Friends of the Rail Bridge

Report of the Bridge Advisory Committee

April 14, 2021

Friends of the Rail Bridge

Report of the Bridge Advisory Committee

Introduction

Burlington Northern Santa Fe Railroad Company is requesting the United States Coast Guard grant a federal permit to allow demolition and replacement of the Bismarck Bridge that was tested, dedicated, and opened to traffic on October 21, 1882. (Appendix A, *The Bismarck Tribune*)

Bridge Design Advisory Group

On January 11, 2021, Friends of the Rail Bridge, as an Invited Signatory, signed a Programmatic Agreement, along with the Advisory Council on Historic Preservation, the North Dakota State Historic Preservation Office, the United States Coast Guard, Burlington Northern Santa Fe, and other consulting partners. The agreement is the culmination of several years of consultation centered on the BNSF request and is part of a federally mandated process proscribed by Section 106 of the National Historic Preservation Act. The resultant Programmatic Agreement is a document that delineates responsibilities for the signatories and requires completion on an accelerated schedule.

Friends of the Rail Bridge (FORB) was tasked with many duties, including formation of a bridge design advisory group (Bridge Advisory Committee or BAC). The results of that committee's work are to be reported by April 14, 2021, to the United States Coast Guard, the lead federal agency with oversight in the Section 106 process. This document serves as the required response. Included are illustrations of design enhancements requested by the BAC.

Committee Membership

On behalf of Friends of the Rail Bridge, a group of five people, either from the area or in the community, was recruited by Amy Guthrie Sakariassen, a Cultural Resource Specialist and North Dakota Advisor to the National Trust for Historic Preservation. The BAC members have varied backgrounds, but all share a deep understanding of the history of the Bismarck Bridge which is the heart of the issue.

Briefly described here are the interests and experience brought to the BAC by its members:

- Alexa Azure, on the Engineering staff of the United Tribes Technical College, was raised locally. Her background is Environmental Engineering, and her knowledge is both practical and sensitive to heritage and a sense of place.
- Alex Hill, though not living in the area currently, has roots in the community and an active interest in changes that may affect the amenities of this area. As a landscape architect, he is professionally equipped to envision and create both practical and possible design alternatives.
- Paul Noot, educator and artist, brings experience with aesthetics and public art, and has a clear understanding of the effects of visual impact on people's relationship with the spaces around them.
- Mandy Persson is a founding board member of the FORB group, a current office holder, and recreation proponent.
- Connie Sprynczynatyk, long dedicated to public service in the community and state, and keenly interested in the historical forces that shaped the state, provides insight into engineering solutions and the aesthetics of the project.

BNSF participated in two of the meetings held by the BAC to discuss context-sensitive design and enhancements to the proposed bridge design (Appendix B). References consulted by the group will be included in the appendices (Appendix C).

At the meetings, BNSF was represented by Mike Herzog, Director of Bridge Maintenance; Amy McBeth, BNSF communications representative; and Aimee Angel from BNSF's consulting firm, Jacobs Engineering. Both meetings were focused on questions and answers to help inform the BAC in their consideration of bridge designs. One additional meeting was held by the BAC to brainstorm suggestions for design enhancements with a focus on how the public will likely view a new bridge.

Bridge Design

Following research on bridge aesthetics, the BAC adopted a quotation from an industry expert highlighted in a Minnesota Department of Transportation document entitled "Aesthetics for Bridge Design." C.E. Ingilis said, **"Dominating the landscape, a bridge may make or mar its surroundings for centuries to come. Consequently, a striving for beauty of form and harmony with surroundings is a social obligation which structural engineers must recognize and educate themselves to perform."** The BAC has kept this principle at the forefront throughout process of design discussions.

The Programmatic Agreement requires the BAC to make design suggestions for both the preservation option, which would be to a "companion" bridge 90.5 feet north of the existing rail bridge, and a "stand-alone" rail bridge option built in closer proximity to the location currently occupied by the 1882 Bismarck Bridge. BNSF provided renderings of the structure they propose. The representatives of BNSF explained that the bridge depicted would be the same in appearance, regardless of whether the 1882 bridge remains or is removed.

BAC members asked the bridge engineer for information on what elements in the proposed design could be modified to make it less visually intrusive if it were to be a companion bridge, and to be more

visually sympathetic to the surrounding viewshed and landscape. *The BAC's concern is that as currently depicted, the community is unlikely to embrace the new bridge design, whether or not the iconic bridge remains in place.* However, the committee was provided with few options for personalizing and enhancing either option. Regardless, the BAC sought to work within the confines of the options to develop reasonable modifications to the aesthetics of both the companion bridge, and the stand-alone bridge.

Mike Herzog of BNSF repeatedly reminded the BAC that no suggested alterations to the preferred design of a new bridge would be entertained should the old bridge remain and be repurposed. In the opinion of BNSF, that outcome would relieve them from mitigating the impact of a new bridge altogether. It is the BAC's belief that the questions of adverse impact and mitigation measures have yet to be answered, and that ultimately, the lead federal agency will make those decisions.

During the second meeting attended by BNSF representatives, again Amy McBeth, Mike Herzog, and Aimee Angel, the entire group arrived at further clarification of design potential and design limitations. The BAC communicated its internal reflections and received feedback on several ideas.

The BAC ideas include:

- Uncomplicated horizontal design
- Pigmented concrete approaches and pillars
- Addition of symbols impressed in the concrete (e.g., indigenous people's symbol for water)
- Addition of texturing on the piers and/or the concrete approaches
- Lighting
- Interpretive signage

Horizontal lines - The elements of design that the committee agreed would be important to address is based on the concept that the new bridge should not detract from the architecture and engineering of the iconic Bismarck Bridge; the horizontal line of the new bridge is believed to be less intrusive if it is uncomplicated. (Appendix D)

Color - The design presented by BNSF calls for weathered steel girder plates over the water, giving way to plain concrete approaches on either end of the new bridge. (e.g., Appendix E) If BNSF will not entertain any change in the weathered and rusty appearance of the metal girder plates, the BAC suggests the girder fascia, the concrete approaches and abutments on the east and the west ends of the bridge be pigmented to match as nearly as possible the color of the weathered steel. Examples abound of the use of pigment additives in major concrete elements (Appendix F). In the March 30 meeting of the BAC, further discussion about coloring on concrete occurred, with the result that use of some coloring, of a one-time surface application, may be allowed on the concrete approaches, according to Bridge Maintenance Director Mike Herzog.

The BAC believes that color is a priority design element, and that the question of concrete pigmentation, rather than an applied surface treatment that will not be maintained, must be reconsidered in the process of determining mitigation measures. Adding a darkening pigment on the wet and dry piers will, the BAC believes, create a more pleasing and visually recessive outcome. The measurements of the piers,

as provided by BNSF, indicate the piers to be 54 feet long and 12 feet wide along much of the height, and certainly will be overwhelming features within the viewshed.

Symbols - On the short list of elements that could respectfully reference the history of the area, is the addition on the piers of water symbols from the area's indigenous people. There are many ways these simple symbols could be presented. BNSF has stated that the piers will be cast in place, which guides the options for the introduction of any element such as the wavy lines generally used by the tribes of the Northern Plains to denote water. The BAC believes that the introduction of sets of wavy lines in an agreed-upon pattern, placed on the east and west sides of the piers, is a reasonable request.

The object, again, is to make more palatable the visual impact of the new bridge. Examples are available of such embellishments on similar large-scale concrete projects. Likely significantly easier to do would be to apply the design element as a metallic or glazed brick/ceramic interpretation to the piers after they have been cast. Regardless of the technique, and in deference to Traditional Knowledge Keepers, the BAC would ask that whatever medium is accepted, the color blue is used for design symbols that represent water.

