

ADDENDUM NO. 2 TO THE PROJECT MANUAL

NEW RIVER CHANNEL IMPROVEMENTS
ASCENSION PARISH, LOUISIANA

PARISH PROJECT NO. EAD 15-004
HDCA PROJECT 2017-14

Prepared For:

EAST ASCENSION CONSOLIDATED GRAVITY DRAINAGE DISTRICT NO.1
42077 CHURCHPOINT ROAD
GONZALES, LOUISIANA 70737



Prepared by:



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JULY 2019

**ADDENDUM NO. 2 TO THE
PROJECT MANUAL**

FOR

**NEW RIVER CHANNEL IMPROVEMENTS
ASCENSION PARISH, LOUISIANA**

**PARISH PROJECT NO. EAD 15-004
HDCA PROJECT 2017-14**

H. DAVIS COLE & ASSOCIATES, LLC (HDCA)
1340 POYDRAS STREET, SUITE 1850
NEW ORLEANS, LOUISIANA
(504) 836 - 2020

This addendum forms a part of the Contract Documents and modifies Specification sections and Drawings as denoted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification. Bidder is responsible to disseminate this addendum to all subcontractors and material suppliers concerned.

This Addendum No. 2 supersedes any contrary or conflicting information in any previously-issued addenda. This Addendum shall be part of the Contract Documents. The following items are issued to add, delete, modify, and clarify the Contract Documents. These items shall be part of and shall have full force and effect as the Contract Documents and the cost involved shall be included in the bid price.

SEALED BIDS will be received by Ascension Parish Purchasing Department, Ascension Parish Governmental Complex, 615 E. Worthey Road, Gonzales, Louisiana, **10:00 a.m., on Wednesday, July 24, 2019** for the above referenced project, for Ascension Parish, Louisiana. Bids will be publicly opened and read aloud. Any bid received after closing time will be returned unopened.

The Contractor shall hold a Louisiana Contractor's license in Municipal and Public Works and/or Heavy Construction.

ATTACHMENTS

- A1. Pre-Bid Conference Sign-In Sheet
- A2. Wetland Permit Package – Access Points
 - a. Disregard reference to the Rock Dam to be removed (Sheet 1/3) and Access Point 1 (Sheet 1/3), both are outside of project limits. The first access point to be considered shall be Access Point 2.
- A3. Revised Bid Form
- A4. Revised Specification Section 01025 – Measurement and Payment
- A5. Revised Drawings Sheet G8

- A6. Timber Pile Bulkhead Detail
- A7. Specification Section 02804 – Driven Piles

CLARIFICATIONS

- C1. The date for the receipt of bids is hereby changed to Wednesday, July 24, 2019, at 10:00 AM local time.

Sealed bids will be received by Ascension Parish Purchasing Department, Ascension Parish Governmental Complex, 615 E. Worthey Road, Gonzales, Louisiana, **10:00 a.m., on Wednesday, July 24, 2019** for the above referenced project, for Ascension Parish, Louisiana. Bids will be publicly opened and read aloud. Any bid received after closing time will be returned unopened.
- C2. **Question:** *Will the unit price bid for Temporary Dewatering Dam Removal and Replacement be paid for each and every time it must be moved?* **Answer:** The lump sum price is for all temporary dams used by the CONTRACTOR during the course of the WORK except when ordered by the OWNER to remove the dams.
- C3. **Question:** *Are there any historic records of the water table elevations that can be provided?* **Answer:** Per Plans Sheet C1 (Page 12/82) the normal water surface elevation of the channel is +2.00.
- C4. **Question:** *Contract Plans require the water level to be drawn down to two feet below the bottom of the channel (-2), so effectively to -4. As with any canal or river in the area the water table will recharge the dewatering operation to the level of the water table within hours. It is not economically feasible to dewater to this level on 3.7 miles, as the cost of this many well points would far exceed the cost of the work. What measures can/will be implemented to address this? Additional time to find low water table levels (it may take many years)? Sheet piling in shorter excavation areas (also very expensive)? Relax the requirement to dewater to that level?* **Answer:** See CHANGES TO CONTRACT DRAWINGS below that change Earthwork Note 4 on Plans Sheet G2 (Sheet 3/82).
- C5. **Question:** *How many access points to the channel can be provided for the WORK?* **Answer:** See attachment entitled Wetland Permit Package that shows the appropriate access points to the channel. Each access point area varies however no access point shall have a width greater than 40 feet.
- C6. **Question:** *Will the unit prices for aggregate, Rip Rap, and fabric be used for the necessary haul roads/temporary access for excavation removal? Or is this work incidental?* **Answer:** No direct payment will be made for aggregate, Rip Rap, and fabric used for necessary haul roads/temporary access for excavation removal. The aggregate listed on the Bid Form refers to the surface coarse aggregate for the boat launch within the project scope, see Plans Sheet 1-C7 (Sheet 51/82). The Rip Rap and fabric items on the Bid Form refer to the items to be installed beneath the bridges and drain pipes along with channel within the project scope.
- C7. **Question:** *Does the Parish (OWNER) have any waste areas that could be provided to reduce the cost of the WORK?* **Answer:** No the OWNER does not have any waste areas due to the right of way restrictions with roadways on either side of the project limits, the CONTRACTOR is responsible for the disposal of the excavated material on a daily basis.

- C8. **Question:** *If sand is used for embankment, how much cover/cap dirt is required?* **Answer:** Sand shall not be used for embankment.
- C9. **Question:** *Plan notes require the CONTRACTOR to repair any pavements damaged during construction (LADOTD, Parish (OWNER), City, etc.) Is there a cooperative means of determining existing damage to minimize the cost that the CONTRACTOR must include in his bid?* **Answer:** See Special Provision 17 that describes the Pre-Construction and Post-Construction surveys that shall be completed by the CONTRACTOR. During the Pre-Construction conference the OWNER will determine if the designated Resident Project Representative for the project shall be present during the completion of these videos. The Pre-Construction surveys shall be submitted to the ENGINEER and OWNER prior to construction beginning.
- C10. **Question:** *Thirty pound Rip Rap is approximately 8-9 inch maximum size. The Plans call for placing a lot of it in a six inch depth, which is not practically possible. Will all of the Rip Rap be paid for, or does the CONTRACTOR have to include the cost for the overage as incidental cost?* **Answer:** It is understood that 30 lb. Rip Rap is generally greater than 6". The slope is to be graded allowing for a minimum of 6" fill of Rip Rap. Rip Rap shall be paid by the square yard in place.
- C11. **Question:** *The Plans show a significant amount of Rip Rap to be placed on the slopes under the bridges where equipment access is not possible: can this hand placement be eliminated/changed to other materials?* **Answer:** Other forms of revetment will be considered by the OWNER of each bridge except the KCS Railroad and the private bridges, in lieu of Rip Rap. The Parish (OWNER) will contact the 2 private bridge owners to determine if other revetments will be allowed as opposed to Rip Rap. DOTD, the City of Gonzales, and the Parish of Ascension (OWNER) will consider other revetment alternatives as per LA DOTD Standard Specifications, Section 712. This includes the Belle Terre bridge, the Burnside Road bridges, the Bryan Avenue bridges and the US 61 (Airline Highway) bridges. The KCS railroad bridge is to have Rip Rap placed as per the Plans.
- C12. **Question:** *The Plans require the concrete to be cast in place: can these inlets be precast to avoid fighting the dewatering during construction?* **Answer:** The inlets may be precast in accordance with Specification Section 02701 – Culvert and Storm Drain Systems. Inlets shall be submitted for approval prior to installation due to varying ground elevations and invert elevations throughout the project. The CONTRACTOR shall allow for a minimum two-day review period for inlet submittals. The CONTRACTOR shall plan for this review of inlets within their construction schedule.
- C13. **Question:** *The Plans require a PE designed Excavation Plan and a Dewatering Plan: can these be incorporated in one plan?* **Answer:** Yes the plans may be combined as long as they are prepared in accordance with the Specifications. The Excavation Plan will be required for each of the permits that the CONTRACTOR must receive in order to complete construction under the particular bridges along the project route.
- C14. **Question:** *The specifications appear to only require \$500,000 in Liability insurance, but require \$1 million in Professional Liability Insurance: what professional liability is considered to be part of construction?* **Answer:** This is a Parish (OWNER) requirement and the cost associated therewith shall be included in the CONTRACTOR's bid.
- C15. **Question:** *What level of Railroad insurance is required then?* **Answer:** Railroad insurance requirements are contained within Special Provision 15. Where railroad policy amounts are greater than the Parish (OWNER) required policy amounts, the railroad requirements

shall control.

- C16. **Question:** *The USACE is encountering problems getting the RR permits on other projects: will the time be extended if the RR Permit is delayed?* **Answer:** The permit for KCSRR has been started by the ENGINEER and OWNER and the CONTRACTOR is responsible for completing the permit by submitting their means and methods for excavation and completion of WORK in the area of the KCSRR bridge. The CONTRACTOR shall begin this process as soon as possible once the Contract for the project has been awarded. If the CONTRACTOR experience continued issues in communicating with the entity, the ENGINEER and OWNER may assist and intervene, and if all efforts have been made, time may be extended under the discretion of the ENGINEER and OWNER.
- C17. **Question:** *Does the Parish (OWNER) have a SWPPP in place, or does the CONTRACTOR have to design it?* **Answer:** The CONTRACTOR is responsible for completing and submitting a SWPPP per Specification Section 02204.
- C18. **Question:** *To what elevation will the seeding be required?* **Answer:** There is no specified elevation in which seeding will be required. Seeding shall be placed on all areas where the ground has been disturbed. Payment will be made for all areas shown in the cross sections of the Plans only. See Specification Section 02717 for the Minimum Pounds per Acre (respectively) of seed required for the soil areas within the project area.
- C19. **Question:** *Can the Rip Rap be placed subaqueous or only when the channel is dry?* **Answer:** The CONTRACTOR shall communicate with each entity that owns each particular bridge and determine the entity's preference on the process of placing Rip Rap.
- C20. **Question:** *Will the CONTRACTOR have to relocate any utilities?* **Answer:** Relocation of utilities is not in the direct scope of the project, however there are utilities in the area and exact locations and depths may be unknown. It is the responsibility of the CONTRACTOR to notify the utility owners prior to construction to determine if any conflicts should be expected. Any conflicts shall be resolved under the provisions of the General Conditions.
- C21. Contacts for the entities in which the CONTRACTOR shall obtain a permit are listed on Sheet G2 of the Plans and as follows:
- a. City of Gonzales, Ms. Jackie Baumann, P.E., Chief Engineer, Department of Public Works, (225) 647-9589, jackie@gonzalesla.com
 - i. Current Permit Application Number 2018-1590
 - b. Louisiana Department of Transportation and Development (LDOTD), Mr. Cedric Lacour, District 61 Permit Specialist, (225) 231-4164, cedric.lacour@la.gov
 - i. Current Permit Application Number unknown – CONTRACTOR to mention project name and State Highway to reference the appropriate project
 - c. Kansas City Southern Railroad (KCSRR), Ms. Denise Case, Transaction Manager, (817) 230-2614, denise.case@am.jll.com
 - i. Current Permit Application Number 18-11481

If there are any discrepancies in the above, refer to Sheet G2 in the Plans. When

communicating with each entity the CONTRACTOR shall refer to the listed current permit application numbers.

- C22. **Question:** *Does the OWNER have a preference on hydraulic dredging?* **Answer:** The means and methods for excavation within the channel shall be determined by the CONTRACTOR.
- C23. No equipment shall be parked within Parish (OWNER), City or State roadways overnight without written permission of the roadway owner.

