# WASHTENAW COUNTY
## FINANCE DEPARTMENT
### Purchasing Division

P.O. Box 8645, 220 N. Main, Ann Arbor, MI 48107-8645
Phone (734) 222-6760, Fax (734) 222-6764
www.purchasing.ewashtenaw.org


**October 25, 2011**

**Addendum #2**

RFP No. 6638

Title: Border-to-Border Trail River Terrace Bridge and Trail Construction

**Due Date:** **Friday, October 28, 2011 at 3:00 PM**

The attached is regarding an additional bridge supplier and other information.

Please return this addendum with your bid proposal on the due date and sign below that you received it.

Anne Strieter, C.P.M.
Interim Purchasing Manager

Signature of Vendor

Specifications for Prefabricated bridges.

Please add the following to list of pre-approved suppliers:

**ART THURESON, INC**
4000 West Walton
Waterford, MI 48329
248-623-8599

PROPOSAL PRICE: The Bidder agrees to complete the Project for the following unit prices:

**BASE BID ITEMS, RFP #6638**

| Item | Item Description | Qty | Unit | Unit Price | Total Price |
|---|---|---|---|---|---|
| 1. | Mobilization, Bonds, Insurance, Permits | 1 | LS | $ | $ |
| 2. | Traffic Control Devices | 1 | LS | $ | $ |
| 3. | Tree protection and natural area protection fences | 1 | LS | $ | $ |
| 4. | Soil erosion control measures | 1 | LS | $ | $ |
| 5. | Clear and grub, woody species and trees as indicated on plans | 1 | LS | $ | $ |
| 6. | Installation of construction entrance | 1 | LS | $ | $ |
| 7. | Excavation of existing soils for proposed trail, re-use on site, dispose of excess off-site. | 1 | LS | $ | $ |
| 8. | Install temporary shoring, gravel crane pad and access drive | 1 | LS | $ | $ |
| 9. | Removal of temporary shoring for crane pad, restoration of crane pad and access drive | 1 | LS | $ | $ |
| 10. | Install steel bollards(2 permanent, 1 removable), footings and concrete pavement with expansion joints | 2 | EA | $ | $ |
| 11. | Install segmental retaining wall at HMA path terminus | 2 | EA | $ | $ |
| 12. | Construct gravel path | 35 | LF | $ | $ |
| 13. | Construct HMA trail type A, including prep and base material | 430 | LF | $ | $ |
| 14. | Construct HMA trail type B, including prep and base material | 75 | LF | $ | $ |

| Item | Item Description | Qty | Unit | Unit Price | Total Price |
|---|---|---|---|---|---|
| 15. | Construct HMA Trail type C, including prep and base material | 635 | LF | $ | $ |
| 16. | Construct boardwalk on sleepers with curbing. | 300 | LF | $ | $ |
| 17. | Construct boardwalk on micropiles with curbing. | 450 | LF | $ | $ |
| 18. | Construct boardwalk on micropiles with railing | 215 | LF | $ | $ |
| 19. | Construct bridge abutments | 1 | LS | $ | $ |
| 20. | Fine grading, restoration seeding, and straw blankets for sides of trail | 1 | LS | $ | $ |
| 21. | Assemble and Install 12'. x 170' long Pedestrian Bridge | 1 | LS | $ | $ |
| 22. | Construct boulder retaining wall | 65 | LF | $ | $ |
| 23 | Load Test Proof of Micropiles at Bridge Abutments | 2 | EA | $ | $ |
| 24 | Load Test Verification of Micropiles at Bridge Abutments | 2 | EA | $ | $ |

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**Total Bid Amount for River Terrace Bridge and Trial (Items 1 through 23)** $

_____ Dollars ($_____)

(Amount shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern.)

The undersigned has read the "Method of Measurement and Basis of Payment", and acknowledges that Pages MP-1 to MP-3 are part of his proposal.

The undersigned agrees that if the foregoing Proposal shall be accepted by the OWNER, he will, within ten (10) days (Sundays and legal holidays excepted) after receiving notice of such acceptance, enter into the attached form of Agreement and will complete the Project, ready for use, at the price and within the time stated in this Proposal, and that he will furnish the OWNER satisfactory Contract Bonds and certificates of insurance coverage.

The undersigned further agrees that if the foregoing Proposal shall be accepted, he will commence work immediately after the Contract has been awarded, the Agreement executed, and he has received a Notice to Proceed and he shall complete the entire work within **30** calendar days.

The undersigned attaches hereto his Bid Security, as required by the Advertisement and Information for Bidders, and the undersigned agrees that in case he shall fail to fulfill his obligations under the foregoing Proposal and/or shall fail to furnish bonds, as specified, the OWNER may, at its option determine that the undersigned has abandoned his rights and interests in such Contract and that his Bid Security accompanying his Proposal has been forfeited to the said OWNER, but otherwise the Bid Security shall be returned to the undersigned upon the execution of the Contract and the acceptance of the bonds.

The Bidder shall acknowledge that he/she is an equal opportunity employer and that they do not discriminate against other firms due to race, age, gender or physical conditions.

In submitting this bid, it is understood that the right is reserved by the OWNER to accept any bid, to reject any or all bids, and to waive irregularities in bidding in the interest of the OWNER.

The Bidder has completed the accompanying "Legal Status" form.

Dated and Signed at_____

this the _____day of _____, 20_____.

OFFICIAL COMPANY ADDRESS

_____

_____

_____

_____
Telephone

_____
email

BIDDER'S NAME

_____

_____

_____
By

_____
Title

☐ **By checking this box we hereby certify that we are a Washtenaw County company as defined in Section F of the Request for Proposal. If proven otherwise you may be subject to Disbarment and/or Suspension of doing business with Washtenaw County.**

**IF THIS INFORMATION IS NOT SUBMITTED WITH SEALED BID AT THE TIME OF BID, THE BID WILL BE CONSIDERED INCOMPLETE.**

## MEASUREMENT AND PAYMENT SCHEDULE
## River Terrace Trail Construction

| ITEM IN PROPOSAL | METHOD OF MEASUREMENT | BASIS OF PAYMENT |
|---|---|---|
| Mobilization, Bonds, Insurance, Permits | By the unit lump sum (LS). | Delivery to site of earthmoving equipment, sanitary facilities, and other equipment as required for start of excavation. Includes the establishment of the CONTRACTOR's temporary site facilities, pre-construction costs such as Bonds, Insurance, and all permits directly attributable to the project. |
| Traffic Contol Devices | By the unit lump sum (LS). | Install, and maintain traffic control devices in accordance with current MDOT standards and specifications and/or per the requirements on the WCRC permit issued for the project. Includes eventual removal at end of project. |
| Tree Protection and Natural Area Protection Fences | By the unit lump sum (LS). | Furnish, install, and maintain site security, and vegetation protection fences in accordance with the plans and specifications. Includes eventual removal at end of project. |
| Soil Erosion Control Measures | By the unit lump sum (LS). | Furnish, install, and maintain all permit required erosion control measures throughout project work. Includes eventual removal at end of project. |
| Clear and grub, woody species and trees as indicated on plans | By the unit lump sum (LS). | For clearing and grubbing of all areas as indicated on plans in accordance with plans, and specifications |
| Installation of temporary construction entrance | By the unit lump sum (LS). | Install and maintain a construction entrance of tracking stone. Includes all materials and eventual removal at end of project. |
| Excavation of existing soils for proposed trail & access drive, spoiled on-site | By the unit lump sum (LS). | For excavation of all soils and removal of all stump and root materials to accommodate proposed improvements, includes temporary stockpiling on site. |

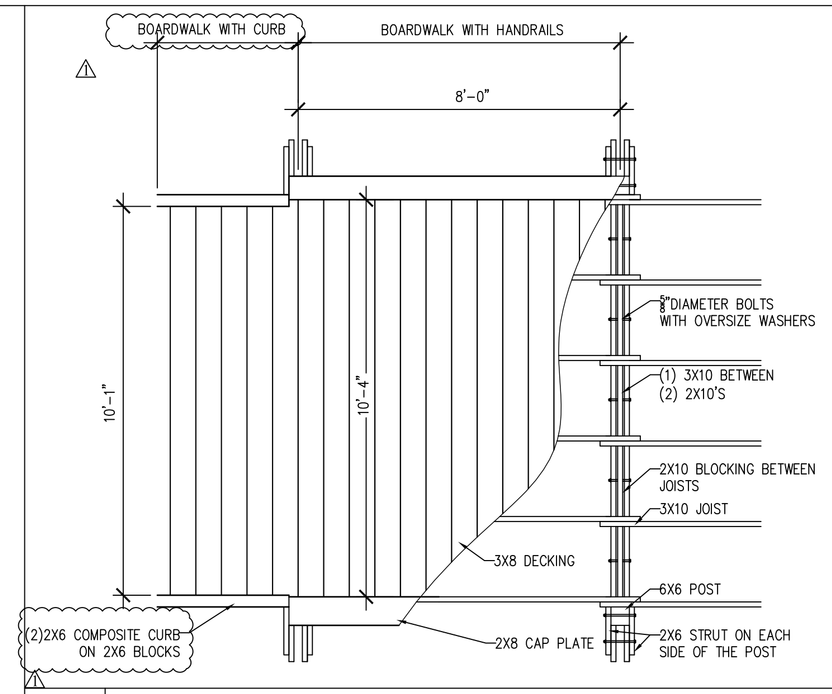
| ITEM IN PROPOSAL | METHOD OF MEASUREMENT | BASIS OF PAYMENT |
|---|---|---|
| | | Excess soils not used in construction grading efforts to be removed from site. |
| Install temporary shoring for gravel crane pad and access drive | By the unit lump sum (LS). | For completing installation of the gravel crane pad and access drive as shown on plans and in accordance with specifications. Includes all construction materials: aggregate, class II granular fill, geotechnical fabric, etc. Includes additional earthwork: backfill, and rough grading of crane pad perimeter and remaining spoils from excavation. CONTRACTOR shall provide OWNER with material load slips certifying specification compliance and quantity prior to approval of full payment. |
| Removal of temporary shoring for gravel crane pad and access drive | By the unit lump sum (LS). | For complete removal of the gravel crane pad and access drive as shown on plans and in accordance with specifications. Includes removal of all construction materials and regarding to original site contours. |
| Install steel bollards(2 permanent, 1 removable), footings and concrete pavement with expansion joints | By the unit each (EA). | For completing installation of all steel bollards in accordance with plans and specifications. Includes associated concrete footings and band. |
| Install segmental retaining wall at HMA path terminus, with composite wood curb | By the unit each (EA). | Furnish and segmental retaining wall and attached wooden curb in accordance with plans and specifications on plans or by retaining wall manufacturer as determined by owner. |
| Construct gravel path | By the unit linear foot (LF). | For completing installation of the gravel path as indicated on plans. |
| Construct HMA trail type A, including prep and base material. | By the unit linear foot (LF). | For furnishing and installing the HMA trail and base material per the details and specifications. CONTRACTOR shall provide |