BNSF representatives assert that this option—indeed the use of any paint—would make it impossible for bridge inspectors to check for condition occurring on the structural parts. Examples are available of just such design applications used in similar projects. Consultants have indicated that though visual inspection which may reveal spalling or other evidence of structural deterioration is important, the use of specialized scanning technology is generally employed and has been in use many years.

Texturing - The use of texture as a means to subdue the uncompromising concrete elements of the proposed BNSF bridge was discussed at the meetings (Appendix G). The BAC believes the community may be more accepting of either a more organic appearance to the piers, or of a more historically sensitive pattern to those piers. Early on, the concept was rejected by BNSF representatives as having an unacceptable influence on the river water rise. Re-addressed during the March meeting, Bridge Maintenance Director Herzog indicated that the only allowable location for texturing would be above the 100-year flood level as marked on the pier's design plans.

The BAC prefers texturing on the bridge, regardless of limitations outlined by BNSF. The mass of the concrete piers, both wet and dry, as shown in the BNSF plans, will have an inescapable influence on the aesthetics of the on-river and off-river experience of these communities and those who visit. If even the pier portions above the 100-year flood level could receive some attention in a positive way, it would be helpful visually. Perhaps the concrete approaches and the abutments can be both colored and textured to be less intrusive on the viewshed.

Lighting - The final element proposed by FORB's Bridge Advisory Committee is lighting. (Appendix H) The United States Coast Guard regulations outlining lighting requirements and restrictions for lighting on bridges over navigable waterways were consulted. In addition, the BAC sought input from the North Dakota Department of Transportation and North Dakota State Historic Preservation Office staff possessing practical knowledge of bridge lighting on structures crossing navigable waterways. The Grand Forks Sorlie and Kennedy Bridges are both lit for pedestrian safety. The Sorlie Bridge, a Parker through truss bridge, has lighting on the superstructure as well.

Regarding the final design of the proposed rail bridge, the BAC has no intention of suggesting additional lighting beyond that required under the Coast Guard's safety regulations. However, in the alternative that results in the preservation of the 1882 rail bridge, the BAC's task under the Programmatic Agreement requires analysis of conversion of the bridge into a pedestrian trail and recreation site. It must be anticipated that lighting on the historic bridge and its approaches will both be critical for safety concerns and need to be adaptable for special events and use. The effects on the historic structure and the aesthetics will need to be considered at the time these decisions are being made. At more than 90 feet apart, the distance between the two bridges in the preservation alternative should be sufficient to diffuse concerns regarding conflict with BNSF's operational lighting per U.S. Coast Guard regulations.

The BAC requests that lights be approved on the original bridge structure, as long as they do not impact the BNSF operational lights. Examples of the creative use of lighting on bridges of all types are commonplace. Rules that govern the type and use of such lighting have been consulted, and vary somewhat among municipalities and locations.

Interpretive signage - The BAC and BNSF also discussed the importance of accurate interpretive signage. This item is included in other areas of the Programmatic Agreement in mitigation discussions, but the BAC feels strongly that educational interpretive signage can be usefully placed near dry piers which will support mitigation measures as the Section 106 process develops.

Summary

Members of FORB's Bridge Advisory Committee have undertaken the responsibility assigned under the Programmatic Agreement to review the proposed designs as presented by BNSF for a bridge to be placed upstream from the historic rail bridge across the Missouri River outside of Bismarck, North Dakota. Two options were addressed: one with a preservation outcome retaining the 1883 bridge, and one with a new bridge built to span the river. Study of the renderings, study of pertinent material obtained from online resources, and consultation—both with professionals in the transportation field and representatives from BNSF—have occupied the group.

It is the opinion of the BAC that the enormous size of the piers as shown in the schematics from BNSF, and the replacement bridge aesthetics, will be difficult for the community to support. In short, the proposed design will create a significant and negative impact the viewshed along this stretch of the Missouri River.

No reasonable suggestion to mitigate the impact of the current design should be ignored. The visual impact of a new structure, particularly one of such overwhelming proportions, will be significant. The suggestions of the BAC are intended to convey an earnest desire to influence the aesthetics of a new bridge, no matter which alternative is ultimately adopted.

Conclusion

It is our opinion that the appearance of the new rail bridge is of great importance to the communities, and the impact of the bridge design on the people of this region and state cannot be minimized or dismissed.

The Missouri River as it flows past Bismarck and Mandan has always been viewed as the public's river. It is the most publicly accessible stretch of the free-flowing portion of the Missouri in North Dakota.

The river segment from the Captain Grant Marsh Memorial Bridge to the Expressway Bridge is an extension of our homes and is the public's back yard. The bridges along this stretch may include a mix of NDDOT bridges, a bridge of the cities of Bismarck and Mandan, and the BNSF's bridge, but foremost, they are the peoples' bridges.

The structures that are placed here were, are today, and will always be, of great importance to the people of North Dakota. The development and care of these structures must always be undertaken with the people in mind.

Appendix A

Library of Congress "Chronicling America," (Bismarck Tribune, Bismarck, D.T. [N.D.]) 1878-1884, October 27, 1882 - Image 7 - Image provided by State Historical Society of North Dakota

THE BISMARCK WEEKLY TRIBUNE

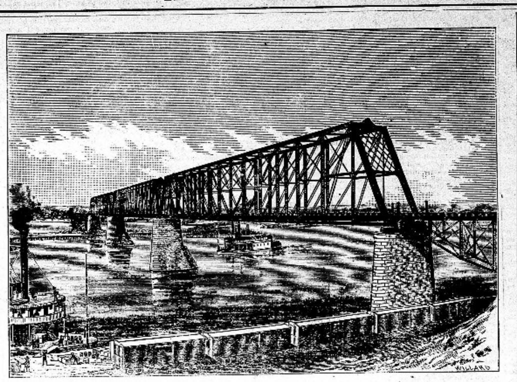
THE BISMARCK BRIDGE.

HISTORY OF THE GREAT WORK NOW FINISHED.

The Dakota and Missouri Divisions of the Northern Pacific Railroad Connected by this Magnificent Structure.

An Important Event.

Although the original scheme of the Northern Pacific railroad contemplated a bridge across the Missouri river at or near Bismarck, no definite action with reference to the construction of this bridge was taken until the winter of 1880, when Mr. George S. Morison was requested to examine the river at this point in conjunction with Gen. A. Anderson, engineer in chief, and to prepare a report on the best method of crossing the river.



THE BISMARCK BRIDGE OVER THE MISSOURI RIVER. OPENED FOR TRAFFIC OCTOBER 21, 1882.