CHANGES TO CONTRACT SPECIFICATIONS

- SP1. Division 0 – Article 1 - Invitation, **DELETE** the first paragraph of the Invitation and **REPLACE** with the following:

Sealed bids will be received by **Ascension Parish Purchasing Department, 615 East Worthy Road, Gonzales, LA 70737 (mailing address P.O. Box 2392, Gonzales, LA 70707-2392)** on **Wednesday, July 24, 2019** until **10:00 AM** and then at said office publicly opened and read aloud for construction of the project described as follows:

- SP2. Division 0 – Article 1 - Invitation, page 2, paragraph 7 from the top, **DELETE** the last two sentences of the paragraph and **REPLACE** with the following:

Beginning at **10:00 AM** (CST) on **Wednesday, July 24, 2019** all bids will be downloaded. No bids are accepted after **10:00 AM**.

- SP3. Division 0 – Article 1 - Invitation, Statement of Work. **DELETE** the current Statement of Work and **REPLACE** with the following:

STATEMENT OF WORK:

“This project consists of channel shaping and excavation of the New River Channel, including drainage excavation, clearing and grubbing, relocation of utilities, and modifications to existing drainage structures, and other items as required by the Plans, Contract Documents, and Technical Specifications.”

- SP4. Division 0 – Article 2 – Instructions to Bidders, page 5, paragraph 2, **DELETE** the last two sentences and **REPLACE** with the following:

Beginning at 10:00 AM (CST) on Wednesday, July 24, 2019 all bids will be downloaded. No bids are accepted after 10:00 AM.

- SP5. Division 0 – Article 3 – Advertisement for Bid, **DELETE** the first paragraph and **REPLACE** with the following:

Sealed bids are invited and will be received by Ascension Parish will be accepted by Ascension Parish Purchasing Department, until **10:00 AM** (Central Standard Time) on Wednesday, July 24, 2019 for the **Construction** project entitled **“NEW RIVER CHANNEL IMPROVEMENTS”**, Project Number **EAD-15-004**.

- SP6. Division 0 – Article 3 – Advertisement for Bid, **DELETE** the reference to “BID DEADLINE/OPENING” and **REPLACE** with the following:

BID DEADLINE/OPENING: Wednesday, July 24, 2019 @ Ascension Parish Purchasing Department

FOR: 10:00 AM (CST)

SP7. Section 01010, Contractor Submittals, Item E: Record Drawings, **ADD** the following paragraph to the current item:

The CONTRACTOR shall provide a cross section of the channel inclusive of a minimum of the following points every 500' along the channel within the project area: Left Top of Bank, Right Top of Bank, Left Bottom of Channel, Right Bottom of Channel, Centerline Bottom of Channel, and at least 2 points along each side slope. The CONTRACTOR shall also provide a profile shot at the centerline of the channel every 250' along the channel within the project area.

SP8. **DELETE** the Bid Form and **REPLACE** with the attached revised Bid Form.

SP9. **DELETE** Specification Section 01025 – Measurement and Payment and **REPLACE** with the attached revised Specification Section 01025 – Measurement and Payment.

SP10. **ADD** Specifications Section 02805 – Driven Piles as attached

SP11. Special Provisions, ADD the following two special provisions:

SP29. The CONTRACTOR shall cut down and remove all trees within the existing slopes except for Live Oaks, Red Maple, Magnolias, and Sycamores along the North side of New River from the Shopping Center Bridge near Raisin Cane's to McDonald's (approx.. 1,200 linear feet), then from Dutch Cleaners at Burnside Road to where Coon trap Road (LA 938) leaves New River (approx.. 2,800 linear feet), and then from New River Extension where Coon trap leaves New River to the city limits of Gonzales (approx.. 1,200 linear feet). Trees are to be cut to the ground as close as practical but the stumps and roots are not to be removed to preserve the stability of the slopes. Payment for this item shall be included in Bid Item No. 5 Site Preparation.

SP30. The CONTRACTOR shall cut down and remove all trees within the existing slopes except for Live Oaks, Red Maple, Magnolias, and Sycamores along the South side of New River from the weir in New River along Weber City Road (LA 429) to the KCS Railroad bridge (approx.. 3,000 linear feet) and then from the Burnside Road to the city limits of Gonzales (approx.. 1,350 linear feet). Trees are to be cut to the ground as close as practical but the stumps and roots are not to be removed to preserve the stability of the slopes. Payment for this item shall be included in Bid Item No.5 Site Preparation.

CHANGES TO CONTRACT DRAWINGS

D1. Sheet G2, Earthwork, Note 4, **DELETE** in its entirety and **REPLACE** with the following:

4) The contractor shall remove and exclude water, including stormwater, groundwater, irrigation water, and wastewater, from excavations. Dewatering wells, well-points, sump pumps, or other means shall be used to remove water and continuously maintain groundwater **at a level corresponding to the bottom of excavations** before the excavation work begins at each location. Water shall be

removed and excluded until backfilling is complete and field soils testing has been completed. **“Each location” refers to the area between each set of dewatering dams. The contractor is responsible for maintaining the groundwater within each set of dewatering dams as they are removed and relocated along the channel in accordance with the construction schedule.**

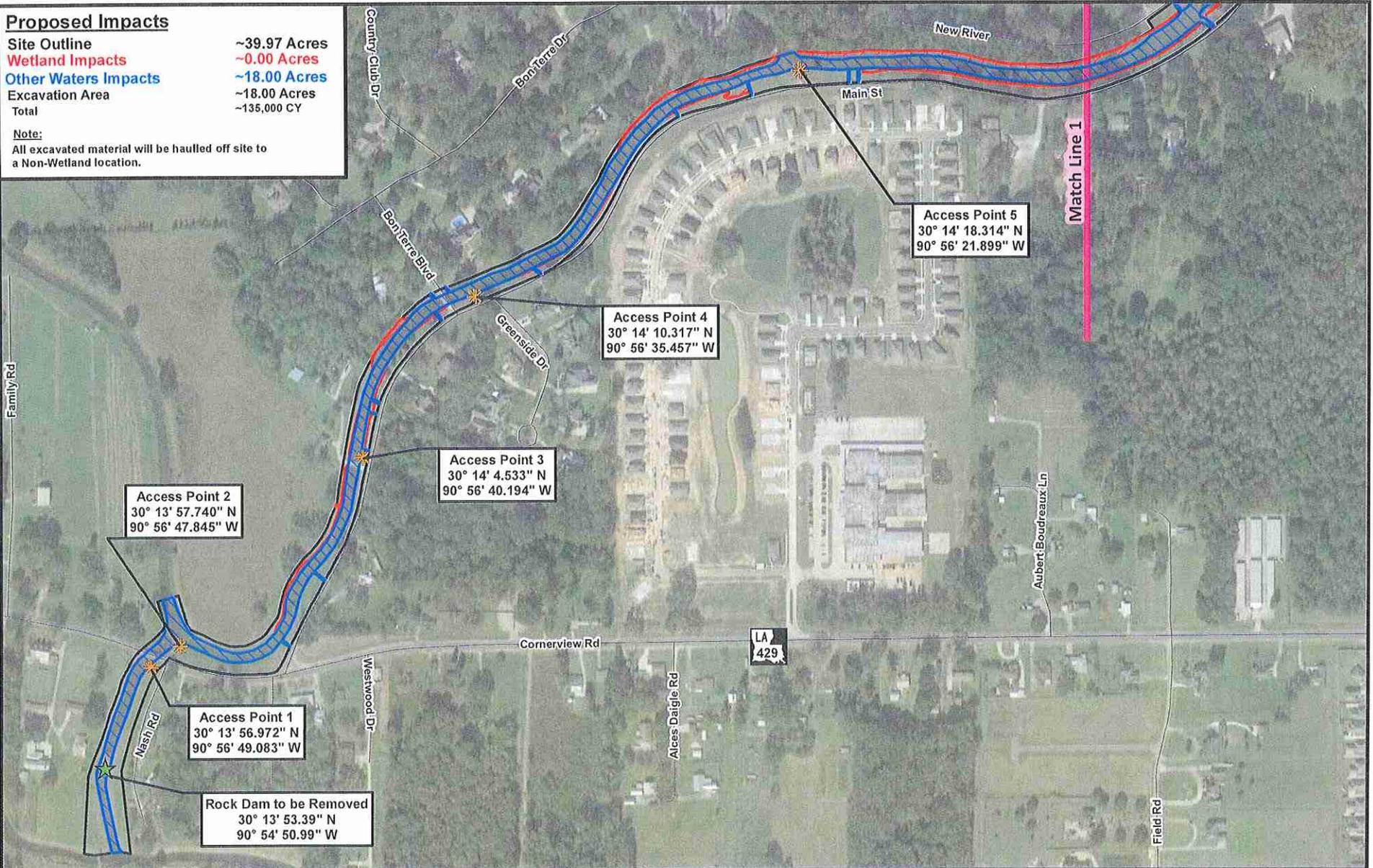
D2. **DELETE** Drawing Sheet G8 and **REPLACE** with the attached Drawing Sheet G8

- END OF ADDENDUM 1 -

Proposed Impacts

Site Outline ~39.97 Acres
 Wetland Impacts ~0.00 Acres
 Other Waters Impacts ~18.00 Acres
 Excavation Area ~18.00 Acres
 Total ~135,000 CY

Note:
 All excavated material will be hauled off site to a Non-Wetland location.



Access Point 2
 30° 13' 57.740" N
 90° 56' 47.845" W

Access Point 3
 30° 14' 4.533" N
 90° 56' 40.194" W

Access Point 4
 30° 14' 10.317" N
 90° 56' 35.457" W

Access Point 5
 30° 14' 18.314" N
 90° 56' 21.899" W

Access Point 1
 30° 13' 56.972" N
 90° 56' 49.083" W

Rock Dam to be Removed
 30° 13' 53.39" N
 90° 54' 50.99" W

Figure 2.1: Plan View

New River Canal Dredge

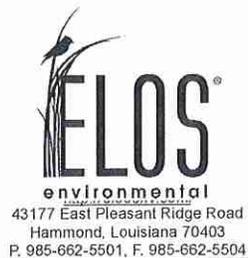
This figure was prepared utilizing public and proprietary data. It should not be used to establish any legal boundaries or specific locations. ELOS Environmental, L.L.C., is not responsible for any usage of this figure contrary to its original, intended purpose.

