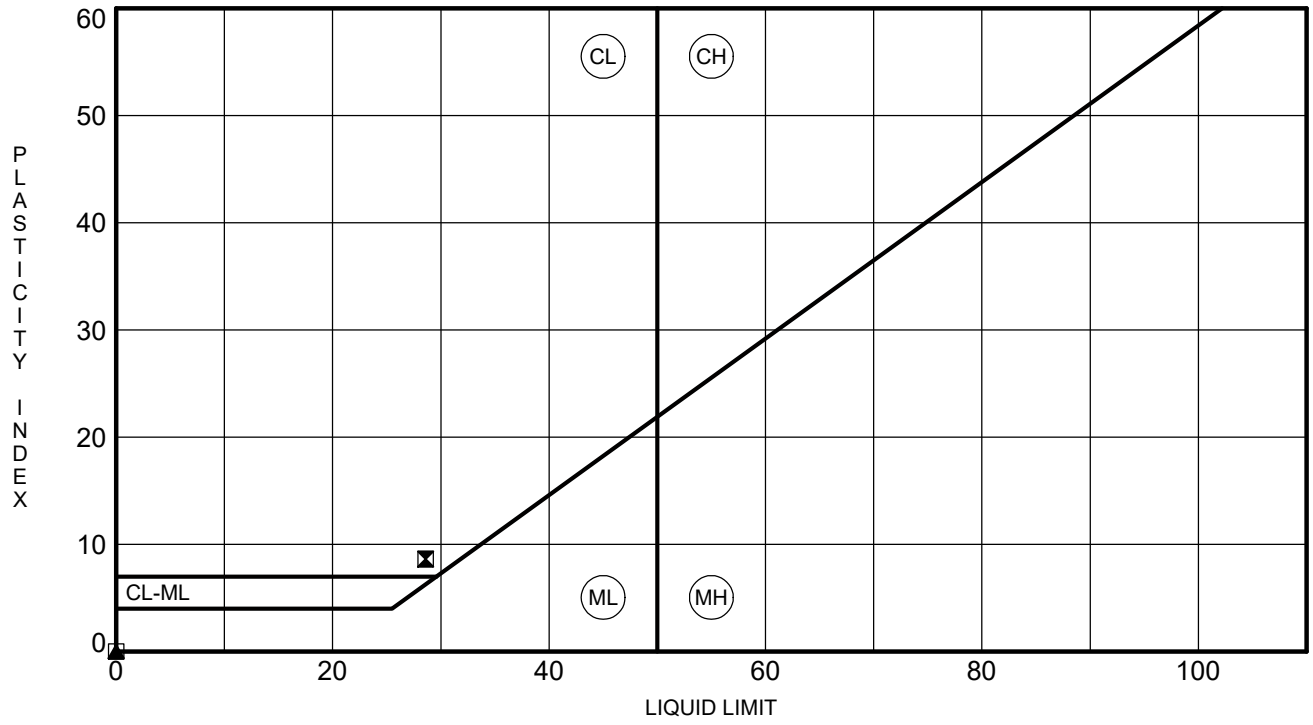
Paducah, KY 42001
Telephone: 270-443-1995
Fax: 270-443-1904

ATTERBERG LIMITS' RESULTS

CLIENT Hickman Fulton Co. Riverport
PROJECT NAME Hickman Fulton Co. Riverport
PROJECT NUMBER 21183
PROJECT LOCATION Hickman, Kentucky



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
□	**B-3**	**5.0**	**NP**	**NP**	**NP**		
⧓	**B-5**	**7.5**	**29**	**20**	**9**	**28**	**CLAYEY SAND(SC)**
▲	**B-5**	**40.0**	**NP**	**NP**	**NP**	**74**	**SILT with SAND(ML)**

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Paducah, KY 42001
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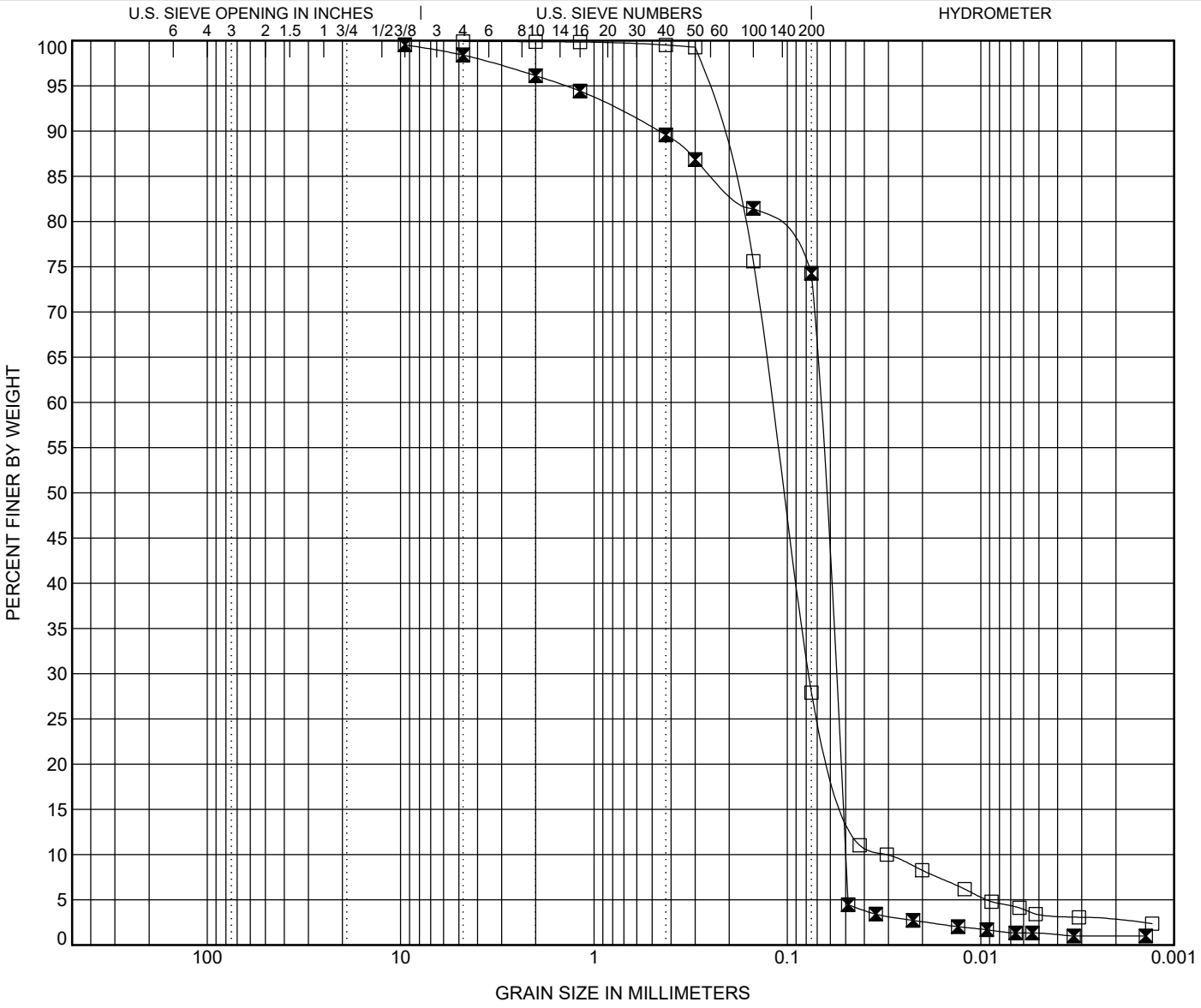
GRAIN SIZE DISTRIBUTION

CLIENT Hickman Fulton Co. Riverport **PROJECT NAME** Hickman Fulton Co. Riverport

PROJECT NUMBER 21183 **PROJECT LOCATION** Hickman, Kentucky



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification (USCS / AASHTO)	LL	PL	PI	Cc	Cu
☐	**B-5**	**7.5**	**CLAYEY SAND(SC) A-2-4 (0)**	**29**	**20**	**9**	**1.63**	**3.91**
☒	**B-5**	**40.0**	**SILT with SAND(ML) A-4 (0)**	**NP**	**NP**	**NP**	**0.94**	**1.37**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
☐	**B-5**	**7.5**	**4.75**	**0.12**	**0.077**	**0.031**		**72.0**	**24.5**	**3.4**
☒	**B-5**	**40.0**	**9.5**	**0.069**	**0.057**	**0.05**	**1.1**	**24.1**	**73.0**	**1.3**

Appendix D

Site Photographs

Hickman-Fulton Co. Riverport Authority

BFW Project #: 21183

Figure 1: Cross Conveyor

BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Hickman-Fulton Co. Riverport Authority

BFW Project #: 21183

Figure 2: Load Chute

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Hickman-Fulton Co. Riverport Authority

BFW Project #: 21183

Figure 3: Existing Mooring Cell and Tower

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Hickman-Fulton Co. Riverport Authority

BFW Project #: 21183

Figure 4: Existing Conveyor Support

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
600 SOUTH 17TH STREET
PADUCAH, KY 42003

Hickman-Fulton Co. Riverport Authority

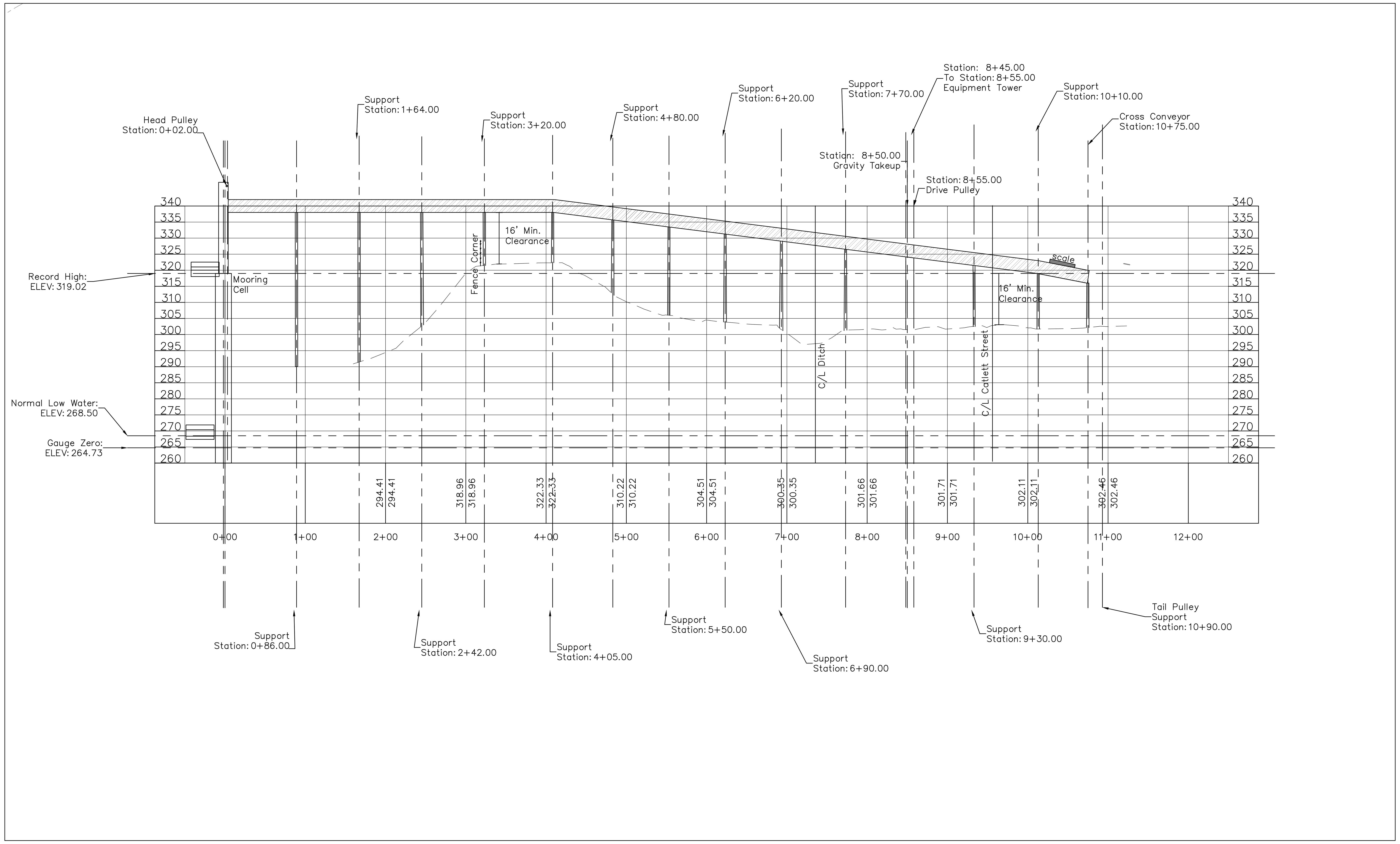
BFW Project #: 21183

Figure 5: Existing Discharge Head

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Appendix E

Preliminary Site Plans



1 CONVEYOR PROFILE VIEW
SCALE: HORIZ - NTS VERT - NTS

PROJECT NO. 21183 DATE MAY 2022
DRAWN BY: SJK CHECKED BY:

REV.	DESCRIPTION	BY	DATE

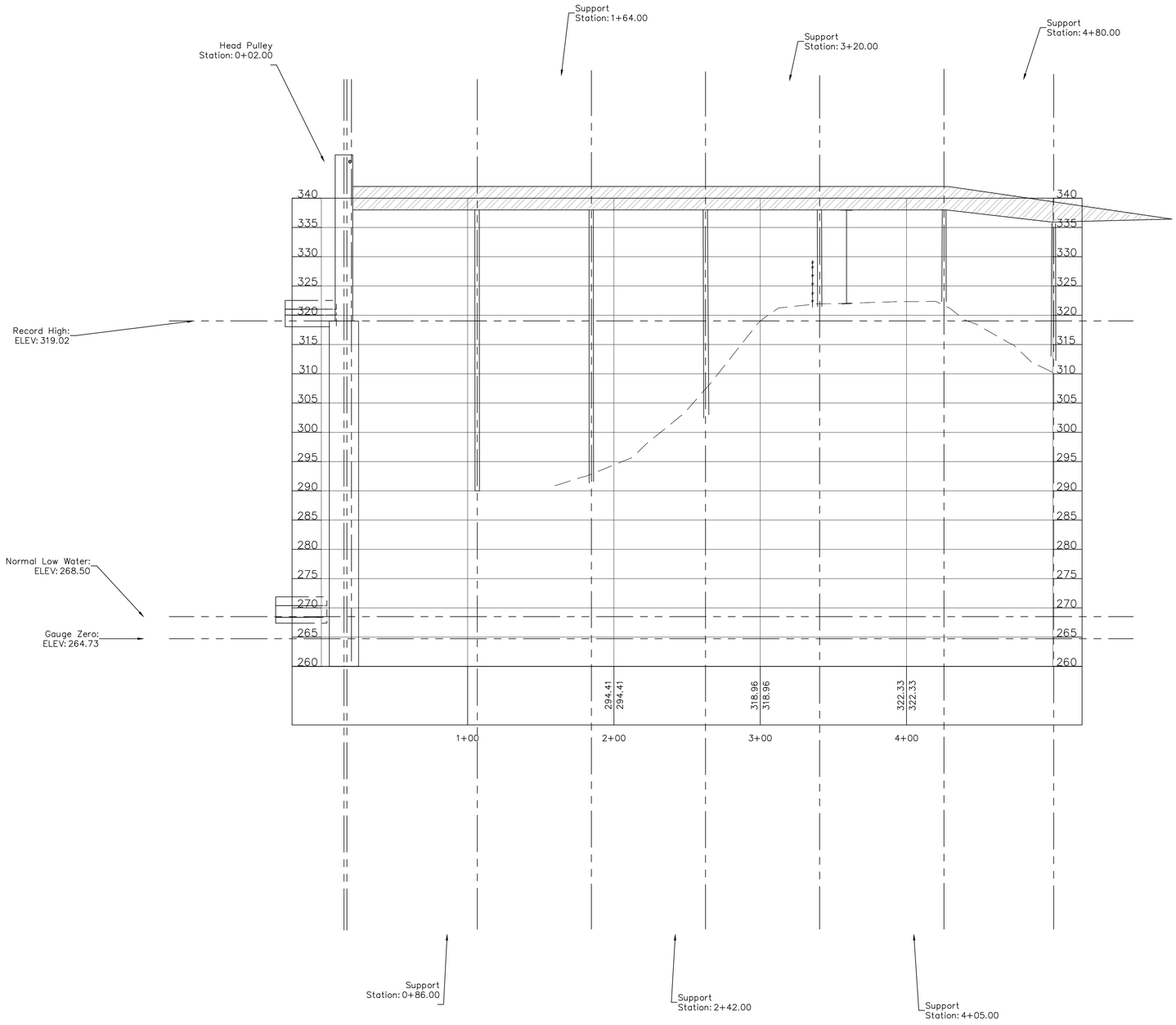
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

CONVEYOR PLAN AND PROFILE VIEW

HICKMAN-FULTON COUNTY RIVERPORT
625 CATLETT STREET
HICKMAN, KY 42050

HICKMAN-FULTON COUNTY RIVERPORT CONVEYOR

SHEET
C1.0



1 CONVEYOR PROFILE VIEW
SCALE: HORIZ - NTS VERT - NTS

PROJECT NO. 21183 DATE MAY 2022
DRAWN BY: SJK CHECKED BY:

REV	DESCRIPTION	BY	DATE
1	-	-	-

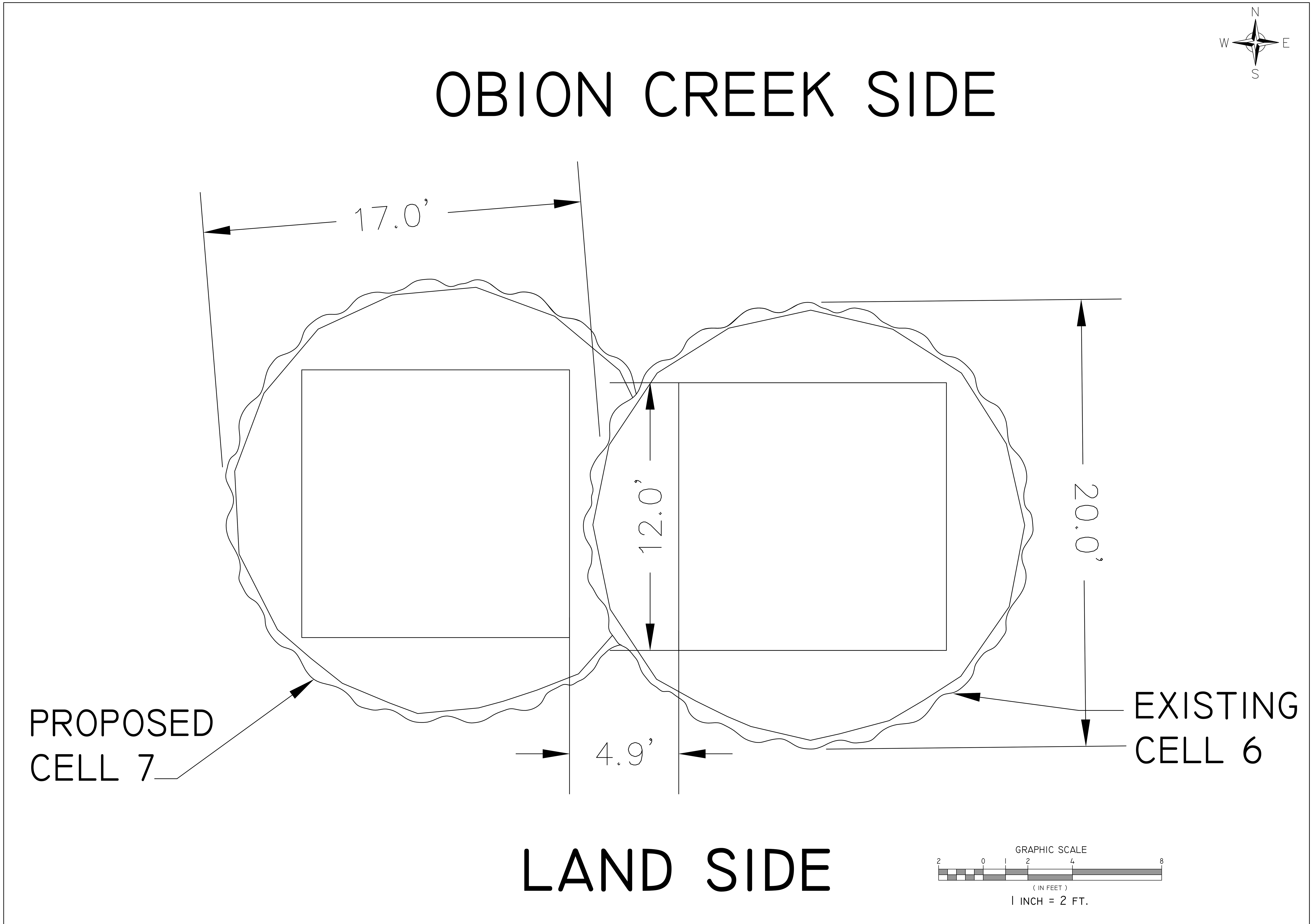
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 JOHN T. YOUNG STREET
ASHLAND, KY 41101
PHONE - 270.443.1995
1215 DUGGO DRIVE
MADISONVILLE, KY 42431
PHONE - 618.697.9190
900 JORDAN RUN, SUITE 2
PADUCAH, KY 42003
PHONE - 561.329.4882
BFW
www.bfwengineers.com

CONVEYOR PLAN AND PROFILE VIEW - RIVER SIDE

HICKMAN-FULTON COUNTY RIVERPORT
625 CATLETT STREET
HICKMAN, KY 42050

HICKMAN-FULTON COUNTY RIVERPORT CONVEYOR

SHEET
C1.1



PROJECT NO. : DATE:
DRAWN BY: SJH CHECKED BY:

REV.	DESCRIPTION	BY	DATE
-	-	-	-

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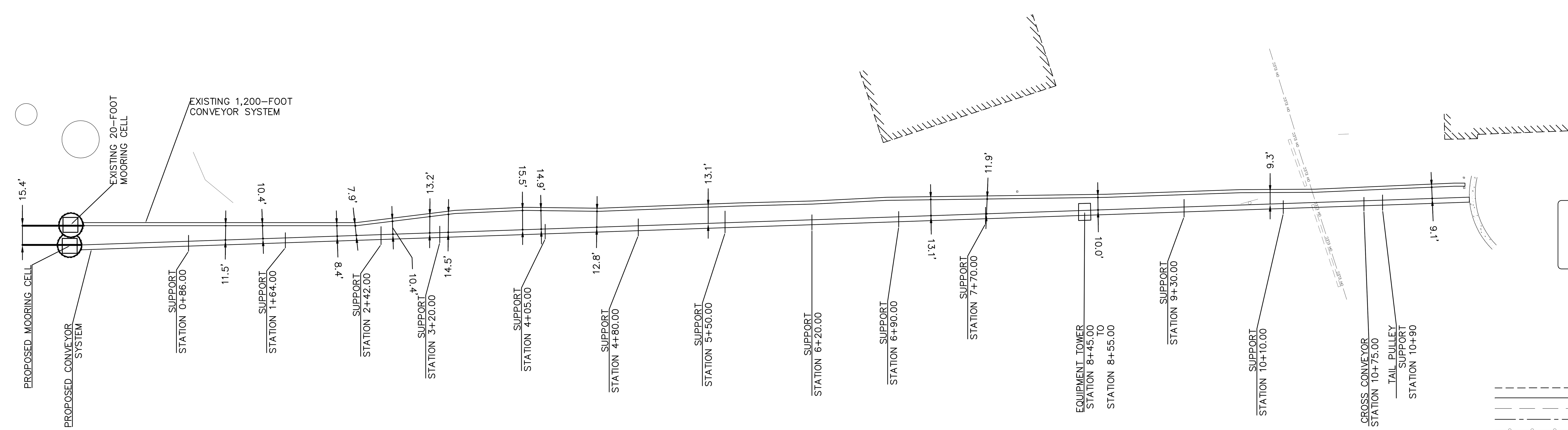
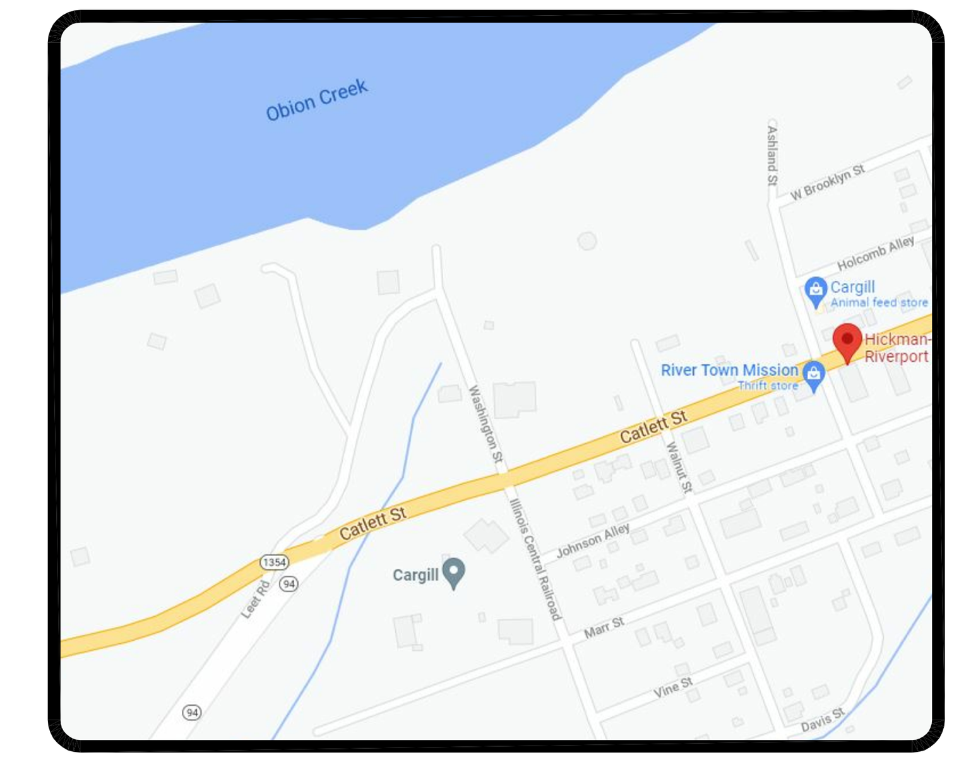
ENGINEERING & TESTING, INC.
500 SOUTH 17th STREET PADUCAH, KY 42003 PHONE – 270.443.1995
403 N. COURT STREET MARION, IL 62959 PHONE – 618.997.9190
1215 DIUGUID DRIVE MURRAY, KY 42071 PHONE – 270.753.7307
966 DOUBLE BRIDGE RD. LEWISBURG, TN 37091 PHONE – 931.359.4882
907 ARROW RD., SUITE 2 CHAMPAIGN, IL 61821 PHONE – 217.530.4283
www.bfwengineers.com

625 Cotlett Street
Hickman, KY, 42050

21183

SHEET
C2.0





VICINITY MAP

N S E W

COORDINATES SHOWN HEREON BASED ON KENTUCKY STATE PLANE COORDINATE SYSTEM (SOUTH ZONE)

DIMENSION NOTE

DIMENSIONS SHOWN REPRESENT DISTANCE BETWEEN INSIDE OF EXISTING AND PROPOSED CONVEYORS.

LEGEND

- BUILDING
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- ROADWAY CENTERLINE
- FENCE
- WATER EDGE
- STORM SEWER
- OVERHEAD ELECTRIC
- MAJOR CONTOUR
- MINOR CONTOUR
- EXISTING BUILDING
- EXISTING CONCRETE PAVEMENT
- UTILITY POLE

BURIED UTILITIES NOTE

BURIED UTILITIES ARE SHOWN AT THEIR APPROXIMATE LOCATION BASED UPON INFORMATION OBTAINED FROM UTILITY COMPANIES AND FIELD EVIDENCE. OTHER BURIED UTILITIES MIGHT EXIST ON THE SUBJECT SITE WHICH ARE NOT SHOWN ON THIS DRAWING. USE EXTREME CAUTION DURING EXCAVATION PROCEDURES AND CONTACT KENTUCKY 811 @ 811 OR 1-800-752-6007 FOR EXACT LOCATION OF BURIED FACILITIES PRIOR TO EXCAVATION OPERATIONS.

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www.kentucky811.com
Two Business Days Before You Dig
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GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 INCH = 50 FT.

DIMENSION NOTE

DIMENSIONS SHOWN REPRESENT DISTANCE BETWEEN INSIDE OF EXISTING AND PROPOSED CONVEYORS.

PROJECT NO.: 21183 DATE: 5/19/22
DRAWN BY: SJH CHECKED BY:

REV.	DESCRIPTION	BY	DATE
-	-	-	-

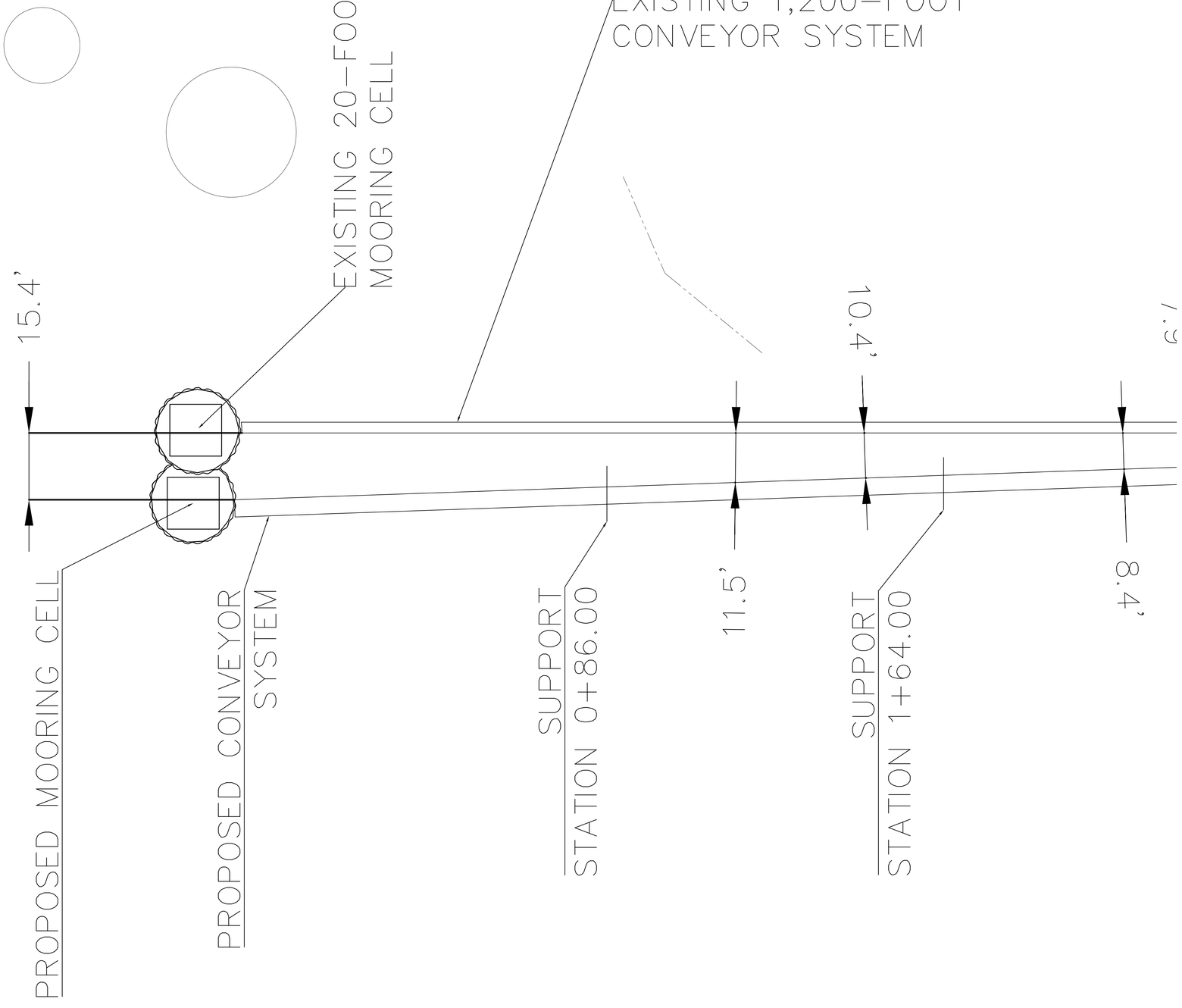
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17th STREET PADUCAH, KY 42003 PHONE - 270.443.1995
403 N. COURT STREET MARION, IL 62959 PHONE - 618.997.9190
1215 DIUGUID DRIVE MURRAY, KY 42071 PHONE - 270.753.7307
966 DOUBLE BRIDGE RD. LEWISBURG, TN 37091 PHONE - 931.359.4882
907 ARROW RD., SUITE 2 CHAMPAIGN, IL 61821 PHONE - 217.530.4283

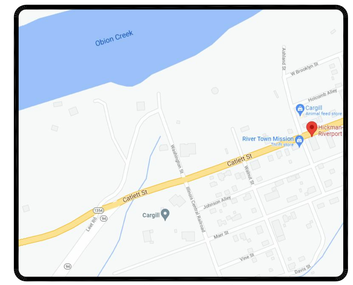
PROPOSED SITE PLAN

FULTON-HICKMAN COUNTY RIVERPORT
CATLETT STREET
HICKMAN, FULTON CO., KENTUCKY 42050

HICKMAN-FULTON COUNTY RIVERPORT

SHEET
C3.0





VICINITY MAP

COORDINATES SHOWN HEREON BASED ON KENTUCKY STATE PLANE COORDINATE SYSTEM (SOUTH ZONE)

DIMENSION NOTE

DIMENSIONS SHOWN REPRESENT DISTANCE BETWEEN INSIDE OF EXISTING AND PROPOSED CONVEYORS.

LEGEND

- BUILDING
- EDGE OF GRAVEL
- EDGE OF PAVEMENT
- ROADWAY CENTERLINE
- FENCE
- WATER EDGE
- STORM SEWER
- OH ELEC — OH ELEC — OH ELEC — OH ELEC — OVERHEAD ELECTRIC
- -500- MAJOR CONTOUR
- -500- MINOR CONTOUR
- EXISTING BUILDING
- EXISTING CONCRETE PAVEMENT
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Two Business Days Before You Dig
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GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)

1 INCH = 50 FT.

PROJECT NO. 21183 DATE 5/19/22
DRAWN BY: SJH CHECKED BY:

REV.	DESCRIPTION	BY	DATE
1	-	-	-

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17th STREET PADUCAH, KY 42003 PHONE: 270.443.0395
403 N. CRAFT STREET MURRAY, KY 42071 PHONE: 270.753.1000
1215 DUGAN DRIVE MARION, KY 42071 PHONE: 270.704.1000
964 DOUBLE BRIDGE RD. CHAMPAIGN, IL 61821 PHONE: 217.352.0292
907 ARROW RD., SUITE 2 HONOLULU, HI 96819 PHONE: 808.864.1362

PROPOSED SITE PLAN - RIVER SIDE

FULTON-HICKMAN COUNTY RIVERPORT
CATLETT STREET
HICKMAN, FULTON CO., KENTUCKY 42050

HICKMAN-FULTON COUNTY RIVERPORT

SHEET
C3.1

Appendix F

Environmental Summary Report

BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.