| ITEM IN PROPOSAL | METHOD OF MEASUREMENT | BASIS OF PAYMENT |
|---|---|---|
| | | OWNER will material load slips certifying specification compliance prior to approval of full payment. |
| Construct HMA trail type B, including prep and base material. | By the unit linear foot (LF). | For furnishing and installing the HMA trail and base material per the details and specifications. CONTRACTOR shall provide OWNER will material load slips certifying specification compliance prior to approval of full payment. |
| Construct HMA trail type C, including prep and base material. | By the unit linear foot (LF). | For furnishing and installing the HMA trail and base material per the details and specifications. CONTRACTOR shall provide OWNER will material load slips certifying specification compliance prior to approval of full payment. |
| Construct boardwalk on sleepers with curbing. | By the unit linear foot (LF). | For furnishing and installing the boardwalk, curbing and substructure required for support per the details and specifications. |
| Construct boardwalk on micropiles with curbing | By the unit linear foot (LF). | For furnishing and installing the boardwalk, curbing, substructure and micropile foundations required for support per the details and specifications. |
| Construct boardwalk on micropiles with railing | By the unit linear foot (LF). | For furnishing and installing the boardwalk, railing, substructure and micropile foundations required for support per the details and specifications. |
| Construct bridge abutments | By the unit lump sum (LS). | For complete installation of the bridge abutments as shown on plans and in accordance with specifications. Includes all construction materials: aggregate, class II granular fill, geotechnical fabric, etc. Includes additional earthwork: backfill, and grading of abutments and remaining spoils from excavation. Excess soils not used in construction grading efforts to be removed from site. |

| ITEM IN PROPOSAL | METHOD OF MEASUREMENT | BASIS OF PAYMENT |
|---|---|---|
| Fine grading, restoration seeding, and straw blankets for sides of trail | By the unit lump sum (LS). | For completing fine grading, seeding, and mulching with straw blanket for areas disturbed and as indicated on plans and in accordance with specifications. |
| Assemble and Install 12' x 170' long Pedestrian Bridge | By the unit lump sum (LS). | For furnishing and complete installation of the bridge as shown on plans and in accordance with specifications. |
| Construct boulder retaining wall | By the unit linear foot (LF). | For furnishing and installing the boulder wall and base material per the details and specifications. |
| Load Test Proof of Micropiles at Bridge Abutments | By the unit each (EA). | For Load Test Proof of Micropiles at Bridge Abutments to meet design criteria. |
| Load Test Verification of Micropiles at Bridge Abutments | By the unit each (EA). | For Load Test Verification of Micropiles at Bridge Abutments to meet design criteria. |

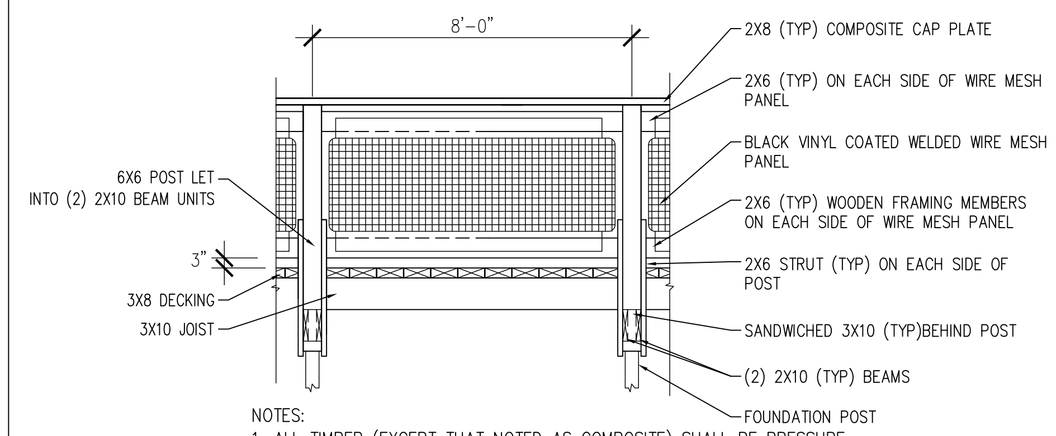
END OF SECTION

2




## A BOARDWALK FRAMING PLAN — NTS

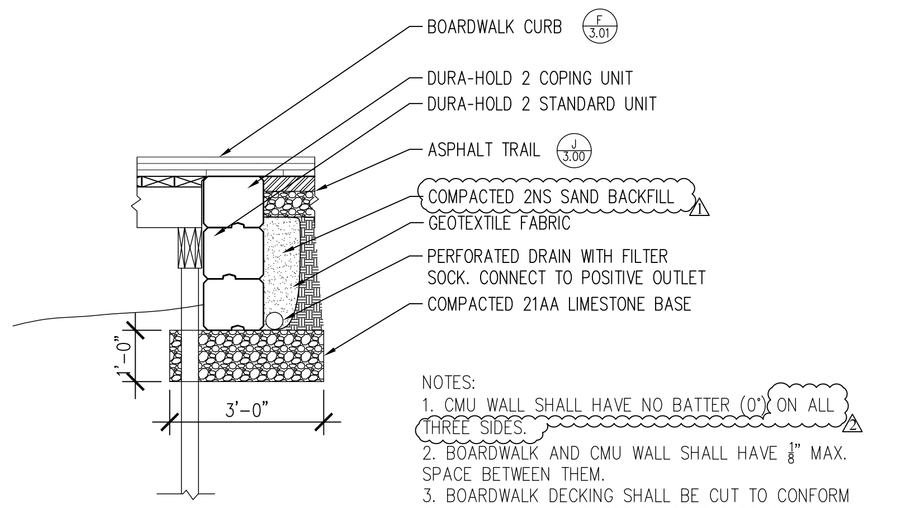





NOTES:
1. ALL TIMBER (EXCEPT THAT NOTED AS COMPOSITE) SHALL BE PRESSURE TREATED TO 0.23 PCF (GROUND CONTACT RATED) WITH MCA.
2. ALL COMPOSITE MATERIAL SHALL BE TREX OR APPROVED EQUIVALENT COORDINATE COLOR W. LANDSCAPE ARCHITECT
3. ALL STEEL FASTENERS SHALL BE HOT DIPPED GALVANIZED.
4. COUNTER SINK ALL SCREW CONNECTIONS 1/4"
5. 3"(H) X 2"(V) 16 GUAGE BLACK VINYL COATED WELD WIRE STEEL MESH PANEL SET IN A WOODEN FRAME. (COVER ALL SHARP ENDS OF MESH PANEL WITH WOODEN FRAMING MEMBERS.) CONTRACTOR SHALL PROVIDE SHOP DRAWINGS.

## B BOARDWALK RAILING DETAIL — 3/16"=1'-0"



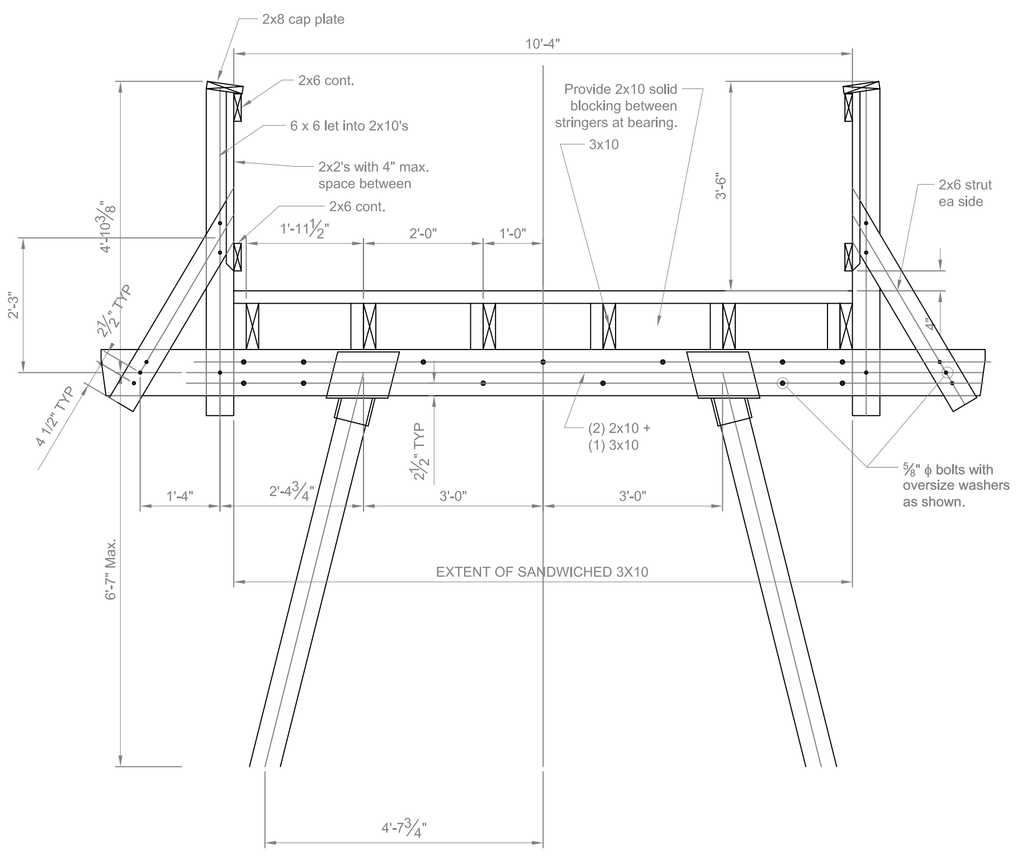



NOTES:
1. CMU WALL SHALL HAVE NO BATTER (0°) ON ALL THREE SIDES.
2. BOARDWALK AND CMU WALL SHALL HAVE 1/8" MAX. SPACE BETWEEN THEM.
3. BOARDWALK DECKING SHALL BE CUT TO CONFORM TO CMU WALL AS NECESSARY TO ENSURE SPACING.
4. ALL BACKFILLED MATERIAL INSIDE WALLS SHALL BE COMPACTED TO A 95% COMPACTION RATE.