Legend:

- Site Outline
- ▨ Wetlands
- ▨ Other Waters
- ★ Access Point
- ★ Structures to be Removed
- Roadway
- Match Line



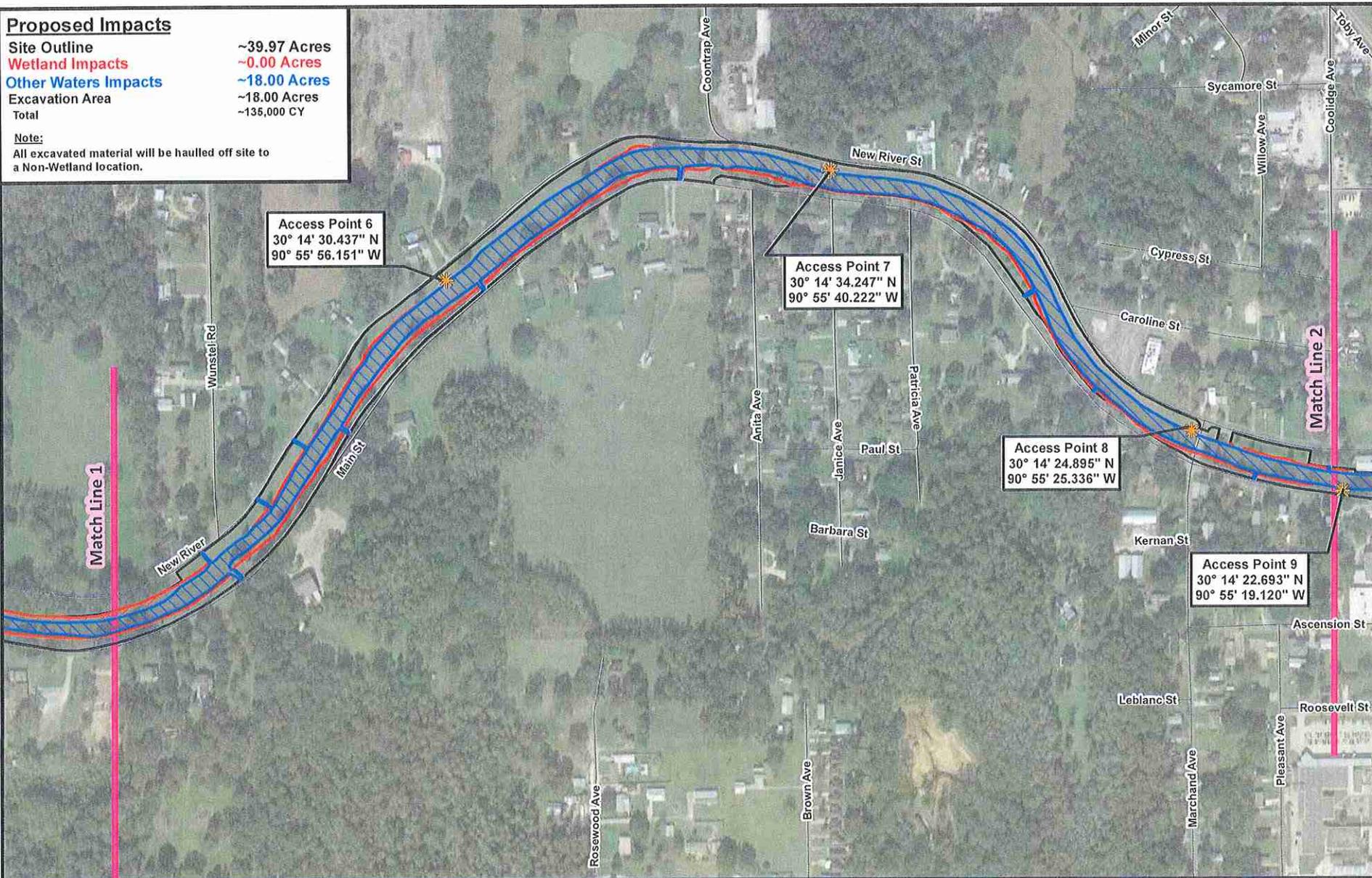
0 200 400 Feet



Proposed Impacts

Site Outline ~39.97 Acres
 Wetland Impacts ~0.00 Acres
 Other Waters Impacts ~18.00 Acres
 Excavation Area ~18.00 Acres
 Total ~135,000 CY

Note:
 All excavated material will be hauled off site to a Non-Wetland location.



Access Point 6
 30° 14' 30.437" N
 90° 55' 56.151" W

Access Point 7
 30° 14' 34.247" N
 90° 55' 40.222" W

Access Point 8
 30° 14' 24.895" N
 90° 55' 25.336" W

Access Point 9
 30° 14' 22.693" N
 90° 55' 19.120" W

Figure 2.2: Plan View

New River Canal Dredge

This figure was prepared utilizing public and proprietary data. It should not be used to establish any legal boundaries or specific locations. ELOS Environmental, L.L.C., is not responsible for any usage of this figure contrary to its original, intended purpose.

Legend:

- Site Outline
- Wetlands
- Other Waters
- Access Point
- Match Line
- Roadway



43177 East Pleasant Ridge Road
 Hammond, Louisiana 70403
 P. 985-662-5501, F. 985-662-5504

Proposed Impacts

Site Outline ~39.97 Acres
 Wetland Impacts ~0.00 Acres
 Other Waters Impacts ~18.00 Acres
 Excavation Area ~18.00 Acres
 Total ~135,000 CY

Note:
 All excavated material will be hauled off site to a Non-Wetland location.

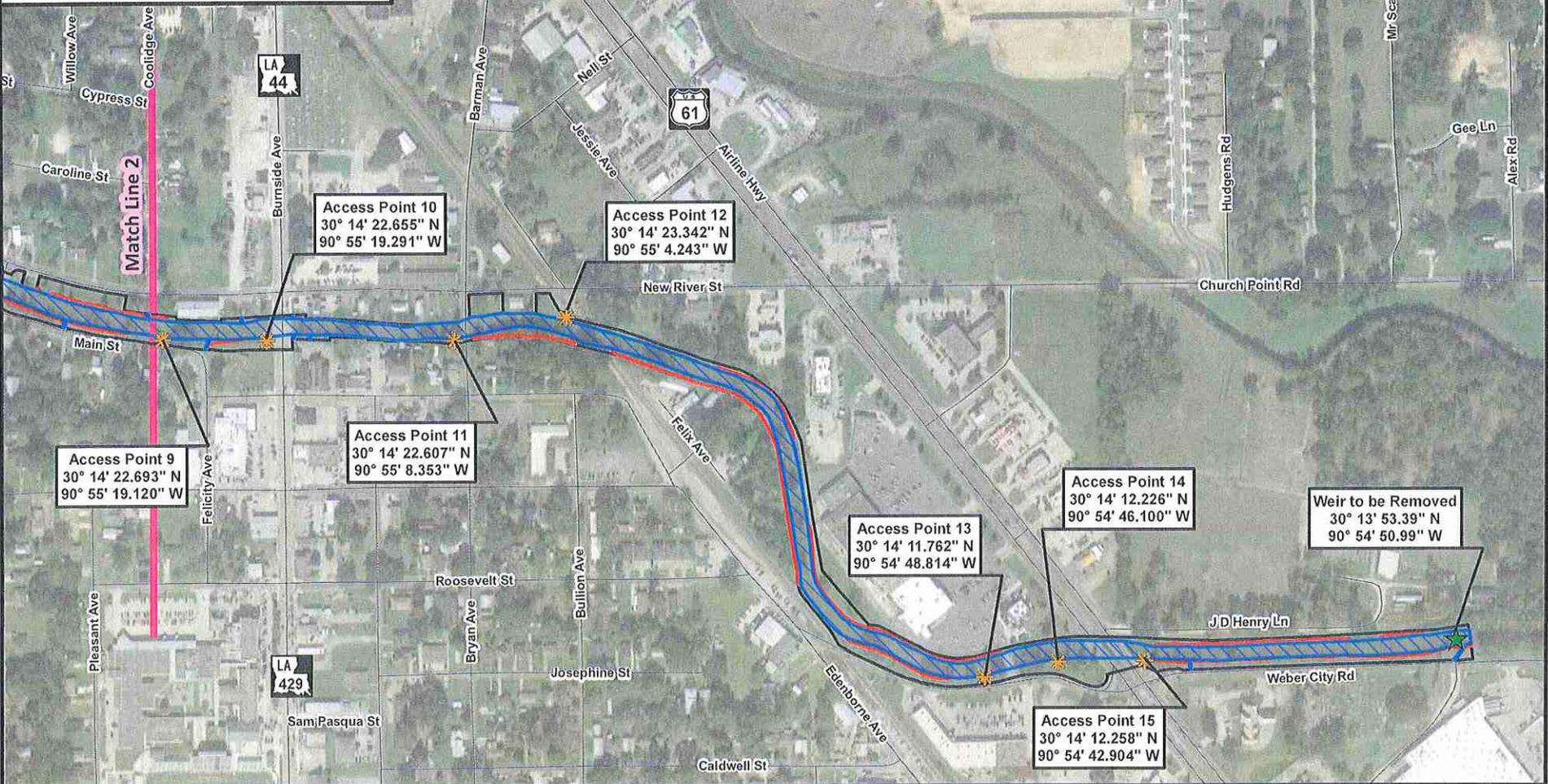


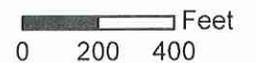
Figure 2.3: Plan View

New River Canal Dredge

This figure was prepared utilizing public and proprietary data. It should not be used to establish any legal boundaries or specific locations. ELOS Environmental, L.L.C., is not responsible for any usage of this figure contrary to its original, intended purpose.

Legend:

- Site Outline
- Access Point
- Wetlands
- Other Waters
- Structures to be Removed
- Roadway
- Match Line



ELOS
 environmental
 43177 East Pleasant Ridge Road
 Hammond, Louisiana 70403
 P. 985-662-5501, F. 985-662-5504



Division 3 – Article 1
LOUISIANA UNIFORM
PUBLIC WORKS BID FORM

TO: *Ascension Parish Government* **BID FOR:** **NEW RIVER CHANNEL IMPROVEMENTS**
P.O. Box 2392 *EAD-15-004*
Gonzales, Louisiana 70707

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: H. Davis Cole & Associates, LLC (HDCA) and dated: March, 2019.
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging)
_____.

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid"* but not alternates) the sum of:

_____ Dollars (\$ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____ N/A _____ Dollars (\$ _____ N/A _____)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____ N/A _____ Dollars (\$ _____ N/A _____)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____ N/A _____ Dollars (\$ _____ N/A _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER ** : _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BIDFORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** **A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218.A is attached to and made a part of this bid.



LOUISIANA UNIFORM PUBLIC WORKS BID FORM
UNIT PRICE FORM

TO: Ascension Parish Government
P.O. Box 2392
Gonzales, Louisiana 70707

BID FOR: NEW RIVER CHANNEL IMPROVEMENTS
EAD-15-004

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# MOBILIZATION			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
1	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# TEMPORARY ENVIRONMENTAL CONTROLS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
2	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# TEMPORARY TRAFFIC CONTROL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
3	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# CONSTRUCTION LAYOUT			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
4	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# SITE PREPARATION			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
5	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# REMOVAL OF STRUCTURES AND OBSTRUCTIONS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
6	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# DRAINAGE EXCAVATION			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
7	80,000	CUBIC YARD		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# EMBANKMENT			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
8	20,000	CUBIC YARD		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# ARBORIST SERVICES			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
9	1	LUMP SUM		



DESCRIPTION:	☒ Base Bid or ☐ Alt.# TREE TRIMMING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
10	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# 15" PLASTIC PIPE STORM DRAIN, OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
11	360	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# 18" PLASTIC PIPE STORM DRAIN, OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
12	240	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# 24" PLASTIC PIPE STORM DRAIN, OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
13	260	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# 36" PLASTIC PIPE, STORM DRAIN, OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
14	20	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# 48" PLASTIC PIPE STORM DRAIN, OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
15	40	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# 48" REINFORCED CONCRETE PIPE STORM DRAIN, OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
16	40	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# MODIFIED CB-01 DRAINAGE STRUCTURE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
17	25	EACH		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# MODIFIED CB-02 DRAINAGE STRUCTURE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
18	4	EACH		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# BEDDING MATERIAL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
19	200	CUBIC YARD		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# OUTFALL PROTECTION, 30 LB RIP – RAP			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
20	900	SQUARE YARD		