ENVIRONMENTAL SUMMARY REPORT
Hickman-Fulton Co. Riverport Authority – Hickman, KY

Submitted to:

Mr. Greg Curlin

Hickman-Fulton County Riverport Authority

625 Catlett Street

Hickman, KY 42050

Submittal Date:

June 7, 2022

June 2022-rev1
BFW Ref. # 21183

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

BCC	Bird of Conservation Concern
BCR	Bird Conservation Regions
BFW	Bacon Farmer Workman Engineering & Testing, Inc.
BMP	Best Management Practices
CWA	Clean Water Act
ESA	Endangered Species Act
FEMA	Federal Emergency Management Act
FWS	U.S. Fish and Wildlife Service
HFCRA	Hickman-Fulton County Riverport Authority
IPaC	Information for Planning and Consulting
KDOW	Kentucky Division of Water
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
PER	Preliminary Engineering Report
SHPO	State Historic Preservation Office
T&E	Threatened and Endangered
USDA	United States Department of Agriculture

APPENDICES

1. BACKGROUND

This report was prepared as a portion of a Preliminary Engineering Report (PER) for the Hickman-Fulton Co. Riverport Authority (HFCRA). Roughly 30 acres of land was reviewed for environmental compliance for the Riverport. This portion of land encompasses the 1,200-foot conveyor system which is slated for replacement as well as surrounding land and riverfront improvement areas. The riverfront improvements will include maintenance to existing mooring cells and the addition of one supplementary cell. The project site lies northwest of 625 Catlett Street, Hickman, KY, 42050.

1.1 PROJECT LOCATION

Take US 45 towards Mayfield, Kentucky, then merge onto I 69 towards Fulton County, Kentucky. Take Exit 1 toward Clinton, Kentucky, then turn left on Holiday Lane. Turn right onto KY 166/Middle Road and continue for 19.1 miles, merging onto KY 125 at the intersection. Turn left onto KY 1099 S/7th Street, and in 1.2 miles turn right onto Broadway Street. In 0.6 miles, turn left onto Catlett Street. The destination will be on your right (north). The project area begins here at Latitude N36.56892° and Longitude W89.20556°.

1.2 PROJECT DESCRIPTION

Currently HFCRA has one (1) 1,200-foot conveyor system, one (1) 800-foot conveyor system, two (2) 20-foot mooring cells, four (4) 16-foot mooring cells, one (1) crane cell, and one (1) pipe pile dolphin. Field verification will be required to determine if any other features are present. The topography of the site varies from elevation 350’ to 290’ (Figure 2 – Topography).

This property was reviewed for:

- Flood Plains
- Soils
- Wetlands and Streams
- Threatened & Endangered Species
- Cultural Resources

2. FLOODPLAIN

The project site lies within the Federal Emergency Management Act (FEMA) map, 21075C0154D (eff. Date 6/02/2011). According to this mapped area (Figure 3 – Flood Hazard Map), the majority of the site is protected from flooding by the levee, Zone X. The northern boundary of the site, adjacent to the Mississippi River, lies within Zone AE – the 100-year flood zone.

3. SOILS

According to the United States Department of Agriculture (USDA), there were two (2) soil types located at the Hickman-Fulton Co. Riverport Authority project site (Figure 4 – Soils Map):

- Convent silt loam – 0 to 2% slopes
- Robinsonville fine sandy loam – 0 to 3% slopes

3.1 SOIL DESCRIPTIONS

The Convent silt loam (Cp) is a soil series whose slopes range from 0 to 2%. They are typically found on flood plains, mainly along the Mississippi River and its distributaries. It consists of very deep, somewhat poorly drained, moderately permeable soils that are formed in recent loamy alluvium. This soil type is considered Prime Farmland if it is drained. They are very limited on shallow excavations, and somewhat limited on small building construction. More extensive findings and descriptions can be found in the Geotechnical Exploration Report.

The Robinsonville fine sandy loam (Rf) is a soil series whose slopes range from 0 to 3%. They are typically found on flood plains on the Mississippi River. It consists of very deep, well drained soils with moderate to moderately rapid permeability. This soil type is considered Prime Farmland if it is protected from flooding, or it is not frequently flooded during the growing season. They are somewhat limited on shallow excavations and very limited on small building construction. More extensive findings and descriptions can be found in the Geotechnical Exploration Report.

4. WETLANDS AND STREAMS

Various satellite imagery and databases were reviewed to determine whether wetlands and streams were present. According to aerial photography, the site appears to contain one (1) pond that is located southwest of the review area. This pond receives much of the area's stormwater runoff There appears to be one (1) or two (2) streams that may drain to this pond but would require an onsite inspection to determine if they are jurisdictional. There are no wetlands present on the site. The Mississippi River lies north of the site (Appendix B – Navigation Chart). Since maintenance to the mooring cells and the addition of a supplementary mooring cell is projected, a permit from the USACE Memphis District will be required in addition to Water Quality Certification (WQC) from the Kentucky Division of Water (KDOW) as well as a floodplain permit from the Surface Water Branch. Unless new fleeting is required for the port, Section 10 coordination for navigation is most likely not needed for this project.

5. THREATENED AND ENDANGERED SPECIES

An Information for Planning and Construction (IPaC) query was performed to determine the Federally listed Threatened or Endangered Species for the proposed site area. According to the U.S. Fish and Wildlife Service (FWS) review, there is a potential to encounter three (3) bat species (Gray Bat, Indiana Bat, and Northern Long-eared Bat), one (1) fish species (Pallid Sturgeon), one (1) clam species (Fat Pocketbook), one (1) insect species (Monarch Butterfly), and six (6) migratory birds (Bald Eagle, Lesser Yellowlegs, Prothonotary Warbler, Red-headed Woodpecker, Rusty Blackbird, and Wood Thrush). However, there is no designated critical habitat.

5.1 MAMMALS

There were three (3) bat species potentially present at the project site. These included the Gray bat, Indiana bat, and Northern Long-eared Bat. There are no known caves on the site. Construction activities will need to be evaluated to determine if clearing activities could have a direct, indirect, or cumulative effect on bat species. It is recommended that any tree trimming, or tree removal be conducted between October 15 and March 31st following the Service's recommendations. Tree trimming or tree removal could result in alterations to habitat and behaviors (feeding, breeding, and resting).

5.2 FISHES

There was one (1) fish species potentially present at the site – the Pallid Sturgeon. The typical habitat isn't defined, but the Pallid Sturgeon can be found in the Mississippi River, its oxbows, and embayed portions of major tributaries. Construction activities will limit vegetation removal to minimize the impacts to riparian areas, revegetate disturbed areas with native vegetation, install upland sediment basins (where appropriate) to minimize sediment input into rivers and streams, minimize the addition of impervious surfaces in the water, and other Best Management Practices (BMP) as needed.

5.3 CLAMS

There is one (1) clam species in the IPaC species list letter, the Fat Pocketbook. The species may be affected by projects that significantly impact, directly or indirectly, the following rivers: Clarks (lower), Cumberland (lower), Green (lower), Mississippi, Ohio (lower), Tennessee, and Tradewater (lower). Construction activities will limit vegetation removal to minimize the impacts to riparian areas, revegetate disturbed areas with native vegetation, install upland sediment basins (where appropriate) to minimize sediment input into rivers and streams, minimize the addition of impervious surfaces in the water, and other BMP as needed.

5.4 INSECTS

There is one (1) insect species potentially present on the project site, the Monarch Butterfly. There are no defined general guidelines for this species, but BMP will be utilized to avoid negatively impacting the population.

5.5 MIGRATORY BIRDS

There are six (6) migratory bird species known to be of concern in the project site. They are the Bald Eagle, Lesser Yellowlegs, Prothonotary Warbler, Red-headed Woodpecker, Rusty Blackbird, and Wood Thrush. The Bald Eagle is considered to be a Non-Bird of Conservation Concern (BCC). However, the Lesser Yellowlegs, Prothonotary Warbler, Red-headed woodpecker, and Wood Thrush are all considered BCC Range wide for the continental USA and Alaska. The Rusty Blackbird is considered BCC only in particular Bird Conservation Regions (BCR). BMP should be used, as well as a Migratory Bird Probability of Presence chart to track the potential presence of a BCC during the duration of the project.

6. CULTURAL RESOURCES

The scope of this project will require a Section 106 Review which allows the State Historic Preservation Office (SHPO) to review and comment on the effects to above ground historic properties and archaeological resources prior to the expenditure of any federal funds. The project description and boundary map will be submitted to SHPO for determination. If any previously identified resources have been documented, they will advise at time of submittal and an Area of Potential Impact will be established. Based on initial findings, mitigation efforts may be required if adverse effects are determined on any of the resources. It should be noted that individual grant requirements will dictate the level of review required for Cultural Resources (i.e. Phase I Archaeological Survey, etc.)

7. POTENTIAL PERMITTING REQUIREMENTS

Project site development will dictate if potential permits are required at the HFCRA. There is the potential need for several permits which could include but are not limited to:

- Section 408 – Provides that USACE may grant permission for another party to alter a Civil Works project upon a determination that the alteration proposed will not be injurious to the public interest and will not impair the usefulness of the Civil Works project. (For example, if any of this work affects the levee, this could require Section 408 coordination.) At this time, it does not appear that a Section 408 permit will be required since no modifications to the flood wall are anticipated.
- FEMA Permit for Floodplain Development – A permit is required before construction or development begins within any Special Flood Hazard Area (SFHA). Section 60.3 defines the National Flood Insurance Program Requirements. Any development adjacent to or within the riverfront portion of the site will require a floodplain permit. Since fill is associated with the mooring cell maintenance, a floodplain permit will be required from the Surface Water Branch of Kentucky Division of Water (KDOW).
- Clean Water Act (CWA) Section 404 – Establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Kentucky Division of Water (KDOW) Permit – Required for construction activities that take place in a stream channel or wetland. This includes laying pipe along (i.e., not across) the banks or channel, channelization, bank shaping, stream relocation, and similar activities. This permit will be required for the mooring cell maintenance activities and the supplementary mooring cell.
- National Environmental Policy Act (NEPA) – The scope of this project indicates that an environmental assessment will be required in order to meet local and federal laws and regulations as well as, meet the federal grant requirements (Appendix C – MARAD Categorical Exclusion Checklist). An environmental assessment will identify possible environmental effects and establish all the impacts either positive or negative about the project and will consist of technical evaluation, economic impact and social results that the project will bring. The intent of NEPA is to ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings. Full NEPA review is generally performed if grant funding requires it. It can include such items as:
    - City Zoning
    - Public Services/Utilities
    - Noise Ordinance
    - Public Health and Safety

  - Clean Air Act
  - Environmental Justice Section 4(f)
  - Climate Change and Greenhouse gases

- National Historic Preservation Act (NHPA) Section 106 – Requires that each federal agency identify and assess the effects its actions may have on historic buildings. Under Section 106, each federal agency must consider public views and concerns about historic preservation issues when making final project decisions. This coordination is required when federal funding or permitting is required. Once final design plans are determined, regulatory agencies review the project to determine if there is a potential for the project to affect cultural resources. Based on a review of the preliminary project, it is archaeological and cultural surveys.
- Rivers and Harbors Act Section 10 – Building of any structure in the channel or along the banks of navigable waters of the U.S. that changes the course, conditions, location, or capacity. The Navigation Chart is included in Appendix B.
- Endangered Species Act (ESA) Section 9 – Prohibits take (e.g., harm or harassment) of ESA-listed species. Threatened & Endangered (T&E) review will be performed once final design plans are prepared to ensure T&E compliance.
- Tribal Consultation – Depending on the location and scope of your work, consultation with one or more Tribes as part of the application review process may be required. Consultation with these Tribes may be informal or formal process of negotiation, cooperation or discussions between an American Indian Tribe and the Corps. Once initiated, consultation must be completed before we can finalize a permit decision. Consultation is defined in the Corps Tribal Consultation Policy as, “Open, timely, meaningful, collaborative, and effective deliberative communication process that emphasizes trust, respect and shared responsibility…”. Most likely with this proposed project, tribal consultation will not be required. This consultation is usually performed with full NEPA Environmental Assessments.

Appendix A
Figures

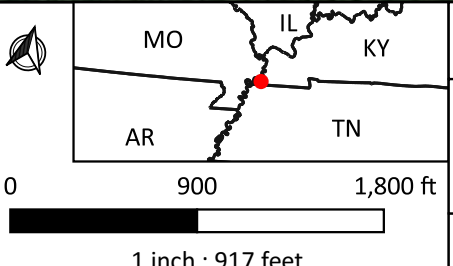
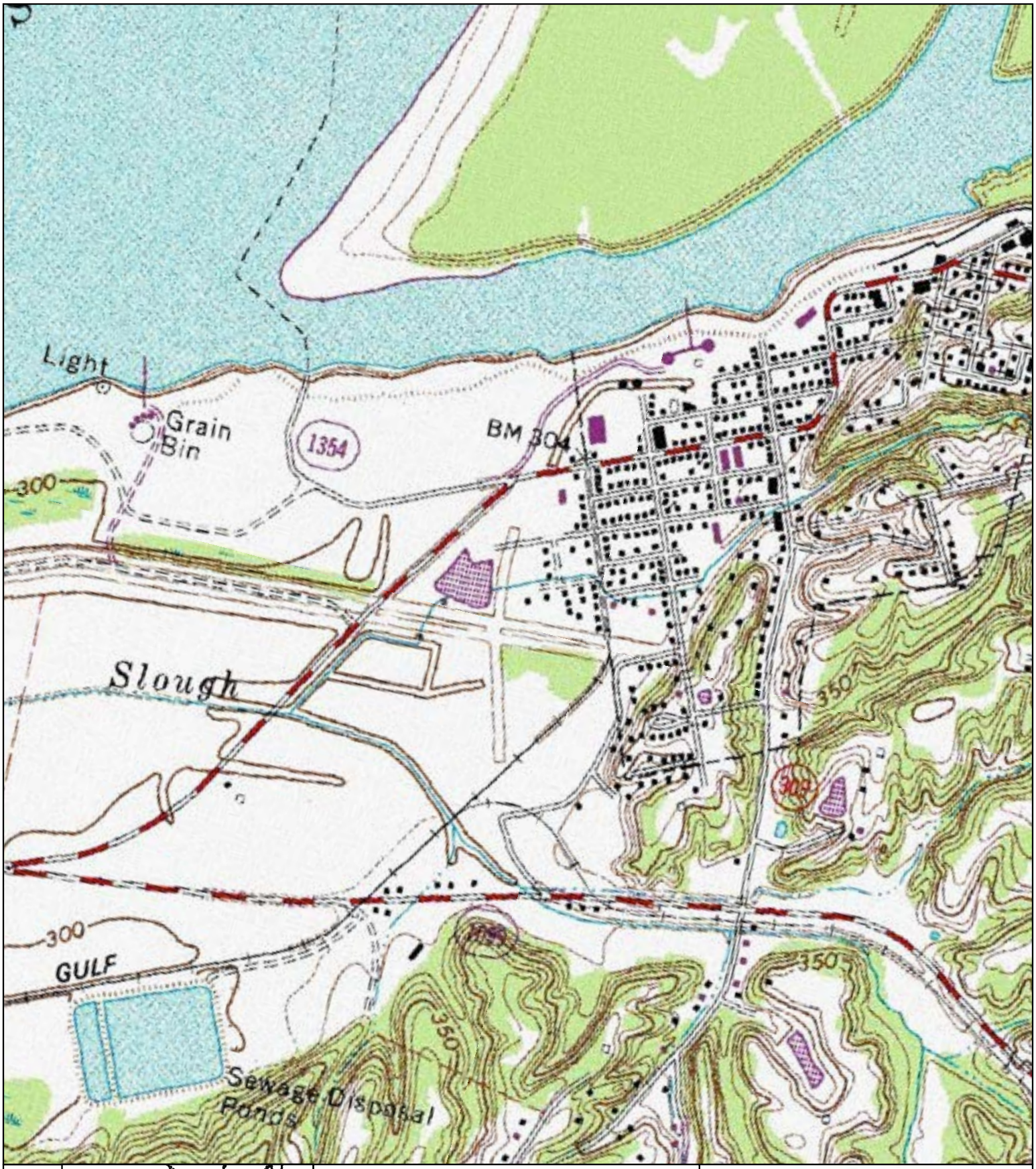


