MEMORANDUM OF AGREEMENT
AMONG
THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
THE
MINNESOTA STATE HISTORIC PRESERVATION OFFICE
THE
FOND DU LAC BAND OF LAKE SUPERIOR CHIPPEWA
THE
CITY OF DULUTH
THE
THE UNITED STATES STEEL CORPORATION
AND
LAKE SUPERIOR MISSISSIPPI RAILROAD COMPANY
REGARDING THE SPIRIT LAKE SEDIMENT REMEDIATION PROJECT IN DULUTH, SAINT LOUIS COUNTY, MINNESOTA

WHEREAS, the United States Environmental Protection Agency (USEPA) plans to carry out the Spirit Lake Sediment Remediation Project (Project) pursuant to the Great Lakes Legacy Act (GLLA); and

WHEREAS, USEPA has determined that the Project, which consists of the remediation of contaminated sediment at Spirit Lake as described in **Attachment 1**, is an undertaking subject to the requirements of 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (NHPA), 54 USC § 306108; and

WHEREAS, the United States Army Corps of Engineers St. Paul District (USACE) may issue permits authorizing the discharge of dredged or fill material in conjunction with the Project pursuant to Section 404 of the Clean Water Act (Section 404), 33 USC §§ 1252-1376, as amended; and has determined that any permit for the Project is an undertaking subject to the requirements of Section 106 and 36 CFR Part 800; and, pursuant to 36 CFR § 800.2(a)(2), in May 2017, designated USEPA as the lead Federal agency for the Project to fulfill their collective responsibilities under Section 106; and

WHEREAS, pursuant to 36 CFR § 800.4(a)(1), USEPA, in consultation with the Minnesota State Historic Preservation Office (SHPO), has defined an area of potential effects (APE) for the Project as documented in **Attachment 2**; and

WHEREAS, pursuant to 36 CFR § 800.2(c)(2)(iii), upon initiation of the Section 106 consultation for the Project, USEPA invited the following federally recognized Native American tribes for which Spirit Island may have religious and cultural significance to consult regarding the proposed Project: Bad River Band of Lake Superior Chippewa, Bois Forte Band of Chippewa, Fond du Lac Band of Lake Superior Chippewa, Grand Portage Band of Lake Superior Chippewa, Leech Lake Band of Ojibwe, Mille Lacs Band of Ojibwe, Red Cliff Band of Lake Superior Chippewa, Red Lake Band of Chippewa Indians, and White Earth Nation; the Mille Lacs Band of Ojibwe and Fond du Lac Band of Lake Superior Chippewa (Fond du Lac Band) were the only

tribes to respond and the Fond du Lac Band was the only tribe to request to participate in this Memorandum of Agreement (Agreement); and

WHEREAS, USEPA, in consultation with the SHPO and the Fond du Lac Band, has completed field survey and evaluation efforts within the APE resulting in the identification of the following historic properties, all of which have been determined to be eligible for listing in the National Register of Historic Places (NRHP): the Morgan Park Residential Historic District, the Northern Pacific Railroad Historic District: Duluth Short Line Segment, the St. Paul and Duluth Railroad/Northern Pacific "Skally Line" Railroad Corridor Historic District, the Skyline Parkway: Bardon's Peak Segment, the Lake Superior and Mississippi Railroad Corridor Historic District: West Duluth Segment, and Spirit Island; and

WHEREAS, USEPA, in consultation with the SHPO, has found that the Project will have no adverse effect on the Morgan Park Residential Historic District, the Northern Pacific Railroad Historic District: Duluth Short Line Segment, the St. Paul and Duluth Railroad/Northern Pacific "Skally Line" Railroad Corridor Historic District, and the Skyline Parkway: Bardon's Peak Segment; and

WHEREAS, USEPA, in consultation with the SHPO and Fond du Lac Band, has found that the Project will have an adverse effect on the Lake Superior and Mississippi Railroad Corridor Historic District: West Duluth Segment (LSMRR Historic District) and Spirit Island, and has determined that the adverse effects to these historic properties cannot be avoided; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), USEPA has notified the Advisory Council on Historic Preservation (ACHP) of the adverse effect finding with specified documentation and the intent to develop and execute an Agreement to resolve the adverse effect, and the ACHP has chosen not to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

WHEREAS, USEPA has consulted with Fond du Lac Band regarding the effects of the undertaking on historic properties, and, because Fond du Lac Band has responsibilities under this Agreement, USEPA has invited Fond du Lac Band to sign this Agreement pursuant to 36 CFR § 800.6(c)(2); and

WHEREAS, USEPA has consulted with the United States Steel Corporation (U. S. Steel), the project partner, the City of Duluth, as owner of the LSMRR Historic District, and the Lake Superior and Mississippi Railroad Company (LSMRR Co), a 501(c)(3) organization which operates a passenger rail service utilizing the LSMRR Historic District, which contributes to its historic integrity, regarding the effects of the undertaking on historic properties, and, because all three of these entities have responsibilities under this Agreement, USEPA has invited U. S. Steel, Lake Superior Mississippi Railroad Co. and the City of Duluth to sign this Agreement pursuant to 36 CFR § 800.6(c)(2); and

WHEREAS, the City of Duluth and U. S. Steel have entered into an agreement, separate from this Agreement, regarding the funding for the implementation of **Stipulation IV. Public**

Interpretation; and

WHEREAS, any invited signatory who does not sign this Agreement does not retain any of the rights or duties of an invited signatory as set forth in the regulations at 36 CFR Part 800 or as set forth in this Agreement; and

WHEREAS, this Agreement has been developed pursuant to Section 106 of the NHPA, 54 USC § 306108; and

WHEREAS, USEPA has provided the public an opportunity to comment on the proposed Project and its effects on historic properties; and

NOW, THEREFORE, USEPA and the SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the adverse effect of the Project on historic properties and agree that USEPA's fulfillment of the undertaking in accordance with the following stipulations shall constitute and evidence USEPA's fulfillment of its obligations under Section 106 of the NHPA, 54 USC § 306108.

STIPULATIONS

USEPA shall ensure that the following measures are carried out:

I. FUNDING FOR SPIRIT LAKE MANAGEMENT PLAN

The signatories as named in each provision, will take the following actions to resolve the adverse effect to Spirit Island.

A. Fond du Lac Band has requested funding from USEPA in the amount of $600,000 for work that meets the requirements of the Great Lakes Restoration Initiative (GLRI) and the GLLA for the development and implementation of a Spirit Island Management Plan for habitat restoration and enhancement of cultural resources and a regional interpretive plan. The funding award was made through the regional interagency funding process for GLRI funds.

1. Fond du Lac Band will provide written acknowledgement of the receipt of funds within thirty (30) calendar days of receipt.

2. USEPA will provide written notification of the transfer of funds along with a copy of the Fond du Lac Band acknowledgment of receipt to the SHPO. This submission of notification will constitute fulfillment of **Stipulation I.**

II. ARCHIVAL DOCUMENTATION OF LAKE SUPERIOR AND MISSISSIPPI RAILROAD HISTORIC DISTRICT: WEST DULUTH SEGMENT

A. Prior to commencement of any Project-related work that has the potential to directly impact the LSMRR Historic District, USEPA will record the condition of the entire six-mile segment of the LSMRR Historic District that has been determined to be eligible for listing in the NRHP.

The historic property will be documented in accordance with the "Minnesota Historic Property Record Guidelines - Updated June 2009," Level I Documentation (MHPR Level I) standards as currently published. The documentation will be completed by an Architectural Historian meeting the Professional Qualification Standards in the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716).

1. In consultation with the LSMRR Co and the City of Duluth, USEPA will determine the scope of MHPR Level I photographic documentation for the LSMRR Historic District identifying appropriate perspectives and views of the unique, linear historic property with special attention to documentary images of the extent of the historic property and its overall setting as well as specific character-defining features, including those which are proposed to be significantly altered as part of the Project.

2. USEPA will provide the SHPO, the City of Duluth, and the LSMRR Co with a draft version of the MHPR Level I documentation for review and comment. The SHPO, the City of Duluth, and the LSMRR Co will have thirty (30) calendar days to review the draft MHPR Level I documentation. USEPA will take any comments of the SHPO, the City of Duluth, and the LSMRR Co into account in developing the final MHPR Level I documentation.

3. USEPA will provide a final archival set of the MHPR Level I documentation to the SHPO for incorporation into the Minnesota Historical Society's Manuscripts Collection. USEPA will submit a high-quality PDF of the final MHPR Level I documentation on an archival quality DVD to the LSMRR Co and the City of Duluth for their records. The SHPO will provide written acknowledgment of acceptance of the final MHPR Level I documentation within sixty (60) days of receipt. This acknowledgment will constitute fulfillment of **Stipulation II.**

III. RESTORATION AND REHABILITATION OF LSMRR TO OPERATIONAL CONDITION

A. USEPA will ensure that the Project is carried out in accordance with the results of the Project design-related consultation with the SHPO, City of Duluth, and LSMRR Co that took place during the summer and fall of 2019 as documented in the "Analysis of Design Impacts to the Lake Superior and Mississippi Railroad from the Spirit Lake Remediation Project," dated July 16, 2019 (**Attachment 3**).

B. Once the Project reaches a stage when it will no longer directly impact the LSMRR Historic District and operations of the LSMRR Co and rehabilitation of the Project impacted portion of the LSMRR Historic District (including the removal of temporary crossings) is complete, USEPA will provide written notification to the City of Duluth and the LSMRR Co.

    1. Upon receipt of USEPA's notification that rehabilitation work is complete, the City of Duluth and LSMRR Co will have ninety (90) days from the date of receipt to inspect the two mile segment of the Lake Superior and Mississippi Railroad affected as stated in the 2019 "Analysis of Design Impacts to the Lake Superior and Mississippi Railroad from Spirit Lake Remediation Project," including any revised Project plans subsequently reviewed pursuant to **Stipulation III.B**.

        i. Within the ninety (90) day review period, if the City of Duluth and/or the LSMRR Co identifies any deficiencies or issues with USEPA and U. S. Steel's implementation of the Project according to previous consultation, the City of Duluth and/or the LSMRR Co will provide written notice to USEPA describing the perceived deficiencies or issues.

            1. If the City of Duluth and/or LSMRR Co does not respond within the ninety (90) day review period and the SHPO is notified in writing of this lack of response, then this will constitute fulfillment of **Stipulation III.B**.

            2. USEPA will respond to the City of Duluth's and/or the LSMRR Co's identified deficiencies or issues within ninety (90) days of receipt of written comments. USEPA's response will include either a plan to remediate the deficiencies or issues or provide an explanation of why USEPA disagrees with the deficiencies or issues identified by the City of Duluth and/or the LSMRR Co.

            3. The submission of a response by USEPA to the City of Duluth and/or the LSMRR Co, and corresponding notification of this response to the SHPO will constitute fulfillment of **Stipulation III.B**.

IV. PUBLIC INTERPRETATION

A. The City of Duluth, in consultation with the USEPA, U. S. Steel, the LSMRR Co, the SHPO and Fond du Lac Band, shall prepare and implement a plan for interpretation (Plan) incorporating interpretation of the LSMRR Historic District and Spirit Island for the two mile segment of the LSMRR Historic District within the APE. The Plan shall be consistent with the City's Interpretive Plan for Waabizheshikana, The Marten Trail for the portion of

the St. Louis River waterfront which includes the property upon which the Project is located. The City's Interpretive Plan for Waabizheshikana, The Marten Trail Plan and the Plan shall be informed by the Waabizheshikana: The Marten Trail Mini-Master Plan for Parks and Recreation Commission (November 2019) or as amended. The City of Duluth shall ensure that the Plan will be reviewed by a qualified historian or architectural historian who meets the Secretary of the Interior's Professional Qualifications Standards (48 FR 44716).

1. Within two (2) years of the execution of this Agreement, the City of Duluth shall prepare a draft Plan including themes for interpretation, planned modes for delivering the interpretation, and draft text and graphics for each mode. Modes may include, but are not limited to, webpages; interpretive signage; walking tours; and integration of interpretive elements into the Project.

2. Prior to issuance of a draft Plan, the City of Duluth shall invite the signatories, invited signatories, and concurring parties to a consultation meeting to discuss the proposed Plan.

3. The City of Duluth shall distribute the draft Plan to the signatories, invited signatories, and concurring parties for a thirty (30) calendar day review and comment period.

4. Following receipt of, and in response to, comments from signatories, invited signatories, and concurring parties, the City of Duluth shall consider, incorporate as appropriate, and revise the draft Plan. If the City of Duluth chooses not to accept a comment by the signatories, invited signatories, and concurring parties, then the City of Duluth shall provide a written explanation to the appropriate signatories, invited signatories, or concurring party and consult, as appropriate, to seek resolution.

5. Upon approval of the final Plan as being consistent with the City of Duluth's Heritage Interpretative Plan, the City of Duluth shall submit the final Plan, to the signatories, invited signatories, and concurring parties for review and concurrence. If any of the signatories or invited signatories do not concur with the final Plan, they shall explain the grounds for their disagreement with the Plan in a letter to the City of Duluth and other signatories and invited signatories. Upon receiving such comments, USEPA shall consult with the appropriate party and the City of Duluth to resolve the dispute in accordance with **Stipulation XIV** of this Agreement.

6. Upon the signatories and invited signatories' concurrence or resolution of the dispute, the City of Duluth shall distribute the final Plan (if revised) to all parties to this Agreement.

7. Within two (2) years after fulfillment of **Stipulation III.B.,** the City of Duluth shall complete its implementation of the Plan. The City of Duluth shall notify all parties to this Agreement in writing upon completion of implementation. This notification

shall constitute fulfilment of **Stipulation IV**.

V. COORDINATION OF PROJECT SCHEDULE AND COMPENSATION FOR THE DISRUPTION OF LSMRR CO OPERATIONS

A. USEPA and U. S. Steel will coordinate with the City of Duluth and the LSMRR Co regarding the construction schedule of the Project at least sixty (60) days before initial Project construction activities begin in order to determine whether the disruption to LMSRR Co operations can be minimized. USEPA and U. S. Steel will provide an updated Project construction schedule to LSMRR Co by January 15 of each subsequent year.

1. USEPA and U. S. Steel will make a good faith effort to reduce disruption to LSMRR Co operations, although the parties agree that it is likely that such disruptions will occur due to the nature of the Project.

    i. USEPA and U. S. Steel retain final authority on approval of the Project schedule even if the schedule will impact LSMRR Co operations.

    ii. USEPA and U. S. Steel will notify, with as much lead time as possible, the LSMRR Co of any schedule changes that occur during Project construction that could impact LSMRR Co operations.

2. The LSMRR Co will make a good faith effort to operate during times identified by USEPA and U. S. Steel as “safe to operate” through the Project area.

B. U. S. Steel will provide up to $45,000 dollars per calendar year to the LSMRR Co for each year that the Project impacts LSMRR Co’s operations.

1. Each year, U. S. Steel, in consultation with LSMRR Co, will determine Project impacts to LSMRR Co operations within sixty (60) days after the LSMRR Co operating season. Compensation for years in which the LSMRR Co operates in a limited capacity due to project impacts may be commensurately reduced.

2. U. S. Steel will provide this compensation by making a payment of 25% of the compensation amount by July 1, a payment of 25% of the compensation amount by September 1, and a final payment of the remaining 50% of the compensation amount reflecting any adjustments due to changes in scheduling by November 30 of each year that operations are impacted.

    i. The LSMRR Co will provide written acknowledgement to U. S. Steel within thirty (30) days of receipt of funds and send a copy of this acknowledgement to USEPA.

3. Upon the fulfilment of **Stipulation III.B.,** U. S. Steel shall notify USEPA, the LSMRR Co, and the SHPO in writing that it will no longer provide compensation funds.

    i. If **Stipulation III.B**. is anticipated to be completed before the LSMRR Co. operating season, by 15 January U. S. Steel shall notify USEPA, the LSMRR Co, and the SHPO in writing that no compensation will be provided for that operating season or in the future. This shall constitute fulfillment of **Stipulation V.B.**

    ii. If **Stipulation III.B**. is anticipated to be completed during the LSMRR Cooperating season, U. S. Steel will consult with the LSMRR Co about the appropriate compensation for that operating season. U. S. Steel will provide the appropriate compensation for that operating season and shall so notify LSMRR Co, the SHPO and USEPA. This shall constitute fulfillment of **Stipulation V.B.**

C. The LSMRR Co. requires access for track crews and equipment into the Project site to conduct maintenance and repair work on the right of way. Access may be made from the east and west to avoid closed sections of the track. Time and duration of this access will be scheduled to be acceptable among USEPA, U. S. Steel, and the LSMRR Co.

VI. DRAFT NATIONAL REGISTER REGISTRATION FORM FOR THE LAKE SUPERIOR AND MISSISSIPPI RAILROAD HISTORIC DISTRICT: WEST DULUTH SEGMENT

A. Within 270 days of the execution of this Agreement, USEPA, in consultation with the LSMRR Co, the SHPO and the City of Duluth, shall prepare a draft NRHP Registration form for the LSMRR Historic District.

1. The draft NRHP Registration form shall be prepared by a historian and/or architectural historian who meets the Secretary of the Interior's Professional Qualification Standards (48 FR 44716) for history and/or architectural history.

2. USEPA will provide the SHPO, the City of Duluth, and the LSMRR Co a draft version of the NRHP Registration form for review and comment. The SHPO, the LSMRR Co and the City of Duluth will have sixty (60) calendar days to review the draft NRHP Registration form. USEPA will take any comments of the SHPO, the LSMRR Co, and the City of Duluth into account when revising the draft NRHP Registration form.

3. USEPA will submit a high-quality PDF and Microsoft Word version of the revised draft NRHP Registration form to the SHPO, the City of Duluth, and the LSMRR Co

on CD/DVD. The SHPO, the LSMRR Co, and the City of Duluth will provide written acknowledgment of receipt of the revised draft NRHP Registration form within sixty (60) days of receipt. This acknowledgment will constitute fulfillment of **Stipulation VI.**

4. Submission of the NRHP Registration form for actual nomination of the LSMRR Historic District to the NRHP is outside the scope of this Agreement.

VII. CONTRACTORS

USEPA and U. S. Steel will ensure any contractors working on the Spirit Lake Sediment Remediation Project adhere to the requirements of this Agreement.

VIII. CONFIDENTIAL INFORMATION

Certain information regarding the Project or the cultural resources or historic properties within the APE may be private (e.g., archaeological resource locations) or may be considered confidential under applicable law. USEPA, U. S. Steel, and associated contractors will share such information with only the Project archaeologists, the SHPO, and affected signatory, invited signatory or consulting party, unless the affected signatory, invited signatory, or consulting party agrees to release the information more widely or is required to release such information under applicable law (e.g. the Minnesota Government Data Practices Act, Minn. Stat. 13 or the Freedom of Information Act, 5 U.S.C. § 552), court order, or appropriate discovery requests. If USEPA or U. S. Steel obtains information it suspects to be private or confidential, the party will consult with the SHPO or affected signatory, invited signatory, or consulting party, unless no affected signatory, invited signatory, or consulting party is known, in which case USEPA will consult with ACHP. Any signatory who becomes aware it has received private or confidential information that it is not authorized to receive or that was sent or may have been sent in error is requested to notify the sender immediately and to protect such information from disclosure to the extent permitted under applicable law.

IX. ANTI-DEFICIENCY ACT

A. USEPA's obligations under this Agreement are subject to the availability of appropriated funds and the stipulations of this Agreement are subject to the provisions of the Anti-Deficiency Act. USEPA will make reasonable and good faith efforts to secure the necessary funds to implement this Agreement in its entirety. If compliance with the Anti-Deficiency Act alters or impairs USEPA's ability to implement the stipulations of this Agreement, USEPA will consult in accordance with the amendment and termination procedures found at **Stipulations XVI** and **XIX** below.

B. U. S. Steel's obligations under this Agreement are subject to and conditioned upon the undertaking being carried out. In the event the undertaking is not carried out, U. S. Steel shall not be obligated to perform its obligations as set forth in this Agreement. The conditions and requirements for the undertaking itself are set forth in separate Agreements

or other documents. This conditional limitation does not waive any obligations that U. S. Steel otherwise may have under any applicable laws or other Agreements.

X. DURATION

This Agreement will expire if its terms are not carried out within ten (10) years from the date of its execution. Prior to such time, USEPA may consult with the other signatories and invited signatories to reconsider the terms of the Agreement and amend it in accordance with **Stipulation XVI** below.

XI. MONITORING AND REPORTING

Each year following the effective date of this Agreement until it expires, is fulfilled, or is terminated, USEPA will provide all signatories, invited signatories, and concurring parties to this Agreement a summary report detailing work undertaken pursuant to its terms. Such report will include any scheduling changes proposed, any problems encountered, and any disputes and objections received in USEPA's efforts to carry out the terms of this Agreement. Copies of this report will be provided to the point of contacts specified in **Stipulation XVIII** below.

XII. UNEXPECTED DISCOVERIES

A. If suspected historic properties, including sites that contain human remains, unidentified animal bone, or mortuary objects, are discovered during implementation of the Project, all activities shall cease within one hundred (100) feet of the discovery to avoid and/or minimize harm to the historic property.

1. USEPA and U. S. Steel shall include in construction contracts a requirement for the Construction Contractor(s) to immediately notify USEPA and U.S. Steel of any discovery of this type and implement interim measures to protect the discovery from damage, looting, and vandalism. Measures may include, but are not limited to, protective fencing, covering of the discovery with appropriate materials, and/or posting of security personnel.

2. Once notified of the discovery, USEPA and U.S. Steel shall immediately notify the SHPO, as well as other invited signatories and concurring parties. When appropriate, USEPA shall notify any tribes that may attach religious and cultural significance to the property. The Contractor shall provide access to Consulting Parties and law enforcement to the site and shall not resume work within the area until notified by USEPA.

B. If any suspected human remains are encountered, USEPA and U. S. Steel shall also follow the requirements of Minnesota Statute (MS) § 307.08 and immediately notify local law enforcement and the Office of the State Archaeologist (OSA), the lead state agency for authentication of burial sites on non-federal and non-tribal lands.

1. In accordance with MS § 307.08, the OSA has the final authority in determining if the remains are human and to ensure appropriate procedures are carried out in accordance with the statute. Avoidance and preservation in place is the preferred option for the treatment of human remains. In accordance with MS § 307.08(3), OSA is required to coordinate with the Minnesota Indian Advisory Council (MIAC) if the remains or associated burial items are thought to be American Indian. USEPA and U. S. Steel shall work with OSA and MIAC to develop and implement a reburial plan, if that is the approach preferred as determined in accordance with MS § 307.08.

C. USEPA and U. S. Steel shall contract with a Secretary of the Interior-Qualified Professional to evaluate the newly discovered property for eligibility for listing in the NRHP. For discovered properties with suspected human remains, the consulting archaeologist must coordinate the evaluation with the OSA's authentication of the burial. In lieu of a consultant's recommendation, USEPA and U. S. Steel may assume a property is eligible for listing in the NRHP following consultation with, or based on input from, the SHPO, invited signatories, and consulting Parties. When applicable, USEPA shall also engage in consultation with interested tribes in relation to discovery of any properties that may have religious or cultural significance to a tribe(s).

1. If USEPA determines that the property does not meet NRHP criteria and the SHPO concurs, construction activities can resume upon receipt of written concurrence with the eligibility determination by the SHPO and after completion of activities required under Paragraph B of this stipulation, if applicable.

2. For all properties determined eligible for the NRHP, USEPA shall make a finding of effect, including resolving any adverse effects through identification of appropriate mitigation through consultation with the SHPO, and subsequent development and implementation of an appropriate mitigation plan agreed to in writing. In addition to the requirements in those stipulations, construction activities may resume after completion of activities required under Paragraph B of this stipulation, if applicable.

XIII. EMERGENCY SITUATIONS AND EMERGENCY ACTIONS

A. Should an emergency situation occur that represents an imminent threat to public health or safety or creates a hazardous condition, USEPA or U. S. Steel will immediately notify the City of Duluth, the SHPO, the ACHP and the other signatories of the condition that has initiated the situation and the measures taken to respond to the emergency or hazardous condition.

Should the City of Duluth, the SHPO or the ACHP or another signatory desire to provide technical assistance, to USEPA or U. S. Steel, the party desiring to provide the assistance will submit comments within seven (7) calendar days from notification, if the nature of

the emergency or hazardous condition allows for such coordination.

B. Emergency actions are those actions deemed necessary by USEPA as an immediate and direct response to an emergency, which is a disaster or emergency declared by the President, tribal government, or the governor of the state, or other immediate threats to life or property. Emergency actions under this Agreement are only those implemented within thirty (30) calendar days from the initiation of the emergency.

C. If the emergency action has the potential to affect historic properties, USEPA will notify the SHPO, interested Indian tribes, City of Duluth and other parties as appropriate prior to undertaking the action, when feasible. As part of the notification, USEPA will provide a plan to address the emergency. The City of Duluth, SHPO and other parties will have seven (7) calendar days to review and comment on the plan to address the emergency. If the SHPO and other parties do not comment or object to the plan within the review period, USEPA and/or U. S. Steel will implement the proposed plan.

D. If USEPA and/or U. S. Steel is unable to consult with the SHPO, the City of Duluth, and other parties prior to carrying out emergency actions, USEPA will notify the SHPO, City of Duluth and other parties as appropriate within forty-eight (48) hours after the initiation of the emergency action. This notification will include a description of the emergency action taken, the effects of the action(s) to historic properties, and, where appropriate, any further proposed measures to avoid, minimize, or mitigate potential adverse effects to historic properties. The SHPO, City of Duluth and other parties will have seven (7) calendar days to review and comment on the proposal where further action is required to address the emergency. If the SHPO, City of Duluth and other parties do not object to the plan within the review period, USEPA and/or U. S. Steel will implement the proposed plan.

E. Where possible, USEPA will ensure that such emergency actions be undertaken in a manner that does not foreclose future preservation or restoration of historic properties. Where such emergency actions may affect historic buildings, they will be undertaken in a manner that is consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (36 CFR Part 68). In addition, where possible, USEPA will ensure that such actions will be done with on-site monitoring by the appropriate preservation professional who meets, at a minimum, the Professional Qualification Standards in the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716) in his or her field of expertise.

F. Where the SHPO, City of Duluth and/or any other party has reason to believe that a historic property may be adversely affected by an emergency action, the party will submit a request to USEPA to review and comment on that action.

G. Immediate rescue and salvage operations conducted to preserve life or property are exempt from these and all other provisions of this Agreement.

XIV. DISPUTE RESOLUTION

Should any signatory, invited signatory, or concurring party to this Agreement object at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, USEPA will consult with such entity, through the point of contact designed in **Stipulation XVII** below, to resolve the objection. If USEPA determines that such objection cannot be resolved, USEPA will:

A. Forward all documentation relevant to the dispute, including USEPA's proposed resolution, to the ACHP. The ACHP will provide USEPA with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, USEPA will prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories, invited signatories, and concurring parties, and provide the signatories, invited signatories, and concurring parties with a copy of this written response. USEPA will then proceed according to its final decision.

B. If the ACHP does not provide its advice regarding the dispute within thirty (30) days, USEPA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, USEPA will prepare a written response that takes into account any timely comments regarding the dispute from the signatories, invited signatories, and concurring parties to the Agreement and provide the signatories, invited signatories, concurring parties, and the ACHP with a copy of such written response.

C. USEPA and U. S. Steel's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute remain unchanged.

XV. POST REVIEW PROJECT CHANGES

Should any Project plan, scope of services, or other document that has been reviewed and commented on as part of Section 106 consultation, be significantly revised following execution of this Agreement, (except to finalize documents commented on in draft form or when USEPA determines that the revision has no potential to cause effects to any historic properties) USEPA will afford the signatories, invited signatories, and concurring parties to this Agreement the opportunity to review the proposed changes and revisions and determine whether it shall request that this Agreement be amended. If one or more such party determines than an amendment is needed, the parties to this Agreement shall consult in accordance with **Stipulation XVI** below to consider such an amendment.

XVI. AMENDMENTS

This Agreement may be amended when such an amendment is agreed to in writing by all signatories and invited signatories. The amendment will be effective on the date a copy signed by all signatories and invited signatories is filed with the ACHP. If Agreement on an amendment cannot be reached, the Dispute Resolution procedures of **Stipulation XIV**

of this Agreement will be implemented.

XVII. EFFECTIVE DATE

This Agreement will become effective on the date on which it has been signed by USEPA and the SHPO.

XVIII. COMMUNICATION

Electronic mail (Email) will serve as the official method of correspondence for all communications regarding this Agreement between all signatories, invited signatories, and concurring parties with the exception of the SHPO who will receive all communication in physical form. See **Attachment 4** for a list of contacts, email addresses, and physical addresses.

A. Contact information in **Attachment 4** may be updated as needed, without an amendment to this Agreement. It is the responsibility of each signatory, invited signatory, and concurring party to immediately inform USEPA of any change in name, address, email address, or phone number of any point of contact. USEPA will forward this information to all signatories, invited signatories, and concurring parties by email. USEPA and the SHPO will maintain a physical copy of this Agreement along with a physical copy of any amendments or changes.

XIX. TERMINATION

If any signatory or invited signatory to this Agreement determines that its terms will not or cannot be carried out, that signatory or invited signatory will immediately consult with the other signatories and invited signatories to attempt to develop an amendment per **Stipulation XVI**, above. If within thirty (30) days (or another time period agreed to by all signatories and invited signatories) an amendment cannot be reached, any signatory or invited signatory may terminate the Agreement upon written notification to the other signatories' or invited signatories' points of contact as specified in **Stipulation XVIII**.

If the Agreement is terminated, and prior to work continuing on the undertaking, USEPA must either (a) execute another agreement pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. USEPA will notify the signatories and invited signatories as to the course of action it will pursue.

Execution of this Agreement by USEPA and the SHPO and implementation of its terms evidence that USEPA has taken into account the effects of this undertaking on historic properties and afforded the ACHP an opportunity to comment.

SIGNATORIES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

_____ Date:

SIGNATORIES

MINNESOTA STATE HISTORIC PRESERVATION OFFICE

_____ Date:

Amy H. Spong, Deputy State Historic Preservation Officer

INVITED SIGNATORIES

CITY OF DULUTH

_____**Date:**

Name and Title

INVITED SIGNATORIES

U. S. STEEL

_____ Date:

Name and Title

INVITED SIGNATORIES

FOND DU LAC BAND OF LAKE SUPERIOR CHIPPEWA

_____ **Date:**

Name and Title

INVITED SIGNATORIES

LAKE SUPERIOR MISSISSIPPI RAILROAD COMPANY

_____**Date:**

Name and Title

Attachment 1
Project Description

DESCRIPTION OF THE SPIRIT LAKE SEDIMENT REMEDIATION PROJECT

Purpose and Need

The Great Lakes National Program Office (GLNPO) within the United States Environmental Protection Agency (USEPA) has been working throughout the Great Lakes region to implement contaminated sediment cleanups under the Great Lakes Legacy Act, focusing on sediment remediation at known areas of concern (AOCs). The Great Lakes AOCs are areas that have experienced severe environmental degradation and beneficial use impairments (BUIs) as a result of past pollution or industrial activity. GLNPO, in conjunction with U. S. Steel Corporation (USS – the project private partner), is planning to address sediment chemical constituents of concern in and adjacent to a portion of Spirit Lake, which is part of the St. Louis River AOC. The purpose of the Spirit Lake Sediment Remediation Project (Project) is to address chemical constituents of concern, primarily polycyclic aromatic hydrocarbons (PAHs) and associated metals, in the Spirit Lake area, and to support the eventual de-listing of the Saint Louis River AOC. This will result in ecological benefits to the Spirit Lake watershed. The project will also benefit the citizens of Minnesota and Duluth by restoring opportunities for recreation within the area.

Location and Background

The Spirit Lake site is in an open reach of the St. Louis River adjacent to the former USS Duluth Works Steel Mill Superfund site in Duluth, Minnesota. The Site is bounded by the Morgan Park neighborhood of Duluth to the north, the eastern two-thirds of Spirit Lake and the St. Louis River to the east, and the USS-owned former steel mill facility to the west and south. The remediation area is bisected by the Lake Superior & Mississippi Railroad (LSMRR), situated on the western lake shore. Spirit Lake is approximately 8 miles upstream from Lake Superior. The Site is largely comprised of the Wire Mill area and the Unnamed Creek area. Wire Mill Delta is near the former wire mill discharge pond. Wire Mill Pond currently contains a small area of open water connected to the delta through a culvert beneath the LSMRR bridge. Unnamed Creek Delta is north of the Wire Mill Delta at the outlet of Unnamed Creek, where it empties into Spirit Lake. Unnamed Creek is a creek and community stormwater conveyance channel that carries flow from approximately 2,000 acres of upstream watershed into Spirit Lake. Unnamed Creek enters the upland portion of the Site through a large culvert on the western edge, flows through the western portions of the Site, and discharges into Spirit Lake. The upland portion of the site is further divided into operable units (OUs).

The USS Duluth Works steel mill was closed in 1979, and the original Record of Decision identified a chosen remedy of No Action for sediments adjacent to the former facility (MPCA 1989). However, subsequent monitoring by USS and MPCA suggested that a remedial investigation (RI) of the sediments was warranted, and that potential remedial action (RA) may be necessary. The St. Louis River, which includes the area of Spirit Lake, was listed as one of 43 Great Lakes Areas of Concern (AOCs) in 1987. The Stage I RA Plan identified the following beneficial use impairments (BUIs) within the AOC: fish consumption advisories, degraded fish and wildlife populations, fish tumors and other deformities, degradation of benthic macroinvertebrate communities, restrictions on dredged material management, excessive loading of sediment and nutrients, beach closings and body contact restrictions, degradation of aesthetics, and loss of fish and wildlife habitat (MPCA and the Wisconsin Department of Natural Resources 1992). Areas with elevated levels of sediment-associated contaminants, including PAHs and metals, are contributing to the St. Louis River AOC's BUIs. The St. Louis River Citizens Action Committee identified remediation of contaminated sediment, including sediment at the former USS Duluth Works property/Spirit Lake area, as a priority action item for the St. Louis River AOC in the

Lower St. Louis River Habitat Plan (SLRCAC 2002). As a result, additional RI/Feasibility Study (FS) work was completed.

The remediation and restoration strategy as recommended by the Spirit Lake Feasibility Study (FS) includes a combination of sediment removal, confined disposal facility (CDF) construction, capping, enhanced natural recovery, and habitat enhancements. The Project also includes monitored natural recovery areas, which are not areas of site remedial action, but will be part of a long-term operation, maintenance, and monitoring plan to confirm compliance with remedial action objectives in accordance with accepted standards. Both before and following publication of the Spirit Lake FS in July 2015, extensive discussions with tribes, resource managers, and stakeholder groups were initiated by USEPA. These discussions following the FS resulted in modifications to the remedy proposed in the selected remedial alternative from the Spirit Lake FS. These changes were made in an attempt to both address review comments and balance competing stakeholder interests. As a result, an alternative that proposed a "hybrid" remediation approach, one that balanced stakeholder interests while achieving project goals (Alternative 08B), was selected as being consistent with the remedy evaluation criteria of the governing federal statute; rules and guidance provided by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); CERCLA's National Contingency Plan; USEPA's Contaminated Sediment Guidance (2005); and the Minnesota Environmental Response and Liability Act. The recommended alternative incorporates additional habitat features, positions the Delta CDF above the OHWL elevation for placement of removed material and provides a greater amount of open water area in both Unnamed Creek and Wire Mill Pond than is currently present. Pre-design investigation activities and extensive design evaluations were conducted following completing of the FS.

Remedy Description

The Project includes areas of sediment removal, capping, combined sediment removal and capping, and enhanced natural recovery. The material removed will be placed in onsite CDFs. The design also includes a habitat restoration component.

The major remediation and restoration project components are as follows:

- Permitting of construction activities.
- Mobilization and Site support services (such as field offices, dewatering pad, wastewater treatment pad and system, decontamination pads, access roads, temporary fencing, security, power, storage, etc.) within the areas that are available to the Contractor.
- Construction of remedy components, including three onsite CDFs- the Delta CDF (approximate capacity of 196,000 CY), the Upland CDF (approximate capacity of 347,000 CY) and the OU-J CDF (capacity of up to 275,000 CY, depending upon design plan chosen).
- Dredging approximately 771,000 total CY of contaminated sediments/soils:
    - 731,000 CY within the Unnamed Creek Delta and Wire Mill Pond.
    - 40,000 CY within the upland former coke settling basin (OU-I and the Tar between I&J).
- In-situ solidification of approximately 28,500 CY of impacted sediment from the Tar Between I&J.
- In-situ solidification of approximately 5,800 CY of impacted sediment and tar within OU-A areas T10 and T-11.
- Process, transport, and disposal of sediments in on-site CDFs.
- Treating contaminated water to effluent discharge requirements and discharge treated water with energy dissipation to Spirit Lake.

- Placement of an engineered cap (materials will include sand and selected areas with carbon amendment) over approximately 117 acres of the site:
    - 107 acres of cap placed over estuary sediments.
    - 9 acres of cap placed in the former coke settling basin (OU-I and the Tar between I&J).
- Placement of a thin layer (approximately 6-inches) of cover over approximately 41 acres of estuary sediments (enhanced monitored natural recovery [EMNR]). Additionally, 72 acres are designated for monitored natural recovery, which does not involve placement of cover or other site disturbances, but will be part of long-term operation, maintenance, and monitoring activities.
- Capping and restoration of surface of CDFs; additionally, grading of approximately 104 acres in selected areas surrounding wetlands within the upland.
- In situ mixing of amendments for chemical stabilization with approximately 15,600 CY of characteristically hazardous soil/sediment to achieve non-hazardous regulatory levels of lead prior to removal of material stockpiling and confirmation testing in advance of off-site disposal.
- Construction of one new railroad bridge in Unnamed Creek and replacement of one bridge in Wire Mill Pond.
- Creation of public trail and trail extension connector to Morgan Park neighborhood.
- Creation of park features on the Delta CDF to facilitate public access.
- Slope stabilization along Unnamed Creek adjacent to the OU-J CDF to accommodate placement of a culvert extension at the upstream end of the Site.
- Approximately 126 acres of habitat restoration.
- Site restoration and demobilization.

Each component of the proposed remedy is described in detail below.

Excavation/Dredging

Excavation with low ground pressure equipment or conventional equipment using temporary access roads will be used to remove soil and sediment from upstream areas of the site. Dredging will be used in the aquatic areas of the site for both the shallow and deeper water portions of the estuary. For upstream areas, removal will consist of mechanical excavation using standard off-road equipment. Control measures such as containment barriers, stream diversion, and/or cofferdams will be used to minimize downstream soil/sediment migration. Dredging in the estuary will consist of mechanical removal. Mechanical removal of sediments will involve the use of an articulated fixed-arm excavator or barge-based crane with a traditional clamshell bucket or environmental bucket. The contractor will select either truck transport from removal areas to dewatering areas or hydraulic transport through a pipeline.

- For hydraulic transport, sediment will first be removed mechanically, then a slurrying process will add water to the dredged sediment in an enclosed mixing vessel to create the slurry. The slurry will be transported by pumping in a pipeline to a sediment processing facility. The processing facility will be located at the destination CDF and will include sand separation and dewatering of the fine-grained fraction using filter presses. Water from the sediment processing facility will undergo solids filtration, then be recirculated back to the slurrying plant for re-use as carrier fluid for more dredged sediment. The remaining fine-grained fraction (filter cake) will be placed in the CDF. Recirculated water will be treated prior to final discharge back to the estuary.

- If the contractor selects conventional gravity dewatering and air drying for management of dredged/excavated materials, drained porewater and contact stormwater will be collected and treated prior to discharge to the estuary.

Selection of the most appropriate removal and material management methods will be based upon further evaluation of site-specific conditions and construction work planning by the contractor.

The project includes excavation of contaminated soils and sediment from portions of both the upland and estuary areas of the Site. Removal of material within the Unnamed Creek will result in a restored estuary through creation of a shallow sheltered bay with two depth profiles. For the main area of the bay (to the northwest of the Delta CDF) that connects Unnamed Creek to Spirit Lake, deeper depths are provided for fish habitat considerations (average water depth of 3 to 5 feet), while the area of the bay northeast of the Delta CDF provides shallow water depths of 1 to 2 feet for establishing emergent wetland type plant communities. The shallow sheltered bay will be created by removing material to a target elevation followed by placement of a subaqueous remedial cap (capping discussed in detail below). The work in this area will also create a shoal feature at the mouth of the bay that is intended to reduce wave energy as well as encourage water flow into and out of the sheltered bay, by focusing seiche flow through a channel at the northern end of the shoal. This configuration has been designed based on hydrodynamic modeling of the Spirit Lake/St. Louis river flow conditions at the Site. Impacted sediment near the shoreline in the Wire Mill Delta, Wire Mill Pond and the northern portion of the Unnamed Creek Delta will be removed but will not be followed with cap placement.

Approximately two feet of sediment will be removed from the former coke settling basin (OU-I and Tar Between I&J). A cap will be placed following removal of the sediments, as detailed in the following section, and the area will generally be restored to its existing condition.

Capping

Capping is a well-established, proven technology for reducing exposure to contaminants. Cap design for the Site was developed based on modeling using data from the pre-design investigation including groundwater, porewater, and chemistry data. Capping in the Site will consist of either capping over in-situ materials or excavated and placed materials. In the upland portion of the site, capping will be used to control direct exposure to and prevent the erosion of the impacted material. Upland caps are designed for recreational considerations in public access areas and industrial considerations in adjacent areas. In the estuary portion of the site, the caps will consist of a natural granular material such as clean sand or gravel. In some areas, caps may be amended with organic material or carbon to improve function and support restoration. Cap thickness in the estuary will depend on the thickness of the bioactive zone in each area to be capped. Caps will be constructed using standard construction and remediation equipment. Caps are designed for protection of ecological receptors using sediment quality targets and following the specific cap requirements set forth by the Minnesota Pollution Control Agency (MPCA).

The selected alternative includes the placement of a soil cap over the OU-I in the upland portion of the site after contaminated soils have been removed to a target elevation. Unnamed Creek downstream of OU-I and adjacent wetland areas will receive caps at a thickness dependent on engineering considerations. In the estuary area, the largest areas of capping will be in the northern portion of the Unnamed Creek Offshore adjacent to the shoal feature and in the Wire Mill Offshore. Subaqueous caps will occur both in the shallow sheltered bay and lakebed east of the shoal. For the shallow sheltered bay, a cap will be placed upon completion of dredging activities.

Confined Disposal Facility (CDF) Construction

CDFs are a widely used technology for consolidating and containing impacted sediments. CDFs are constructed based on the method of sediment/soil excavation and the geotechnical properties of their underlying sediment/soil. A detailed evaluation of the geotechnical properties of the material to be placed in CDFs on-site was conducted as part of the Pre-Design Investigation for the Project. Following site preparation activities (ground clearing and topsoil removal to one foot below soil surface below containment berms), the CDFs will be constructed by initially constructing perimeter containment berms followed by filling the containment berms with excavated/dredged material. The excavated/dredged material will undergo gravity dewatering and air drying to remove excess water. Portland cement or another similar material will be used as a drying agent, if needed, to improve geotechnical characteristics. Placement of excavated/dredged materials will include some compaction intended to provide sufficient strength and density to support construction equipment. CDFs are expected to undergo some settlement during and following construction by consolidation of fine-grained silt and clay. The consolidation process results in shear strength gain improvements in the underlying fine-grained soils (increase in resisting forces). Settlement monitoring of the Upland CDF will be performed to inform fill management and construction activities. This monitoring will be accomplished through the use of settlement plates and other techniques to confirm design assumptions. Temporary erosion controls such as seeding and use of erosion control blankets will be used during construction for CDFs, and permanent erosion control will be managed by engineered caps placed following filling of the CDFs.

Three CDFs will be constructed in the Site with berm heights ranging from 10 feet to 18 feet. The Delta CDF will be constructed in the Unnamed Delta along the spit of land and will be placed at an elevation greater than the OHWL. Estuary sediments will be placed in the Delta CDF; additionally, some upland material may be placed in the Delta CDF if the material passes the industrial soil reference values (SRVs). This material will be sourced from the slope areas in Wire Mill Pond and be used to construct the Delta CDF berms. The peninsula created by construction of the Delta CDF will not extend east past the OHWL (approximate current shoreline), thereby reducing the CDF footprint and avoiding containment of impacted materials in existing open water. The Upland CDF will be constructed in the Unnamed Creek ravine adjacent to the Unnamed Creek Delta. This CDF, along with the Delta CDF, will hold most of the removed material from the Site. The OU-J CDF will be constructed in the Unnamed Creek ravine west of the Upland CDF. Sediment excavated from OU-I will be consolidated in the OU-J CDF. Excess material from the estuary that cannot be accommodated in the Delta or Upland CDF will also be consolidated in the OU-J CDF. The final capacity of the OU-J CDF will be determined in final design; the final design will likely include two design options to provide flexibility in sediment management to the construction contractor. This application presents the engineering drawings for the 40,000 cy design and a proposed footprint for the largest design between 232,000 and 275,000 cy design (with below and above ground components). The CDFs constructed in the Unnamed Creek ravine will have the higher berm heights and will use the valley side near these areas during construction to help contain some of the material.

Enhanced Natural Recovery (ENR) Thin Cover

For estuary sediments, ENR will include placement of a thin layer (approximately 6 inches) of clean sediment or sand over impacted sediment. This thin cover amendment speeds the development of a clean sediment layer at the sediment-water interface. Natural recovery uses ongoing naturally occurring processes to contain or reduce the availability of contaminants in impacted sediment. Implementing ENR is a way to accelerate the recovery process. ENR thin cover will be placed in two areas within the Unnamed Creek Delta and in one area in between Unnamed Creek Delta and Wire Mill Delta (Exhibit

2A, Sheet 76). Due to the thin nature of the cover material, placement is not anticipated to contribute to changes in the landscape within the Site.

In-Situ Solidification/Stabilization

Solidification/stabilization encapsulates impacted soil to form a solid material that restricts the migration of contaminants by decreasing the amount of surface area available for leaching. This is commonly done by mixing cement with metal stabilization agents or other similar additives into impacted soils using a backhoe bucket, rotating mechanical mixing method, or large diameter auger. In-situ solidification/stabilization will be provided for sediments and soil in the Wire Mill pond area to address the delineation of materials with lead concentrations elevated above the regulatory level for toxicity characteristic. Chemical stabilization is further facilitated by the addition of metal binding agents within amendments. The solidified/stabilized materials will be sampled to confirm the modified soil mass is non-hazardous prior to offsite disposal.

This process has been historically used at OU-J and will be completed for the impacted soils located within the Tar Between I&J and OU-A Areas T-10 and T-11. The solidified and stabilized material will subsequently be excavated to a set elevation for stream restoration with a wetland cover placed over the solidified Tar between I&J area. The excavated material will be placed in the OU-J CDF (Exhibit 2C, Sheet CC-103).

Unnamed Creek Diversion

Unnamed Creek is an open channel stormwater conveyance feature that enters at the western edge of the site through a culvert. An approximately 250-foot culvert extension will be installed to allow for construction of slopes adjacent to the creek. Unnamed Creek will be temporarily diverted during construction to allow for stabilization of the Tar Between I&J, excavation and capping within OU-I, construction of the Delta CDF, Upland CDF, Unnamed Creek cap and creek bed, and construction of the shallow sheltered bay. The temporary diversion will reroute stormwater by a temporary open channel constructed of clean materials, aided by temporary features such as Port-a-dams to direct surface water flow away from disturbed areas. Once construction activities are completed, a permanent channel will be constructed on top of the OU-I cap and around the CDFs to protect them from storm and flood events. Storm water flow upstream of the Unnamed Creek water level control weir will be similar to current conditions and will include similar ponding capacity of peak flows. Downstream of the weir, storm water flow will be directed to the shallow sheltered bay created in the OU-M Delta.

<u>Habitat Restoration</u>

Habitat restoration is a major component of the Project. Almost all remedial areas are designed to have the appropriate vegetation for the final habitat type or water depth; these include shallow emergent marsh vegetation, mixed vegetation (emergent, submerged, and floating), submerged vegetation, and upland planting. Many wetland areas within the footprint will remain a wetland after habitat restoration is complete; however, the wetland type may change (e.g. forested wetland to shallow, open water wetland). The remediated wetland areas will benefit from improved aquatic function as a result of removal of contaminated substrate and improved hydrologic connectivity to surrounding areas. Implementation of the remedy will result more depth variations in the estuary, thus providing specific wetland habitat types desired by Minnesota natural resource managers. Areas not planted will serve as deepwater fish habitat. Habitat restoration and creation along with substrate improvement across the majority of the project footprint (approximately 126 acres) will restore the ecological condition of the area as a whole. As such, although some wetland loss will occur, the Project is proposed to be self-mitigating.

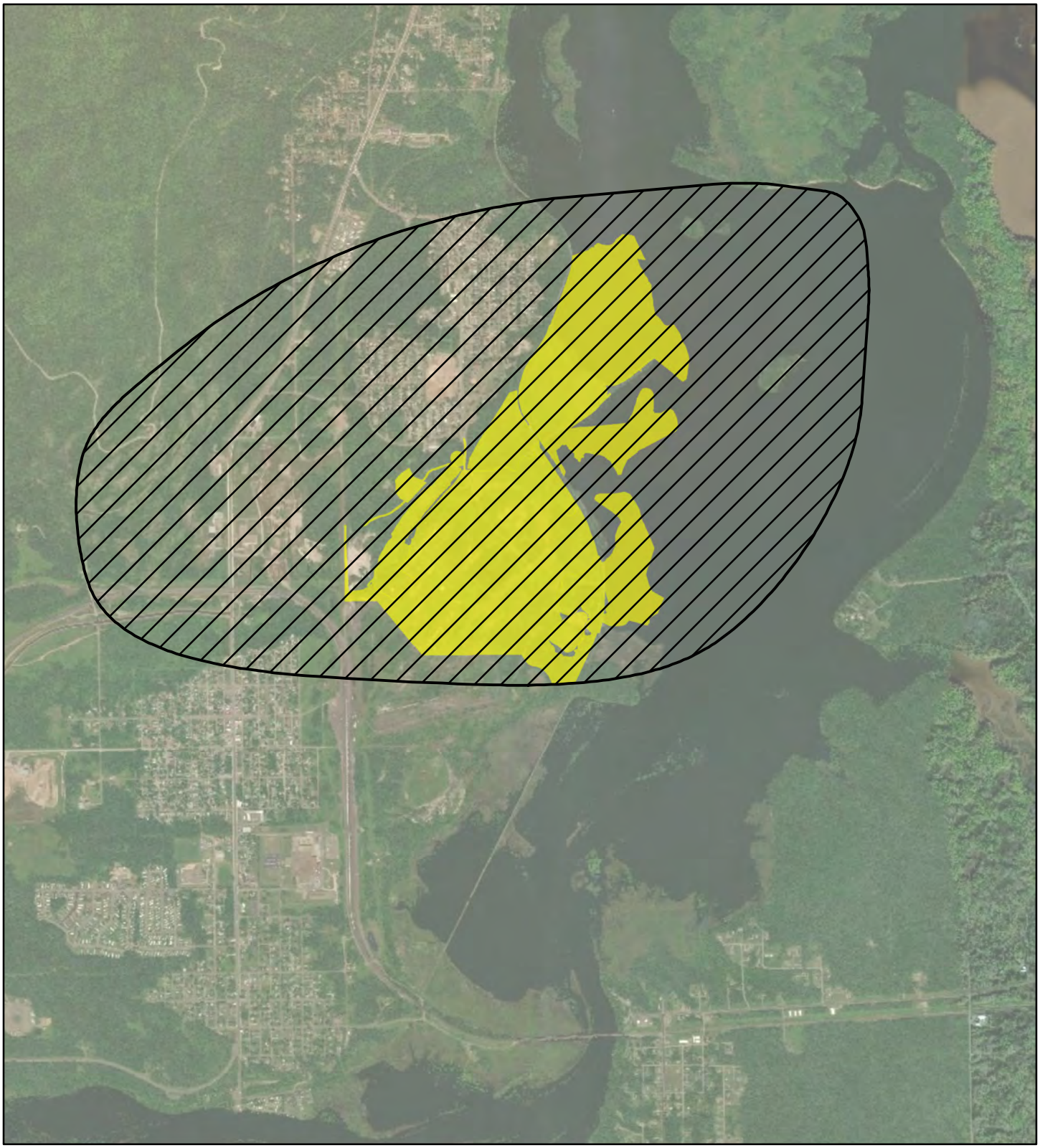
Public Trail and Park Features

A pedestrian trail is included as part of the project. The trail will follow the existing rail line and include a pedestrian bridge at the new Unnamed Creek railroad bridge. The portion of the trail located adjacent to the railroad has been spaced appropriately given accepted standards and considerations of frequency of railroad traffic, existing track speed limit, and other factors. Americans with Disabilities Act accessibility best management practices (BMPs) will be incorporated into the design. The design for the trail will be developed in coordination with the City of Duluth's plans for the rail and adjacent trail operations. The pedestrian trail provided as part of the Spirit Lake Sediment Remediation is designed in conjunction with park features that will be included on the surface of the Delta CDF, in coordination with the City of Duluth. These features align with the City's plans for future use of the site and include:

- A protected reflective seating area on the spit of land
- Additional sand area for boat put-in
- Stormwater swale to divert stormwater runoff around the sand area
- Small dock with a boat launch (ADA accessible)
- Viewing area ("Great River Lawn") on the southeast corner of the CDF overlooking Spirit Island
- Southwest walking path for access from the spit of land to the beach, small dock, and walking trail
- Southwest gravel walking trail from base CDF elevation to top of CDF
- Northeast walking path for access from the spit of land to the Northeast walking trail
- Northeast gravel walking trail from base CDF elevation to top of CDF
- Fishing pier
- Wetland walking path along the spit of land, with vegetated side slopes
- Specially selected trees planted along the CDF shoreline to provide a natural habitat appearance
- Shrub plantings along the ridgelines of the CDFs for a natural habitat appearance; low height to maintain views to surrounding areas; and
- Grass pedestrian path connecting the southwest trail to the Great River Lawn.

Attachment 2

Area of Potential Effects



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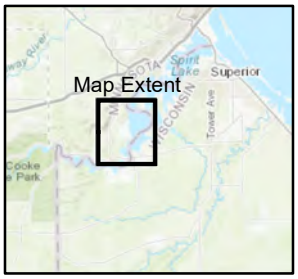

Legend

- Area of Direct Effect
- Area of Indirect Effect

0 1,000 2,000
Feet

N

Area of Direct Effect and Area of Indirect Effect

Spirit Lake Sediment Site
Former U.S. Steel Duluth Works
St. Louis River, Duluth, Minnesota

Data Sources:
ESRI Basemap 2018

Map Date: 10/10/2019

Attachment 3

Analysis of Design Impacts to the Lake Superior and Mississippi Railroad and Spirit Island from the Proposed Pedestrian Trail Feature as Part of the Spirit Lake Sediment Remediation Project, January 2020

Analysis of Design Impacts to the Lake Superior and Mississippi Railroad from the Spirit Lake Sediment Remediation Project, July 16, 2019

Analysis of Design Impacts to the Lake Superior and Mississippi Railroad and Spirit Island from the Proposed Pedestrian Trail Feature as Part of the Spirit Lake Sediment Remediation Project

Prepared for

U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, Maryland 21031
(410) 584-7000

January 2020
EA Project No. 1518924

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Analysis of Design Impacts to the Lake Superior and Mississippi Railroad and Spirit Island from the Proposed Pedestrian Trail Feature as Part of the Spirit Lake Sediment Remediation Project

Prepared for

U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
444 Lake Cook Road, Suite 18
Deerfield, Illinois 60015

January 2020
EA Project No. 1518924

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LIST OF ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
BMP	Best Management Practices
CDF	Confined Disposal Facility
EPA	U.S. Environmental Protection Agency
LSMRR	Lake Superior and Mississippi Railroad
MSE	Mechanically Stabilized Embankment
NHPA	National Historic Preservation Act of 1966, as amended
SHPO	State Historic Preservation Office
THPO	Tribal Historic Preservation Office

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1. INTRODUCTION AND PURPOSE

The Spirit Lake Sediment Remediation Project area is located in an open reach of the St. Louis River, referred to as Spirit Lake, near the Morgan Park neighborhood of Duluth, Minnesota and adjacent to the former U. S. Steel Duluth Works Steel Mill facility. The purpose of this report is to continue project consultation under Section 106 of the National Historic Preservation Act (NHPA) and provide the Minnesota State Historic Preservation Office (SHPO) and the Tribal Historic Preservation Office (THPO) of the Fond du Lac Band of the Lake Superior Chippewa and of the Mille Lacs Band with a review of the design approach for the pedestrian trail feature proposed as part of the Spirit Lake Sediment Remediation Project (Project). This report evaluates the potential effects of the pedestrian trail on the adjacent Lake Superior and Mississippi Railroad (LSMRR) and on the traditional cultural property of Spirit Island. The pedestrian trail as included in the project design would be constructed adjacent to the LSMRR (Figure 1). A six-mile segment of the LSMRR falls within the project boundary. Spirit Island is located approximately 0.3 miles outside of the project boundary (Figure 1). It is owned by the Fond du Lac Band of Lake Superior Chippewa and is of immense cultural and spiritual significance to all Ojibwe tribes.