DESCRIPTION:	☒ Base Bid or ☐ Alt.# RIP-RAP (30 LB), BRIDGES			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
21	4200	SQUARE YARD		



DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# RIP-RAP (10 LB) (RAILROAD BRIDGE)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
22	350	SQUARE YARD		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# GEOTEXTILE FABRIC			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
23	5800	SQUARE YARD		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# TYPE 3 OBJECT MARKERS AND POSTS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
24	58	EACJ		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# NO PARKING SIGNS AND POSTS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
25	2	EACJ		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# SITE PREPARATION FOR TIMBER PILE BULKHEAD			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
26	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# TIMBER PILE BULKHEAD			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
27	240	SQUARE FOOT		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# INITIAL INSTALLATION AND FINAL REMOVAL OF TEMPORARY DAMS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
28	1	LUMP SUM		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# TEMPORARY DEWATERING DAM REMOVAL AND REPLACEMENT			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
29	1	EACH		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# FURNISH AND INSTALL 18" FLAP GATE FOR DRAIN PIPE OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
30	2	EACH		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# FURNISH AND INSTALL 24" FLAP GATE FOR DRAIN PIPE OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
31	1	EACH		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# REMOVE AND RE-INSTALL 48" FLAP GATE FOR DRAIN PIPE OUTFALL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
32	2	EACH		

DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# AGGREGATE SURFACE COURSE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
33	50	CUBIC YARD		



DESCRIPTION:	<input checked="" type="checkbox"/> Base Bid or <input type="checkbox"/> Alt.# HYDRO-SEEDING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (<i>Quantity times Unit Price</i>)
34	1	LUMP SUM		



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SECTION 01025 - MEASUREMENT AND PAYMENT (REVISED 03/12/2019)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. Payment for the various items on the Bid Form, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of permits and cost of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefor shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.

1.2 ACCURACY

- A. The ENGINEER will be the judge of the accuracy of measurements, or approximations made in lieu of accurate determinations and these decisions shall be binding upon both the CONTRACTOR and the OWNER.
- B. The ENGINEER will utilize the accepted Schedule of Values for the purpose of estimating the value of WORK completed for the evaluation of requests for payment.
- C. In computing volumes of excavation, the average end area method or other acceptable methods will be used.
- D. When United States standard units are used, the pound or the ton will be the standard units of weight. The term "ton," in the United States standard, will mean the short ton of 2,000 pounds avoirdupois. Materials measured or proportioned by weight shall be weighed on approved scales by qualified personnel at designated locations. If material is shipped by rail, the car weight may be accepted provided the weight of material only will be paid for; however, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid by measured weight shall be weighed empty at such times as directed; and each truck shall bear a plainly legible identification mark.
- E. Materials specified to be measured by volume in hauling vehicles shall be hauled in approved vehicles and will be measured therein at the point of delivery on the project. Vehicles may be of any acceptable size or type, provided the body is of such shape that the volume can be readily and accurately determined. Vehicles shall be loaded to at least a predetermined permanently fixed mark, which defines a known volume, upon arrival at the point of delivery. Vehicles will be measured in increments of 0.5 cubic yard, except that when tailgate spreader-boxes are used to place aggregate materials for asphaltic surface treatment, the volume of the spreader-ox will be added to the volume of the vehicle. When materials are measured by weight and converted to volume for payment, conversion will be made to the nearest 0.1 cubic yard

- F. The terms "lump sum, each, or unit" when used as a unit of measure for payment will mean complete payment for the work described in the contract.

1.3 **MOBILIZATION (Ref. No. 1)**

- A. **Measurement:** No measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at the lump sum price on the Bid Form, or in portions thereof in accordance with the following table, which price shall constitute full payment for mobilization, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Mobilization
1 st Application for Payment	25
10	50
25	75
50	100

1.4 **TEMPORARY ENVIRONMENTAL CONTROLS (Ref. No. 2)**

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for temporary environmental controls will be made at the lump sum price named in the Bid Form, or portions thereof, in accordance with the following table, which price shall constitute full payment for temporary environmental controls, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

Percent of Total Contract Amount Earned:	Allowable Percent of Lump Sum Price for Temporary Environmental Controls:
First Estimate	40
25	60
50	80
75	95
100	100

1.5 **TEMPORARY TRAFFIC CONTROL (Ref. No. 3)**

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for temporary traffic control will be made at the lump sum price named in the Bid Form, or portions thereof, in accordance with the following table, which price shall constitute full payment for temporary traffic control, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

Percent of Total Contract Amount Earned	Allowable Percent of Lump Sum Price for Temporary Traffic Control
Initial Erection of Temporary Traffic Controls	40
25	60
50	80
75	95
100	100

1.6 **CONSTRUCTION LAYOUT (Ref. No. 4)**

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at the lump sum price named in the Bid Form, or portions thereof, in accordance with the following table, which shall constitute full payment for construction layout, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

Percent of Total Contract Amount Earned:	Allowable Percent of Lump Sum Price for Construction Layout:
First Estimate	40
25	60
50	80
75	95
100	100

1.7 SITE PREPARATION (Ref. No. 5)

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at, or in portions thereof based upon the estimated amount of the WORK completed, of the lump sum bid price named on the bid form which price shall constitute full payment for clearing and grubbing and sit preparation including removal and disposal of grubbed material, and including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.8 REMOVAL OF STRUCTURES AND OBSTRUCTIONS (Ref. No. 6)

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at, or in portions thereof based upon the estimated amount of the WORK completed, of the lump sum bid price named on the bid form which price shall constitute full payment for all required removal of structures and obstructions, inclusive of existing storm drain pipes to be removed and structures to be removed, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.9 DRAINAGE EXCAVATION (Ref. No. 7)

- A. **Measurement:** Drainage excavation includes the excavation for drainage beyond the limits of the roadway section. Drainage excavation also includes inlet and outlet ditches to structures or roadways; changes in or deepening of channels of streams, berm ditches, ditches parallel or adjacent to the roadway beyond the limits of the roadway section; and material excavated from areas under bridges. The measurement of quantities will be computed by the average end area method and will be that area bound by the original ground line based on original cross sections obtained by the CONTRACTOR, and final field cross sections obtained by the CONTRACTOR. After clearing and grubbing operations, the CONTRACTOR will take original cross sections for the entire length of the project. All original cross sections shall be taken in the presence of the ENGINEER or his representative. Cross sections shall be taken at sufficient intervals to accurately determine earthwork quantities, not

to exceed 100 linear feet. Final cross sections will be taken after stabilization of the excavations. The cross sections shall be taken by methods acceptable to the ENGINEER, and results must be furnished to the ENGINEER in a format satisfactory to the ENGINEER. The ENGINEER reserves the right to take additional cross sections as needed to verify the CONTRACTOR's cross sections. In the event the cross sections do not verify, the CONTRACTOR will investigate and reconcile any differences.

- B. **Payment:** Payment for the accepted quantities will be made at the unit price named in the bid form which price shall constitute full payment for drainage excavation, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.10 EMBANKMENT (Ref. No. 8)

- A. **Measurement:** The measurement of quantities will be computed by the average end area method and will be that area bound by the original ground line based on original cross sections obtained by the CONTRACTOR, and final field cross sections obtained by the CONTRACTOR. After clearing and grubbing operations, the contractor will take original cross sections for the entire length of the project. All original cross sections shall be taken at sufficient intervals to accurately determine earthwork quantities, not to exceed 100 linear feet. Final cross sections will be taken after stabilization of the excavations. The cross sections shall be taken by methods acceptable to the ENGINEER, and results must be furnished to the ENGINEER in a format satisfactory to the ENGINEER. The ENGINEER reserves the right to take additional cross sections as needed to verify the CONTRACTOR's cross sections. In the event the cross sections do not verify, the CONTRACTOR will investigate and reconcile any differences.
- B. **Payment:** Payment for this item will be made at the unit price per named in the Bid Form which price shall constitute full compensation for embankment, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.11 ARBORIST SERVICES (Ref. No. 9)

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at, or in portions thereof based upon the estimated amount of the WORK completed, of the lump sum bid price named on the bid form which price shall constitute full payment for all arborist services in accordance with the Contract Documents, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.12 TREE TRIMMING (Ref. No. 10)

- A. **Measurement:** No Measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at, or in portions thereof based upon the estimated amount of the WORK completed, of the lump sum bid price named on the bid form which price shall constitute full payment for all tree trimming in accordance with the Contract Documents, including furnishing all equipment, labor and materials

necessary for the completion of this WORK in accordance with the Contract Documents.

1.13 15" PLASTIC PIPE STORM DRAIN, OUTFALL (Ref. No. 11)

- A. **Measurement:** Measurement for payment for this item will be based upon the number of linear feet of such pipe actually placed as determined by measurement along the centerline of such pipe. Excavation required for installation of pipes will not be measured for payment. Furnishing and placing backfill material for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items.
- B. **Payment:** Payment for this item will be made at the contract unit price per linear foot, which includes connections to existing structures, concrete, reinforcing steel, excavation, backfill, and all including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.14 18" PLASTIC PIPE STORM DRAIN, OUTFALL (Ref. No. 12)

- A. **Measurement:** Measurement for payment for this item will be based upon the number of linear feet of such pipe actually placed as determined by measurement along the centerline of such pipe. Excavation required for installation of pipes will not be measured for payment. Furnishing and placing backfill material for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items.
- B. **Payment:** Payment for this item will be made at the contract unit price per linear foot, which includes connections to existing structures, concrete, reinforcing steel, excavation, backfill, and all including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.15 24" PLASTIC PIPE STORM DRAIN, OUTFALL (Ref. No. 13)

- A. **Measurement:** Measurement for payment for this item will be based upon the number of linear feet of such pipe actually placed as determined by measurement along the centerline of such pipe. Excavation required for installation of pipes will not be measured for payment. Furnishing and placing backfill material for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items.
- B. **Payment:** Payment for this item will be made at the contract unit price per linear foot, which includes connections to existing structures, concrete, reinforcing steel, excavation, backfill, and including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.16 **36" PLASTIC PIPE STORM DRAIN, OUTFALL (Ref. No. 14)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of linear feet of such pipe actually placed as determined by measurement along the centerline of such pipe. Excavation required for installation of pipes will not be measured for payment. Furnishing and placing backfill material for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items.
- B. **Payment:** Payment for this item will be made at the contract unit price per linear foot, which includes connections to existing structures, concrete, reinforcing steel, excavation, backfill, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.17 **48" PLASTIC PIPE STORM DRAIN, OUTFALL (Ref. No. 15)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of linear feet of such pipe actually placed as determined by measurement along the centerline of such pipe. Excavation required for installation of pipes will not be measured for payment. Furnishing and placing backfill material for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items.
- B. **Payment:** Payment for this item will be made at the contract unit price per linear foot, which includes connections to existing structures, concrete, reinforcing steel, excavation, backfill, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.18 **48" REINFORCED CONCRETE PIPE STORM DRAIN, OUTFALL (Ref. No. 16)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of linear feet of such pipe actually placed as determined by measurement along the centerline of such pipe. Excavation required for installation of pipes will not be measured for payment. Furnishing and placing backfill material for pipes will not be measured for payment. Backfill material needed to complete backfill above natural ground and around pipes that extend above natural ground will be measured and payment will be made under applicable earthwork items.
- B. **Payment:** Payment for this item will be made at the contract unit price per linear foot, which includes connections to existing structures, concrete, reinforcing steel, excavation, backfill, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.19 **MODIFIED CB – 01 DRAINAGE STRUCTURE (Ref. No. 17)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such structures completed. Excavation and backfill for installation of these structures will not be measured for payment.