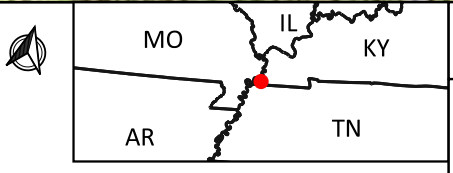
Figure 1. Aerial Image

Hickman-Fulton riverport
Hickman, Fulton County, KY

Project Number:	Drafted/Checked:	Date:
21183	HK/SC	2022-05-09

BFW
BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003





0 900 1,800 ft

1 inch : 917 feet

Figure 2. Topographic Map

Hickman-Fulton riverport
Hickman, Fulton County, KY

Project Number:	Drafted/Checked:	Date:
21183	HK/SC	2022-05-09

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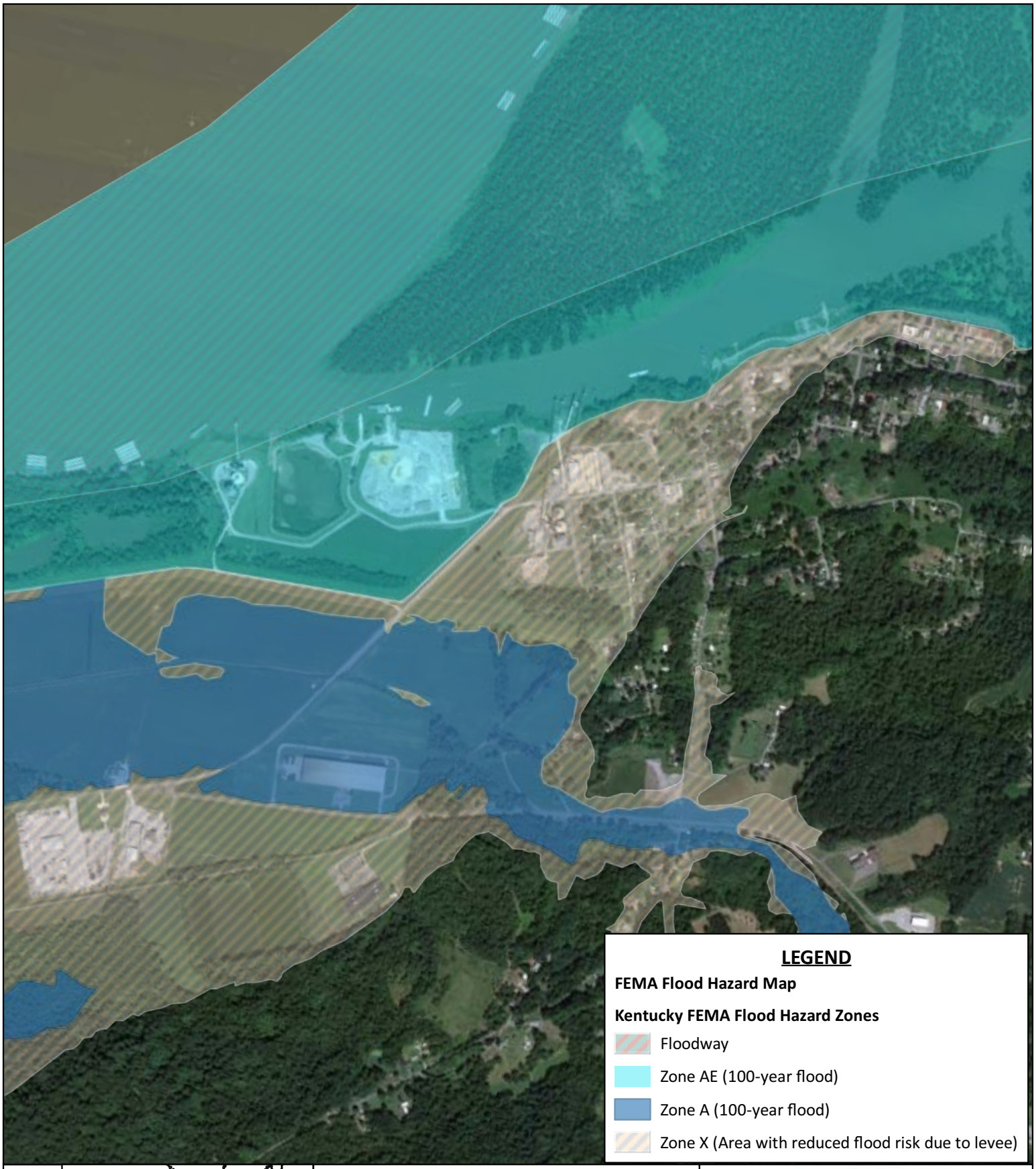

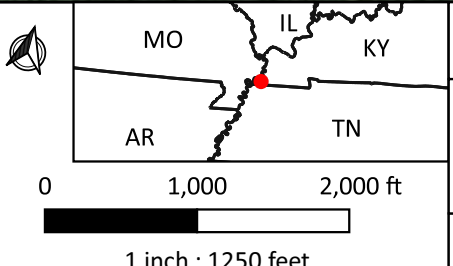

Figure 3. FEMA Flood Hazards

Hickman-Fulton riverport
Hickman, Fulton County, KY

Project Number:	Drafted/Checked:	Date:
21183	HK/SC	2022-05-09

BFW
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ENGINEERING & TESTING, INC.
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PADUCAH, KY 42003

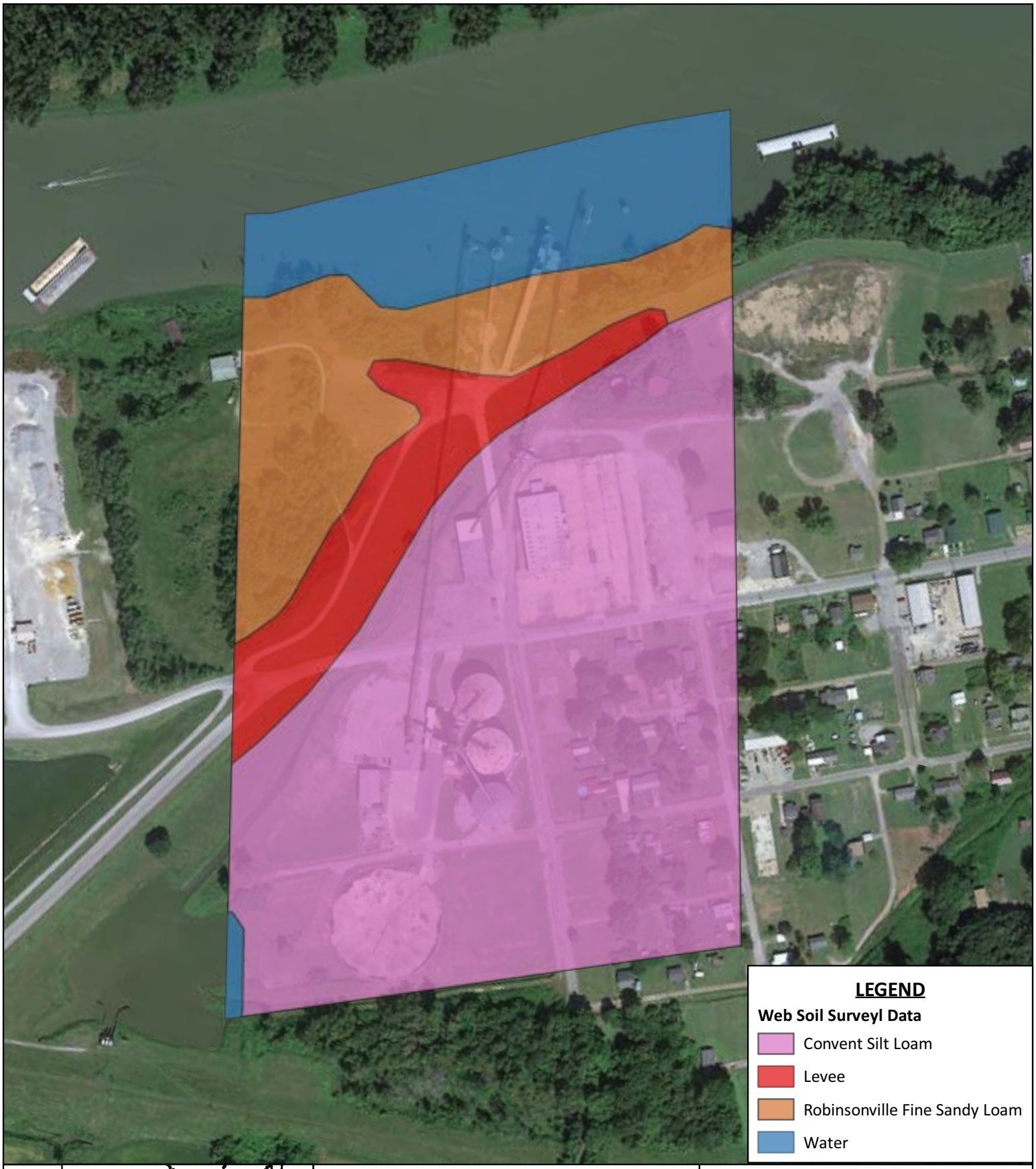

Figure 4. Soil Data

Hickman-Fulton riverport
Hickman, Fulton County, KY

Project Number:	Drafted/Checked:	Date:
21183	HK/SC	2022-05-16

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BACON | FARMER | WORKMAN
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

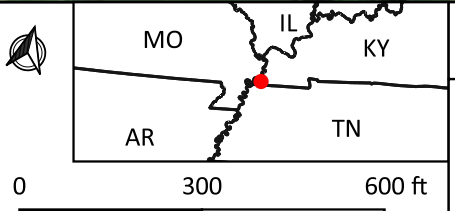

Figure 5. Soil Data

Hickman-Fulton riverport
Hickman, Fulton County, KY

Project Number:	Drafted/Checked:	Date:
21183	HK/SC	2022-05-16

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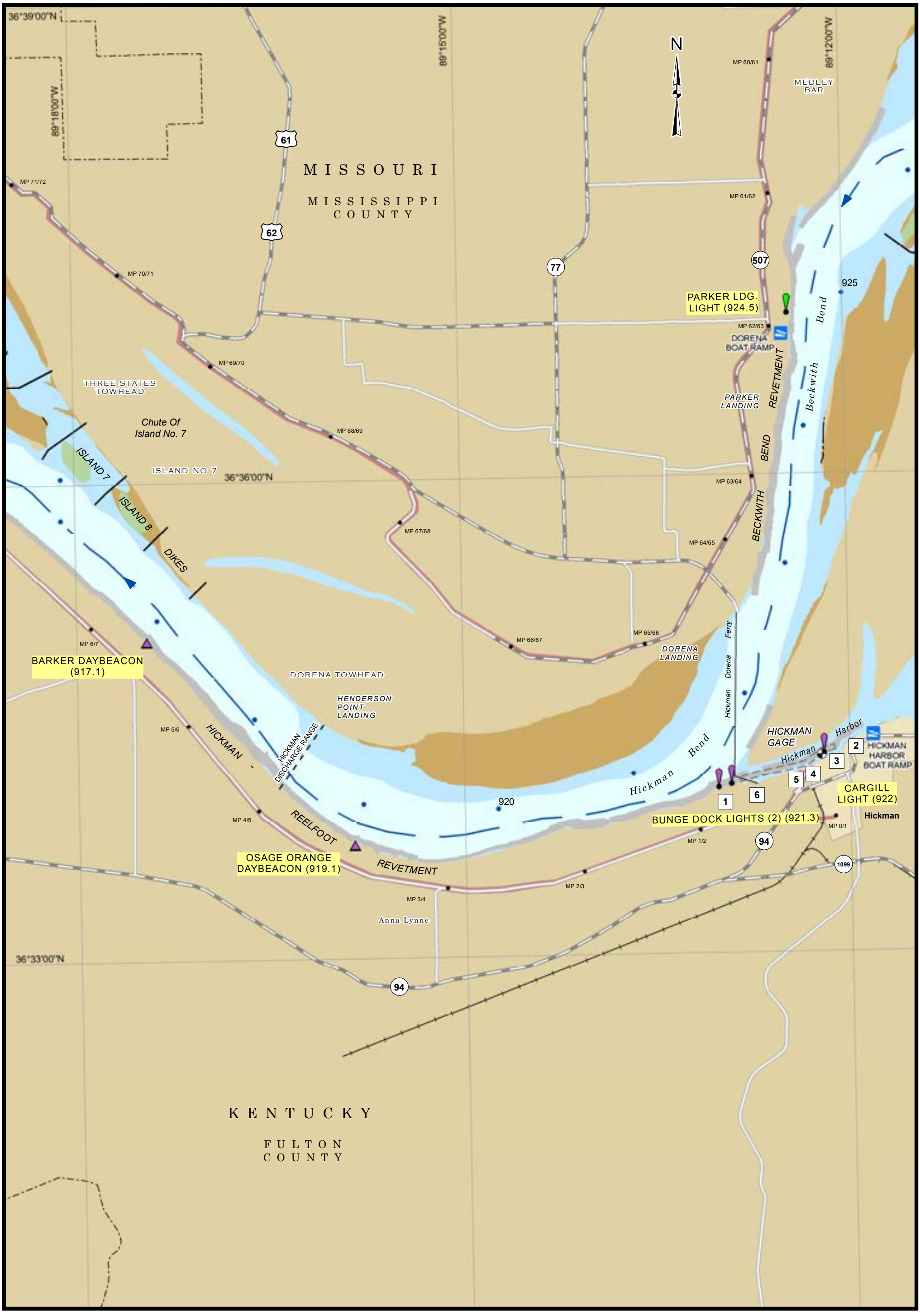
ENGINEERING & TESTING, INC.
500 SOUTH 17TH STREET
PADUCAH, KY 42003

Appendix B

Navigation Chart



2015 **SCALE = 1:40,000**

1 0.5 0 1 2 Miles

1 0.5 0 1 2 Kilometers

CHART NO. 4

Last Revised Date: 5/6/2016

River Mile 926.1 to 915.5

Appendix C
MARAD CE Checklist

CATEGORICAL EXCLUSION CHECKLIST

Project(s): Hickman-Fulton County Riverport Authority Conveyor / Mooring Cell Replacement

Date: 6/3/2022

Nature of Action(s):

Exclusion Category: No._____ Topic_____

Instructions: For the above action(s) under the subject project or group of homogeneous projects, check the appropriate answer to each of the questions below. If all the answers on this list are checked "No," then the action(s) meet the criteria for categorical exclusion. If any answer is checked "Yes" or "Uncertain," then an environmental assessment will be prepared unless there is no doubt that an environmental impact statement is required.

1.	This action would have significant adverse effects on public health or safety.	No X	Uncertain_____	Yes_____
2.	This action would have significant effect on wildlife resources or would affect unique geographical features such as: wetlands, wild or scenic rivers, refuges, floodplains, etc., or lands protected by section 4(f) of the DOT Act.	No_____	Uncertain X	Yes_____
3.	This action will have highly controversial environmental effects.	No X	Uncertain_____	Yes_____
4.	This action will have highly uncertain environmental effects or involve unique or unknown environmental risk.	No X	Uncertain_____	Yes_____
5.	This action will establish a precedent for future actions.	No X	Uncertain_____	Yes_____
6.	This action is related to other actions with individually insignificant but cumulatively significant effects.	No X	Uncertain_____	Yes_____

7. This action will affect properties listed or eligible for listing in the National Register of Historic Places, or otherwise protected by section 106 of the National Historic Preservation Act.	No____	Uncertain X	Yes____
8. This action will affect a species listed or proposed to be listed as Endangered or Threatened.	No____	Uncertain X	Yes____
9. This action is inconsistent with Federal, State, local or tribal law or requirements imposed for protection of the environment.	No X	Uncertain____	Yes____
10. This action or group of actions would involve unresolved conflicts concerning alternative uses of available resources.	No X	Uncertain____	Yes____

Conclusion:

NEPA Action-Categorical Exclusion_____
EA Required Yes_____
EIS Required_____
Explanation and/or Remarks:_____

Preparer's Name and Title:

Concur: _____ Date:_____
(Signature, Name, and Title of Program Official)

Concur: _____ Date:_____
(Signature, Name, and Title of Environmental Activities Coordinator)

Appendix G

Mooring Cell Assessment

WATERFRONT FACILITIES INSPECTIONS AND ASSESSMENTS

HICKMAN-FULTON COUNTY RIVERPORT AUTHORITY

HICKMAN RIVERPORT

INSPECTION DATE: MARCH 24, 2022

Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Kentucky, License No. PE 32859, Expiration Date: June 30, 2022.

STATE OF KENTUCKY
J. ROSS WHITING
32859
LICENSED PROFESSIONAL ENGINEER

Signature: _____
J. Ross Whiting

Prepared for:
Hickman-Fulton County Riverport Authority
625 Catlett Street
Hickman, KY 42050

Prepared by:
Marine Solutions, Inc.
225 Industry Parkway
Nicholasville, KY 40356
Phone: (859) 260-1055

Table of Contents

1. INTRODUCTION

Marine Solutions, Inc. conducted a routine inspection of the waterfront structures at the Hickman Riverport in Hickman, Kentucky on March 24, 2022. The purpose of this inspection was to observe and report the above and below water structural conditions of Mooring Cells 1 through 6, Dolphin 1, and the Floating Dock.

The following paragraphs provide a description of the facility, inspection procedures, and summarized results. The complete results of this inspection are documented on the Structure Inspection Forms which are included in Appendix A. The facility figures, which illustrate the depths around the structures and provide general descriptions of the facility, are included in Appendix B. The non-destructive testing results for remaining steel thicknesses are included in Appendix C.

1.1. Description of the Facility

The terminal is located in Hickman, Kentucky on the southern bank of Obion Creek located approximately 1.2 miles east of Mississippi River Mile Marker 921. The terminal consists of six mooring cells, one monopile dolphin, and a floating dock. The structures are roughly arranged east to west.

1.2. Inspection Procedures

The inspection was conducted utilizing a three-person inspection team led by a professional engineer. The inspection included an above and below water visual and tactile examination of the accessible structural components. The sheet piles forming the mooring cells were labeled clockwise with Sheet 1 typically designated as the ladder sheet. For the purposes of this inspection, the orientation references were considered as bank (south), channel (north), downstream (east), and upstream (west).