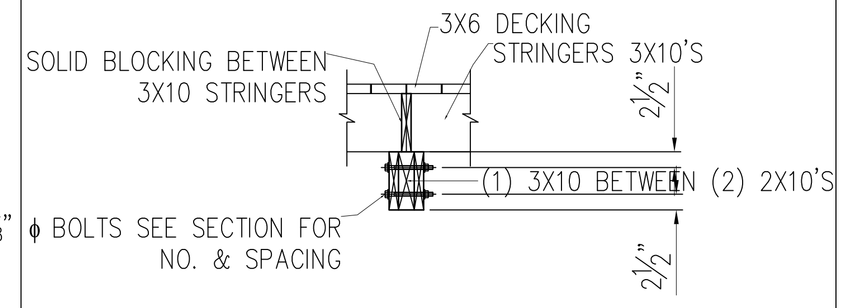
## C HMA PATH TERMINUS WALL SECTION — 3/8"=1'-0"



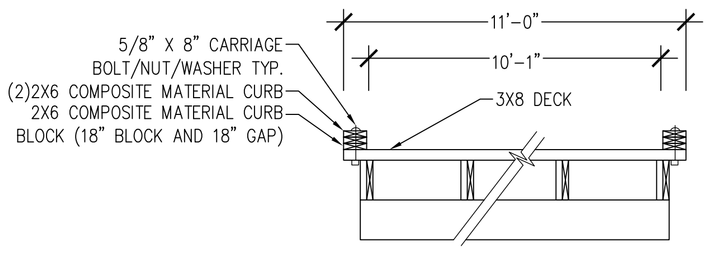
NOTES:
1. ALONG BOARDWALK LENGTH, CONTRACTOR SHALL PROVIDE GRADUAL TRANSITION BETWEEN BOARDWALK GRADES.
2. BOARDWALK IS DESIGNED TO SUPPORT AASHTO STANDARD H5 LOADING.




## E BOARDWALK SECTION

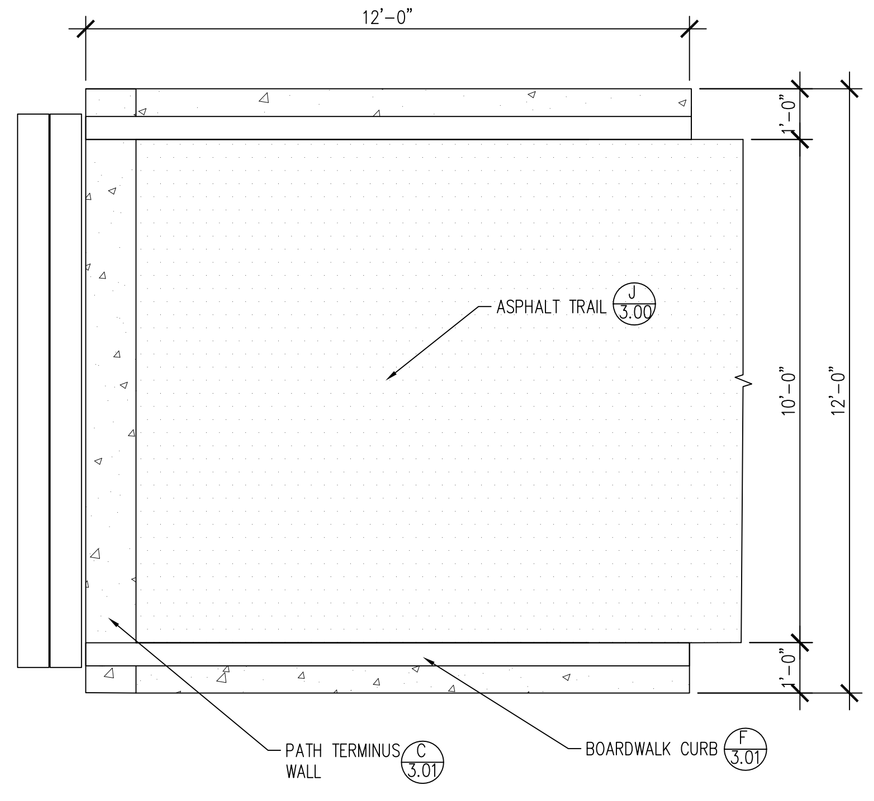



## D BOARDWALK SECTION — NTS




## F BOARDWALK CURB — NTS






NOTES:
1. CURB ON WALL OF PATH TERMINUS SHALL ALIGN WITH CURB ON BOARDWALK.
2. CURB ON WALL OF PATH TERMINUS SHALL BE ANCHORED INTO CONCRETE BLOCKS WITH A MINIMUM OF TWO CONCRETE ANCHORS PER CURB BLOCK.
3. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR REVIEW.

## G HMA PATH TERMINUS — 3/8"=1'-0"



Landscape Architect:
Conservation Design Forum
375 West First Street
Elmhurst, Illinois 60126
630.559.2000 Phone
630.559.2030 Fax
www.cdfinc.com

Structural Engineer:
Fitzpatrick

Survey:
Washtenaw Engineering Company, Inc.

Client:
Washtenaw County

# Washtenaw County River Terrace Trail Details

Issue/Revision

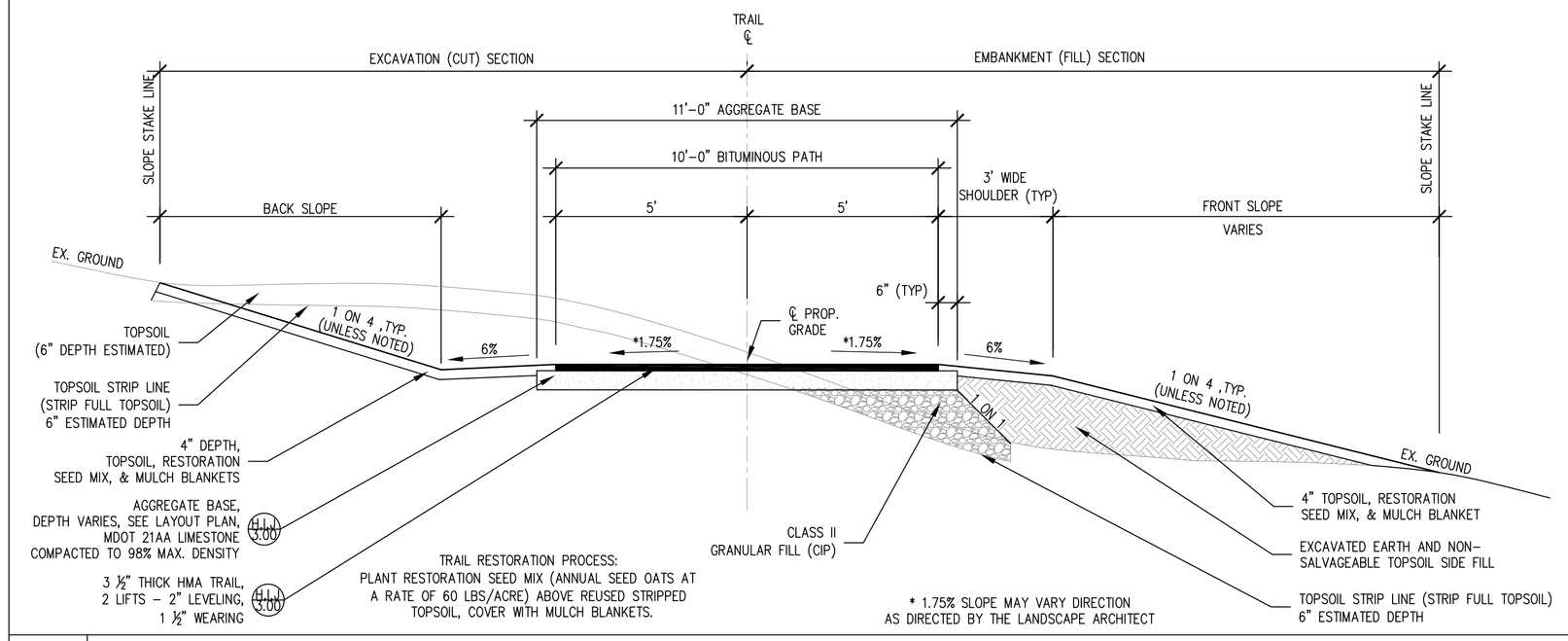
- ADDENDUM 2 10/24/2011
- ADDENDUM 1 10/19/2011