- B. **Payment:** Payment for this item will be made at the unit price named in the Bid Form, which price shall constitute full payment for construction of such drainage structures, including excavation, shoring, backfill, concrete, reinforcement, grates, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.20 **MODIFIED CB – 02 DRAINAGE STRUCTURE (Ref. No. 18)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such structures completed. Excavation and backfill for installation of these structures will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the unit price named in the Bid Form, which price shall constitute full payment for construction of such drainage structures, including excavation, shoring, backfill, concrete, reinforcement, grates, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.21 **BEDDING MATERIAL (Ref. No. 19)**

- A. **Measurement:** Bedding material, including plastic soil material, completed and accepted, will be measured by the cubic yard (net section). The length and width will be measured horizontally to the theoretical points established by the plans for bedding material. The depth will be as shown on the plans or established by the ENGINEER. Geotextile fabric will not be measured for payment. Necessary excavation and disposal of excess excavated materials will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the unit price named in the Bid Form which price shall constitute full compensation for placement and compaction of bedding material, including provision of material, placement, and compaction of the material, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.22 **OUTFALL PROTECTION, 30 – LB RIP RAP (Ref. No. 20)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of square yards of such rip rap actually placed. Excavation required for installation of rip rap will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the unit price named in the Bid Form which price shall constitute full compensation for placement and compaction of bedding material, including provision of material, placement, and compaction of the material, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.23 **RIP RAP (30 LB), BRIDGES (Ref. No. 21)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of square yards of such rip rap actually placed. Excavation required for installation of rip rap will not be measured for payment.

- B. **Payment:** Payment for this item will be made at the contract unit price per square yard, which includes delivery and installation of rip rap, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.24 **RIP RAP (10 LB) (RAILROAD BRIDGE) (Ref. No. 22)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of square yards of such rip rap actually placed. Excavation required for installation of rip rap will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the contract unit price per square yard, which includes delivery and installation of rip rap, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.25 **GEOTEXTILE FABRIC (Ref. No. 23)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of square yards of such geotextile fabric actually placed. Excavation required for installation of geotextile fabric will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the contract unit price per square yard, which includes delivery and installation of geotextile fabric, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.26 **TYPE 3 OBJECT MARKERS AND POSTS (Ref. No. 24)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such signs actually placed. Excavation required for installation of signs will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the contract unit price per each, which includes delivery and installation of type 3 object markers and posts, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.27 **NO PARKING SIGNS AND POSTS (Ref. No. 25)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such signs actually placed. Excavation required for installation of signs will not be measured for payment.
- B. **Payment:** Payment for this item will be made at the contract unit price per each, which includes delivery and installation of no parking signs and posts, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.28 **SITE PREPARATION FOR TIMBER PILE BULKHEAD (Ref. No. 26)**

- A. **Measurement:** No measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at the lump sum price named in the Bid Form, which price shall constitute full payment for site preparation for timber pile bulkhead installation, including clearing, grubbing, removal of obstructions, furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.29 **TIMBER PILE BULKHEAD (Ref. No. 27)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of square feet of such timber pile bulkhead actually placed. Excavation required for installation of timber pile bulkhead will not be measured for payment. Piles will not be measured for payment.
- B. **Payment:** Payment for this item, if necessary and ordered by the ENGINEER, will be made at the contract unit price per square foot, which includes delivery and installation of timber pile bulkhead, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.30 **INITIAL INSTALLATION AND FINAL REMOVAL OF TEMPORARY DAMS (Ref. No. 28)**

- A. **Measurement:** No measurement will be made for this item.
- B. **Payment:** Payment for this item will be made at the lump sum price listed in the Bid Form, which price shall constitute full compensation for initial installation and final removal of temporary dams (inclusive of disposal) including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents. Costs associated with furnishing, installing and operating the accepted dry weather flow by-pass system shall be included in this item.

1.31 **TEMPORARY DEWATERING DAM REMOVAL AND REPLACEMENT (Ref. No. 29)**

- A. **Measurement:** Measurement for this item will be made based upon the number of occurrences for dam removal and replacement as ordered by the OWNER or ENGINEER.
- B. **Payment:** Payment for this item will be made at price per each listed in the Bid Form, which price shall constitute full compensation for removal, disposal of, and re – installation of temporary dams where ordered by the ENGINEER including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.32 **FURNISH AND INSTALL 18” FLAP GATE FOR DRAIN PIPE OUTFALL (Ref. No. 30)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such flap gates actually placed.

- B. **Payment:** Payment for this item will be made at the contract unit price per each, which includes delivery and installation of flap gates, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.33 **FURNISH AND INSTALL 24” FLAP GATE FOR DRAIN PIPE OUTFALL (Ref. No. 31)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such flap gates actually placed.
- B. **Payment:** Payment for this item will be made at the contract unit price per each, which includes delivery and installation of flap gates, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.34 **REMOVE AND RE-INSTALL 48” FLAP GATE FOR DRAIN PIPE OUTFALL (Ref. No. 32)**

- A. **Measurement:** Measurement for payment for this item will be based upon the number of such flap gates actually removed and reinstalled.
- B. **Payment:** Payment for this item will be made at the contract unit price per each, which includes removal and reinstallation of flap gates, and all other items of material, labor, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.35 **AGGREGATE SURFACE COURSE (Ref. No. 33)**

- A. **Measurement:** Measurement for this item will be made based upon the number of cubic yards of material delivered and placed as determined by adjusted vehicular measure. The CONTRACTOR, with approval of the ENGINEER and OWNER, may elect to measure material deliveries by the ton. Should the CONTRACTOR elect to measure deliveries by the ton, the CONTRACTOR shall provide certified haul tickets with weights measured by scales acceptable to the ENGINEER. Materials delivered by volume will be measured by the cubic yard in hauling vehicles and divided by the following factors to determine pay volume:

Material	Factor
Stone or Crushed Slag	1.30
Lime Treated Sand – Clay – Gravel	1.30
Recycled Portland Cement Concrete	1.30
Reclaimed Asphalt Pavement	1.50

Materials delivered by weight will be measured by the ton in hauling vehicles and divided by the following factors to determine the pay volume:

Material	Tons to Cubic Yards Factor
Limestone	1.95
Sandstone	1.82
Porous Limestone	1.76
Lime Treated Sand Clay Gravel	1.89
Recycled Portland Cement Concrete	1.82
Reclaimed Asphalt Pavement	1.80

B. **Payment:** Payment for this item will be made at price per each listed in the Bid Form, which price shall constitute full compensation for furnishing, placing, and satisfactorily compacting material for aggregate surface course, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

1.36 **HYDRO-SEEDING (Ref. No. 34)**

A. **Measurement:** No measurement will be made for this item.

B. **Payment:** Payment for this item will be made at the lump sum price named in the Bid Form which price shall constitute full payment for labor, materials, tools, and equipment required for hydro-seeding including surface preparation, fertilization, placement of seed, establishment, including furnishing all equipment, labor and materials necessary for the completion of this WORK in accordance with the Contract Documents.

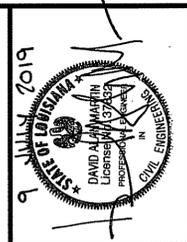
PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SUMMARY OF ESTIMATED QUANTITIES

REF. NO.	DESCRIPTION	UNIT	QUANTITY	REMARKS
1	MOBILIZATION	LUMP SUM	1	
2	TEMPORARY ENVIRONMENTAL CONTROLS	LUMP SUM	1	
3	TEMPORARY TRAFFIC CONTROL	LUMP SUM	1	
4	CONSTRUCTION LAYOUT	LUMP SUM	1	
5	SITE PREPARATION	LUMP SUM	1	
6	REMOVAL OF STRUCTIONS AND OBSTRUCTIONS	LUMP SUM	1	
7	DRAINAGE EXCAVATION	CUBIC YARD	80000	
8	EMBANKMENT	CUBIC YARD	20000	
9	ARBORIST SERVICES	LUMP SUM	1	
10	TREE TRIMMING	LUMP SUM	1	
11	15" PLASTIC PIPE STORM DRAIN, OUTFALL	LINEAR FOOT	360	
12	18" PLASTIC PIPE STORM DRAIN, OUTFALL	LINEAR FOOT	240	
13	24" PLASTIC PIPE STORM DRAIN, OUTFALL	LINEAR FOOT	260	
14	36" PLASTIC PIPE STORM DRAIN, OUTFALL	LINEAR FOOT	20	
15	48" PLASTIC PIPE STORM DRAIN, OUTFALL	LINEAR FOOT	40	
16	48" RCP STORM DRAIN, OUTFALL	LINEAR FOOT	40	
17	MODIFIED CB-01 DRAINAGE STRUCTURE	EACH	25	
18	MODIFIED CB-02 DRAINAGE STRUCTURE	EACH	4	
19	BEDDING MATERIAL	CUBIC YARD	200	
20	RIP RAP (30 LB CLASS) (PIPES)	SQUARE YARD	900	
21	RIP RAP (30 LB CLASS) (BRIDGES)	SQUARE YARD	4200	
22	RIP RAP (10 LB CLASS) (RAILROAD BRIDGE)	SQUARE YARD	350	
23	GEOTEXTILE FABRIC	SQUARE YARD	5800	
24	TYPE 3 OBJECT MARKERS AND POSTS	EACH	58	
25	NO PARKING SIGNS AND POSTS	EACH	2	
26	SITE PREPARATION FOR TIMBER PILE BULKHEAD INSTALLATION	LUMP SUM	1	
27	TIMBER PILE BULKHEAD	SQUARE FOOT	240	
28	INITIAL INSTALLATION AND FINAL REMOVAL OF TEMPORARY DAMS	LUMP SUM	1	
29	TEMPORARY DEWATERING DAM REMOVAL AND REPLACEMENT	EACH	1	
30	FURNISH AND INSTALL 18" FLAP GATE FOR DRAIN PIPE OUTFALL	EACH	2	
31	FURNISH AND INSTALL 24" FLAP GATE FOR DRAIN PIPE OUTFALL	EACH	1	
32	REMOVE AND RE-INSTALL 48" FLAP GATE FOR DRAIN PIPE OUTFALL	EACH	2	
33	AGGREGATE SURFACE COURSE	CUBIC YARD	50	
34	HYDRO-SEEDING	LUMP SUM	1	



SUBMITTED BY:
ANDREI FORDE
PROJECT MANAGER
LICENSE NO. 37852

SUBMITTED BY:
DAVID A. MARTIN, P.E.
PRINCIPAL
LICENSE NO. 37852



REVISION RECORD	DATE	BY	CHKD	DESCRIPTION
1	07/2019	ARF	ARF	ADDDENDUM 2
2	04/2019	ARF	ARF	RELEASED FOR BIDS & CONSTRUCTION