This report is organized as follows:

- *Section 2*- presents a detailed description of the trail and all associated features to be constructed within the project footprint.
- *Section 3*- presents a detailed description of the trail and all associated features to be constructed within the project footprint. Section 2 presents the EPA's determination of adverse effect from the trail on the segment of LSMRR that occurs within the project footprint, and on Spirit Island, in accordance with 36 CFR Part 800.5, Assessment of Adverse Effects under Section 106 of the NHPA.

It should be noted that the evaluation in this report includes the portion of the pedestrian trail that will be constructed as part of the Project and which occurs solely within the direct project footprint. Continuation of the trail to the north or south of the project footprint may be performed by the City of Duluth as part of separate efforts to develop trails adjacent to the project area. Potential continuation of the trail to north or south by the City of Duluth is not part of this undertaking and is not covered under this review or effects determination.

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2. DESCRIPTION OF THE PEDESTRIAN TRAIL AND ASSOCIATED FEATURES

A pedestrian multi-use (walking and biking) trail is included as part of the final design for the Project. The pedestrian trail design has been developed in close coordination with the City of Duluth's plans for adjacent trail development and is compatible with the future recreational features that may be developed within the Delta confined disposal facility (CDF) area of the project footprint. The trail and each associated feature are described below.

2.1 PEDESTRIAN TRAIL

The pedestrian trail will be located adjacent to the LSMRR for the full six-mile segment located within the project footprint (Figure 1). The trail will be 10 feet wide and will be surfaced with crushed stone; the path of the pedestrian trail will not physically contact the existing rail line. The offset distance between a railroad and a pedestrian trail is typically recommended to be a minimum of 25 feet from the center line of the railroad to be protective of both railroad and trail users. The design of the pedestrian trail considered this recommendation and considered the operation frequency of the LSMRR. Because the LSMRR has historically operated at a frequency of one to two times per week (and there is no currently known plan to increase the frequency of rail trips), the pedestrian trail will be constructed with a minimum offset distance (from the center line of the railroad) of 15 feet. The pedestrian trail will be constructed at this 15 foot offset distance for the full length of the trail, with the exception of the portion of the trail that follows the slopes of Wire Mill Pond (Figure 1) and one other location south of the spit of land (this is detailed in the discussion of the Mechanically Stabilized Embankment, below). The design of the pedestrian trail takes several approaches to maximize protectiveness to the LSMRR. Where topography allows, the trail will be constructed at a lower elevation than the railroad tracks to prevent impact from stormwater runoff on the railroad. The pedestrian trail will have a shallow cross slope (less than 1.5%) away from the railroad to promote drainage of runoff. Due to potential terrain restraints along the path of the pedestrian trail, there may be some areas where the trail will be constructed at the same elevation as the track. In these instances, poorly graded aggregate material will be used for the trail subgrade to promote drainage under the trail. Any existing culverts (not including those planned to be abandoned as part of the design) beneath the railroad will be extended beneath the pedestrian trail to maintain existing drainage routing. Excavation into the toe of the hill along the proposed path of the trail will be avoided to reduce the risk of the stability issues that could impact the LSMRR.

The trail design also meets the Americans with Disabilities Act (ADA) criteria for accessibility best management practices (BMPs) and standards to be used when developing this type of feature. The slopes of the pedestrian trail will comply with ADA standards which allow slopes of 5% or less for any length, and running slopes of 8.3, 10, and 12.5% for a maximum length of 200, 30 and 10 feet, respectively.

2.2 INTERPRETIVE SIGNAGE

The pedestrian trail design includes installation of interpretive signs at specific locations along the trail to provide trail users with information on trail orientation and natural and cultural

heritage interpretation for the surrounding location. Four signs will be located at key transition/entrance points along the pedestrian trail:

- One interpretive sign will be located at the trail entrance from the Morgan Park neighborhood (Figure 2)
- Two additional interpretive signs will be located along the trail at the spit of land (Figure 3)
    - A sign will be located at the railroad crossing
    - Another will be located approximately 400 feet east of the railroad on the spit of land portion of the pedestrian trail; this portion of the trail does not run adjacent to the LSMRR.
- A final interpretive sign will be located at the entrance to the portion of the pedestrian trail that follows the slopes of the remediated Wire Mill Pond area (Figure 4).

The interpretive signs will be positioned immediately adjacent to the path of the proposed pedestrian trail and will not encroach on the minimum offset distance between the trail and the railroad. The interpretive signs will include graphic panels presenting the information about the surrounding area. Signs will extend approximately 45 inches above the ground surface and consist of a cantilevered mounting structure atop two 8-inch diameter concrete footings (24 inches in length) that overlie 8 inches of stone bedding. Each sign will be constructed with approximately 2 inches of backfill.

2.3 UNNAMED CREEK PEDESTRIAN BRIDGE AND FOOTBRIDGES

A pedestrian bridge (Figure 3) will be constructed along the pedestrian trail to provide a crossing over the channel where Unnamed Creek will be rerouted as part of the remediation design. The pedestrian bridge over the Unnamed Creek relocation channel will be constructed using a typical pre-manufactured steel span for a 10-foot wide trail. This bridge is designed to be a single span founded on colorized precast concrete abutments supported by 16-inch closed end steel pipe pile. Standards set forth by the American Association of State Highway and Transportation Officials (AASHTO) and State of Minnesota will be used in the design.

Additionally, four small foot bridges will be installed along the portion of the pedestrian trail that follows the Wire Mill Pond slopes. This portion of the pedestrian trail does not run adjacent to the LSMRR. These foot bridges will be of wood construction and are designed to provide crossings over drainage letdown channels around the pond. The specific design details for these footbridges will be determined by the Contractor to meet minimum requirements outlined in the technical specifications for the design.

2.4 RAILROAD CROSSING AT THE SPIT OF LAND

An access trail stemming from the pedestrian trail to the Delta CDF will connect to the main pedestrian walking and biking trail at the spit of land (Figure 3). The access trail will cross the railroad at this location. A permanent railroad crossing with appropriate signage and safety information will be provided for pedestrian safety. This crossing will be constructed such that the full-depth precast panels used will be installed to match the existing top or rail conditions. To

achieve top of rail conditions, a load-bearing polyurethane rail grout will be placed beneath the rail in the precast concrete flangeway, which will allow the rail to be raised to match the existing top of rail. The concrete panel will be surrounded by 6 inches of Class V aggregate to promote drainage around the rail.

2.5 MECHANICALLY STABILIZED EMBANKMENT (MSE)

The pedestrian trail will be constructed at a lower elevation than the LSMRR along the full path, apart from one short span of the trail path 600 feet south of the spit of land (Figure 4). At this location the existing terrain does not provide adequate space for a 3:1 slope, and retaining wall was originally proposed for installation. Based upon comments received on the pre-final design for the pedestrian trail, a mechanically stabilized embankment (MSE) will be utilized at this location. The MSE is constructed with geotextile fabric doubled over to retain the soil. The final design for this feature is in progress. Installation of this feature will provide protection to the railroad without directly contacting the rail line.

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3. EVALUATION OF EFFECTS ON THE LSMRR AND SPIRIT ISLAND

The pedestrian trail itself, along with each of the above described trail features, have been evaluated for adverse effect on the segment of LSMRR that occurs within the project footprint, and on Spirit Island, in accordance with 36 CFR Part 800.5, Assessment of Adverse Effects under Section 106 of the NHPA. Adverse effect criteria include any direct or indirect alteration of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the property's location, design, setting, materials, workmanship, feeling, or association. Criteria also include reasonably foreseeable future effects caused by the undertaking. A summary of the evaluation of effects for the LSMRR and Spirit Island in Table 1. Detail on the evaluation of each trail feature is provided below.

3.1 EFFECT ON THE LSMRR

Due to the construction of the trail immediately adjacent to the LSMRR, evaluation of the trail impacts on the LSMRR are presented for each element of the trail feature.

3.1.1 Pedestrian Trail

The pedestrian trail will follow the path of the LSMRR and maintain an offset of at least 15 feet from the centerline of the railroad. The trail will not directly contact or impact the location of the LSMRR. The trail will be constructed of a semi-pervious gravel and is not expected to diminish the setting or feeling that contributes to the historic nature of the property. Public usage of the new trail feature will likely encourage tourism and awareness of the historic character and importance of the LSMRR. As such, the EPA finds that the pedestrian trail will have no adverse effect on the LSMRR.

3.1.2 Interpretive Signage

The four planned interpretive signs are aimed to inform public users of the pedestrian trail about the history of the Spirit Lake site and the history of the LSMRR. The signs will not physically touch the rail line and will be offset from the pedestrian trail opposite the railroad. The signs are not expected to impact the location of or diminish the setting or feeling that contributes to the historic character of the property. As such, the EPA finds that the interpretive signs will have no adverse effect on the LSMRR.

3.1.3 Unnamed Creek Pedestrian Bridge and Footbridges

The Unnamed Creek pedestrian bridge located at the creek relocation channel will be constructed at the same width as the pedestrian trail (10 feet) and composed of a typical steel span atop colorized concrete. These materials will be compatible with those used to construct the new railroad bridge at this location (this feature has been previously evaluated for impacts on the LSMRR) and will not come into physical contact with the LSMRR or alter the location of the rail. The footbridges along the Wire Mill Pond portion of the pedestrian trail will not be located adjacent to the LSMRR (Figure 4). The Unnamed Creek pedestrian bridge and footbridges at Wire Mill Pond will be in line of sight of the LSMRR but are not expected to diminish any

features that contribute to the historic character of the property, and would not impact the property's historic setting or feeling. As such, the EPA finds that the Unnamed Creek pedestrian bridge and footbridges will have no adverse effect on the LSMRR.

3.1.4 Railroad Crossing at the Spit of Land

This railroad crossing will allow access to the spit of land pedestrian trail. Although the track crossing will physically contact the rail line at this location, construction would not involve any alteration of the rail location, or removal, modification, or replacement of any components of the rail, including those components which may contribute to historical character of the property. Materials added to create this feature will be finished to be compatible with existing conditions of the rail line in that area and will be compatible to the extent practicable with historic materials. It is not expected that this feature will diminish the location, design, setting, materials, workmanship, feeling, or association that contribute to the historic character of the property. As such, the EPA finds that the railroad crossing at the spit of land will have no adverse effect on the LSMRR.

3.1.5 Mechanically Stabilized Embankment (MSE)

The MSE will be constructed slightly higher than the railroad but will be contained by geotextile fabric to avoid physical contact of any material with the rail line. While the final design for this feature is still in progress, installation will not directly contact the LSMRR and the dimensions of the feature are not expected to intrude on the historic feeling or setting of the property. As such the EPA finds that the MSE will have no adverse effect on the LSMRR.

3.2 EFFECT ON SPIRIT ISLAND

The cultural and spiritual feeling of Spirit Island, as well as the viewshed from the island is of the utmost importance to the Ojibwe tribes and is vital to the setting and cultural meaning of the area. To evaluate the trail's impacts on the cultural/spiritual setting and viewshed from Spirit Island, EPA has considered the trail itself and the above described associated features as a single element and therefore has evaluated these together for impacts on Spirit Island. We believe this method of evaluation is appropriate given that the trail itself and the associated features are likely to produce the same impacts on the property (e.g. impacts from the trail itself and impacts from the interpretive signage would not be distinguishable from one another). Therefore, when considering the impacts on Spirit Island "pedestrian trail" refers to the trail combined with all associated features described in Section 1.

Construction of the pedestrian trail will likely result in increased pedestrian traffic in the project area. While this will be noticeable to tribal members using Spirit Island, it is not anticipated to adversely affect the continued cultural and spiritual usage or setting/character of the island. Additionally, this increased public usage of the project site may introduce visual and audible elements noticeable from Spirit Island. However, it is unlikely that the frequency, duration, and magnitude of the increased usage would be significant enough to produce an adverse effect on the spiritual feeling and cultural association of Spirit Island.

4. SUMMARY AND DETERMINATION

4.1 LSMRR

The pedestrian trail and associated features as described above will be constructed largely adjacent to and not directly contacting the LSMRR, apart from the railroad crossing at the spit of land. The trail and features are all adjacent to the LSMRR and will be within view of rail users and other users of the project area post-remediation of the site and completion of the rest of the project design. EPA does not anticipate that the trail or any planned features will adversely affect the location, setting, feeling or association that contribute to the overall historical nature of the LSMRR. Several features including the trail itself and interpretive signs are compatible with the City of Duluth's long-term plan for pedestrian and bicycle trails within the Spirit Lake project area, and aim to engage and inform public users of the trail of the historical importance of the project area for which the LSMRR provides a significant contribution.

Based on the evaluation provided in this report, the EPA determines that the pedestrian trail and associated features proposed as part of the Spirit Lake Sediment Remediation Project will have no adverse effect on the LSMRR segment within the project footprint.

4.2 SPIRIT ISLAND

Based on the information available to the EPA, we understand that Spirit Island was and is still spiritually and religiously significant to spiritual healers and practitioners. Ceremonial practices held on the island represent a religious tradition that incorporates ancient teachings into a modern context. These current practices are based in healing and restoration of balance and aim to restore cultural traditions by extension of harmony with the natural landscape; therefore, the spiritual feeling of the land as well as the viewshed from the island is incredibly significant to the Ojibwe tribes. Through the evaluation presented in this report, the EPA has reached a preliminary determination that the pedestrian trail will have no adverse effect on Spirit Island. EPA may reevaluate this determination as necessary, based upon continued consultation with the federally recognized tribes for whom Spirit Island retains important cultural and spiritual significance.

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Figures and Tables

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Legend

- Pedestrian Trail
- Railroad
- Project Boundary

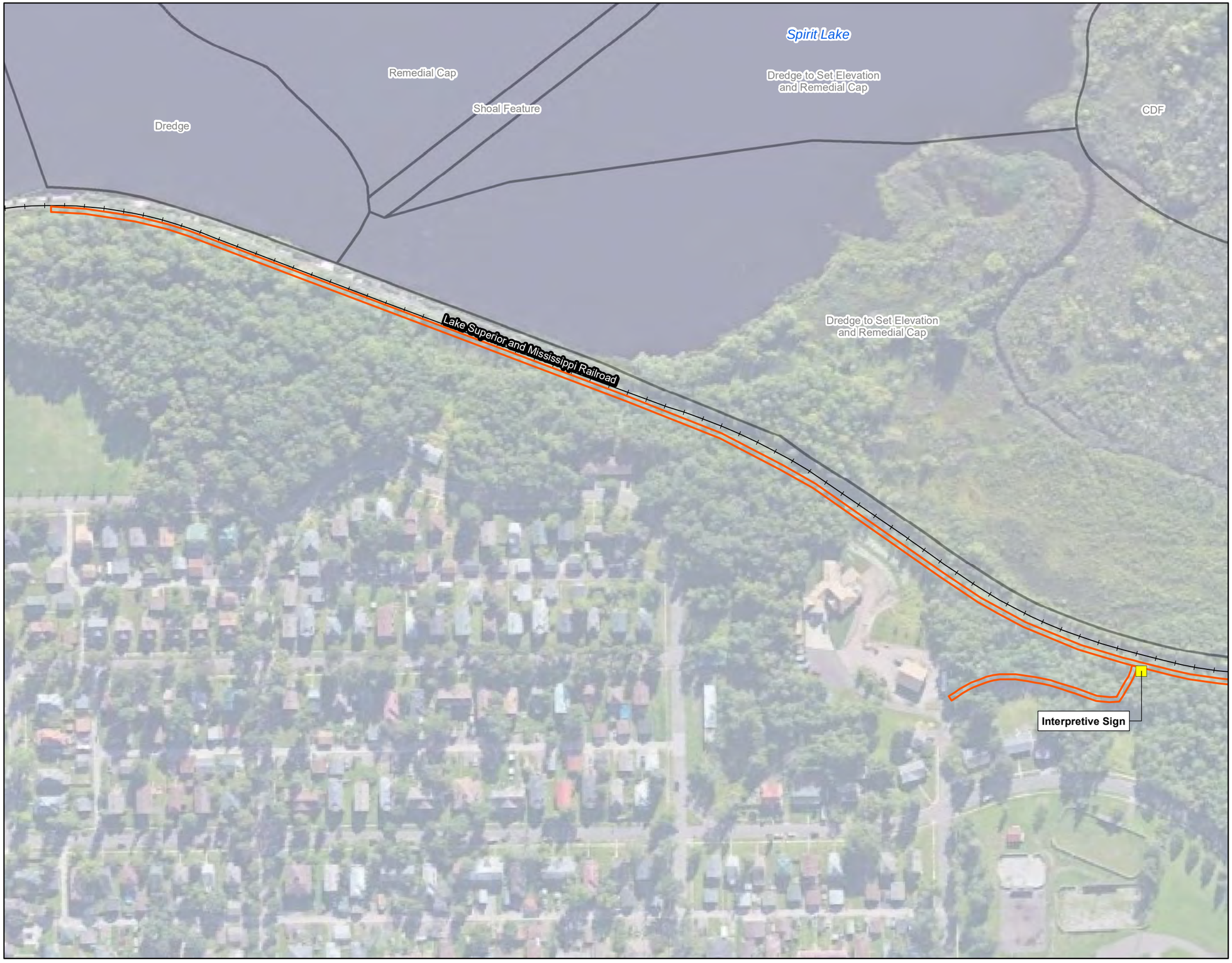
0 500 1,000
Feet

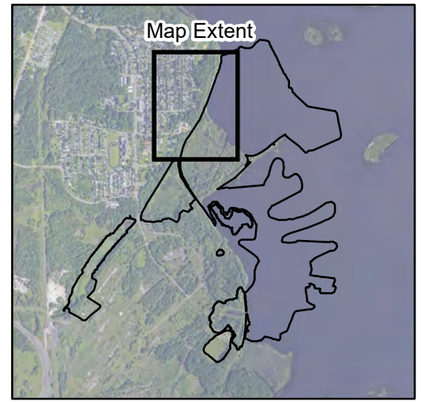
N

Map Date: 11/1/2019
Base Map: Google Earth 2017

Figure 1
Pedestrian Trail Overview Map
Spirit Lake Sediment Remediation Project
Duluth, Minnesota

Document Path: \\lovetongis\GISdata\Federal\Midwest\Minnesota\SpiritLake\MXD\RemedialDesign\RailroadReport\Figure X Pedestrian Trail Overview Map.mxd





Legend

- Intepretive Sign
- Pedestrian Trail
- Railroad
- Project Boundary

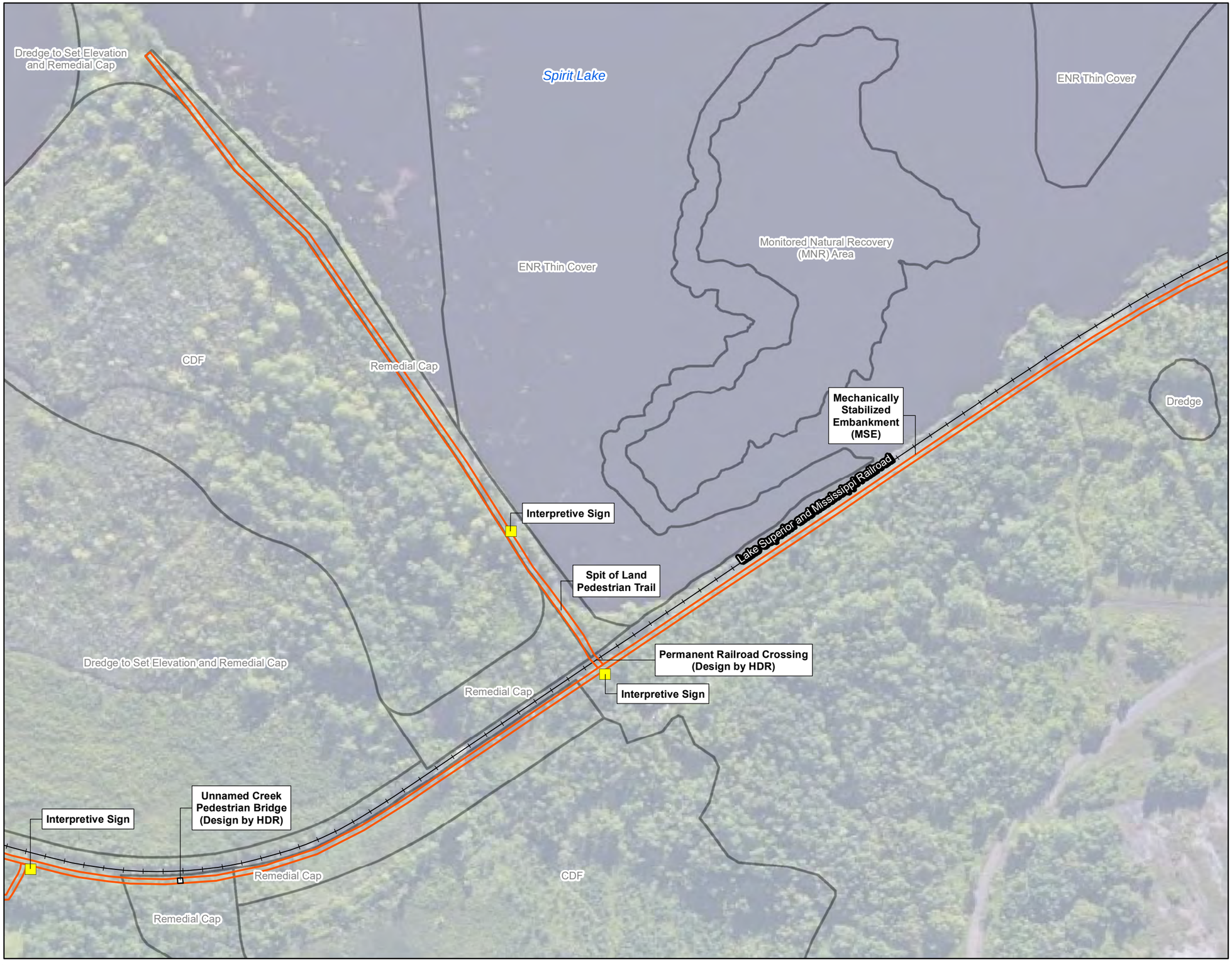
0 100 200
Feet

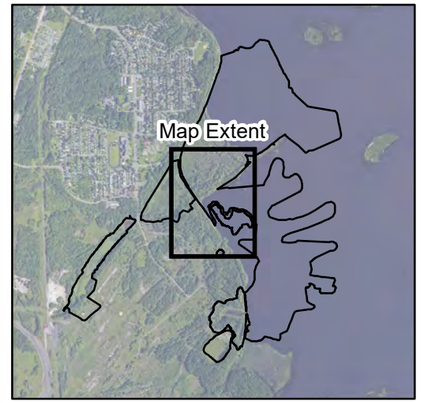
N

Map Date: 11/4/2019
Base Map: Google Earth 2017

Figure **2**
Pedestrian Trail Features - North
Spirit Lake Sediment Remediation Project
Duluth, Minnesota

Document Path: \\lovetongis\GISdata\Federal\Midwest\Minnesota\SpiritLake\MXD\RemedialDesign\RailroadReport\Figure 1 Pedestrian Trail Features - North.mxd





Legend

- Intepretive Sign
- Pedestrian Trail
- Railroad
- Project Boundary
- Pedestrian Trail Footbridge

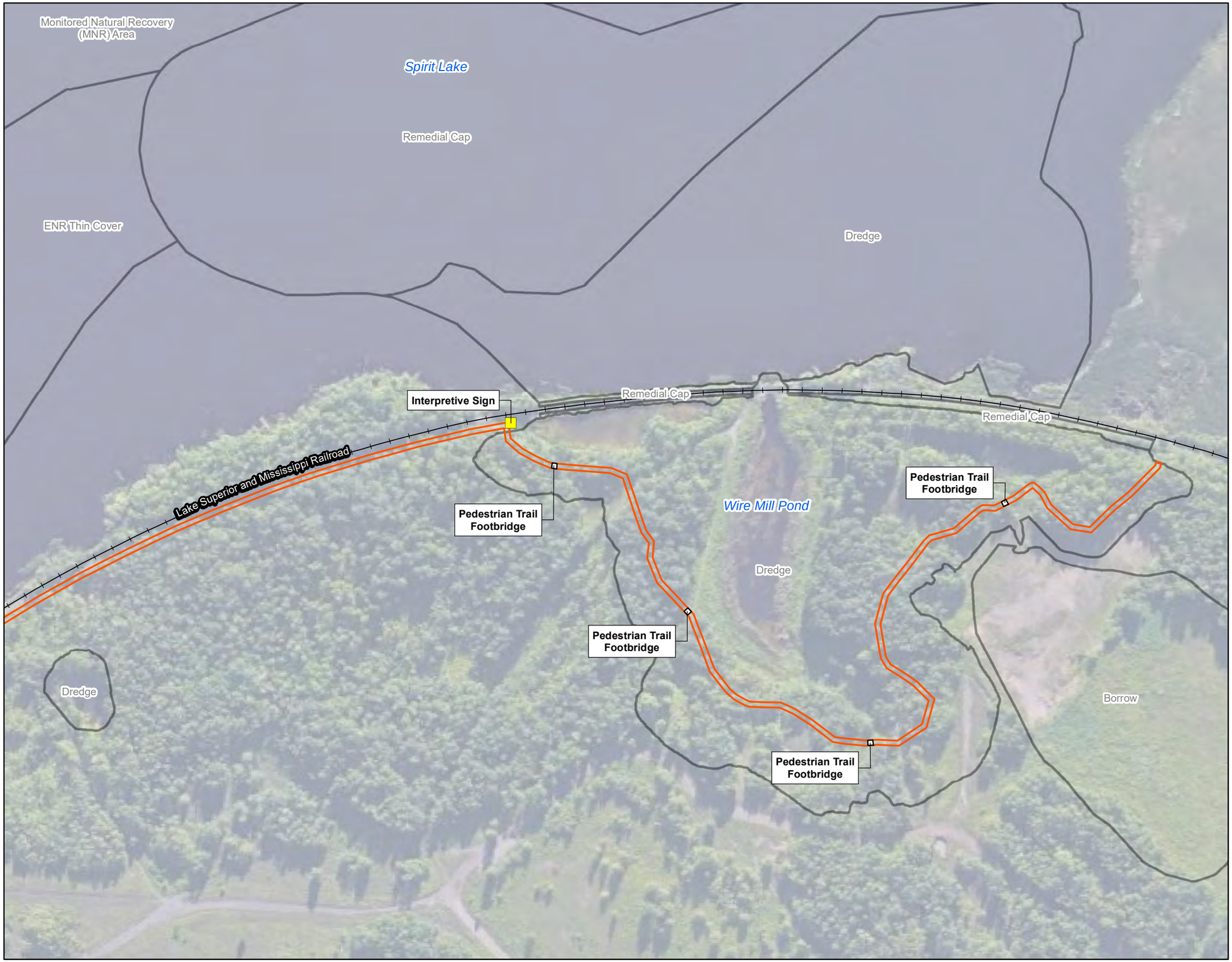
0 100 200
Feet

N

Map Date: 11/4/2019
Base Map: Google Earth 2017

Figure 3
Pedestrian Trail Features - Central
Spirit Lake Sediment Remediation Project
Duluth, Minnesota

Document Path: \\lovetongis\GISdata\Federal\Midwest\Minnesota\SpiritLake\MXD\RemedialDesign\RailroadReport\Figure 2 Pedestrian Trail Features - Central.mxd



Legend

- Intepretive Sign
- Pedestrian Trail
- Railroad
- Project Boundary
- Pedestrian Trail Footbridge

0 100 200
Feet

N

Map Date: 11/4/2019
Base Map: Google Earth 2017

Figure **4**
Pedestrian Trail Features - South
Spirit Lake Sediment Remediation Project
Duluth, Minnesota

Document Path: \\lovetongis\GISdata\Federal\Midwest\Minnesota\SpiritLake\MXD\RemedialDesign\RailroadReport\Figure 3 Pedestrian Trail Features - South.mxd

TABLE 1. SPIRIT LAKE SEDIMENT REMEDIATION PROJECT PEDESTRIAN TRAIL SUMMARY OF EFFECT ON THE LAKE SUPERIOR AND MISSISSIPPI RAILROAD AND SPIRIT ISLAND					
Trail /Feature	**Impact Area(s)**	**Determination of Adverse Effect**	**Adverse Effect Criteria**		
			Location	**Materials, workmanship**	**Setting, feeling, association**
Lake Superior and Mississippi Railroad					
Pedestrian trail	Adjacent to LSMRR for the 6-mile rail segment within the project footprint	No adverse effect	The trail will not remove or otherwise alter the location of the historic property.	The trail will not destroy, alter, remove, or otherwise impact the materials or workmanship of the historic property that contribute to historic character.	The trail will not change the setting or feeling of the property or introduce visual elements that diminish the integrity of the property's historic features.
Interpretive Signage	Four locations along the pedestrian trail	No adverse effect	The signs will not remove or otherwise alter the location of the historic property. The signs will not directly contact the LSMRR.	There will be no direct contact between the signs and the rail line. Therefore, the signs will not destroy, alter, remove, or otherwise impact the materials or workmanship of the historic property that contribute to historic character.	The signs will provide informative material regarding the cultural and historical significance of the project site. The signs will not change the setting or feeling of the property or introduce visual elements that diminish the integrity of the property's historic features.
Unnamed Creek Pedestrian Bridge and Footbridges	Unnamed Creek relocation channel and along Wire Mill Pond portion of the pedestrian trail	No adverse effect	The pedestrian bridge at the Unnamed Creek relocation channel will not alter the location of the historic property. The footbridges around the Wire Mill Pond portion of the pedestrian bridge are not adjacent to the LSMRR and will therefore not affect the location of the property.	The bridges will not destroy alter, remove, or otherwise impact the materials or workmanship of the historic property that contribute to historic character.	The bridges will not change the setting or feeling of the property or introduce visual elements that diminish the integrity of the property's historic features. The bridges will help to improve access and usage of the area by the public, contributing to appreciation of the historical setting/feeling of the property.
Railroad Crossing at the Spit of Land	LSMRR rail line at the spit of land	No adverse effect	The railroad crossing will not remove or otherwise alter the location of the historic property. Construction would not involve removal, modification, or replacement of any components of the rail, including those components	Materials added to create this crossing will be finished to be compatible with existing conditions of the rail line in that area and will be compatible to the extent practicable with historic materials. The crossing will	The crossing will not change the setting or feeling of the property or introduce visual elements that diminish the integrity of the property's historic features.

TABLE 1. SPIRIT LAKE SEDIMENT REMEDIATION PROJECT PEDESTRIAN TRAIL SUMMARY OF EFFECT ON THE LAKE SUPERIOR AND MISSISSIPPI RAILROAD AND SPIRIT ISLAND					
Trail /Feature	**Impact Area(s)**	**Determination of Adverse Effect**	**Adverse Effect Criteria**		
			Location	**Materials, workmanship**	**Setting, feeling, association**
			which may contribute to historical character of the property.	not destroy, alter, remove, or otherwise impact the materials or workmanship of the historic property that contribute to historic character.	
Mechanically Stabilized Embankment (MSE)	Along proposed pedestrian trail, 600 feet south of the spit of land	No adverse effect	The MSE will not directly contact the LSMRR. The MSE will not remove or otherwise alter the location of the historic property.	Installation of this feature will provide protection to the railroad without directly contacting the rail line. The MSE will not destroy, alter, remove, or otherwise impact the materials or workmanship of the historic property that contribute to historic character.	The dimensions of the feature are not expected to intrude on the historic feeling or setting of the property, or introduce visual elements that diminish the integrity of the property's historic features.
Spirit Island					
Pedestrian trail (including associated elements)	Trail will be within view of Spirit Island; trail constructed adjacent to LSMRR for the 6-mile rail segment within the project footprint	No adverse effect	The trail will not remove or otherwise alter the location of Spirit Island.	Not applicable- Spirit Island is not a built structure.	Cultural Setting: construction of the pedestrian trail will likely result in increased pedestrian traffic in the project area. While this will be noticeable to individuals using Spirit Island, it is not anticipated to adversely affect the continued cultural and spiritual usage or setting/character of the island. The pedestrian trail will provide improved access to the waterfront of Spirit Lake, which is an element desired by the Fond du Lac and other tribes. Cultural/Spiritual Feeling and Association: increased public usage of the project site may introduce visual and audible

TABLE 1. SPIRIT LAKE SEDIMENT REMEDIATION PROJECT PEDESTRIAN TRAIL SUMMARY OF EFFECT ON THE LAKE SUPERIOR AND MISSISSIPPI RAILROAD AND SPIRIT ISLAND					
Trail /Feature	**Impact Area(s)**	**Determination of Adverse Effect**	**Adverse Effect Criteria**		
			Location	**Materials, workmanship**	**Setting, feeling, association**
					elements noticeable from Spirit Island. However, it is unlikely that the frequency, duration, and/or magnitude of the increased usage would be significant enough to produce an adverse effect on the spiritual feeling and association of Spirit Island.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

16 July 2019

MEMORANDUM
Revision 01

TO: Sarah Beimers, Environmental Review Program Manager, Minnesota State Historic Preservation Office

FROM: William Murray, U.S. Environmental Protection Agency

SUBJECT: Analysis of Design Impacts to the Lake Superior and Mississippi Railroad from the Spirit Lake Sediment Remediation Project

The purpose of this memorandum is to provide Minnesota SHPO with a review of the design approach for the areas of the Lake Superior and Mississippi Railroad (LSMRR) that will be directly impacted by the Spirit Lake sediment remediation project. A six-mile segment of the LSMRR falls within the project boundary. Following evaluation, this segment was determined to be eligible for listing on the National Register of Historic Places as a railroad corridor historic district.

Specifically, this memorandum will:

1) Provide a description of the current railroad structure at each impact area and the design approach at that area;
2) Define the components of the structure at each impact area that contribute to the overall historic district (character defining components);
3) Summarize the existing and proposed replacement materials at each impact area, and how the proposed new materials are compatible with the character of the historic district; and
4) Summarize the project design approach to avoid or minimize adverse effects to the LSMRR.

The evaluation presented in this memorandum is intended to support the finding that the new crossing structures proposed have been designed in accordance with the Secretary of the Interior's Standards for Rehabilitation, standards 9 and 10, which state:

> **Standard No. 9**- *New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.*
>
> **Standard No. 10**- *New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

Section 1 of this memorandum presents the description of each adverse effect and the design approach at the location. Section 2 describes how the design approach at each location meets the requirements set forth by the standards listed above.

1. Railroad Adverse Effects

The LSMRR is a historic railroad owned by the City of Duluth that is eligible for listing on the National Register of Historic Places under the National Historic Preservation Act, Section 106. The intent of the project design is to minimize adverse effects to the LSMRR and provide for site restoration to address adverse effects where possible. For the remedy to be successful and achieve the USEPA's remedial action objectives, some impact to the railroad is unavoidable. Remedial actions performed as part of the project will include sediment/soil removal sediment/soil capping, construction of 3 confined disposal facilities (CDF), and monitored and enhanced natural recovery (Figure 1).

Remedial activities will intersect the railroad at nine locations within the project footprint. Construction will produce both temporary and permanent adverse effects; it is estimated that there will be approximately 355 feet of railroad temporarily impacted and 185 feet of railroad permanently impacted as a result of direct project construction actions. These locations and a photo of the structure at each is shown in Figures 2 and 3. A description of the design approach and existing and proposed structure components for each of the adverse effects is presented below. Additionally, approximately 3 miles of the LSMRR will experience a temporary adverse effect from the loss of operation during the 3 year construction period.

Area 1
Area 1 is at the northernmost point of the project footprint (Figure 2). The impact at this location will be temporary; this area of the railroad segment will be temporarily closed during remedy construction.

> *Existing rail components*: Open rail line.
> *Design approach*: Installation of standard chain link fence across the track. No components of the track or ties will be impacted. The fence will be removed after construction is complete.

Area 2
Area 2 is located north of Unnamed Creek (Figure 2). The impact at this location will be temporary; a truck crossing will be built to allow for movement of materials dredged from the estuary to the CDFs.

> *Existing rail components*: Open rail line.
> *Design approach*: A 20-foot truck crossing is planned north of Unnamed Creek during construction to transport dredged material from one side of the railroad tracks to the other without damaging the existing tracks. The crossing will be designed to 20 feet to allow for the possibility of two-way vehicle traffic. The track will be left in-place and construction will involve an at-grade crossing structure over the track. Geotextile fabric will be placed on top of the existing track to provide separation and prevent material and overspill from the crossing contaminating the original track bed. For additional protection, gravel may be placed next to further reduce the truck impact. Gravel would be followed by an additional layer of fabric to prevent gravel from settling in and around the rail line. This fabric would be a higher strength woven mono-filament

fabric to withstand gravel removal activities once construction is complete. Timber planking/mats will be placed over the geotextile fabric, between and outside of the rails, to spread the loads from trucks and other construction equipment and raise the surface of the crossing above the rail. Finally, grading will be completed on both sides of the rail tracks to minimize jostling of material crossing the tracks. Restoration will include removing the geotextile and timber planking/mats, and mats and replacing the ballast with similar material as needed. A construction monitoring and post-construction monitoring survey will include rail and ties to confirm no changes during construction, a post-construction to confirm no changes will also be completed. The crossing location is show in Attachment A, Drawing CA-101.

Area 3

Area 3 is located at a section of rail line at the rail curve in Unnamed Creek (Figure 2). Both a temporary and a permanent impact will occur at this location. A temporary diversion of water is under consideration in Unnamed Creek. A permanent new bridge will be constructed to allow for stream flow from Unnamed Creek to be rerouted to pass below the railroad. The area where the current bridge is located has been damaged by flooding as recently as 2012.

Existing rail components: Open rail line.
Design approach: The temporary diversion of water (if necessary) will involve excavation through the railroad embankment to allow Unnamed Creek to divert and discharge to Spirit Lake. The temporary diversion will be located along the west side of the Upland CDF and discharge to Spirit Lake at the northernmost extent of the CDF. If required, this excavation will be similar to temporary crossing impacts regarding removal of railroad rails, ties, and ballast, reconstruction of embankment following temporary diversion activities during remediation, and reuse of existing components to extent practical. The bridge design in shown in Attachment A, Drawing CU-104.

The newly constructed permanent bridge will impact 90 total feet of railroad; the bridge will span 50 feet and require 40 feet of total excavation to construct the bridge foundations. The bridge will be composed of precast concrete and prestressed, with a 3-span concrete ballast deck bridge. A trapezoidal opening for hydraulic capacity will be installed and bridge component elevations will transition to existing rail and tie elevation, with only minor adjustments. The top of rail elevation for the proposed bridge will be 606.2 ft. The existing top of rail elevation is 606.3 ft. The top of bridge elevation will be 606.3 feet and the bridge deck will be 2.5 ft thick with a bottom of bridge elevation of 603.8 ft. The channel dimensions under the bridge include a top channel width of 40 ft, a bottom channel width of 26.2 ft, and side slopes at a 3:1 grade. The bridge design will reduce flooding impact to the railroad since the channel under the bridge will be able to convey the 100-year storm event without overtopping the railroad, though this flow will submerge the bottom of the bridge deck. Since the bridge has been designed to convey all upstream flow from Unnamed Creek, existing culverts under the railroad at the original crossing will be abandoned and filled with flowable fill (as described for Area 5, below). A construction monitoring survey will include evaluation of the rail and ties to confirm no changes are occurring during construction of the track; a post-construction survey to confirm no changes have occurred once will also be performed.

Area 4

Area 4 is located on both the north and south sides of the newly constructed bridge in Unnamed Creek (Figure 2). The impact at this location will be temporary; the rail line on either side of the new bridge will be adjusted to meet the bridge elevation. A detailed photograph showing the existing rail line at the location of Area 4 was not available; however, based upon visual observations from site reconnaissance performed in 2016, the condition and components of the track in Area 4 is comparable to that of the track shown in the photograph for Area 3.

Existing rail components: open rail line.
Design approach: The rail on the north and south sides of the new bridge at Unnamed Creek will be tapered to meet the new bridge elevation; approximately 260 feet of rail will be impacted. The rail steel alignment may be adjusted to meet design standards for maintaining curvature, grades, and related tolerances for rail steel to connect to new rail segments for bridges. Adjustments on the order of tenths of inches are expected and in general this is not considered an impact to the railroad historical integrity, as rail is reused, and only slight adjustments will be made.

Area 5
Area 5 is in Unnamed Creek near the boundary of the estuary confined disposal facility (CDF) (Figure 2). The impact at this location will be permanent; five culverts that were originally installed to replace a 2-span timber bridge that was damaged by flooding in 2012 are in poor condition will be abandoned.

Existing rail components: Five 42 to 48-inch corrugated metal pipes.
Design approach: The Unnamed Creek channel alignment will be moved as part of the design and several storm water culverts under the railroad will be abandoned with flowable fill as the channel alignment shifts north. A construction monitoring and post-construction monitoring survey will include a survey of the rail and ties to confirm that no changes are expected to occur/occurred during construction. Work to abandon the culverts will not remove the existing rail embankment and/or tracks. The location of the culvert abandonment is show in Attachment A, Drawing CA-102.

Area 6
Area 6 is located near the access to the spit of land in Unnamed Creek (Figure 2). Both a temporary and a permanent impact will occur at this location. A temporary truck crossing will be built to allow for movement of materials dredged from the estuary to the CDFs and the rest of the site. Once the remedy is complete, the temporary road will be converted into a permanent maintenance road to access the Delta CDF.

Existing rail components: open rail line.
Design approach: A 20-foot truck crossing is planned at the spit of land in Unnamed Creek during construction to transport soil and equipment between the Shallow Sheltered Bay, the Delta CDF, and rest of the site. The crossing will be designed to 20 feet to allow for the possibility of two-way vehicle traffic and will allow the transport of material without damaging the existing track. The track will be left in-place and construction will involve an at-grade crossing structure over the track. For additional protection, gravel may be placed next to further reduce the truck impact. Gravel would be followed by an additional layer of fabric to prevent gravel from settling in and around the rail line. This fabric would be a higher strength woven mono-filament fabric to withstand gravel removal activities once construction is complete. Once the remedy is complete, the at-grade crossing will be left in place to become a permanent maintenance road for access to the Delta CDF. Concrete pads will be placed between the tracks to protect the rail line from repeated crossing by a standard utility truck that would access the Delta CDF to perform routine long-term monitoring and maintenance activities. The crossing location is show in Attachment A, Drawing CA-101.

Area 7
Area 7 is located just north of the current opening to Wire Mill Pond (Figure 3). The impact at this location is temporary; a truck crossing will be built to allow for movement of materials dredged from the estuary to the CDFs and the rest of the site.

Existing rail components: open rail line.
Design approach: A 20-foot truck crossing is planned at Wire Mill Pond to allow dredged material to be transport to the CDFs. The crossing will be designed to 20 feet to allow for the

possibility of two-way vehicle traffic and will allow the transport of material without damaging the existing track. The track will be left in-place and construction will involve an at-grade crossing structure over the track. For additional protection, gravel may be placed next to further reduce the truck impact. Gravel would be followed by an additional layer of fabric to prevent gravel from settling in and around the rail line. This fabric would be a higher strength woven mono-filament fabric to withstand gravel removal activities once construction is complete. The crossing materials, construction process, and restoration of the rail post construction will be as described for the temporary truck crossings in Areas 2 and 6. The crossing location is show in Attachment A, Drawing CA-101.

Area 8

Area 8 is at the entrance to Wire Mill Pond (Figure 3). The impact at this location is permanent; a new bridge will be installed to improve connectivity between Wire Mill Pond and the estuary.

Existing rail components: The Wire Mill Pond outlet structure with retaining wall abutments; the bridge was rebuilt in 1945, with modifications in the late 1990's.
Design approach: The existing timber bridge and culvert will be removed, and the channel will be widened to allow greater circulation of water in and out of Wire Mill Pond. The new precast concrete, prestressed, 3-span concrete ballast deck bridge will have a total length of approximately 55 ft and will be installed to allow the train to cross the new, wider channel. The new bridge will require 40 feet of total excavation to construct the foundations. Bridge component elevations will transition to existing rail and tie elevation, with only minor adjustments. The new railroad bridge will have a top of rail ties elevation of 607 ft and a thickness of 2.5 feet. The existing top of rail elevation is 607 ft. The bottom of the bridge will be at an elevation of 604.2 ft. The channel below the bridge will have a top width of 46 ft, a bottom width of 26.8 ft, an invert elevation of 599.5 ft, and side slopes at a 3:1 grade. A construction monitoring survey will include evaluation of the rail and ties to confirm no changes are occurring during construction of the track; a post-construction survey to confirm no changes have occurred once will also be performed. The bridge design is shown in Attachment A, Drawing CA-102 and CR-105.

Area 9

Area 9 is located at the southernmost extent of the project boundary (Figure 3). The impact at this location will be temporary; this area of the railroad segment will be temporarily closed during remedy construction.

Existing rail components: Open rail line.
Design approach: Installation of standard chain link fence across the track. No components of the track or ties will be impacted. The fence will be removed once construction is complete.

2. Consideration of the Secretary of the Interior's Standards for Rehabilitation

The Secretary of Interior's standards defines the act of rehabilitation as the process by which a compatible use for a historic property is made possible through repair, alterations, and additions while preserving those portions of features which convey its historical, cultural or architectural values. Of the ten Standards for Rehabilitation, standards 9 and 10 are most applicable to the project adverse effects on the LSMRR, as they pertain to new additions, alterations and construction being compatible with and differentiated from historic materials, and new components being added in such a way that the integrity of the historic property is unimpaired.

Each of the permanent adverse effects to the LSMRR from the project have been evaluated for adherence to these standards. The temporary adverse effects described above were not evaluated, as these will only occur during the construction period; once construction is complete, any new elements added to or near

the track will be removed and the area restored to original condition, with no permanent landscape changes and no impact to the historical integrity of the railroad.

The discussion below (and summary in Table 1) presents the elements of permanent impact to the LSMRR that contribute to historic character, the elements that do not contribute to historic character, and how the design at each location meets the following guidelines for rehabilitation set forth in the Secretary's recommendations which are applicable to this project:

- *Identify, retain, and preserve historic materials and features*- Identification of the features and materials that are important in defining the property's historic character and which must be retained to preserve that character.
- *Protect and maintain historic materials and features*- Protection of the features involves the least degree of intervention possible and includes maintenance of the materials and ensuring property is protected during work.
- *Repair historic materials and features*- Repairing includes the limited replacement of in kind or with a compatible suitable material of deteriorating or missing components.
- *Replace deteriorated historic materials and features*- Replacement of an entire character-defining feature with new material; feature should be replaced to match the historic feature based on physical documentation of its form and detailing.

The following guidance provided in the rehabilitation standards is not discussed for the adverse effects to the LSMRR, as these items are not applicable to the project:

- *Design for the replacement of missing historic features*- Replacement of a missing feature (when information about the feature is inadequate to permit reconstruction) by designing a new feature that is compatible with the overall historic character of the property.
    - It is anticipated that adequate information on contributing components of the LSMRR is available such that reconstruction of features with in kind material would be possible.
- *Alterations*- Includes changes to the feature site or setting, such as removal of portions of the property that are intrusive, to ensure its continued use.
    - It is not anticipated that any areas of the property will be removed entirely without any repair or replacement of contributing historical features.
- *Accessibility and Life Safety*- Rehabilitation work that involves accessibility or life safety requirements must be assessed for impact on the historic property.
    - The project does not involve work specific to rehabilitation of accessibility or life safety features on the property.
- *Resilience to Natural Hazards*- If the historic property has existing characteristics that help to address or minimize adverse effects from natural hazards, these must be considered during rehabilitation work such that there is minimal effect on the historic character of the property.
    - The LSMRR does not currently have existing characteristics that specifically address or minimize adverse effects from natural hazards; therefore, impacts to the LSMRR as defined in this memorandum will not negatively affect the railroad resilience.
- *Sustainability*- The historic property's existing energy efficient features should be retained and/or repaired during the rehabilitation work.
    - The LSMRR does not contain any energy efficient features.
- *New Exterior Additions and Related New Construction*- Applicable if the historic property is being expanded by an attached exterior addition.
    - The project will not involve any additions to the LSMRR.

New Bridges at Unnamed Creek and at Wire Mill Pond Outlet

Existing rail components where the new bridge is to be constructed at Unnamed Creek (Figure 2, Area 3) that contribute to historical character and integrity include 90 total feet of railroad segment, and associated rails, ties, ballast, and embankment materials. Components that do not contribute to historical

integrity include all embankment materials below ballast; these materials are considered replaceable with general fill or other geotechnically suitable material.

Existing rail components where the bridge is to be constructed at Wire Mill Pond Outlet (Figure 3, Area 8) that contribute to historical character and integrity include 95 feet of railroad segment and wooden bridge structure, and associated rails and ties. Components that do not contribute to historical integrity include the retaining wall abutments.

The design of these bridges will meet the guidelines for rehabilitation (Table 1):

- *Identify, retain, and preserve historic materials and features*- The project team has identified which components of the rail at these locations are contributing and non-contributing (Table 1).
- *Protect and maintain historic materials and features*- Existing historic materials at these locations will be reused to the maximum extent practicable while still achieving the goals of the overall project design, and to the extent the materials are structurally sufficient. All best management practices to maintain the structural sufficiency of existing materials during removal, handling and reconstruction will be implemented. To be reused, the existing materials much achieve design standards and design criteria involving maintenance and longevity considerations for new railroad materials.
- *Repair historic materials and features/ Replace deteriorated historic materials and features* - Work may include repair or limited replacement of contributing components with in kind or with a compatible suitable material. Both bridges will be designed with colorized concrete for bents, abutments and spans and other features to match the look of timber for historical aesthetics.

At-grade Crossing for Permanent Road in Unnamed Creek
Existing rail components where the permanent maintenance road will be constructed near the spit of land in Unnamed Creek (Figure 2, Area 6) that contribute to historical character and integrity include open rail line and associated ties and ballast. Components that do not contribute to historical integrity will include concrete or equivalent material to support vehicle loading (feature added during construction).

The design of the permanent maintenance road will meet the guidelines for rehabilitation (Table 1):

- *Identify, retain, and preserve historic materials and features*- The project team has identified which components of the rail at this location are contributing and non-contributing (Table 1).
- *Protect and maintain historic materials and features*- Only minor changes to historic features involving replacement of ballast with concrete slightly higher in elevation to protect rails are anticipated. All best management practices to maintain the structural sufficiency of existing materials during removal, handling and reconstruction will be implemented.
- *Repair historic materials and features/ Replace deteriorated historic materials and features* - Existing historically significant materials removed for construction of the crossing (rail, ties, ballast) will be reused to extent practical as described above for bridge construction. The added concrete or equivalent material to support vehicle loading is not contributing to historical integrity, but as a new component will be designed to have some visual appeal to subdue the change, such as colorized concrete to match the timber aesthetic of the remaining historic contributing rail ties. Over time, many rail ties have been replaced with modern appearing ties throughout the property.

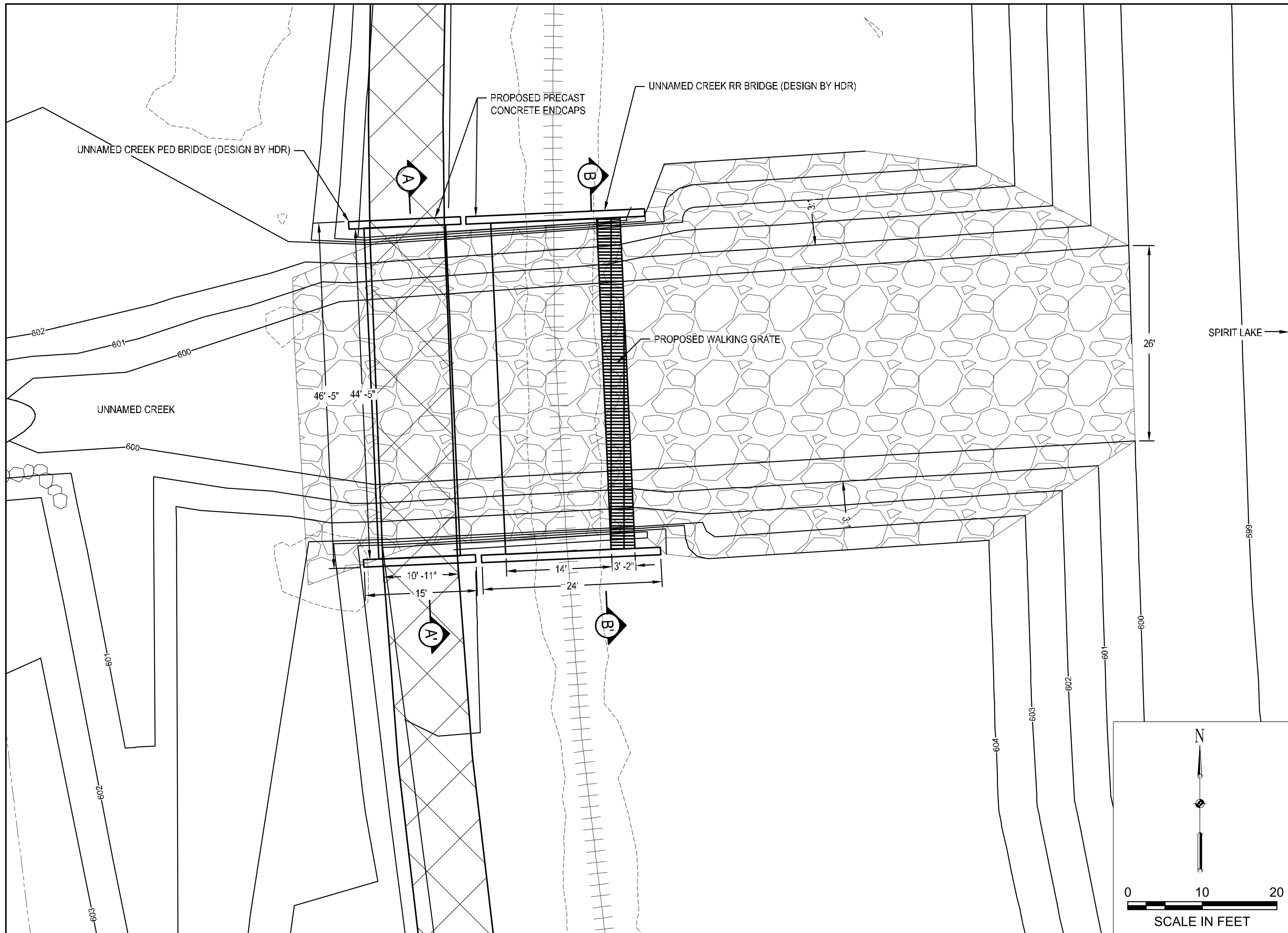
Culvert Abandonment
There are no existing rail components that will be impacted at this location in Unnamed Creek (Figure 1, Area 3). Components that do not contribute to historical character and integrity include five 42 to 48-inch corrugated metal pipes. Although culvert abandonment is a permanent impact along the LSMRR, the work to abandon these culverts and fill with flowable material will not remove or negatively impact existing rail embankment or tracks (Table 1).