The inspected components were observed for signs of distress or deterioration including damaged sheet pile interlocks, impact damage, cracks, corrosion, abrasion, missing hardware, scour, loss of ballast material, and debris accumulation. Observed conditions, defects, and observations were identified by component location and documented by notes and photographs. Non-destructive testing of the sheet piles was performed using an ultrasonic thickness gauge to determine remaining thicknesses of steel. Where accessible, measurements were taken near the water surface, at mid-depth, and near the mudline at the upstream, downstream, bank, and channel sides of each waterfront structure.

The structures and structural elements were categorized by overall condition ratings and element level severity ratings. The assigned ratings were based on the American Society of Civil Engineers, *Waterfront Facilities Inspection and Assessment,* Manual and Reports on Engineering Practice No. 130 (ASCE MOP No. 130), June 2015. The rating criteria considered are presented in Tables 1-1 and 1-2.

Table 1-1 Overall Condition Assessment Rating Criteria

ASSESSMENT RATING	DESCRIPTION
"Good"	No visible damage or only minor damage noted. Structural elements may show very minor deterioration, but no overstressing observed.
"Satisfactory"	Limited minor to moderate defects or deterioration observed but no overstressing observed.
"Fair"	All primary structural elements are sound but minor to moderate defects or deterioration observed. Localized areas of moderate to advanced deterioration may be present but do not significantly reduce the load-bearing capacity of the structure.
"Poor"	Advanced deterioration or overstressing observed on widespread portions of the structure but does not significantly reduce the load-bearing capacity of the structure.
"Serious"	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of primary structural components. Local failures are possible and loading restrictions may be necessary.
"Critical"	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur and load restrictions should be implemented as necessary.

Table 1-2 Defect Assessment Rating Criteria (Steel Structures)

ASSESSMENT RATING	DESCRIPTION
"Severe"	Defect significantly affects the integrity, function or load bearing capacity of the member including bending, buckling, breakage, or displacement. The member has lost critical functionality and load carrying capacity.
"Major"	Partial loss of section, visible reduction in thickness, or a loss of nominal thickness between 30 to 50 percent at any location. The member has lost some functionality and load carrying capacity.
"Moderate"	Over 50 percent of the surface affected by corrosion at any elevation or section with loss of thickness of 15 to 30 percent at any location. Defect may affect the function or loading bearing capacity of the member.
"Minor"	Less than 50 percent of the surface affected by corrosion at any elevation or cross section with loss of thickness up to 15 percent of nominal at any location. The integrity, function or load bearing capacity of the member is not affected at this time.

2. INSPECTION RESULTS

Table 2-1 summarizes the inspection results. The table includes the overall condition rating of each structure, recommended actions and repairs, and suggested priority. The suggested priorities for recommended actions are based on restoring or maintaining structural integrity and performance. Operational priorities and other factors should also be considered. As a guideline, recommendations considered immediate priority should be performed in the immediate or very near future. High priority recommendations should be performed within one calendar year. Medium priority recommendations should be performed prior to the next recommended inspection period based on the global facility recommendations. Low priority recommendations should be considered for repair as part of a routine maintenance program with the timeframe decided upon based on need of the facility operators. For a detailed discussion of conclusions and recommendations, refer to Report Section 3. Additional details for each structure's configuration and observations are provided in the inspection forms in Appendix A.

The recommended actions and repairs do not consider further analysis or conceptual design efforts to provide project specific details, but instead provide general recommendations to aid scoping analysis/design efforts required to determine site specific details typically developed in a repair design project.

Table 2-1 Summary of Waterfront Facility Inspection Results

STRUCTURE	PRIORITY	RECOMMENDATION
Cell 1 Satisfactory Condition	N/A	Repairs are not recommended at this time
Cell 2 Satisfactory Condition	High	Repair toe board on cell cap
		Replace missing safety chain on cell cap
	Medium	Replace overstressed and damaged mooring components
Cell 3 Poor Condition	High	Reballast cell with graded stone to the bottom of the cell cap
	Medium	Replace damaged mooring components
	Low	Repair broken ladder rung
Cell 4 Satisfactory Condition	High	Replace damaged guardrail on cell cap
	Medium	Replace damaged mooring components
		Install patch plate over separated interlock
Cell 5 Satisfactory Condition	Low	Repair spall in cap
Cell 6 Poor Condition	High	Design and install a full circumference cell band from elevation 288 feet to 264 feet to address the open interlocks and protect the cell from further abrasion damage
	Low	Repair damaged walkway grating between cells
Dolphin 1 Satisfactory Condition	Medium	Replace damaged mooring components
	Low	Replace damaged ladder on downstream face
Floating Dock Satisfactory Condition	Low	Repair or replace damaged walkway grating and replace missing grating clips

3. CONCLUSIONS AND RECOMMENDATIONS

The following sections discuss the conclusions, ratings, and recommendations for each structure. Detailed observations and photos are provided in the Structure Inspection Forms in Appendix A.

3.1. Mooring Cells

Overall, the six mooring cells as part of the terminal are in Satisfactory to Poor condition.

The underwater inspection indicated that the cells exhibit 49 percent to 100 percent section remaining of the sheet piles due to corrosion. When less than 70 percent section remains due to corrosion, sheet piles exhibit an increased susceptibility to defects and a decreased resistance to impacts that may cause relaxation of the sheet piles. Whether due to corrosion or barge impacts on the weakened areas, further damage is likely. Openings in the steel sheet piles and loss of ballast will result in substantial weakening of the cell structure, possible loss of use, and more expensive repairs than preventative measures. An increased risk of hazards to operations, equipment and personnel also exists.

Recommendations are provided for prioritizing which cells to repairs based on their condition. However, operational importance and other factors should be considered. Any recommended structural repairs should be designed by a licensed engineer to restore the structural capacity of the cells and to provide increased impact resistance.

- **Poor Condition: Cells 3 and 6**
    - Cell 3 exhibits moderate corrosion with between 79 percent to 100 percent remaining section. The cell exhibits substantial loss of ballast, measuring 22.6 feet below the top of the cap. The sheet ladder has one broken rung. It is recommended that the ballast be replaced with graded stone to the bottom of the cell cap on a high priority basis, and the broken ladder rung be repaired on a low priority basis.
    - Cell 6 exhibits severe corrosion with an average of 90 percent section remaining; however, isolated areas exhibit more advanced corrosion with measurements as low as 49 percent remaining section. Two interlocks are split open on the channel face and there are two areas of impact damage on the upstream channel side measuring up to 9-inches deep. Additionally, the access walkway between Cells 5 and 6 has broken grating. It is recommended that a full circumference band be installed from elevation 288 feet to 264 feet NGVD29 on a high priority basis, and the broken grating be replaced on a low priority basis.

- **Satisfactory Condition: Cells 1, 2, 4 and 5**
    - Cell 1 exhibits moderate corrosion with between 76 percent and 96 percent remaining section. The cell is otherwise free of notable defects.
    - Cell 2 exhibits moderate corrosion with between 83 percent and 100 percent remaining section. The cell exhibits abrasion damage from an adjacent haul line on an interlock at two locations measuring up to 1.5-inches deep and three areas of impact damage up to 1.5-inches deep. The toe board is broken above Sheet 41, and the safety chain in front of Sheet 1 is missing. It is recommended that the toe board be repaired and the missing safety chain replaced on a high priority basis.

- Cell 4 exhibits moderate corrosion with between 82 percent and 100 percent remaining section. The cell has one open interlock between Sheets 3 and 4 at elevation 296 feet NGVD29. The guardrail on the cell cap has impact damage on the downstream / channel side. It is recommended that the open interlock be repaired on a medium priority basis, and the guardrail replaced on a low priority basis.
- Cell 5 has moderate corrosion with between 80 percent and 100 percent remaining section. The cell cap has one spall measuring 2-inches deep adjacent to Sheets 15 and 16. It is recommended that the spall repaired on a low priority basis.

- **Mooring Rings**
  - Cells 2, 3, and 4 have damaged mooring ring assemblies. Cell 2 exhibits two overstressed mooring rings and one deformed U-bolt due to impact. Cell 3 exhibits two U-bolts that have been impacted and deformed upwards. Cell 4 has one mooring ring that has a missing section. It is recommended that the damaged mooring ring assemblies be replaced with forged mooring ring assemblies on a medium priority basis.

3.2. Dolphin 1

Dolphin 1 is in Satisfactory condition. Dolphin is located at the upstream end of the terminal. The dolphin consists of a 60-inch outer diameter spiral-welded pipe pile. The pile has moderate corrosion with at least 82 percent remaining section, with rust nodules up to 1-inch diameter by 1-inch thick and pitting up to 1/8-inch deep present below elevation 292 feet NGVD29. One of the mooring rings is overstressed. The externally-mounted ladder to the top of the dolphin is impacted and not useable. It is recommended that the overstressed mooring ring be replaced with a forged mooring ring on a medium priority basis, and the ladder be replaced on a low priority basis.

3.3. Floating Dock

The Floating Dock is in Satisfactory condition. The Floating Dock consists of three sections at the downstream side of Cell 6 and provides access to the on-shore walkways from the water. The sections are connected at transition corners by steel pins secured with keeper pins. One of the keeper pins is missing its lynch pin. The walkways have damaged or broken grating and traction bars throughout. It is recommended that the walkways be repaired on a low priority basis.

3.4. Global Facility Recommendations

Following repairs, the terminal should be periodically inspected as part of a routine inspection program or following significant events such as severe vessel impacts or flood conditions. Routine inspections are generally recommended not to exceed 6 years in periodicity for similar structures in fair or better condition per guidelines presented in ASCE MOP No. 130. Steel structures in poor condition should be inspected every 4 years. It is recommended that the next routine inspection be performed in 5 years or less.

Appendix A – Structure Inspection Forms

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE: Cell 1

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

SHEET PILE TYPE OR SHEET WIDTH: 32.75-inches per pair
NO. OF SHEETS: 38 CIRCUMFERENCE AT W/L: 51'-10"
DIAMETER: 15'-8" Upstream-Downstream; 16'-4" Channel-Bank
PLUMB: Yes
SHEET NUMBERING/DIRECTION: Sheet 1 at ladder sheet, clockwise
TOP OF MOORING CELL ELEV.: 319.6 feet NGVD29
PILE TIP ELEV.: Unknown
CAP/DECK: 24-inches thick
BALLAST HEIGHT (FROM TOP OF CAP): Unknown, Ballast Inaccessible
MOORING FITTINGS: Seven mooring rings on Sheet 35

GENERAL CONDITIONS:

☐Good ☒ Satisfactory ☐ Fair ☐ Poor ☐ Serious ☐ Critical

CORROSION: ☐ Severe ☐Major ☒Moderate ☐Minor ☐ N/A

SPLIT INTERLOCKS: ☐Yes/☒No
IMPACT DAMAGE: ☐Yes/☒No
LOSS OF BALLAST: ☐Yes/☐No/☒UNK
CORROSION HOLES: ☐Yes/☒No
BROKEN MOORINGS: ☐Yes/☒No
LADDER DAMAGE: ☐Yes/☒No/☐N/A

PREVIOUS REPAIRS: None.

SHEET PILE WEB THICKNESS READINGS:

NOMINAL: 0.375 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	0.365	100%
Channel Sheet 1 Depth: 33'	Splash Zone	0.310	83%
	Mid-Depth	0.330	88%
	Bottom	0.325	87%
Downstream Sheet 10 Depth: 29'	Splash Zone	0.330	96%
	Mid-Depth	0.285	76%
	Bottom	0.315	84%
Bank Sheet 19 Depth: 25'	Splash Zone	0.330	88%
	Mid-Depth	0.320	85%
	Bottom	0.318	85%
Upstream Sheet 28 Depth: 29'	Splash Zone	0.355	95%
	Mid-Depth	0.285	76%
	Bottom	0.345	92%

BAND THICKNESS READINGS (if applicable):

NOMINAL:	Zone	In.	% Nom.

STRUCTURE:	Cell 1

ELEVATION PHOTOS:

Photo 1: Elevation – Channel Side

STRUCTURE:	Cell 1

CONFIGURATION NOTES:

1. Sheet ladder on Sheet 1 from top of cell at elevation 319.6 feet NGVD29 to below waterline.
2. Seven mooring rings on Sheet 35 spaced approximately 6 feet on center beginning at elevation 316 feet NGVD29. The mooring rings are secured with a U-bolt measuring 2 1/2-inch thick, and the mooring rings measure 2 1/2-inches thick and 17-inches in diameter. Mooring rings are not forged.
3. A haul line is shackled to the mooring ring at elevation 310 feet NGVD29.

STRUCTURE:	Cell 1

CONDITION NOTES:

1. The channel bottom around the cell consists of silt.
2. The cell cap exhibits minor weathering with isolated hairline cracking.
3. The sheet piles above elevation 298 feet NGVD29 typically exhibit minor surface corrosion with no measurable pitting.
4. The sheet piles below elevation 298 feet NGVD29 typically exhibit scale up to 1/16-inch thick and pitting up to 1/8-inch deep.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE:	Cell 1

ADDITIONAL PHOTOS:

Photo 2: View of the concrete cell cap.

Photo 3: View of the typical sheet pile condition at the waterline.

Photo 4: View of a typical mooring ring.

Photo 5: View of the haul line attched to the mooring ring at elevation 310 feet NGVD29.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR: R. Whiting, P.E..

STRUCTURE: Cell 2

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

SHEET PILE TYPE OR SHEET WIDTH: 32.75-inches per pair
NO. OF SHEETS: 48 CIRCUMFERENCE AT W/L: 65'-6"
DIAMETER: 20'-8" Upstream-Downstream; 20'-8" Channel-Bank
PLUMB: Yes
SHEET NUMBERING/DIRECTION: Sheet 1 at ladder sheet, clockwise
TOP OF MOORING CELL ELEV.: 319.5 feet NGVD29
PILE TIP ELEV.: Unknown
CAP/DECK: 24-inches thick
BALLAST HEIGHT (FROM TOP OF CAP): 4.9 feet
MOORING FITTINGS: 8 mooring rings on Sheet 3, 7 mooring rings on Sheet 45

GENERAL CONDITIONS:

☐Good ☒ Satisfactory ☐ Fair ☐ Poor ☐ Serious ☐ Critical | CORROSION: ☐ Severe ☐Major ☒Moderate ☐Minor ☐ N/A

SPLIT INTERLOCKS: ☐Yes/☒No IMPACT DAMAGE: ☒Yes/☐No LOSS OF BALLAST: ☒Yes/☐No/☐UNK
CORROSION HOLES: ☐Yes/☒No BROKEN MOORINGS: ☒Yes/☐No LADDER DAMAGE: ☐Yes/☒No/☐N/A

PREVIOUS REPAIRS: None.

SHEET PILE WEB THICKNESS READINGS:

NOMINAL: 0.375 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	0.353	94%
Channel Sheet 1 Depth: 35'	Splash Zone	0.345	92%
	Mid-Depth	0.325	87%
	Bottom	0.375	100%
Downstream Sheet 12 Depth: 34'	Splash Zone	0.342	91%
	Mid-Depth	0.345	92%
	Bottom	0.350	93%
Bank Sheet 24 Depth: 24'	Splash Zone	0.327	87%
	Mid-Depth	0.335	89%
	Bottom	0.337	90%
Upstream Sheet 36 Depth: 30'	Splash Zone	0.333	89%
	Mid-Depth	0.313	83%
	Bottom	0.330	88%

BAND THICKNESS READINGS (if applicable):

NOMINAL:	Zone	In.	% Nom.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE:	Cell 2

ELEVATION PHOTOS:

Photo 1: Elevation – Channel Side

STRUCTURE:	Cell 2

CONFIGURATION NOTES:

1. Sheet ladder on Sheet 1 from top of cell at elevation 319.5 feet NGVD29 to below waterline.
2. Eight mooring rings on Sheet 3 spaced approximately 6 feet on center beginning at elevation 313 feet NGVD29. The mooring rings are secured with a U-bolt measuring 2 1/2-inch thick, and the mooring rings measure 2 1/2-inches thick and 17-inches in diameter. Mooring rings are not forged.
3. Seven mooring rings on Sheet 3 spaced approximately 6 feet on center beginning at elevation 313 feet NGVD29. The mooring rings are secured with a U-bolt measuring 2 1/2-inch thick, and the mooring rings measure 2 1/2-inches thick and 17-inches in diameter. Mooring rings are not forged.
4. The cell supports a load-out hopper and conveyor system.

STRUCTURE:	Cell 2

CONDITION NOTES:

1. The channel bottom around the cell consists of silt.
2. The cell cap exhibits minor weathering with isolated hairline cracking.
3. The sheet piles above elevation 298 feet NGVD29 typically exhibit minor surface corrosion with no measurable pitting.
4. The sheet piles below elevation 298 feet NGVD29 typically exhibit scale up to 1/16-inch thick and pitting up to 1/8-inch deep.
5. The interlocks on Sheets 46 to 1 exhibits two areas of abrasion damage from the haul line that runs between the cells. At elevation 311 feet NGVD29 the abrasion damage is 1.5-inches deep, and at elevation 305 feet NGVD29 the abrasion damage is 1-inch deep.
6. Sheet 2 exhibits an area of impact damage at elevation 307 feet NGVD29 measuring 12-inch in diameter by 1-inch deep.
7. The interlock between Sheets 10 and 11 exhibits an area of impact damage at elevation 306 feet NGVD29 measuring 6-inches tall by 1-inch deep.
8. The interlock between Sheets 43 and 44 exhibits an area of impact damage at elevation 307 feet NGVD29 measuring 4-inches tall by 1.5-inches deep.
9. The U-bolt on Sheet 3 at elevation 295 feet NGVD29 has been impacted and deformed upwards.
10. The mooring rings on Sheet 45 at elevations 301 and 295 feet NGVD29 are overstressed.
11. The toe kick above Sheet 41 is broken.
12. The safety chain above Sheet 1 is missing.