DESIGNED BY: DAM/ARF
DATE: APRIL, 2019

DRAWN BY: ARF/RMM
CHECKED BY: DAM

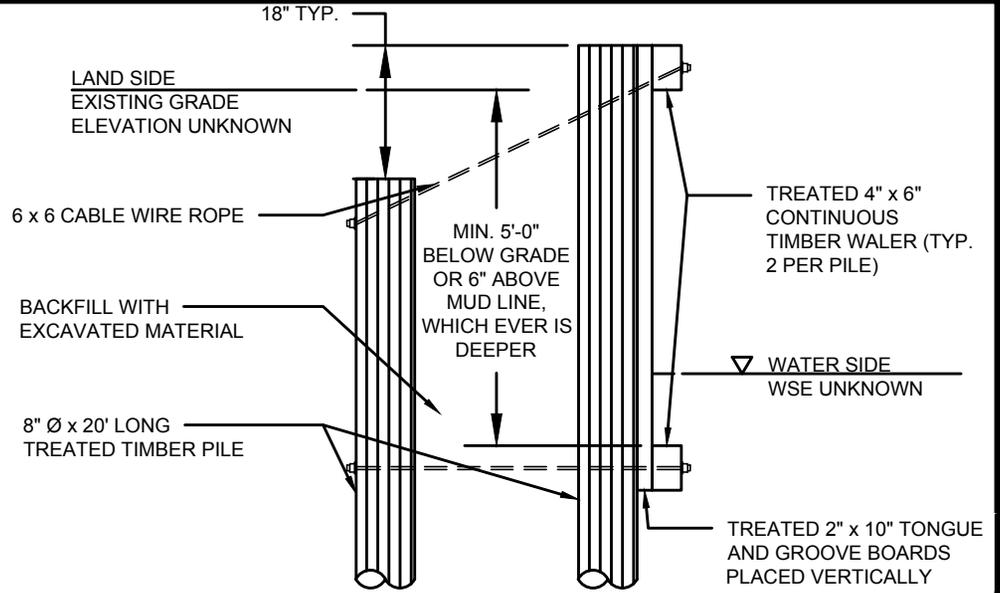
HDC PROJECT NO. 2017-14

NEW RIVER CHANNEL IMPROVEMENTS
LOUISIANA
GONZALES
EAST ASCENSION CONSOLIDATED GRAVITY DRAINAGE DISTRICT NO.1
42077 CHURCHPOINT ROAD, GONZALES, LA 70737
SUMMARY OF ESTIMATED QUANTITIES

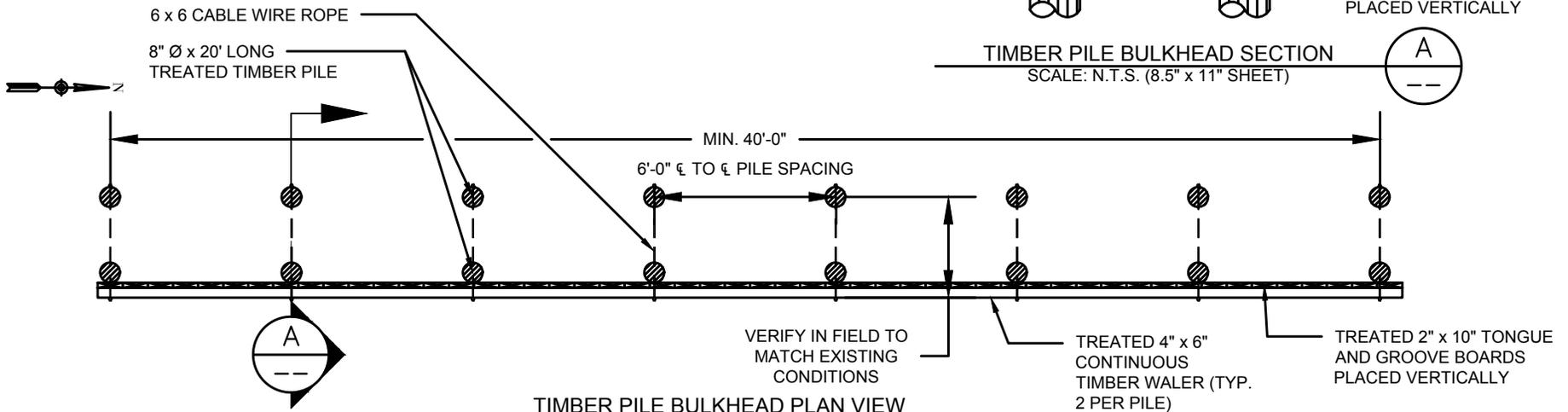


LOCATION OF PROPOSED
TIMBER PILE BULKHEAD
(ADJACENT TO 127 E. NEW RIVER
STREET - WITHIN NEW RIVER
CHANNEL)
(APPROX. LOCATION:
N = 632928.7529
E = 3411425.1648)

TIMBER PILE BULKHEAD LOCATION
SCALE: 1" = 200'-0" (8.5" x 11" SHEET)



TIMBER PILE BULKHEAD SECTION
SCALE: N.T.S. (8.5" x 11" SHEET)



TIMBER PILE BULKHEAD PLAN VIEW
SCALE: 1" = 5'-0" (8.5" x 11" SHEET)

NOTES:

1. REFER TO SPECIFICATION SECTION 02804 - DRIVEN PILES FOR MORE INFORMATION.
2. CABLE WIRE ROPE SHALL COMPLY WITH FEDERAL SPECIFICATION RR-W-410G SUITABLE FOR MARINE EXPOSURE. WIRE SHALL BE DOUBLED OVER AT THE ENDS AND PERMANENTLY CLAMPED WITH AN APPROVED FITTING WHICH SHALL PERMANENTLY MAINTAIN TENSION ON THE CABLE.
3. ALL LUMBER AND TIMBERS SHALL BE GRADE #2 AND BETTER SOUTHERN PINE IN ACCORDANCE WITH SPIB GRADE RULES AND TREATED IN ACCORDANCE WITH AWPA SPECIFICATIONS U1 AND T1.

TIMBER PILE BULKHEAD DETAIL
SCALE: VARIES (8.5" x 11" SHEET)



**H. Davis Cole &
Associates, LLC**
Consulting Engineers

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New Orleans, Louisiana 70112
Telephone: 504.836.2020
Facsimile: 504.836.2010

SECTION 02804 – DRIVEN PILES (REVISED 02/26/2019)

PART 1 -- GENERAL

1.1 THE REQUIREMENT

- A. The CONTRACTOR shall provide driven piles, complete and in place, in accordance with the requirements of the Contract Documents.

1.2 MODIFICATION BY SPECIAL PROVISIONS

- A. The WORK of this section may be affected by requirements contained within the Special Provisions. The CONTRACTOR shall review, understand, and incorporate the requirements contained within the Special Provisions into the WORK of this Section.

1.3 REFERENCE STANDARDS

A. **American Association of State Highway and Transportation Officials (AASHTO)**

AASHTO M270 Standard Specification for Structural Steel for Bridges

B. **ASTM International (ASTM)**

ASTM A 252 Standard Specification for Welded and Seamless Steel Pipe Piles

ASTM D 25 Standard Specification for Round Timber Piles

ASTM D 173 Standard Specification for Bitumen Saturated Cotton Fabrics Used in Roofing and Waterproofing

C. **American Wood Protection Association (AWPA)**

AWPA C1 Preservative Treatment by Pressure Process

AWPA C3 Piles – Preservative Treatment by Pressure Process

AWPA M4 Standard for the Care of Preservative – Treated Wood Products

AWPA P1 Standard for Creosote Preservative

AWPA P2 Standard for Creosote Solutions

AWPA P3 Standard for Creosote – Petroleum Oil Solution

AWPA P5 Standard for Waterborne Preservatives

AWPA P8 Standard for Oil – Borne Preservatives

AWPA P9 Standard for Solvents and Formulations for Organic Preservative Systems

D. **American Welding Society (AWS)**

AWS D1.1 Structural Welding Code

AWS D1.5 Bridge Welding Code

1.4 CONTRACTOR SUBMITTALS, SAMPLING, AND TESTING

- A. The CONTRACTOR shall provide submittals, samples for testing, and testing of materials in accordance with Section 01010 – General Requirements and Section 01030 – Submittals, Sampling and Testing Plan.

1.5 SUBSURFACE CONDITIONS

- A. A geotechnical engineering study has been performed for the site. The soil report is available from the office of the ENGINEER. The CONTRACTOR shall understand and conform to all recommendations and criteria associated with pile foundations given in this report.
- B. The CONTRACTOR shall visit the site and shall satisfy itself as to all existing surface and subsurface conditions affecting its WORK. The information provided in the geotechnical engineering report is available to the CONTRACTOR to assist it, at its own risk, in its assessment of subsurface conditions at the site. Prior to bidding, interested parties may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the OWNER.

PART 2 -- PRODUCTS

2.1 PILE LENGTHS

- A. The CONTRACTOR shall furnish piles in accordance with the plans, which show the number, size, length, and location of all permanent piles. The lengths shown on the plans will be based upon the lengths that are assumed to remain in the completed structure. At the CONTRACTOR's expense, the pile lengths shall be increased as required to provide for fresh heading and for such additional length as required to suit the CONTRACTOR's method of operation. When test piles or indicator piles are required, the pile lengths shown on the plans were for estimating purposes. The ENGINEER may revise pile lengths when driving conditions differ from those in design.

2.2 TIMBER PILES

- A. Timber piles shall be Southern Yellow Pine or Douglas Fir and shall comply with ASTM D 25, except that the table below shall be used in lieu of Tables I and II in ASTM D 25.

Circumference and Diameters of Timber Piles (Measurements shall be taken with bark removed)						
Length, Feet	3 Feet from Butt, Inches				At Tip, Inches	
	Minimum		Maximum		Minimum	
	Circumference	Diameter (Approx)	Circumference	Diameter (Approx)	Circumference	Diameter (Approx)
Under 40	38	12	63	20	25	8
40 to 54	38	12	63	20	22	7

Inclusive						
55 to 74 Inclusive	41	13	63	20	22	7
75 to 90 Inclusive	41	13	63	20	19	6
Over 90	41	13	63	20	16	5

B. All timber piles shall be treated with timber preservative. The type preservatives to be used are as follows:

1. Creosote: Creosote for land, fresh, and coastal water use shall comply with AWPA P1/P3.
2. Creosote Solutions: Creosote solutions for fresh and coastal water shall comply with AWPA P2.
3. Pentachlorophenol – Petroleum Solution: Pentachlorophenol – Petroleum solution shall comply with AWPA P8 and P9.
4. Chromated Copper Arsenate: Chromated Copper Arsenate shall comply with AWPA P5, Type B or C.
5. Creosote for Field Repairs: Creosote for field repair shall comply with AWPA M4.

C. **Treatment of Timber Piles:** Piles shall be treated according to current AWPA Standard Specifications for Preservative Treatment by Pressure Process C1 and C3, modified as indicated herein. Kiln – dried timber shall be steamed prior to treatment for a minimum of two hours. The amount of preservative shall be as indicated in the Minimum Preservative Retention Table below. The amount of preservative shall be determined by assay. The assay zone shall be as specified in the AWPA standards. All penetration requirements of the AWPA standards shall be met. Treating reports shall be forwarded to the ENGINEER upon request and may be utilized for acceptance at the discretion of the ENGINEER. Material treated with CCA shall be conditioned by kiln – drying prior to treatment.