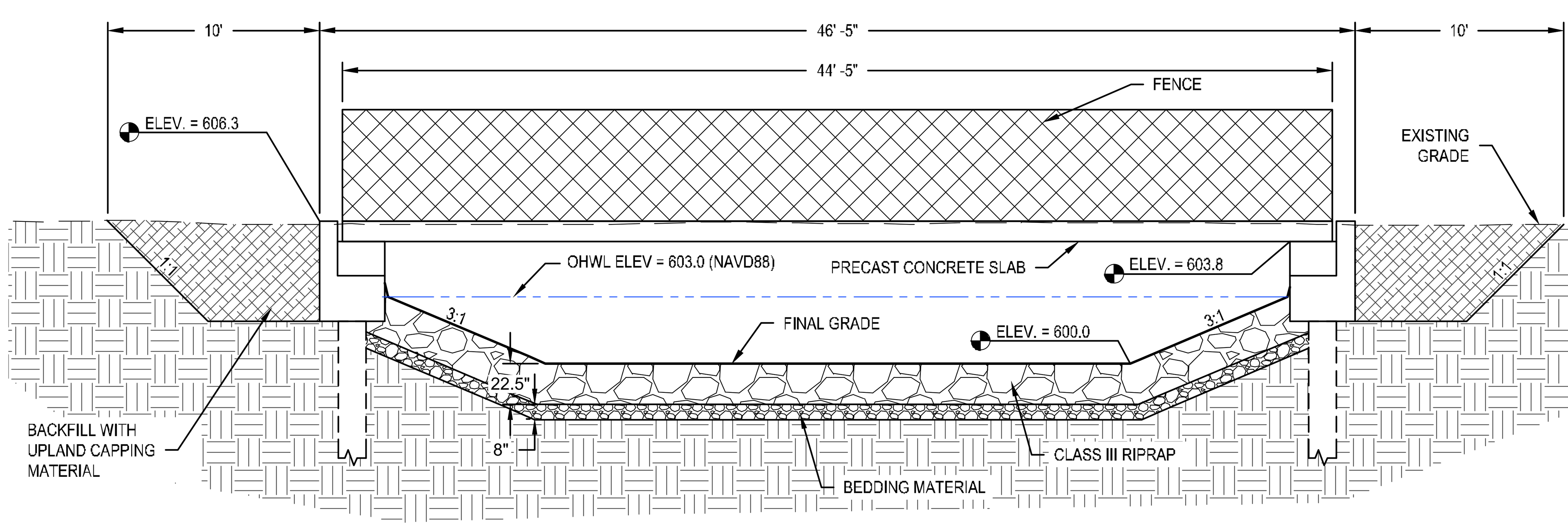
Avoidance and Minimization Efforts in All Impact Areas

Throughout the design construction, all practicable efforts to avoid or minimize adverse effects to historical features of the LSMRR will be implemented. Where permanent adverse effects are likely to occur, the following measures will be taken, as practicable:

- Avoidance in the design: where possible, additional adverse effects to the historical features of the LSMRR will be avoided. Note that to achieve project goals, impacts may not be avoidable, but all efforts will be taken to minimize the severity of the impact.
- Recordation consistent with documenting resources prior to adverse effect will be performed: this will enable minimization of impacts as well as support the best repair/replacement efforts, if necessary.
- Material reuse: original historical components will be reused to the maximum extent possible and new bridge components will be constructed to be compatible with the historical integrity of the property.
- Compatible new materials: for the bridge at Unnamed Creek and at Wire Mill Pond, all efforts will be made to construct the piling configuration such that it is slightly recessed, an select pilings of an appropriate type and size to give the impression of timber piles that are compatible with the historical character.
- Inclusion of signage: at some adverse effect locations (in coordination with City of Duluth planned public trail), signage may be displayed to present historical information about the LSMRR.
- Monitoring and surveys: construction surveys will be performed that document the pre-construction condition and post-construction condition of all impacted areas.

TABLE 1. SUMMARY OF SPIRIT LAKE LSMRR DESIGN ELEMENT COMPLIANCE WITH THE GUIDELINES FOR REHABILITATION							
Permanent Impact	**Impact Area**	**Historical Resource Components Affected**	**Non-historical Resource Components Affected**	**Compliance with the Secretary of the Interior's Guidelines for Rehabilitating Historic Properties**			
				Identify, Retain, and Preserve Historic Materials and Features	**Protect and Maintain Historic Materials and Features**	**Repair Historic Materials and Features**	**Replace Deteriorated Materials and Features**
New Bridge at Unnamed Creek	Area 3 (Figure 2)	• Segment of railroad embankment, including rails, ties, ballast, and embankment materials	• Embankment materials below ballast	YES	YES • Protection during construction • Reuse material as possible	YES • Repair/replace with in kind material if possible • Compatible material to keep historical integrity • Repair vs. replace dictated by structural sufficiency of existing material and suitability to achieve design criteria for current railroad construction materials • Added concrete colorized to match timber aesthetic	
Bridge at Wire Mill Pond Outlet	Area 8 (Figure 3)	• Wooden bridge structure constructed in 1945, including rail and ties	• Retaining wall abutments	YES	YES • Protection during construction • Reuse material as possible	YES • Repair/replace with in kind material if possible • Compatible material to keep historical integrity • Repair vs. replace dictated by structural sufficiency of existing material and suitability to achieve design criteria for current railroad construction materials • Added concrete colorized to match timber aesthetic	
At-grade crossing for permanent road in Unnamed Creek	Area 6 (Figure 2)	• Segment of railroad embankment, including rails, ties, ballast, and embankment materials	• Added concrete or equivalent material to support vehicle loading	YES	YES • Protection during construction of crossing • Minor changes needed for rail protection • Reuse material as possible	YES • Repair/replace with in kind material if possible • Added concrete colorized to match timber aesthetic of the rail ties	
Culvert Abandonment	Area 5 (Figure 2)	• No components contributing to historic integrity identified at this area, culverts were installed in 2012	• Five 42 to 48-inch corrugated metal culverts	Not applicable- Work to abandon culverts will not impact the existing rail embankment and/or rail line			

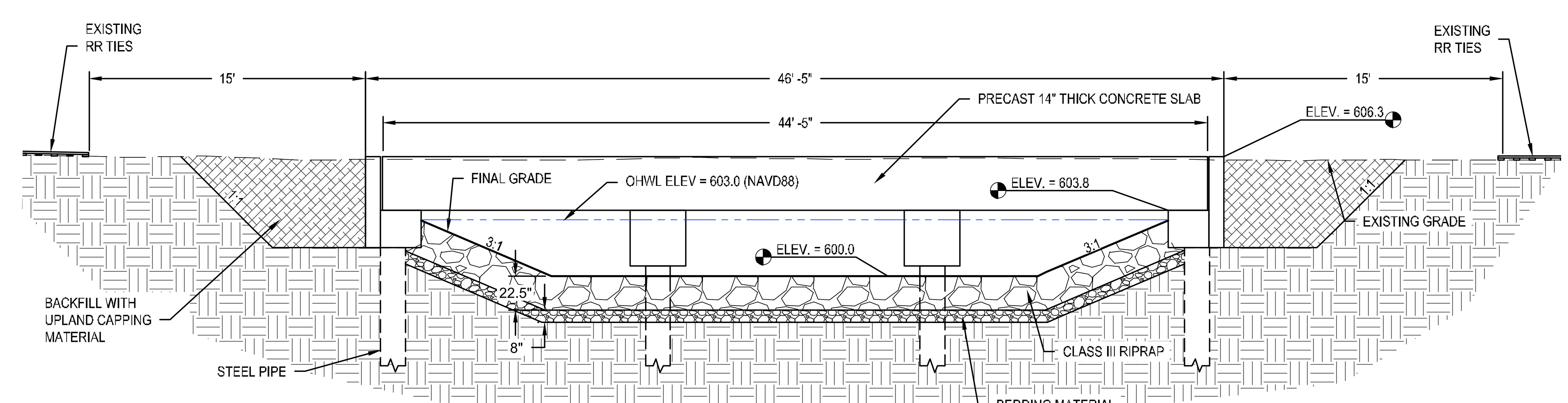




A
CU-104

UNNAMED CREEK PED BRIDGE SECTION

SCALE: NO SCALE



B
CU-104

UNNAMED CREEK RR BRIDGE SECTION

SCALE: NO SCALE

NOTE:

1. REMOVE RAILROAD TIES 15' FROM BASE OF THE PROPOSED PRECAST CONCRETE ABUTMENT CAPS ON BOTH SIDE OF BRIDGE.

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION

DESIGNED BY: LLR
DRAWN BY: JRM
CHECKED BY: JMT
PROJECT MANAGER: JB

SEAL

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAMES BEAVER P.E. 48712, MAY 2019. IT IS NOT TO BE USED FOR CONSTRUCTION OR BIDDING.

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN

DULUTH, MINNESOTA

UNNAMED CREEK BRIDGE PLAN

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-945-8010

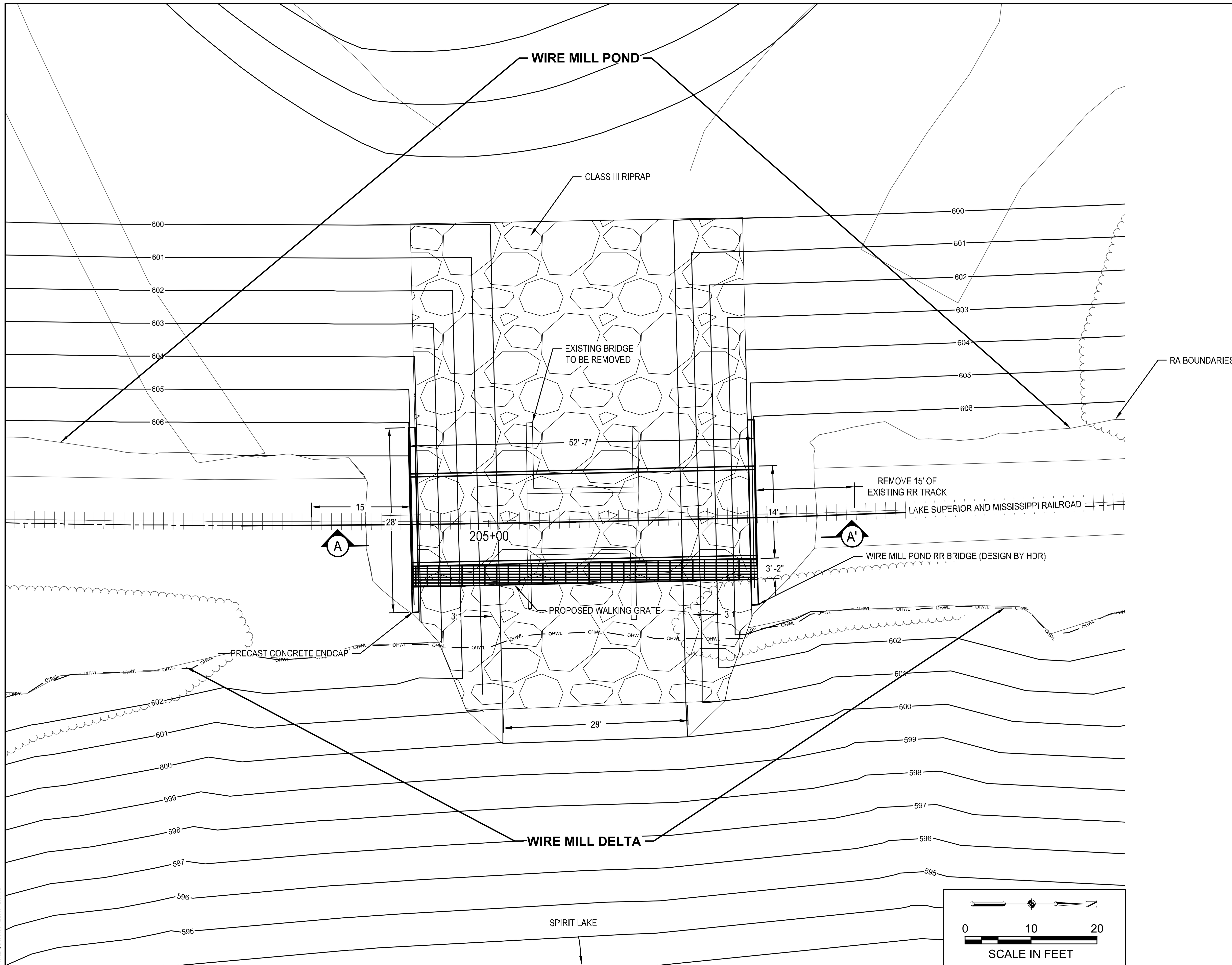
DATE: JUNE 2019

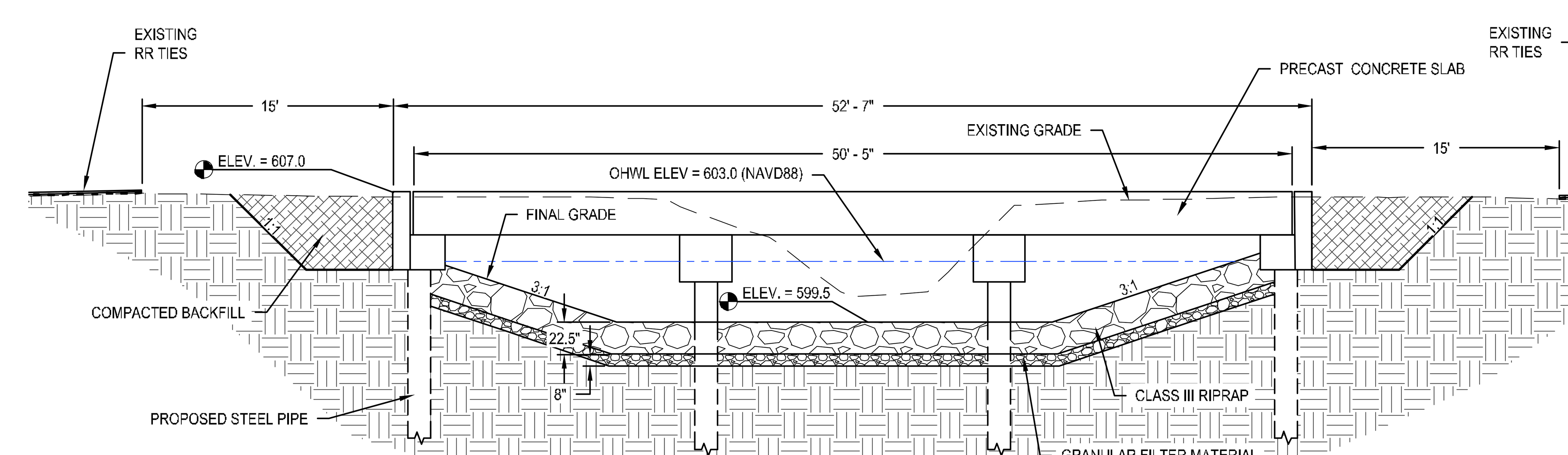
PROJECT NUMBER: 1518924

CU-104

SHEET: 23 OF 116

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION





B
CU-104

WMP RR BRIDGE SECTION
SCALE: NO SCALE

NOTE:

1. REMOVE RAILROAD TIES 15' FROM BASE OF THE PROPOSED PRECAST CONCRETE ABUTMENT CAPS ON BOTH SIDE OF BRIDGE.
2. STOCKPILE RAILS, SALVAGEABLE TIES, AND BALLAST MATERIAL FOR REUSE IN ACCORDANCE WITH THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 PERMITTING REQUIREMENTS.

REVISIONS			
NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: LLR
DRAWN BY: JRM
CHECKED BY: JMT
PROJECT MANAGER: JB

SEAL

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF JAMIE BEAVER P.E. 48712, MAY 2019. IT IS NOT TO BE USED FOR CONSTRUCTION OR BIDDING.

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

WIRE MILL POND SEDIMENT REMOVAL PLAN

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
221 Sun Valley Boulevard; Suite D
Lincoln, NE 68528
(402) 476-3766

DATE: JUNE 2019
PROJECT NUMBER: 1518924

CR-104

SHEET: 48 OF 116

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

GENERAL NOTES

DESIGN LOADING

ALL COMPONENTS ARE DESIGNED IN ACCORDANCE WITH THE 2017 AREMA MANUAL FOR RAILWAY ENGINEERING, CHAPTER 8-CONCRETE STRUCTURES AND FOUNDATIONS.

LIVE LOAD:	E40 w/ DIESEL IMPACT
DESIGN SPEED:	10 MPH
MINIMUM BALLAST:	15 INCHES
MAXIMUM BALLAST:	24 INCHES
MAXIMUM TRACK ECCENTRICITY:	6 INCHES (FROM ℄ BRIDGE TO ℄ TRACK)

REFERENCE DATA

ALL DETAILS AND DIMENSIONS OF THE EXISTING SITE ARE BASED ON FIELD SURVEY DATA SUPPLIED BY LHB CORPORATION ON JUNE 15, 2016 WITH SUPPLEMENTARY DATA SUPPLIED ON JUNE 12, 2018.

BRIDGE STATIONING IS BASED ON THE INSIDE FACE OF THE NORTH EXISTING BACKWALL OF THE EXISTING WIRE MILL POND BRIDGE AS STATION 204+78.00.

BENCHMARK DATA:	SURVEY CONTROL POINT (HV-1302), STA 165+96.52, OFFSET 276.76' RIGHT, ELEV 651.21'.
VERTICAL DATUM:	NAVD88
HORIZONTAL DATUM:	NAD83/96 MINNESOTA NORTH ZONE

HYDRAULIC INFORMATION IS BASED ON HYDRAULIC MODELING INFORMATION PROVIDED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. DATED JANUARY 24, 2019 AND FEMA FIRM PANEL NO. 2704210045C.

GEOTECHNICAL INFORMATION IS BASED ON HDR ENGINEERING, INC. GEOTECHNICAL REPORT DATED MAY 2019.

BRIDGE STATIONING AND RIGHT-OF-WAY ARE BASED ON HISTORICAL NORTHERN PACIFIC RAILWAY (N.P. RY.) TRACK CHARTS.

GENERAL

IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE ACTUAL FIELD CONDITIONS AND ANY NECESSARY AS-BUILT DIMENSIONS AFFECTING THE SATISFACTORY COMPLETION OF THE WORK REQUIRED FOR THIS PROJECT.

NEW CONSTRUCTION SHOWN AS HEAVY LINES. EXISTING STRUCTURES TO REMAIN SHOWN AS LIGHT LINES. EXISTING STRUCTURES TO BE REMOVED SHOWN AS LIGHT DOTTED LINES.

CONTRACTOR IS RESPONSIBLE FOR DEWATERING TO FACILITATE CONSTRUCTION WHEN REQUIRED TO SATISFACTORILY COMPLETE THE WORK REQUIRED FOR THIS PROJECT.

IN ORDER TO ENSURE THE HYDRAULIC CAPACITY OF THE BRIDGE, THE FINISHED GROUND UNDER THE BRIDGE SHALL BE SHAPED TO MATCH THE UPSTREAM CHANNEL AND FLOODPLAIN AS SHOWN ON DRAWING BU-101.

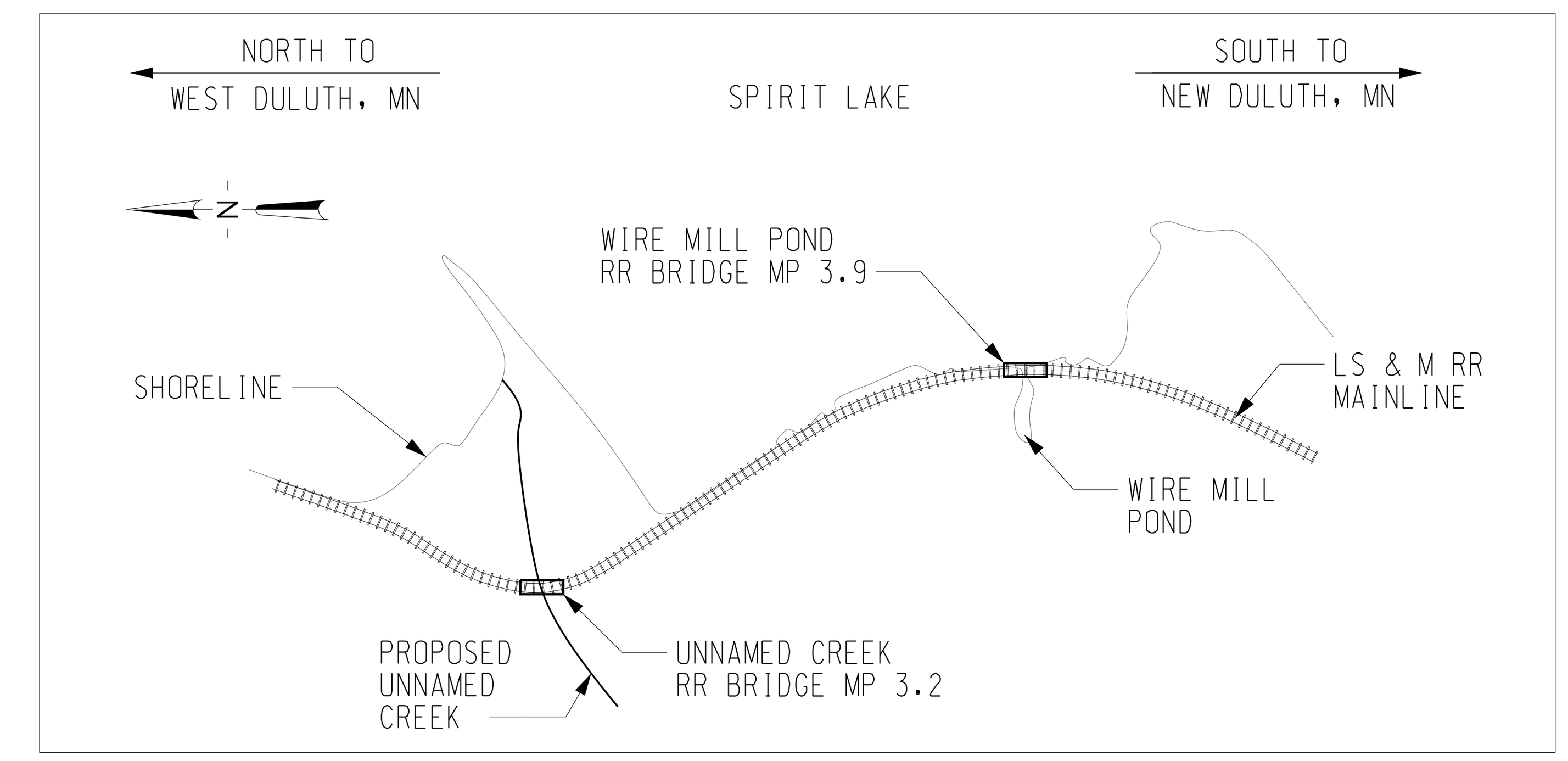
CONTRACTOR SHALL DOCUMENT ALL WORK IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS INCLUDING SUPPLYING: AS-BUILT DRAWINGS, PILE DRIVING RECORDS, AND SHOP DRAWINGS FOR ALL PREFABRICATED COMPONENTS. ALL SHOP DRAWINGS SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION PER THE PROJECT SPECIFICATIONS.

CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIALS IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS INCLUDING BUT NOT LIMITED TO EXISTING TIMBER STRUCTURES, SOILS, AND DEFICIENT TRACK MATERIALS.

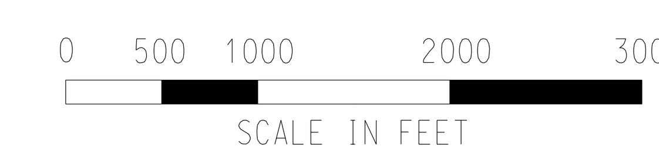
THE L.S.&M. RAILROAD IS AN HISTORIC RAILROAD. CONTRACTOR SHALL TAKE EXTREME CARE TO PRESERVE THE HISTORIC NATURE OF THE SITE AND RESTORE ANY DISTURBED AREAS TO PRE-CONSTRUCTION CONDITIONS.

TRACK MATERIALS INCLUDING TIES, RAIL, TIE PLATES, SPIKES, ETC. SHALL BE REUSED DURING TRACK RESURFACING TO PRESERVE THE HISTORIC NATURE OF THE RAILROAD. COMPONENTS SHALL BE INSPECTED FOR DEFECTS PRIOR TO PLACING BACK INTO SERVICE TO ENSURE SAFE OPERATION OF TRAINS. DEFECTIVE COMPONENTS MAY BE REPLACED WITH NEW MATERIAL OF A TYPE THAT CLOSELY MATCHES THE EXISTING COMPONENTS.

INFORMATION SHOWN ON THESE PLANS CONCERNING TYPE AND LOCATION OF EXISTING UNDERGROUND AND OVERHEAD UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF UNDERGROUND AND OVERHEAD UTILITIES BEFORE BEGINNING CONSTRUCTION.



VICINITY MAP



BID ITEMS ~ UNNAMED CREEK RR BR 3.2

ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT
1	FURNISH AND DRIVE PILE*	924	LF
2	FABRICATE AND INSTALL BRIDGE**	1	LS

*INCLUDES COAL TAR EPOXY COATING AS SPECIFIED ON SHEET BU-102.

**INCLUDES ALL COMPONENTS OF BRIDGE SHOWN ON THESE PLANS EXCEPT PILING.

LIST OF DRAWINGS ~ UNNAMED CREEK RR BR 3.2

DRAWING NUMBER	SHT. NO.	TITLE
BU-001	86	GENERAL NOTES AND ESTIMATED QUANTITIES
BU-101	87	GENERAL LAYOUT AND TYPICAL SECTIONS
BU-102	88	PILE PLAN AND DETAILS
BU-501	89	PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 1 OF 2)
BU-502	90	PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 2 OF 2)
BU-503	91	WALK AND DECK PLAN AND HANDRAIL DETAILS
STANDARD RR BRIDGE COMPONENTS AND DETAILS		
BG-501	98	PRECAST CONCRETE BENT CAP DETAILS AND NOTES
BG-502	99	PRECAST CONCRETE END BENT CAP DETAILS
BG-503	100	WALKWAY AND HANDRAIL DETAILS
BG-504	101	STEEL DETAILS
BG-505	102	MISCELLANEOUS DETAILS

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION

DESIGNED BY: CLB

DRAWN BY: RLW

CHECKED BY: AGH

PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN

DULUTH, MINNESOTA

UNNAMED CREEK RR BRIDGE
GENERAL NOTES AND ESTIMATED QUANTITIES

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

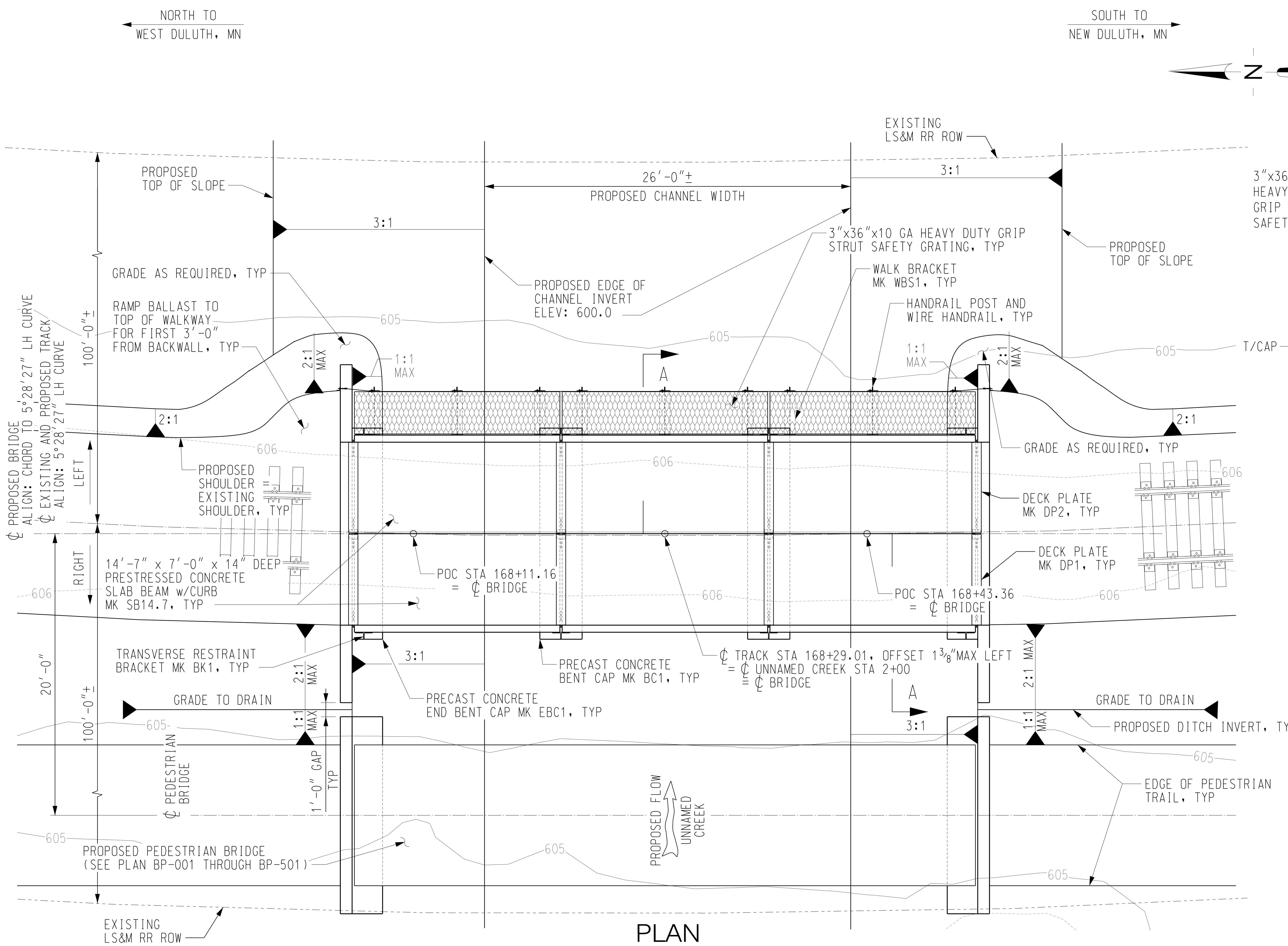
HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019

PROJECT NUMBER:

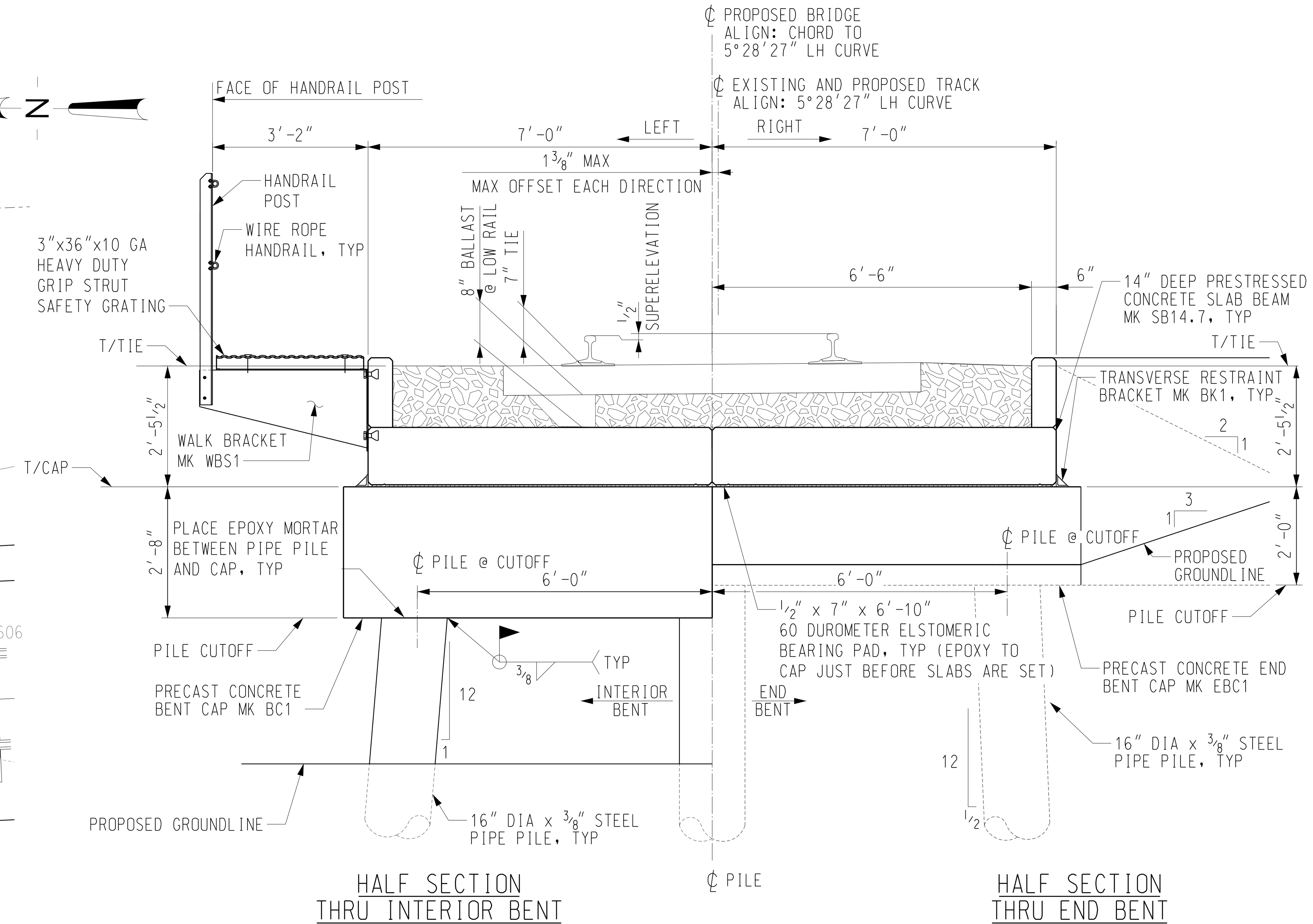
BU-001

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



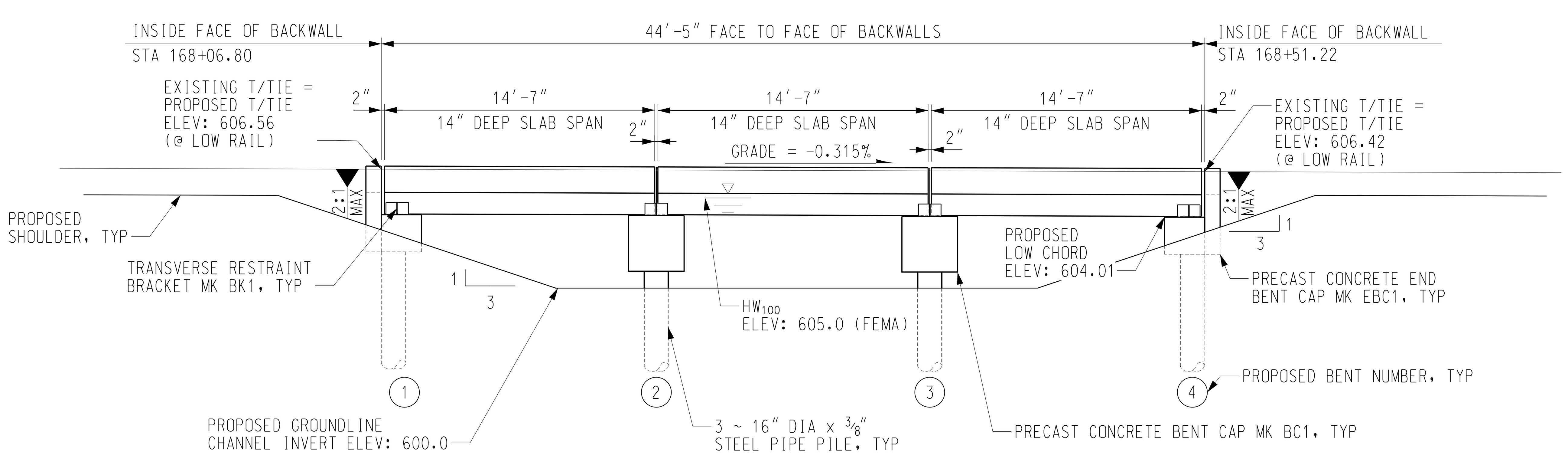
PLAN

SCALE: 3/16" = 1'-0"



SECTION A–A

SCALE: 1/2" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"
WALKWAY AND HANDRAIL NOT SHOWN FOR CLARITY

TABLE OF ELEVATIONS ~ UNNAMED CREEK RR BR 3.2

LOCATION	END BENT 1	BENT 2	BENT 3	END BENT 4
PROPOSED TOP OF TIE (@ LOW RAIL)	606.56	606.51	606.47	606.42
TOP OF CAP	604.10	604.05	604.01	603.97
PILE CUTOFF	602.10	601.39	601.34	601.97
TOP OF TIE TO PILE CUTOFF	4'-5½"	5'-1½"	5'-1½"	4'-5½"

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: RLW; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

UNNAMED CREEK RR BRIDGE
GENERAL LAYOUT AND TYPICAL SECTIONS

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

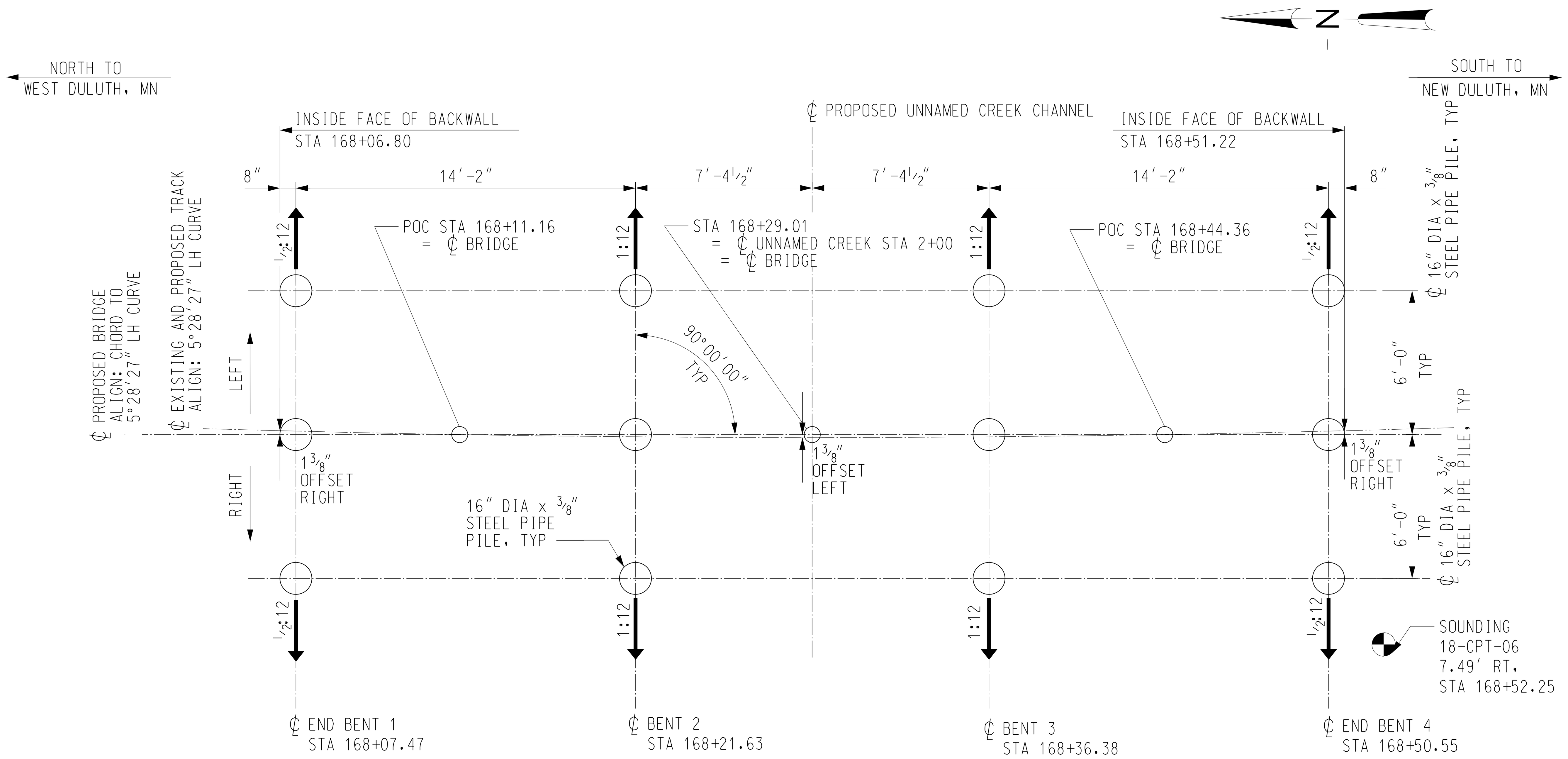
DATE: MAY 2019

PROJECT NUMBER:

BU-101

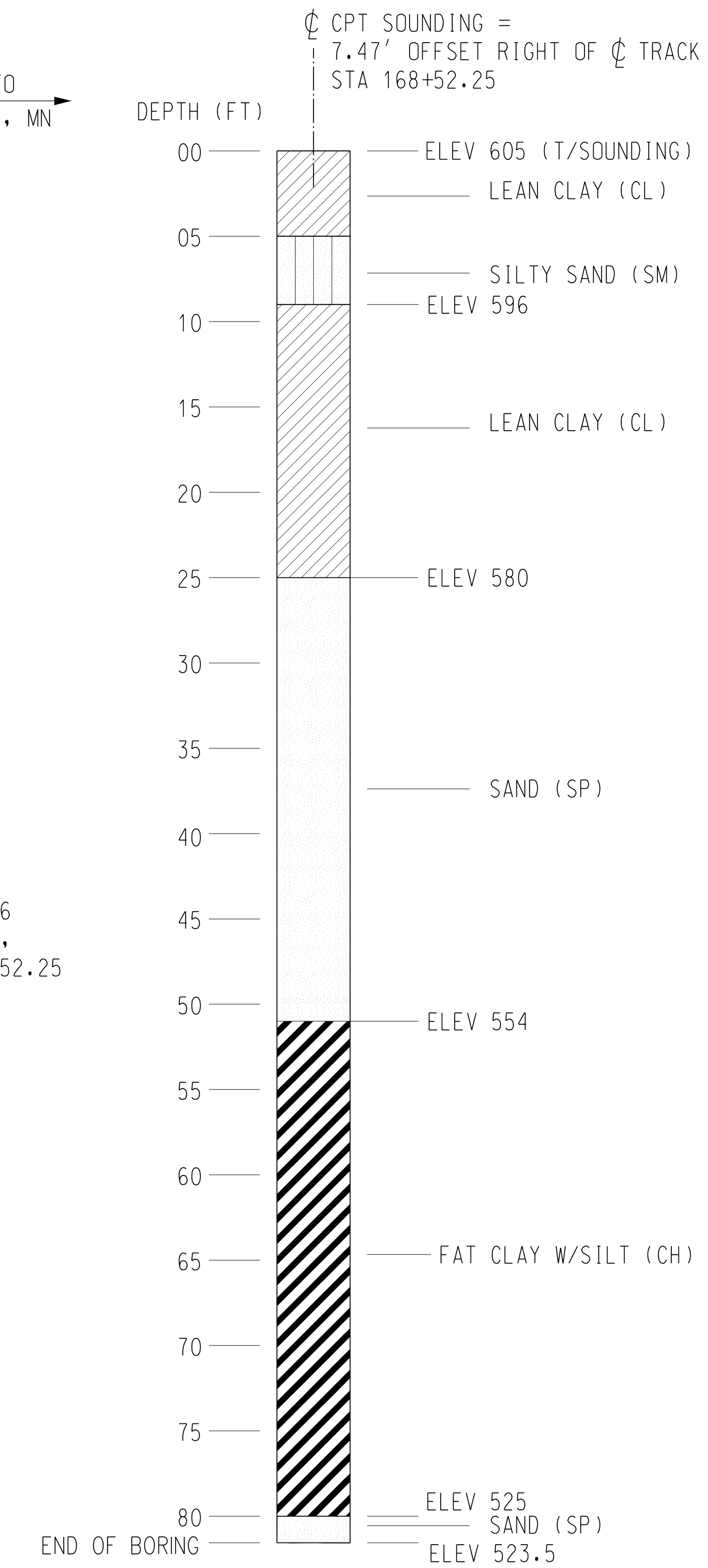
SHEET: 87 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



PILE PLAN

NO SCALE



SOUNDING 18-CPT-06

NO SCALE

PILE NOTES

PIPE PILES SHALL BE 16" DIA x ⅜" CONCRETE FILLED STEEL PIPE PILES AND MEET THE REQUIREMENTS OF ASTM A252 GRADE 3, Fy = 45 KSI.

PILE POINTS SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS ON ALL PIPE PILES PRIOR TO DRIVING.

DEBURR ALL EDGES.

FABRICATION SHALL CONFORM TO CURRENT AREMA GUIDELINES.

BRIDGE PIPE PILES SHALL BE DRIVEN PER THE PROJECT PROJECT SPECIFICATIONS TO THE DEEPER, MORE CONSERVATIVE DEPTH REQUIRED BY EITHER THE MINIMUM TIP ELEVATION OR TO ACHIEVE THE REQUIRED ULTIMATE CAPACITY NOTED IN THE PILE DATA TABLE. CONTACT THE ENGINEER IF PRACTICAL REFUSAL IS REACHED PRIOR TO REACHING THE MINIMUM TIP ELEVATION. ESTIMATED PILE LENGTH BELOW CUTOFF IS SHOWN IN THE PILE DATA TABLE.

CONTRACTOR SHOULD BE PREPARED TO ADJUST PILE LENGTH WITHOUT DELAYING THE PROJECT.

SYMBOL 1:12 → DENOTES DIRECTION AND AMOUNT OF PILE BATTER.

THE CONTRACTOR SHALL HAVE SUFFICIENT PILE SPLICE MATERIAL ON HAND BEFORE PILE DRIVING IS STARTED.

CONTRACTOR TO SUBMIT PROPOSED DRIVING SYSTEM WITH ACCOMPANYING DRIVEABILITY ANALYSIS TO ENGINEER FOR CONFIRMATION OF DRIVEABILITY. MINIMUM RECOMMENDED PILE DRIVING HAMMER ENERGY IS 40 KIP-FT (DELMAG 16-32 OR GREATER). NOTE THE RECOMMENDED HAMMER SIZE IS BASED ON ANTICIPATED ENERGY REQUIRED TO ACHIEVE THE MINIMUM TIP ELEVATION WHICH MAY BE DEEPER THAN THE ELEVATION AT WHICH THE REQUIRED ULTIMATE CAPACITY IS REACHED TO ENSURE PILE TIP REACHES COMPETENT SOIL LAYERS.

THE MAXIMUM HORIZONTAL OUT OF POSITION TOLERANCE AT THE CUTOFF ELEVATION IS 3 INCHES.

PILE COATING NOTES

A COATING OF TWO COMPONENT (SELF-CURING) COAL TAR EPOXY PAINT CONFORMING TO STEEL STRUCTURES PAINTING COUNCIL SPECIFICATION SSPC-PAINT 16, COAL TAR EPOXY BLACK (OR DARK RED PAINT) SHALL BE SHOP APPLIED (AS PER THE MANUFACTURER'S (RECOMMENDATIONS) TO THE ENTIRE OUTER SURFACE OF EACH PILE AND EMBED PLATE PRIOR TO PLACEMENT AS DETAILED BELOW.

STEEL SURFACES WHICH ARE TO RECEIVE THIS COATING SHALL BE PREPARED BY BLAST CLEANING TO NEAR WHITE, GRADE SSPC 10. THE COAL TAR EPOXY PAINT SHALL BE APPLIED BEFORE RUSTING OCCURS AND IN NO CASE LATER THAN 24 HOURS AFTER BLAST CLEANING.

THE COATING MAY BE APPLIED BY SPRAY OR BRUSH. IF THE APPLICATION IS BY BRUSH, APPLY WITH A STIFF BRUSH HEAVILY LOADED WITH PAINT; APPLY QUICKLY AND SMOOTHLY AND AVOID EXCESSIVE BRUSHING.

THE COATING SHALL BE APPLIED IN TWO COATS TO A TOTAL DRY FILM THICKNESS OF 16 MILS AT ITS THINNEST SPOT.

DRYING TIME BETWEEN COATS SHALL BE A MINIMUM OF 12 HOURS AND A MAXIMUM OF 72 HOURS UNDER NORMAL PAINTING CONDITIONS. LONG DRYING TIMES BETWEEN COATS WILL CAUSE POOR INTERCOAT ADHESION AND IT IS ADVISABLE IN WARM WEATHER TO REDUCE THE MAXIMUM INTERVAL BETWEEN COATS. IN VERY HOT WEATHER IT MAY BE NECESSARY TO LIMIT THE INTERCOAT DRYING PERIOD TO 24 HOURS OR LESS.

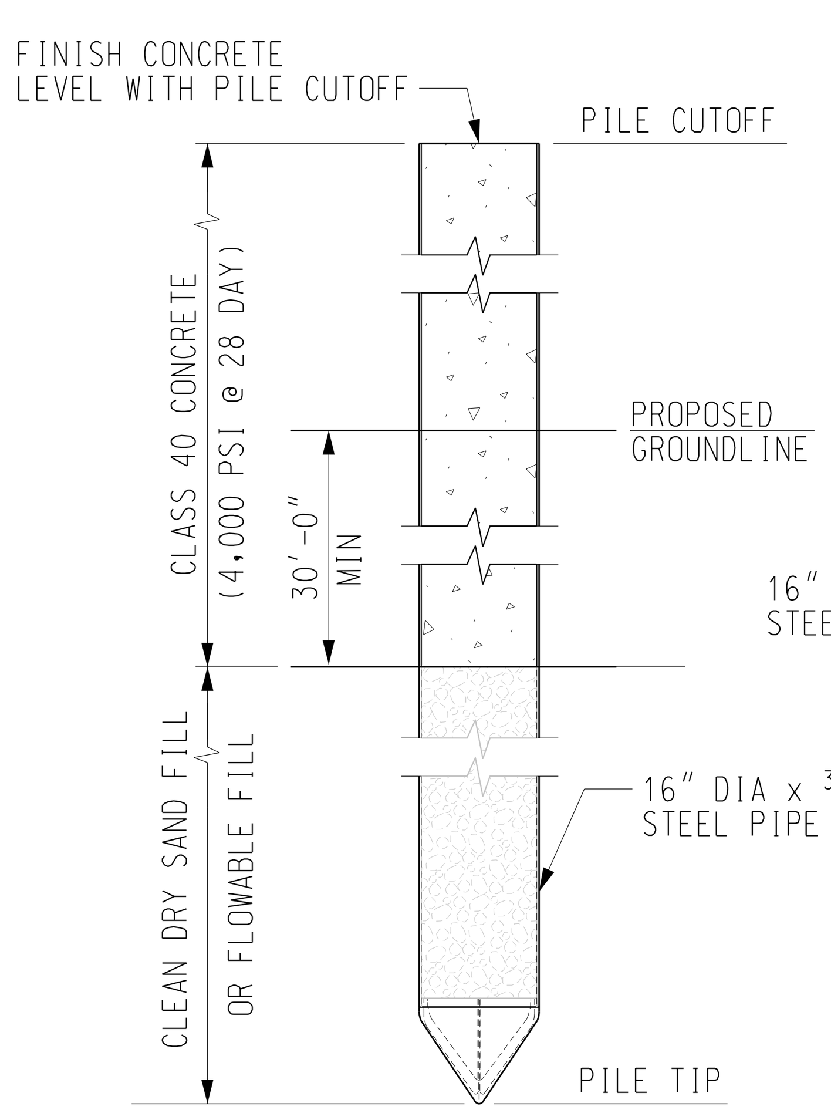
AT NORMAL TEMPERATURES THE COATING DRIES DUST FREE IN ABOUT FOUR HOURS AND BECOMES THOROUGHLY HARDENED AFTER 3 TO 5 DAYS OF CURING. PILE PLACEMENT SHALL NOT BEGIN SOONER THAN 5 DAYS AFTER COATING.

THE COATING SHALL NOT BE APPLIED WHEN THE RECEIVING SURFACES OR AMBIENT TEMPERATURES ARE BELOW 50 DEGREES FAHRENHEIT UNLESS IT CAN BE REASONABLY BE ANTICIPATED THAT THE AVERAGE AMBIENT TEMPERATURE WILL BE 50 DEGREES FAHRENHEIT OR HIGHER FOR THE 5 DAY PERIOD FOLLOWING THE APPLICATION OF ANY COAT.

STEEL MEMBERS WHICH ARE WELDED AFTER COATING SHALL HAVE THE COATING REMOVED FROM THE WELD AREAS AND SHALL RECEIVE TWO COATS OF THE COATING APPLIED TO THE WELD HEAT AFFECTED AREAS.

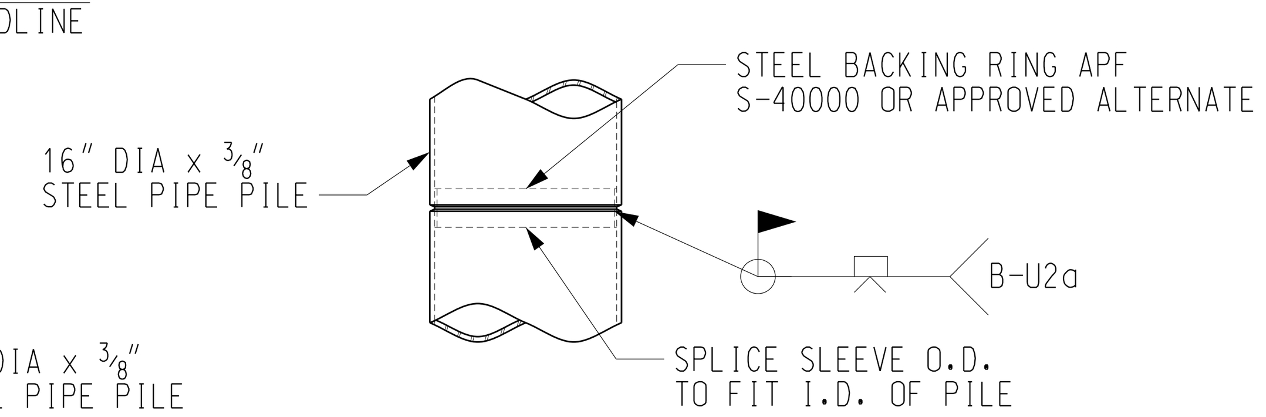
AFTER PLACEMENT, THE AREAS OF THE PILES AND BASE PLATES WHERE THE COATING HAS BEEN DAMAGED SHALL BE TOUCHED UP.

THE COST OF FURNISHING AND APPLYING THE COATING SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE PER FOOT FOR 16" DIA x ⅜" THICK STEEL PIPE BEARING PILE, FURNISH AND DRIVE.



PILE FILL DETAIL

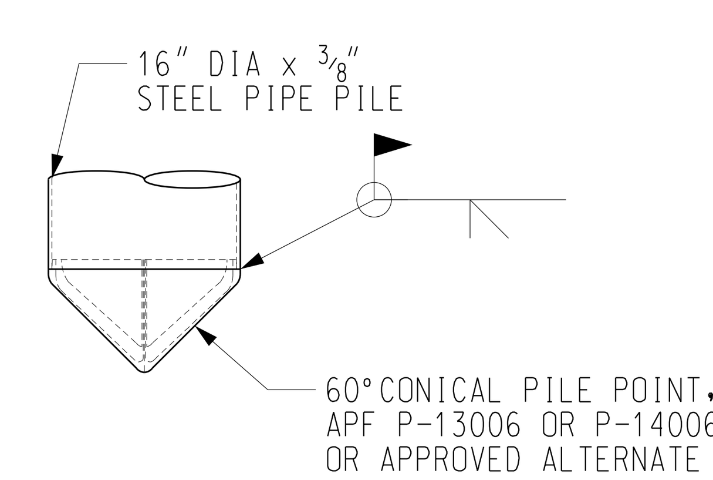
NO SCALE



PIPE PILE SPLICE DETAIL

NO SCALE

PILE SPLICE QUANTITY AND LOCATION TO BE DETERMINED BY CONTRACTOR BASED ON ORDERED LENGTHS



PIPE PILE POINT DETAIL

NO SCALE

PILE DATA TABLE ~ UNNAMED CREEK RR BR 3.2					
LOCATION	T/TIE ELEV	PILE CUTOFF ELEV	REQUIRED ULTIMATE CAPACITY (TON) *	MINIMUM TIP ELEV	ESTIMATED PILE LENGTH BELOW CUTOFF (FT)
END BENT 1	606.56	602.10	113	525	77.1
BENT 2	606.51	601.39	113	525	76.4
BENT 3	606.47	601.34	113	525	76.3
END BENT 4	606.42	601.97	113	525	77.0

* BASED ON FACTOR OF SAFETY = 2.0.