Status
Drwn by:JJ/RVW/BO
Chkd by: PJ

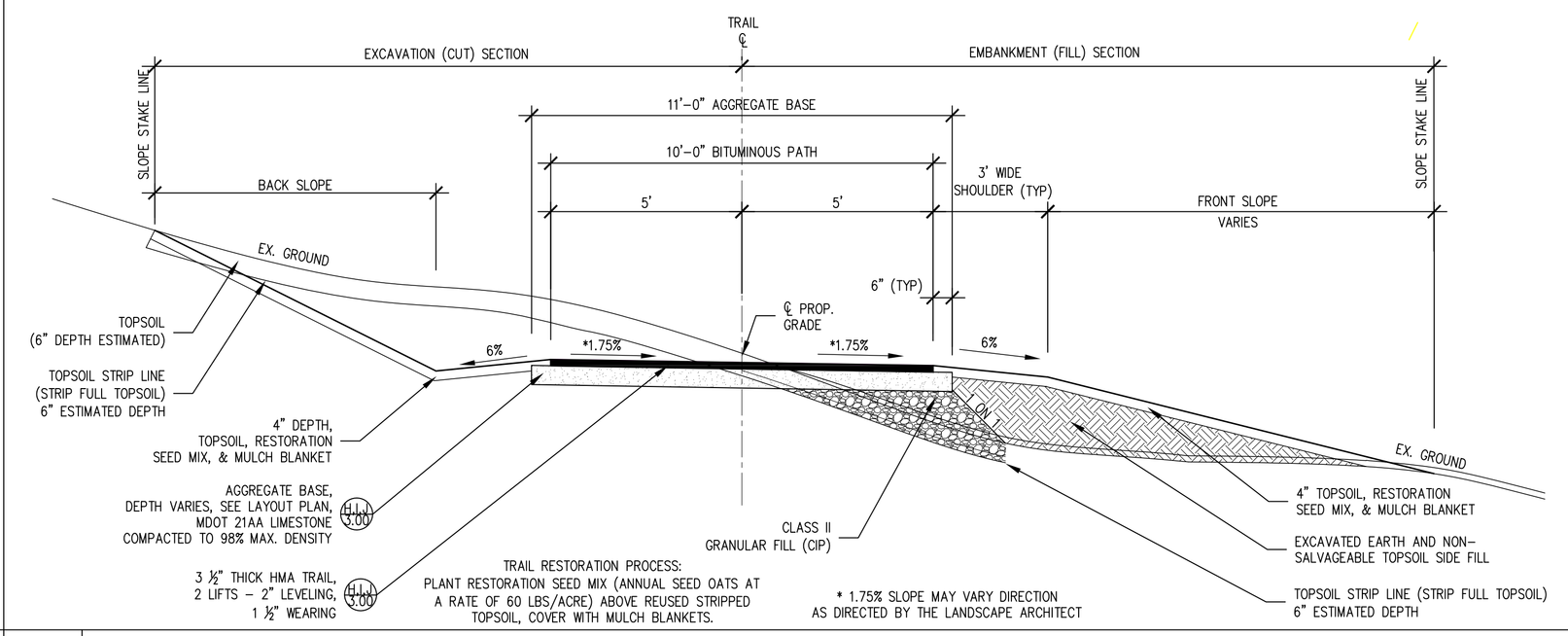
Date
09-21-2011

Job No.
10015.01

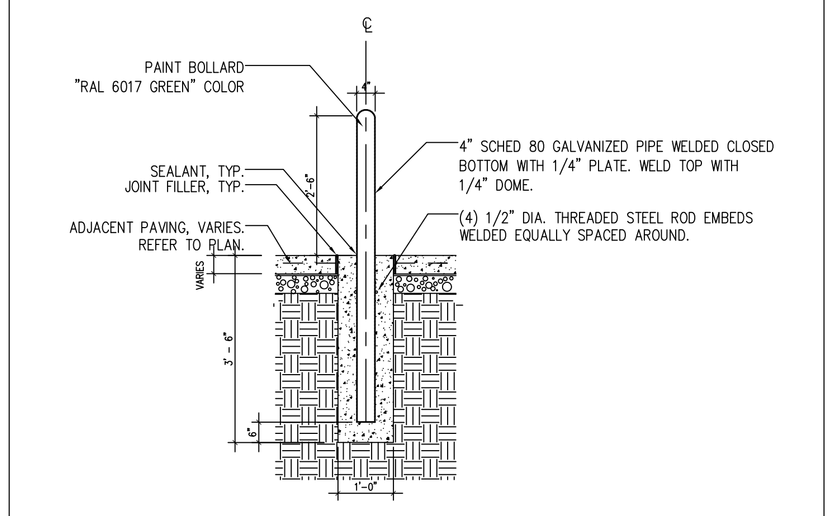
L-3.01



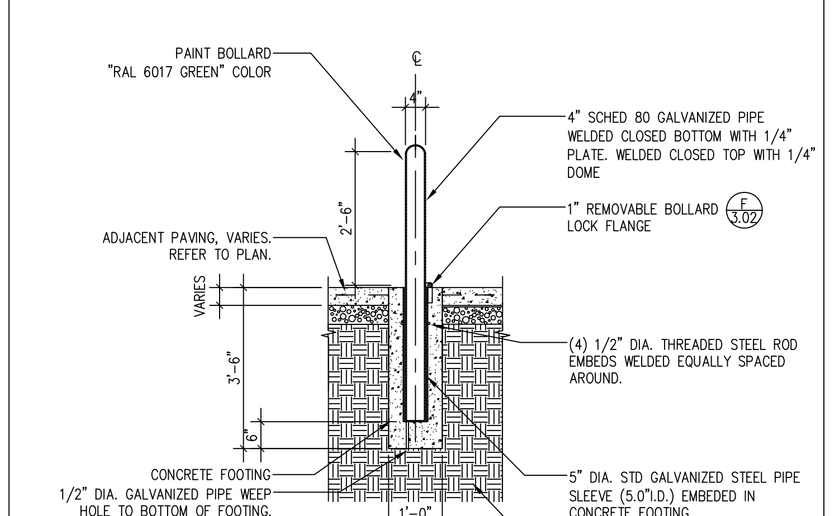

A HCMA TRAIL TYPE 1 NTS



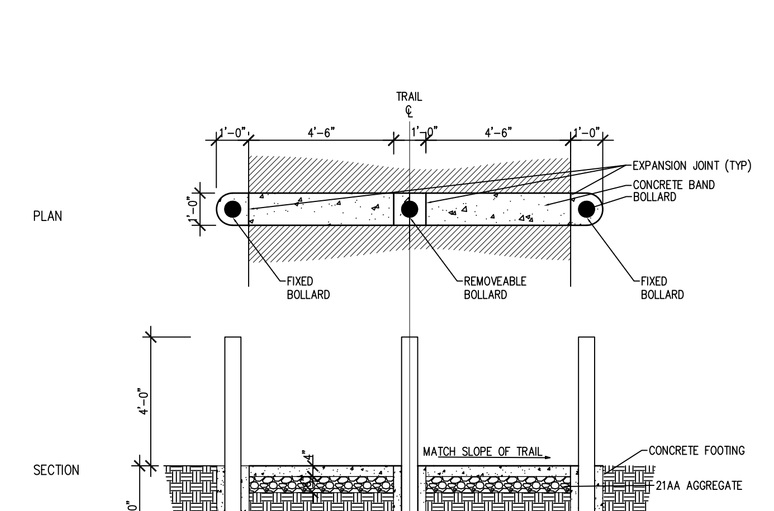

B HCMA TRAIL TYPE 2 NTS




C FIXED BOLLARD 1/2"=1'-0"

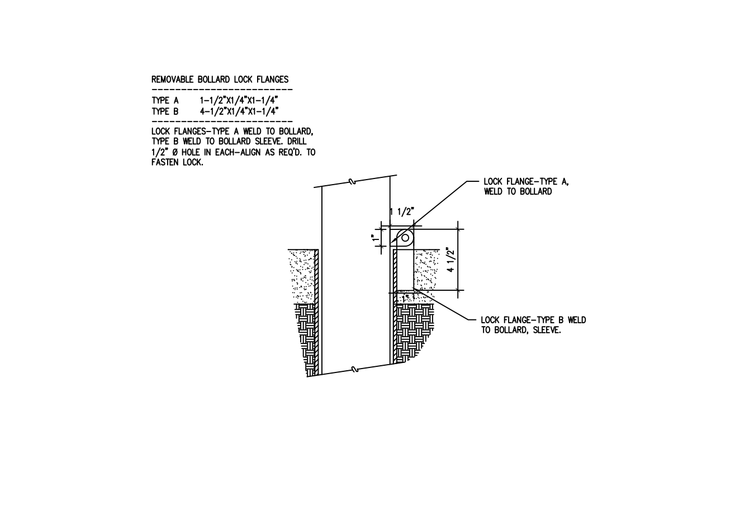



D REMOVABLE BOLLARD 1/2"=1'-0"