Minimum Preservative Retention Table for Timber Piles (Pounds per Cubic Foot of Wood)				
Material and Usage	Creosote	Creosote Solutions	Pentachlorophenol	Chromated Copper Arsenate
Non – Foundation Piles				
Land and Fresh Water, Southern Pine	16.0	16.0	N/A	0.80
Land and Fresh Water, Douglas Fir	17.0	17.0	N/A	1.00
Coastal Water, Southern Pine or Douglas Fir	20.0	20.0	N/A	2.50

Foundation Piles (Piles which are Embedded in the Ground and Capped with Concrete)				
Land and Fresh Water, Southern Pine	12.0	12.0	0.60	0.80
Land and Fresh Water, Douglas Fir	17.0	17.0	0.85	N/A
Coastal Water, Southern Pine or Douglas Fir	20.0	20.0	N/A	2.50

PART 3 -- EXECUTION

3.1 GENERAL

- A. **Hammers:** Piles may be driven with either diesel hammers or external combustion hammers (ECH) such as hammers driven by steam, air, or hydraulic power. Non-impact hammers such as vibratory hammers shall not be used unless specified in the plans or permitted in writing by the ENGINEER. Hammers shall be rated based on the theoretical potential energy of the ram at impact. A variable energy hammer shall be used to drive precast concrete piles.
1. **Steam and Air Hammers:** Steam and air hammers that are used to drive precast concrete piles shall be capable of providing at least two ram stroke lengths. The short ram stroke length shall be approximately half of the full stroke. Reductions in steam or air pressures to produce reduced hammer strokes will not be permitted. In lieu of a variable energy hammer, the CONTRACTOR may propose in the Pile Installation Plan the use of multiple hammers of different rated energies to drive precast concrete piles. The plant and equipment furnished for steam and air hammers shall have sufficient capacity to maintain the hammer at the volume and pressure specified by the manufacturer. The plant and equipment shall be equipped with accurate pressure gauges that are easily accessible for viewing by the ENGINEER. The weight of the striking parts of air and steam hammers shall not be less than 1/3 the weight of drive head and pile being driven, and in no case shall the striking parts weight less than 2,750 pounds.
 2. **Open-End Diesel Hammers:** Open-end diesel hammers used to drive precast concrete piles shall be capable of providing a selection of at least three fuel settings that will produce varying stroke lengths. The CONTRACTOR shall provide the ENGINEER a chart from the hammer manufacturer equating stroke in feet and blows per minute. The CONTRACTOR shall have available on-site an approved device to determine and display ram stroke in feet of an open-end diesel hammer. The device used to determine the hammer stroke shall be periodically verified as determined by the ENGINEER by comparing the computed hammer stroke with the observed stroke on rams that have rings on the ram or by placing a temporary scale extending above the ram cylinder.
 3. **Closed-End Diesel Hammers:** Closed-end diesel hammers used to drive precast concrete piles shall be capable of providing a selection of at least three fuel settings that will produce varying stroke lengths. Closed – end (double acting) diesel hammers shall be equipped with a bounce chamber pressure gauge mounted to be easily accessible by the ENGINEER. The CONTRACTOR shall provide the ENGINEER a chart, calibrated to actual hammer performance, equating bounce

chamber pressure to either equivalent energy or stroke for the closed-end diesel hammer to be used. The calibration between bounce chamber pressure and actual hammer performance should be performed within 30 calendar days prior to starting driving and at 90 calendar day intervals thereafter.

4. **Hydraulic Impact Hammers:** The power plant and equipment furnished for hydraulic hammers shall have sufficient capacity to maintain the hammer at the volume and pressure specified by the manufacturer. The power plant and equipment shall be equipped with accurate pressure gauges that are easily accessible to the ENGINEER. These hammers shall be equipped with sensors or other approved devices capable of monitoring and displaying hammer performance.
5. **Gravity Hammers:** Gravity hammers, if permitted in the contract, shall only be used to drive timber piles. When gravity hammers are permitted, the ram shall weight between 2,000 and 3,300 pounds and the height of drop shall not exceed 10 feet. In no case shall the weight of gravity hammers be less than the combined weight of helmet and pile. All gravity hammers shall be equipped with hammer guides to ensure concentric impact on the helmet.

B. Drive System Components and Accessories:

1. **Hammer Cushion:** All impact pile driving equipment designed to be used with a hammer cushion shall be equipped with a suitable thickness of hammer cushion material to prevent damage to the hammer or pile and to ensure uniform driving behavior. Hammer cushions shall be made of durable, manufactured materials, provided in accordance with the hammer manufacturer's guidelines. Wood, wire rope, and asbestos hammer cushions shall not be used unless permitted by the ENGINEER. A striker plate as recommended by the hammer manufacturer shall be placed on the hammer cushion to ensure uniform compression of the cushion material. The hammer cushion shall be inspected in the presence of the ENGINEER when beginning pile driving at each structure and after every 100 hours of use during pile driving operations. The CONTRACTOR shall replace the cushion when the hammer cushion begins to deteriorate or when the reduction in thickness exceeds 25 percent of the original thickness.
2. **Helmet:** Piles driven with impact hammers require an adequate helmet or drive head to distribute the hammer blow to the pile head. The helmet shall be axially aligned with the hammer and the pile. The helmet shall be guided by the leads and not be free-swinging. The helmet shall fit around the pile head in such a manner as to prevent transfer of torsional forces during driving, while maintaining proper alignment of hammer and pile.
3. **Pile Cushion:** A pile cushion shall protect the heads of precast concrete piles. The pile cushion shall be made of plywood, hardwood, or a composite plywood and hardwood material. The minimum pile cushion thickness placed on the pile head prior to driving shall not be less than 4 inches. The pile cushion dimensions shall match the cross sectional area of the pile top. A new pile shall be provided for each pile driven unless otherwise permitted by the ENGINEER. The pile cushion shall be replaced during pile driving when the cushion begins to deteriorate or burn. Pile bearing capacity shall not be determined using a new pile cushion until after the pile has been driven a minimum of 5 feet or 100 blows. When easy driving conditions exist throughout the entire depth of driving, the ENGINEER may allow the pile cushion to be reused on several piles after guidelines for pile cushion replacement are developed from successful field performance. The objective shall be to maintain

consistent energy delivery at the end-of-driving for proper determination of the pile bearing capacity without pile damage.

4. **Leads:** Piles shall be supported in line and position with leads while being driven. Pile driver leads shall be constructed in a manner that affords freedom of movement of the hammer while maintaining alignment of the hammer and the pile to ensure concentric impact for each blow. Leads may be either fixed, semi-fixed or swinging types. Swinging leads shall be used in combination with a rigid template providing pile support meeting the approval of the ENGINEER. The pile section being driven shall not extend above the leads. The leads shall be of sufficient length to make the use of followers unnecessary and shall be so designed as to permit proper alignment of batter piles.
5. **Templates:** A rigid template shall be used swinging leads are used. When driving battered piles with swinging leads, the template shall be two tiered or equipped with cradles to hold the pile at the required batter, and the bottom of the leads shall be attached to the template. Template construction shall allow the pile to pass freely through the template without binding.

- C. Piles shall be accurately located and driven either vertically or to the prescribed batter as shown. No variation greater than 1/4-inch per foot will be permitted. Piles with greater variation and those seriously damaged in driving shall be removed or cut off, and replaced with new piles. Any pile heaved by the subsequent driving of adjacent piles shall be re-driven. Piles, after driving, shall not be out of position by more than 6 inches. All correction costs shall be paid by the CONTRACTOR.

3.2 PREPERATION FOR INSTALLATION OF DRIVEN PILES

- A. **Excavation:** Piles shall not be driven until after any required excavation is complete. Any material forced up between the piles shall be removed to the correct elevation before concrete for the foundation is placed.
- B. **Embankment Fill:** The full height of embankments shall be constructed prior to dricing piles. Piles to be driven through compacted embankment greater than 6 feet shall be driven through pre-bored holes limited to the depth of the embankment.
- C. **Cofferdams:** Prior to driving any piles the CONTRACTOR shall ensure the cofferdam is stable by monitoring the external stability of the ground outside of the cofferdam, wall inclination, and depth of excavation within the cofferdam. All excavation within the cofferdam shall be complete prior to driving piles. The depth of the excavation within the cofferdam shall be inspected for proper depth with a weighted line or other approved method.

3.3 PILING PREPARATION

- A. **Supporting Holes for Piles:** When approved, piles may be set in supporting holes, but in no case shall the depth of the holes be more than 10 feet for piles up to 50 feet long, or more than 20 percent of the designated penetration of the piles for piles over 50 feet long. If additional support is required, templates or falsework above ground shall be furnished. After piles are driven, supporting holes shall be backfilled to finished ground or base of footing with granular-type material acceptable to the ENGINEER and saturated with water.
- B. **Splicing Piles:**

1. **Timber Piles:** Timber piles shall be furnished and driven full length.

3.4 CONSTRUCTION REQUIREMENTS

- A. **Pre-boring:** Pre-boring by augering, wet-rotary drilling, or other methods used to facilitate pile driving will not be permitted unless specified in the plans or specifications or required by the ENGINEER. When the soil investigation or field trials indicate impenetrable material above the minimum pile tip elevation, pre-boring may be required to facilitate pile driving. The use of spuds to punch through impenetrable soil layers shall not be permitted without approval. The depth of the prebored hole shall be developed so as to minimize the pile skin friction disturbance and still be sufficient to permit pile installation to the required pile tip elevation. Preboring procedures shall be carried out in a manner that will not impair the capacity of the piles already in place or the safety of existing structures. The CONTRACTOR shall develop the preboring depth limits based on the soil information obtained from soil boring logs and submit the limits to the ENGINEER for approval. The maximum prebored depth shall be 3 feet above pile tip elevation, unless otherwise directed. Prebored holes shall have a maximum diameter of 80 to percent of the pile diameter unless written approval to do otherwise is received from the ENGINEER. The prebored hole diameter for tapered piles shall be determined by the ENGINEER. Upon completion of the preboring, any voids around the pile shall be filled with granular-type material acceptable to the ENGINEER and saturated with water. The CONTRACTOR is responsible for any and all effects due to preboring.
- B. **Jetting:** Jetting will not be permitted unless allowed in the plans or required by the ENGINEER. Jetting will not be allowed in footings, header banks, or where stability of embankments or other structures would be endangered unless approved in writing by the ENGINEER. When the soil investigation or field trials indicate impenetrable material above the minimum pile tip elevation, jetting may be required to facilitate pile driving. The jet pipe penetration limit shall be developed to minimize the pile skin friction disturbance and still be sufficient to permit pile installation to the required pile tip elevation. The CONTRACTOR shall develop the jet pipe penetration limits based on soil information obtained from soil boring logs and shall submit the limits to the ENGINEER for approval. The maximum jet penetration limit shall be 5 feet above the required pile tip elevation. Extending the maximum jet penetration limit will require written approval by the ENGINEER.
- C. When water jets are permitted, the jetting procedures shall be carried out in a manner which will not impair the capacity of the piles already in place or the safety of existing structures or create a crater around the pile causing it to drift. The CONTRACTOR shall be responsible for all damage to the site caused by unapproved or improper jetting operations. The number and size of jets and the volume and pressure of water at jet nozzles shall be sufficient to erode material adjacent to the pile but not disturb the soil bearing material within 5 feet of the required pile tip penetration. The jetting plant shall have sufficient capacity to deliver at all times a pressure equivalent to at least 100 psi at two 0.75 inch jet nozzles. One jet pipe will be allowed only when the CONTRACTOR is pre-jetting a hole prior to placing and driving the pile or when driving is interrupted and the jet is placed inside a steel pipe pile or a voided concrete pile. A minimum of two jets will be required when piles are jetted and driven concurrently using external jets. When jetting and driving is required, the jets shall be above the advancing pile tip approximately 3 feet, or as approved by the ENGINEER. Jetting operations shall cease when the jet penetration limit is reached, and the pile shall then be driven with the approved impact hammer to the final pile tip penetration. The pile bearing capacity shall be determined only from the results of driving after the jets have been withdrawn. The CONTRACTOR shall control, treat if necessary, and dispose of all jet water in a manner

satisfactory to the ENGINEER. Upon completion of jetting a pile, any voids around the pile shall be filled with granular-type material acceptable to the ENGINEER and saturated with water.