"The Bismarck Bridge Over the Missouri River Opened for Traffic October 21, 1882"

"The Bismarck Bridge is the first bridge which has been built across that portion of the Missouri river…"

Appendix B

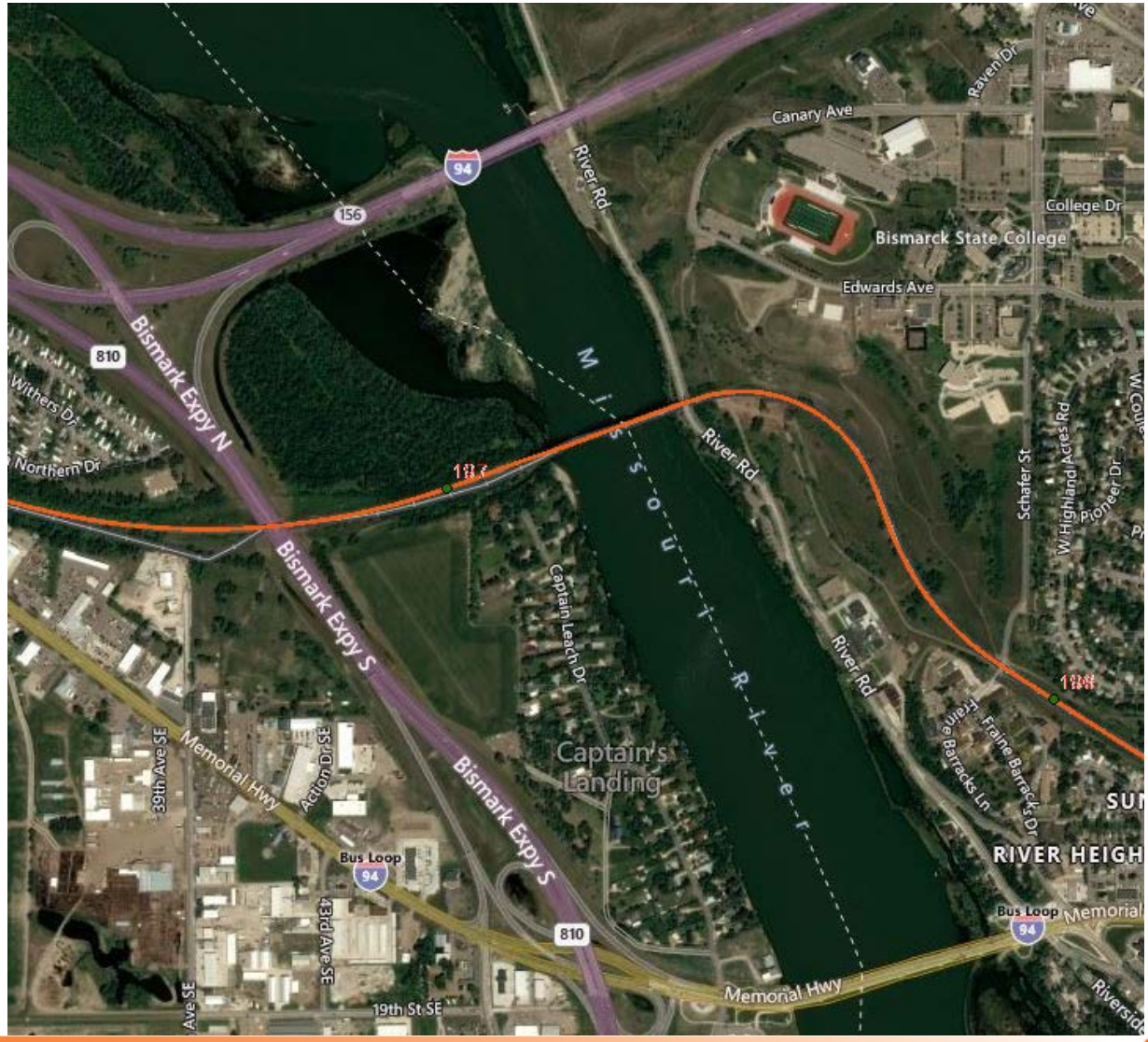
BNSF Bridge Project
0038-196.6 (Bismarck, ND)