STRUCTURE:	Cell 2

ADDITIONAL PHOTOS:

Photo 2: View of the concrete cell cap.

Photo 3: View of the typical sheet pile condition at the waterline.

Photo 4: View of a typical mooring ring.

Photo 5: Sheets 46 to 1, abrasion damage from haul line

STRUCTURE:	Cell 2

ADDITIONAL PHOTOS:

Photo 6: View of impacted U-bolt on Sheet 3.

Photo 7: View of overstressed mooring ring on Sheet 45.

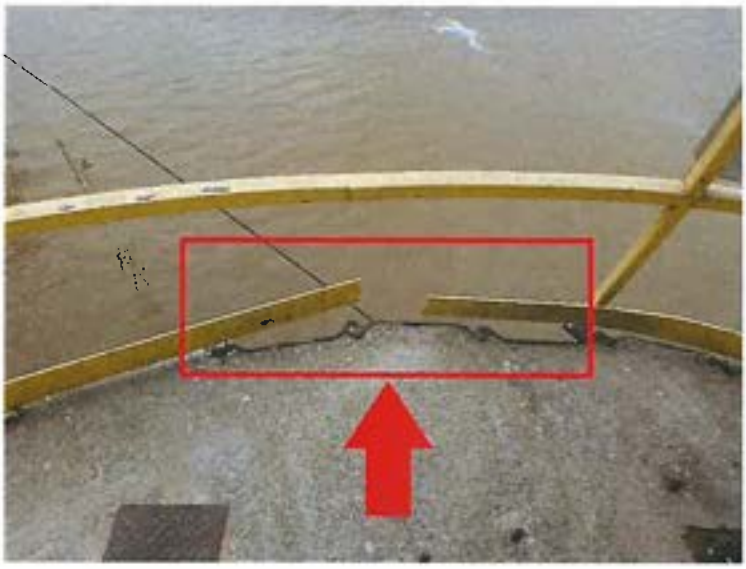


Photo 8: View of a broken toe kick over Sheet 41.

Photo 9: View of the missing safety chain over Sheet 1.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE: Cell 3

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

SHEET PILE TYPE OR SHEET WIDTH: 32.75-inches per pair
NO. OF SHEETS: 38 CIRCUMFERENCE AT W/L: 51'-10"
DIAMETER: 16'-4" Upstream-Downstream; 15'-9" Channel-Bank
PLUMB: Yes
SHEET NUMBERING/DIRECTION: Sheet 1 at ladder sheet, clockwise
TOP OF MOORING CELL ELEV.: 320.0 feet NGVD29
PILE TIP ELEV.: Unknown
CAP/DECK: 24-inches thick
BALLAST HEIGHT (FROM TOP OF CAP): 22.6 feet
MOORING FITTINGS: Seven mooring rings on Sheet 35

GENERAL CONDITIONS:

☐Good ☐ Satisfactory ☐ Fair ☒ Poor ☐ Serious ☐ Critical CORROSION: ☐ Severe ☐Major ☒Moderate ☐Minor ☐ N/A

SPLIT INTERLOCKS: ☐Yes/☒No IMPACT DAMAGE: ☐Yes/☒No LOSS OF BALLAST: ☒Yes/☐No/☐UNK

CORROSION HOLES: ☐Yes/☒No BROKEN MOORINGS: ☐Yes/☒No LADDER DAMAGE: ☐Yes/☒No/☐N/A

PREVIOUS REPAIRS: None.

SHEET PILE WEB THICKNESS READINGS:

NOMINAL: 0.375 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	0.380	101%
Channel	Splash Zone	0.365	97%
Sheet 1	Mid-Depth	0.350	93%
Depth: 31'	Bottom	0.360	96%
Downstream	Splash Zone	0.370	99%
Sheet 10	Mid-Depth	0.340	91%
Depth: 33'	Bottom	0.375	100%
Bank	Splash Zone	0.350	93%
Sheet 19	Mid-Depth	0.338	90%
Depth: 25'	Bottom	0.345	92%
Upstream	Splash Zone	0.385	103%
Sheet 27	Mid-Depth	0.295	79%
Depth: 33'	Bottom	0.325	87%

BAND THICKNESS READINGS (if applicable):

NOMINAL:	Zone	In.	% Nom.

STRUCTURE:	Cell 3

ELEVATION PHOTOS:

Photo 1: Elevation – Channel Side

STRUCTURE:	Cell 3

CONFIGURATION NOTES:

1. Sheet ladder on Sheet 1 from top of cell at elevation 320.0 feet NGVD29 to below waterline.
2. Seven mooring rings on Sheet 37 spaced approximately 6 feet on center beginning at elevation 317 feet NGVD29. The mooring rings are secured with a U-bolt measuring 2 1/2-inch thick, and the mooring rings measure 2 1/2-inches thick and 17-inches in diameter. Mooring rings are not forged.
3. The mooring cell supports an e-crane unloader.
4. A handrail has been installed around the perimeter of the cell on the upstream, downstream, and channel sides.

STRUCTURE:	Cell 3

CONDITION NOTES:

1. The channel bottom around the cell consists of silt.
2. The cell cap exhibits minor weathering with isolated hairline cracking.
3. The sheet piles above elevation 298 feet NGVD29 typically exhibit minor surface corrosion with no measurable pitting.
4. The sheet piles below elevation 298 feet NGVD29 typically exhibit scale up to 1/16-inch thick and pitting up to
5. 1/8-inch deep.
6. Sheet 1 exhibits impact damage to the ladder rung at elevation 307 feet NGVD29.
7. The U-bolts on Sheet 37 at elevations 305 and 299 feet NGVD29 have been impacted and are deformed upwards.

STRUCTURE:	Cell 3

ADDITIONAL PHOTOS:

Photo 2: View of the concrete cell cap.

Photo 3: View of typical sheet pile condition at the waterline.

Photo 4: View of a typical mooring ring.

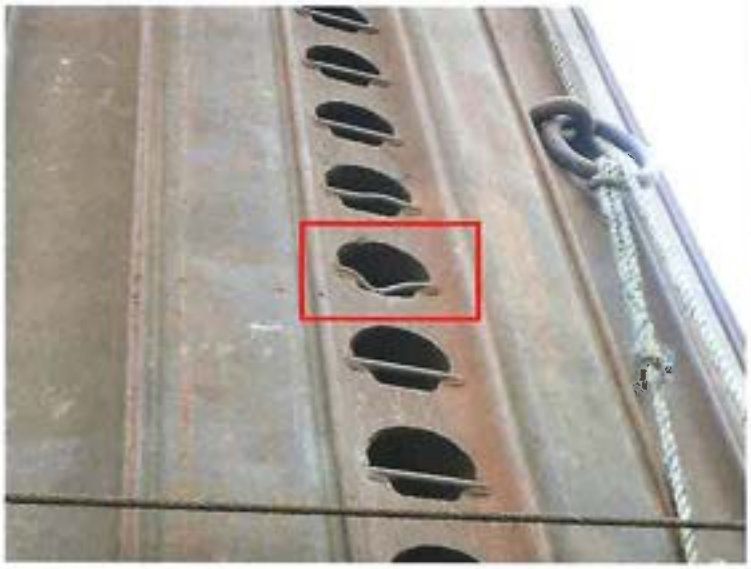


Photo 5: View of the impacted ladder rung.

STRUCTURE:	Cell 3

ADDITIONAL PHOTOS:

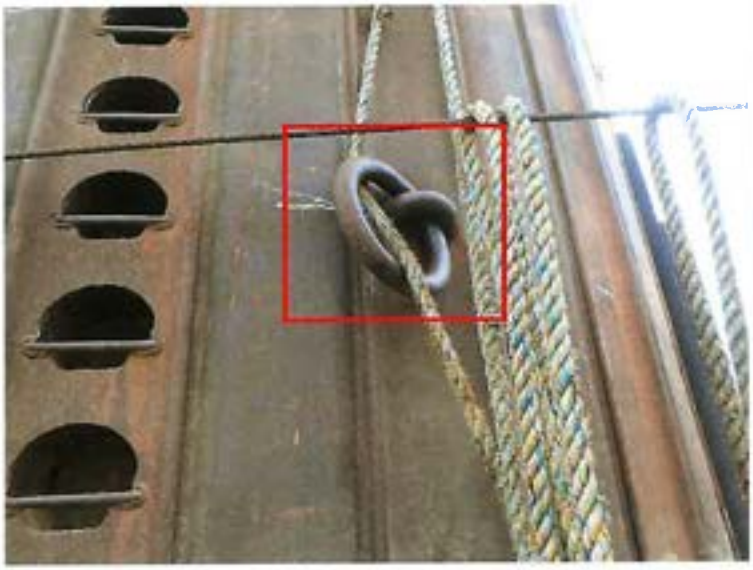


Photo 6: View of the impacted and deformed U-Bolt at elevation 305 feet NGVD29.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE: Cell 4

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

SHEET PILE TYPE OR SHEET WIDTH: 32.75-inches per pair
NO. OF SHEETS: 38 CIRCUMFERENCE AT W/L: 51'-10"
DIAMETER: 17'-1" Upstream-Downstream; 15'-1" Channel-Bank
PLUMB: Yes
SHEET NUMBERING/DIRECTION: Sheet 1 at ladder sheet, clockwise
TOP OF MOORING CELL ELEV.: 320.1 feet NGVD29
PILE TIP ELEV.: Unknown
CAP/DECK: 24-inches thick
BALLAST HEIGHT (FROM TOP OF CAP): 9.0 feet
MOORING FITTINGS: Seven mooring rings on Sheet 37

GENERAL CONDITIONS:

☐Good ☒ Satisfactory ☐ Fair ☐ Poor ☐ Serious ☐ Critical

CORROSION: ☐ Severe ☐ Major ☒ Moderate ☐ Minor ☐ N/A

SPLIT INTERLOCKS: ☒Yes/☐No
IMPACT DAMAGE: ☐Yes/☒No
LOSS OF BALLAST: ☒Yes/☐No/☐UNK
CORROSION HOLES: ☐Yes/☒No
BROKEN MOORINGS: ☒Yes/☐No
LADDER DAMAGE: ☐Yes/☒No/☐N/A

PREVIOUS REPAIRS: None.

SHEET PILE WEB THICKNESS READINGS:

NOMINAL: 0.375 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	-	-
Channel Sheet 1 Depth: 37'	Splash Zone	0.318	85%
	Mid-Depth	0.308	82%
	Bottom	0.385	103%
Downstream Sheet 9 Depth: 35'	Splash Zone	0.380	101%
	Mid-Depth	0.335	89%
	Bottom	0.300	80%
Bank Sheet 19 Depth: 30'	Splash Zone	0.390	104%
	Mid-Depth	0.328	87%
	Bottom	0.345	92%
Upstream Sheet 27 Depth: 30'	Splash Zone	0.385	103%
	Mid-Depth	0.330	88%
	Bottom	0.320	85%

BAND THICKNESS READINGS (if applicable):

NOMINAL:	Zone	In.	% Nom.

STRUCTURE:	Cell 4

ELEVATION PHOTOS:

Photo 1: Elevation – Channel Side

STRUCTURE:	Cell 4

CONFIGURATION NOTES:

1. Sheet ladder on Sheet 1 from top of cell at elevation 320.1 feet NGVD29 to below waterline.
2. Seven mooring rings on Sheet 37 spaced approximately 6 feet on center beginning at elevation 318 feet NGVD29. The mooring rings are secured with a U-bolt measuring 2 1/2-inch thick, and the mooring rings measure 2 1/2-inches thick and 17-inches in diameter. Mooring rings are not forged.
3. An access catwalk to cell 5 is located on the top of the cell on the upstream bank side.
4. Two haul lines have been attached to the mooring rings at elevations 305 and 299 feet NGVD29.
5. Three abandoned lines run through the top of the cap.

STRUCTURE:	Cell 4

CONDITION NOTES:

1. The channel bottom around the cell consists of silt.
2. The cell cap exhibits minor weathering with isolated hairline cracking.
3. The sheet piles above elevation 298 feet NGVD29 typically exhibit minor surface corrosion with no measurable pitting.
4. The sheet piles below elevation 298 feet NGVD29 typically exhibit scale up to 1/16-inch thick and pitting up to 1/8-inch deep.
5. The interlock between Sheets 3 and 4 is open at elevation 296 feet NGVD29 for a vertical height of 4-inches.
6. The mooring ring at elevation 299 feet NGVD29 has an area of missing section measuring 2-inches wide by 1/2-inch deep. It appears the missing section was removed with a cutting torch.
7. The guardrail is impacted from above Sheet 1 to above Sheet 12.

STRUCTURE:	Cell 4

ADDITIONAL PHOTOS:

Photo 2: View of the concrete cell cap. Note the abandoned steel lines running into the cell cap.

Photo 3: View of typical sheet pile condition at the waterline.

Photo 4: View of a typical mooring ring and haul line attachment.

Photo 5: View of the open interlock between Sheets 3 and 4.

STRUCTURE:	Cell 4

ADDITIONAL PHOTOS:

Photo 6: View of a missing section on the mooring ring.

Photo 7: View of the impacted handrail.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE: Cell 5

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

SHEET PILE TYPE OR SHEET WIDTH: 32.75-inches per pair
NO. OF SHEETS: 72 CIRCUMFERENCE AT W/L: 98'-3"
DIAMETER: 31'-3"
PLUMB: Yes
SHEET NUMBERING/DIRECTION: Sheet 1 at center of channel
TOP OF MOORING CELL ELEV.: 320.1 feet NGVD29
PILE TIP ELEV.: Unknown
CAP/DECK: 24-inches thick
BALLAST HEIGHT (FROM TOP OF CAP): 4.8 feet
MOORING FITTINGS: None

GENERAL CONDITIONS:

☐Good ☒ Satisfactory ☐ Fair ☐ Poor ☐ Serious ☐ Critical

CORROSION: ☐ Severe ☐Major ☒Moderate ☐Minor ☐ N/A

SPLIT INTERLOCKS: ☐Yes/☒No
IMPACT DAMAGE: ☐Yes/☒No
LOSS OF BALLAST: ☒Yes/☐No/☐UNK
CORROSION HOLES: ☐Yes/☒No
BROKEN MOORINGS: ☐Yes/☒No
LADDER DAMAGE: ☐Yes/☐No/☒N/A

PREVIOUS REPAIRS: None.

SHEET PILE WEB THICKNESS READINGS:

NOMINAL: 0.375 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	-	-
Channel Sheet 1 Depth: 32'	Splash Zone	0.375	100%
	Mid-Depth	0.325	87%
	Bottom	0.363	97%
Downstream Sheet 18 Depth: 20'	Splash Zone	0.380	101%
	Mid-Depth	0.318	85%
	Bottom	0.358	95%
Bank Sheet 36 Depth: 18'	Splash Zone	0.347	93%
	Mid-Depth	0.347	93%
	Bottom	0.342	91%
Upstream Sheet 54 Depth: 27'	Splash Zone	0.375	100%
	Mid-Depth	0.315	84%
	Bottom	0.300	80%

BAND THICKNESS READINGS (if applicable):

NOMINAL:	Zone	In.	% Nom.

STRUCTURE:	Cell 5

ELEVATION PHOTOS:

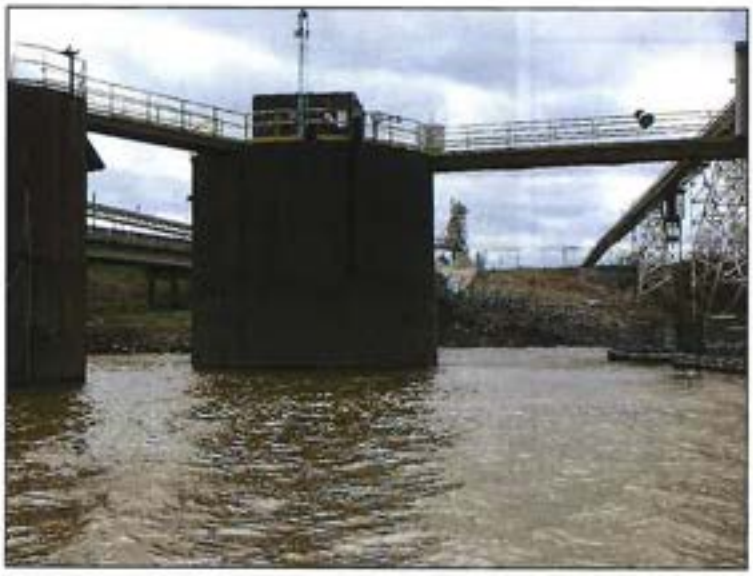


Photo 1: Elevation – Channel Side

STRUCTURE:	Cell 5

CONFIGURATION NOTES:

1. There are two access catwalks to Cell nos. 4 and 6 on the channel side of the cell.
2. There is a haul line winch motor located above sheet 1.

STRUCTURE:	Cell 5

CONDITION NOTES:

1. The channel bottom around the cell consists of silt.
2. The cell cap exhibits minor weathering with isolated hairline cracking.
3. The sheet piles above elevation 298 feet NGVD29 typically exhibit minor surface corrosion with no measurable pitting.
4. The sheet piles below elevation 298 feet NGVD29 typically exhibit scale up to 1/16-inch thick and pitting up to 1/8-inch deep.
5. There is a 9-inch long by 11-inch wide by 2-inch deep spall on the cap above Sheets 15 and 16.