- D. **Followers and Underwater Hammers:** Followers or underwater hammers shall only be used when approved in writing by the ENGINEER. When a follower or underwater hammer is permitted, the first pile in each pile group and every tenth pile driven thereafter shall be sufficiently long to permit being driven without a follower or underwater hammer, to verify that adequate pile capacity is being attained to develop the desired end-of-driving pile capacity for the pile group. The determination of the pile bearing capacity shall be made as specified herein using the driving results of the extended piles. No direct payment will be made for cut-off of these extended piles. The follower or underwater hammer and pile shall be held and maintained in equal and proper alignment during driving. The follower shall be of such material and dimensions to permit the piles to be driven to the length determined necessary from the driving of the extended piles. The follower shall be provided with a socket or hood carefully fitted to the pile head to minimize energy losses and prevent pile damage.
- E. **Location and Alignment Tolerances:** Piles shall be driven at locations shown on the plans or as ordered in writing. In pile bents, the centroid of a pile at cut-off elevation shall not vary from plan location by more than 3 inches measured perpendicular to the bent, nor more than 6 inches measured along the centerline of the bent. For footing piles, the centroid of load of any pile at cut-off elevation shall be within a 6 inch radius of a circle having the plan location as its center. No pile shall be nearer than 3 inches from any edge of the cap. Any increases in size of cap to meet these edge distance requirements shall be at the CONTRACTOR'S expense. The final pile head at cut-off elevation shall be plus or minus 2 inches of the final grade shown in the plans. Piles shall be installed so that the axial alignment is within 2 percent of the specified alignment shown in the plans. For piles that cannot be inspected internally after installation, an alignment check shall be made before installing the last 5 feet of pile, or after installation is completed provided the exposed portion of the pile is not less than 5 feet in length. The ENGINEER may require that driving be stopped in order to check the pile alignment. Pulling laterally on piles to correct misalignment, or splicing a properly aligned section on a misaligned section shall not be permitted. If the location and/or alignment tolerances specified herein are exceeded, the CONTRACTOR shall provide the ENGINEER with a sketch showing the actual versus theoretical positions of the piles. If corrective measures are necessary, the CONTRACTOR shall bear all costs, including delays, associated with the corrective action.
- F. **Installation Sequence:** The CONTRACTOR'S approved pile driving sequence to drive individual piles in a footing shall be used unless otherwise directed by the ENGINEER. The pile driving sequence for individual piles in a footing shall be in accordance with one of the following options:
1. From the center of the pile group outward.
 2. By rows from the center of the pile group to the side.
 3. By rows from one side of the pile group to the other side.
- G. **Pile Driving Stresses:** The piles shall be driven in a manner as not to exceed the maximum allowable driving stresses. For steel piles, the maximum compressive driving stresses shall not exceed 90 percent of the yield point of the pile material. For timber piles, the compressive driving stress shall not exceed 3600 psi. For precast prestressed concrete piles, the tensile and compressive driving stress in units of psi from the Maximum Allowable Driving Stresses Table below shall not be exceeded.

Maximum Allowable Driving Stresses Table

Tensile Driving Stress (Normal Environments):	
U.S. Units $3 \sqrt{f'_c + f_{pe}}$	Metric Units: $0.25 \sqrt{f'_c + f_{pe}}$
Tensile Driving Stress (Corrosive Environments):	
U.S. Units f_{pe}	Metric Units f_{pe}
Compressive Driving Stress (All Environments):	
U.S. Units $0.85 f'_c - f_{pe}$	Metric Units: $0.85 f'_c - f_{pe}$
f'_c = Concrete Compressive Strength, psi (MPa) f_{pe} = Effective Prestress, psi (MPa)	

H. **Extent of Driving:** Driving shall be continued until the ENGINEER determines satisfactory penetration and pile bearing capacity have been obtained. Approval from the ENGINEER shall be required to terminate pile driving above the plan tip elevation. Piles shall be driven to the plan tip elevation in accordance with these specifications, unless a minimum pile tip is specified in the plans. If the pile penetration requirements and pile bearing capacity are achieved within 5 feet of the plan pile tip elevation, the ENGINEER may consider the penetration and capacity requirements to be satisfied. The following requirements shall be used to evaluate satisfactory pile penetration and pile bearing capacity.

- Pile Driving Penetration Requirements:** Practical refusal blow count depends on the site soil profile, the pile type, and hammer manufacturer limitations to prevent hammer damage. Practical refusal is broadly defined as a rate of 20 blows per inch at maximum stroke, for 3 consecutive inches. However, depending on site conditions, this criterion may not always be applicable. If practical refusal is encountered above the required plan pile tip elevation, the CONTRACTOR may be required to obtain a larger hammer capable of achieving the required penetration, or to use pile installation techniques to facilitate pile driving such as preboring or jetting. Refusal conditions shall require that the approved hammer is operating at the maximum stroke or fuel setting required to achieve the hammer manufacturer's maximum rated energy. The hammer shall be in proper working order. If the hammer performance needs to be evaluated, the ENGINEER may require dynamic monitoring of the pile driving operations. If the hammer performance indicates that the pile driving system's effective efficiency is not satisfactory, the CONTRACTOR shall be required to adjust the pile driving system until satisfactory performance is observed. The cost of dynamic monitoring and/or delays due to unsatisfactory hammer performance shall be at the CONTRACTOR'S expense. Dynamic monitoring of hammers performing satisfactorily shall be paid for by the OWNER.
- Pile Bearing Capacity Requirements:** The pile bearing capacity shall be determined as specified herein. If pile bearing capacity is less than the required end-of-driving pile capacity at cut-off elevation, the ENGINEER has the option of

either loading a permanent pile to determine its ultimate pile capacity, continuing to drive the pile until satisfactory resistance is obtained, or perform a pile restrike to check for increase in pile bearing capacity due to soil set-up. The loading procedure of permanent piles shall be in accordance with the requirements of this section. The additional length of pile due to the additional driving shall be furnished in accordance with the construction methods specified herein for pile extensions. Pile restrikes shall be performed as specified herein. If the potential exists for obtaining false pile bearing capacity results due to excess pore water pressure or if this condition was observed during field testing of test piles, indicator piles, or monitor piles, the pile bearing capacity shall be determined from pile restrikes as directed by the ENGINEER.

3. **Pile Restrikes:** Pile restrikes are to be conducted as required for test piles, indicator piles, and production piles or as directed by the ENGINEER. Pile restrikes shall be conducted at no direct pay. The piles to be restruck shall be driven initially to 1 foot above the required pile tip elevation, or as directed by the ENGINEER. All pile restrikes shall be performed with a warm hammer that has applied a minimum of 20 blows to another pile or dummy block immediately before being used to restrike the selected pile. For precast concrete piles, the original pile cushion used during initial driving shall be used. If the original pile cushion used to drive precast concrete piles is no longer in an acceptable condition, another similar used cushion shall be used. The maximum amount of pile penetration required for each pile restrike shall be 6 inches or a maximum of 50 hammer blows. If the required end-of-driving pile capacity is obtained during the restrike of permanent piles, the pile shall be driven to grade. Restrike blow counts shall be measured as the number of hammer blows per increment of 1 inch
4. **Heaved Piles:** Elevations to check on pile heave after driving shall be made at the start of pile driving operations and shall continue until the ENGINEER determines that such checking is no longer required. Elevations shall be taken immediately after the pile has been driven and again after piles within a radius of 15 feet have been driven. If pile heave is observed, level readings referenced to a fixed datum shall be taken on all piles immediately after installation and periodically thereafter as adjacent piles are driven to determine the pile heave range. All end bearing piles that have been heaved more than 1/4 inch shall be redriven to the required resistance or penetration at no direct pay. Concrete shall not be placed in pile casings until all piles in a footing have been driven, or as directed by the ENGINEER.

I. **Pile Cut-Offs:**

1. **Timber Piles:** The tops of timber piling which support concrete footings or caps shall be sawed off perpendicular to their axes at the required elevation. When piles support timber caps they shall be sawed to a horizontal plane or to the slope specified, in such manner as to fit the cap. Shimming on tops of piles will not be permitted. Treatment of pile heads shall be as follows:
 1. After cutting, pile heads shall be treated to prevent decay. Pile heads to be encased in concrete will not require treatment.
 2. Immediately after making final cut-off on treated timber foundation piles, the cut area shall be given two liberal applications of preservative followed by a heavy application of hot roofing pitch or other approved sealer.

3.5 UNSATISFACTORY PILES

- A. The procedure used in driving piles shall not subject them to excessive abuse which produces cracking, crushing or spalling of concrete, splitting, splintering and brooming of timber, or deformation of steel. Manipulation of precast concrete piles to force them into proper position will not be permitted. Any pile found to be unacceptable due to internal defects, by improper driving, driven out of proper location, or driven below required elevation shall be corrected at no direct pay by one of the following methods approved by the ENGINEER:
1. The pile shall be withdrawn and replaced by a new and, if necessary, a longer pile. Additional pile length and/or load testing may be required with no additional compensation due to disturbance of the soil from jetting or other methods used during removal of the pile.
 2. A second pile shall be driven adjacent to the defective pile. This may require driving the replacement pile with a batter in order to place the pile head at the plan location.
 3. The pile shall be spliced or built up as otherwise provided herein or a sufficient portion of the footing extended to embed the pile.
 4. The cap or footing shall be redesigned at no direct pay and shall be approved by the ENGINEER. The CONTRACTOR will not be allowed additional compensation for increased quantities in a bent or footing due to driving additional piles to correct unsatisfactory piles.
- B. Cracks in concrete piles shall be corrected as follows:
1. Transverse cracks in piles that show evidence of spalling and or piles with diagonal or longitudinal cracks will be rejected unless the pile has required penetration and resistance and can be cut off below the crack and built up, or it can be repaired by other methods approved by the ENGINEER.
 2. Transverse cracks that show light dusting or powdering during driving shall be repaired by epoxy injection. Driving shall be stopped at the first sign of powdering and the crack shall be injected and cured in accordance with the epoxy manufacturer's recommendations before driving is resumed.
 3. Concrete piles with minor hairline surface cracks will not be cause for rejection or repair provided no change in the crack condition occurs during driving.

3.6 DETERMINATION OF PILE BEARING CAPACITY

- A. The pile bearing capacity is the pile capacity obtained during the end-of-driving or pile restrike. The pile bearing capacity determination shall be made by use of the Dynamic Formula, the Wave Equation, or the Test Pile Loading Results as specified in the plans. If the method of pile capacity is not shown on the plans the Dynamic Formula shall be used.
1. **Dynamic Formula:** The pile bearing capacity shall be determined by the ENGINEER, based on the dynamic formula. Piles shall be driven with the approved pile driving equipment to the ordered length or other lengths necessary to obtain the required end-of-driving pile capacity. If the end of driving capacity is not shown on the plans the required pile bearing capacity shall be 3.5 times the pile design load.

English Dynamic Formula:

$$R = \frac{(1.75\sqrt{E_r} \log(10N_b)) - 100}{2}$$

R = *Pile Bearing Capacity (Tons)*

E_r = *Manufacturer's Rated Energy at the field
observed ram stroke (foot – pounds)*

N_b = *Number of Hammer Blows/Inch*

- END OF SECTION -