REVISIONS | NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB | DRAWN BY: RLW | CHECKED BY: AGH | PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

UNNAMED CREEK RR BRIDGE
PILE PLAN AND DETAILS

PREPARED FOR: EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019

PROJECT NUMBER:

BU-102

SHEET: 88 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

PRESTRESSED CONCRETE NOTES

MATERIALS

CONCRETE

CONCRETE MATERIAL, PLACING AND CURING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE PROJECT SPECIFICATIONS FOR PRECAST/PRESTRESSED CONCRETE PRODUCTS AND THE CURRENT EDITION OF CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.

THE COMPRESSIVE STRENGTH OF THE CONCRETE SHALL BE:
- PRETENSIONED CONCRETE:
  - $f'ci$ = 4,500 PSI (AT TRANSFER)
  - $f'c$ = 7,000 PSI (28-DAY)
- CURB CONCRETE:
  - $f'c$ = 4,500 PSI (28-DAY)

AIR ENTRAINING AGENTS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE CURRENT EDITION OF ASTM C260. THE TOTAL ENTRAINED AIR CONTENT SHALL BE 6% +/- 1% BY VOLUME OF THE PLASTIC CONCRETE.

CONCRETE AGGREGATE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE CURRENT EDITION OF ASTM C33. COARSE AGGREGATE SHALL BE SIZE NO. 67.

CONCRETE SHALL BE DYED TO ACHIEVE A UNIFORM NATURAL WOOD TONE FINISH PER THE PROJECT SPECIFICATIONS. PROPOSED COLOR SAMPLE SHALL BE SUBMITTED AND APPROVED PRIOR TO FABRICATION. PROPOSED COLOR SHALL MATCH THAT OF THE PRECAST CONCRETE BENT CAPS.

PRESTRESSING STRANDS

PRESTRESSING STRAND SHALL BE 0.5-INCH DIAMETER, SEVEN-WIRE, UNCOATED, LOW-RELAXATION STRAND WHICH IS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN ASTM A416. THE STRAND SHALL HAVE AN ULTIMATE TENSILE STRENGTH OF 270 KSI. THE INITIAL PRESTRESS SHALL BE 31,000 LBS. PER STRAND UNLESS NOTED OTHERWISE.

STRAND SHALL BE TESTED IN ACCORDANCE WITH PCI RECOMMENDATIONS (MOUSTAFA METHOD) AND CERTIFIED BY THE FABRICATOR AS HAVING ADEQUATE BOND CHARACTERISTICS TO SATISFY THE PREDICTION EQUATIONS FOR TRANSFER AND DEVELOPMENT LENGTH GIVEN IN THE AREMA MANUAL FOR RAILWAY ENGINEERING.

AN ALTERNATE STRAND PATTERN WHICH HAS THE SAME ECCENTRICITY AS THE PATTERN SHOWN ON THIS PLAN AND IS BETTER SUITED TO THE MANUFACTURER'S FACILITIES WILL BE CONSIDERED. MANUFACTURER MUST SUBMIT PLAN AND COMPUTATIONS TO ENGINEER FOR APPROVAL PRIOR TO CASTING.

REINFORCING STEEL

REINFORCING STEEL SHALL BE DEFORMED, PER CURRENT ASTM A615 SPECIFICATIONS AND MUST MEET GRADE 60 REQUIREMENTS. UNCOATED BLACK BARS SHALL BE USED FOR ALL LOCATIONS EXCEPT FOR CURB REINFORCING.

CURB REINFORCING DENOTED WITH "X" AT THE END OF THE MARK NUMBER (I.E. 3F1X) SHALL BE DEFORMED, CORROSION RESISTANT, HIGH STRENGTH REINFORCEMENT MEETING THE CURRENT ASTM A1035 SPECIFICATIONS AND MUST MEET GRADE 100 REQUIREMENTS.

FABRICATION OF REINFORCING STEEL SHALL BE PER CHAPTER 7 OF THE CRSI MANUAL OF STANDARD PRACTICE. DIMENSIONS OF BENDING DETAILS ARE OUT-TO-OUT OF BAR.

REINFORCING STEEL IS TO BE BLOCKED TO PROPER LOCATION AND SECURELY WIRED AGAINST DISPLACEMENT. USE PLASTIC PROTECTED REINFORCING SUPPORTS MEETING CRSI SPECIFICATIONS CHAPTER 3, CLASS 1. TACK WELDING OF REINFORCING IS PROHIBITED. MINIMUM CONCRETE ON REINFORCEMENT SHALL MEET CURRENT AREMA REQUIREMENTS. MINIMUM CONCRETE COVER IS $1\frac{1}{2}$ INCHES.

GALVANIZING

ALL INSERTS, NUTS, AND WASHERS SHALL BE GALVANIZED ACCORDING TO ASTM A153 (HOT DIP PROCESS) OR ACCORDING TO ASTM B695, CLASS 50, TYPE 1 (MECHANICAL PROCESS).

FABRICATION

CONCRETE

PRODUCTION PROCEDURES AND DIMENSIONAL TOLERANCES FOR THE MANUFACTURE OF PRECAST, PRESTRESSED BEAMS SHALL BE IN ACCORDANCE WITH THE AREMA MANUAL FOR RAILWAY ENGINEERING AND THE PRESTRESSED CONCRETE INSTITUTES CURRENT MANUAL MNL-116 FOR QUALITY CONTROL.

TOLERANCE FOR LOCATION OF LIFTING LOOPS SHALL BE +/- $\frac{1}{2}$".

THE ENDS OF THE STRANDS SHALL BE CUT OFF FLUSH WITH THE END OF THE BEAM AND PAINTED. RECESSES AND MINOR SPALLS MUST BE FILLED AND FINISHED TO THE PLAN DIMENSIONS USING AN EPOXY BONDING COMPOUND AND GROUT.

CURB SHALL BE CAST AFTER THE BEAM IS REMOVED FROM THE FORM.

CONCRETE BONDING AGENT: REFER TO SPECIFICATIONS

SURFACES SHALL BE FORMED IN A MANNER WHICH WILL PRODUCE A SMOOTH AND UNIFORM APPEARANCE WITHOUT RUBBING OR PLASTERING. UNLESS OTHERWISE NOTED, EXPOSED EDGES OF 90-DEGREES OR LESS ARE TO BE CHAMFERED $\frac{3}{4}$" X $\frac{3}{4}$". UNFORMED SURFACES SHALL HAVE A SMOOTH FINISH FREE OF ALL FLOAT AND TROWEL MARKS.

THE FABRICATOR SHALL STENCIL THE FABRICATOR'S NAME, DATE OF FABRICATION, PLACE MARK, AND LIFTING WEIGHT AT LOCATION SHOWN.

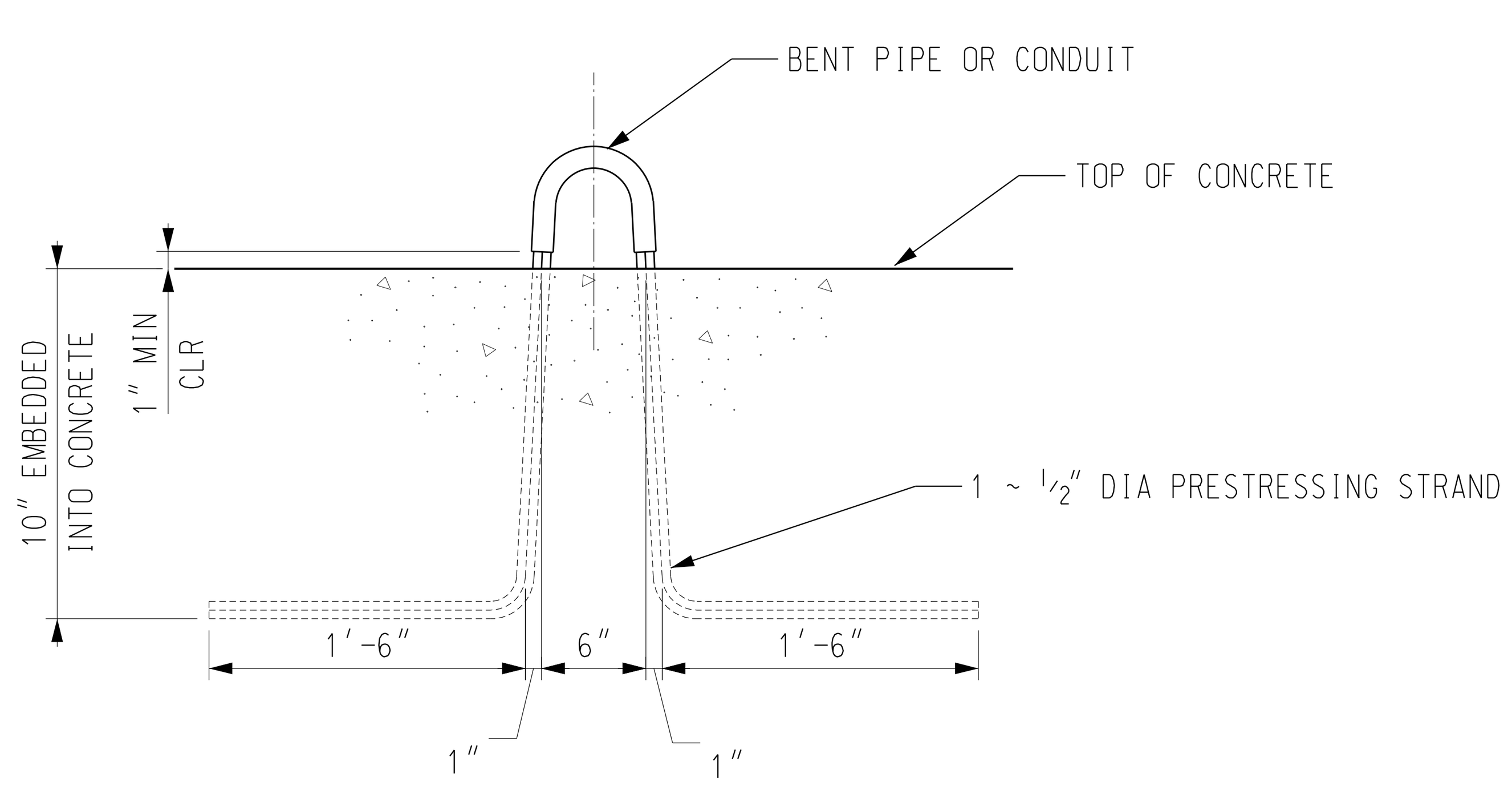
CURB TO BE DIVIDED INTO THREE EQUAL SEGMENTS AS SHOWN. IF CURB JOINTS CANNOT BE EQUALLY SPACED DUE TO CONFLICTS WITH HANDRAIL CONNECTIONS, THEN FABRICATOR SHALL ADJUST CURB SEGMENT LENGTHS SO THAT EACH CURB JOINT IS A MINIMUM OF 12" FROM THE CENTERLINE OF ANY WALKWAY/HANDRAIL CONNECTION.

CONSTRUCTION

MORTAR FOR SETTING BEAMS

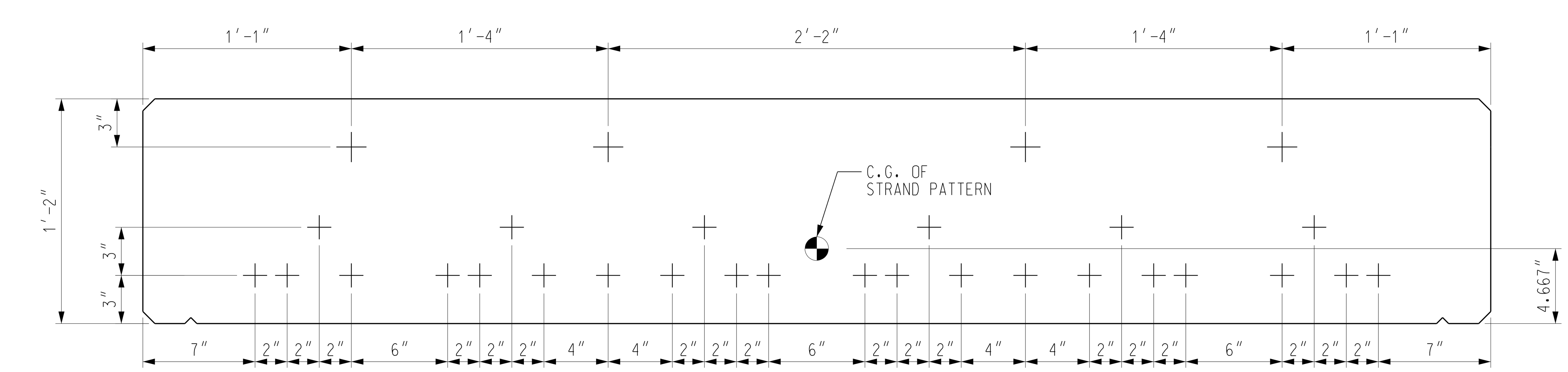
BEAMS SHALL HAVE FULL AND EVEN BEARING UPON THE BRIDGE SEAT AREAS. IF NEEDED, MORTAR CONSISTING OF EQUAL PARTS BY VOLUME OF CLASS B EPOXY AND DRY SILICA SAND, MIXED IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS, SHALL BE SPREAD ON THE TOP OF BEARING PADS TO OBTAIN UNIFORM BEARING. SCRAPE EXCESS MORTAR FROM AROUND BEARING PADS AFTER THE BEAMS ARE SET.

AFTER PRECAST CONCRETE MEMBERS ARE SET, THE ENDS OF THE LIFTING LOOP STRANDS SHALL BE BURNED OFF AND RECESSED TO A DEPTH OF 1 INCH. FILL RECESSES AT LIFT ANCHORS WITH CEMENT GROUT TO TOP OF SURROUNDING CONCRETE.



LIFTING DETAIL

FABRICATOR IS RESPONSIBLE FOR ADEQUACY OF LIFTING LOOPS.



PRESTRESSED STRAND PATTERN FOR MK SB14.7

MILD REINFORCING NOT SHOWN FOR CLARITY
(30 ~ 0.5" 270 KSI STRANDS ALL STRAIGHT STRANDS)
SCALE: 2" = 1' -0"

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: RLW; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

UNNAMED CREEK RR BRIDGE
PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 1 OF 2)

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019

PROJECT NUMBER:

BU-501

SHEET: 89 OF 111

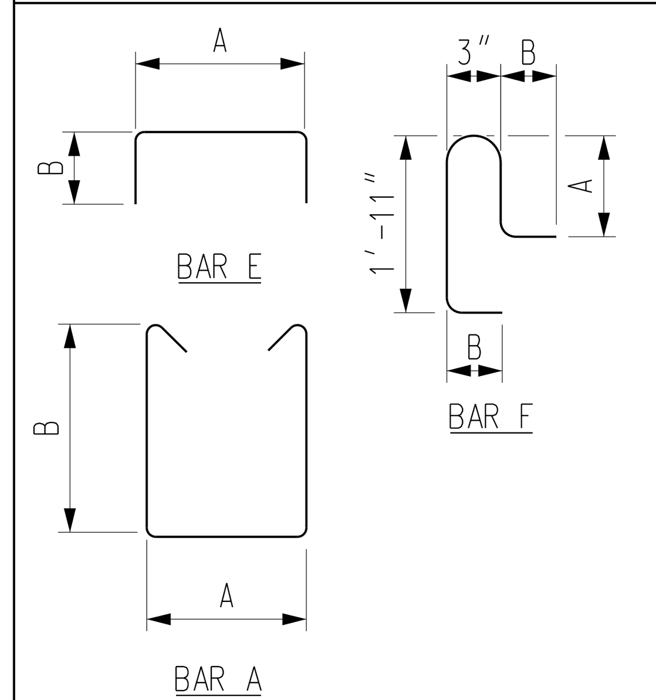
PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

REINFORCING SCHEDULE

MARK	QTY	SIZE	TYPE	A	B	LENGTH
3F1X	27	3	F	1′-10″	5″	4′-10″
4S1	6	4	STR	–	–	4′-7″
4S2	12	4	STR	–	–	4′-6″
5A1	48	5	A	2′-11″	10″	5′-6″
5A2	24	5	A	2′-10″	10″	5′-5″
5E1	10	5	E	9½″	9″	2′-3½″
5E2	12	5	E	8¼″	2′-0″	4′-8¼″
5E3	24	5	E	6′-8″	10″	8′-4″
5S1	18	5	STR	–	–	14′-3″

1075 LBS = WEIGHT OF REINFORCING STEEL PER BEAM (ASTM A615)

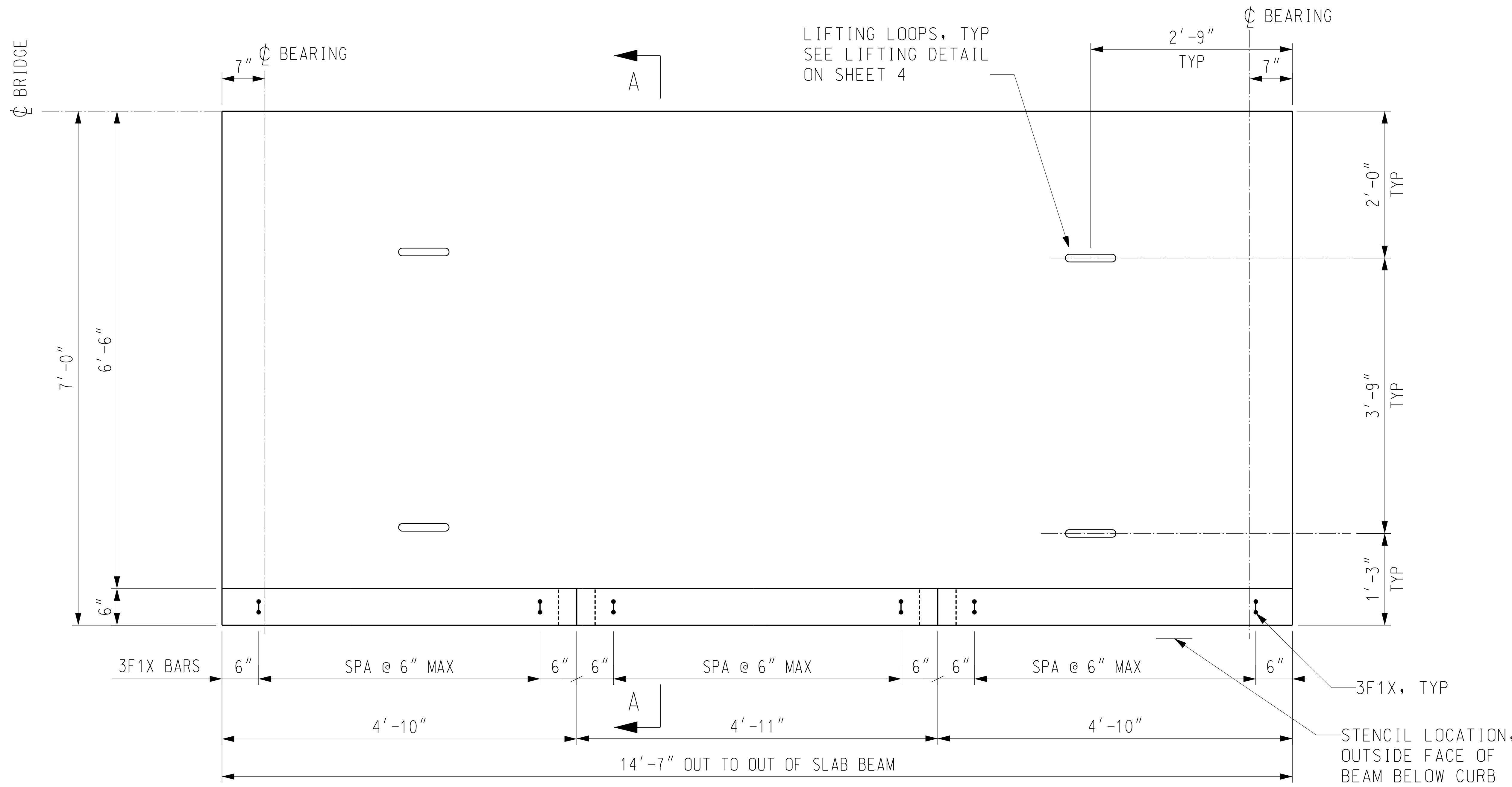
BENDING DETAILS



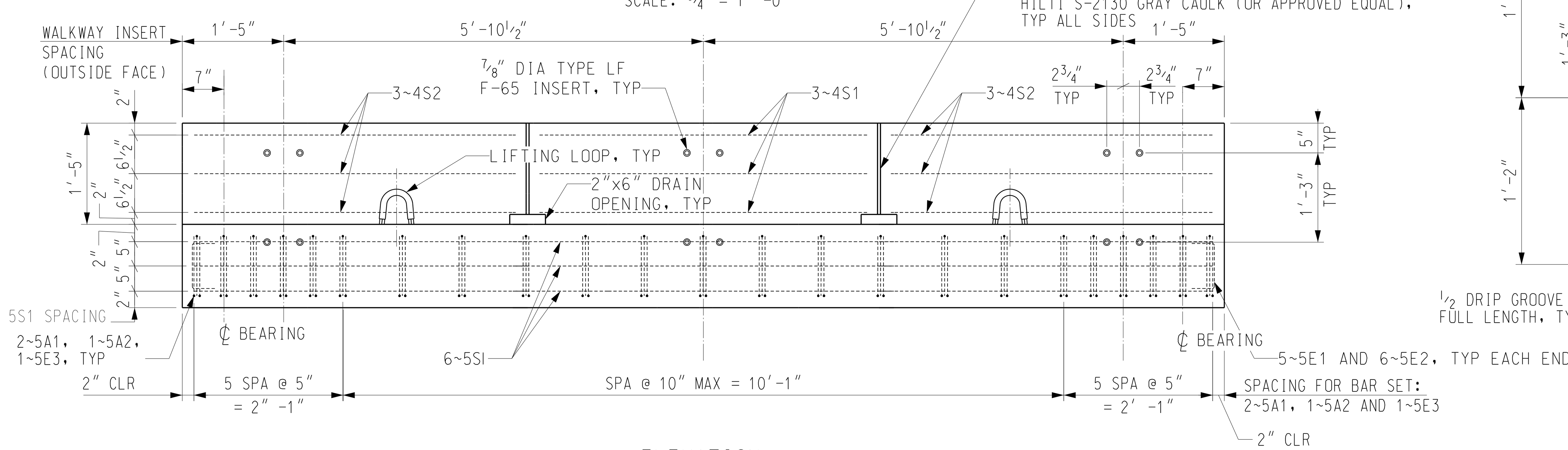
DIMENSIONS ARE OUT TO OUT

NOTES

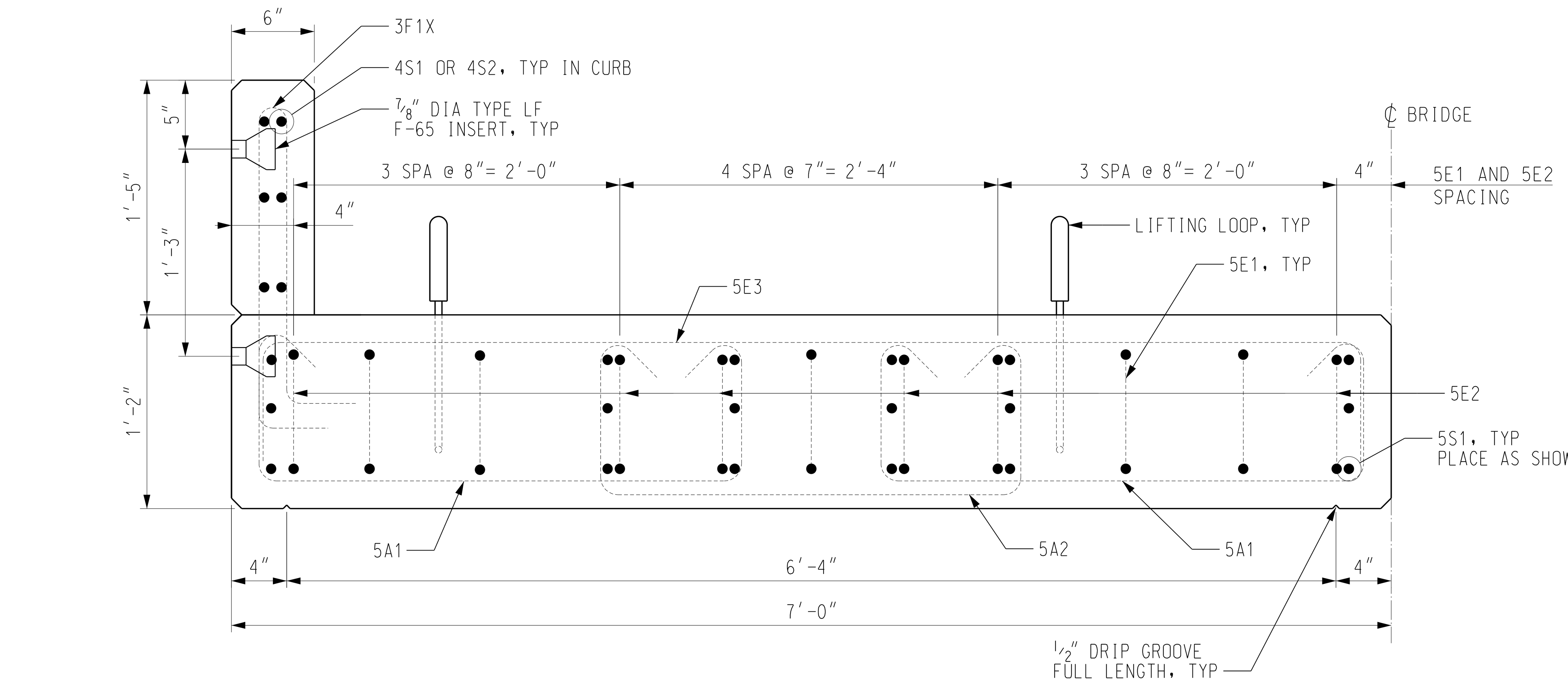
SEE SHEET 89 FOR PRESTRESSED CONCRETE NOTES, STRAND PATTERN, AND LIFTING DETAIL.



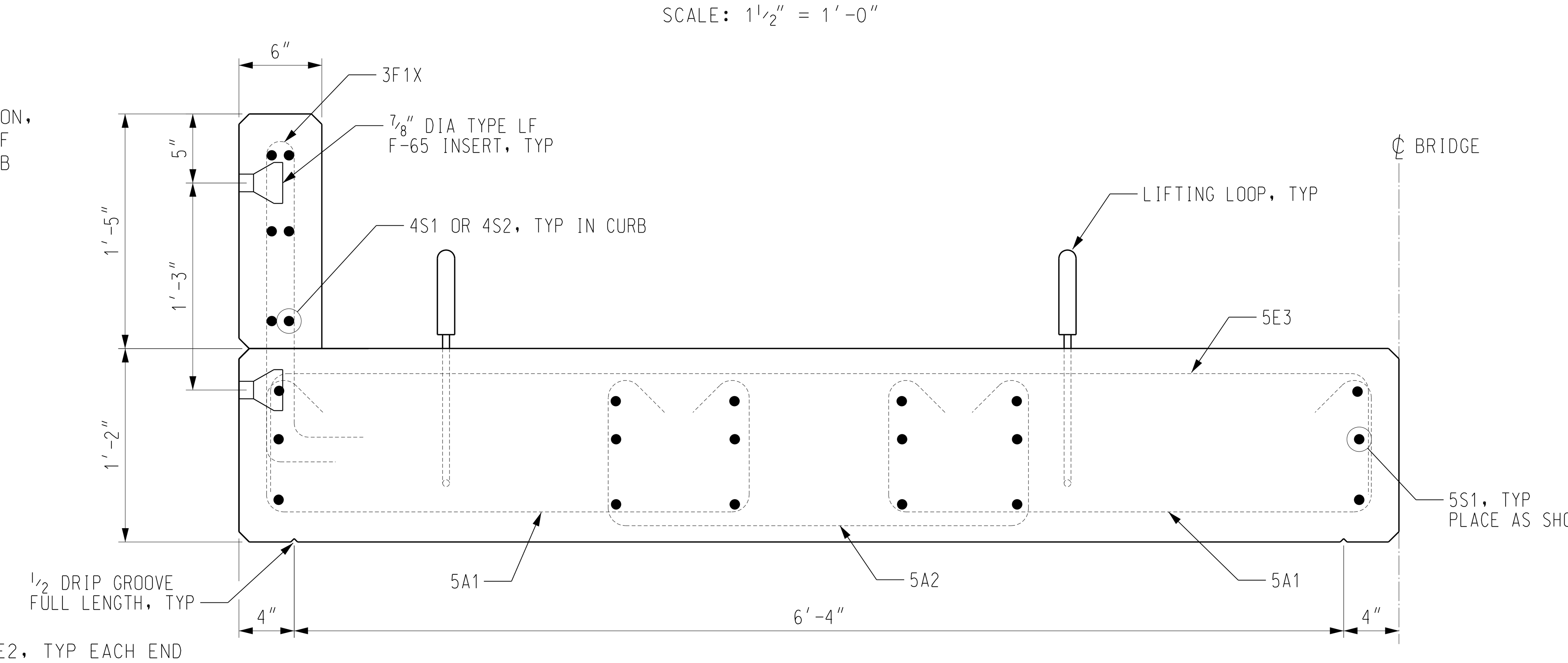
PLAN
SCALE: ¾″ = 1′ -0″



ELEVATION
SCALE: ¾″ = 1′ -0″



END VIEW
SCALE: 1½″ = 1′-0″



SECTION A-A
SCALE: 1½″ = 1′-0″

14″ DEEP PRESTRESSED CONCRETE SLAB BEAM MK SB14.7

6 REQUIRED
CONCRETE VOLUME = 4.5 CU.YD (BEAM), 0.4 CU.YD (CURB)
LIFT WEIGHT = 19,500 LBS (19.5 KIPS)

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: RLW; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

UNNAMED CREEK RR BRIDGE
PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 2 OF 2)

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:
BU-502

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

WALKWAY GENERAL NOTES

STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH ASTM DESIGNATION A36 OR APPROVED EQUIVALENT. ALL STRUCTURAL STEEL ITEMS AND HARDWARE TO BE GALVANIZED UNLESS OTHERWISE NOTED.

HANDRAIL POSTS ON WALKWAYS SHALL BE ERECTED PLUMB AND IN LINE.

GALVANIZING OF STRUCTURAL STEEL AFTER FABRICATION SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM DESIGNATION A123.

GALVANIZING OF IRON AND STEEL HARDWARE SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM DESIGNATION A153.

FIELD PAINT ANGLE BRACES, WELDED AREAS, AND ABRASIONS OR CUTS ON RAILING POSTS, WALK BRACKETS, AND GRIP STRUT WALKWAY WITH ONE PRIME AND ONE FINISH COAT OF ZINC RICH PAINT.

WIRE ROPE SHALL BE 3/8" DIA. 7-WIRE STRAND, SIEMENS MARTIN GRADE, TYPE A COATING.

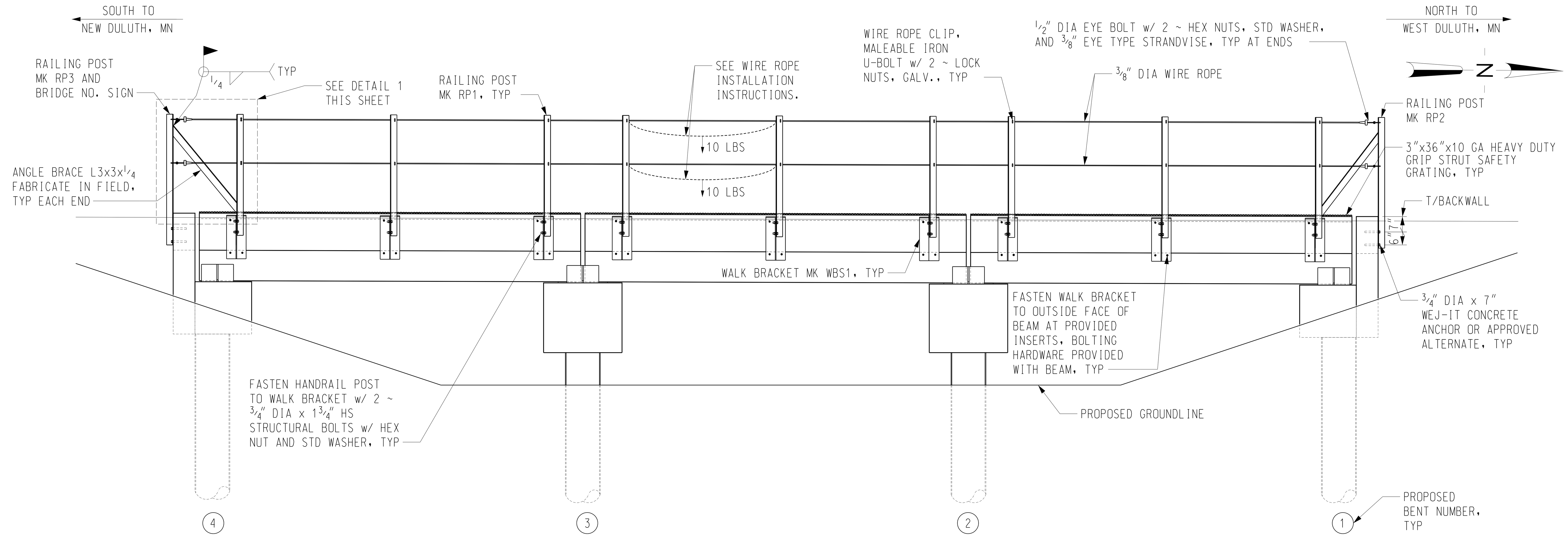
EYE BOLTS SHALL BE 1/2" DIAMETER WITH 2" LONG SHANK AND 1" INSIDE DIAMETER EYE.

WIRE ROPE CLIPS SHALL BE MALLEABLE IRON U-BOLTS 1/4" DIAMETER x 1 1/2" LONG WITH A 1" CENTERLINE WIDTH.

GRIP STRUT ANCHOR DEVICE CLIPS SHALL BE MCNICHOLS NO. 12262 DIAMOND ANCHOR DEVICE OR APPROVED EQUAL AND BE COMPATIBLE WITH THE GRIP STRUT PANELS ORDERED.

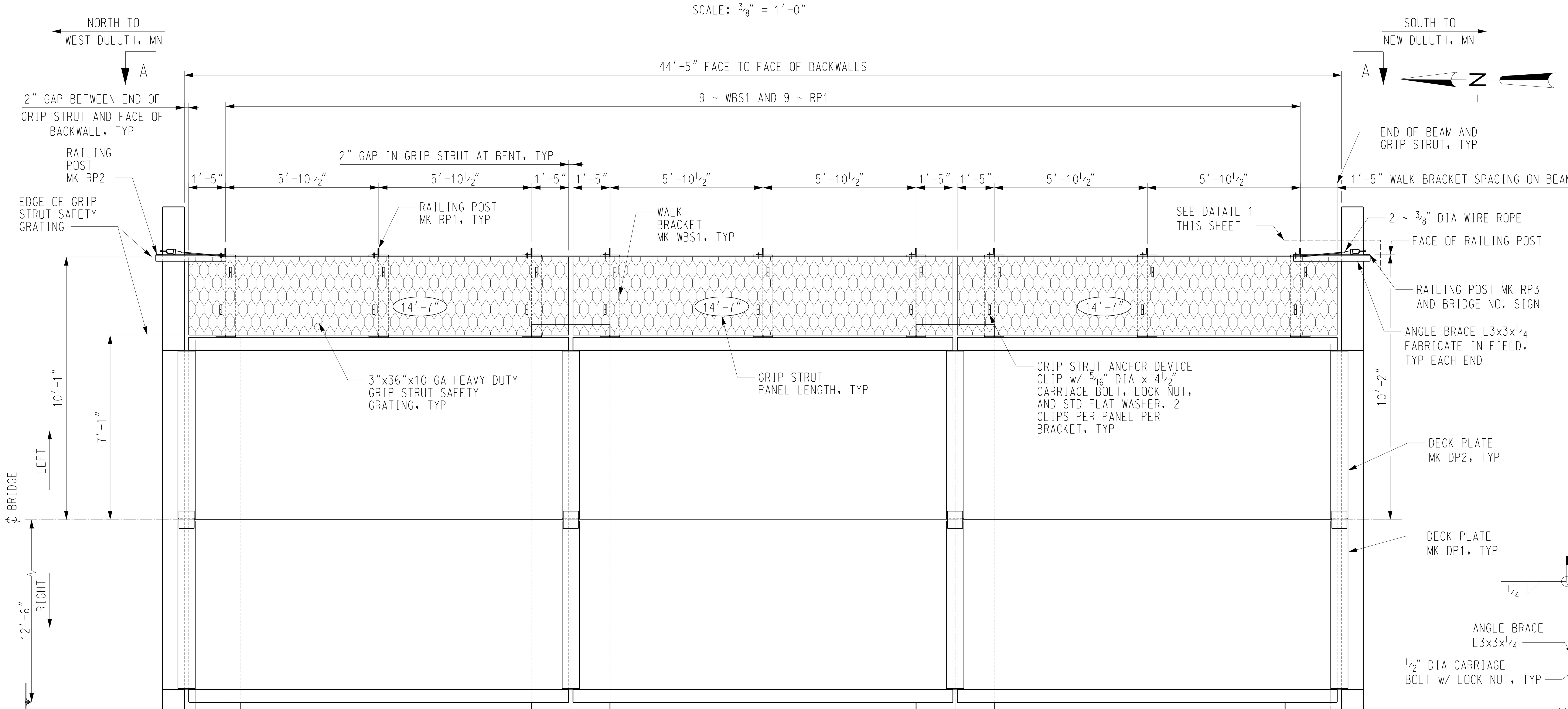
WIRE ROPE INSTALLATION INSTRUCTIONS

1. THREAD WIRE ROPE THROUGH ALL CLIPS AND BARREL ANCHORS AND SEAT RETAINING WEDGES ON ONE END RAILING POST (DO NOT TIGHTEN).
2. STRETCH WIRE ROPE AND HANG A MINIMUM OF 10 LBS ON ROPE BETWEEN TWO POSTS AS SHOWN. REMOVE ALL SAG IN ROPE TO A MAXIMUM OF 2 INCHES.
3. SEAT RETAINING WEDGES AT REMAINING END POST.
4. REMOVE WEIGHTS.
5. TIGHTEN CLIPS AT INTERMEDIATE POSTS.
6. CUT AND REMOVE EXCESS WIRE ROPE, COAT CUT PORTIONS OF WIRE ROPE WITH COLD GALVANIZING COMPOUND.



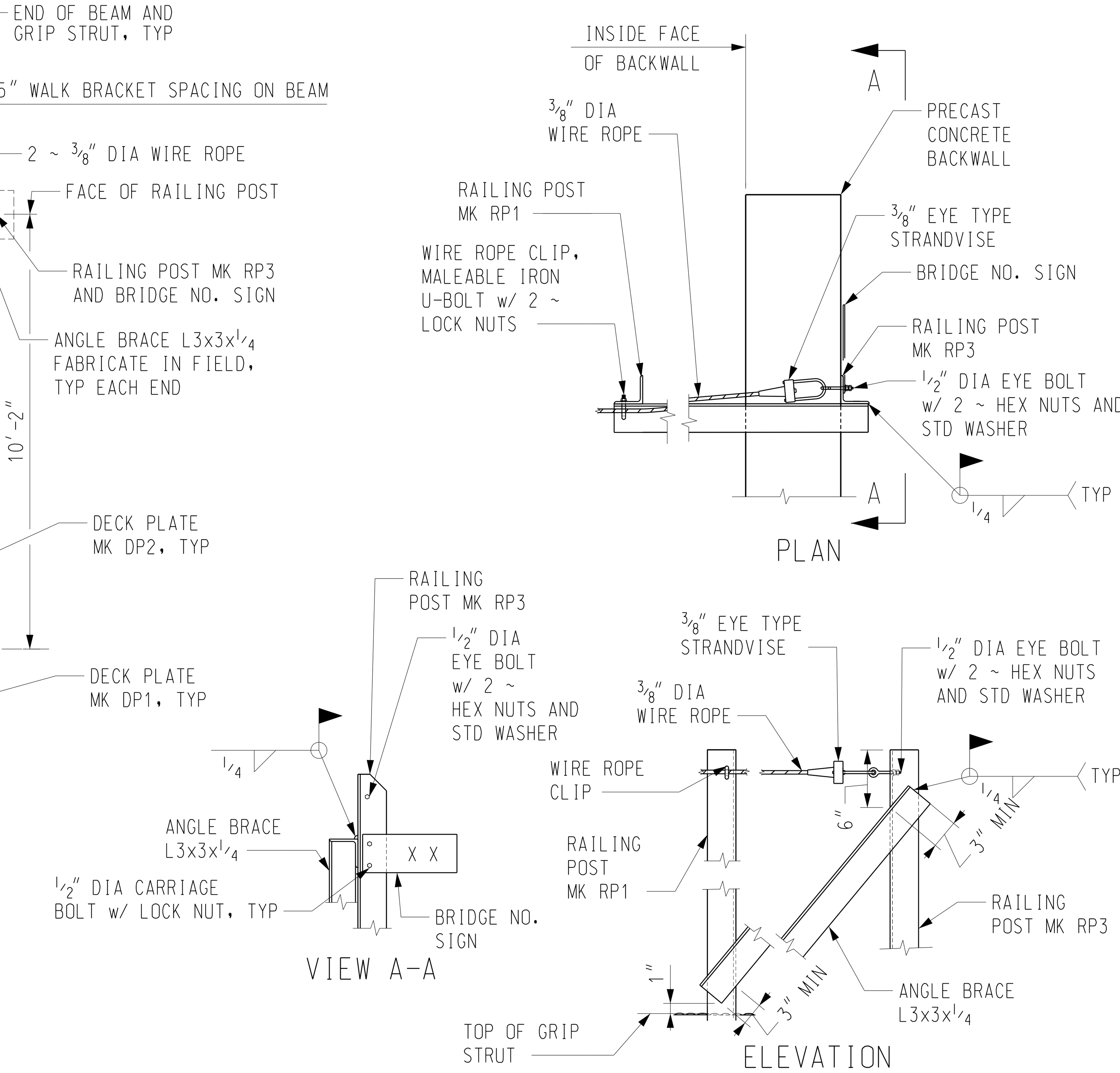
VIEW A–A

SCALE: 3/8" = 1'-0"



WALK AND DECK PLAN

SCALE: 3/8" = 1'-0"



DETAIL 1

SCALE: 1" = 1'-0"

REVISIONS			
NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB | DRAWN BY: RLW | CHECKED BY: AGH | PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN

DULUTH, MINNESOTA

UNNAMED CREEK RR BRIDGE
WALK AND DECK PLAN AND HANDRAIL DETAILS

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-945-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019

PROJECT NUMBER:

BU-503

SHEET: 91 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

GENERAL NOTES

DESIGN LOADING

ALL COMPONENTS ARE DESIGNED IN ACCORDANCE WITH THE 2017 AREMA MANUAL FOR RAILWAY ENGINEERING, CHAPTER 8-CONCRETE STRUCTURES AND FOUNDATIONS.

LIVE LOAD:	E40 w/ DIESEL IMPACT
DESIGN SPEED:	10 MPH
MINIMUM BALLAST:	15 INCHES
MAXIMUM BALLAST:	24 INCHES
MAXIMUM TRACK ECCENTRICITY:	6 INCHES (FROM ℄ BRIDGE TO ℄ TRACK)

REFERENCE DATA

ALL DETAILS AND DIMENSIONS OF THE EXISTING SITE ARE BASED ON FIELD SURVEY DATA SUPPLIED BY LHB CORPORATION ON JUNE 15, 2016 WITH SUPPLEMENTARY DATA SUPPLIED ON JUNE 12, 2018.

BRIDGE STATIONING IS BASED ON THE INSIDE FACE OF THE NORTH EXISTING BACKWALL OF THE EXISTING WIRE MILL POND BRIDGE AS STATION 204+78.00.

BENCHMARK DATA:	SURVEY CONTROL POINT (HV-3702), STA 195+97.67, OFFSET 923.70' RIGHT, ELEV 648.82'.
VERTICAL DATUM:	NAVD88
HORIZONTAL DATUM:	NAD83/96 MINNESOTA NORTH ZONE

HYDRAULIC INFORMATION IS BASED ON HYDRAULIC MODELING INFORMATION PROVIDED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. DATED MARCH 15, 2018 AND FEMA FIRM PANEL NO. 2704210045C.

GEOTECHNICAL INFORMATION IS BASED ON HDR ENGINEERING, INC. GEOTECHNICAL REPORT DATED MAY 2019.

BRIDGE STATIONING AND RIGHT-OF-WAY ARE BASED ON HISTORICAL NORTHERN PACIFIC RAILWAY (N.P. RY.) TRACK CHARTS.

GENERAL

IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE ACTUAL FIELD CONDITIONS AND ANY NECESSARY AS-BUILT DIMENSIONS AFFECTING THE SATISFACTORY COMPLETION OF THE WORK REQUIRED FOR THIS PROJECT.

NEW CONSTRUCTION SHOWN AS HEAVY LINES. EXISTING STRUCTURES TO REMAIN SHOWN AS LIGHT LINES. EXISTING STRUCTURES TO BE REMOVED SHOWN AS LIGHT DOTTED LINES.

CONTRACTOR IS RESPONSIBLE FOR DEWATERING TO FACILITATE CONSTRUCTION WHEN REQUIRED TO SATISFACTORILY COMPLETE THE WORK REQUIRED FOR THIS PROJECT.

IN ORDER TO ENSURE THE HYDRAULIC CAPACITY OF THE BRIDGE, THE FINISHED GROUND UNDER THE BRIDGE SHALL BE SHAPED TO MATCH THE UPSTREAM CHANNEL AND FLOODPLAIN AS SHOWN ON DRAWING BW-101. THE EXISTING LOW WATER CHANNEL SHALL BE MAINTAINED AS NEAR AS POSSIBLE TO THE EXISTING LOCATION.

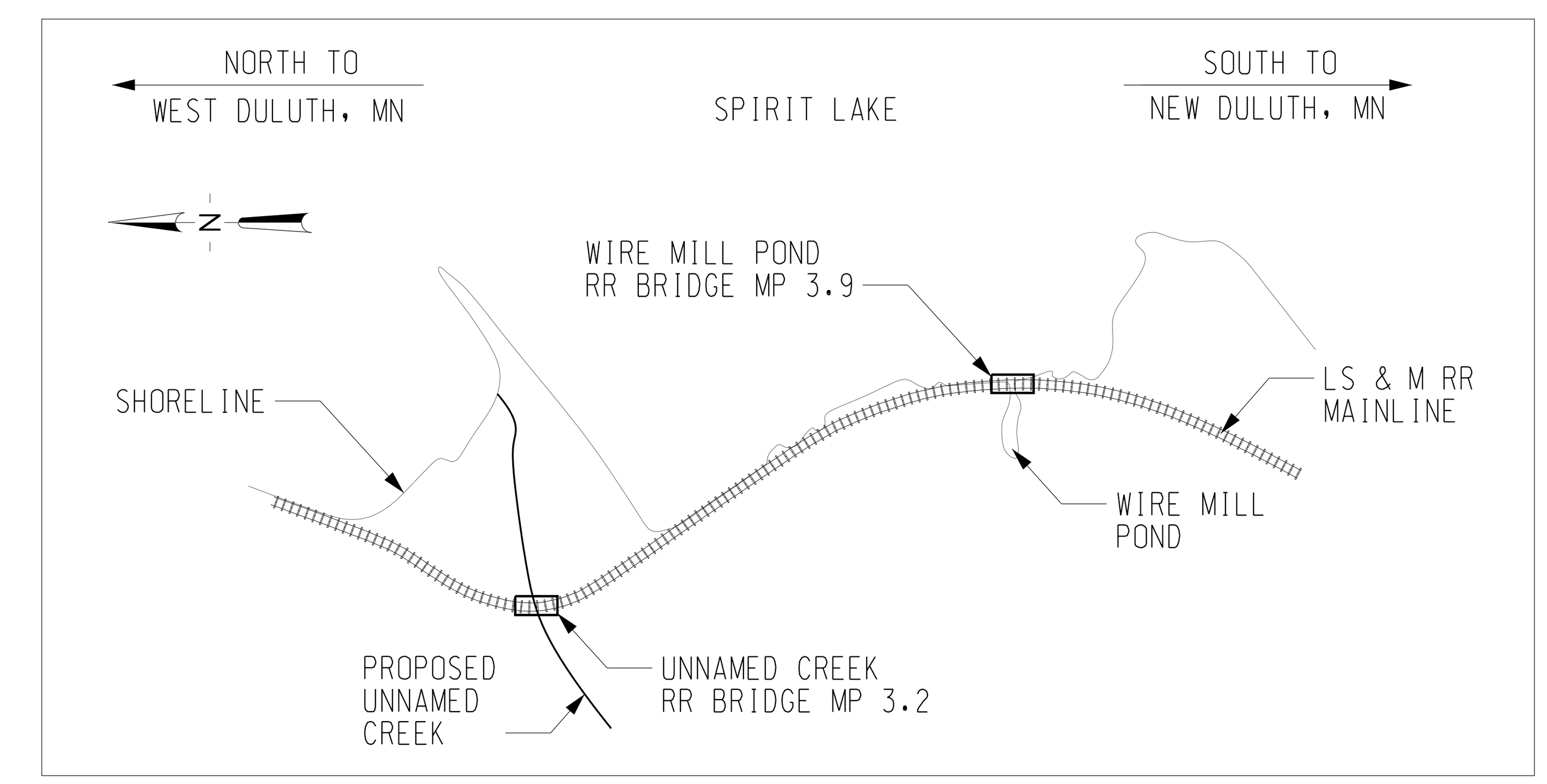
CONTRACTOR SHALL DOCUMENT ALL WORK IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS INCLUDING SUPPLYING: AS-BUILT DRAWINGS, PILE DRIVING RECORDS, AND SHOP DRAWINGS FOR ALL PREFABRICATED COMPONENTS. ALL SHOP DRAWINGS SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION PER THE PROJECT SPECIFICATIONS.

CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIALS IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS INCLUDING BUT NOT LIMITED TO EXISTING TIMBER STRUCTURES, SOILS, AND DEFICIENT TRACK MATERIALS.

THE L.S.&M. RAILROAD IS AN HISTORIC RAILROAD. CONTRACTOR SHALL TAKE EXTREME CARE TO PRESERVE THE HISTORIC NATURE OF THE SITE AND RESTORE ANY DISTURBED AREAS TO PRE-CONSTRUCTION CONDITIONS.

TRACK MATERIALS INCLUDING TIES, RAIL, TIE PLATES, SPIKES, ETC. SHALL BE REUSED DURING TRACK RESURFACING TO PRESERVE THE HISTORIC NATURE OF THE RAILROAD. COMPONENTS SHALL BE INSPECTED FOR DEFECTS PRIOR TO PLACING BACK INTO SERVICE TO ENSURE SAFE OPERATION OF TRAINS. DEFECTIVE COMPONENTS MAY BE REPLACED WITH NEW MATERIAL OF A TYPE THAT CLOSELY MATCHES THE EXISTING COMPONENTS.

INFORMATION SHOWN ON THESE PLANS CONCERNING TYPE AND LOCATION OF EXISTING UNDERGROUND AND OVERHEAD UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF UNDERGROUND AND OVERHEAD UTILITIES BEFORE BEGINNING CONSTRUCTION.



VICINITY MAP

0 500 1000 2000 3000
SCALE IN FEET

BID ITEMS ~ WIRE MILL POND RR BR 3.9

ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT
1	FURNISH AND DRIVE PILE*	1080	LF
2	FABRICATE AND INSTALL BRIDGE**	1	LS
3	REMOVE EXISTING TIMBER BRIDGE	1	LS

*INCLUDES COAL TAR EPOXY COATING AS SPECIFIED ON SHEET BW-102.