STRUCTURE:	Cell 5

ADDITIONAL PHOTOS:

Photo 2: View of the concrete cell cap.

Photo 3: View of the spall in the cell cap.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman, KY
CREW: R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
R. Whiting, P.E..

STRUCTURE: Cell 6

LOCATION: Hickman, KY

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

SHEET PILE TYPE OR SHEET WIDTH: 32.75-inches per pair
NO. OF SHEETS: 48 CIRCUMFERENCE AT W/L: 65'-6"
DIAMETER: 20'-8" Upstream-Downstream; 20'-8" Channel-Bank
PLUMB: Yes
SHEET NUMBERING/DIRECTION: Sheet 1 at ladder sheet, clockwise
TOP OF MOORING CELL ELEV.: 320.0 feet NGVD29
PILE TIP ELEV.: Unknown
CAP/DECK: 24-inches thick
BALLAST HEIGHT (FROM BOTTOM OF CAP): 5.4 feet
MOORING FITTINGS: Seven mooring rings on Sheet 47

GENERAL CONDITIONS:

☐Good ☐ Satisfactory ☐ Fair ☒ Poor ☐ Serious ☐ Critical CORROSION: ☒ Severe ☐Major ☐Moderate ☐Minor ☐ N/A

SPLIT INTERLOCKS: ☒Yes/☐No IMPACT DAMAGE: ☒Yes/☐No LOSS OF BALLAST: ☒Yes/☐No/☐UNK

CORROSION HOLES: ☐Yes/☒No BROKEN MOORINGS: ☐Yes/☒No LADDER DAMAGE: ☐Yes/☒No/☐N/A

PREVIOUS REPAIRS: None.

SHEET PILE WEB THICKNESS READINGS:

NOMINAL: 0.375 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	0.375	97%
Channel Sheet 1 Depth: 35'	Splash Zone	0.365	97%
	Mid-Depth	0.367	97%
	Bottom	0.360	96%
Downstream Sheet 12 Depth: 34'	Splash Zone	0.385	103%
	Mid-Depth	0.310	83%
	Bottom	0.315	84%
Bank Sheet 26 Depth: 31'	Splash Zone	0.385	103%
	Mid-Depth	0.185	49%
	Bottom	0.355	95%
Upstream Sheet 36 Depth: 33'	Splash Zone	0.387	103%
	Mid-Depth	0.325	87%
	Bottom	0.345	92%

BAND THICKNESS READINGS (if applicable):

NOMINAL:	Zone	In.	% Nom.

STRUCTURE:	Cell 6

ELEVATION PHOTOS:

Photo 1: Elevation – Channel Side

Photo 2: Elevation – Downstream Side

STRUCTURE:	Cell 6

CONFIGURATION NOTES:

1. Sheet ladder on Sheet 1 from top of cell at elevation 319.5 feet NGVD29 to below waterline.
2. Seven mooring rings on Sheet 47 spaced approximately 6 feet on center beginning at elevation 317 feet NGVD29. The mooring rings are secured with a U-bolt measuring 2 1/2-inch thick, and the mooring rings measure 2 1/2-inches thick and 17-inches in diameter. Mooring rings are not forged.
3. Walkway located on top of the cell that provides access from Cell 5 on the downstream side.
4. There is a vertical guide pile for the floating dock connected to the bank side of the cell. The guide pile is secured with four welded steel plate tiebacks located at elevations 320, 300, 286, and 274 feet.
5. The cell supports a loadout conveyor.

STRUCTURE:	Cell 6

CONDITION NOTES:

1. The channel bottom around the cell consists of silt.
2. The cell cap was not visible for inspection and was obscured by organic material.
3. The sheet piles above elevation 298 feet NGVD29 exhibit minor surface corrosion with no measurable pitting.
4. The sheet piles below elevation 298 feet NGVD29 typically exhibit scale up to 1/16-inch thick and pitting up to 1/8-inch deep.
5. The interlock between Sheets 1 and 2 is split open up to 1-inch wide from elevation 278 feet to 266 feet NGVD29.
6. The interlock between Sheets 2 and 3 is split open up to 1.5-inches wide from elevation 282 to 267 feet NGVD29. A steel patch plate has been installed over the split interlock from elevation 282 feet to 280 feet NGVD29 and the plate is also split over the interlock from elevation 281 feet to 280 feet NGVD29.
7. There is an area of impact damaged centered at elevation 286 feet NGVD29 on Sheets 43 and 44 measuring 2 feet tall and up to 4-inches deep.
8. There is an area of impact damage centered at elevation 310 feet NGVD29 that goes from Sheet 41 to Sheet 46 measuring 15 feet high by up to 9-inches deep.
9. There is a gap between the sheet piles and the cell cap above Sheets 42 through 45 measuring up to 1.5-inches wide. The seperation appears to be related to the adjacent area of impact.
10. The walkway between Cells 5 and 6 has an area of broken grating.

STRUCTURE:	Cell 6

ADDITIONAL PHOTOS:

Photo 3: View of the cell cap

Photo 4: View of the typical sheet pile condition at the waterline.

Photo 5: View of a typical mooring ring.

Photo 6: View of the access walkway from Cell 5.

STRUCTURE:	Cell 6

ADDITIONAL PHOTOS:

Photo 7: View of the floating dock guide pile.

Photo 8: View of a support for the loadout conveyor.

Photo 9: View of the split interlock between Sheets 2 and 3 (2021).

Photo 10: View of the impact damage on Sheets 43 and 44 (2021).

STRUCTURE:	Cell 6

ADDITIONAL PHOTOS:

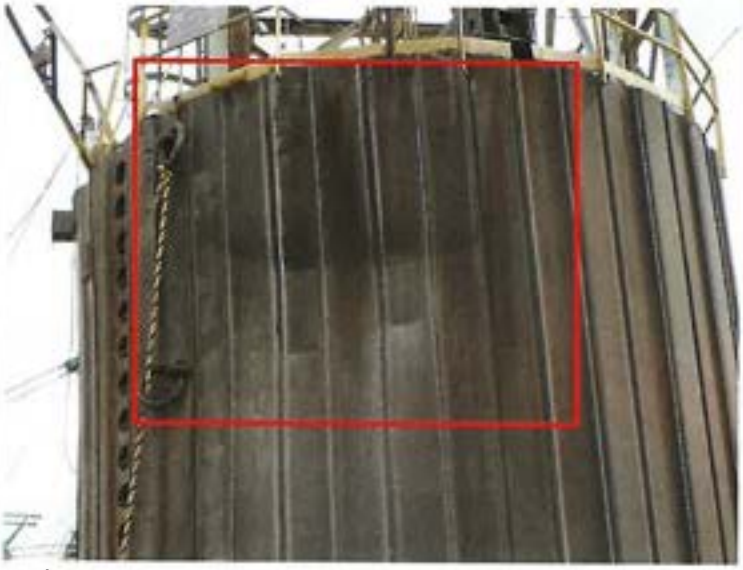


Photo 11: View of the impact damage on Sheets 41 to 46.

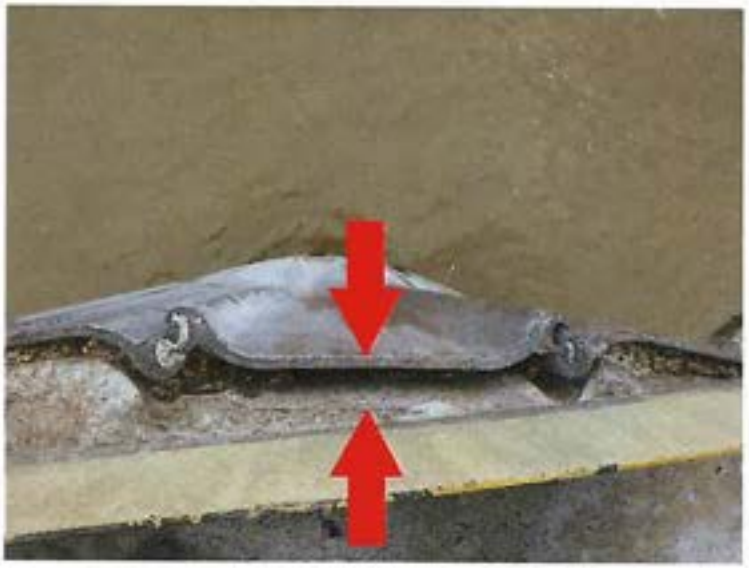


Photo 12: View of the gap between the sheet piles and cap.

Photo 13: View of the broken grating on the walkway.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: J.R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
J.R. Whiting, P.E.

STRUCTURE: Dolphin 1

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

PILE TYPE: 60-inch dia. spiral welded steel pipe pile
PLUMB: Yes
TOP OF DOLPHIN ELEV.: 318.0 feet NGVD29
PILE TIP ELEV.: Unknown
MOORING FITTINGS: 3 mooring rings on the downstream/channel face

GENERAL CONDITIONS:

☐Good ☒ Satisfactory ☐ Fair ☐ Poor ☐ Serious ☐ Critical

CORROSION: ☐ Severe ☐Major ☒Moderate ☐Minor ☐ N/A

SPLIT PIPE: ☐Yes/☒No
IMPACT DAMAGE: ☒Yes/☐No
LOSS OF BALLAST: ☐Yes/☐No/☒N/A
CORROSION HOLES: ☐Yes/☒No
BROKEN MOORINGS: ☒Yes/☐No
FENDER DAMAGE: ☐Yes/☐No/☒N/A

PREVIOUS REPAIRS: A full-circumference patch plate measuring 1 foot high has been installed at elevation 279.0 feet NGVD29.

PILE THICKNESS READINGS:

NOMINAL: 0.500 in.	Zone	In.	% Nom.
Nominal Reading	Above Water	0.485	97%
Upstream Face Depth: 36'	Splash Zone	0.490	98%
	Mid-Depth	0.410	82%
	Bottom	0.440	88%

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: J.R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
J.R. Whiting, P.E.

STRUCTURE:	Dolphin 1

ELEVATION PHOTOS:

Photo 1: Elevation – Downstream Side

STRUCTURE:	Dolphin 1

CONFIGURATION NOTES:

1. The dolphin is constructed of one 60-inch diameter spiral welded steel pipe.
2. Three mooring rings are present on the downstream/channel face of the dolphin spaced approximately 10 feet on center beginning at elevation 316 feet NGVD29. The mooring rings are secured with a pad-eye measuring 2-inch thick, and the mooring rings measure 1-inch thick and 13-inches outer diameter. Mooring rings are not forged.
3. A barge haul line is attached to the mooring pad-eye at elevation 306.0 feet NGVD29.
4. A 12-inch tall full circumference patch plate is present on the dolphin at elevation 279.0 feet NGVD29.
5. An externally mounted ladder that runs from the top of the dolphin to below the waterline is present on the downstream face of the dolphin.
6. Due to impact damage to the ladder, the top of the dolphin was inaccessible.

STRUCTURE:	Dolphin 1

CONDITION NOTES:

1. The channel bottom around the dolphin consists of silt.
2. The dolphin exhibits rust nodules up to 1-inch diameter by 1-inch thick with pitting up to 1/8-inch deep from elevation 292.0 feet NGVD29 to the channel bottom.
3. The upstream and channel faces of the dolphin exhibit multiple shallow impact spalls less than 1-inch deep throughout.
4. The mooring ring at elevation 296 feet NGVD29 is overstressed.
5. The ladder on the downstream face is impacted and deformed for its full height.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: J.R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
J.R. Whiting, P.E.

STRUCTURE:	Dolphin 1

ADDITIONAL PHOTOS:

Photo 2: View of typical dolphin condition at waterline.

Photo 4: View of a typical mooring ring.

Photo 3: View of the overstressed mooring ring at El. 296 feet.

Photo 5: View of impacted ladder.

MARINE SOLUTIONS

STRUCTURE INSPECTION SHEET
PROJECT NO: 05-22-001
CLIENT: Hickman-Fulton County Riverport Authority
SITE: Hickman Riverport
CREW: J.R. Whiting, P.E., A. Barber, N. Ogden

DATE: 03/24/2022

LEAD INSPECTOR:
J.R. Whiting, P.E.

STRUCTURE: Floating Dock

LOCATION: Hickman Riverport

WATER SURFACE ELEVATION: 294.2 feet NGVD29

CONFIGURATION:

PILE TYPE: 5'' Dia. Guide Pile
PLUMB: No, Section 3 is listing.
TOP OF DOCK ELEV.: 296.5 feet NGVD29 at time of inspection
PILE TIP ELEV.: N/A
MOORING FITTINGS: None

GENERAL CONDITIONS:

☐Good ☒ Satisfactory ☐ Fair ☐ Poor ☐ Serious ☐ Critical

CORROSION: ☐ Severe ☐ Major ☐ Moderate ☐ Minor ☒ N/A

SPLIT PIPE: ☐Yes/☒No
IMPACT DAMAGE: ☐Yes/☒No
LOSS OF BALLAST: ☐Yes/☐No/☒N/A
CORROSION HOLES: ☐Yes/☒No
BROKEN MOORINGS: ☐Yes/☒No
FENDER DAMAGE: ☐Yes/☐No/☒N/A

PREVIOUS REPAIRS: None.

PILE THICKNESS READINGS:

NOMINAL: N/A	Zone	In.	% Nom.

STRUCTURE:	Floating Dock

ELEVATION PHOTOS:

Photo 1: Elevation – View from Approach Gangway

STRUCTURE:	Floating Dock

CONFIGURATION NOTES:

1. The floating dock consists of three sections of gangway comprised of 16-inch tall quick connect floats supporting galvanized steel framing.
2. Galvanized steel grating is attached to the framing by clips and forms the walking surface.
3. Glavanized steel handrails are present on both sides of the walkway.
4. The sections are connected by galvanized steel pins with keeper pins located at transistion corners.
5. The floating dock is retained by a guide pile connected between section 2 and the adjacent mooring cell, Cell 6. The guide pile has four tieback supports connected to the bank face of the cell.

STRUCTURE:	Floating Dock

CONDITION NOTES:

1. Section 1 has a missing grating clip at the downstream/bank corner.
2. Section 2 has an area of broken grating framing and damaged grating at the upstream/bank corner.
3. The transition between Sections 2 and 3 has a missing lynch pin for the keeper pin at the downstream/channel corner.
4. Section 3 is listing towards the downstream side by 4-inches. The list is due to unequal loading.
5. The gangway has multiple bent traction bars; however, the traction bars are still secure and functional.

STRUCTURE:	Floating Dock

ADDITIONAL PHOTOS:

Photo 2: View of typical floating dock configuration.

Photo 3: View of a typical keeper pin.

Photo 4: View of the guide pile.

Photo 5: View of the missing grating clip on section 1.

STRUCTURE:	Floating Dock

ADDITIONAL PHOTOS:

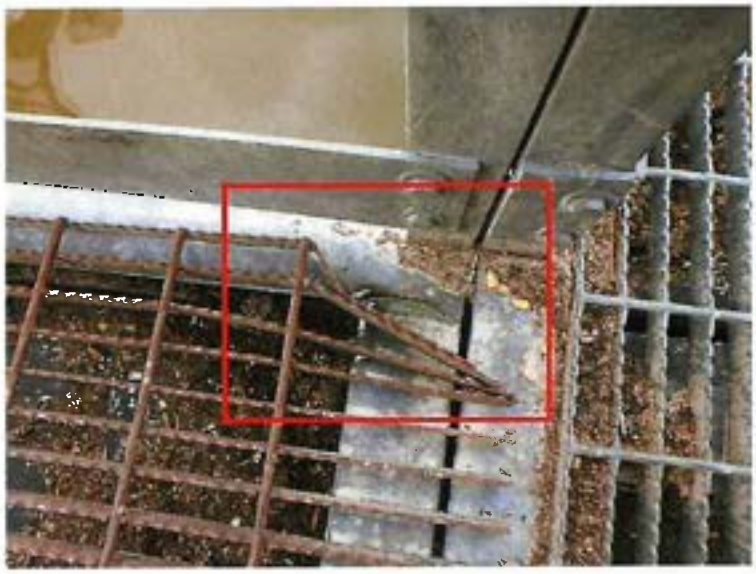


Photo 6: View of damaged framing and grating.

Photo 7: View of the missing lynch pin.