Bridge Advisory Committee

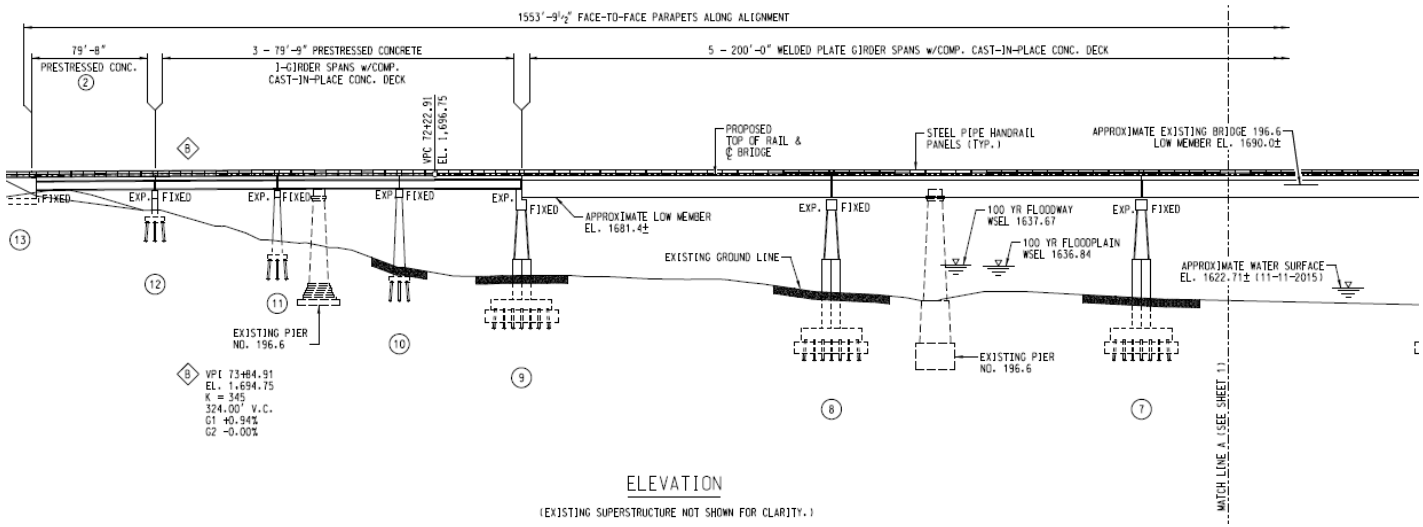
February 15, 2021

BNSF RAILWAY

BNSF Bridge Project – Surrounding Area

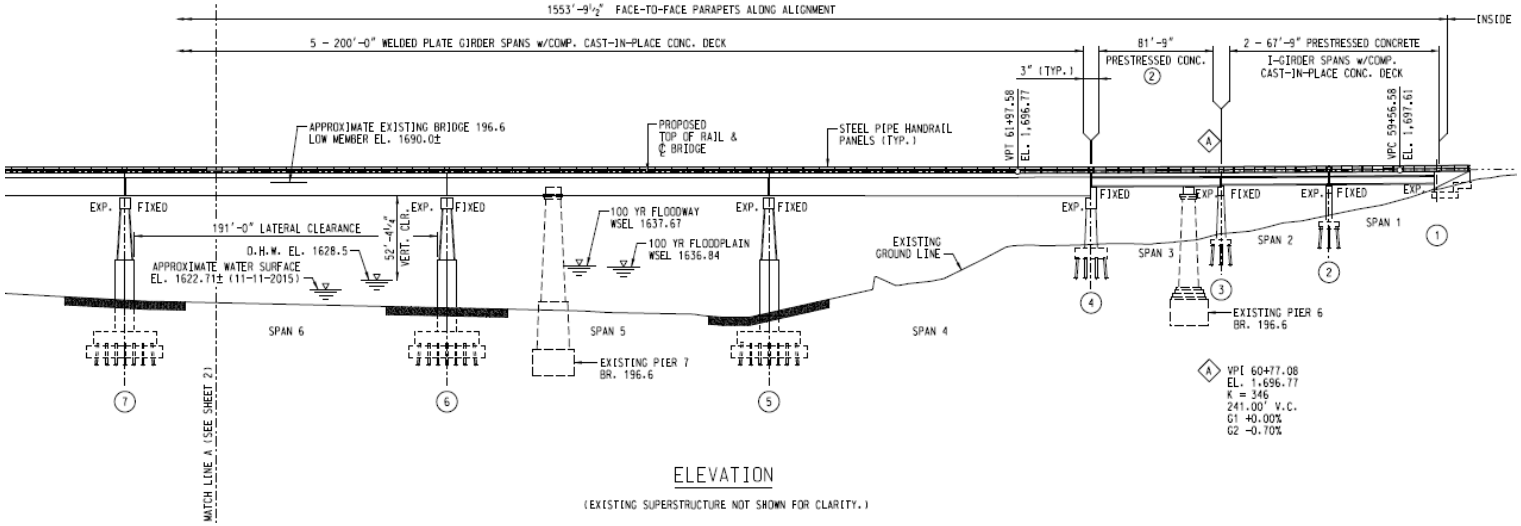


Elevation View – Proposed Concept



ELEVATION

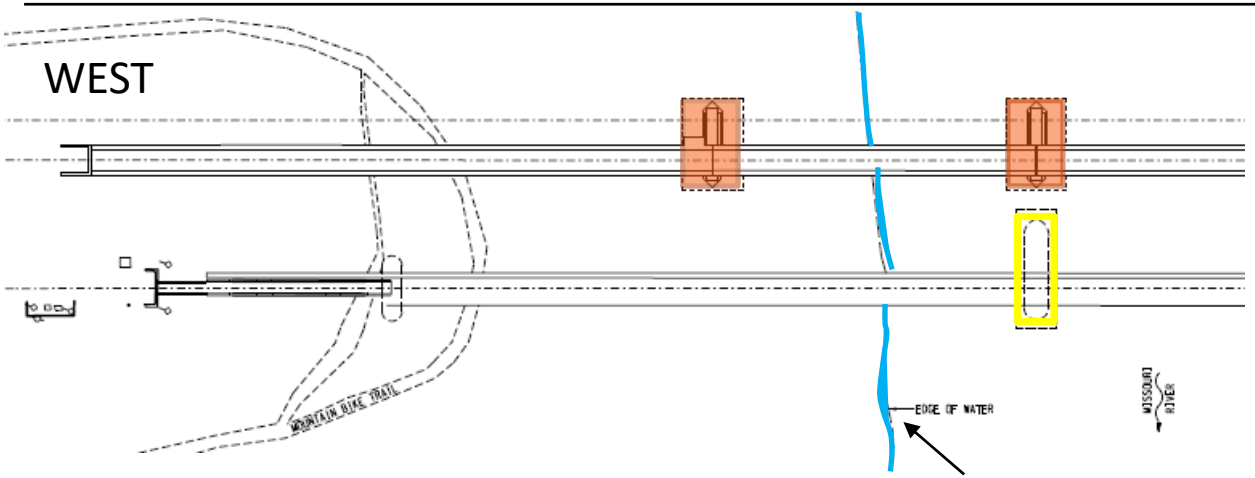
(EXISTING SUPERSTRUCTURE NOT SHOWN FOR CLARITY.)



ELEVATION

(EXISTING SUPERSTRUCTURE NOT SHOWN FOR CLARITY.)

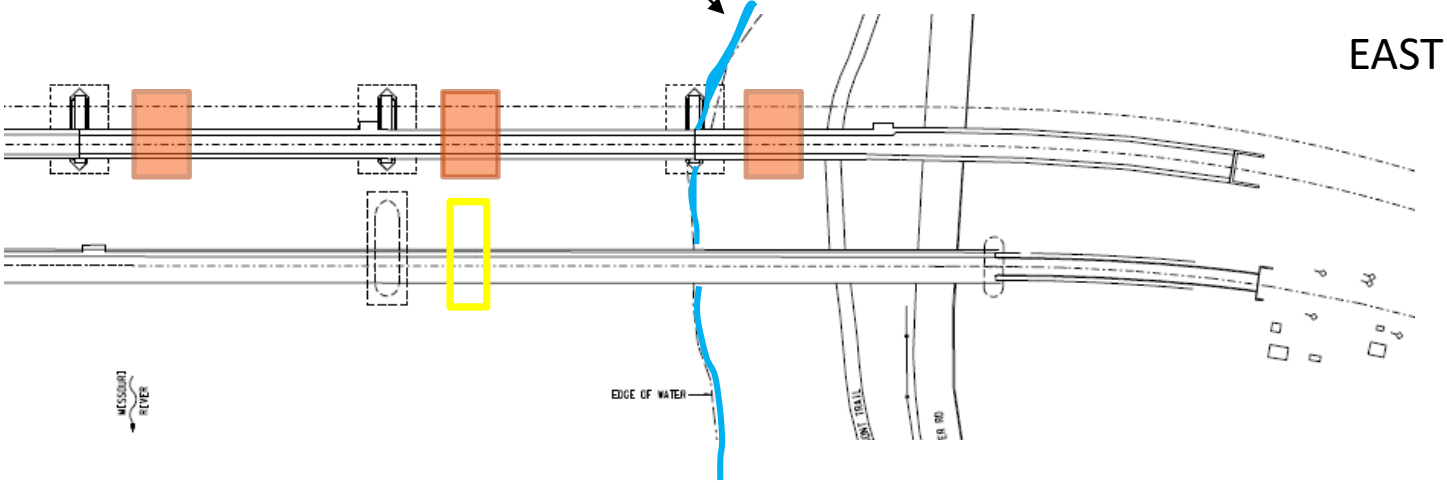
Alt Concept : 200ft Spans, Piers 92.5ft Upstream