**INCLUDES ALL COMPONENTS OF BRIDGE SHOWN ON THESE PLANS EXCEPT PILING.

LIST OF DRAWINGS ~ WIRE MILL POND RR BR 3.9

DRAWING NUMBER	SHT. NO.	TITLE
BW-001	92	GENERAL NOTES AND ESTIMATED QUANTITIES
BW-101	93	GENERAL LAYOUT AND TYPICAL SECTIONS
BW-102	94	PILE PLAN AND DETAILS
BW-501	95	PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 1 OF 2)
BW-502	96	PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 2 OF 2)
BW-503	97	WALK AND DECK PLAN AND HANDRAIL DETAILS
STANDARD RR BRIDGE COMPONENTS AND DETAILS		
BG-501	98	PRECAST CONCRETE BENT CAP DETAILS AND NOTES
BG-502	99	PRECAST CONCRETE END BENT CAP DETAILS
BG-503	100	WALKWAY AND HANDRAIL DETAILS
BG-504	101	STEEL DETAILS
BG-505	102	MISCELLANEOUS DETAILS

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: GJT; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

WIRE MILL POND RR BRIDGE
GENERAL NOTES AND ESTIMATED QUANTITIES

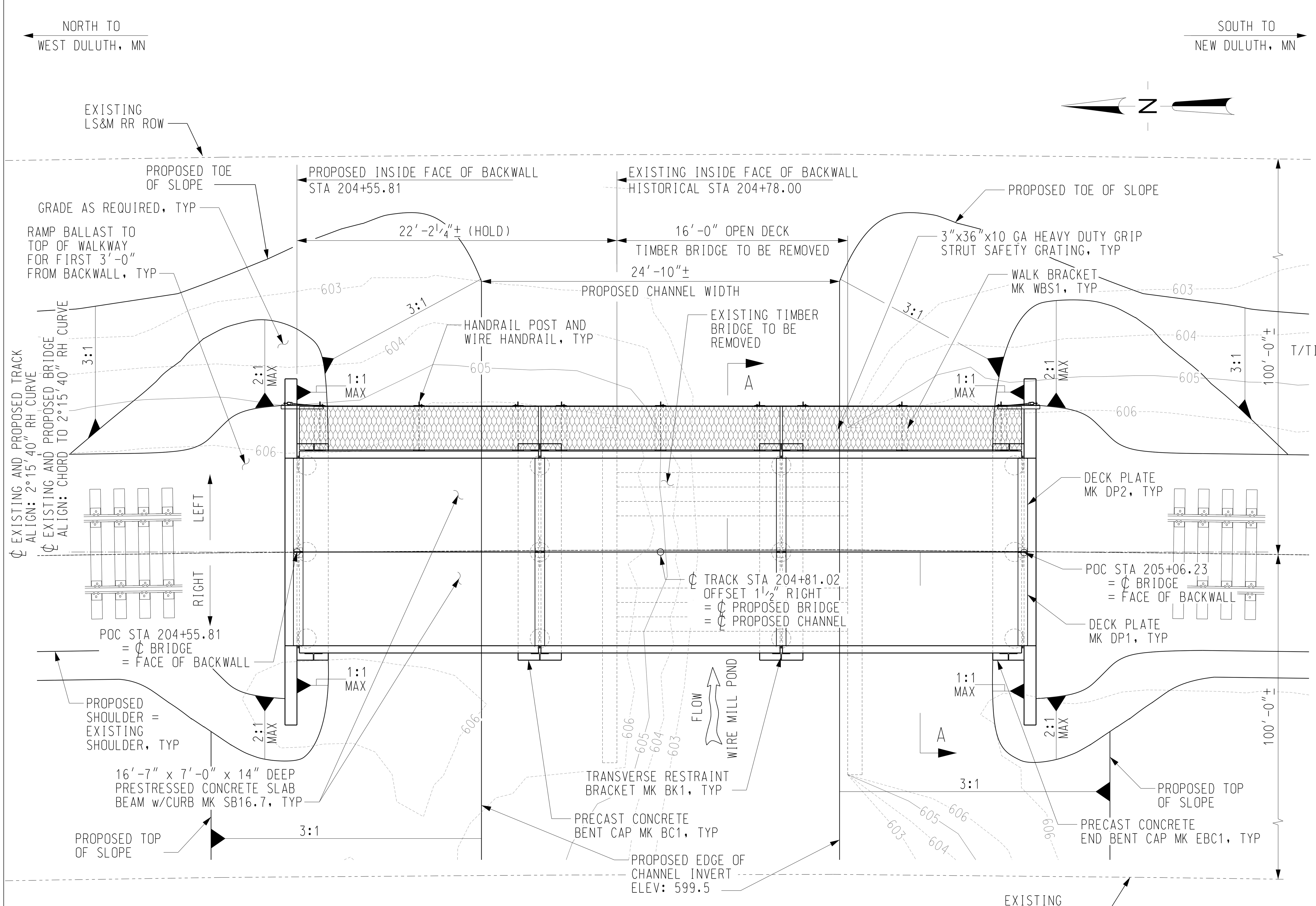
PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

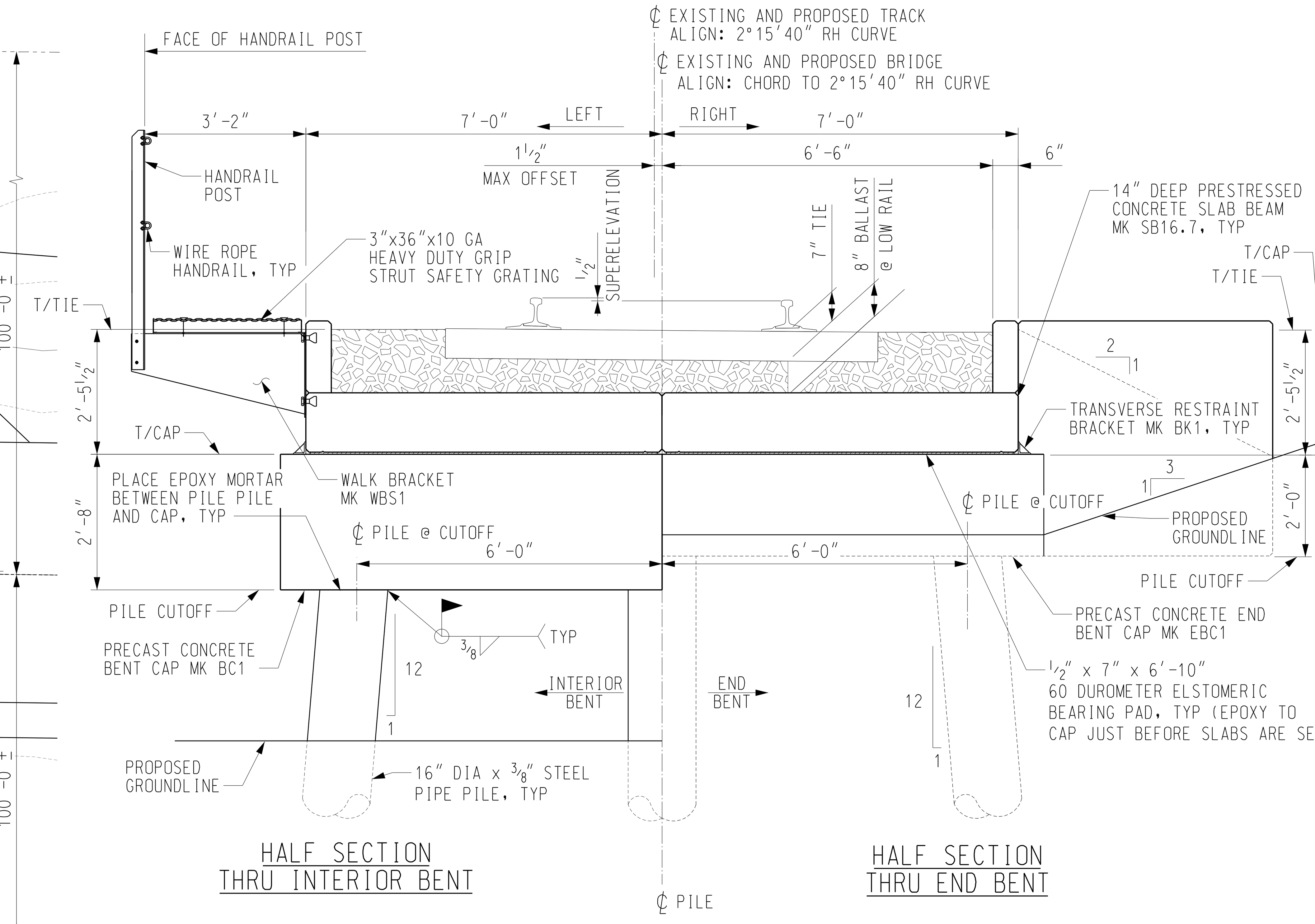
DATE: MAY 2019
PROJECT NUMBER:
BW-001
SHEET: 92 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



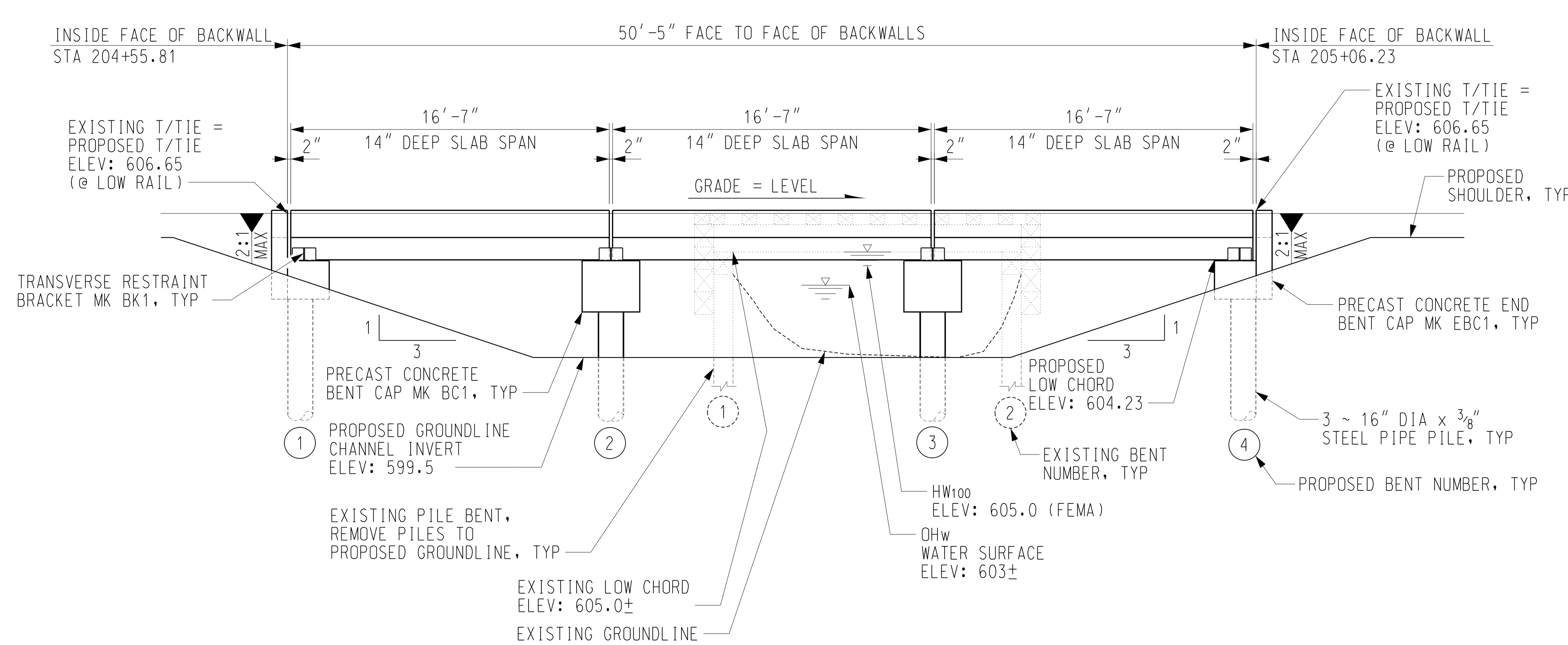
PLAN

SCALE: 3/16" = 1'-0"



SECTION A–A

SCALE: 1/2" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"
WALKWAY AND HANDRAIL NOT SHOWN FOR CLARITY

TABLE OF ELEVATIONS ~ WIRE MILL POND RR BR 3.9

LOCATION	END BENT 1	BENT 2	BENT 3	END BENT 4
PROPOSED TOP OF TIE (@ LOW RAIL)	606.65	606.65	606.65	606.65
TOP OF CAP	604.19	604.19	604.19	604.19
PILE CUTOFF	602.19	601.52	601.52	602.19
TOP OF TIE TO PILE CUTOFF	4'-5 1/2"	5'-1 1/2"	5'-1 1/2"	4'-5 1/2"

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: GJT; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

WIRE MILL POND RR BRIDGE
GENERAL LAYOUT AND TYPICAL SECTIONS

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

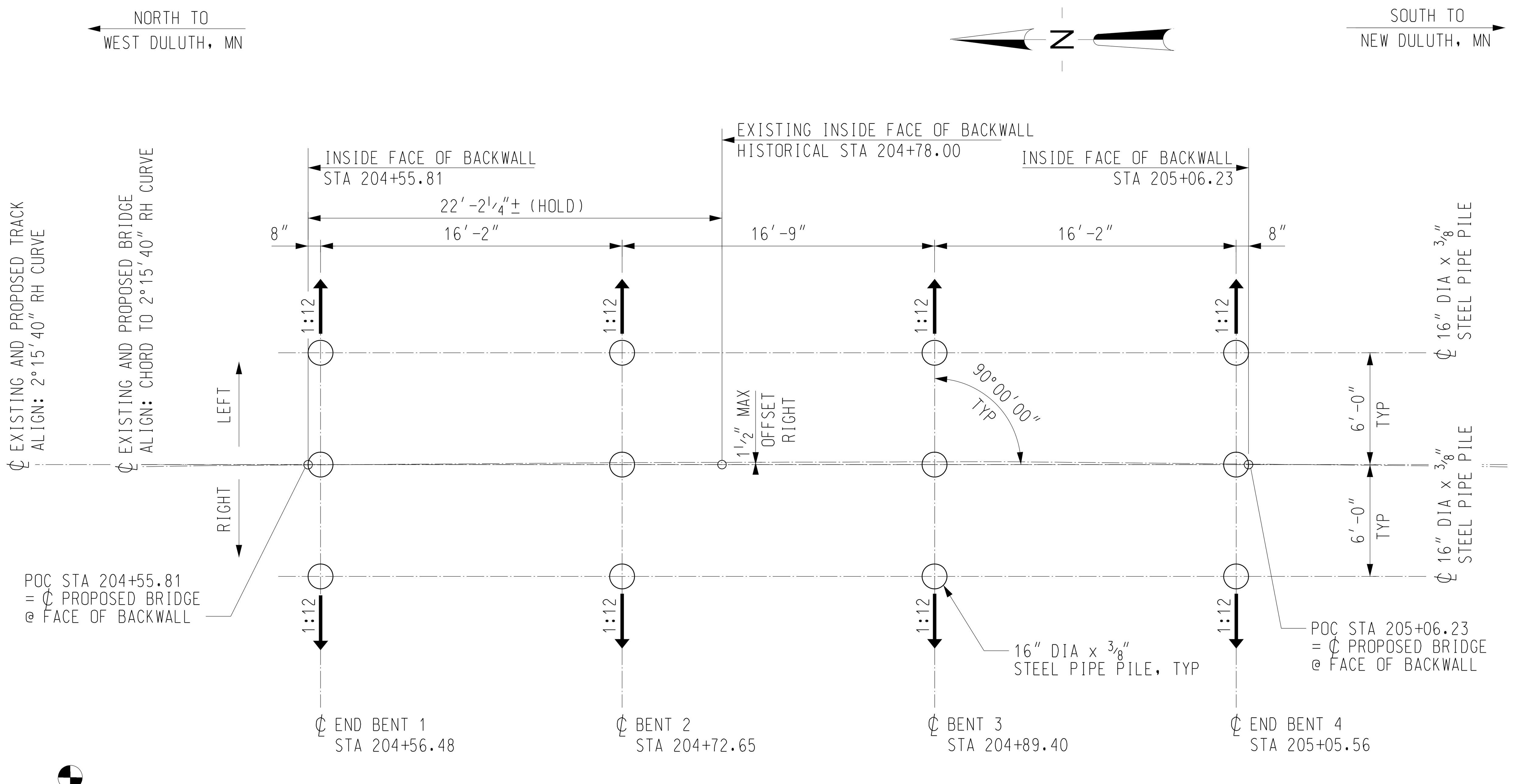
DATE: MAY 2019

PROJECT NUMBER:

BW-101

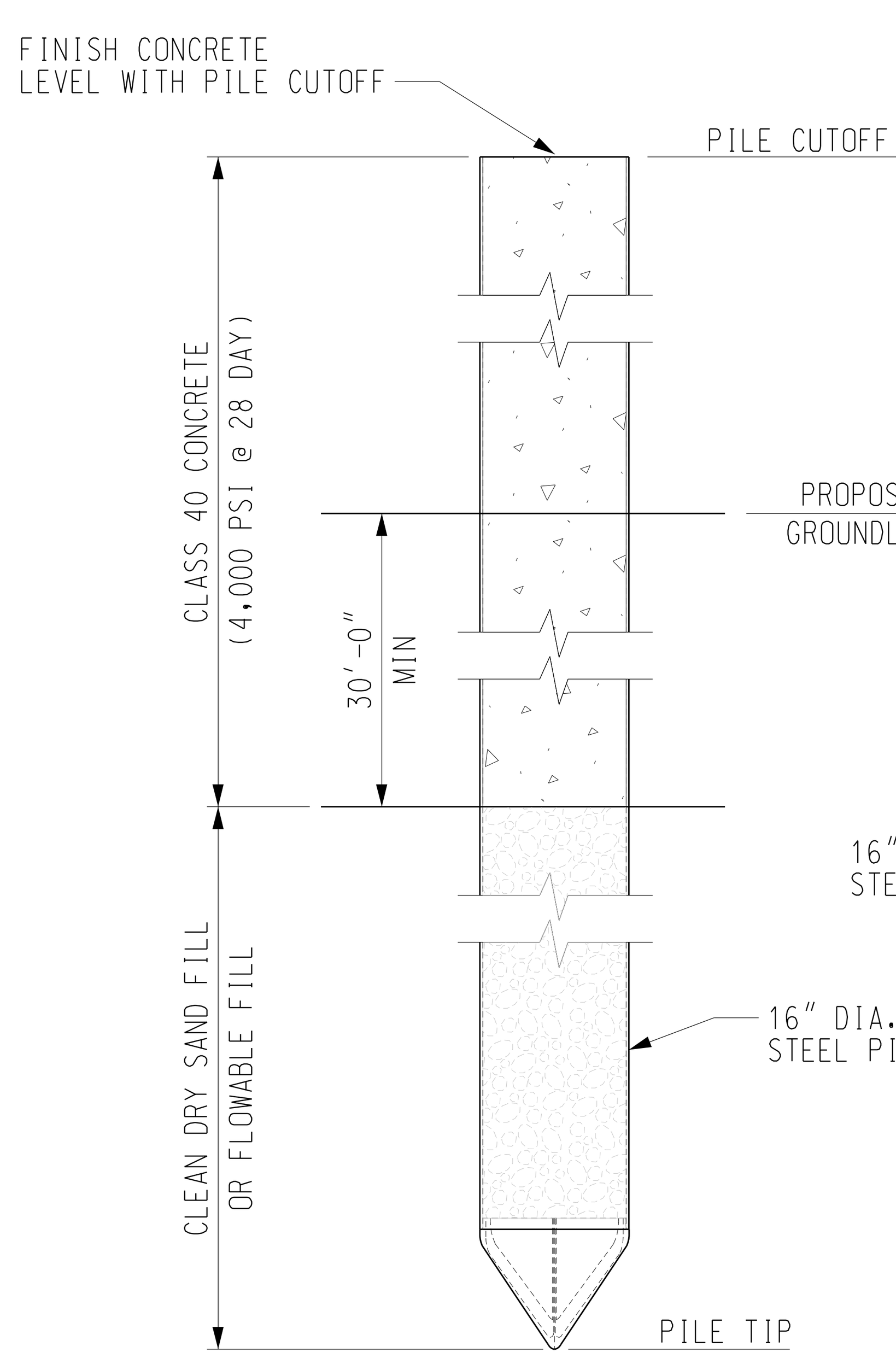
SHEET: 93 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



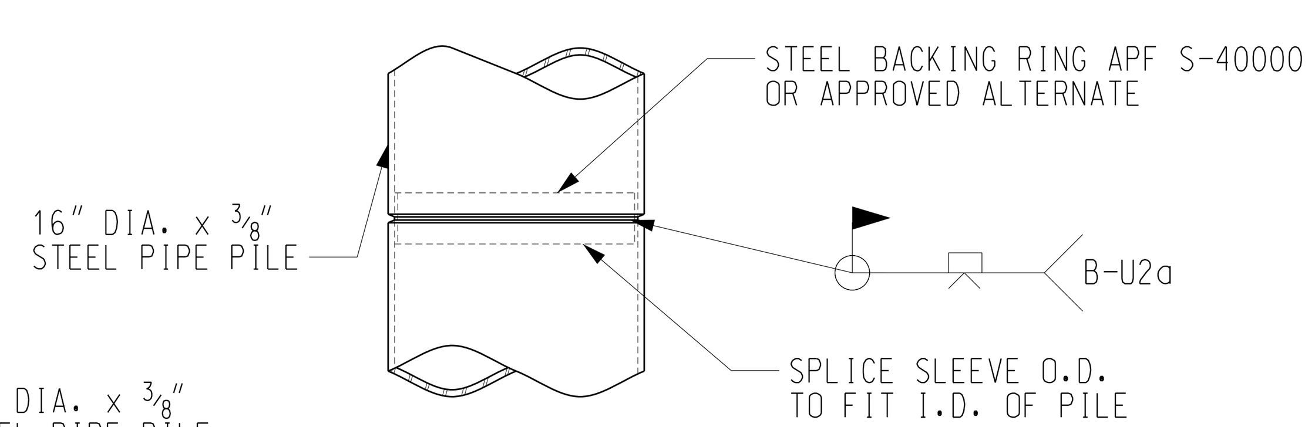
PILE PLAN

NO SCALE
EXISTING SUBSTRUCTURE NOT SHOWN FOR CLARITY.



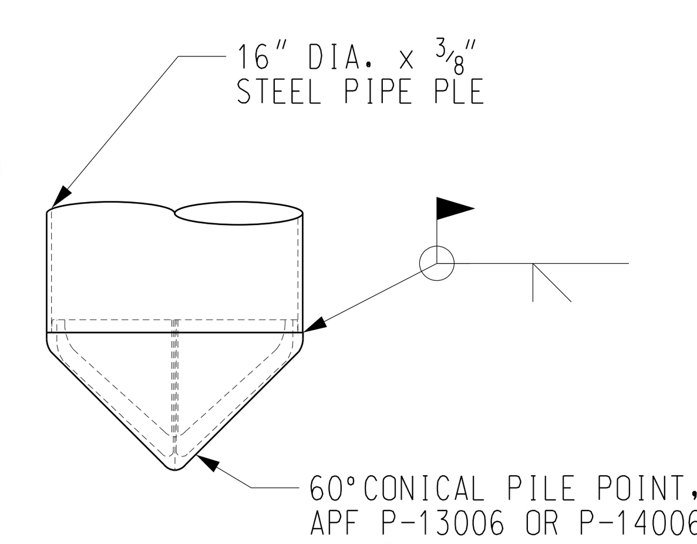
PILE FILL DETAIL

NO SCALE



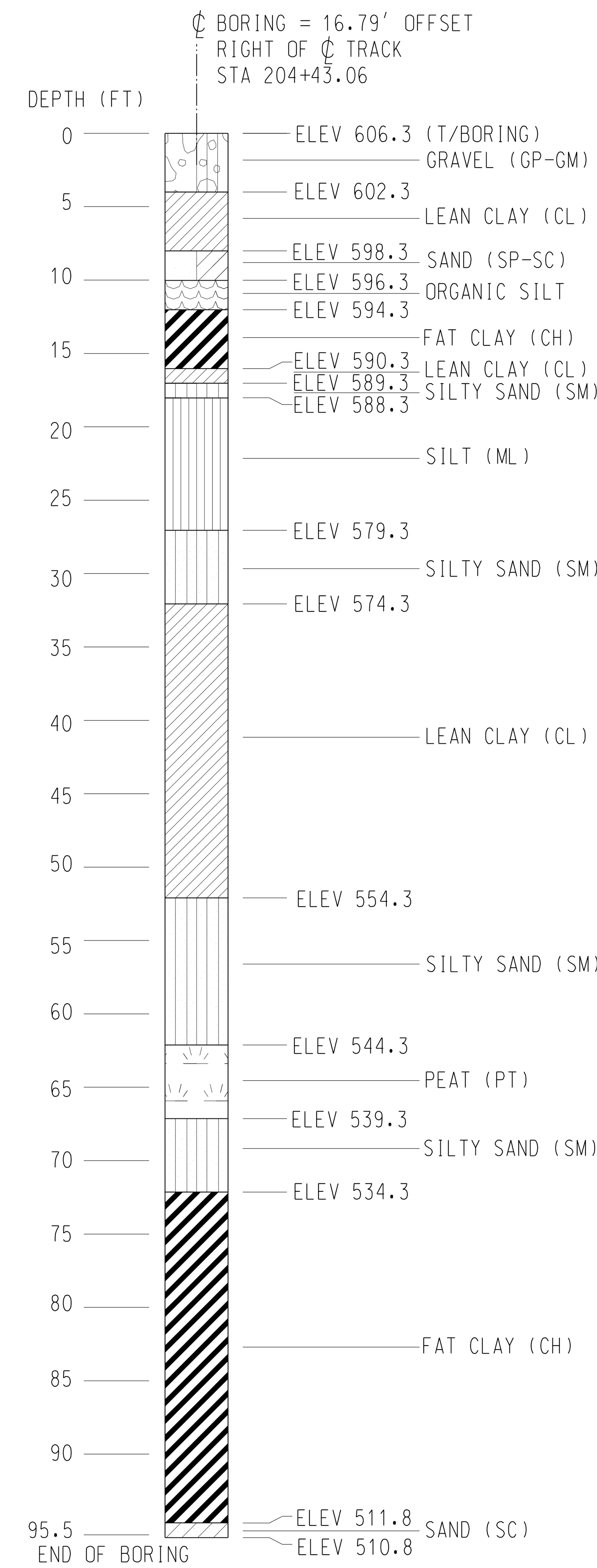
PIPE PILE SPLICE DETAIL

NO SCALE
PILE SPLICE QUANTITY AND LOCATION
TO BE DETERMINED BY CONTRACTOR BASED
ON ORDERED LENGTHS.



PIPE PILE POINT DETAIL

NO SCALE



BORING SL18-SPT-09

NO SCALE

PILE NOTES

PIPE PILES SHALL BE 16" DIA x 3/8" CONCRETE FILLED STEEL PIPE PILES AND MEET THE REQUIREMENTS OF ASTM A252 GRADE 3, Fy = 45 KSI.

PILE POINTS SHALL BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS ON ALL PIPE PILES PRIOR TO DRIVING.

DEBURR ALL EDGES.

FABRICATION SHALL CONFORM TO CURRENT AREMA GUIDELINES.

BRIDGE PIPE PILES SHALL BE DRIVEN PER THE PROJECT SPECIFICATIONS TO THE DEEPER, MORE CONSERVATIVE DEPTH REQUIRED BY EITHER THE MINIMUM TIP ELEVATION OR TO ACHIEVE THE REQUIRED ULTIMATE CAPACITY NOTED IN THE PILE DATA TABLE. CONTACT THE ENGINEER IF PRACTICAL REFUSAL IS REACHED PRIOR TO REACHING THE MINIMUM TIP ELEVATION. ESTIMATED PILE LENGTH BELOW CUTOFF IS SHOWN IN THE PILE DATA TABLE.

CONTRACTOR SHOULD BE PREPARED TO ADJUST PILE LENGTH WITHOUT DELAYING THE PROJECT.

SYMBOL 1:12 → DENOTES DIRECTION AND AMOUNT OF PILE BATTER.

THE CONTRACTOR SHALL HAVE SUFFICIENT PILE SPLICE MATERIAL ON HAND BEFORE PILE DRIVING IS STARTED.

CONTRACTOR TO SUBMIT PROPOSED DRIVING SYSTEM WITH ACCOMPANYING DRIVEABILITY ANALYSIS TO ENGINEER FOR CONFIRMATION OF DRIVEABILITY. MINIMUM RECOMMENDED PILE DRIVING HAMMER ENERGY IS 40 KIP-FT (DELMAG 16-32 OR GREATER). NOTE THE RECOMMENDED HAMMER SIZE IS BASED ON ANTICIPATED ENERGY REQUIRED TO ACHIEVE THE MINIMUM TIP ELEVATION WHICH MAY BE DEEPER THAN THE ELEVATION AT WHICH THE REQUIRED ULTIMATE CAPACITY IS REACHED TO ENSURE PILE TIP REACHES COMPETENT SOIL LAYERS.

THE MAXIMUM HORIZONTAL OUT OF POSITION TOLERANCE AT THE CUTOFF ELEVATION IS 3 INCHES.

PILE COATING NOTES

A COATING OF TWO COMPONENT (SELF-CURING) COAL TAR EPOXY PAINT CONFORMING TO STEEL STRUCTURES PAINTING COUNCIL SPECIFICATION SSPC-PAINT 16. COAL TAR EPOXY BLACK (OR DARK RED PAINT) SHALL BE SHOP APPLIED (AS PER THE MANUFACTURER'S RECOMMENDATIONS) TO THE ENTIRE OUTER SURFACE OF EACH PILE AND EMBED PLATE PRIOR TO PLACEMENT AS DETAILED BELOW.

STEEL SURFACES WHICH ARE TO RECEIVE THIS COATING SHALL BE PREPARED BY BLAST CLEANING TO NEAR WHITE, GRADE SSPC 10. THE COAL TAR EPOXY PAINT SHALL BE APPLIED BEFORE RUSTING OCCURS AND IN NO CASE LATER THAN 24 HOURS AFTER BLAST CLEANING.

THE COATING MAY BE APPLIED BY SPRAY OR BRUSH. IF THE APPLICATION IS BY BRUSH, APPLY WITH A STIFF BRUSH HEAVILY LOADED WITH PAINT; APPLY QUICKLY AND SMOOTHLY AND AVOID EXCESSIVE BRUSHING.

THE COATING SHALL BE APPLIED IN TWO COATS TO A TOTAL DRY FILM THICKNESS OF 16 MILS AT ITS THINNEST SPOT.

DRYING TIME BETWEEN COATS SHALL BE A MINIMUM OF 12 HOURS AND A MAXIMUM OF 72 HOURS UNDER NORMAL PAINTING CONDITIONS. LONG DRYING TIMES BETWEEN COATS WILL CAUSE POOR INTERCOAT ADHESION AND IT IS ADVISABLE IN WARM WEATHER TO REDUCE THE MAXIMUM INTERVAL BETWEEN COATS. IN VERY HOT WEATHER IT MAY BE NECESSARY TO LIMIT THE INTERCOAT DRYING PERIOD TO 24 HOURS OR LESS.

AT NORMAL TEMPERATURES THE COATING DRIES DUST FREE IN ABOUT FOUR HOURS AND BECOMES THOROUGHLY HARDENED AFTER 3 TO 5 DAYS OF CURING. PILE PLACEMENT SHALL NOT BEGIN SOONER THAN 5 DAYS AFTER COATING.

THE COATING SHALL NOT BE APPLIED WHEN THE RECEIVING SURFACES OR AMBIENT TEMPERATURES ARE BELOW 50 DEGREES FAHRENHEIT UNLESS IT CAN REASONABLY BE ANTICIPATED THAT THE AVERAGE AMBIENT TEMPERATURE WILL BE 50 DEGREES FAHRENHEIT OR HIGHER FOR THE 5 DAY PERIOD FOLLOWING THE APPLICATION OF ANY COAT.

STEEL MEMBERS WHICH ARE WELDED AFTER COATING SHALL HAVE THE COATING REMOVED FROM THE WELD AREAS AND SHALL RECEIVE TWO COATS OF THE COATING APPLIED TO THE WELD HEAT AFFECTED AREAS.

AFTER PLACEMENT, THE AREAS OF THE PILES AND BASE PLATES WHERE THE COATING HAS BEEN DAMAGED SHALL BE TOUCHED UP.

THE COST OF FURNISHING AND APPLYING THE COATING SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE PER FOOT FOR 16" DIA x 3/8" THICK STEEL PIPE BEARING PILE, FURNISH AND DRIVE.

PILE DATA TABLE ~ WIRE MILL POND RR BR 3.9

LOCATION	T/TIE ELEV	PILE CUTOFF ELEV	REQUIRED ULTIMATE CAPACITY (TON) *	MINIMUM TIP ELEV	ESTIMATED PILE LENGTH BELOW CUTOFF (FT)
END BENT 1	606.65	602.19	95	512	90.2
BENT 2	606.65	601.52	95	512	89.5
BENT 3	606.65	601.52	95	512	89.5
END BENT 4	606.65	602.19	95	512	90.2

* BASED ON FACTOR OF SAFETY = 2.0.

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: GJT; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

WIRE MILL POND RR BRIDGE
PILE PLAN AND DETAILS

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:
BW-102
SHEET: 94 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

PRESTRESSED CONCRETE NOTES

MATERIALS

CONCRETE

CONCRETE MATERIAL, PLACING AND CURING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE PROJECT SPECIFICATIONS FOR PRECAST/PRESTRESSED CONCRETE PRODUCTS AND THE CURRENT EDITION OF CHAPTER 8 OF THE AREMA MANUAL FOR RAILWAY ENGINEERING.

THE COMPRESSIVE STRENGTH OF THE CONCRETE SHALL BE:

PRETENSIONED CONCRETE:
f'ci = 4,500 PSI (AT TRANSFER)
f'c = 7,000 PSI (28-DAY)

CURB CONCRETE:
f'c = 4,500 PSI (28-DAY)

AIR ENTRAINING AGENTS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE CURRENT EDITION OF ASTM C260. THE TOTAL ENTRAINED AIR CONTENT SHALL BE 6% +/- 1% BY VOLUME OF THE PLASTIC CONCRETE.

CONCRETE AGGREGATE SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN THE CURRENT EDITION OF ASTM C33. COARSE AGGREGATE SHALL BE SIZE NO. 67.

CONCRETE SHALL BE DYED TO ACHIEVE A UNIFORM NATURAL WOOD TONE FINISH PER THE PROJECT SPECIFICATIONS. PROPOSED COLOR SAMPLE SHALL BE SUBMITTED AND APPROVED PRIOR TO FABRICATION. PROPOSED COLOR SHALL MATCH THAT OF THE PRECAST CONCRETE BENT CAPS.

PRESTRESSING STRANDS

PRESTRESSING STRAND SHALL BE 0.5-INCH DIAMETER, SEVEN-WIRE, UNCOATED, LOW-RELAXATION STRAND WHICH IS IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN ASTM A416. THE STRAND SHALL HAVE AN ULTIMATE TENSILE STRENGTH OF 270 KSI. THE INITIAL PRESTRESS SHALL BE 31,000 LBS. PER STRAND UNLESS NOTED OTHERWISE.

STRAND SHALL BE TESTED IN ACCORDANCE WITH PCI RECOMMENDATIONS (MOUSTAFA METHOD) AND CERTIFIED BY THE FABRICATOR AS HAVING ADEQUATE BOND CHARACTERISTICS TO SATISFY THE PREDICTION EQUATIONS FOR TRANSFER AND DEVELOPMENT LENGTH GIVEN IN THE AREMA MANUAL FOR RAILWAY ENGINEERING.

AN ALTERNATE STRAND PATTERN WHICH HAS THE SAME ECCENTRICITY AS THE PATTERN SHOWN ON THIS PLAN AND IS BETTER SUITED TO THE MANUFACTURER'S FACILITIES WILL BE CONSIDERED. MANUFACTURER MUST SUBMIT PLAN AND COMPUTATIONS TO ENGINEER FOR APPROVAL PRIOR TO CASTING.

REINFORCING STEEL

REINFORCING STEEL SHALL BE DEFORMED, PER CURRENT ASTM A615 SPECIFICATIONS AND MUST MEET GRADE 60 REQUIREMENTS. UNCOATED BLACK BARS SHALL BE USED FOR ALL LOCATIONS EXCEPT FOR CURB REINFORCING.

CURB REINFORCING DENOTED WITH "X" AT THE END OF THE MARK NUMBER (I.E. 3F1X) SHALL BE DEFORMED, CORROSION RESISTANT, HIGH STRENGTH REINFORCEMENT MEETING THE CURRENT ASTM A1035 SPECIFICATIONS AND MUST MEET GRADE 100 REQUIREMENTS.

FABRICATION OF REINFORCING STEEL SHALL BE PER CHAPTER 7 OF THE CRSI MANUAL OF STANDARD PRACTICE. DIMENSIONS OF BENDING DETAILS ARE OUT-TO-OUT OF BAR.

REINFORCING STEEL IS TO BE BLOCKED TO PROPER LOCATION AND SECURELY WIRED AGAINST DISPLACEMENT. USE PLASTIC PROTECTED REINFORCING SUPPORTS MEETING CRSI SPECIFICATIONS CHAPTER 3, CLASS 1. TACK WELDING OF REINFORCING IS PROHIBITED. MINIMUM CONCRETE ON REINFORCEMENT SHALL MEET CURRENT AREMA REQUIREMENTS. MINIMUM CONCRETE COVER IS 1 1/2 INCHES.

GALVANIZING

ALL INSERTS, NUTS, AND WASHERS SHALL BE GALVANIZED ACCORDING TO ASTM A153 (HOT DIP PROCESS) OR ACCORDING TO ASTM B695, CLASS 50, TYPE 1 (MECHANICAL PROCESS).

FABRICATION

CONCRETE

PRODUCTION PROCEDURES AND DIMENSIONAL TOLERANCES FOR THE MANUFACTURE OF PRECAST, PRESTRESSED BEAMS SHALL BE IN ACCORDANCE WITH THE AREMA MANUAL FOR RAILWAY ENGINEERING AND THE PRESTRESSED CONCRETE INSTITUTES CURRENT MANUAL MNL-116 FOR QUALITY CONTROL.

TOLERANCE FOR LOCATION OF LIFTING LOOPS SHALL BE +/- 1/2".

THE ENDS OF THE STRANDS SHALL BE CUT OFF FLUSH WITH THE END OF THE BEAM AND PAINTED. RECESSES AND MINOR SPALLS MUST BE FILLED AND FINISHED TO THE PLAN DIMENSIONS USING AN EPOXY BONDING COMPOUND AND GROUT.

CURB SHALL BE CAST AFTER THE BEAM IS REMOVED FROM THE FORM.

CONCRETE BONDING AGENT: REFER TO SPECIFICATIONS

SURFACES SHALL BE FORMED IN A MANNER WHICH WILL PRODUCE A SMOOTH AND UNIFORM APPEARANCE WITHOUT RUBBING OR PLASTERING. UNLESS OTHERWISE NOTED, EXPOSED EDGES OF 90-DEGREES OR LESS ARE TO BE CHAMFERED 3/4" X 3/4". UNFORMED SURFACES SHALL HAVE A SMOOTH FINISH FREE OF ALL FLOAT AND TROWEL MARKS.

THE FABRICATOR SHALL STENCIL THE FABRICATOR'S NAME, DATE OF FABRICATION, PLACE MARK, AND LIFTING WEIGHT AT LOCATION SHOWN.

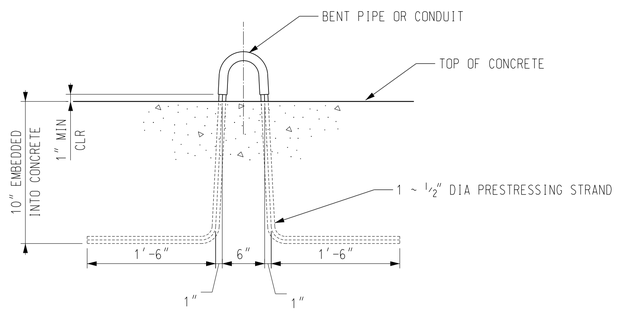
CURB TO BE DIVIDED INTO THREE EQUAL SEGMENTS AS SHOWN. IF CURB JOINTS CANNOT BE EQUALLY SPACED DUE TO CONFLICTS WITH HANDRAIL CONNECTIONS, THEN FABRICATOR SHALL ADJUST CURB SEGMENT LENGTHS SO THAT EACH CURB JOINT IS A MINIMUM OF 12" FROM THE CENTERLINE OF ANY WALKWAY/HANDRAIL CONNECTION.

CONSTRUCTION

MORTAR FOR SETTING BEAMS

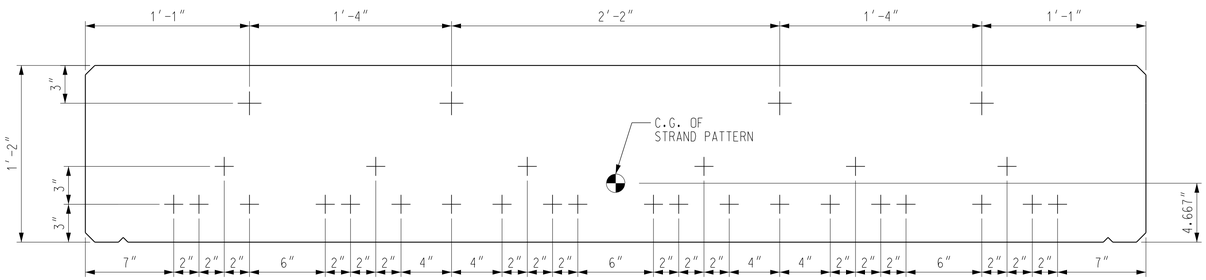
BEAMS SHALL HAVE FULL AND EVEN BEARING UPON THE BRIDGE SEAT AREAS. IF NEEDED, MORTAR CONSISTING OF EQUAL PARTS BY VOLUME OF CLASS B EPOXY AND DRY SILICA SAND, MIXED IN ACCORDANCE WITH THE MANUFACTURER'S DIRECTIONS, SHALL BE SPREAD ON THE TOP OF BEARING PADS TO OBTAIN UNIFORM BEARING. SCRAPE EXCESS MORTAR FROM AROUND BEARING PADS AFTER THE BEAMS ARE SET.

AFTER PRECAST CONCRETE MEMBERS ARE SET, THE ENDS OF THE LIFTING LOOP STRANDS SHALL BE BURNED OFF AND RECESSED TO A DEPTH OF 1 INCH. FILL RECESSES AT LIFT ANCHORS WITH CEMENT GROUT TO TOP OF SURROUNDING CONCRETE.



LIFTING DETAIL

FABRICATOR IS RESPONSIBLE FOR ADEQUACY OF LIFTING LOOPS.



PRESTRESSED STRAND PATTERN FOR MK SB16.7

MILD REINFORCING NOT SHOWN FOR CLARITY
(30 ~ 0.5" 270 KSI STRANDS ALL STRAIGHT STRANDS)
SCALE: 2" = 1' -0"

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

WIRE MILL POND RR BRIDGE
PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 1 OF 2)

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019

PROJECT NUMBER:

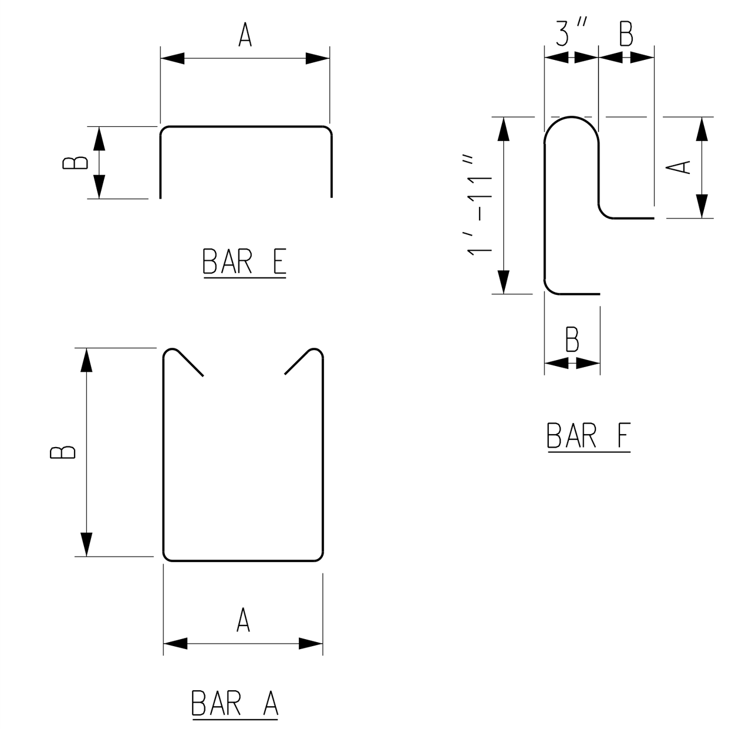
BW-501

SHEET: 95 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

REINFORCING SCHEDULE						
MARK	QTY	SIZE	TYPE	A	B	LENGTH
3F1X	31	3	F	1'-10"	5"	4'-10"
4S1	6	4	STR	–	–	5'-3"
4S2	12	4	STR	–	–	5'-2"
5A1	52	5	A	2'-11"	10"	5'-6"
5A2	26	5	A	2'-10"	10"	5'-5"
5E1	10	5	E	9½"	9"	2'-3½"
5E2	12	5	E	8¼"	2'-0"	4'-8¼"
5E3	26	5	E	6'-8"	10"	8'-4"
5S1	18	5	STR	–	–	16'-3"
1180 LBS = WEIGHT OF REINFORCING STEEL PER BEAM (ASTM A615)						

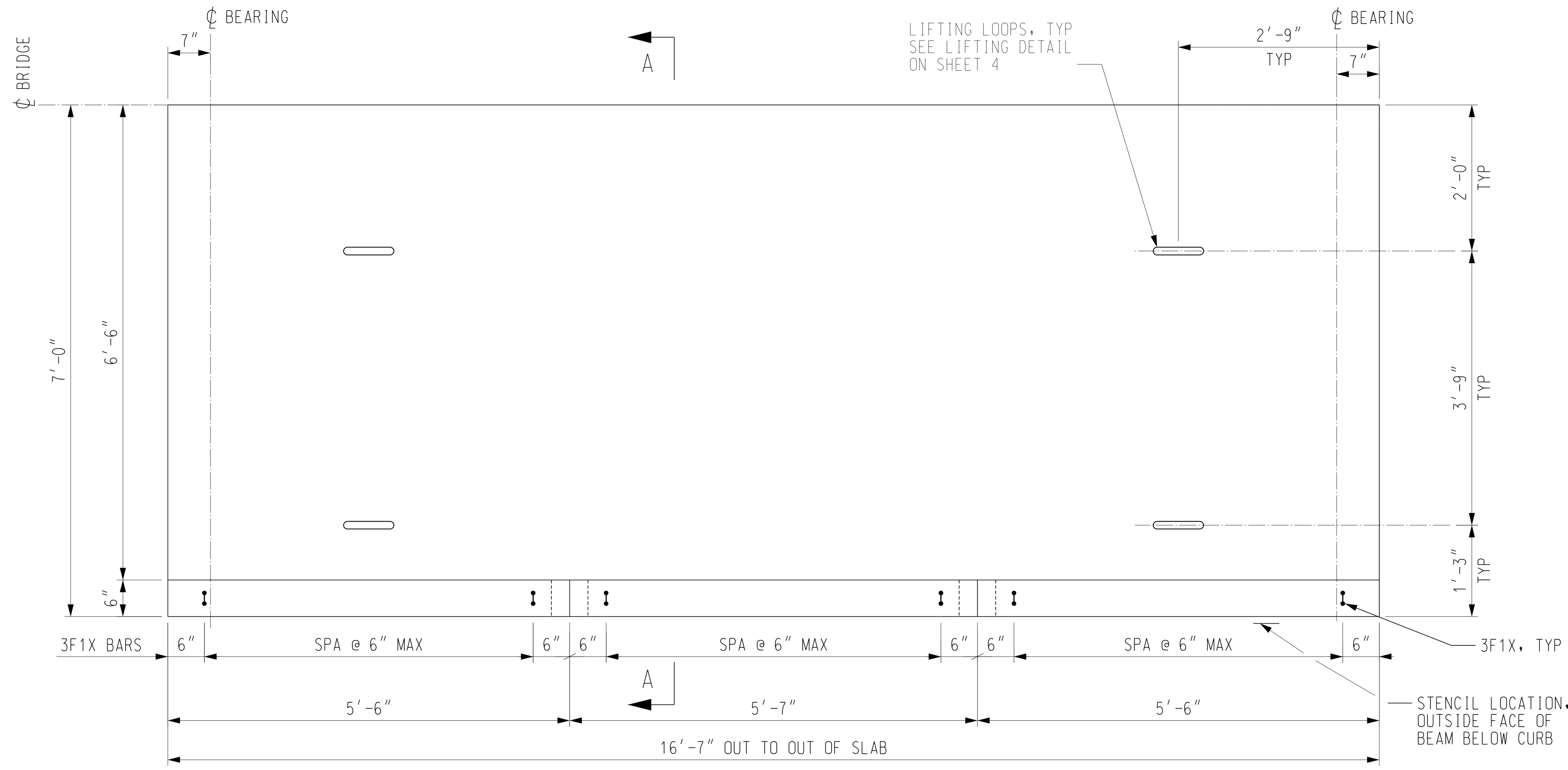
BENDING DETAILS



DIMENSIONS ARE OUT TO OUT

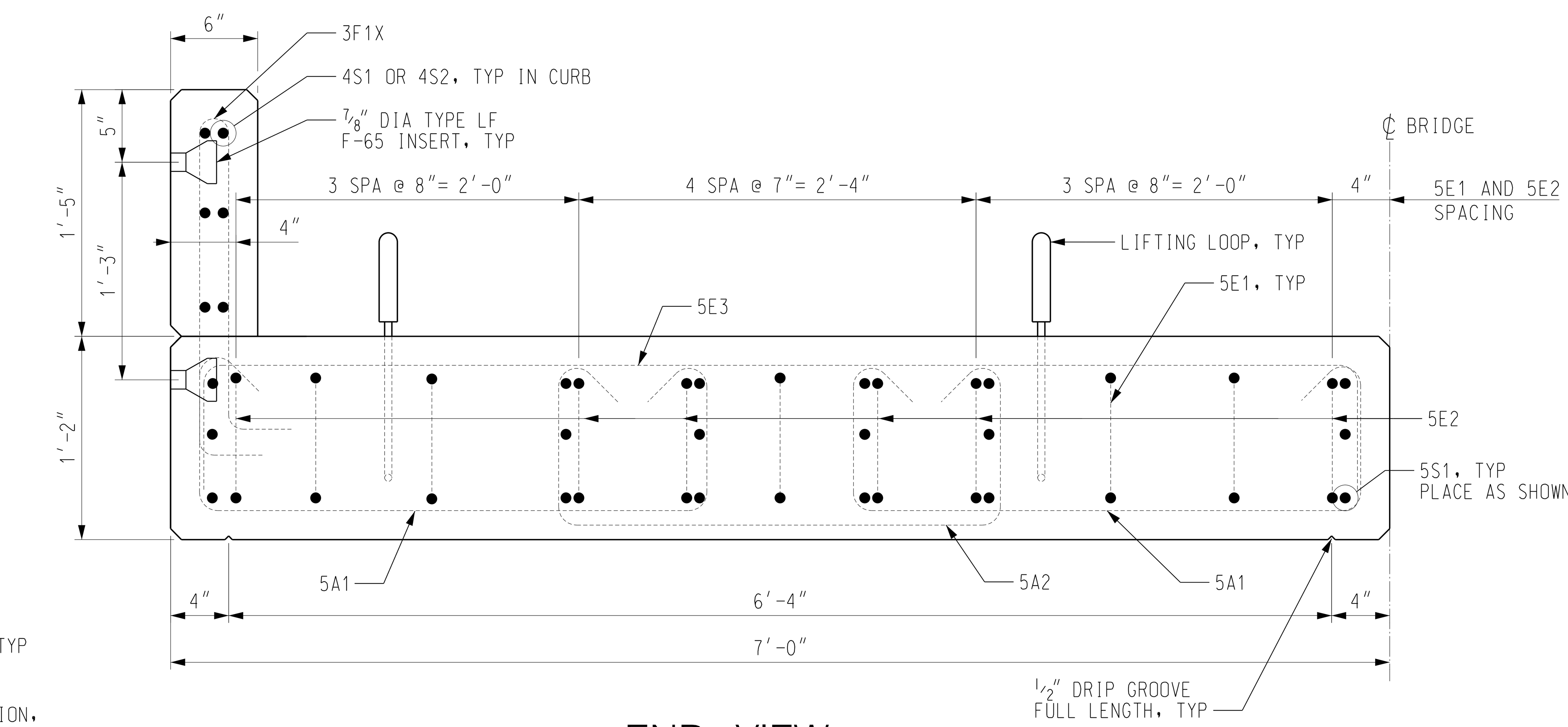
NOTES

SEE SHEET 95 FOR PRESTRESSED CONCRETE NOTES, STRAND PATTERN, AND LIFTING DETAIL.



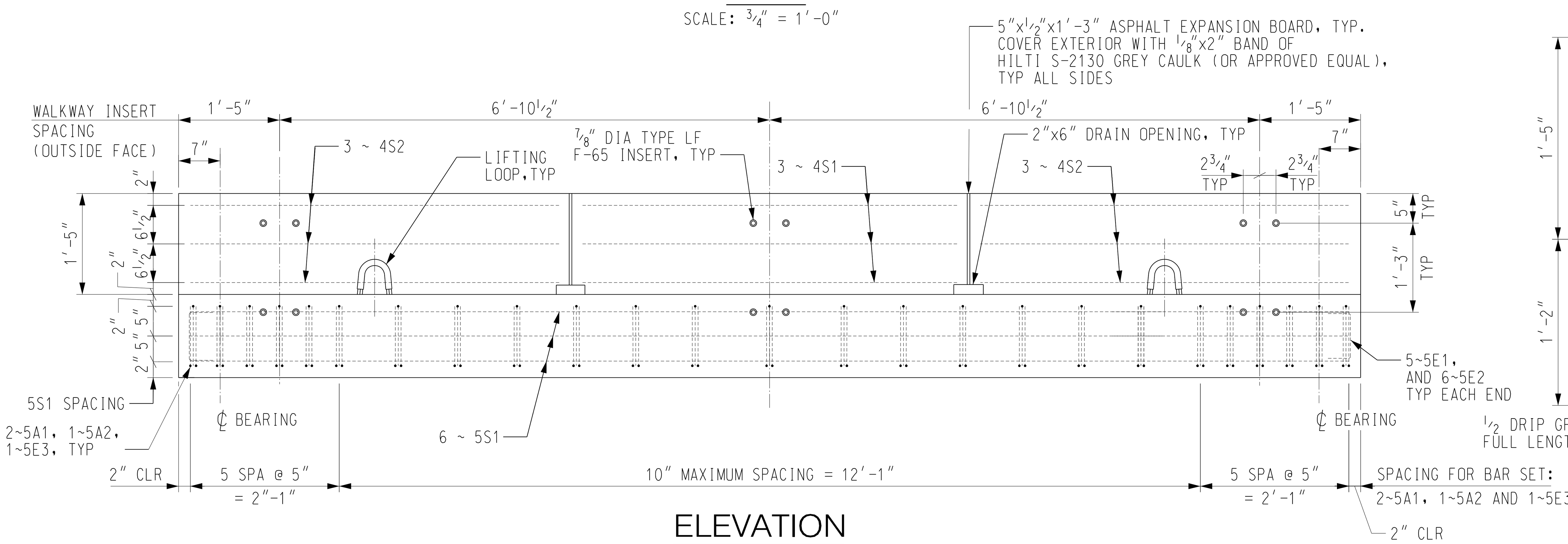
PLAN

SCALE: ¾" = 1'-0"



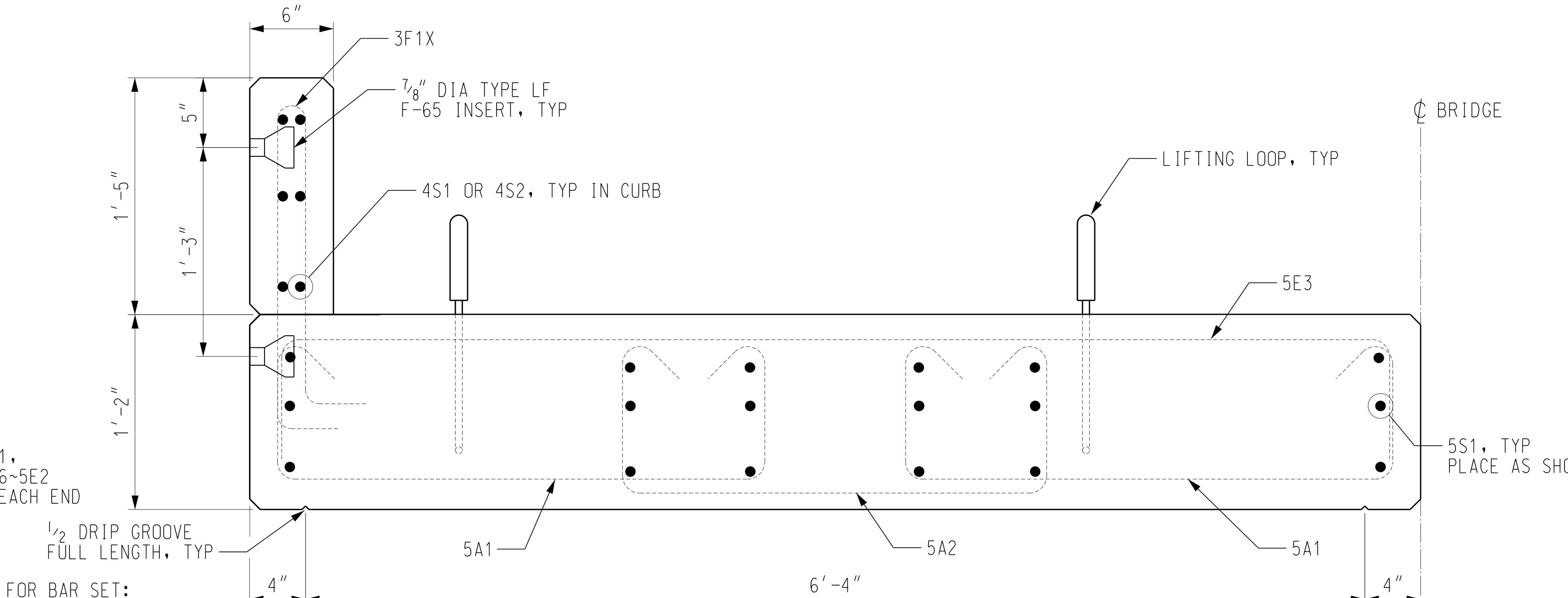
END VIEW

SCALE: 1½" = 1'-0"



ELEVATION

SCALE: ¾" = 1'-0"



SECTION A–A

SCALE: 1½" = 1'-0"

14" DEEP PRESTRESSED CONCRETE SLAB BEAM MK SB16.7

6 REQUIRED
CONCRETE VOLUME = 5.1 CU. YD (BEAM), 0.5 CU.YD (CURB)
LIFT WEIGHT = 22,200 LBS (22.2 KIPS)

REVISIONS			
NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
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WIRE MILL POND RR BRIDGE
PRESTRESSED CONCRETE SLAB BEAM DETAILS (SHEET 2 OF 2)

PREPARED FOR:

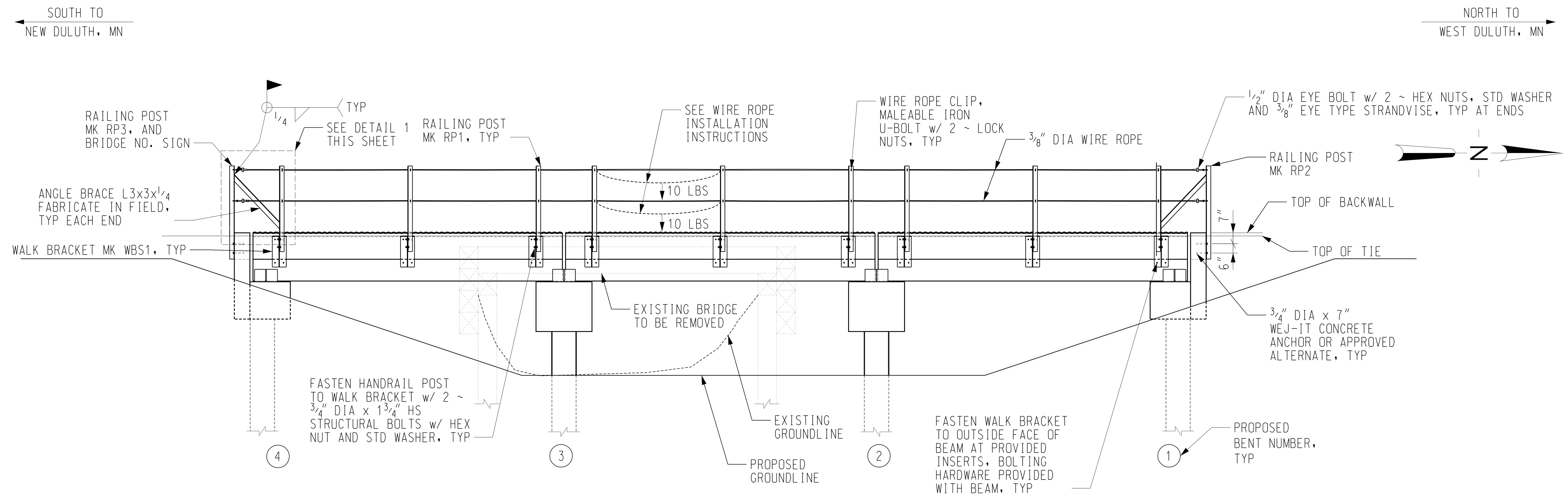
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:
BW-502

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



VIEW A–A

SCALE: 1/4" = 1'-0"

WALKWAY GENERAL NOTES

STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH ASTM DESIGNATION A36 OR APPROVED EQUIVALENT. ALL STRUCTURAL STEEL ITEMS AND HARDWARE TO BE GALVANIZED UNLESS OTHERWISE NOTED.