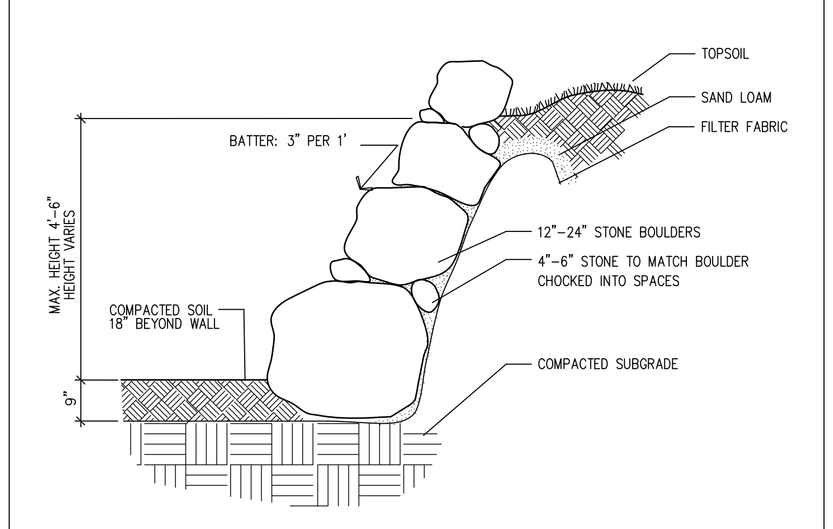



E 12" CONCRETE BAND AND BOLLARDS NTS



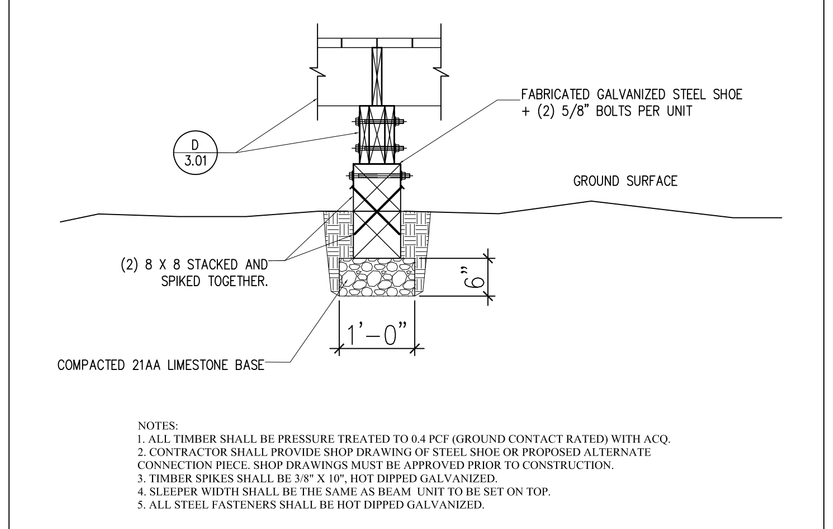



F REMOVABLE BOLLARD LOCK FLANGE 1 1/2"=1'-0"



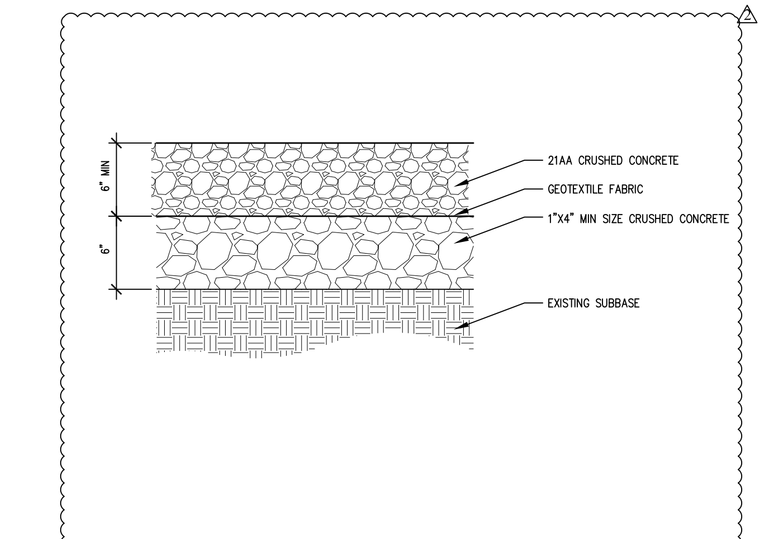

G BOULDER RETAINING WALL NTS



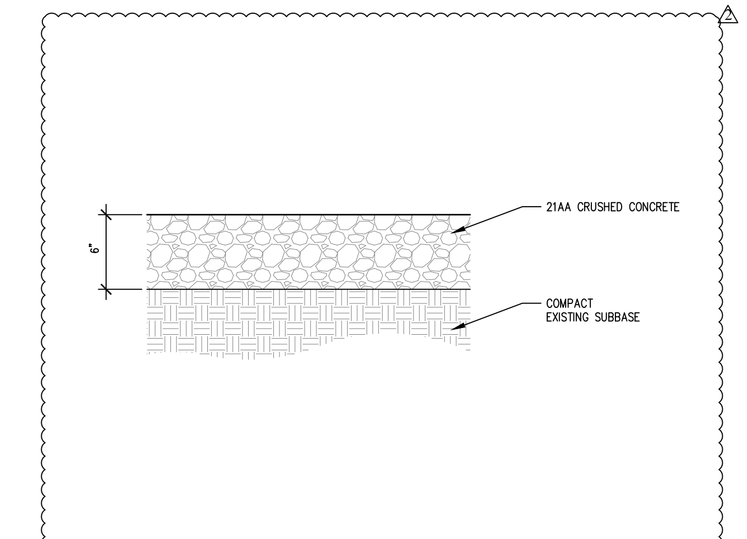



NOTES:
1. ALL TIMBER SHALL BE PRESSURE TREATED TO 0.4 PCF (GROUND CONTACT RATED) WITH ACQ.
2. CONTRACTOR SHALL PROVIDE SHOP DRAWING OF STEEL SHOE OR PROPOSED ALTERNATE CONNECTION PIECE. SHOP DRAWINGS MUST BE APPROVED PRIOR TO CONSTRUCTION.
3. TIMBER SPIKES SHALL BE 3/8" X 10", HOT DIPPED GALVANIZED.
4. SLEEPER WIDTH SHALL BE THE SAME AS BEAM UNIT TO BE SET ON TOP.
5. ALL STEEL FASTENERS SHALL BE HOT DIPPED GALVANIZED.

H BOARDWALK SLEEPER NTS




I CRANE PAD NTS




J CONSTRUCTION ACCESS DRIVE NTS

Landscape Architect:
Conservation Design Forum
375 West First Street
Elmhurst, Illinois 60126
630.559.2000 Phone
630.559.2030 Fax
www.cdfinc.com

Structural Engineer:
Fitzpatrick

Survey:
Washtenaw Engineering Company, Inc.

Client:
Washtenaw County

Washtenaw County River Terrace Trail
Details

Issue/Revision

2 ADDENDUM 2 10/24/2011
1 ADDENDUM 1 10/19/2011

Status
Drwn by:JJ/RVW/BO
Chkd by: PJ

Date 09-21-2011
Job No. 10015.01

L-3.02

# SPECIAL PROVISION
# FOR
# TYPE B MICROPILE CONSTRUCTION - LRFD

**a. Description.** Furnish, install, and test Type B micropiles of the resistance, and to the dimensions shown on the plans. Design the grout mix. Design, furnish, install and remove load testing apparatuses. Complete this work in accordance with the standard specifications, except as modified herein.

Examine the plans and visit the site prior to bidding the work in order to assess the site geometry, equipment access conditions, subsurface conditions, location of existing structure(s), overhead restrictions and any other factors which may influence the bid.

1. Contractor Qualifications. No micropile construction can begin until the Engineer has approved the Contractor's qualifications.

A. Documented experience with at least 5 projects performed within the last 5 years involving at least 100 micropiles.

B. Documented experience in micropile drilling and grouting in subsurface conditions similar to the project site.

C. Documented experience of the Contractor's supervisor, on-site foreman, and drill rig operators, who are employed by the Contractor or specialty subcontractor and who have experience with at least 3 projects within the last 5 years that had subsurface conditions similar to the project site.

2. Definitions. The following definitions apply to this work:

**Alignment Load (AL).** A small load applied to a micropile during testing to keep the testing equipment correctly positioned.

**Apparent Free Micropile Length.** The length of the pile that is not bonded to the surrounding ground, as calculated from the elastic load extension data during testing.

**Bond Breaker.** A sleeve or coating placed over the bar reinforcement to prevent load transfer.

**Bond Length.** The length of the pile that is bonded to the surrounding ground and which is used to transfer the applied axial loads to the surrounding ground.

**Casing.** The steel pipe introduced during the drilling process to temporarily stabilize the drill hole. Depending on the details shown on the plans, the casing may be fully extracted during or after grouting; or may remain partially or completely in place permanently as part of the file pile.

**Centralizer.** A device used to centrally locate the bar reinforcement within the drill hole.

**Core Steel.** Reinforcement bars used to strengthen or stiffen the pile, excluding any casing left in place.

**Corrosion Inhibiting Compound.** Material used to protect against corrosion and/or lubricate the reinforcement inside a bond breaker.

**Coupler.** The means by which the load can be transmitted from one partial length reinforcement to another.

**Creep Movement.** The movement that occurs during a creep test of a micropile under a constant load.

**Duplex Drilling.** A drilling system involving the simultaneous advancement of inner drill rod and outer drill casing. Flush from the inner drill rod is permitted to exit the drill hole via the annulus area between the drill rod and casing.

**Elastic Movement.** The recoverable movement measured during a micropile test.

**Encapsulation.** A corrugated tube protecting the reinforcement against corrosion.

**Free (Unbonded) Length.** The designed length of the micropile that is not bonded to the surrounding ground or grout during testing.

**Micropile.** A small diameter, bored, cast-in-place pile, in which most of the applied load is resisted by the reinforcement.

**Nominal Resistance ($R_n$).** The theoretical ultimate resistance of the micropile. The nominal resistance is shown on the plans. The nominal resistance is the resistance on which the load tests are based.

**Overburden.** Non-lithified material, natural or placed, which normally requires cased drilling methods to provide an open borehole to underlying strata.

**Plunge Length.** Transition zone between the upper cased section and the uncased portion of bond length.

**Preloading.** The principle whereby load is applied to the micropile, prior to the micropiles's connection to the structure, to minimize any structural movement in service.

**Primary Grout.** Portland cement based grout that is injected into the micropile hole prior to or after the installation of the reinforcement to provide the load transfer to the surrounding ground along the micropile and affords a degree of corrosion protection in compression.