New Piers

Existing Piers

Edge of Water



North View - Memorial Highway

≈ 0.80 mile

South View - I-94

≈ 0.40 mile

BNSF RAILWAY

South View

200ft Spans – 92.5ft Upstream

South View - River Road

South View – West River Bank

BNSF RAILWAY

West View - River Road

West View - River Road

200ft Spans – 92.5ft Upstream

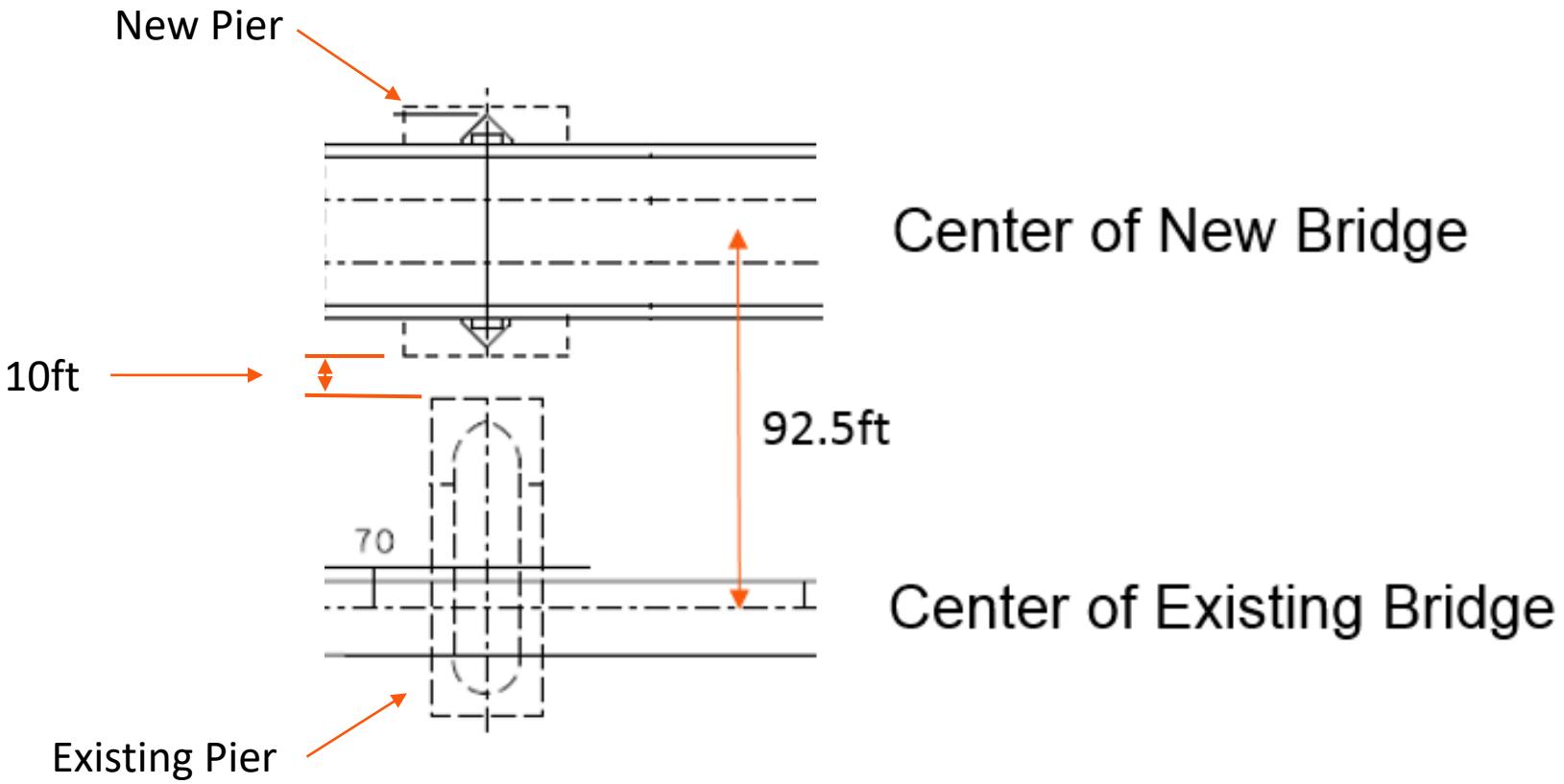
Northeast View - Captain's Landing

200ft Spans – 92.5ft Upstream

BNSF RAILWAY

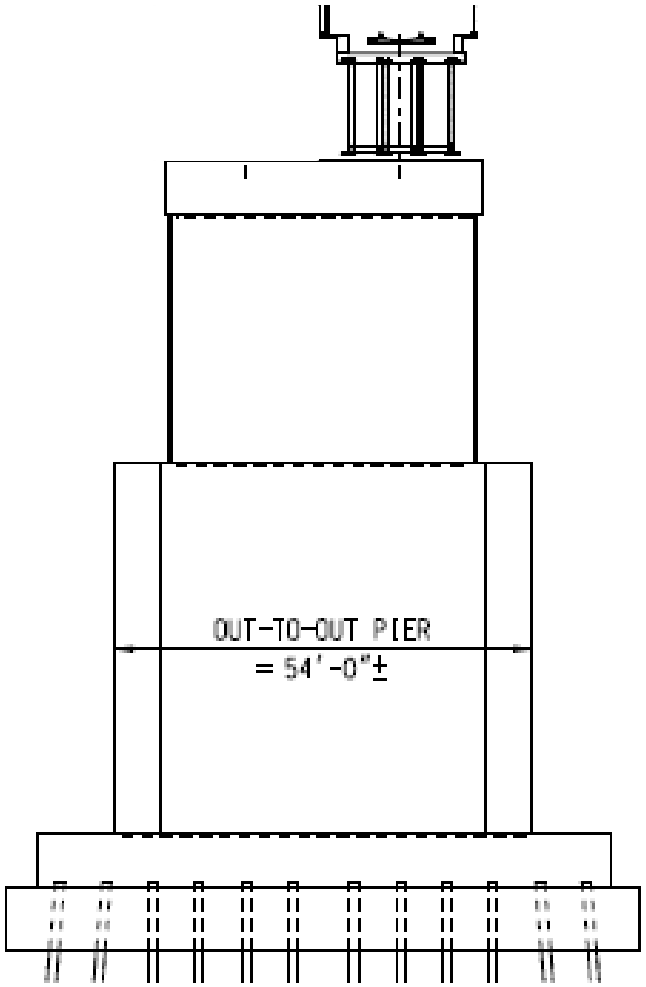
River Pier Layout

200ft Spans – 92.5ft Upstream



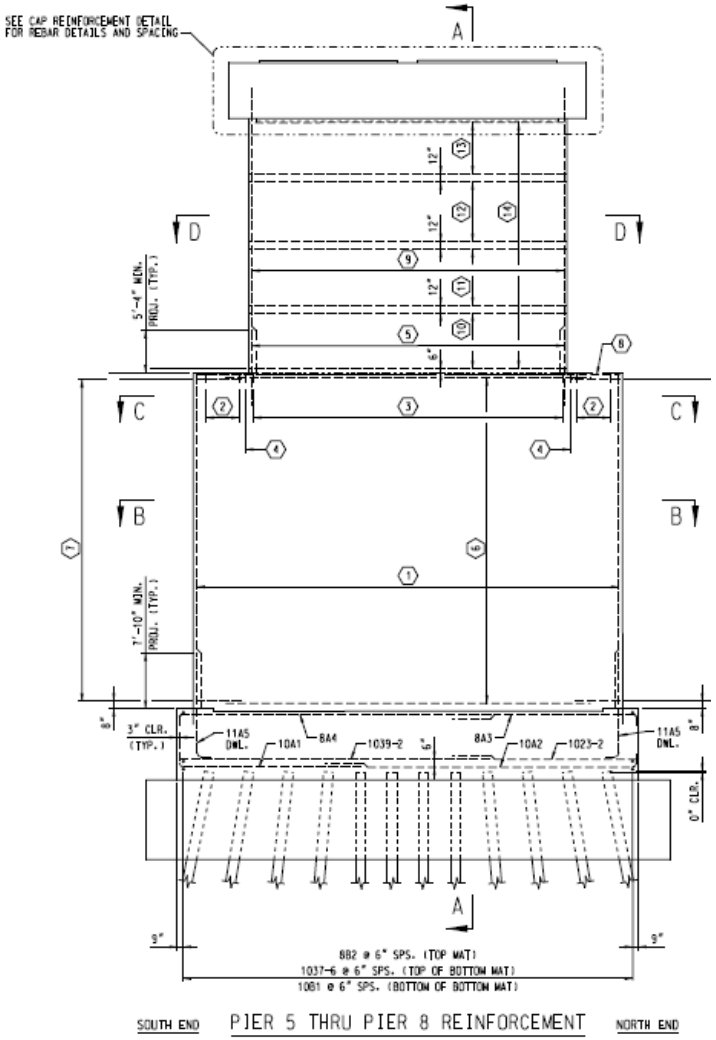
Typical River Pier

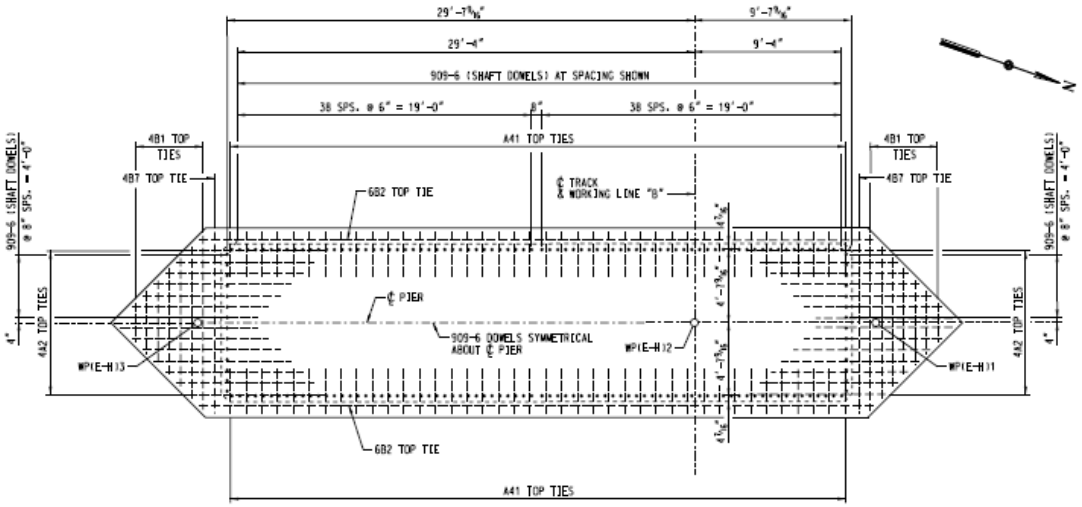
Proposed and Alt Concepts with 200ft Spans