HANDRAIL POSTS ON WALKWAYS SHALL BE ERECTED PLUMB AND IN LINE.

GALVANIZING OF STRUCTURAL STEEL AFTER FABRICATION SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM DESIGNATION A123.

GALVANIZING OF IRON AND STEEL HARDWARE SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM DESIGNATION A153.

FIELD PAINT ANGLE BRACES, WELDED AREAS, AND ABRASIONS OR CUTS ON RAILING POSTS, WALK BRACKETS, AND GRIP STRUT WALKWAY WITH ONE PRIME AND ONE FINISH COAT OF ZINC RICH PAINT.

WIRE ROPE SHALL BE 3/8" DIA, 7-WIRE STRAND, SIEMENS MARTIN GRADE, TYPE A COATING.

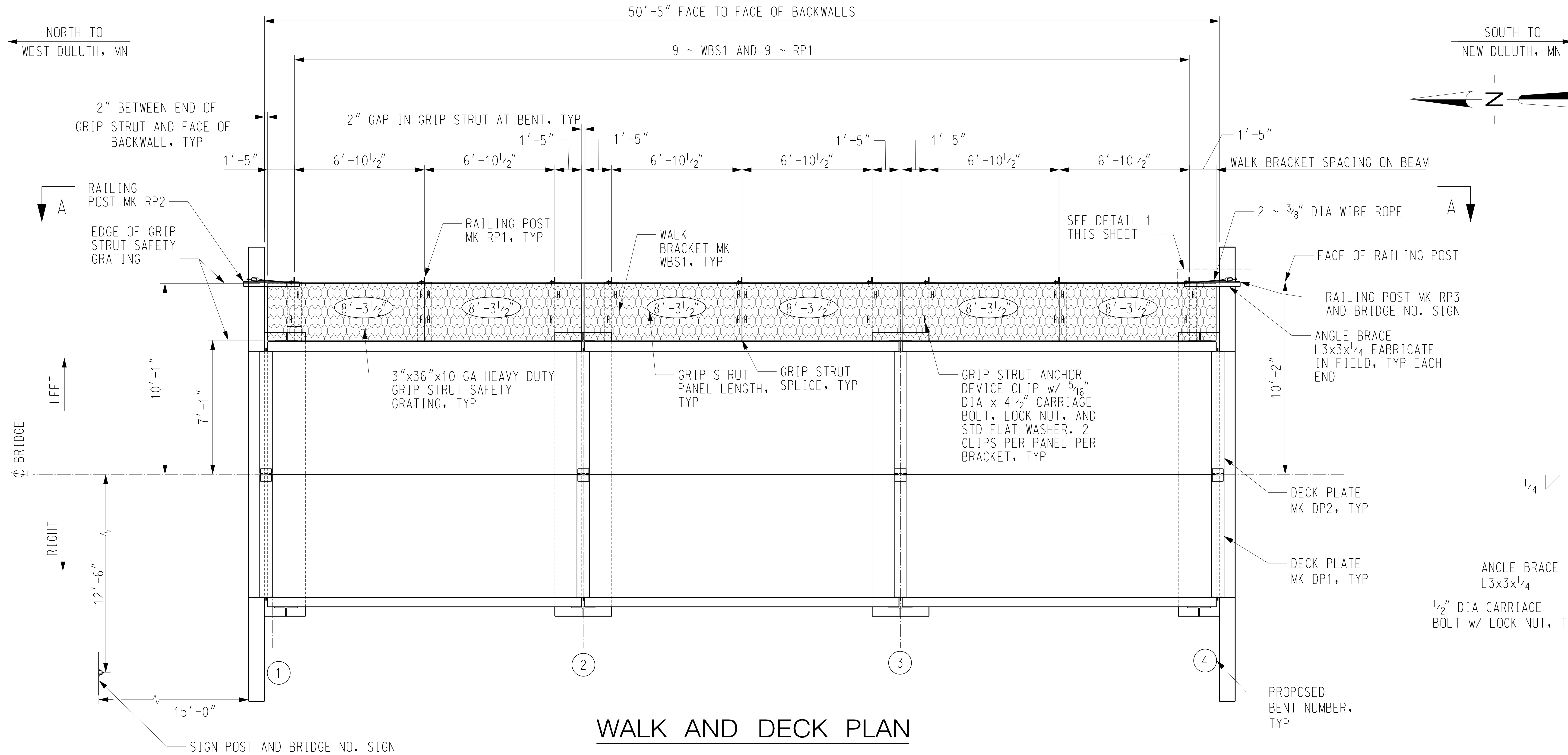
EYE BOLTS SHALL BE 1/2" DIAMETER WITH 2" LONG SHANK AND 1" INSIDE DIAMETER EYE.

WIRE ROPE CLIPS SHALL BE MALLEABLE IRON U-BOLTS 1/4" DIAMETER x 1 1/2" LONG WITH A 1" CENTERLINE WIDTH.

GRIP STRUT ANCHOR DEVICE CLIPS SHALL BE MCNICHOLS NO. 12262 DIAMOND ANCHOR DEVICE OR APPROVED EQUAL AND BE COMPATIBLE WITH THE GRIP STRUT PANELS ORDERED.

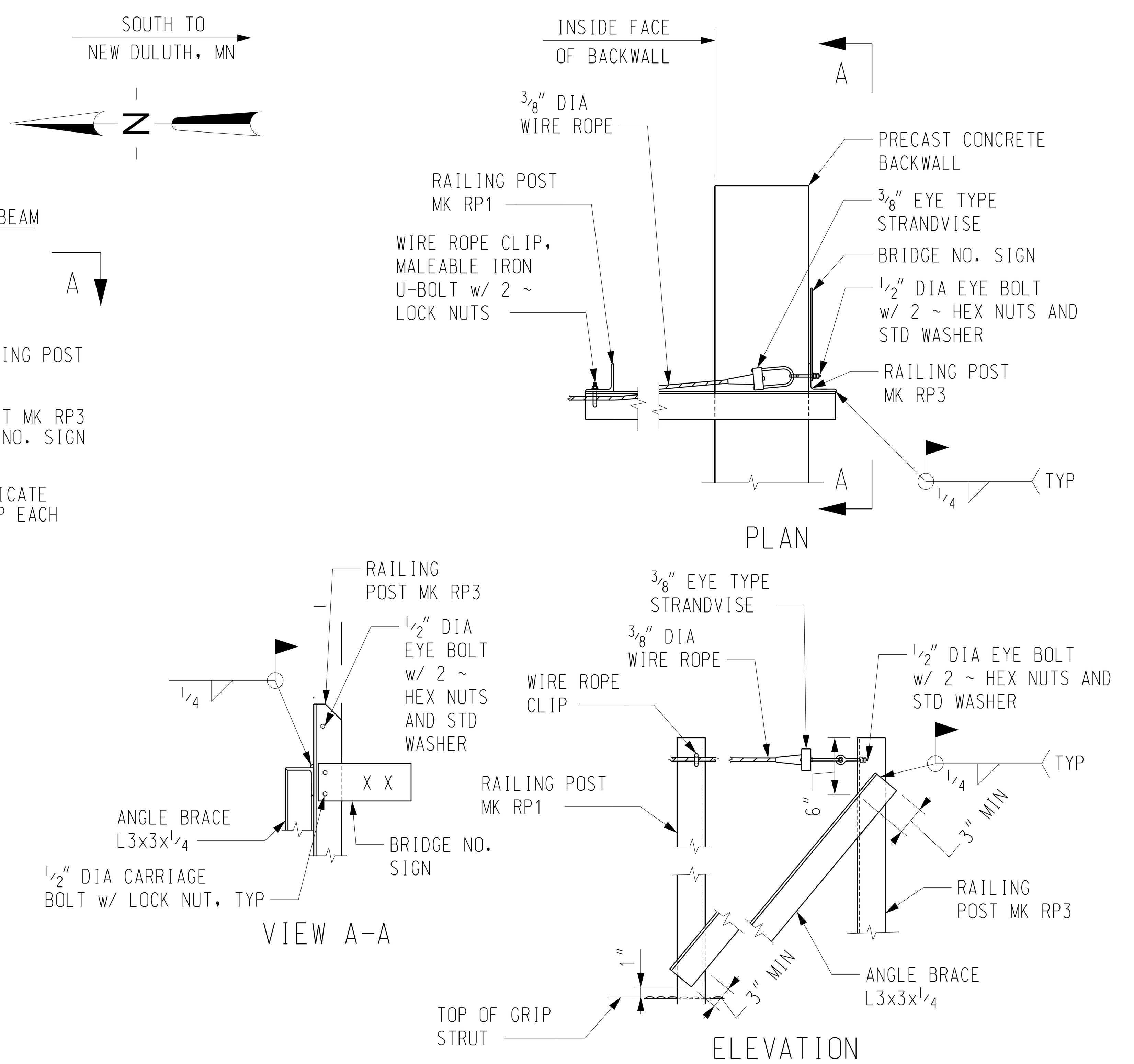
WIRE ROPE INSTALLATION INSTRUCTIONS

1. THREAD WIRE ROPE THROUGH ALL CLIPS AND BARREL ANCHORS AND SEAT RETAINING WEDGES ON ONE END RAILING POST (DO NOT TIGHTEN).
2. STRETCH WIRE ROPE AND HANG A MINIMUM OF 10 LBS ON ROPE BETWEEN TWO POSTS AS SHOWN. REMOVE ALL SAG IN ROPE TO A MAXIMUM OF 2 INCHES.
3. SEAT RETAINING WEDGES AT REMAINING END POST.
4. REMOVE WEIGHTS.
5. TIGHTEN CLIPS AT INTERMEDIATE POSTS.
6. CUT AND REMOVE EXCESS WIRE ROPE, COAT CUT PORTIONS OF WIRE ROPE WITH COLD GALVANIZING COMPOUND.



WALK AND DECK PLAN

SCALE: 1/4" = 1'-0"



DETAIL 1

SCALE: 1" = 1'-0"

REVISIONS
NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
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DULUTH, MINNESOTA

WIRE MILL POND RR BRIDGE
WALK AND DECK PLAN AND HANDRAIL DETAILS

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019

PROJECT NUMBER:

BW-503

SHEET: 97 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

PRECAST CONCRETE NOTES

FABRICATION AND WORKMANSHIP SHALL CONFORM TO CURRENT AREMA MANUAL FOR RAILWAY ENGINEERING, CHAPTER 8, CONCRETE STRUCTURES AND PROJECT SPECIFICATIONS.

PRECAST CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS PER SPECIFICATION FOR PRECAST CONCRETE PRODUCTS.

CONCRETE SHALL BE VIBRATED INTERNALLY DURING PLACEMENT TO PROVIDE THROUGH CONSOLIDATION AND COMPACTION. CARE SHALL BE TAKEN TO AVOID DISPLACEMENT OF EMBEDDED ITEMS.

ALL REINFORCING STEEL FOR CAP SHALL CONFORM TO ASTM A615 GR 60.

ALL REINFORCING STEEL SHALL HAVE A MINIMUM OF 2" CLEAR COVER, UNLESS OTHERWISE NOTED.

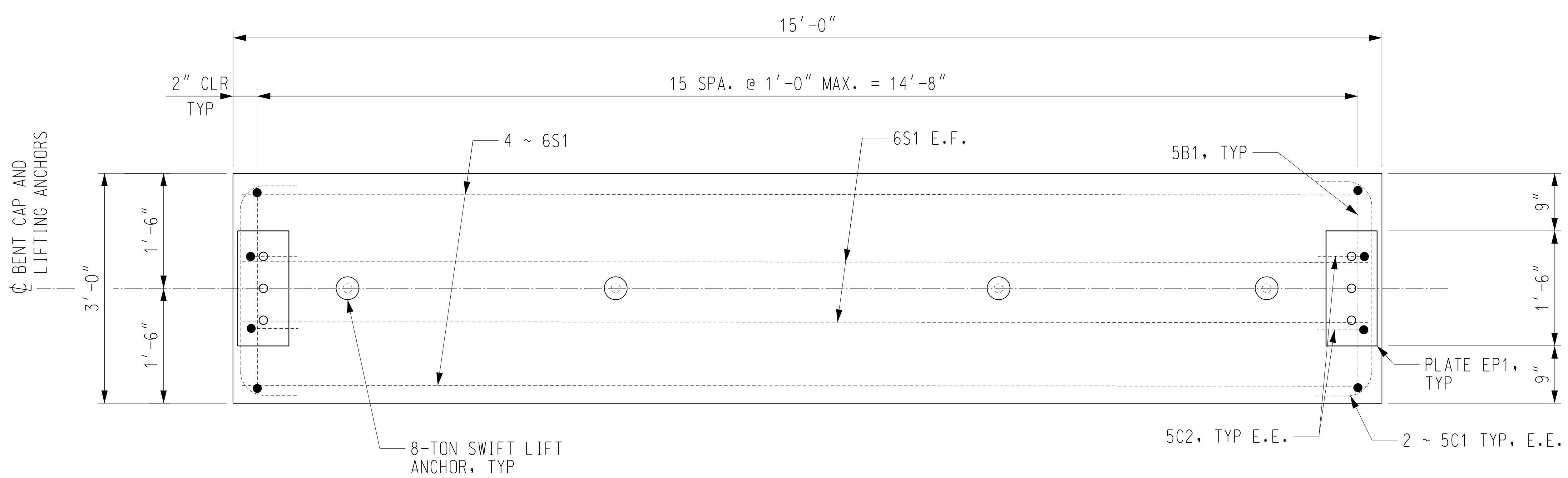
ALL BAR BENDING AND STANDARD HOOK DIMENSIONS SHALL BE IN ACCORDANCE WITH THE "MANUAL OF STANDARD PRACTICE" AS PUBLISHED BY THE CONCRETE REINFORCING STEEL INSTITUTE UNLESS OTHERWISE SHOWN OR NOTED.

CHAMFER ALL EXPOSED CORNERS 3/4", TYPICAL.

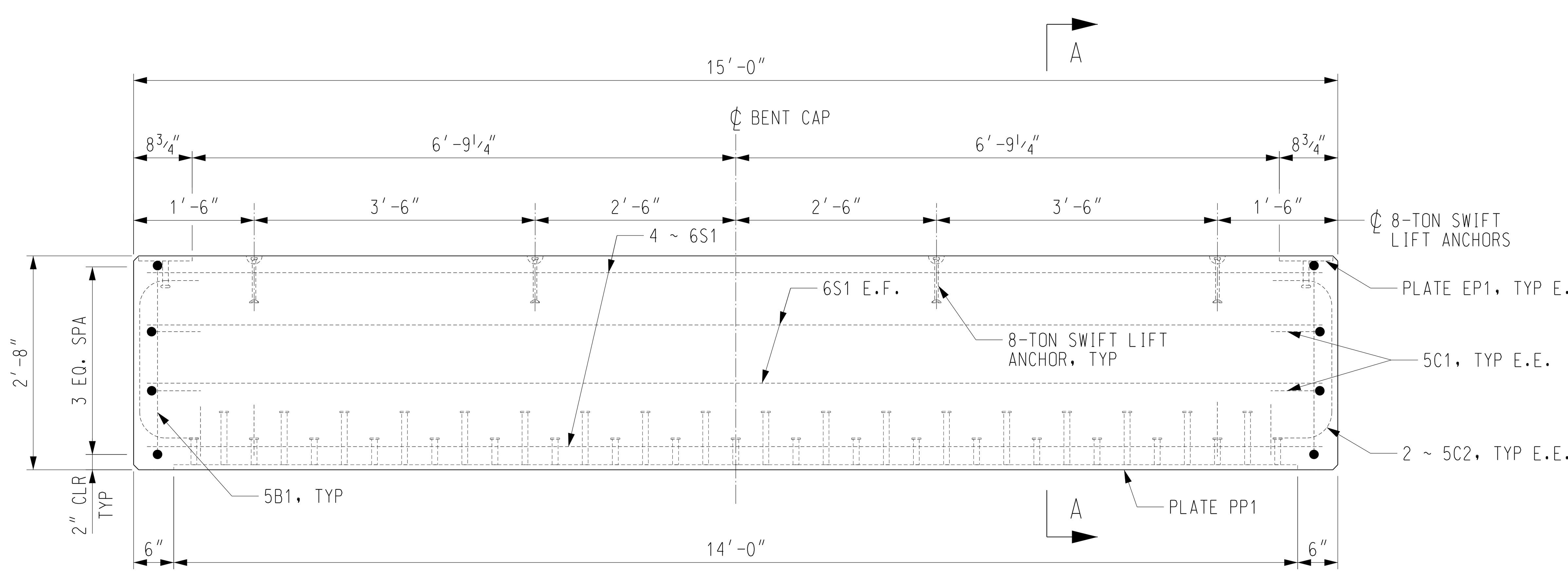
CONCRETE SHALL BE DYED TO ACHIEVE A UNIFORM NATURAL WOOD TONE FINISH PER THE PROJECT SPECIFICATIONS. PROPOSED COLOR SAMPLE SHALL BE SUBMITTED AND APPROVED PRIOR TO FABRICATION. PROPOSED COLOR SHALL MATCH THAT OF THE PRECAST CONCRETE BEAMS.

FABRICATOR TO VERIFY ALL LIFTING DEVICES NECESSARY FOR FABRICATION, TRANSPORTATION, AND PLACEMENT.

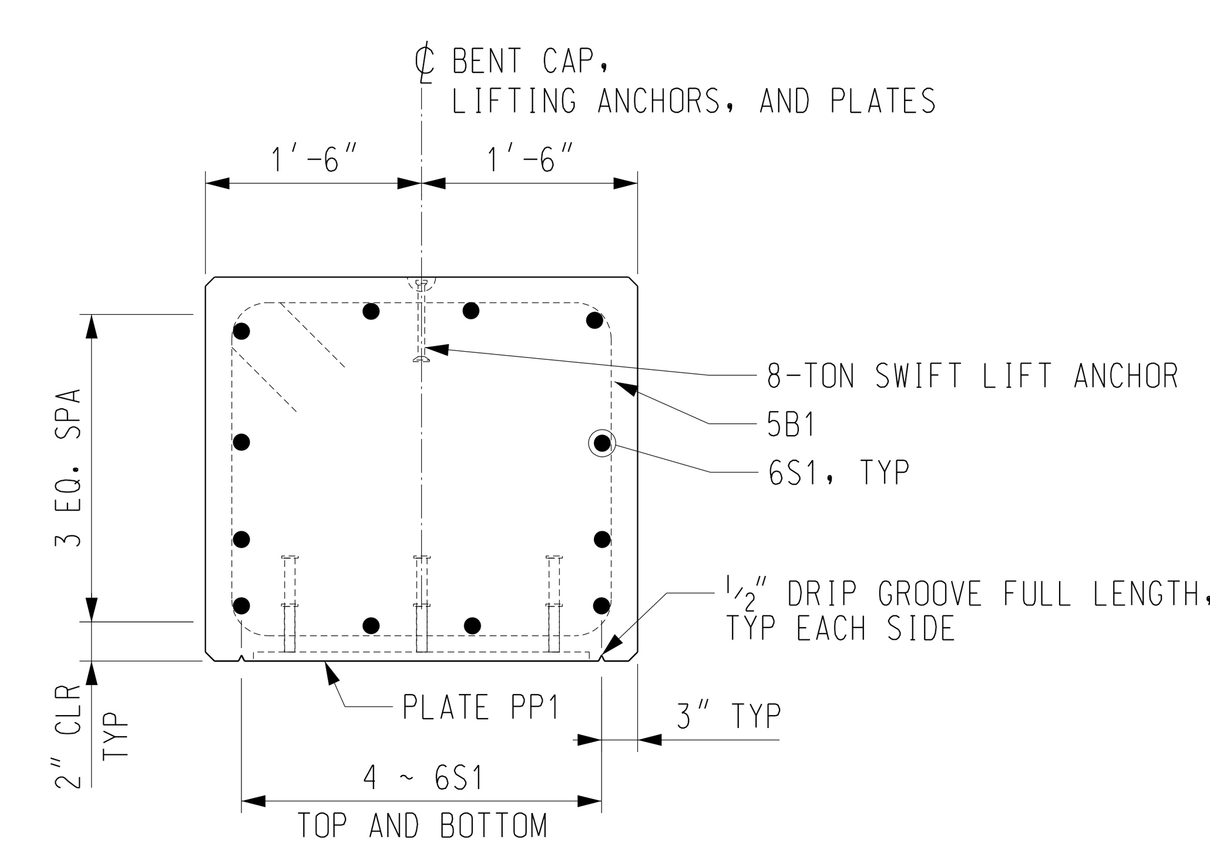
E.F. = EACH FACE
E.E. = EACH END



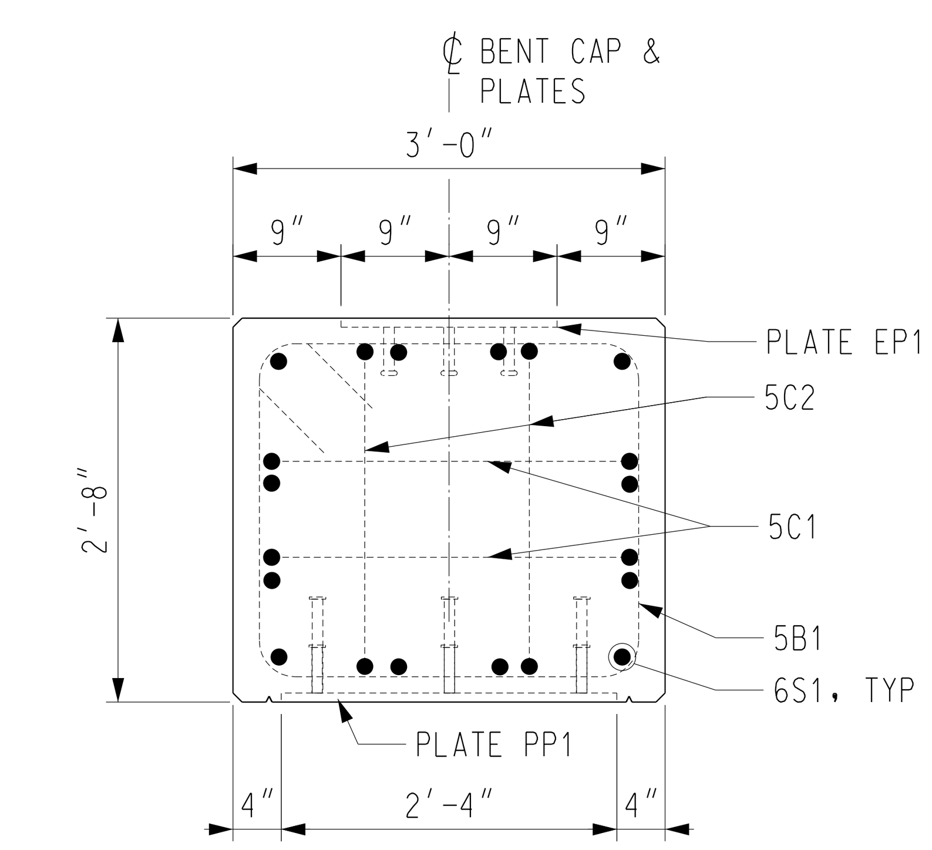
PLAN



ELEVATION



SECTION A–A



END VIEW

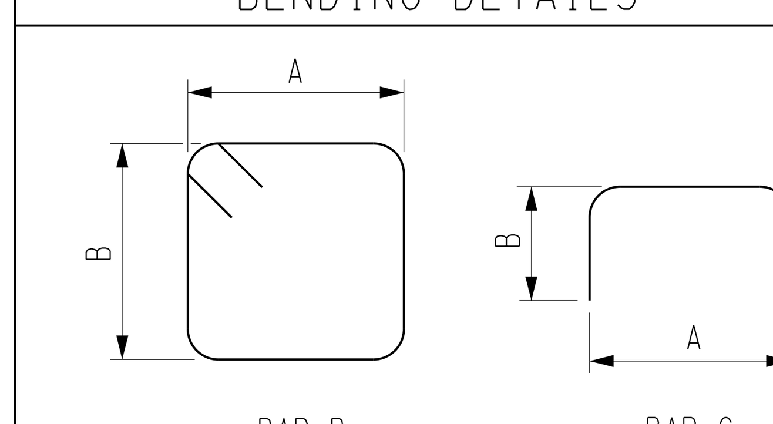
PRECAST CONCRETE BENT CAP MK BC1

SCALE: 3/4" = 1'-0"
ESTIMATED LIFTING WEIGHT = 19,210 LBS. (9.6 TONS)
CONCRETE VOLUME = 4.5 C.Y.

REINFORCING SCHEDULE FOR BENT CAP MK BC1

QTY	MARK	SIZE	TYPE	A	B	LENGTH
16	5B1	5	B	2'-8"	2'-4"	10'-11"
4	5C1	5	C	2'-7"	10"	4'-3"
4	5C2	5	C	2'-3"	10"	3'-11"
12	6S1	6	STR	-	-	14'-8"
TOTAL REINFORCING WEIGHT (LBS) = 481						

BENDING DETAILS



ALL DIMENSIONS SHOWN ARE OUT TO OUT OF BARS.

REVISIONS | NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN

DULUTH, MINNESOTA

STANDARD RR BRIDGE COMPONENTS AND DETAILS
PRECAST CONCRETE BENT CAP DETAILS AND NOTES

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:

BG-501

SHEET: 98 OF 111

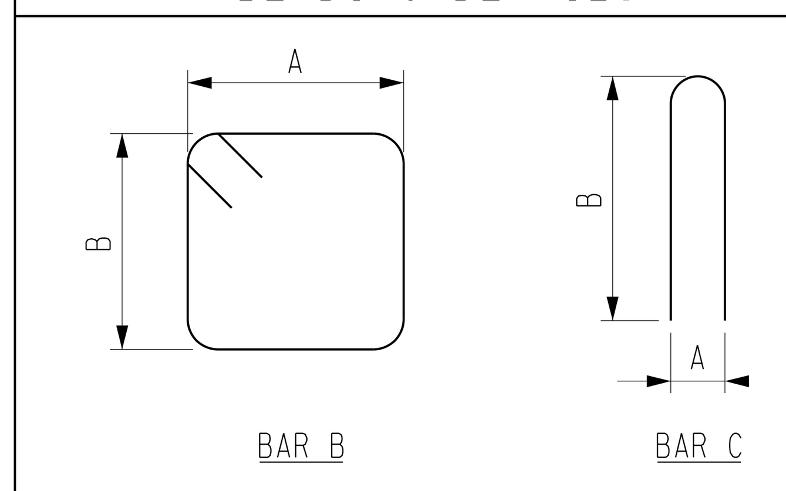
PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

REINFORCING SCHEDULE FOR END BENT CAP MK EBC1

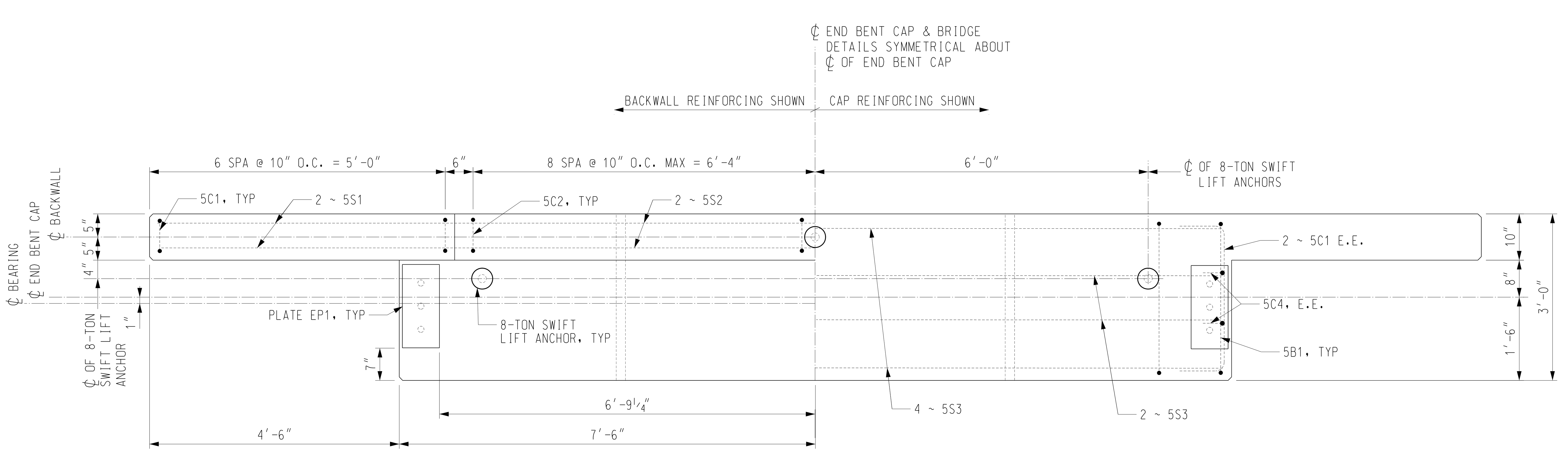
QTY	MARK	SIZE	TYPE	A	B	LENGTH
19	5B1	5	B	2′-8″	1′-8″	9′-7″
8	5S1	5	STR	–	–	5′-2″
4	5S2	5	STR	–	–	23′-8″
12	5S3	5	STR	–	–	14′-8″
16	5S4	5	STR	–	–	6′-4″
14	5C1	5	C	6″	4′-3½″	9′-1″
17	5C2	5	C	6″	2′-10½″	6′-3″
4	5C3	5	C	2′-7″	10″	4′-3″
4	5C4	5	C	1′-7″	10″	3′-3″

TOTAL REINFORCING WEIGHT (LBS) = 896

BENDING DETAILS

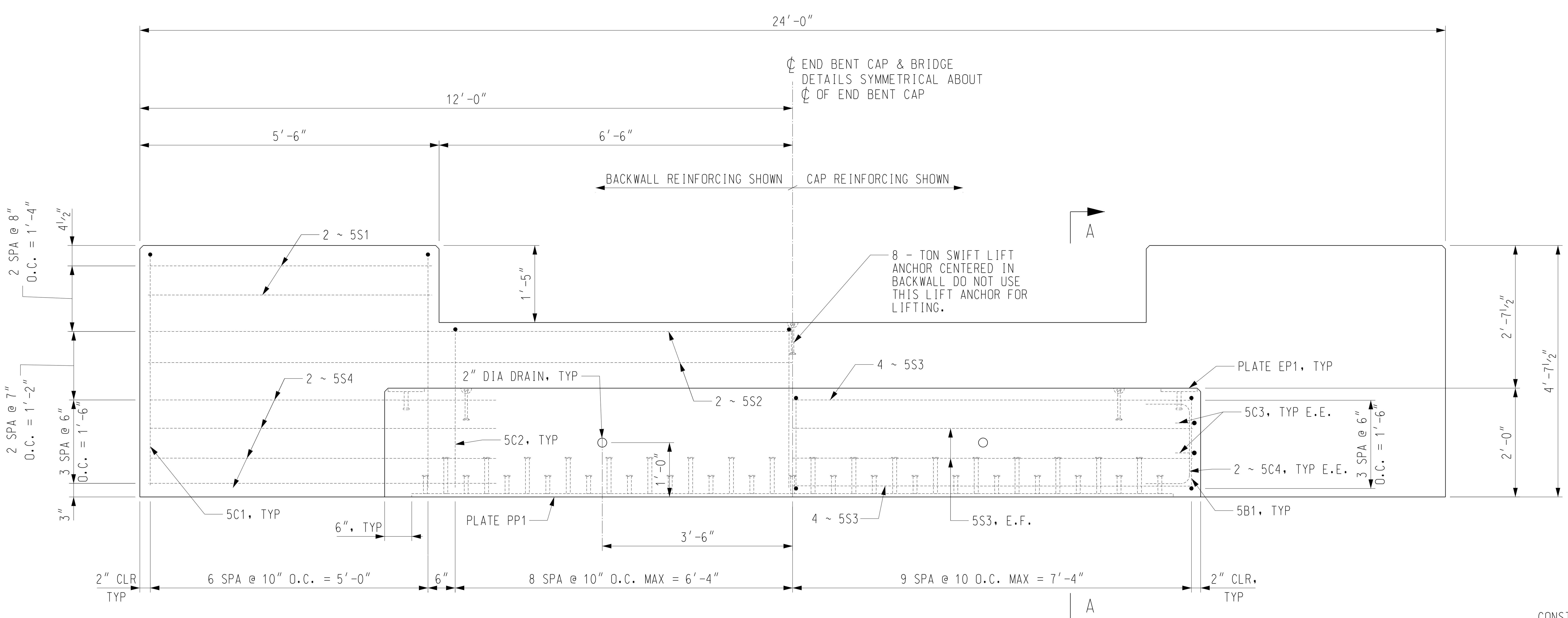


ALL DIMENSIONS SHOWN ARE OUT TO OUT OF BARS.



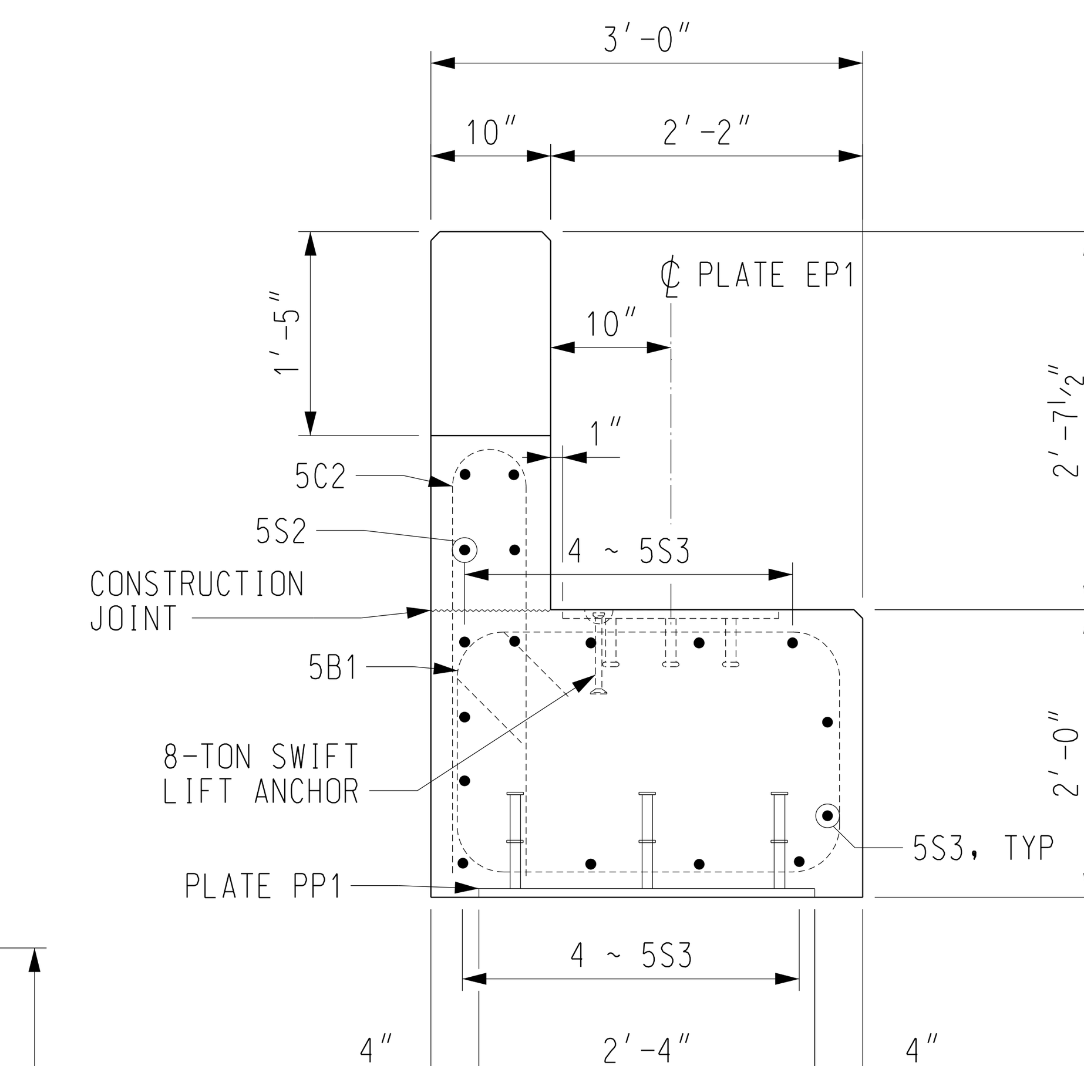
PLAN

BOTTOM AND SIDE LONGITUDINAL MATS OF REINFORCING NOT SHOWN FOR CLARITY



ELEVATION

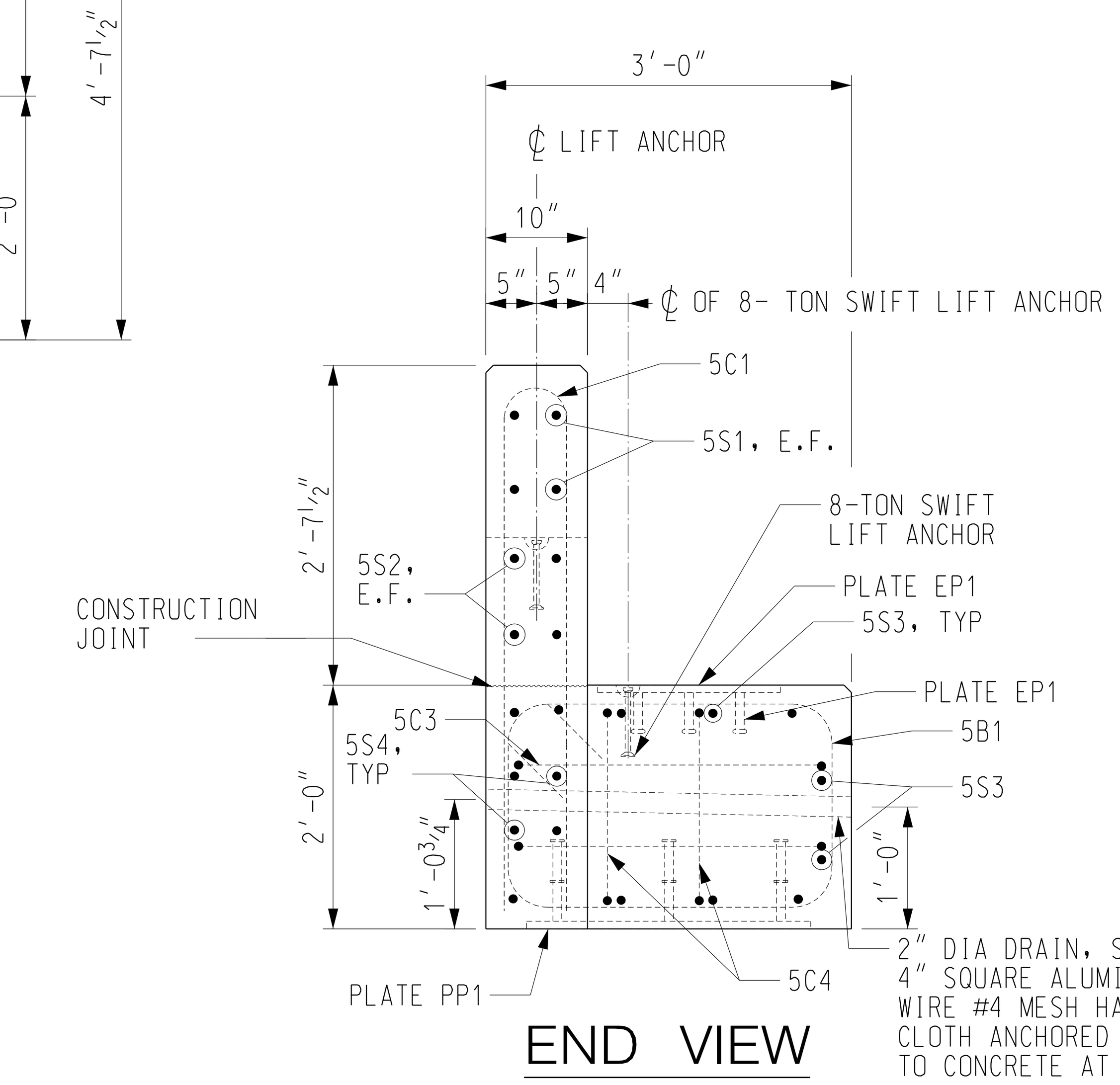
SECTION A–A



NOTES

FOR PRECAST CONCRETE NOTES, SEE SHEET 98.

END VIEW



PRECAST CONCRETE END BENT CAP MK EBC1

SCALE: ⅜″ = 1′-0″
EST. LIFTING WEIGHT = 22,520 LBS (11.3 TONS)
CONCRETE VOLUME = 5.3 C.Y

REVISIONS | NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

STANDARD RR BRIDGE COMPONENTS AND DETAILS
PRECAST CONCRETE END BENT CAP DETAILS

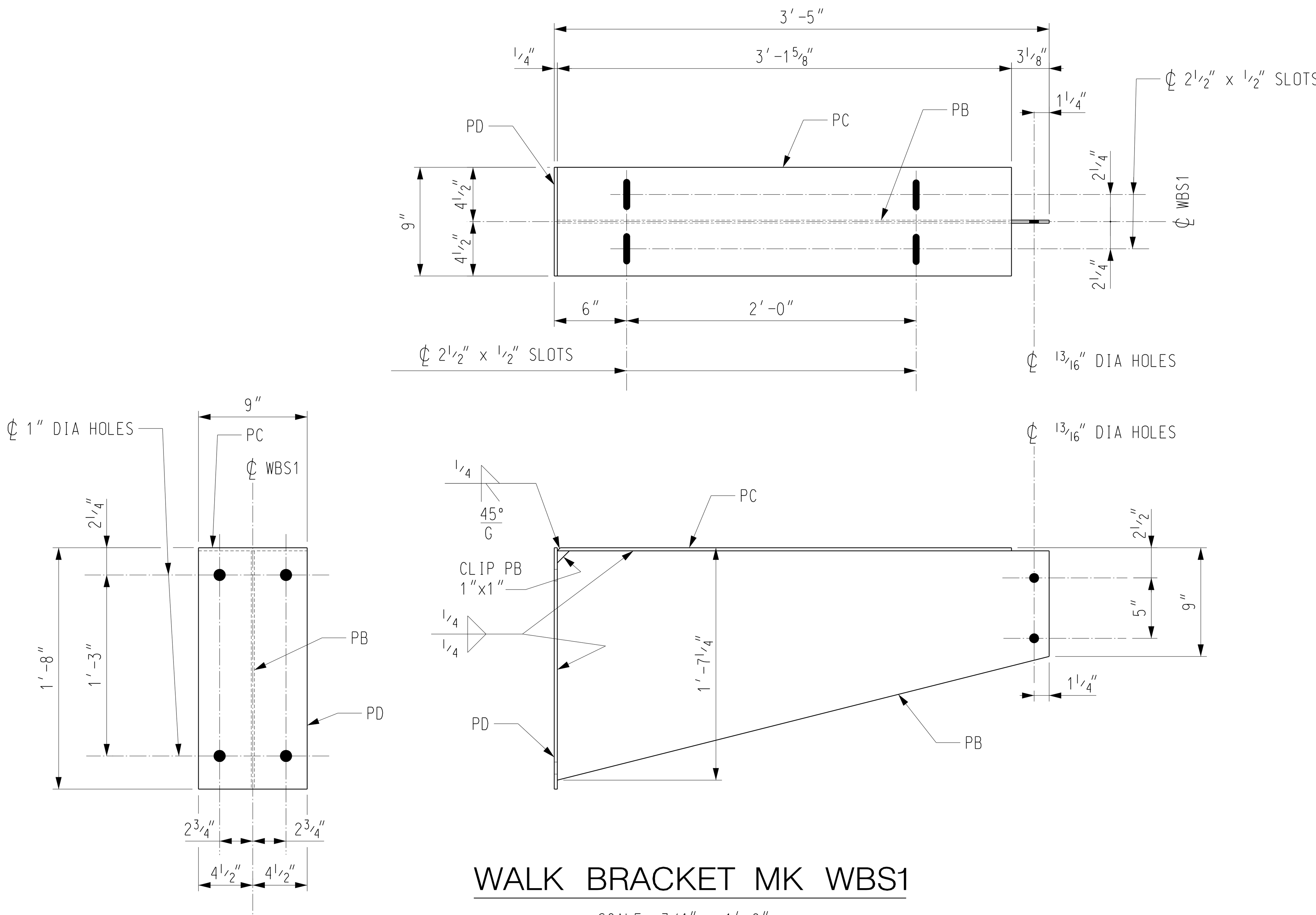
PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

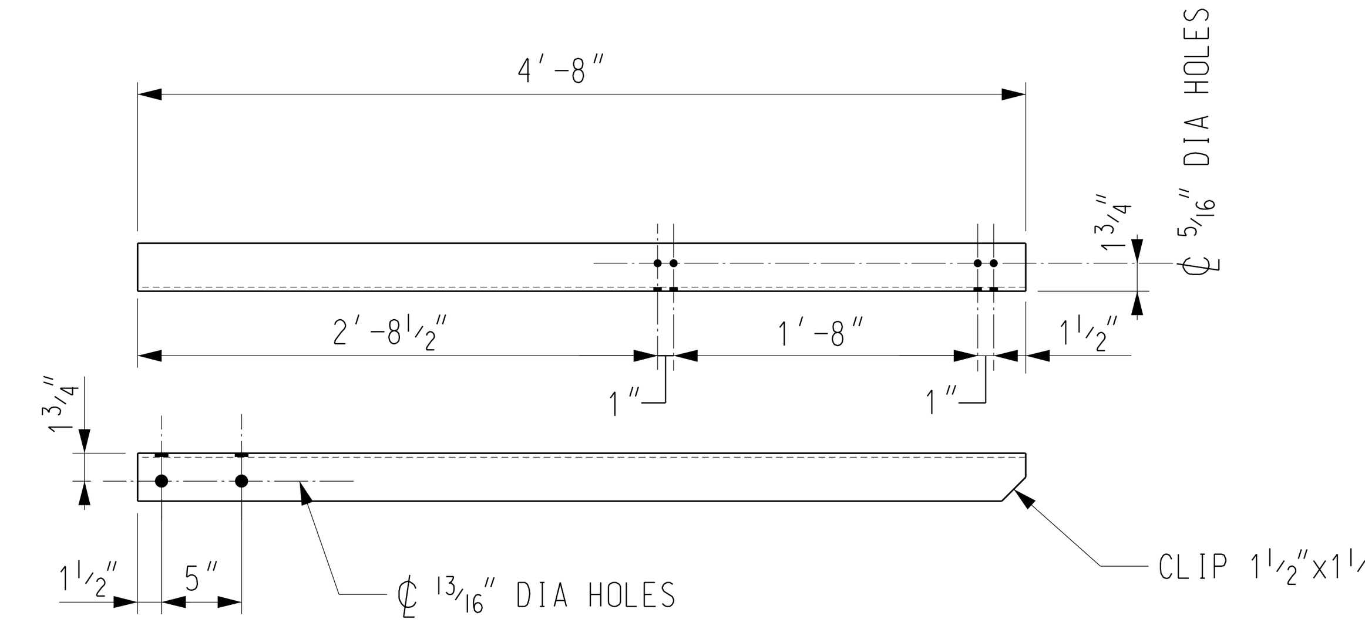
DATE: MAY 2019
PROJECT NUMBER:
BG-502
SHEET: 99 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



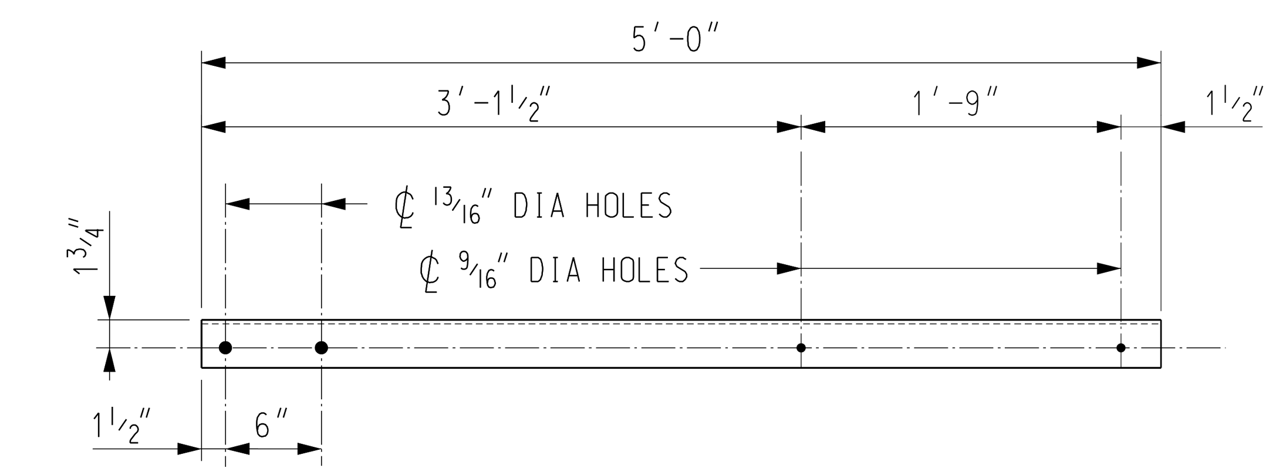
WALK BRACKET MK WBS1

SCALE: 3/4″ = 1′-0″
PB = 1 ~ PL 1/4″ x 19″x 3′-4 3/4″
*PC = 1 ~ PL 1/4″ x 9″x 3′-1 5/8″
*PD = 1 ~ PL 1/4″ x 9″x 1′-8″
WEIGHT = 77 LBS
GALVANIZE AFTER FABRICATION
* ONE (1) BENT PLATE MAY BE SUBSTITUTED FOR THE TWO (2) PLATES PC AND PD SHOWN. MINIMUM INSIDE RADII OF BEND IN PLATE SHALL BE 1.5 TIMES THE THICKNESS OF THE PLATE FOR COLD BENDING.