**Production Pile.** A micropile constructed for use in the final structure.

**Proof Load Test.** Incremental loading of a production pile, recording the total movement at each increment.

**Reinforcement.** The steel component of the micropile which accepts and/or resists applied loadings.

**Residual Movement.** The non-elastic (non-recoverable) movement of a micropile measurement during load testing.

**Single Tube Drilling.** The advancement of a steel casing through overburden usually aided by water flushing through the casing. Also known as “external flush”. The fluid may or may not return to the surface around the casing, depending largely on the permeability of the overburden.

**Spacer.** A device to separate elements of multiple element reinforcement.

**Tremie Grouting.** The placing of grout in a borehole via a grout pipe introduced to the bottom of the hole. During grouting, the exit of the pipe is kept at least 10 feet below the level of the grout in the hole.

**Type B Micropile.** A micropile constructed by injecting a neat cement grout under pressure (typically 40 to 150 psi) into the drilled hole while the drill casing is withdrawn.

**Verification Load Test.** A micropile load test performed to verify the micropile nominal resistance based on the construction methods proposed. Verification load tests are performed on non-production piles, prior to installation of production piles.

**b. Materials.**

1. Water. Use water conforming to ASTM C 94.

2. Admixtures. Use admixtures conforming to ASTM C 494.

3. Cement. Use Type I, Type III Portland cement conforming to ASTM C150 from one manufacturer.

4. Fine Aggregate. Use sand conforming to AASHTO M 45.

5. Reinforcement. Bend tests for the epoxy coating are not required. Use solid epoxy coated deformed steel reinforcing bars conforming to ASTM A615 Grade 75 (Fy=75 ksi), as shown on the plans. When a bearing plate and nut are required to be threaded onto the top end of reinforcing bars for the pile top to footing anchorage, the threading may be continuous spiral deformed ribbing provided by the bar deformations (e.g. Dywidag or Williams continous threadbars or approved equal) or may be cut into a reinforcing bar. If threads are cut into a reinforcing bar, the next larger bar number designation from that shown on the plans must be provided, at no additional cost. Bar tendon couplers, if required, must develop the ultimate tensile strength of the bars without any evidence of failure.

6. Permanent Casing. Use steel pipe conforming to ASTM A 252, Grade 3 with a yield strength not less than 80 ksi and a minimum elongation of 15 percent. Threaded casing joints must develop at least the required nominal resistance used in the design of the micropile.

7. Structural Steel. Use structural steel conforming to ASTM A992 Grade 50 for shapes, ASTM A36 for plates, angles, and channels.

8. Centralizers. Use schedule 40 PVC pipe or tube, or epoxy coated steel conforming to subsection 905.03.C of the Standard Specifications for Construction, or other materials that are not detrimental to the steel reinforcement and permanent casing. Do not use wood. Centralizers and spacers must be securely attached to the reinforcement; sized to position the reinforcement within 1/2 inch of plan location from center of pile and sized to allow grout to freely flow up the drillhole and casing and between the spacers and reinforcing bar.

9. Couplers. Use steel reinforcement couplers, meeting the approval of the Engineer that can develop the ultimate tensile strength of the steel reinforcement without evidence of failure.

10. Grout Protection. Provide a minimum of 1 inch grout cover over bare or epoxy coated bar and minimum of 1/4 inch grout cover over bar couplers.

**c. Construction.**

1. Equipment. Use duplex equipment and methods to provide a fully cased drill hole over the entire specified minimum length of micropile without advancing the inner drill beyond the temporary casing and without using air as a flushing medium. Use pressure grouting equipment capable of grouting the bonded zone at grouting pressures not less than 50 psi. Use equipment suitable for drilling through the conditions encountered without causing damage to any overlying or adjacent structures, utilities, services or ground.

Use equipment capable of producing grout that is free of lumps and undispersed cement. Equip the grout pump with a pressure gauge to monitor grout pressures. Use a second pressure gauge at the point of injection at the top of the micropile. Pressure gauges must be capable of measuring pressures not less than 150 psi or twice the actual grout pressures, whichever is greater. Size grouting equipment to enable micropiles to be grouted in one continuous operation.

2. Submittals. Submit 5 copies of items A through C below, to the Engineer not less than 21 calendar days prior micropile construction. Submit 5 copies of items D through G below, to the Engineer not less than 21 calendar days prior to load testing or incorporation of the respective materials into the work. Allow 14 calendar days to review a submittal after it has been received. Additional review time necessary due to incomplete or unacceptable submittals is not cause for a claim for additional time or compensation. All costs and delays associated with incomplete or unacceptable submittals will be borne by the Contractor.

A. Installation plan that includes a step-by-step description of the proposed micropile construction procedure including drilling equipment, drilling methods, casings, flushing medium, grouting methods, personnel, testing and testing equipment to ensure quality control. Include the step-by-step to ensure quality control. Include step by step procedure on the working drawings in sufficient detail to allow the Engineer to monitor and validate the construction and proposed start date and micropile installation schedule.

B. Information on headroom and space requirements for installation equipment to verify that the proposed equipment can perform at the site.

C. Detailed description of proposed management procedures for the control and disposal of excess surface water, drill flush, grout and any resultant product of the micropile installation. Do not excavate flush pits at or below the floodplain.

D. Certified mill test reports for bar reinforcement and permanent casing, or coupon test results for permanent casing without mill certification. Include ultimate strength, yield strength, elongation, and material properties composition with the reports.

E. Grouting Plan. Provide complete descriptions, details and supporting calculations for:

(1) Grout mix design and type of materials to be used including certified test data and trial batch reports.

(2) Specific gravity of the grout mix.

(3) Methods and equipment for accurately monitoring and recording the grout depth, grout volume and grout pressure as the grout is being placed.

(4) Grouting rate calculations if requested by the Engineer. Base the calculations on the initial pump pressures or static head on the grout and losses throughout the placing system, including anticipated head of drilling fluid (if applicable) to be displaced.

(5) Estimated curing time for grout to achieve the required strength. Submit previous test results for the proposed grout mix. The test results must have been completed within 1 year of the start of grouting for initial verification load test. Test grout during production as specified herein.

(6) Procedure and equipment proposed for monitoring grout quality and consistency.

F. Detailed working drawings for the proposed micropile load testing. Include all drawings and details necessary to clearly describe the proposed test methods, reaction frame, reaction piles, system test load capacity, equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and pile top movements according to the load test requirements specified herein. Submit structural design calculations for all structural components of the test apparatus.

H. Calibration reports and data prepared by an independent testing laboratory within 90 calendar days of the date submitted for each test jack, pressure gauge, master pressure gauge, and electronic load cell to be used. Do not perform load testing until the Engineer has reviewed and accepted the calibration reports and data.

3. Fabrication.

A. Structural Steel. Fabricate footing connections meeting the details shown on the plans and in accordance with ACI 318.

B. Permanent Casing. Use casing with an outside diameter and wall thickness meeting the dimensions shown on the plans. Threaded casing joints must develop the nominal resistance of the pile cross-section strength. Threaded casing joints must be rigid enough to provide proper alignment so that no eccentricities or angles occur along the axis of the micropile. Do not use threaded casing joints within 20 feet of the pile cutoff. If welding of the casing is necessary, perform welding according to subsection 707.03 of the Standard Specifications for Construction.

C. Bar Reinforcement. When a bearing plate and nut (pile cap anchorage) are required to be threaded onto the top end of the reinforcement for the pile-to-footing connection, the threading shall be continuous spiral bar.

4. Installation.

A. Utilities. Field-verify the location of all utilities shown on the plans. Notify the Engineer of any utility locations different than what is shown on the plans that may require micropile relocations or structure design modifications. Additional costs due to micropile relocation and/or structure design modifications resulting from utility locations different than what is shown on the plans will be paid for extra work.

B. Excavation. Coordinate the work and excavations so that the micropiles are safely constructed. Do not excavate slopes steeper than those shown on the plans. Do not perform excavations above or below the micropiles without approval from the Engineer.

C. Site Drainage Control. Control and properly dispose of drill flush, excess grout and any other construction related waste according to the *Natural Resources and Environmental Protection Act, 1994 PA 451, Part 115 – Solid Waste Management and Part 31 – Water Resources Protection* and all other applicable regulations. Repair damage caused by construction activity and waste at no additional cost to the Owner. Immediately notify the Engineer if unanticipated existing subsurface drainage structures are discovered during excavation or drilling. Suspend work in these areas until remedial measures, meeting the approval of the Engineer, are implemented. The remedial measures or repair work resulting from encountering unanticipated subsurface drainage structures will be paid for as extra work.

D. Tolerances. Install micropiles with a variation of not more than 2 percent of total length from the vertical or batter line shown on the plans. After installation, the position of each micropile must be within 3 inches of the position shown on the plans. However, the distance between the edge of all micropiles and the outline of the superimposed concrete must not be less than 9 inches.

Cut off the micropiles normal to the longitudinal axis of the pile and within 1 inch of the elevation specified on the plans. Install core steel within 0.5 inches of the location shown on the plans.

E. Drilling. Select a duplex drilling method that does not cause distress to existing structures. The selected method must not compromise in situ ground conditions, the grouting procedure, and the grouting pressure used. Estimate the grout take. No additional compensation will be given for gout overruns. Do not use drilling fluid containing bentonite.

The drill hole must be open along its full length to at least the minimum hole diameter shown on the plans prior to placing grout and reinforcement. Use casing to support the pile drill hole from caving. Prevent detrimental ground movements. Detrimental ground movement is defined as ground movement which requires remedial repair measures at any time. Costs for remedial measures due to encountering unanticipated naturally occurring subsurface obstructions such as cobbles and boulders will be borne by the Contractor. Notify the Engineer if subsurface conditions vary from those shown on the plans at the bottom of the micropile.