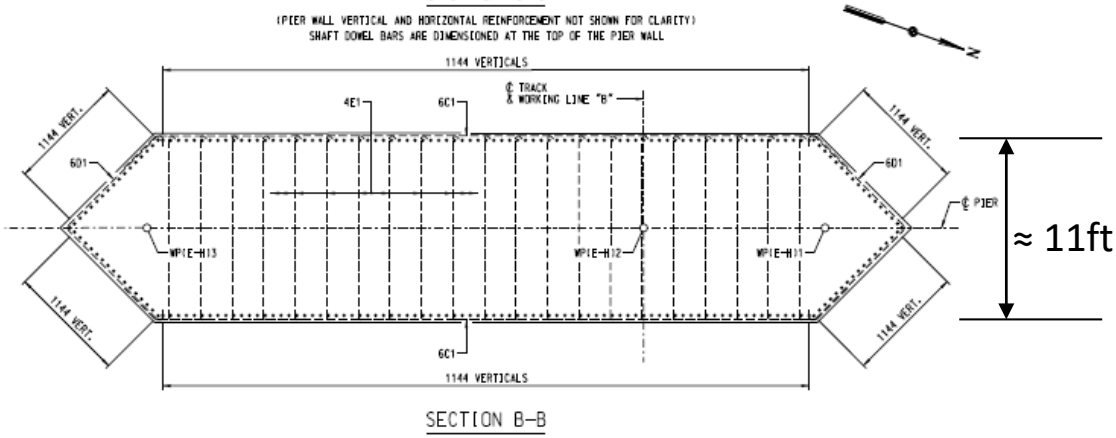


Typical River Pier

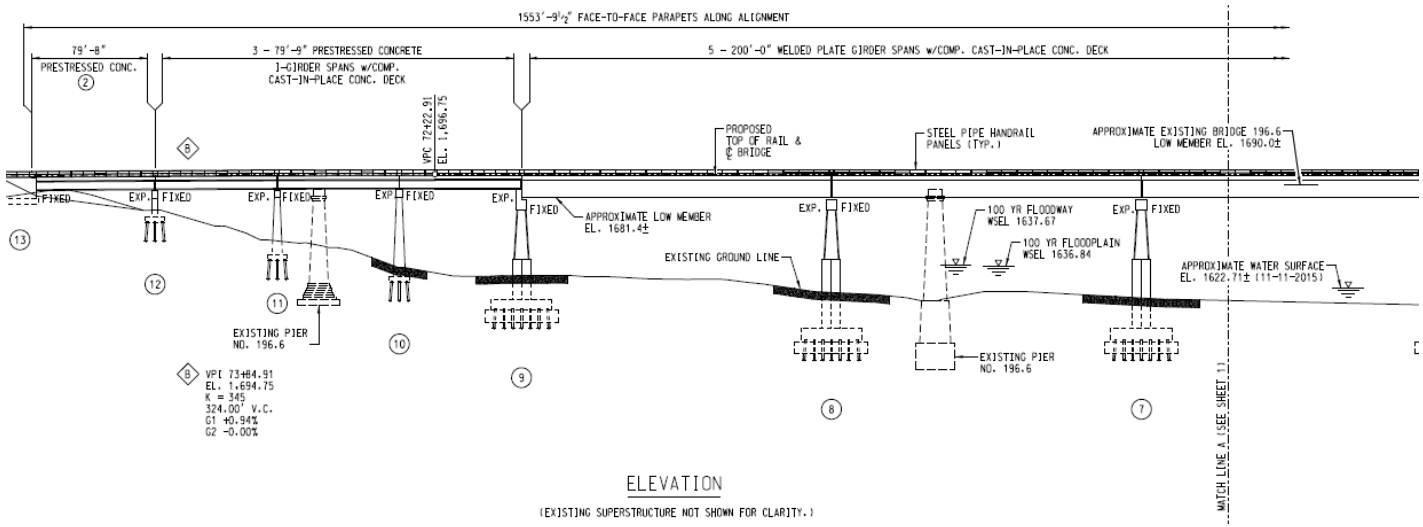
Proposed and Alt Concepts with 200ft Spans





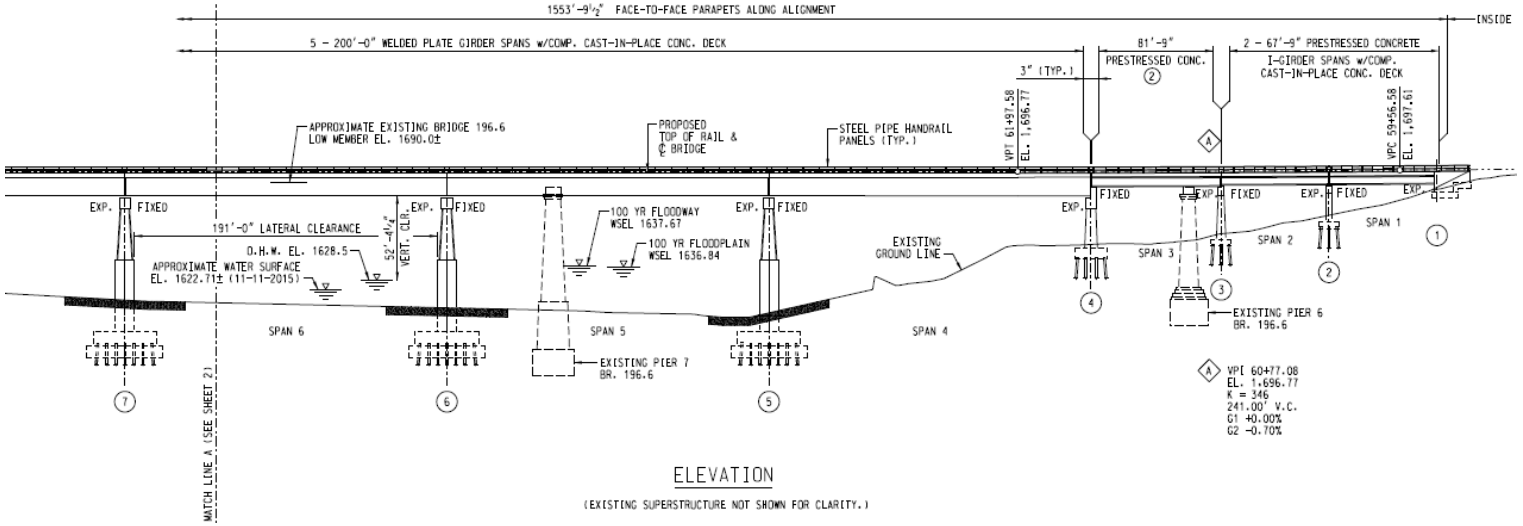


Elevation View – Proposed Concept



ELEVATION

(EXISTING SUPERSTRUCTURE NOT SHOWN FOR CLARITY.)