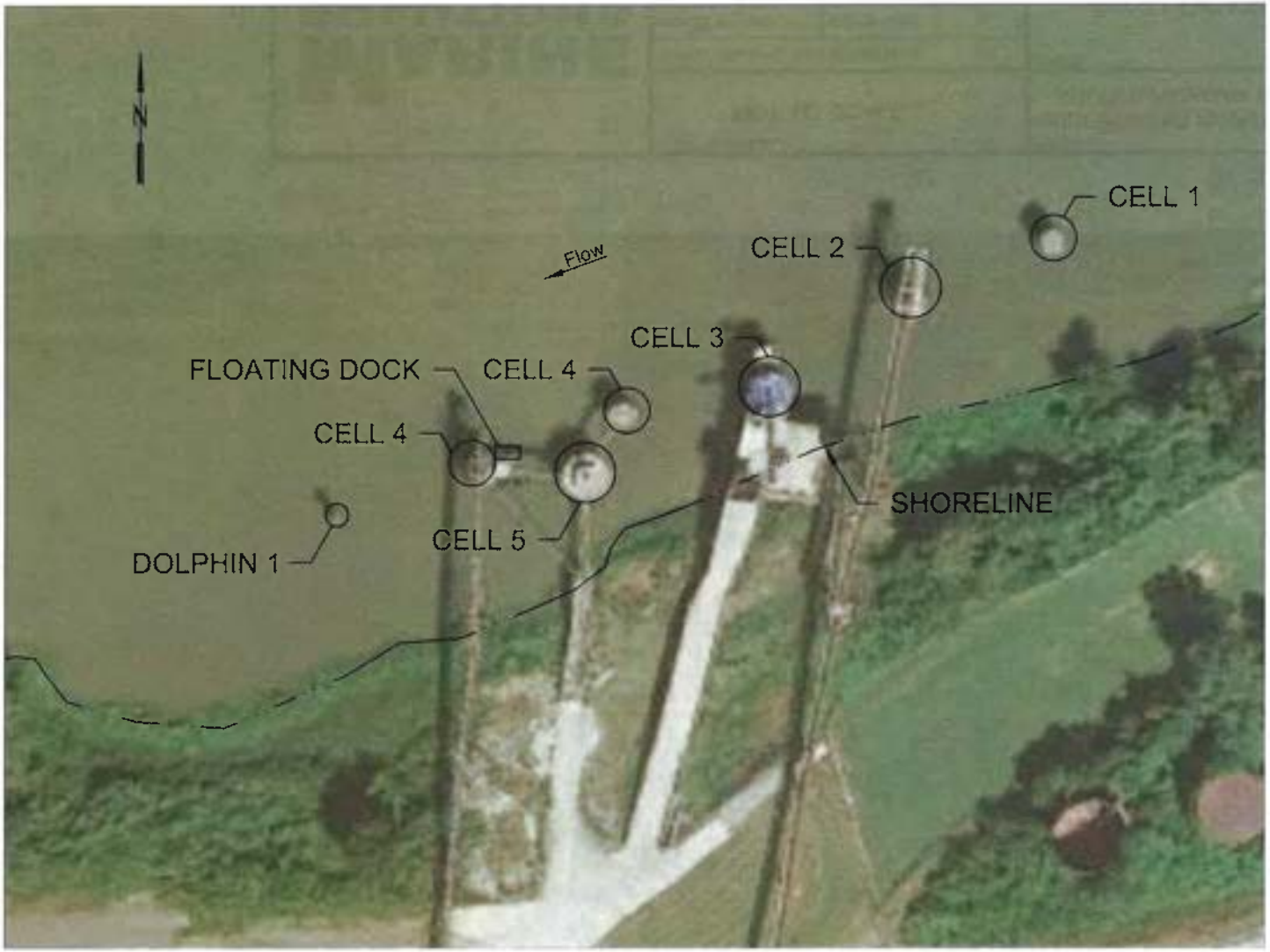
Photo 8: View of Section 3 listing to the downstream side.

Photo 9: View of a typical bent traction bar.

Appendix B – Figures

MARINE SOLUTIONS

GRAPHIC SCALE: NOT TO SCALE	PROJECT: UNDERWATER INSPECTION AND ASSESSMENT FULTON-HICKMAN RIVERPORT AUTHORITY
INSPECTION DATE: INSPECTION DATE	SHEET: SITE LOCATION MAP HICKMAN, KY
DRAWN BY: ASA CKD BY: JRW	FIG NO. 1 of 3
MSI PROJECT NO.: 05-22-001	
FILENAME: 05-22-001.DWG	



MARINE SOLUTIONS

GRAPHIC SCALE:
0 50 100 200 FT
SCALE: 1"= 100'

PROJECT:
UNDERWATER INSPECTION AND ASSESSMENT
FULTON-HICKMAN RIVERPORT AUTHORITY

INSPECTION DATE: INSPECTION DATE

DRAWN BY: ASA | CKD BY: JRW

MSI PROJECT NO.: 05-22-001

FILENAME: 05-22-001.DWG

SHEET:
DOLPHIN AND CELL LOCATION MAP
HICKMAN, KY

FIG NO.
2 of 3

LEGEND

1. DEPTH SOUNDING TAKEN AT THE BASE OF EACH STRUCTRE.
2. WATER SURFACE ELEVATION 294.24 FEET AT TIME OF INSPECTION (NWS GAUGE ID HKMK2).

LEGEND

12.0' ● SOUNDING LOCATION AND DEPTH BELOW WATER SURFACE

Flow DIRECTION OF FLOW

MARINE SOLUTIONS

GRAPHIC SCALE: 0 50 100 200 FT

SCALE: 1"= 100'

PROJECT: UNDERWATER INSPECTION AND ASSESSMENT FULTON-HICKMAN RIVERPORT AUTHORITY

INSPECTION DATE: INSPECTION DATE

DRAWN BY: ASA | CKD BY:JRW

MSI PROJECT NO.: 05-22-001

FILENAME: 05-22-001.DWG

SHEET: SOUNDING PLAN

HICKMAN, KY

FIG NO. 3 of 3

Appendix C – Ultrasonic Thickness Data

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Cell 1 Date: March 24, 2022

Element Type: --- Pile X Sheet Pile --- Other: ---

Section: Weirton, Sheet Type Unknown Nominal Sheet Pile Thickness (inches): 0.375

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: 38 Sheet Length (inches): 32.75 (Pair) Cell Diameter (feet): 15.7' / 16.3'

Sheet Number	Location	Elev.* (NGVD29)		Measured Thickness (inches) Web 1	Web 2	Web 3	Web Ave	% Remaining
		298	Above Waterline	0.365	0.365	0.365	0.365	97%
1	Channel	294	Splash Zone	0.310	0.310	0.310	0.310	83%
		277	Mid-Depth	0.330	0.330	0.330	0.330	88%
		261	Mudline	0.325	0.325	0.325	0.325	87%
28	Upstream	294	Splash Zone	0.355	0.355	0.355	0.355	95%
		279	Mid-Depth	0.285	0.285	0.285	0.285	76%
		265	Mudline	0.345	0.345	0.345	0.345	92%
19	Bank	294	Splash Zone	0.330	0.330	0.330	0.330	88%
		281	Mid-Depth	0.320	0.320	0.320	0.320	85%
		269	Mudline	0.310	0.310	0.335	0.318	85%
10	Downstream	294	Splash Zone	0.330	0.330	0.330	0.330	88%
		279	Mid-Depth	0.285	0.285	0.285	0.285	76%
		265	Mudline	0.315	0.315	0.315	0.315	84%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

	Sheets:
Average Recorded Thickness (inches):	0.324
Percentage of Theoretical (%):	86.43%
Average Recorded Thickness at Waterline (inches):	0.338
Percentage of Theoretical (%):	90.22%
Average Recorded Thickness at Mid-Depth (inches):	0.304
Percentage of Theoretical (%):	81.00%
Average Recorded Thickness at Bottom (inches):	0.319
Percentage of Theoretical (%):	85.19%

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Cell 2 Date: March 24, 2022

Element Type: --- Pile X Sheet Pile --- Other: ---

Section: Weirton, Sheet Type Unknown Nominal Sheet Pile Thickness (inches): 0.375

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: 48 Sheet Length (inches): 32.75 (Pair) Cell Diameter (feet): 20.8'

Sheet Number	Location	Elev.* (NGVD29)		Measured Thickness (inches) Web 1	Web 2	Web 3	Ave	% Remaining
		298	Above Waterline	0.350	0.355	0.355	0.353	94%
1	Channel	294	Splash Zone	0.345	0.345	0.345	0.345	92%
		277	Mid-Depth	0.325	0.325	0.325	0.325	87%
		259	Mudline	0.375	0.375	0.375	0.375	100%
36	Upstream	294	Splash Zone	0.330	0.335	0.335	0.333	89%
		277	Mid-Depth	0.315	0.310	0.315	0.313	84%
		260	Mudline	0.330	0.330	0.330	0.330	88%
24	Bank	294	Splash Zone	0.335	0.325	0.320	0.327	87%
		282	Mid-Depth	0.335	0.335	0.335	0.335	89%
		270	Mudline	0.330	0.340	0.340	0.337	90%
12	Downstream	294	Splash Zone	0.350	0.345	0.350	0.348	93%
		279	Mid-Depth	0.345	0.345	0.345	0.345	92%
		264	Mudline	0.350	0.350	0.350	0.350	93%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

	Sheets:
Average Recorded Thickness (inches):	0.340
Percentage of Theoretical (%):	90.60%
Average Recorded Thickness at Waterline (inches):	0.336
Percentage of Theoretical (%):	89.63%
Average Recorded Thickness at Mid-Depth (inches):	0.342
Percentage of Theoretical (%):	91.22%
Average Recorded Thickness at Bottom (inches):	0.354
Percentage of Theoretical (%):	94.37%

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Cell 3 Date: March 24, 2022

Element Type: --- Pile X Sheet Pile --- Other: ---

Section: Weirton, Sheet Type Unknown Nominal Sheet Pile Thickness (inches): 0.375

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: 38 Sheet Length (inches): 32.75 (Pair) Cell Diameter (feet): 15.8' / 16.3'

Sheet Number	Location	Elev.* (NGVD29)		Measured Thickness (inches) Web 1	Web 2	Web 3	Ave	% Remaining
		298	Above Waterline	0.380	0.380	0.380	0.380	101%
1	Channel	294	Splash Zone	0.365	0.365	0.365	0.365	97%
		278	Mid-Depth	0.350	0.350	0.350	0.350	93%
		263	Mudline	0.360	0.360	0.360	0.360	96%
27	Upstream	294	Splash Zone	0.385	0.385	0.385	0.385	103%
		278	Mid-Depth	0.295	0.295	0.295	0.295	79%
		261	Mudline	0.325	0.325	0.325	0.325	87%
19	Bank	294	Splash Zone	0.350	0.350	0.350	0.350	93%
		282	Mid-Depth	0.335	0.335	0.345	0.338	90%
		269	Mudline	0.345	0.345	0.345	0.345	92%
10	Downstream	294	Splash Zone	0.370	0.370	0.370	0.370	99%
		278	Mid-Depth	0.335	0.345	0.340	0.340	91%
		261	Mudline	0.375	0.375	0.375	0.375	100%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

	Sheets:
Average Recorded Thickness (inches):	0.352
Percentage of Theoretical (%):	93.91%
Average Recorded Thickness at Waterline (inches):	0.368
Percentage of Theoretical (%):	98.22%
Average Recorded Thickness at Mid-Depth (inches):	0.333
Percentage of Theoretical (%):	88.89%
Average Recorded Thickness at Bottom (inches):	0.360
Percentage of Theoretical (%):	96.00%

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Cell 4 Date: March 24, 2022

Element Type: --- Pile X Sheet Pile --- Other: ---

Section: Weirton, Sheet Type Unknown Nominal Sheet Pile Thickness (inches): 0.375

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: 38 Sheet Length (inches): 32.75 (Pair) Cell Diameter (feet): 17.1' / 15.1'

Sheet Number	Location	Elev.* (NGVD29)		Measured Thickness (inches) Web 1	Web 2	Web 3	Ave	% Remaining
		298	Above Waterline	-	-	-	-	-
1	Channel	294	Splash Zone	0.310	0.325	0.320	**0.318**	85%
		276	Mid-Depth	0.325	0.300	0.300	**0.308**	82%
		257	Mudline	0.385	0.385	0.385	**0.385**	103%
27	Upstream	294	Splash Zone	0.385	0.385	0.385	**0.385**	103%
		279	Mid-Depth	0.330	0.330	0.330	**0.330**	88%
		264	Mudline	0.320	0.320	0.320	**0.320**	85%
19	Bank	294	Splash Zone	0.390	0.390	0.390	**0.390**	104%
		279	Mid-Depth	0.330	0.325	0.330	**0.328**	88%
		264	Mudline	0.340	0.345	0.350	**0.345**	92%
9	Downstream	294	Splash Zone	0.380	0.380	0.380	**0.380**	101%
		276	Mid-Depth	0.335	0.335	0.335	**0.335**	89%
		259	Mudline	0.300	0.300	0.300	**0.300**	80%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

	Sheets:
Average Recorded Thickness (inches):	0.344
Percentage of Theoretical (%):	91.67%
Average Recorded Thickness at Waterline (inches):	0.385
Percentage of Theoretical (%):	102.67%
Average Recorded Thickness at Mid-Depth (inches):	0.345
Percentage of Theoretical (%):	91.89%
Average Recorded Thickness at Bottom (inches):	0.343
Percentage of Theoretical (%):	91.56%

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Cell 5 Date: March 24, 2022

Element Type: --- Pile X Sheet Pile --- Other: ---

Section: Weirton, Sheet Type Unknown Nominal Sheet Pile Thickness (inches): 0.375

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: 72 Sheet Length (inches): 32.75 (Pair) Cell Diameter (feet): 31.3'

Sheet Number	Location	Elev.* (NGVD29)		Measured Thickness (inches) Web 1	Web 2	Web 3	Ave	% Remaining
		298	Above Waterline	-	-	-	-	-
1	Channel	294	Splash Zone	0.375	0.375	0.375	0.375	100%
		278	Mid-Depth	0.325	0.325	0.325	0.325	87%
		262	Mudline	0.355	0.365	0.370	0.363	97%
54	Upstream	294	Splash Zone	0.375	0.375	0.375	0.375	100%
		281	Mid-Depth	0.315	0.315	0.315	0.315	84%
		267	Mudline	0.300	0.300	0.300	0.300	80%
36	Bank	294	Splash Zone	0.365	0.350	0.325	0.347	92%
		285	Mid-Depth	0.345	0.350	0.345	0.347	92%
		276	Mudline	0.355	0.335	0.335	0.342	91%
18	Downstream	294	Splash Zone	0.380	0.380	0.380	0.380	101%
		284	Mid-Depth	0.310	0.310	0.335	0.318	85%
		274	Mudline	0.355	0.365	0.355	0.358	96%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

	Sheets:
Average Recorded Thickness (inches):	0.345
Percentage of Theoretical (%):	92.11%
Average Recorded Thickness at Waterline (inches):	0.367
Percentage of Theoretical (%):	97.93%
Average Recorded Thickness at Mid-Depth (inches):	0.336
Percentage of Theoretical (%):	89.56%
Average Recorded Thickness at Bottom (inches):	0.354
Percentage of Theoretical (%):	94.52%

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Cell 6 Date: March 24, 2022

Element Type: --- Pile X Sheet Pile --- Other: ---

Section: Weirton, Sheet Type Unknown Nominal Sheet Pile Thickness (inches): 0.375

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: 48 Sheet Length (inches): 32.75 (Pair) Cell Diameter (feet): 31.3'

Sheet Number	Location	Elev.* (NGVD29)		Measured Thickness (inches) Web 1	Web 2	Web 3	Ave	% Remaining
		298	Above Waterline	-	-	-	-	-
1	Channel	294	Splash Zone	0.365	0.365	0.365	**0.365**	97%
		277	Mid-Depth	0.360	0.370	0.360	**0.363**	97%
		259	Mudline	0.360	0.360	0.360	**0.360**	96%
36	Upstream	294	Splash Zone	0.380	0.390	0.390	**0.387**	103%
		278	Mid-Depth	0.325	0.325	0.325	**0.325**	87%
		261	Mudline	0.345	0.345	0.345	**0.345**	92%
16	Bank	294	Splash Zone	0.385	0.385	0.385	**0.385**	103%
		279	Mid-Depth	0.185	0.185	0.185	**0.185**	49%
		263	Mudline	0.355	0.355	0.355	**0.355**	95%
12	Downstream	294	Splash Zone	0.385	0.385	0.385	**0.385**	103%
		277	Mid-Depth	0.310	0.310	0.310	**0.310**	83%
		260	Mudline	0.315	0.315	0.315	**0.315**	84%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

	Sheets:
Average Recorded Thickness (inches):	0.340
Percentage of Theoretical (%):	90.67%
Average Recorded Thickness at Waterline (inches):	0.386
Percentage of Theoretical (%):	102.81%
Average Recorded Thickness at Mid-Depth (inches):	0.295
Percentage of Theoretical (%):	78.67%
Average Recorded Thickness at Bottom (inches):	0.343
Percentage of Theoretical (%):	91.56%

MARINE SOLUTIONS

ULTRASONIC THICKNESS TESTING LOG

Facility: Hickman Riverport Structure: Dolphin 1 Date: March 24, 2022

Element Type: X Pile --- Sheet Pile --- Other: ---

Section: 60" Dia. Steel Monopile Nominal Thickness (inches)**: 0.500

Record By: R. Whiting, P.E. Crew: R. Whiting, P.E., A. Barber, N. Ogden

Number of Sheets: --- Sheet Length (inches): --- Pipe Diameter (in.): 60.0

Location	Elev.* (NGVD29)		Measured Wall Thickness (inches) 1	2	3	Ave	% Remaining
Upstream Face	294	Splash Zone	0.490	0.490	0.490	**0.490**	98%
	276	Mid-Depth	0.410	0.410	0.410	**0.410**	82%
	258	Mudline	0.440	0.440	0.440	**0.440**	88%

* The water surface elevation was 294.2 feet (NGVD29) at the time of the inspection

** As constructed nominal pile thickness is unknown. The assumed nominal thickness is based on standard steel sizes and field measurements taken above normal pool elevation. As built drawings were not avaliable.

Average Recorded Thickness (inches): 0.447
Percentage of Theoretical (%): 89.33%

Average Recorded Thickness at Waterline (inches): 0.490
Percentage of Theoretical (%): 98.00%

Average Recorded Thickness at Mid-Depth (inches): 0.410
Percentage of Theoretical (%): 82.00%

Average Recorded Thickness at Bottom (inches): 0.440
Percentage of Theoretical (%): 88.00%