F. Ground Heave or Subsidence. Monitor the conditions in the vicinity of micropile construction for signs of ground heave or subsidence. Notify the Engineer if signs of movements are observed and suspend construction, if directed by the Engineer. If the Engineer determines that the movements require corrective action, perform the necessary repairs to the site and damages to adjacent structure(s). Bear the cost of the corrective actions and repairs unless damages are a result of differing site conditions, as determined by the Engineer. Submit a description of modified construction methods to the Engineer for review, to avoid further heave, subsidence and damage to adjacent structures(s).

G. Placing and Splicing Bar Reinforcement. Place reinforcement prior to grouting or insert reinforcement into grout. Ensure that reinforcement is free from dirt and free from excessive rust, loose mill scale, or other foreign material when placed. When multiple reinforcing bars are used, ensure that they will not be damaged or disturbed during installation and grouting. If necessary, use larger diameter reinforcing bars than what is shown on the plans at no additional cost to the Department. Place centralizers and spacers at a spacing not exceeding 10 feet. Space the uppermost and lowermost centralizer not more than 5 feet from the top and bottom of the micropile. Centralizers and spacers must permit the free flow of grout without misalignment of the reinforcing bar(s) and permanent casing. Do not drive or force partially inserted reinforcement into the drill hole. Redrill and reinsert reinforcement, at no additional cost to Owner, when necessary to facilitate reinforcement placement. Secure splices in proper alignment and in manner to avoid eccentricities or angle between the axis of the two lengths to be spliced. When multiple reinforcing bars are used in a group, stagger the splices not less than 12 inches apart. Reinforcing bar splices must not be less than two

H. Grouting. Place the grout the same day when the bonded length is drilled. Use a stable neat cement grout or sand cement grout with a 28-day compressive strength not less than 5000 psi. If used, proportion admixtures according to the manufacturer's recommendations. Continuously agitate grout prior to placement. Place grout within 30 minutes of initial mixing. Inject grout from the lowest point of the drill hole and continue until uncontaminated grout flows from the top of the pile.

Inject grout under pressure as the temporary casing is withdrawn. Extract temporary casing in stages ensuring that after each length of casing is removed, the grout level is brought back up to the ground level before the next length is removed. The tremie pipe or casing must always extend below the level of the existing grout in the drill hole. Control grout pressures and grout takes to prevent excessive heave or fracturing of surrounding ground. The grout tube may remain in the hole upon completion of grouting if the grout tube is filled with grout.

I. Pile Cutoff. Do not use a torch to cut the casing to the cutoff elevation shown on the plans after grouting. Use a method of cutting that does not damage the grout inside the casing.

J. Installation Records. Submit full length/depth installation records for each micropile installed to the Engineer. Submit the records within 24 hours after each micropile installation is complete. Record data on a micropile installation log as shown on page 8-14 of Report Number FHWA-NHI-05-039 *Micropile Design and Construction Reference Manual*. Use a separate installation log for each micropile.

5. Testing.

A. Grout Testing. Do not perform verification or proof load tests until the grout in the micropile has been in place for 3 days and has attained a compressive strength not less than 3000 psi.

During installation of production piles, make three 2 inch grout cubes from each plant each day of operation or per every 10 piles, whichever occurs more frequently. Test the grout cubes according to AASHTO T 106. The compressive strength will be determined from the average of the compressive strengths of the three grout cubes.

Immediately prior to pile grouting, measure grout density according to AASHTO T 133 or API RP-13B-1. Conduct at least one grout density test per pile.

Submit compressive strength and density test results to the Engineer within 24 hours of testing. If requested by the Engineer, make and test additional cubes to verify the 3-day compressive strength test, at no additional cost to the Owner.

B. Micropile Testing. Perform verification and proof testing of micropiles according to ASTM D 1143, except as modified herein. Perform the testing under the direction of a Professional Engineer licensed in the State of Michigan. Summarize the test data in a report to be sealed by the Professional Engineer. Submit the report to the Engineer within 24 hours of each load test. Notify the Engineer in writing 3 working days prior to any load test.

Do not exceed 80 percent of the following micropile sDo not exceed 80 percent of the following micropile structural elements during load testing: steel yield in tension, steel yield in compression, steel buckling in compression, and grout compressive strength. Costs associated with increasing the strength of the verification test pile structural elements above the strength required for production piles will be borne by the Contractor.

(1) Testing Equipment and Data Recording. Testing equipment includes, but is not limited to: dial gauges, dial gauge supports, jack and pressure gauges, electronic load cell, reaction piles, and a reaction frame. The load cell is required only for the creep test portion of the verification test and proof test. Submit a written description of the load test setup and jack, pressure gauge and load cell calibration reports according to subsection c.2 herein. Design the testing reaction frame to be sufficiently rigid and of adequate dimensions to prevent excessive deformation of the testing equipment. Align the jack, bearing plates stressing anchorage such that unloading and repositioning of the equipment will not be required during the test. Apply the test load with a hydraulic jack and measure the load with a pressure gauge graduated in 50 psi increments or less. Use a jack and gauge with a pressure range not more than twice the anticipated maximum test pressure. Select a jack with ram travel sufficient to allow the test to be performed without repositioning during the test. Monitor the creep test load hold during verification tests and proof tests with both the pressure gauge and the electronic load cell. Use the load cell to accurately maintain a constant load hold during the creep test load hold increment of the verification test. Measure the pile top movement with a dial gauge capable of measuring to 0.001 inch and a travel sufficient to allow the test to be performed without having to reset the gauge. Align the gauge to be parallel to the axis of the micropile. Support the gauge independent from the jack, pile or reaction frame. Use a minimum of four dial gauges when the test setup requires reaction against the ground or reaction piles on each side of the test pile. Record the load test data.

(2) Verification Load Testing. Perform a pre-production verification load test to verify that the design of the micropile and the construction methods used to the install the micropile. Do not use production piles as reaction piles during load tests. Unless otherwise specified on the plans, install one sacrificial verification test pile per structure. Install verification test piles at locations approved by the Engineer. The verification micropile must be identical to those used in production and installed using the same methods to be used for installing production piles.

Do not locate reaction piles closer than 5 feet to the verification pile. Reaction piles must meet the approval of the Engineer. Perform verification load tests by incrementally loading the micropile in compression according to Table 1. Depending on performance, the Engineer will determine whether a 10 minute or a 60 minute creep load hold is appropriate. If the pile top movement measured between 1 and 10 minutes exceeds 0.04 inches, maintain an additional 50 minutes of load hold during the creep test. Record pile top movements during each hold period at time intervals of 1, 2, 3, 4, 5, 6, 10, 20, 30, 50, and 60 minutes. Reset dial gauges to zero after the initial alignment load (AL) is applied. The acceptance criteria for micropile verification load tests are:

(a) Failure of the test pile does not occur before the maximum test load is applied. Failure is defined as the lesser of:

(i) The slope of the load versus deflection curve (at the end of the load increment) exceeds 0.026 inch/kip, or

(ii) Where attempts to further increase the test load simply results in continued pile movement.

(b) Test pile supports the nominal resistance ($R_n$) with not more than 0.50 inches of total vertical movement at the top of the pile from its position prior to testing.

(c) At the end of the creep test load period, a creep rate not greater than 0.04 inch/log cycle time (1 to 10 minutes) and not greater than 0.08 inch/log cycle time (6 to 60 minutes or the last log cycle if held longer) and linear or decreasing creep rate.

The Engineer will provide written approval or rejection of the micropile design and construction techniques with 7 working days of the completion of the verification load test.

Verification piles constructed using methods different from the methods submitted for production piles will be rejected and additional verification test pile(s) will be required at no additional cost to the Owner. If the verification pile fails to meet the acceptance criteria, the Engineer may modify the design of the production piles, or require the Contractor to make modifications to the construction methods, or both. Modifications may include, but not be limited to, modifying the installation methods, increasing the bond length, or changing the micropile type. Any modification to the construction procedure that necessitates changes to the structure requires the Engineer's review and approval.

Do not install production piles until the verification load test results have been reviewed and accepted by the Engineer. At the completion of verification testing, remove testing equipment and remove test piles and reaction piles to an elevation directed by the Engineer.

**Table 1 Verification Load Test Schedule**

| Step | Load (a)(b) | Hold Time, minutes | Step | Load (a)(b) | Hold Time, minutes |
|---|---|---|---|---|---|
| 1 | AL | - | 19 | AL | 1 |
| 2 | 0.10 $R_n$ | 3 | 20 | 0.10 $R_n$ | 1 |
| 3 | 0.20 $R_n$ | 3 | 21 | 0.20 $R_n$ | 1 |
| 4 | 0.30 $R_n$ | 3 | 22 | 0.30 $R_n$ | 1 |
| 5 | AL | 1 | 23 | 0.40 $R_n$ | 1 |
| 6 | 0.10 $R_n$ | 1 | 24 | 0.50 $R_n$ | 1 |
| 7 | 0.20 $R_n$ | 1 | 25 | 0.60 $R_n$ | 1 |
| 8 | 0.30 $R_n$ | 1 | 26 | 0.70 $R_n$ | 1 |
| 9 | 0.40 $R_n$ | 3 | 27 | 0.80 $R_n$ | 3 |
| 10 | 0.50 $R_n$ | 3 | 28 | 0.90 $R_n$ | 3 |

| | | | | | |
|---|---|---|---|---|---|
| 11 | AL | 1 | 29 | 1.00 $R_n$ | 10 |
| 12 | 0.10 $R_n$ | 1 | 30 | 0.75 $R_n$ | 5 |
| 13 | 0.20 $R_n$ | 1 | 31 | 0.50 $R_n$ | 5 |
| 14 | 0.30 $R_n$ | 1 | 32 | 0.25 $R_n$ | 5 |
| 15 | 0.40 $R_n$ | 1 | 33 | Al | 5 |
| 16 | 0.50 $R_n$ | 1 | | | |
| 17 | 0.60 $R_n$ | 3 | | | |
| 18 | 0.70 $R_n$ | 10 OR 60 (creep test) | | | |
| a. $R_n$ denotes nominal resistance.<br>b. AL denotes alignment load. AL is equal to 0.025 $R_n$ | | | | | |

(3) Proof Load Testing of Production Micropiles. Unless otherwise specified on the plans, perform proof load tests on one production pile per substructure unit or five percent of the production piles, whichever is greater. Do not install other production piles, except those designed for proof load testing, until the proof load test results have been reviewed and accepted by the Engineer. Repair damage to production proof load tested piles at no additional cost to the Owner.