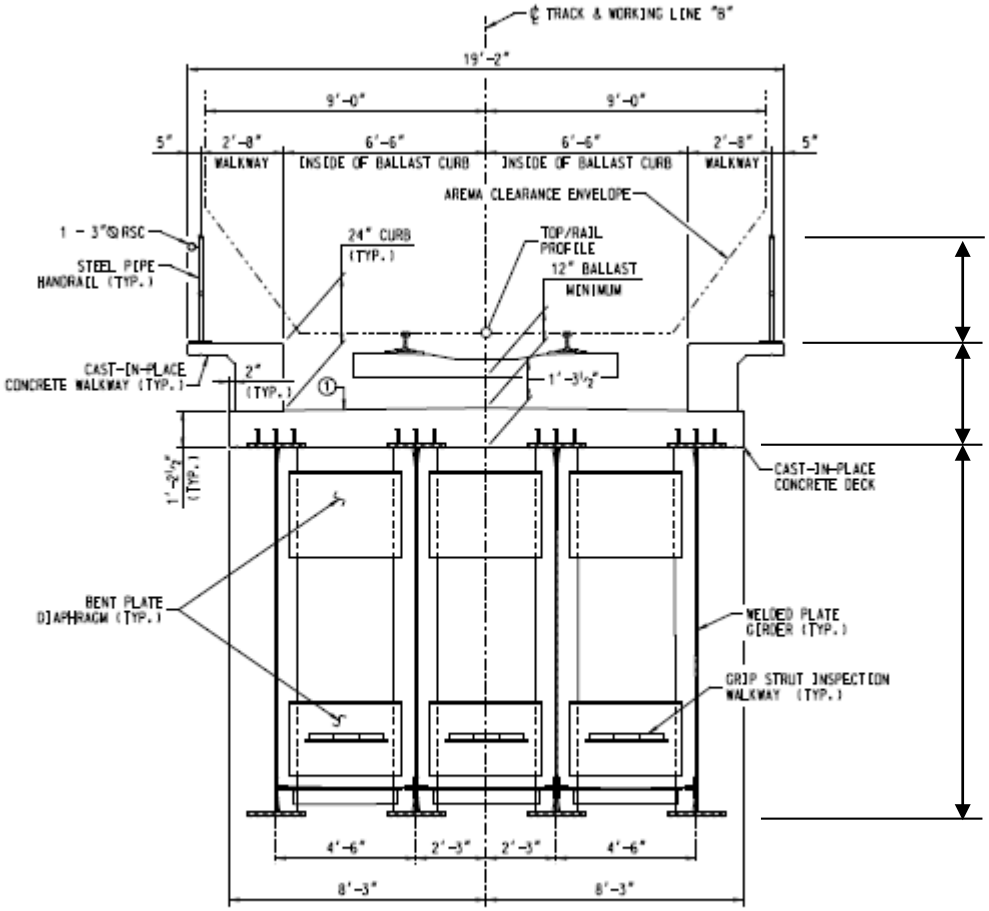


ELEVATION

(EXISTING SUPERSTRUCTURE NOT SHOWN FOR CLARITY.)

Typical Span Cross Section

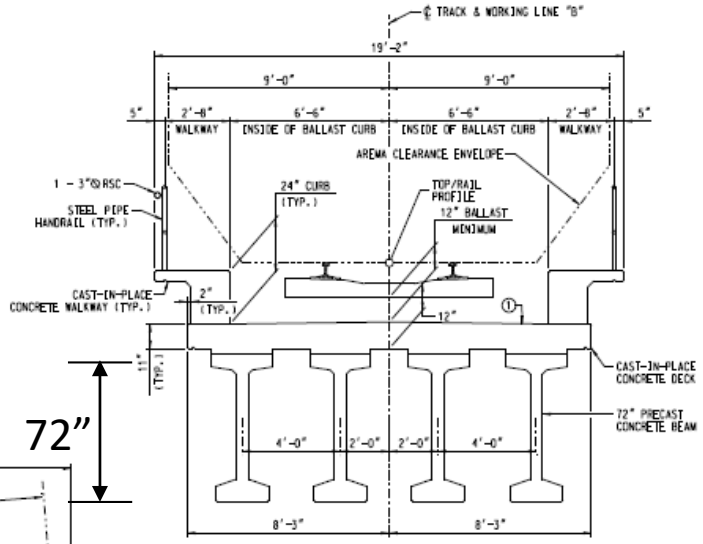
200ft Steel Girder Spans



200' WELDED PLATE GIRDER SPANS

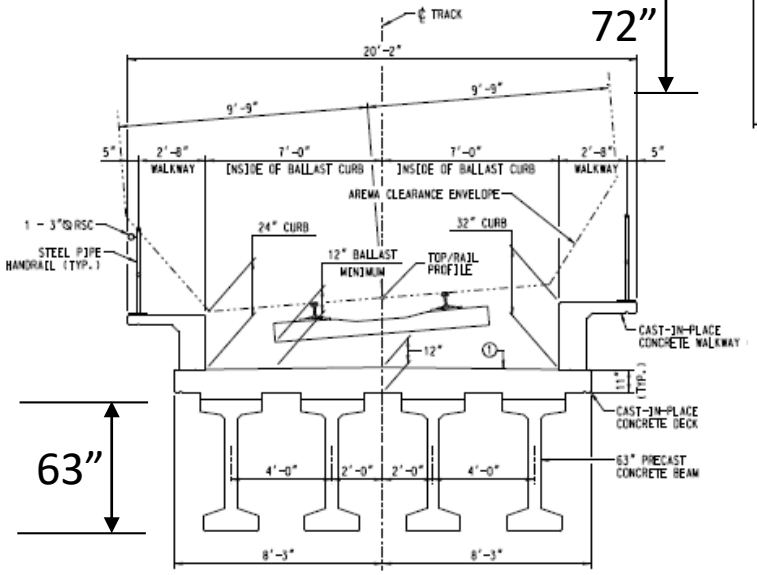
Typical Span Cross Section

Precast Concrete Beam Spans



80' WEST APPROACH SPANS

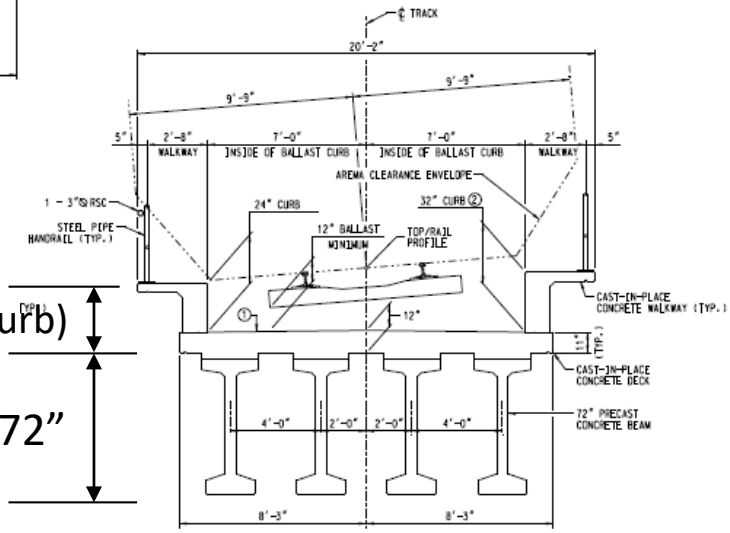
72"



63"

68' EAST APPROACH SPAN (SPANS 1 & 2)

≈ 3ft (Deck and Curb)