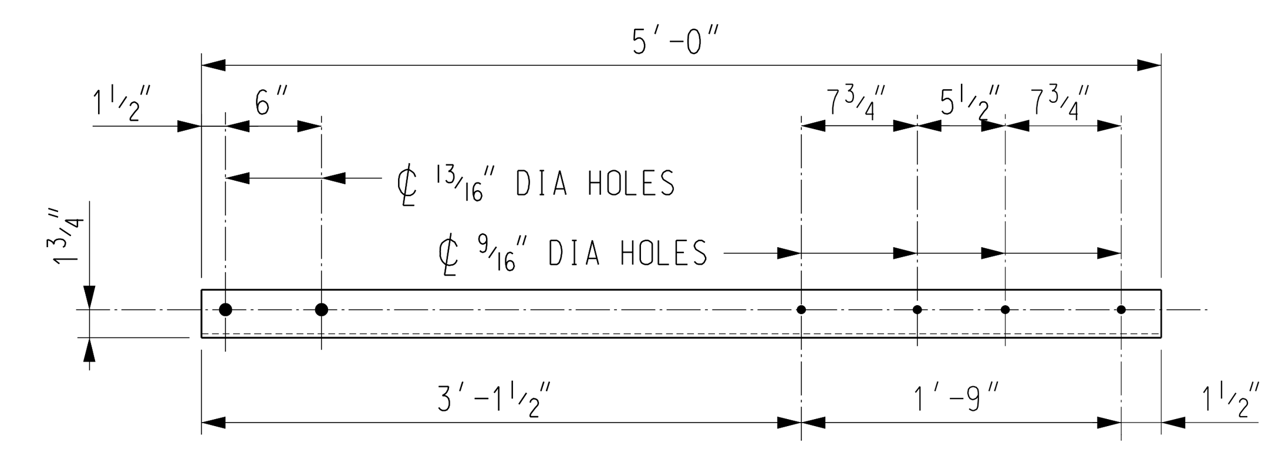
RAILING POST MK RP1

SCALE: 1″ = 1′-0″
1 ~ L3x3x1/4 x 4′-8″
GALVANIZE AFTER FABRICATION.
WEIGHT = 23 LBS



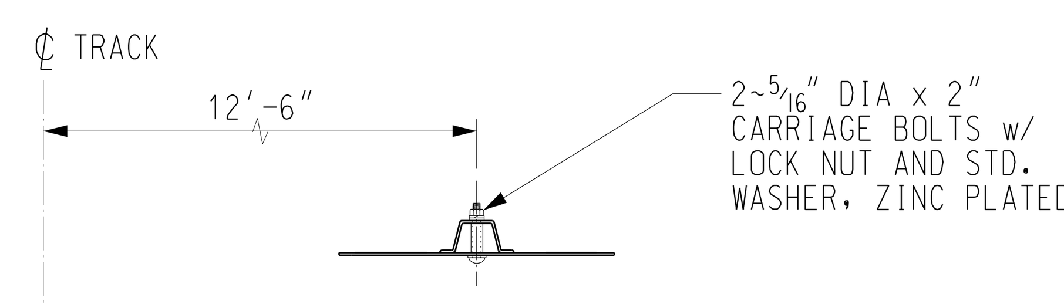
RAILING POST MK RP2

SCALE: 1″ = 1′-0″
1 ~ L3x3x1/4 x 5′-0″
GALVANIZE AFTER FABRICATION.
WEIGHT = 25 LBS

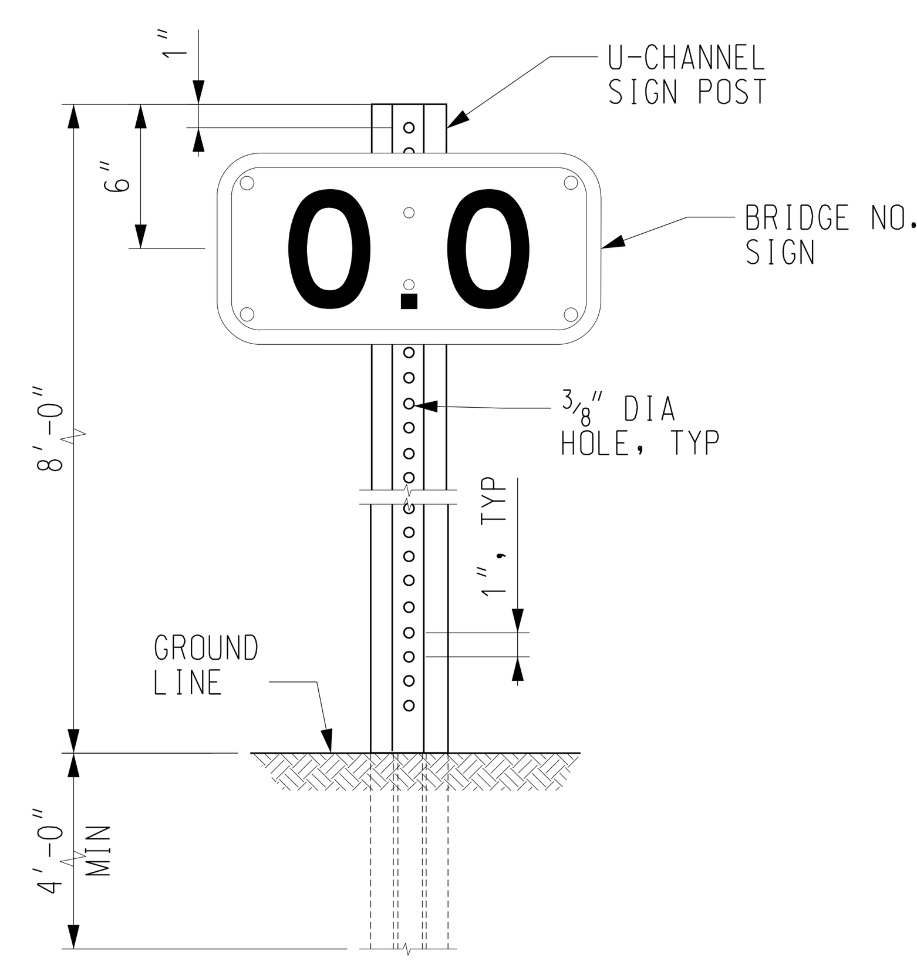


RAILING POST MK RP3

SCALE: 1″ = 1′-0″
1 ~ L3x3x1/4 x 5′-0″
GALVANIZE AFTER FABRICATION.
WEIGHT = 25 LBS



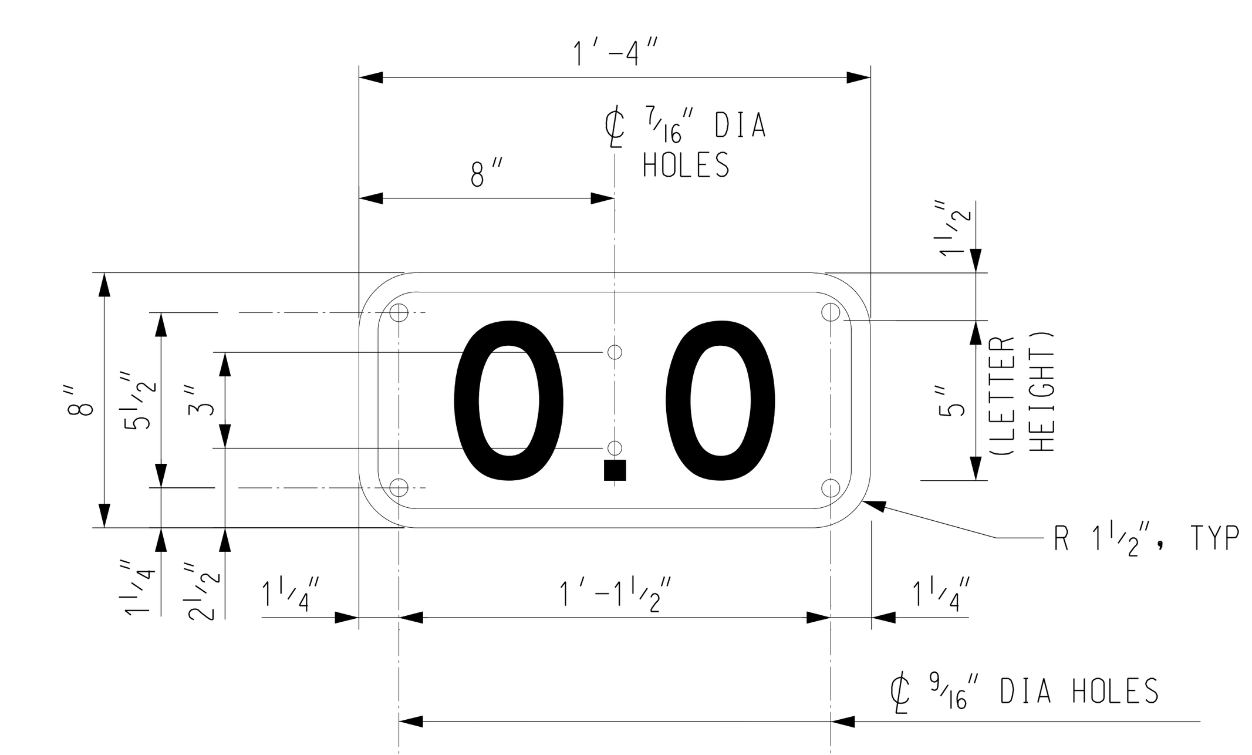
TOP VIEW



FRONT VIEW

SIGN POST MOUNTING DETAIL

SCALE: NTS
SIGN POST WEIGHT = 2.0 LB/FT
1 SIGN POST PER BRIDGE



BRIDGE NO. SIGN DETAIL

SCALE: 2″ = 1′-0″
LETTERING AND BACKGROUND ON ONE SIDE ONLY
WEIGHT = 10 LBS
2 SIGNS PER BRIDGE,
BRIDGE NO.'S (3.2, 3.9)

GENERAL NOTES

ALL MATERIAL AND WORKMANSHIP SHALL BE PER THE CURRENT PROJECT SPECIFICATIONS.

STRUCTURAL STEEL SHALL MEET THE REQUIREMENTS OF THE CURRENT ASTM DESIGNATION A36 UNLESS OTHERWISE NOTED.

FABRICATION AND ARC WELDING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH CHAPTER 15, PART 3 OF THE CURRENT AREMA MANUAL FOR RAILWAY ENGINEERING.

GALVANIZING SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM DESIGNATION A123.

SIGN NOTES

SIGN POSTS SHALL MEET THE REQUIREMENTS OF ASTM A107, GRADE 1060 AND HAVE A WEIGHT PER LINEAL FOOT OF 2.0 LBS. POSTS SHALL BE MADE FROM NEW BILLET STEEL.

SIGNS TO BE WHITE 3M HIGH INTENSITY BACKGROUND ON 0.80″ 3105 ALUMINUM SHEET.

ALL LETTERS AND NUMERALS TO BE BLACK 3M 3650-12 "SCOTCHCAL PLUS" NON-REFLECTIVE OR 3M PROCESSED INK.

USE GOTHIC SERIES "D" LETTERS OR FIGURES OF THE SIZE SPECIFIED ON THE SIGN DETAIL.

REVISIONS | DESCRIPTION | NO. | DATE | BY

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

STANDARD RR BRIDGE COMPONENTS AND DETAILS
WALKWAY AND HANDRAIL DETAILS

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:
BG-503
SHEET: 100 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

STEEL NOTES

STRUCTURAL STEEL PLATES AND BARS SHALL MEET THE REQUIREMENTS OF THE CURRENT ASTM DESIGNATION A709, GRADE 36.

SHEAR STUD CONNECTORS CONFORMING TO ASTM A108, GRADE 1010 THRU 1020 SHALL BE FASTENED TO THE STEEL PLATE PER CURRENT AWS WELDING CODE D1.1, SECTION 7. CONTACT SURFACES OF PLATE SHALL BE CLEANED PER STEEL STUCTURES PAINTING COUNCIL SPECIFICATION SSPC-SP6 PRIOR TO WELDING STUDS. DO NOT SHOP PAINT.

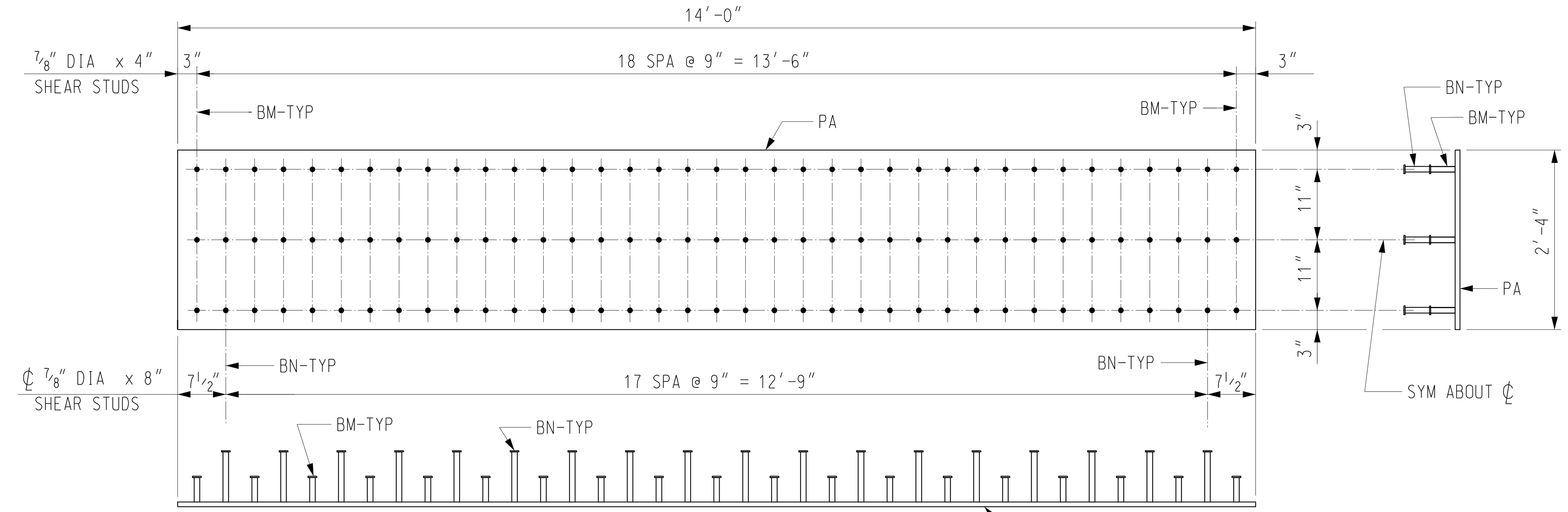
FABRICATION NOTES

FABRICATION AND ARC WELDING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH CHAPTER 15, PART 3 OF THE CURRENT AREMA MANUAL FOR RAILWAY ENGINEERING.

AFTER GALVANIZING ALL ELEMENTS SHALL BE FREE OF FINS, ABRASIONS, ROUGH OR SHARP EDGES AND OTHER SURFACE DEFECTS.

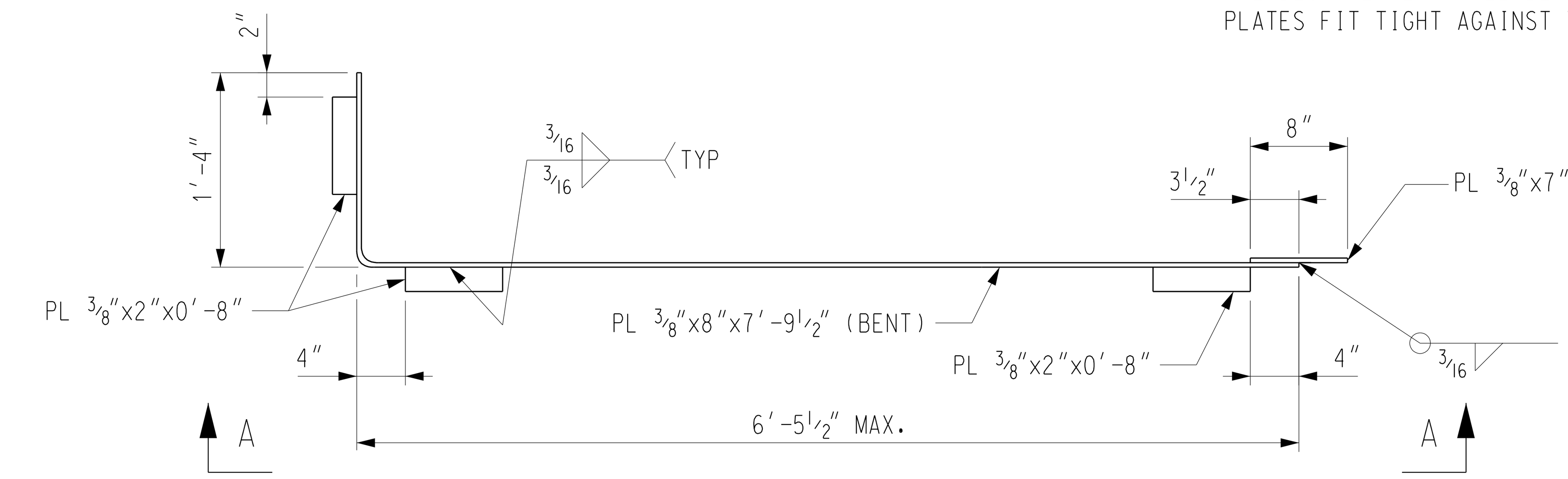
GALVANIZING SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM DESIGNATION A123.

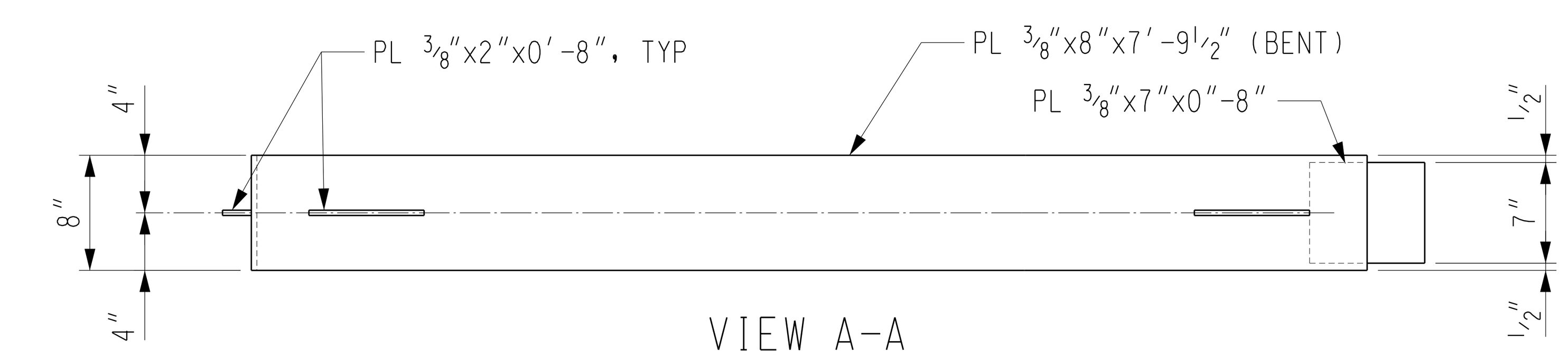
THE DECK PLATES SHALL BE ADJUSTED AS NECESSARY TO ENSURE THE PLATES FIT TIGHT AGAINST THE BEAMS AND CURBS.



PILE PLATE PP1

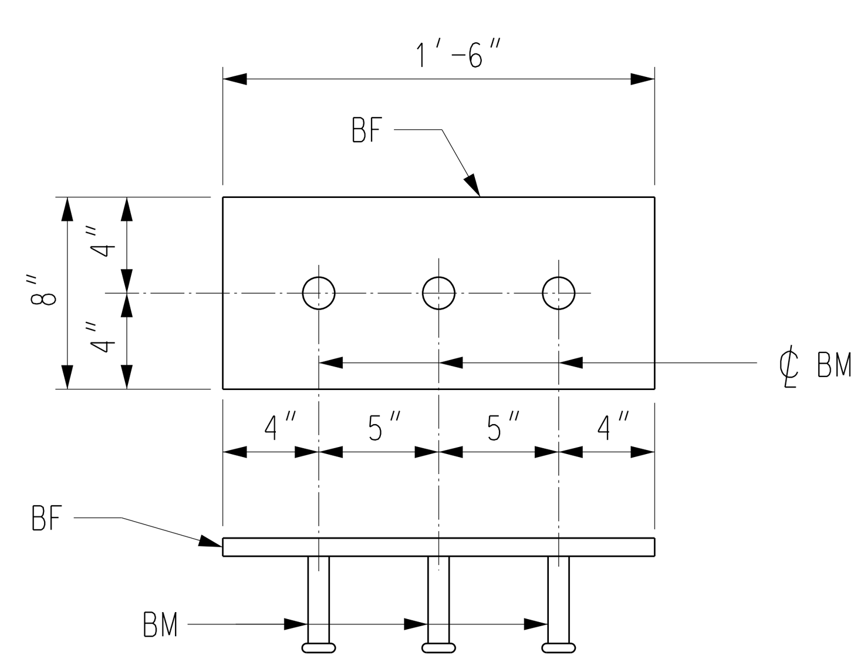
SCALE: 3/4" = 1'-0"
1~PL 3/4"x28"x 14'-0" - PA
57~7/8" DIA x 4" SHEAR STUDS - BM
54~7/8" DIA x 8" SHEAR STUDS - BN
WEIGHT = 1,113 LBS





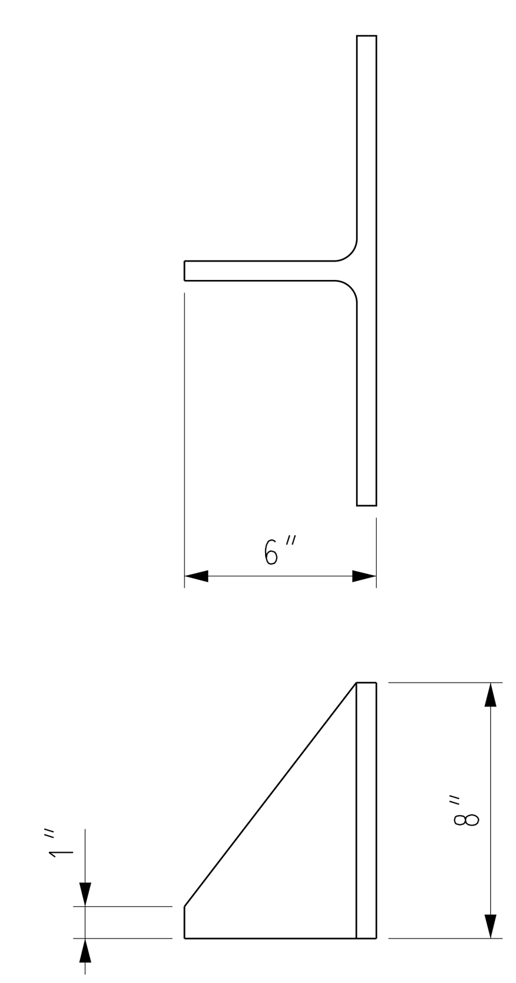
DECK PLATE MK DP1

SCALE: 1" = 1'-0"
WEIGHT = 91 LBS
GALVANIZED AFTER FABRICATION



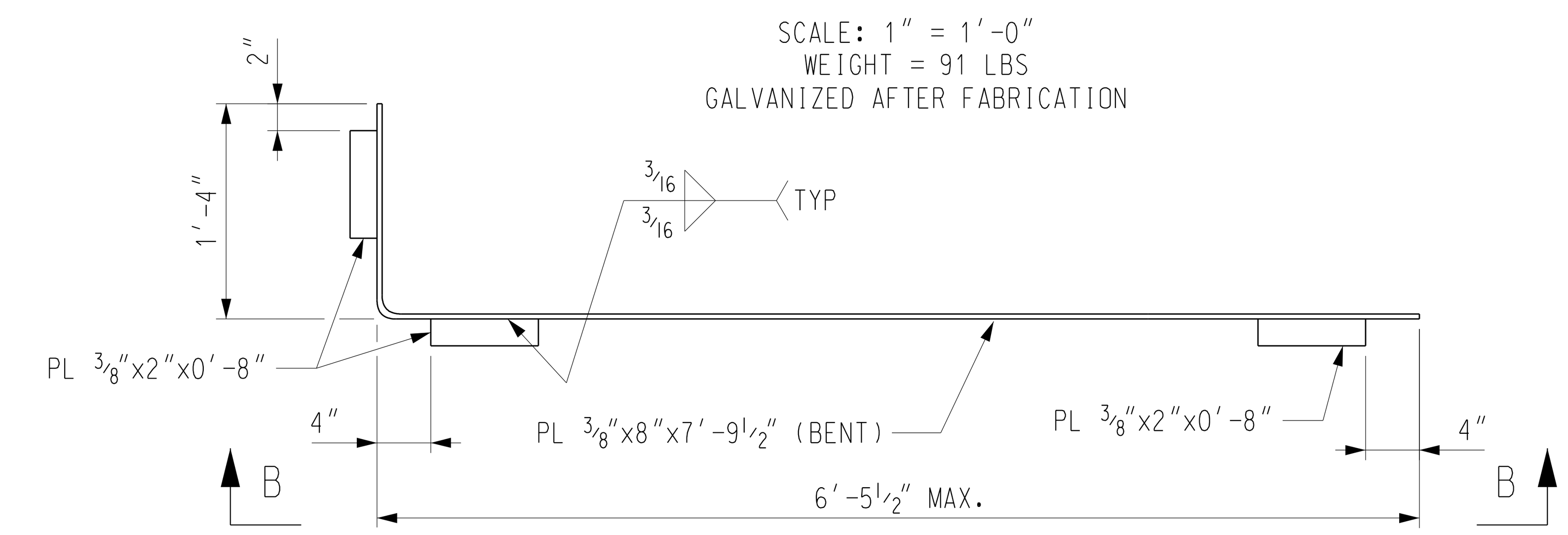
EMBED PLATE EP1

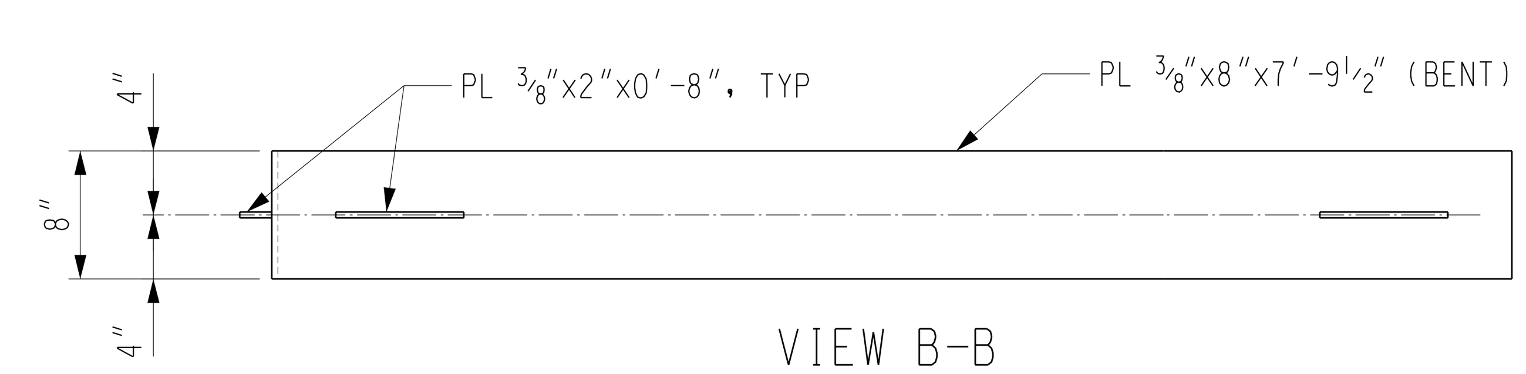
SCALE: 1 1/2" = 1'-0"
1~BAR 8"x3/4" x 1'-6" - BF
3-7/8" DIA x 4" STUDS - BM
WEIGHT = 33 LBS



TRANSVERSE RESTRAINT BRACKET MK BK1

SCALE: 2" = 1'-0"
FABRICATE FROM
HP14x89# PILE CUTOFFS.
WEIGHT = 30 LBS





DECK PLATE MK DP2

SCALE: 1" = 1'-0"
WEIGHT = 85 LBS
GALVANIZED AFTER FABRICATION

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: CLB; DRAWN BY: GJT; CHECKED BY: AGH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

STANDARD RR BRIDGE COMPONENTS AND DETAILS
STEEL DETAILS

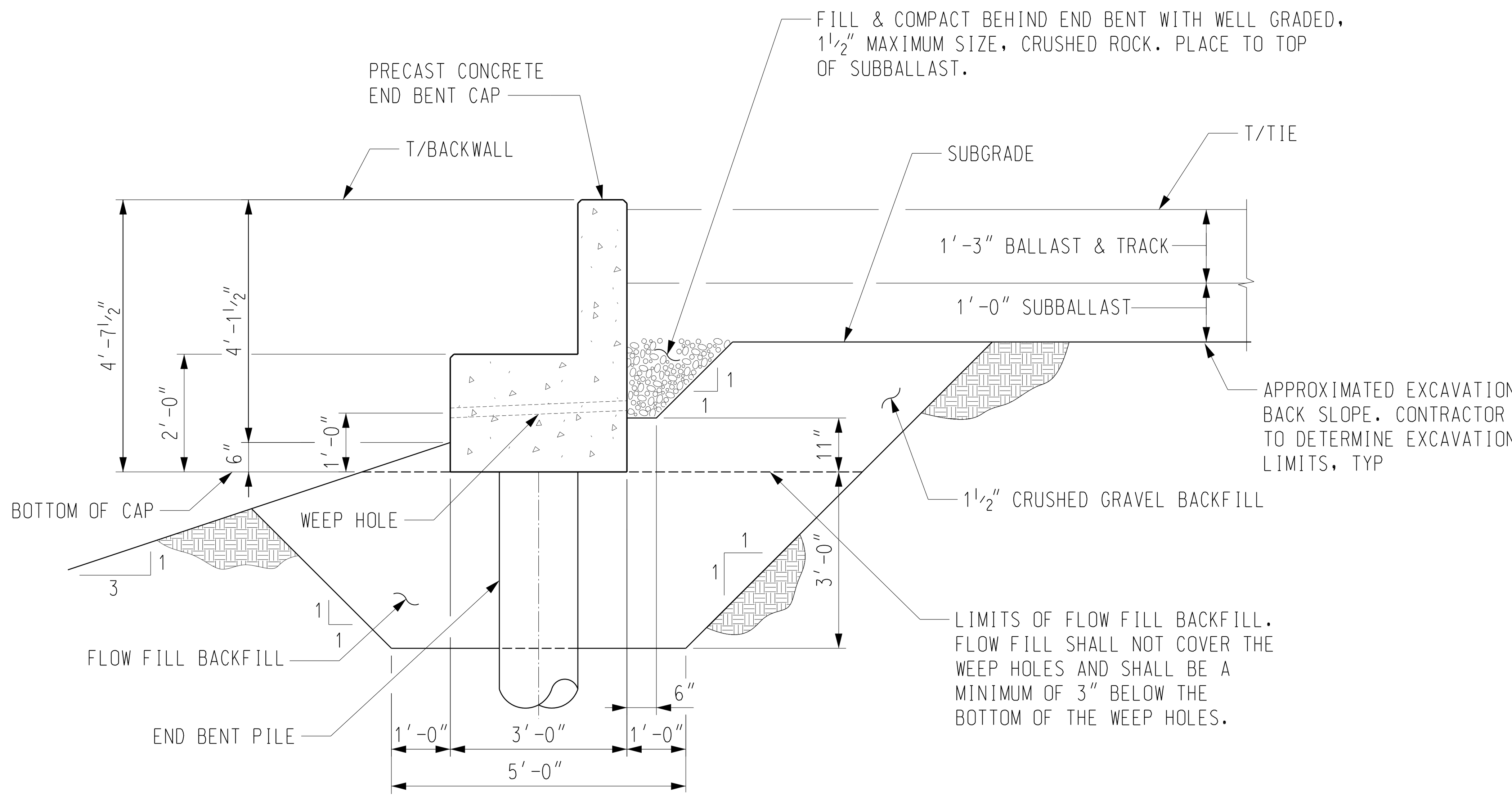
PREPARED FOR: EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:
BG-504
SHEET: 101 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



HEAD OF BANK DETAILS

BEFORE BACKFILLING END BENTS, APPLY A COATING OF PETROLATUM TO PILE PLATE PP1, AND TOP ONE FOOT OF PILES.

BEARING PAD SPECIFICATIONS

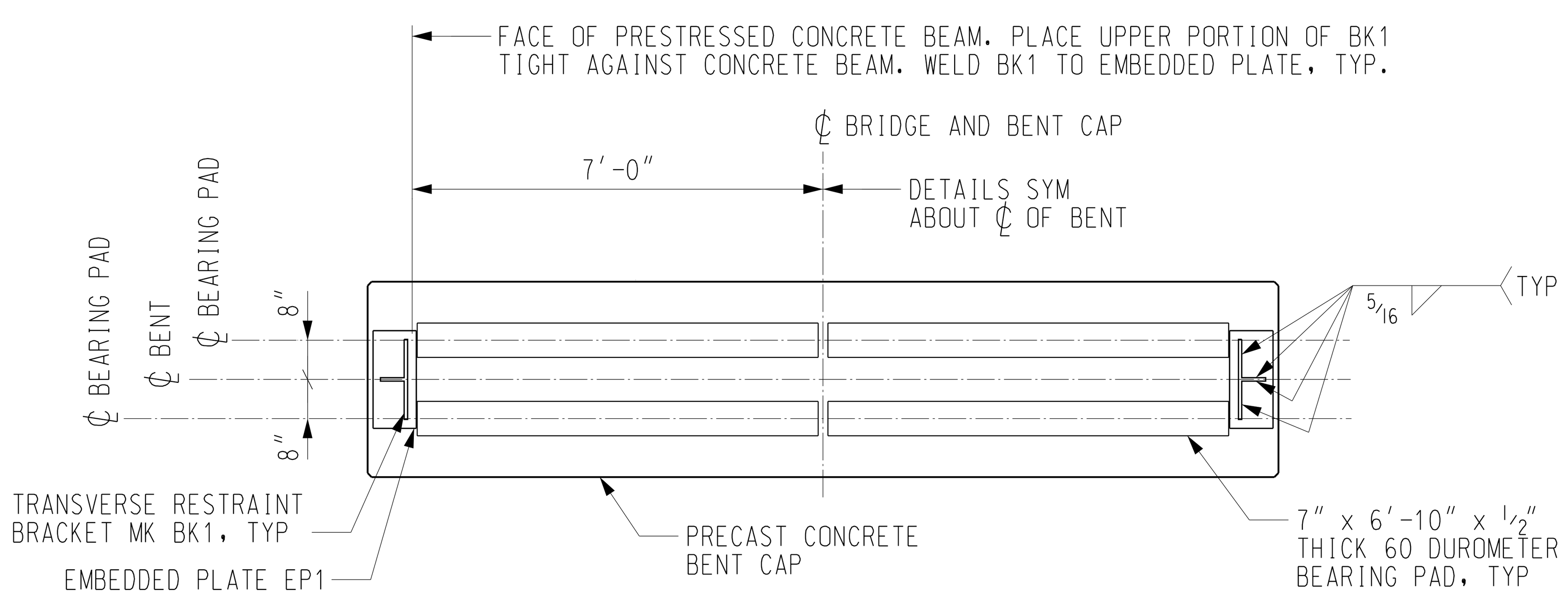
BEARING PADS SHALL BE RANDOM ORIENTED FIBER ELASTOMERIC MATERIAL COMPRISED OF HIGH-QUALITY OZONE-RESISTANT VIRGIN ELASTOMER AND SYNTHETIC FIBERS. PADS SHALL CONFORM TO THE PROJECT SPECIFICATIONS AND THE FOLLOWING MINIMUM MATERIAL PROPERTIES:

HARDNESS (SHORE A, ASTM D2240)	60 ± 5
TENSILE STRENGTH, PSI (ASTM D412, DIE C)	2500 ± 100
ULTIMATE ELONGATION, MINIMUM %	350
HEAT AGING (ASTM D573, 70 HOURS AT NOTED TEMPERATURE)	
DUROMETER, 212 °F, MAXIMUM POINT CHANGE	0 TO +15
TENSILE STRENGTH, 158 °F, MAXIMUM % CHANGE	-15
ULTIMATE ELONGATION, 212 °F, MAXIMUM % CHANGE	-40
COMPRESSION SET, MAXIMUM % (ASTM D395 22 HOURS AT 158 F, METHOD B)	25
APPARENT SHEAR MODULUS (GA), PSI, BASED ON TESTS CONDUCTED AT 70 F TO 80 F UNDER UNIFORM COMPRESSIVE STRESSES OF 500, 1000, AND 1500 PSI AND AT APPLIED HORIZONTAL SHEAR PLUS SLIP STRAIN OF 50%. GA IS CONSTANT IN ALL DIRECTIONS PARALLEL TO THE BEARING PLAN.	230 ± 30

CUTTING OF THE PADS SHALL BE DONE SO THAT THE EDGES HAVE NO TEARS OR OTHER JAGGED AREAS.

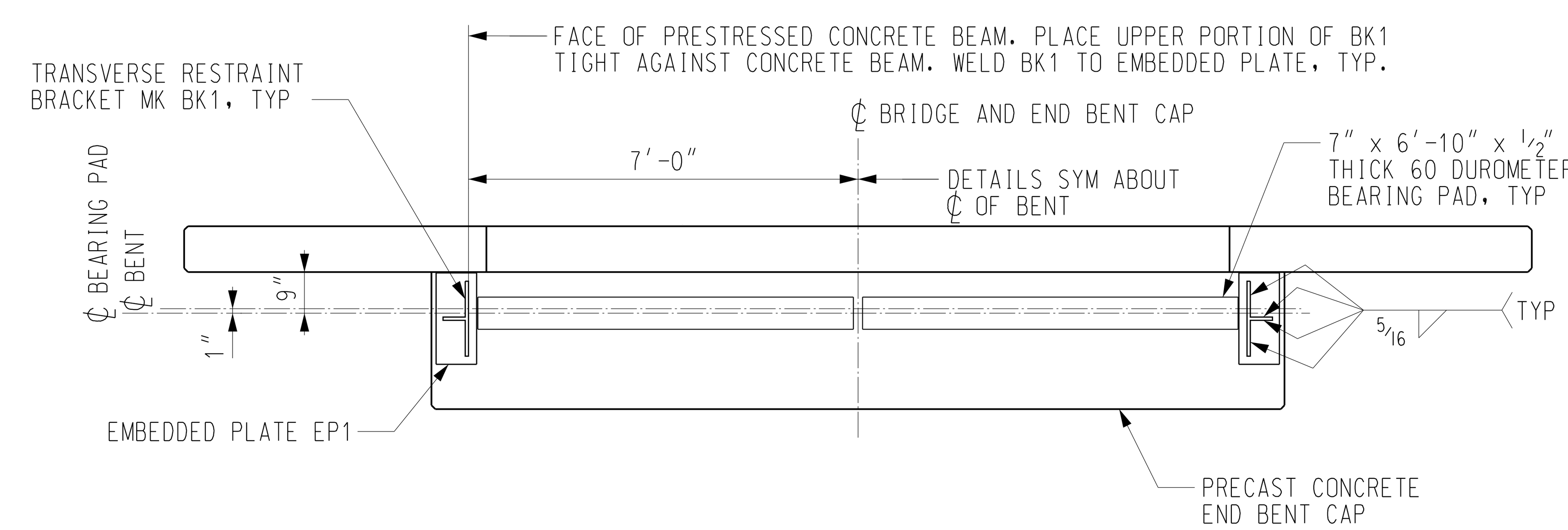
PERMISSIBLE TOLERANCES OF THE PAD SHALL BE AS STATED IN SECTION 5.12.6b, CHAPTER 15 OF THE 2017 AREMA MANUAL AND THE PROJECT SPECIFICATIONS.

THE CAP FABRICATOR SHALL FASTEN THE BEARING PADS TO THE CAP BY USING THE FOLLOWING PROCEDURE: CLEAN PADS ACCORDING TO MANUFACTURER'S RECOMMENDATIONS; PRIME CONTACT SURFACE AND GLUE TO CAP WITH AN APPROVED EPOXY.



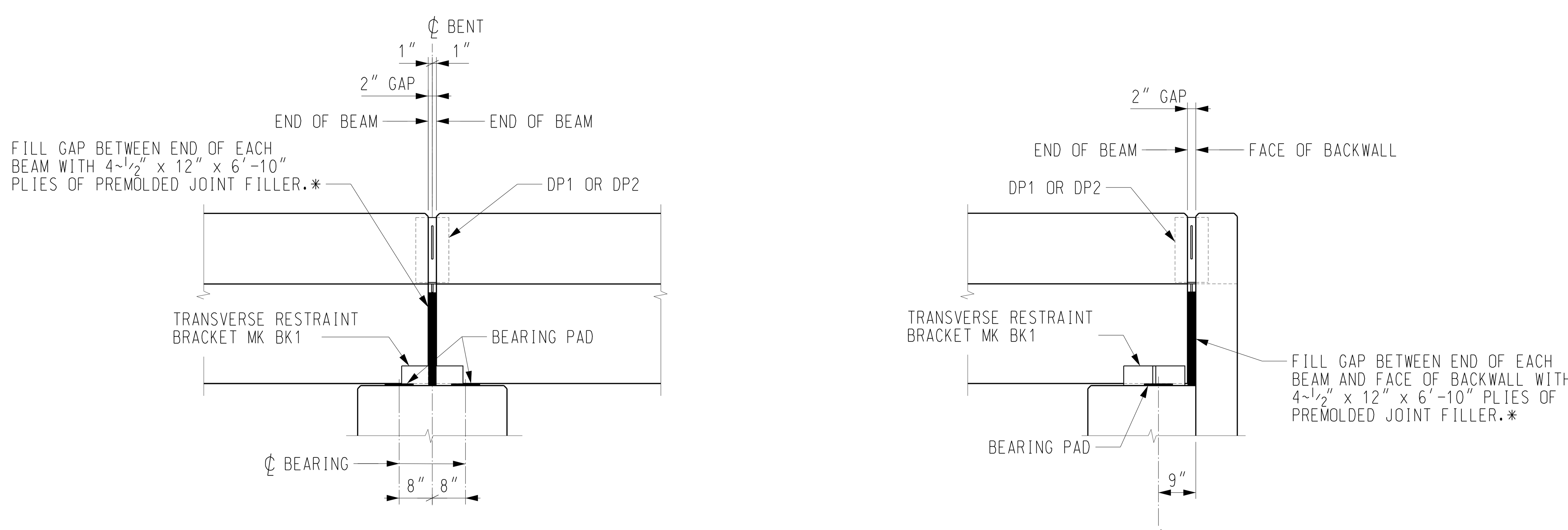
BEARING PAD LAYOUT–INTERIOR BENT

SCALE: ⅜" = 1'-0"



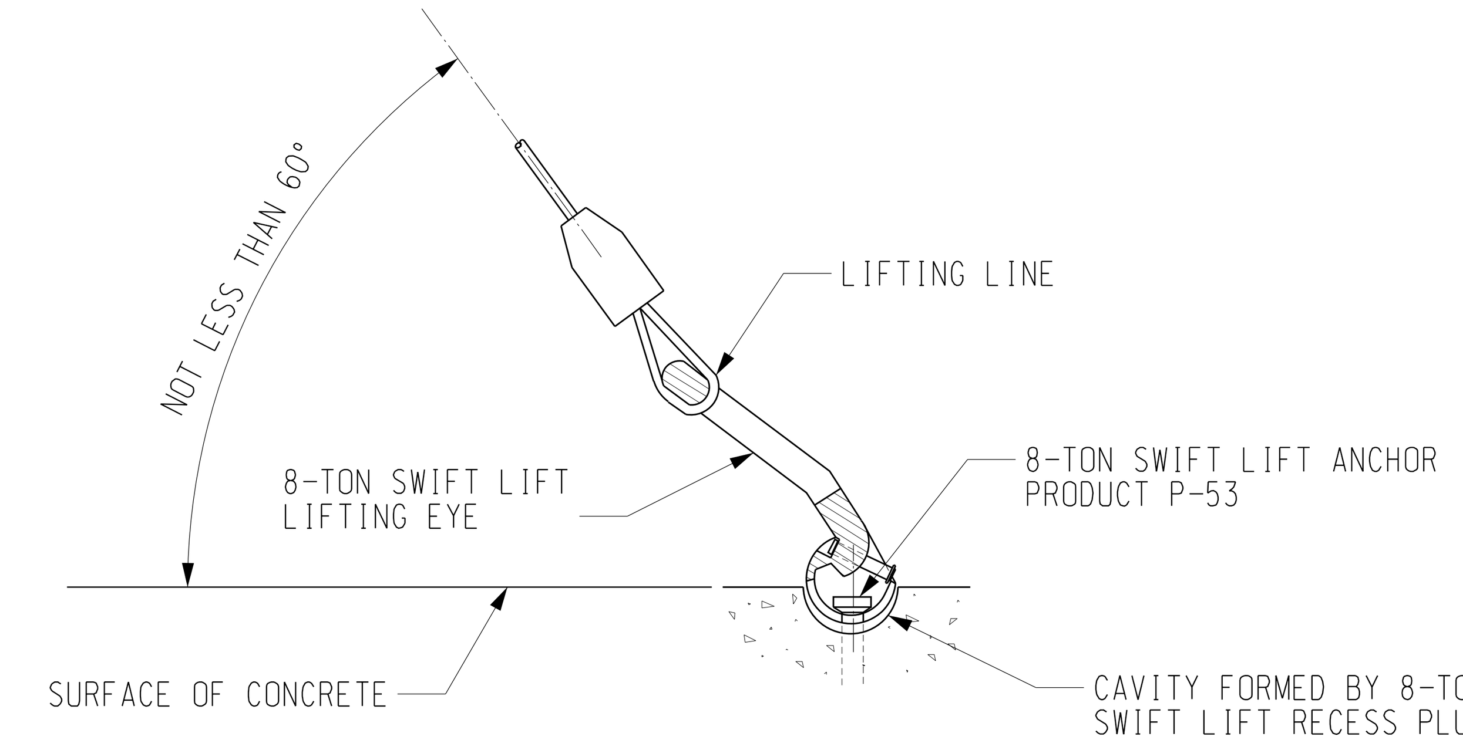
BEARING PAD LAYOUT–END BENT

SCALE: ⅜" = 1'-0"



BEARING DETAILS – SLAB BEAMS

* PREMOLDED JOINT FILLER SHALL BE ASPHALT IMPREGNATED



LIFTING DETAIL

NO SCALE

P-53 8-TON SWIFT LIFT RECESS PLUGS, ANCHORS AND LIFTING EYES ARE AVAILABLE FROM DAYTON SUPERIOR CORP. THE MATERIALS FOR THIS LIFTING SYSTEM ARE NOT INCLUDED IN THE BILL OF MATERIAL BUT ARE TO BE ORDERED AS REQUIRED.

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: CLB
DRAWN BY: GJT
CHECKED BY: AGH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
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STANDARD RR BRIDGE COMPONENTS AND DETAILS
MISCELLANEOUS DETAILS

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY 2019
PROJECT NUMBER:
BG-505
SHEET: 102 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

GENERAL NOTES

DESIGN LOADING

PEDESTRIAN BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE CURRENT MINNESOTA DOT BRIDGE DESIGN MANUAL, AASHTO LRFD BRIDGE DESIGN SPECIFICATION, AND THE AASHTO LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF THE PEDESTRIAN BRIDGES.

DESIGN LIVE LOADING IS THE GREATER OF UNIFORM 90 PSF PEDESTRIAN LOAD OR SINGLE H10 DESIGN VEHICLE.

FINAL BEARING LOADS FOR FOUNDATION DESIGN SHALL BE PROVIDED BY TRUSS FABRICATOR FOR VERIFICATION OF THE FOUNDATION DESIGN BY THE ENGINEER.

STEEL TRUSS SUPERSTRUCTURE

THE STEEL SUPERSTRUCTURE DESIGN MUST BE A TRUSS CONFIGURATION SIMILAR TO THAT SHOWN ON THE DRAWINGS. THE BRIDGE CROSS-SECTION SHALL BE DETERMINED BY THE CONTRACTOR BUT SHALL COMPLY WITH THE DETAILS SHOWN ON THE PLANS. THE CONTRACTOR SHALL DETERMINE TRUSS HEIGHT AND THE LOCATION OF THE DECK WITH RESPECT TO THE TOP AND BOTTOM CHORDS IN ACCORDANCE WITH THE PLANS.

THE STEEL BRIDGE SUPERSTRUCTURE, BEARINGS, AND ASSOCIATED DETAILS INCLUDING TIMBER COMPONENTS SHALL BE DESIGNED UNDER THE DIRECTION OF A MINNESOTA PROESSIONAL ENGINEER. THE COMPLETED DESIGN, DRAWINGS AND SPECIFICATION PACKAGE SHALL BE SIGNED AND SEALED BY AN ENGINEER LICENSED IN MINNESOTA AND SUBMITTED FOR REVIEW. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

INCLUDE ALL COSTS ASSOCIATED WITH DESIGN, FABRICATING, FURNISHING, AND ERECTING THE STEEL TRUSS SUPERSTRUCTURE INCLUDING THE HANDRAIL AND TIMBER DECKING IN THE UNIT PRICE BID FOR STEEL TRUSS SUPERSTRUCTURE.

SEE PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

REFERENCE DATA

ALL DETAILS AND DIMENSIONS OF THE EXISTING SITE ARE BASED ON FIELD SURVEY DATA SUPPLIED BY AECOM, INC. ON JUNE 15, 2016 WITH SUPPLEMENTARY DATA SUPPLIED ON JUNE 12, 2018.

BRIDGE STATIONING IS BASED ON THE INSIDE FACE OF THE NORTH EXISTING BACKWALL OF THE EXISTING WIRE MILL POND RAILROAD BRIDGE AS STATION 204+78.00.

BENCHMARK DATA: SURVEY CONTROL POINT, STA 165+96.52, OFFSET 276.76' RIGHT, ELEV 651.21'.
VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83/96 MINNESOTA NORTH ZONE

HYDRAULIC INFORMATION IS BASED ON HYDRAULIC MODELING INFORMATION PROVIDED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC. DATED JANUARY 24, 2019 AND FEMA FIRM PANEL NO. 2704210045C.

GEOTECHNICAL INFORMATION IS BASED ON HDR ENGINEERING, INC. GEOTECHNICAL REPORT DATED MAY 2019.

BRIDGE STATIONING AND RIGHT-OF-WAY ARE BASED ON HISTORICAL NORTHERN PACIFIC RAILWAY (N.P. RY.) TRACK CHARTS.

GENERAL

IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE ACTUAL FIELD CONDITIONS AND ANY NECESSARY AS-BUILT DIMENSIONS AFFECTING THE SATISFACTORY COMPLETION OF THE WORK REQUIRED FOR THIS PROJECT.

NEW CONSTRUCTION SHOWN AS HEAVY LINES. EXISTING STRUCTURES TO REMAIN SHOWN AS LIGHT LINES. EXISTING STRUCTURES TO BE REMOVED SHOWN AS LIGHT DOTTED LINES.

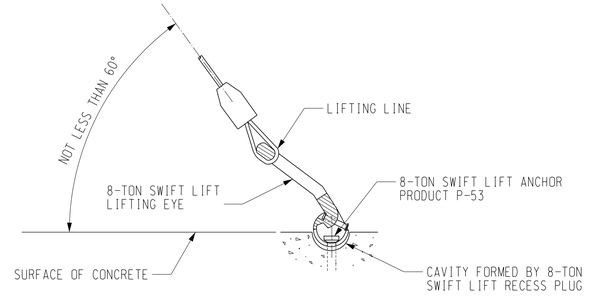
CONTRACTOR IS RESPONSIBLE FOR DEWATERING TO FACILITATE CONSTRUCTION WHEN REQUIRED TO SATISFACTORILY COMPLETE THE WORK REQUIRED FOR THIS PROJECT.

IN ORDER TO ENSURE THE HYDRAULIC CAPACITY OF THE BRIDGE, THE FINISHED GROUND UNDER THE BRIDGE SHALL BE SHAPED TO MATCH THE UPSTREAM CHANNEL AND FLOODPLAIN AS SHOWN ON DRAWING BP-101.

CONTRACTOR SHALL DOCUMENT ALL WORK IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS INCLUDING SUPPLYING: AS-BUILT DRAWINGS, PILE DRIVING RECORDS, AND SHOP DRAWINGS FOR ALL PREFABRICATED COMPONENTS. ALL SHOP DRAWINGS SHALL BE APPROVED BY THE ENGINEER PRIOR TO FABRICATION PER THE PROJECT SPECIFICATIONS.

CONTRACTOR SHALL DISPOSE OF ALL SOIL WASTE MATERIALS IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS INCLUDING, BUT NOT LIMITED TO, EXISTING TIMBER STRUCTURES, SOILS, AND DEFICIENT TRAIL MATERIALS.

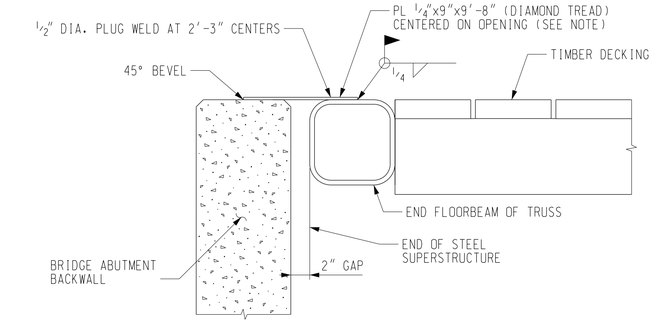
INFORMATION SHOWN ON THESE PLANS CONCERNING TYPE AND LOCATION OF EXISTING UNDERGROUND AND OVERHEAD UTILITES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONCTRACTOR SHALL VERIFY THE LOCATION OF UNDERGROUND AND OVERHEAD UTILITIES BEFORE BEGINNING CONSTRUCTION.



LIFTING DETAIL

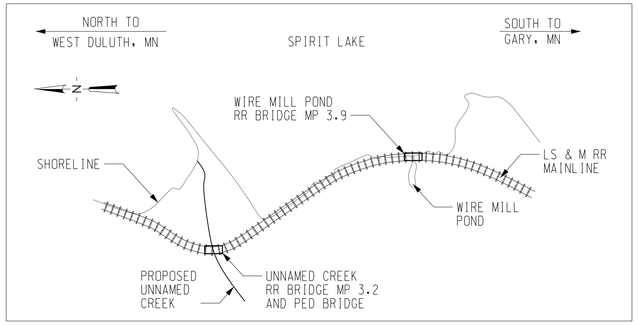
NO SCALE

P-53 8-TON SWIFT LIFT RECESS PLUGS, ANCHORS AND LIFTING EYES ARE AVAILABLE FROM DAYTON SUPERIOR CORP. THE MATERIALS FOR THIS LIFTING SYSTEM ARE NOT INCLUDED IN THE BILL OF MATERIAL BUT ARE TO BE ORDERED AS REQUIRED.



COVER PLATE DETAIL

SCALE: 1 1/2" = 1'-0"
COORDINATE WITH TRUSS SUPPLIER DETAILS OF COVER PLATE.



VICINITY MAP

0 500 1000 2000 3000
SCALE IN FEET

BID ITEMS ~ UNNAMED CREEK PED BRIDGE

ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT
1	FURNISH AND DRIVE PILE*	308	LF
2	PREFABRICATED STEEL TRUSS SUPERSTRUCTURE AND DECK	1	LS
3	FABRICATE AND INSTALL PRECAST CONCRETE SUBSTRUCTURE**	1	LS
4	INSTALL PREFABRICATED STEEL TRUSS SUPERSTRUCTURE	1	LS

* INCLUDES COAL TAR EPOXY COATING AS SPECIFIED ON SHEET BP-102.
** INCLUDES ALL COMPONENTS OF SUBSTRUCTURE SHOWN ON THESE PLANS EXCEPT PILING.