Perform proof load tests by incrementally loading the micropile in compression according to Table 2. Depending on performance, the Engineer will determine whether a 10 minute or a 60 minute creep load hold is appropriate. If the pile top movement measured between 1 and 10 minutes exceeds 0.04 inches, maintain an additional 50 minutes of load hold during the creep test. Record pile top movements during each hold period at time intervals of 1, 2, 3, 4, 5, 6, 10, 20, 30, 50, and 60 minutes. Reset dial gauges to zero after the initial alignment load (AL) is applied. The acceptance criteria for micropile verification load tests are:

(a) Failure of the test pile does not occur before the maximum test load is applied. Failure is defined as the lesser of:

(i) The slope of the load versus deflection curve (at the end of the load increment) exceeds 0.026 inch/kip, or

(ii) Where attempts to further increase the test load simply results in continued pile movement.

(b) Test pile supports the maximum test load with not more than 0.50 inches of total vertical movement at the top of the pile from its position prior to testing.

(c) At the end of the creep test load period, a creep rate not greater than 0.04 inch/log cycle time (1 to 10 minutes) and not greater than 0.08 inch/log cycle time (6 to 60 minutes or the last log cycle if held longer) and linear or decreasing creep rate.

If proof-tested micropile fails to meet the acceptance criteria, proof test another micropile

within the same substructure unit as designated by the Engineer. For the failed piles and the construction of the remaining production piles, modify the construction methods. Modifications may include, but not be limited to, installing replacement piles, incorporating piles at not more than 50 percent of the maximum test load attained, post grouting, modifying installation methods, increasing the bond length or changing micropile type. Any modification that necessitates changes to the structure design requires the approval of the Engineer. The cost of modifying construction methods, additional test piles, performing additional proof tests, and replacing production piles will be borne by the Contractor.

**Table 2 Proof Load Test Schedule**

| Step | Load (a)(b) | Hold Time, minutes |
|---|---|---|
| 1 | AL | - |
| 2 | $0.10R_n$ | 3 |
| 3 | $0.20R_n$ | 3 |
| 4 | $0.30R_n$ | 3 |
| 5 | $0.40R_n$ | 3 |
| 6 | $0.50R_n$ | 3 |
| 7 | $0.60R_n$ | 3 |
| 8 | $0.70R_n$ (Max. Test Load) | 10 or 60 (Creep Test Load Hold) |
| 9 | $0.55R_n$ | 3 |
| 10 | $0.40R_n$ | 3 |
| 11 | $0.25R_n$ | 3 |
| 12 | $0.10R_n$ | 3 |
| 13 | AL | 3 |

a. $R_n$ denotes nominal resistance.
b. AL denotes alignment load. AL is equal to $0.025R_n$

The following is a list of questions from specifications and drawings and answers from design team:

Sect – 12200 – Part 3 – are these items supposed to be in the bid schedule and how is a unit price provided?
NO, UNIT PRICE 1 AND UNIT PRICE NO. 2 ARE NOT TO BE INCLUDED ON THE BID SCHEDULE. PLEASE DISREGARD AT THIS TIME.

Sect – 13100 – will this be required
YES

Sect-13200 – will this be required
YES

Sect – 14000 – please clarify what testing the contractor is responsible for. In the more specific specification sections the following info is provided:

Section 31200 states by owner

Section 321216 is unclear

Section 321313 is unclear

Section 33000 states by owner
UNLESS SPECIFICALLY STATED THAT TESTING IS DONE BY THE OWNER, THE CONTRACTOR IS RESPONSIBLE FOR TESTING. THE CONTRACTOR DOES NEED TO PROVIDE A UNIT PRICE FOR THE LOAD TESTING OF MICROPILES AS PREVIOUSLY ADDED IN ADDENDUM 1.

TESTING IN ABOVE SECTIONS AS WELL AS TESTING LOAD PROOFS MAY ALSO BE OBSERVED (BUT NOT TESTED) BY A THIRD PARTY TESTING AGENCY, DETRMINED BY THE OWNER AND WILL BE THE RESPONSIBILITY OF THE OWNER.

Sect – 17419 – will this be required
YES

General:

-What permits are required and are provisions in the contract to allow for a delayed project due to permit delays?
THE OWNER HAS APPLIED FOR AND HAS APPROVED PERMITS FROM THE MDNR FOR CONSTRUCTION IN NATURAL RIVERS AND FOR CONSTRUCTION IN INLAND LAKES AND STREAMS (P.A. 346/P.A. 451 PT. 303). THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL ACCESS AND CONSTRUCTION RELATED PERMITS, WHICH MAY INCLUDE BUT IS NOT LIMITED TO RAILROAD ACCESS, COUNTY ROADS, SOIL EROSION AND SEDIMENTATION CONTROL, ETC.

-will other bridge manufactures be allowed?
ONE ADDITIONAL BRIDGE SUPPLIER HAS SUBMITTED MATERIAL FOR CONSIDERATION OF PRE-QUALIFICATION. THE DESIGN TEAM AND ITS REPRESNTATIVES ARE IN THE PROCESS OF REVIEWING MATERIAL AND IF PRE-APPROVAL IS APPROVED, INFORMATION WILL BE PROVIDED IN ADDENDUM 2.

-does the county understand the complexity and cost of micro piles? Also the environmental effects of constructing them in a wet land? This is a major concern.

IT HAS BEEN DETERMINED BY THE DESIGN TEAM THAT MICROPILES ARE THE BEST FOUNDATION SOLUTION FOR THIS PROJECT AND ARE LESS INTRUSIVE TO THE ENVIRONMENT THAN OTHER METHODS.

What are the design loads of the micropile under the boardwalk and under the bridge abutments. Are these axial loads in the piles? Are all lateral forces accounted for in the MP batter or is there a lateral force in the pile as well?

FACTORED LOADS AXIAL LOAD CAPACITY SHOWN IN THE SOILS REPORT FOR THE PILE BOND LENGTH WAS USED FOR THE DESIGN OF THE PILES. THE BATTERED PILES ARE DESIGNED TO TAKE OUT THE ENTIRE MAXIMUM LATERAL LOAD INDICATED ON THE CONTECH DRAWINGS. THE PILES WERE DESIGNED WITH AN ASSUMED LENGTH INTO GRADE (SCOUR DEPTH AS GRADE FOR THE ABUTMENT) TO ACHIEVE FIXITY OF THE PILE AND THEN EXTENDED ADDITIONAL LENGTH FOR BENDING RESISTANCE. PILES WERE CONSERVATIVELY ASSUMED TO BE PINNED AT THE PILE CAP. THE STEEL PILE CASING WAS USED TO RESIST BENDING ALONG WITH THE FULL AXIAL FORCE IN THE PILE ABOVE THE FIXITY DEPTH. THE SCOUR DEPTH ASSUMED BELOW THE ABUTMENT CAP WAS 1 FOOT WITH AN ADDITIONAL DISTANCE OF 6 FEET ASSUMED TO FIXITY OF THE PILE. THE MAX. BOARDWALK HEIGHT OF PILE ABOVE GRADE PROVIDED BY THE LANDSCAPE ARCHITECT WAS ABOUT 7 FEET AND AGAIN SIX FEET WAS ASSUMED FOR THE DEPTH BELOW GRADE TO FIXITY OF THE PILE AND ADDITIONAL 6 FEET WAS USED. THE FACTORED FORCES FOR EACH FACTORED LOAD CASE AT THE FIXITY POINT CAN BE FURNISHED IF DESIRED FOR BOTH THE ABUTMENT AND THE BOARDWALK. GEOTECH ENGINEER (SOMAT) PROVIDED FIXITY INFORMATION.

Confirm that two bridge abutments are to be supported as shown on L3.03

YES

Galvanizing pipe for micropiles is typically not done because the coating would be damaged during normal micropile installation processes. Please confirm that galvanization is only required of the top 6'-7" that is exposed for boardwalk micropiles. Please provide required galvanized length for bridge abutment micropiles.

THE EXPOSED LENGTH IS ADEQUATE. THE EXPOSED LENGTH OF THE ABUTMENT PILES WILL ONLY BE ABOUT ONE FOOT AFTER SCOUR BASED ON CURRENT INFORMATION. I DON'T THINK THAT GALVANIZING WOULD BE NEEDED IN THAT CASE.

Typically one or two sacrificial or production micropiles are load tested to confirm geotechnical design capacity. 48 load tests will be extremely cost prohibitive. In addition, testing of battered piles is more cumbersome. We would recommend one to three vertical piles be tension tested to confirm design capacity.

THE CONTRACTOR DOES NEED TO PROVIDE A UNIT PRICE FOR THE LOAD TESTING OF MICROPILES AS PREVIOUSLY ADDED IN ADDENDUM 1, BUT THE QUANTITY HAS BEEN CHANGED IN ADDENDUM 2 TO ONLY TEST 2, ONE UNDER EACH ABUTMENT.

the plan says we want 3x8 decking for the boardwalk. Did we mean 1x8? Trex doesn't make a 3x8????? Please include this with your responses.

DECKING IS 3X8 WOOD MATERIAL. TREX PRODUCTS WILL BE ONLY ON CURBS AND CAPS OF RAILINGS.