LIST OF DRAWINGS ~ UNNAMED CREEK PED BRIDGE

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: MCH
DRAWN BY: GJT
CHECKED BY: MCH
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

UNNAMED CREEK PED BRIDGE
GENERAL NOTES AND ESTIMATED QUANTITIES

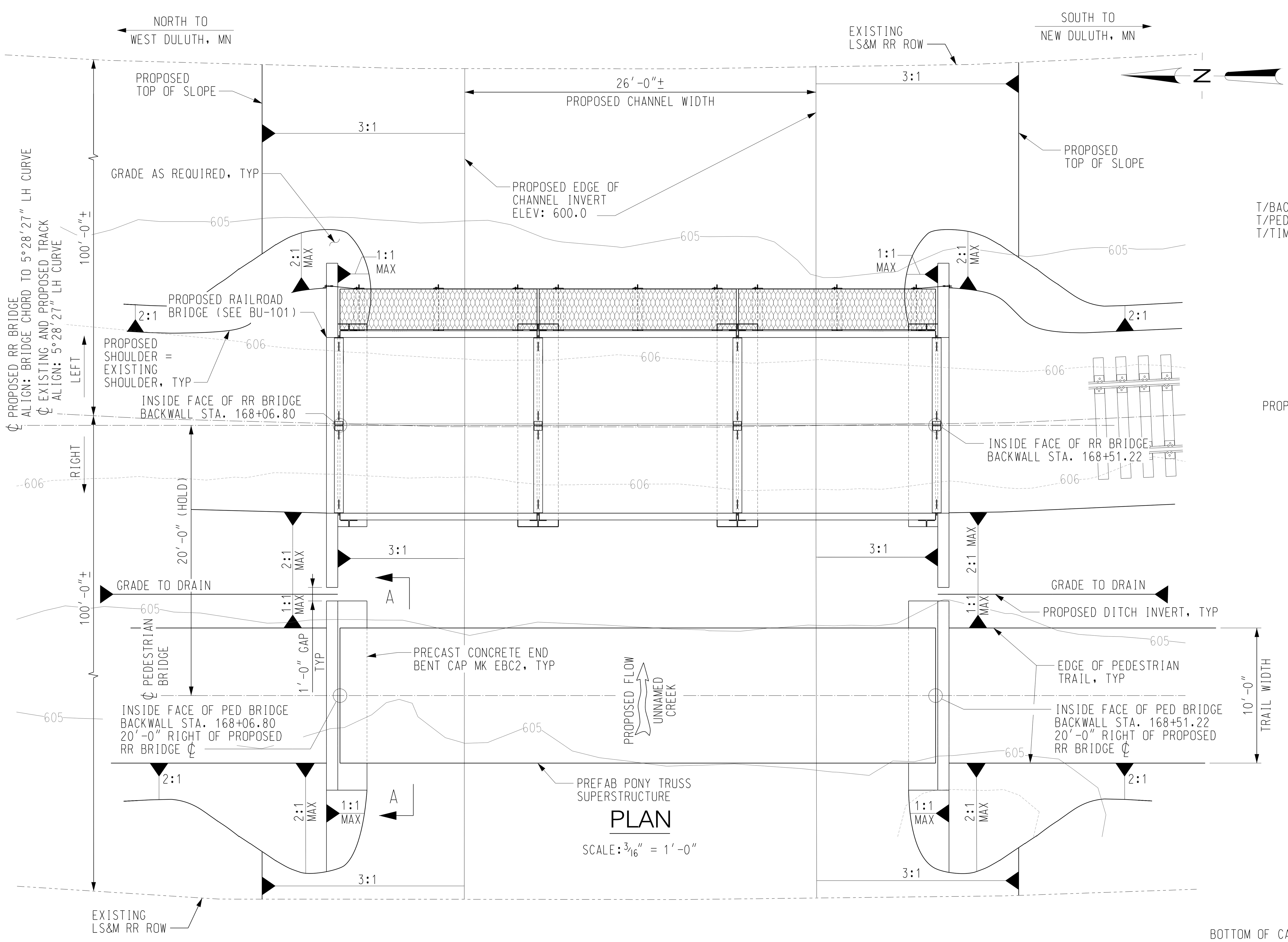
PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

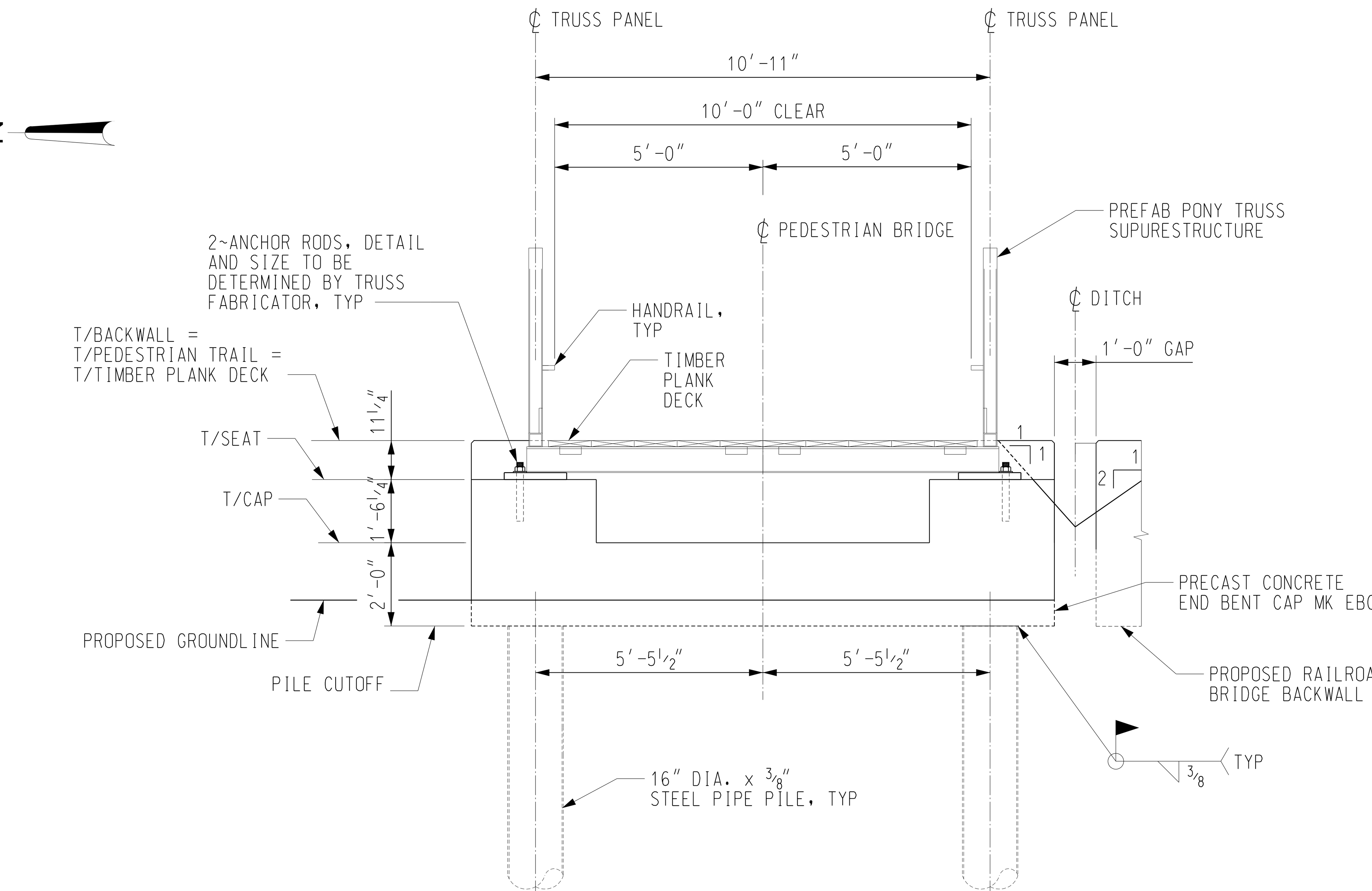
DATE: MAY 2019
PROJECT NUMBER:
BP-001
SHEET: 103 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



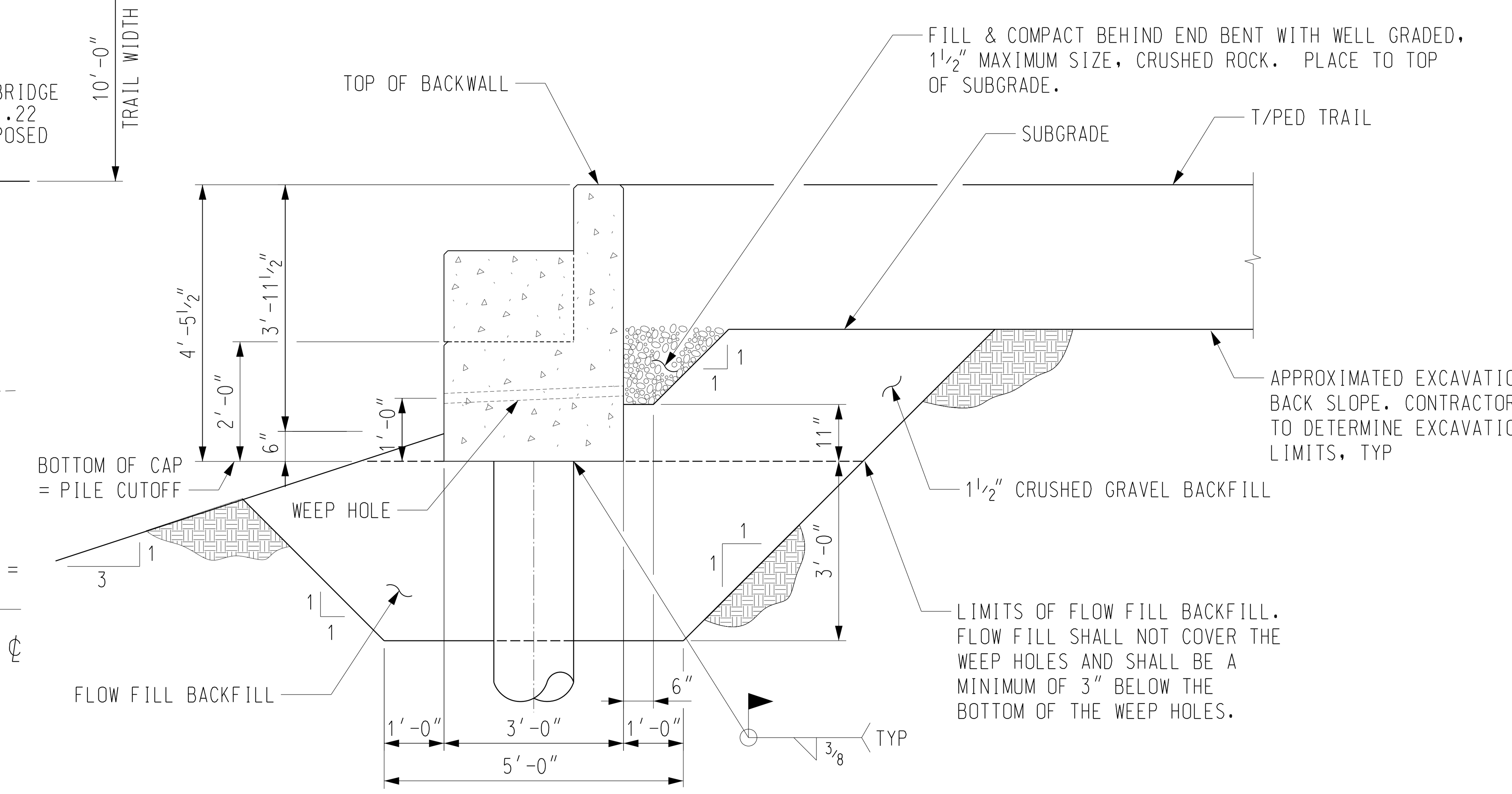
PLAN

SCALE: 3/16" = 1'-0"



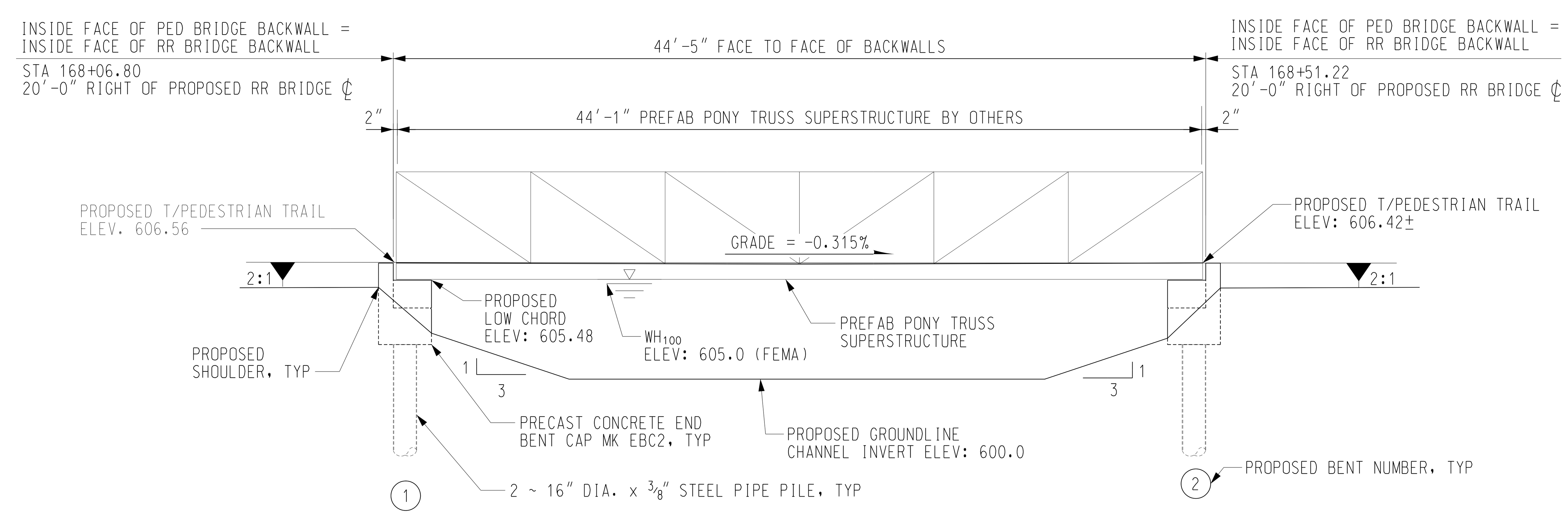
SECTION A–A

SCALE: 3/8" = 1'-0"



HEAD OF BANK DETAILS

BEFORE BACKFILLING END BENTS, APPLY A COATING OF PETROLATUM TO PILE PLATE PP2, AND TOP ONE FOOT OF PILES.



ELEVATION

SCALE: 3/16" = 1'-0"

TABLE OF ELEVATIONS ~ UNNAMED CREEK PED BRIDGE

LOCATION	END BENT 1	END BENT 2
PROPOSED TOP OF PEDESTRIAN TRAIL	606.56	606.42
TOP OF CAP	604.10	603.97
PILE CUTOFF	602.10	601.97
TOP OF PATH TO PILE CUTOFF	4'-5 1/2"	4'-5 1/2"

REVISIONS: NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION: DESIGNED BY: MCH; DRAWN BY: GJT; CHECKED BY: MCH; PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN

DULUTH, MINNESOTA

UNNAMED CREEK PED BRIDGE
GENERAL LAYOUT AND TYPICAL SECTIONS

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

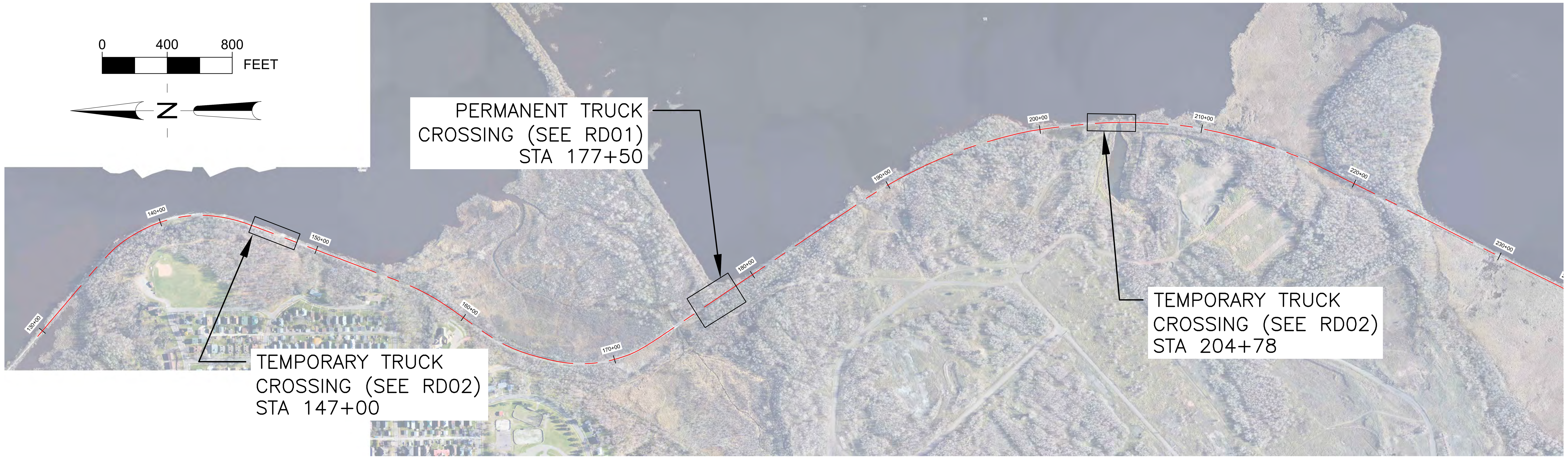
DATE: MAY 2019

PROJECT NUMBER:

BP-101

SHEET: 104 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN

RAILROAD AT-GRADE CROSSINGS

BID ITEMS ~ RAILROAD AT-GRADE CROSSINGS

ITEM NO.	ITEM DESCRIPTION	QTY.	UNIT
1	PERMANENT AT-GRADE CROSSING	1	LS
2	TEMPORARY AT-GRADE CROSSINGS	2	LS

LIST OF DRAWINGS ~ RAILROAD AT-GRADE CROSSINGS

DRAWING NUMBER	SHT. NO.	TITLE
GN-01	107	COVER SHEET
GN-02	108	GENERAL NOTES
GN-03	109	TYPICAL DETAILS
RD-01	110	PERMANENT CROSSINGS PLANS
RD-02	111	TEMPORARY CROSSINGS PLAN

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: JCM
DRAWN BY: JCM
CHECKED BY: WJJ
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

RAILROAD AT-GRADE CROSSINGS
COVER SHEET

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY, 2019

PROJECT NUMBER: 10085944

GN-01

SHEET: 107 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

SURFACE FEATURES LEGEND
SYMBOLS

	SCRIBED "X"
	PK NAIL
	METAL SIGN POST
	WOOD SIGN POST
	WATER MANHOLE
	FIRE HYDRANT
	WATER METER
EL	ELECTRICAL JUNCTION BOX
PM	POWER METER
TC	TELECOMMUNICATION JUNCTION BOX
	JUNCTION BOX
TELR	TELECOMMUNICATION RISER
	UTILITY POLE
UG	UTILITY POLE W/ CONDUITS TO UNDERGROUND
	GUY ANCHOR
GP	GUY POLE
	YARD LIGHT OR LUMINAIRE W/ NO MAST
	FENCE
	TRACK CENTERLINE
	CONTROL POINT
	SANITARY SEWER MANHOLE
	STORM DRAIN MANHOLE
CO	CATCH BASIN
WV	WATER VALVE
	STORM DRAIN

ABBREVIATIONS

A = AREA
AC = ASPHALT CONCRETE
AP = ANGLE POINT
ASSY = ASSEMBLY
BC = BACK OF CURB
BNSF = BURLINGTON NORTHERN SANTA FE RAILWAY
CB = CATCH BASIN
CG = CURB AND GUTTER
CIPP = CURED IN PLACE PIPE
C/L, C.L. = CENTERLINE
CLF = CHAIN LINK FENCE
CMP = CORRUGATED METAL PIPE
CO = CLEANOUT
CONC = CONCRETE
CPP = CORRUGATED POLYETHYLENE PIPE
CS = CONTROL STRUCTURE
CSBC = CRUSHED SURFACING BASE COURSE
D.I., DIP = DUCTILE IRON PIPE
EA = EACH
EAC = EDGE ASPHALT CURB
ECC = EDGE CONCRETE CURB
ELEC = ELECTRICAL
EL = ELEVATION
EX., EXIST = EXISTING
EXC = EXTRUDED CONCRETE CURB
EOP = EDGE OF PAVEMENT
ESC = EROSION AND SEDIMENT CONTROL
F.O.C., FC = FACE OF CURB
F.G., FIN GR = FINISHED GRADE
FH = FIRE HYDRANT
FSC = FIRE SPRINKLER CONNECTION
FL = FLANGE OR FLOWLINE
F.L. = FLOWLINE
GA, GALV = GALVANIZE
G.V. = GATE VALVE
H = HORIZONTAL
HMA = HOT MIX ASPHALT
I.E., IE = INVERT ELEVATION
LT = LEFT
LF = LINEAR FEET
MH = MANHOLE
MAX = MAXIMUM
MDD = MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-1557 (MODIFIED PROCTOR)
MIL = 1/1000 OF AN INCH
MIN = MINIMUM
MN = MINNESOTA
MNDOT = MINNESOTA DEPARTMENT OF TRANSPORTATION
MON = MONUMENT
MTCE = MAINTENANCE
N, E, W, S = NORTH, EAST, WEST, SOUTH
OC = ON CENTER
OD = OUTSIDE DIAMETER
OPS = OPERATIONS
PC = POINT OF CURVATURE
PVC = POLYVINYLCHLORIDE PIPE
PCC = PORTLAND CEMENT CONCRETE
PP = POWER POLE
POC = POINT OF CONNECTION or POINT ON CURVE
PT = POINT OF TANGENCY
RCP = REINFORCED CONCRETE PIPE
REQD = REQUIRED
RT = RIGHT
R.O.W. = RIGHT OF WAY
RD = ROAD
REQD = REQUIRED
S = SLOPE
SDMH = STORM DRAINAGE MANHOLE
SF = SQUARE FEET
SHT = SHEET
SP = STEEL POLE
SSMH = SANITARY SEWER MANHOLE
SSSO = SANITARY SEWER STUB OUT
STA = STATION
STD = STANDARD
SY = SQUARE YARD
T/ = TOP OF HOT DIP
TP = TOP OF PAVING
UNO = UNLESS NOTED OTHERWISE
V, VERT = VERTICAL
TYP = TYPICAL
W/ = WITH
WP = WOOD POLE

GENERAL NOTES

SPECIFICATIONS AND STANDARDS

1. MNDOT STANDARD CONSTRUCTION SPECIFICATIONS.
2. WHERE NOTED ON THE PLANS AND IN THE SPECIFICATIONS, METHODS AND MATERIALS SHALL CONFORM TO THE MINNESOTA STANDARD SPECIFICATIONS FOR CONSTRUCTION 2018. THE MINNESOTA STATE DEPARTMENT OF TRANSPORTATION (MNDOT),AND THE AMERICAN PUBLIC WORKS ASSOCIATION (APWA) MINNESOTA STATE CHAPTER.

GENERAL

1. THESE NOTES CONTAIN GENERAL INFORMATION AND ARE NOT COMPLETE FOR CONSTRUCTION PURPOSES. CONTRACTOR SHALL VERIFY INFORMATION GIVEN HERE WITH SPECIFICATIONS AND OTHER DOCUMENTS AND BRING ANY CONFLICTS TO THE ATTENTION OF THE ENGINEER BEFORE BEGINNING AFFECTED WORK. OWNER WILL RESOLVE ANY SUCH CONFLICT.
2. THE EXISTING TRACKS AND ALL PARTS OF THE EXISTING YARD NOT ASSIGNED TO THE CONTRACTOR WILL BE IN OPERATION DURING CONSTRUCTION. EXCEPT WHERE IDENTIFIED ON THE PLANS, THE CONTRACTOR SHALL KEEP THEIR WORKERS, MATERIAL, AND EQUIPMENT A MINIMUM OF 25 FEET CLEAR OF ALL OPERATIONS AND SHALL NOT IN ANY WAY HINDER OR DISRUPT YARD OPERATIONS.
3. ALL DIMENSIONS AND DETAILS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO FABRICATION AND CONSTRUCTION.
4. ALL SHOP DRAWINGS SHALL BE SUBMITTED TO, REVIEWED, AND APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
5. ARRANGE CONSTRUCTION OPERATIONS TO AVOID CREATION OF HAZARDOUS CONDITIONS. MAINTAIN ADEQUATE CLEARANCE FROM CONSTRUCTION WORK TO PERMIT NORMAL OPERATIONS AND TRAFFIC TO CONTINUE. PROVIDE FLAGGERS, BARRICADES WITH FLASHING LIGHTS, ETC., AS REQUIRED AT NO COST TO THE RAILROAD.
6. PROTECT MATERIALS AND EQUIPMENT TO BE USED IN THE PROJECT FROM WEATHER AND TRAFFIC.
7. REPAIR AND OR REPAINT THE NEW WORK AND ADJACENT SURFACES DAMAGED DURING THE INSTALLATION OF THE NEW WORK, IN ACCORDANCE WITH THE RAILROAD STANDARD PROCEDURES.
8. COMPLY WITH RAILROAD, STATE AND OSHA SHORING REQUIREMENTS.
9. UNDERGROUND UTILITIES AND STRUCTURES, WHERE SHOWN ON THE DRAWINGS, ARE BASED ON FIELD SURVEYS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN THE EXISTING CONDITIONS AND WHAT IS SHOWN ON THE DRAWINGS.
10. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL UTILITIES WHETHER SHOWN ON THE PLAN OR NOT.
11. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY ALL UTILITY COMPANIES WHEN CONSTRUCTION WORK BEGINS AND TO ARRANGE FOR A REPRESENTATIVE OF THE UTILITY TO BE PRESENT WHEN THE CONTRACTOR'S CONSTRUCTION OPERATIONS ARE IN CLOSE PROXIMITY TO ANY LINES IN THEIR EXISTING OR RELOCATED POSITION . THE CONTRACTOR SHALL COORDINATE ITS ACTIVITIES WITH UTILITY COMPANIES.
12. THE CONTRACTOR SHALL REPAINT EXISTING PAVEMENT MARKINGS REMOVED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE RAILROAD
13. NO FIELD CHANGES WILL BE PERMITTED WITHOUT DIRECT WRITTEN AUTHORIZATION FROM THE RAILROAD PROJECT ENGINEER.
14. CONTRACTOR SHALL COORDINATE WORK WHICH AFFECTS ADJACENT PROPERTY OWNERS. ANY QUESTIONS OR AGREEMENTS BETWEEN ADJACENT PROPERTY OWNERS AND CONTRACTOR SHALL BE MADE IN WRITING. A COPY OF SUCH AGREEMENT SHALL BE PROVIDED TO THE BNSF RAILWAY.
15. CONTRACTOR SHALL REFER TO THE PROJECT TECHNICAL SPECIFICATIONS AND EROSION AND SEDIMENT CONTROL PLANS FOR ADDITIONAL EROSION CONTROL DETAILS.
16. CONTRACTOR SHALL COORDINATE ALL DAILY ACTIVITIES WITH THE RAILROAD STAFF.
17. CONTRACTOR TO COORDINATE EQUIPMENT STAGING AREA WITH RAILROAD STAFF.

DEMOLITION

1. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO CONTAIN THE DEMOLITION WITHIN THE LIMITS DESIGNATED, TO AVOID DAMAGE TO EXISTING STRUCTURES, UTILITIES, OR FACILITIES.
2. ANY DAMAGE INCURRED TO ANY PART OF THE SITE OR FACILITY NOT SPECIFICALLY DESIGNATED FOR DEMOLITION SHALL BE REPAIRED, REPLACED, AND/OR RECONSTRUCTED BY THE CONTRACTOR AT THEIR EXPENSE, TO ITS ORIGINAL CONDITION AS DIRECTED BY THE ENGINEER.
3. ALL DEMOLISHED MATERIAL, EXCEPT AS NOTED AND/OR SPECIFIED, SHALL BE COMPLETELY REMOVED AND DISPOSED OF BY THE CONTRACTOR.

SURVEY

1. HORIZONTAL DATUM: NAD83/96 MINNESOTA COORDINATE SYSTEM, NORTH ZONE
2. VERTICAL DATUM: NAVD88 (GEIOD 03)
3. THE CONTRACTOR IS RESPONSIBLE FOR THE PRESERVATION OF ALL SURVEY CONTROL MONUMENTS. IN THE EVENT MONUMENTS ARE DAMAGED OR DESTROYED BY THE CONTRACTOR, THE ENGINEER WILL REPLACE THE MONUMENT SOLELY AT THE CONTRACTOR'S EXPENSE.

REVISIONS
NO. | DATE | BY | DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: JCM
DRAWN BY: JCM
CHECKED BY: WJJ
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

RAILROAD AT-GRADE CROSSINGS
GENERAL NOTES

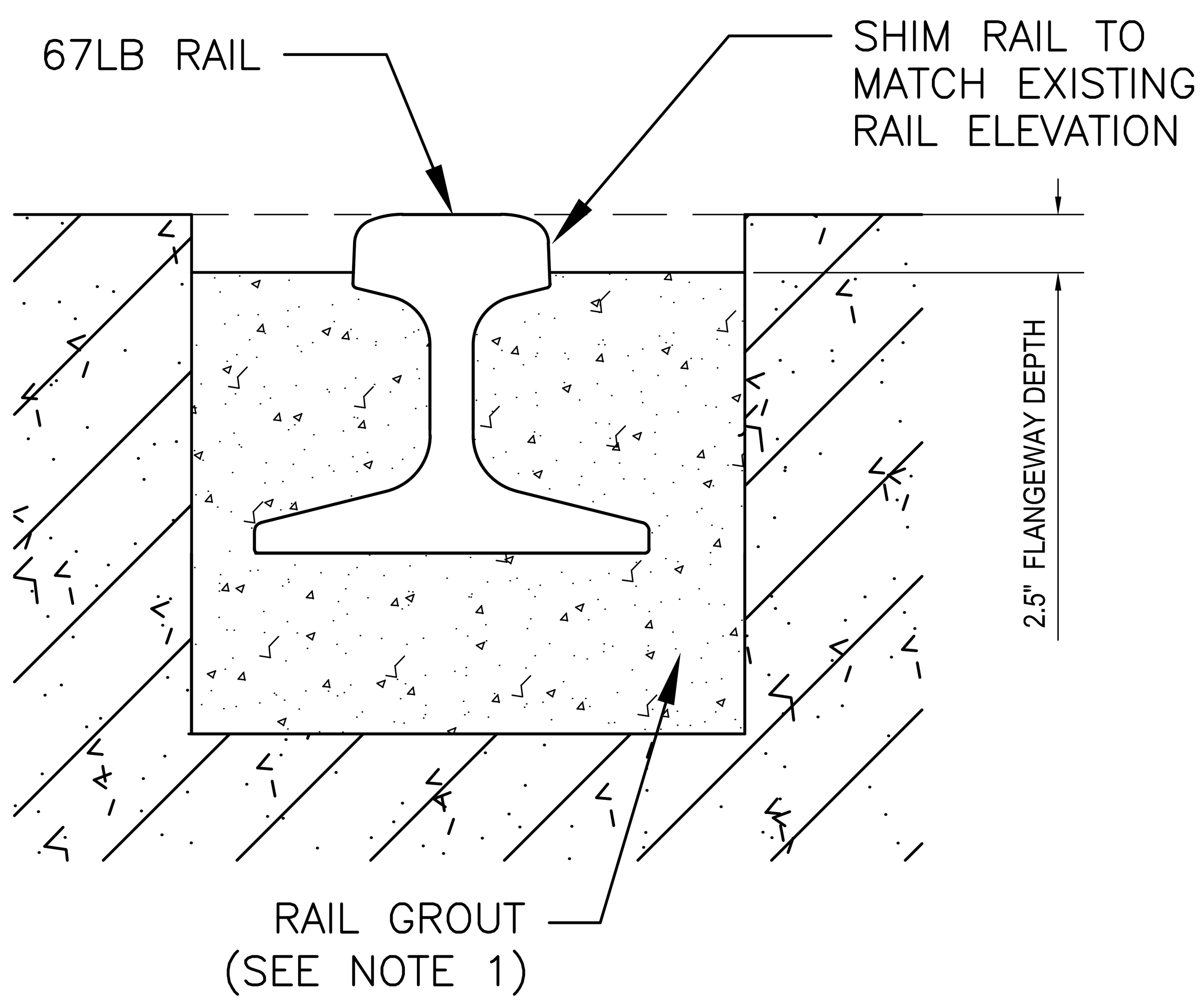
PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-945-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

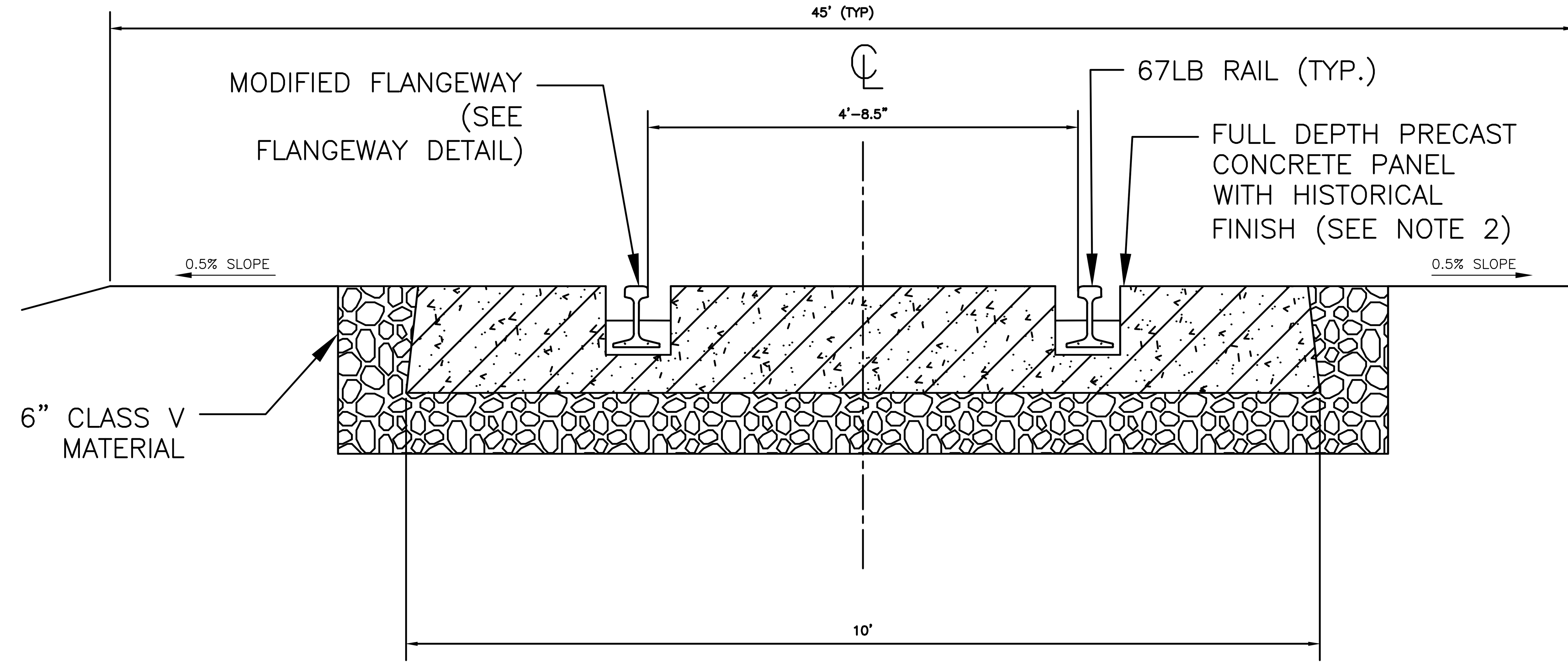
DATE: MAY, 2019
PROJECT NUMBER: 10085944
GN-02
SHEET: 108 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



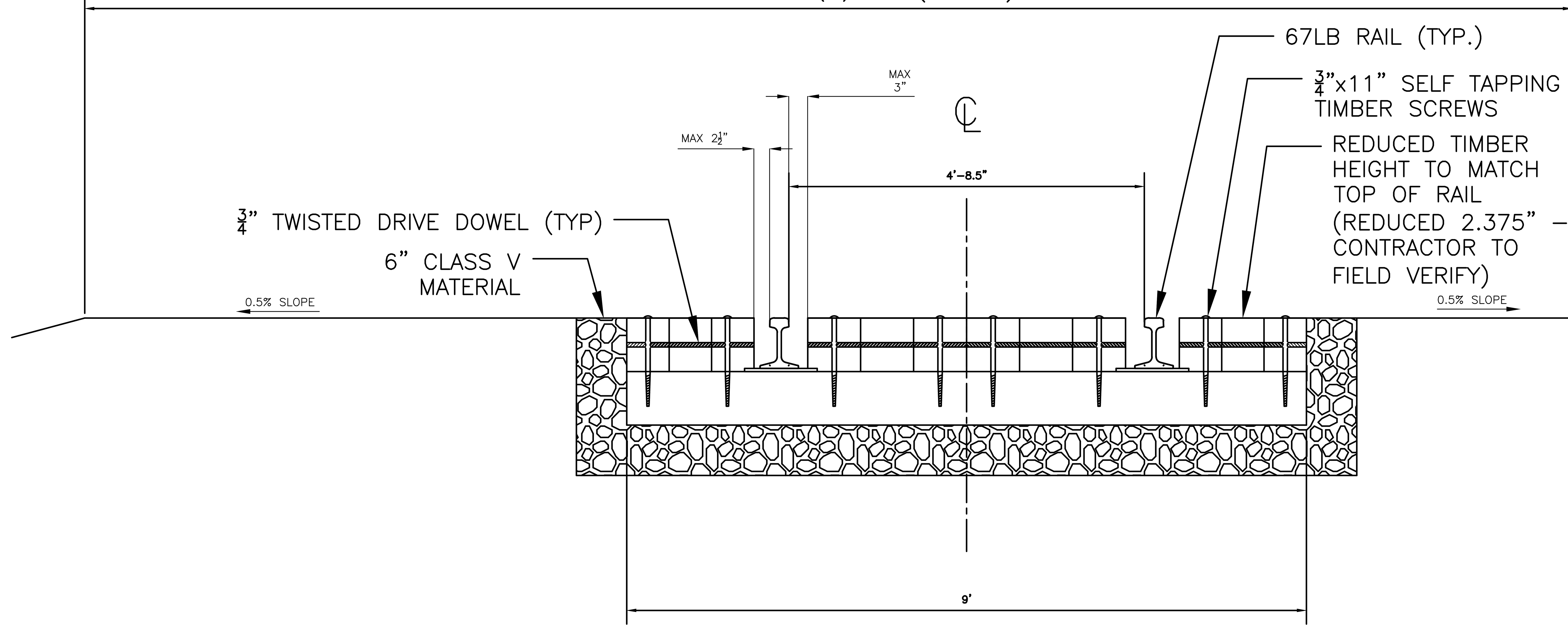
FLANGEWAY DETAIL

(NTS)



PERMANENT EMBEDDED CONCRETE CROSSING DETAIL

(NTS)



TEMPORARY TIMBER CROSSING DETAIL

(NTS)

NOTES:

1. SET RAIL IN LOAD–BEARING POLYURETHANE RAIL GROUT. SHIM RAIL TO MATCH TOP OF RAIL TO TOP OF FLANGEWAY CHANNEL. ⅛" VERTICAL TOLERANCE FOR RAIL ELEVATIONS – SEE AREMA FOR SPECIFICATIONS.
2. APPLY HISTORICAL FINISH TO CONCRETE PANELS TO MATCH CURRENT HISTORICAL CONDITIONS – SEE SPECIFICATIONS.
3. MAINTAIN POSITIVE DRAINAGE AWAY FROM TRACKS (MINIMUM 0.5%)

REVISIONS

NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: JCM
DRAWN BY: JCM
CHECKED BY: WJJ
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

RAILROAD AT-GRADE CROSSINGS CROSSING TYPICAL DETAILS

PREPARED FOR:

EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

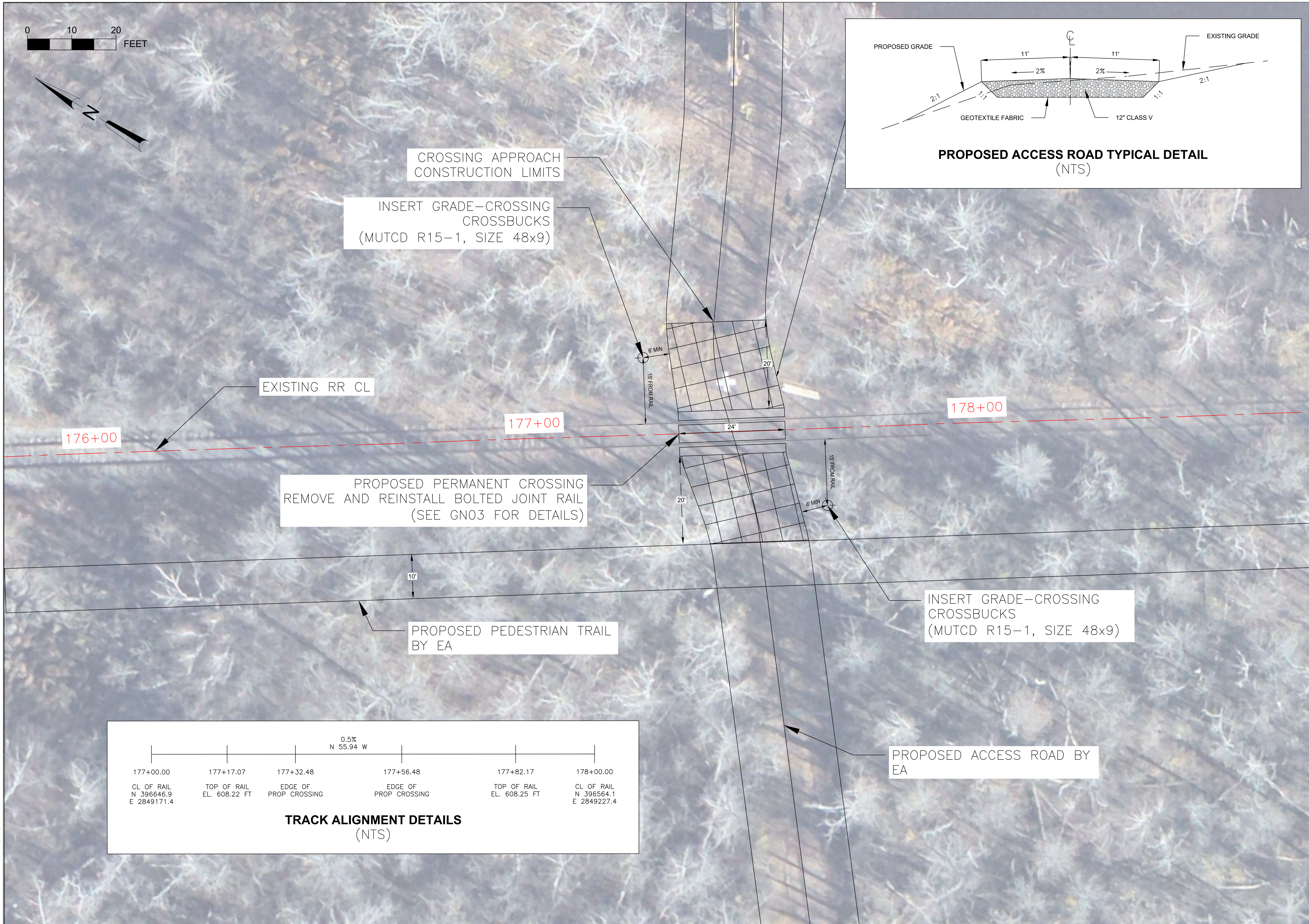
DATE: MAY, 2019

PROJECT NUMBER: 10085944

GN–03

SHEET: 109 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION



REVISIONS			
NO.	DATE	BY	DESCRIPTION

DESIGN INFORMATION
DESIGNED BY: JCM
DRAWN BY: JCM
CHECKED BY: WJJ
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

RAILROAD AT-GRADE CROSSINGS PERMANENT CROSSING PLAN VIEW

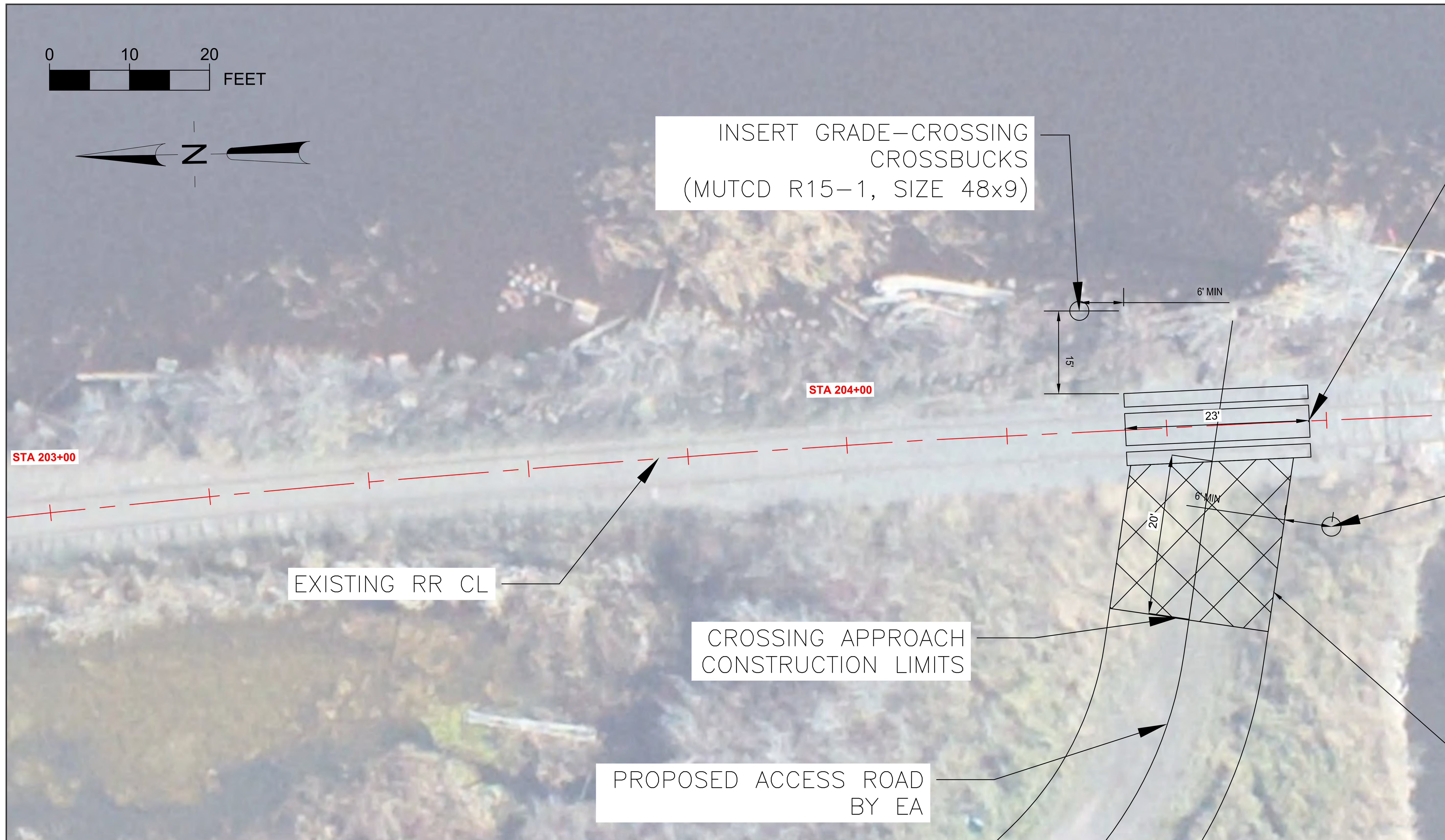
PREPARED FOR:
EPA

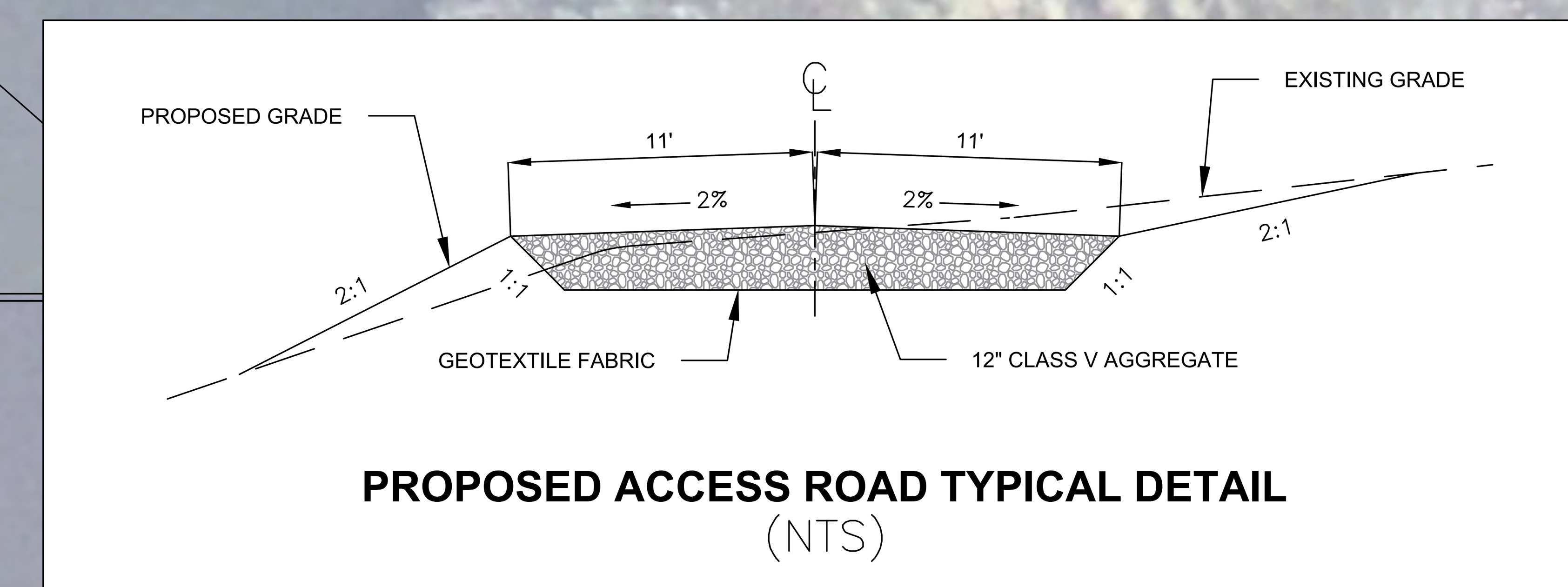
EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-915-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

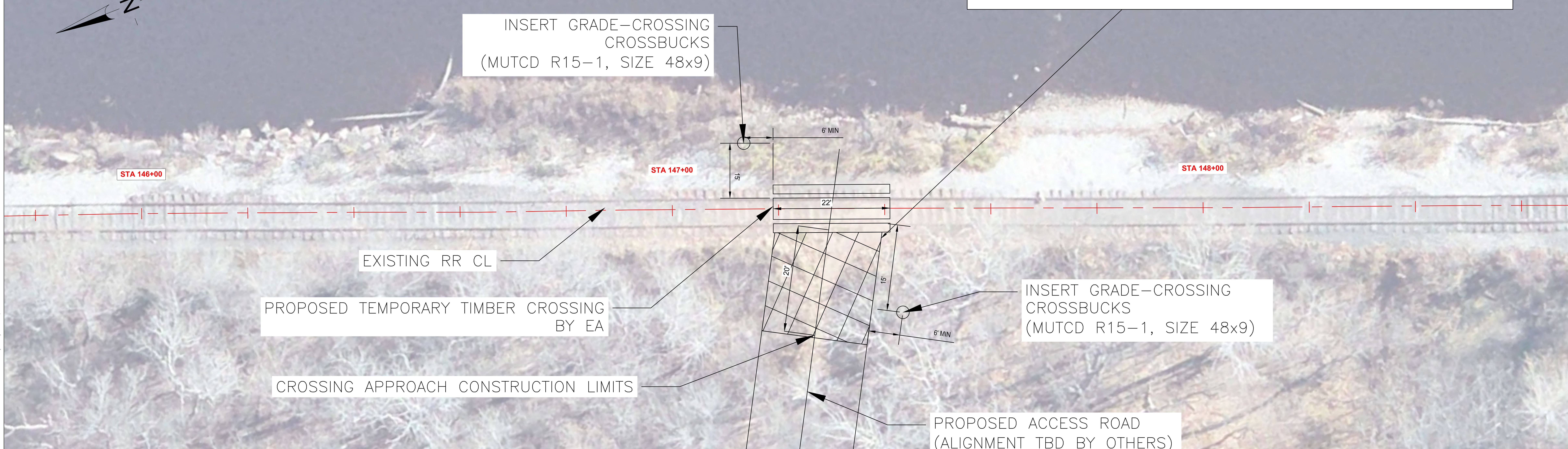
DATE: MAY, 2019
PROJECT NUMBER: 10085944
RD-01
SHEET: 110 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION





PROPOSED ACCESS ROAD TYPICAL DETAIL
(NTS)



NO.	DATE	BY	DESCRIPTION

REVISIONS

DESIGN INFORMATION
DESIGNED BY: JCM
DRAWN BY: JCM
CHECKED BY: WJJ
PROJECT MANAGER: DLM

SEAL

REMEDIAL DESIGN
SPIRIT LAKE ESTUARY SITE
ST. LOUIS RIVER AREA OF CONCERN
DULUTH, MINNESOTA

RAILROAD AT-GRADE CROSSINGS
TEMPORARY CROSSING PLAN VIEW

PREPARED FOR:
EPA

EA Engineering, Science, and Technology, Inc., PBC
444 LAKE COOK ROAD, SUITE 18
DEERFIELD, IL 60015
847-945-8010

HDR ENGINEERING, INC.
700 SW HIGGINS AVE., SUITE 200
MISSOULA, MT 59803-1489

DATE: MAY, 2019
PROJECT NUMBER: 10085944
RD-02
SHEET 111 OF 111

PRE-FINAL DESIGN - NOT FOR CONSTRUCTION

ANALYSIS OF DESIGN IMPACTS TO THE LAKE SUPERIOR AND MISSISSIPPI RAILROAD FROM THE SPIRIT LAKE SEDIMENT REMEDIATION PROJECT

RESPONSE TO COMMENTS ON DRAFT MEMORANDUM SUBMITTED TO MINNESOTA SHPO, LAKE SUPERIOR AND MISSISSIPPI RAILROAD, AND CITY OF DULUTH APRIL 2019

Comment	Response
State Historic Preservation Office (comments received April 3)	
Area 1- This section indicates that a standard chain link fence will be installed during the remedy construction. We assume that this will be removed once construction is complete. Please state this clearly.	It has been clearly stated that this fencing will be removed once construction is complete.
Area 2- We agree that the approach described in this document is in conformance with the Standards.	Comment noted.
Area 3- The narrative description and plan drawings presents an appropriate resolution to minimize the adverse effect. In order to fully evaluate conformance with the Standards, we request the opportunity to review elevation and drawings of the proposed new 3-span concrete ballast deck bridge including railings, abutments, and retaining/wing walls, if any.	Design drawings for the bridges have been provided with this revised package.
Area 4- The proposed adjustment to the rail line's elevation at the north and south ends of the Area3/bridge replacement in order to meet the elevation of the new bridge crossing are described as temporary impacts in the report. It is our opinion that these are permanent impacts to the historic property, but the narrative description indicates that they will be treated appropriately per the Standards.	Comment noted; the adjustments to the rail at this location would be on the tenths of inches.
Area 5- The proposed removal of five (5) pipe culverts at this location is described as a temporary impact in the report. It is our opinion that this work is a permanent impact, but the narrative description and project plans indicate the design of the work is in conformance with the Standards.	Comment noted; this impact is presented in the table and figure as a permanent impact.
Area 6- The report described both the temporary truck crossing during remedy construction and how this crossing will be converted to a permanent access road for post-construction monitoring. We agree that the narrative description and project plans indicate the design of the work is in conformance with the Standards.	Comment noted.
Area 7- The report describes the temporary truck crossing installed during remedy construction. We agree that the narrative description and project	Comment noted.

Comment	Response
plans indicate the design of the work is in conformance with the Standards.	
Area 8- The report describes the proposed construction of a new bridge crossing at Wire Mill Pond. While we agree that the narrative description and project plan views indicate the design is appropriate, as with Area 3 (above), in order to fully evaluate conformance with the Standards, we request the opportunity to review elevation drawings of the proposed new 3-span concrete ballast deck bridge including railings, abutments, and retaining/wing walls, if any.	Design drawings for the bridges have been provided with this revised package.
Area 9- As with Area 1 (above) we understand that the impact will be a temporary closure of part of the rail line during construction. Please clarify that the chain link fence will be removed following remedy construction.	It has been clearly stated that this fencing will be removed once construction is complete.
Avoidance and Minimization in All Impact Areas- Edit the first bullet point sentence to read: "Avoidance in design: where possible *additional* adverse effects to the historical features of the LSMRR will be avoided."	Change has been made as suggested.
Avoidance and Minimization in All Impact Areas- Under the second bullet point, it is suggested that the historic property will be recorded "consistent with documenting resources prior to adverse effects." Does this suggest that the LSMRR Historic District will be subject to archival documentation standards consistent with the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER), or our equivalent state documentation policy the Minnesota Historic Property Record (MHPR)? If so, then we agree with the provision but this will need to be further discussed as part of the consultation process for the MOA.	Comment noted.
Other provisions listed in this section- including suggestions for interpretative signage, construction monitoring, and pre-construction surveys- will also likely be included as terms of the MOA.	Comment noted.
LSMRR (comments received April 3)	
General - The LSMRR will experience a huge temporary adverse effect in the loss of operation for approximately 3 miles during the entire time of remediation.	Comment noted. Text has been added to section 1 noting the operation impact on the LSMRR.
Area 2 - Truck Crossing - Given the heavy nature of the traffic over the crossing, it may be advisable to add a layer of gravel between the	The following has been added for clarification: "For additional protection, gravel may be placed next to further reduce the truck impact. Gravel

Comment	Response
fabric and the timber mats. Regardless, the impact of truck loadings may deteriorate the track structure and require some additional maintenance upon removal of the crossing.	would be followed by an additional layer of fabric to prevent gravel from settling in and around the rail line. This fabric would be a higher strength woven mono-filament fabric to withstand gravel removal activities once construction is complete."
Area 3 - Where will the temporary diversion opening be located? Will this be in addition to current flowage thru Area 5? Top of Rail (T/R) is the preferred way to provide rail elevations. I believe the proposed T/R elevation at the Bridge is 606.9 ft. What is the existing elevation at that location? The assumption is made that replaced track across the bridge will consist of new ties. This is not a historical issue but a common maintenance practice on railroads as the pans of a ballast deck bridge make future replacement of individual ties difficult.	The following has been added to this section for clarification: "The temporary diversion will be located along the west side of the Upland CDF and discharge to Spirit Lake at the northernmost extent of the CDF." "The top of rail elevation for the proposed bridge will be 606.2 ft. The existing top of rail elevation is 606.3 ft."
Area 4 - Assuming existing and design elevations are close, there should be little impact in this area.	Comment noted.
Area 6 - Assuming the crossing design is the same as Area 2, same comments apply. When the permanent crossing surface is installed, there may be some maintenance or upgrades to the track structure required.	The same language as added to Area 2 has been added to Area 6.
Area 7 - Same comments as Area 2.	The same language as added to Areas 2 and 6 has been added to Area 7.
Area 8 - Same comments as Area 3. Is existing T/R elevation the same as proposed T/R at the new bridge? There is no indication of surfacing outside the limits of the bridge construction.	The following language has been added for clarification: "The new railroad bridge will have a top of rail ties elevation of 606.7607 ft and a thickness of 2.5 feet. The existing top of rail elevation is 607 ft."

Attachment 4

Email Contacts

Agency	Point of Contact	Email
Environmental Protection Agency	Diana Mally, Project Manager	Mally.diana@epa.gov
	Bradly Benson	Benson.bradly@epa.gov
Minnesota State Historic Preservation Office	Sarah Beimers, SHPO	Minnesota Historical Society State Historic Preservation Office Government Programs and Compliance 345 Kellogg Blvd. West St. Paul, Minnesota 55102 ** Sarah.beimers@state.mn.us
Fond du Lac Band of Lake Superior Chippewa	Kevin DuPuis Sr., Chairperson	KevinDuPuis@FDLREZ.COM
	Jill Hoppe, THPO	jillhoppe@fdlrez.com
City of Duluth	Jim Filby Williams	jfwilliams@duluthmn.gov
U.S. Steel	Mark Rupnow	mrupnow@uss.com
Lake Superior Mississippi Railroad	Joel Manns	jdmmwm@gmail.com

** Official correspondences to the Minnesota State Historic Preservation Officer must be sent via hardcopy.