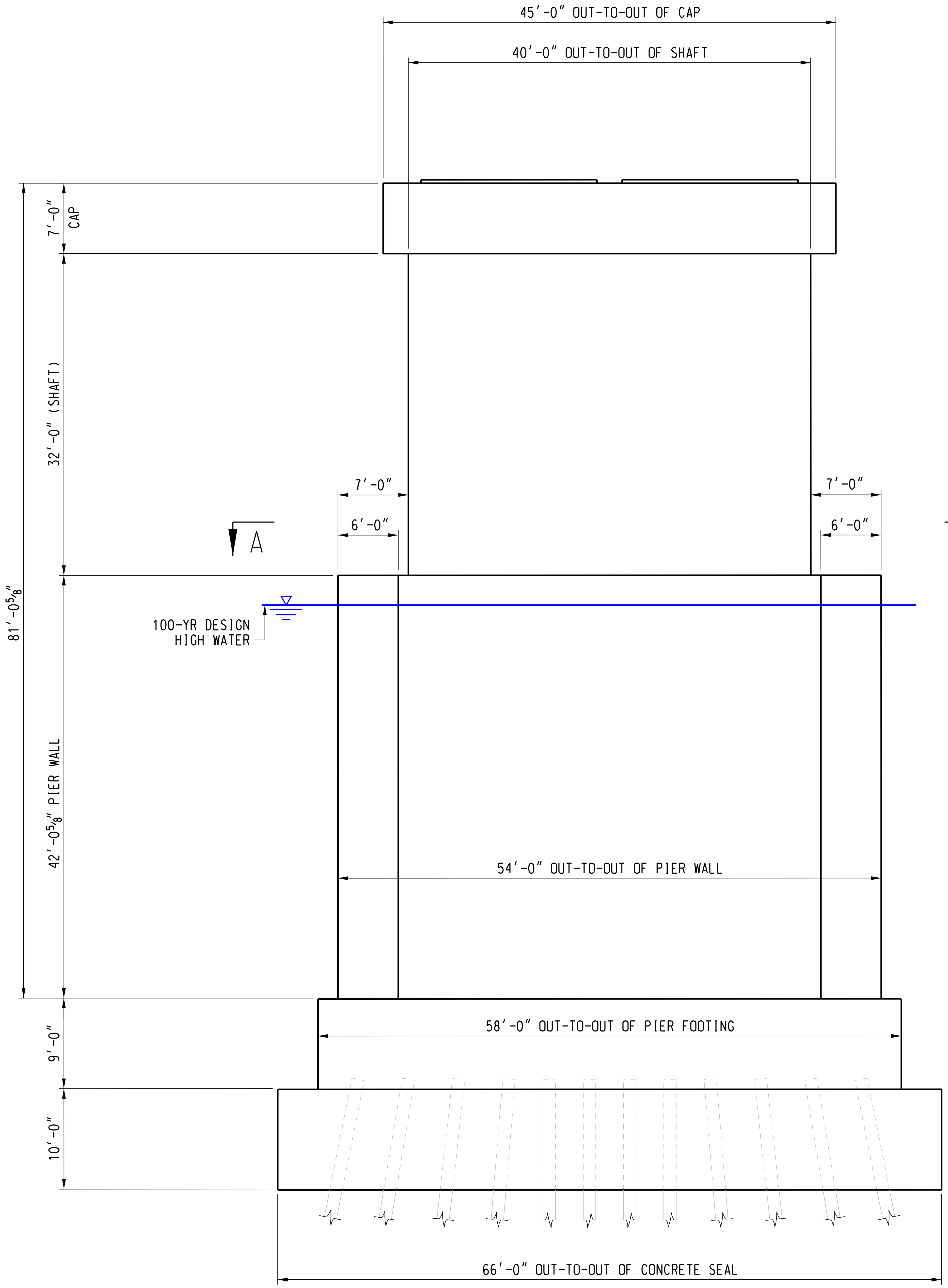


72"

82' EAST APPROACH SPAN (SPAN 3)

Similar Project with Span Types
(Steel and Concrete)

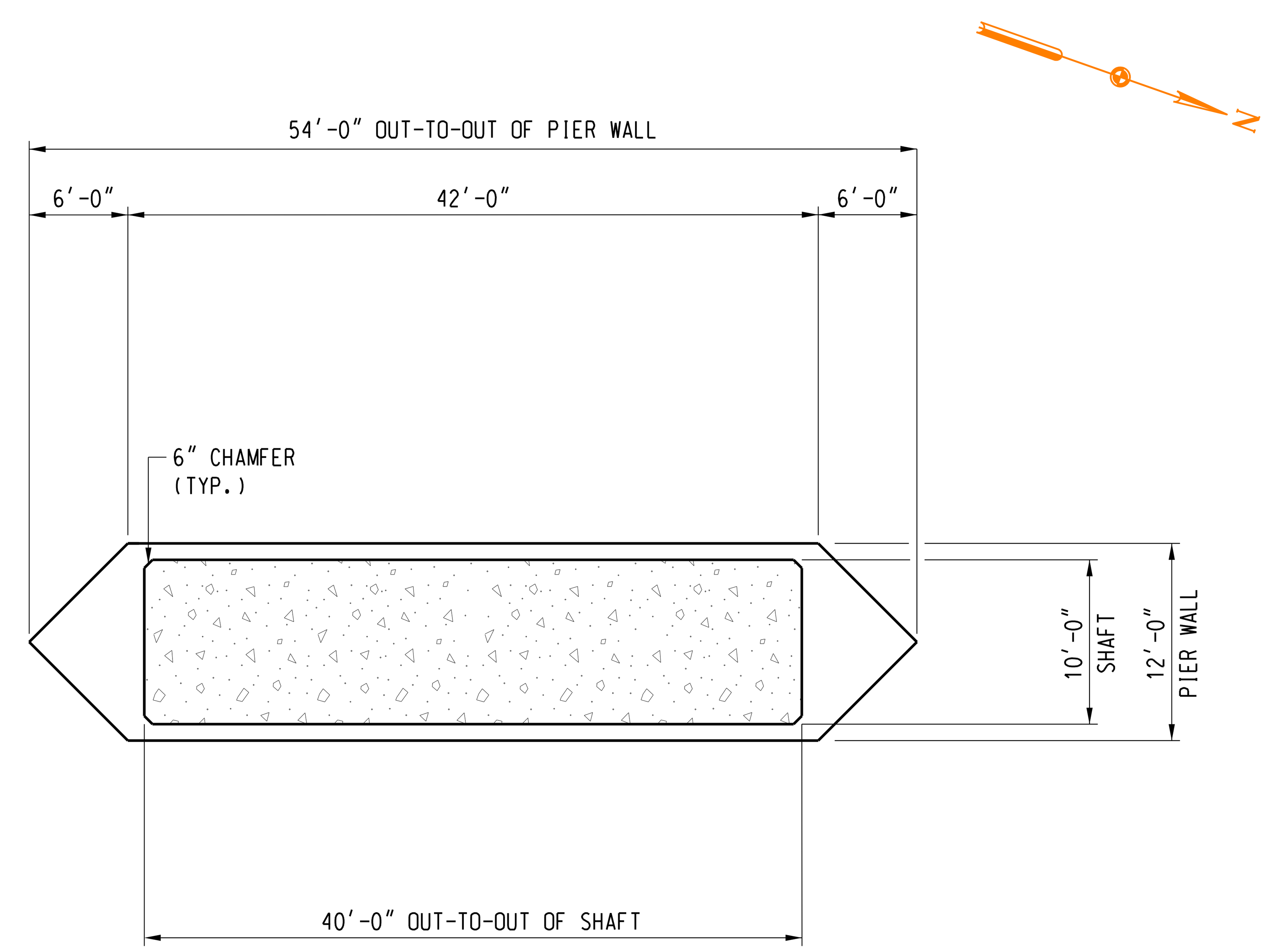
Questions?



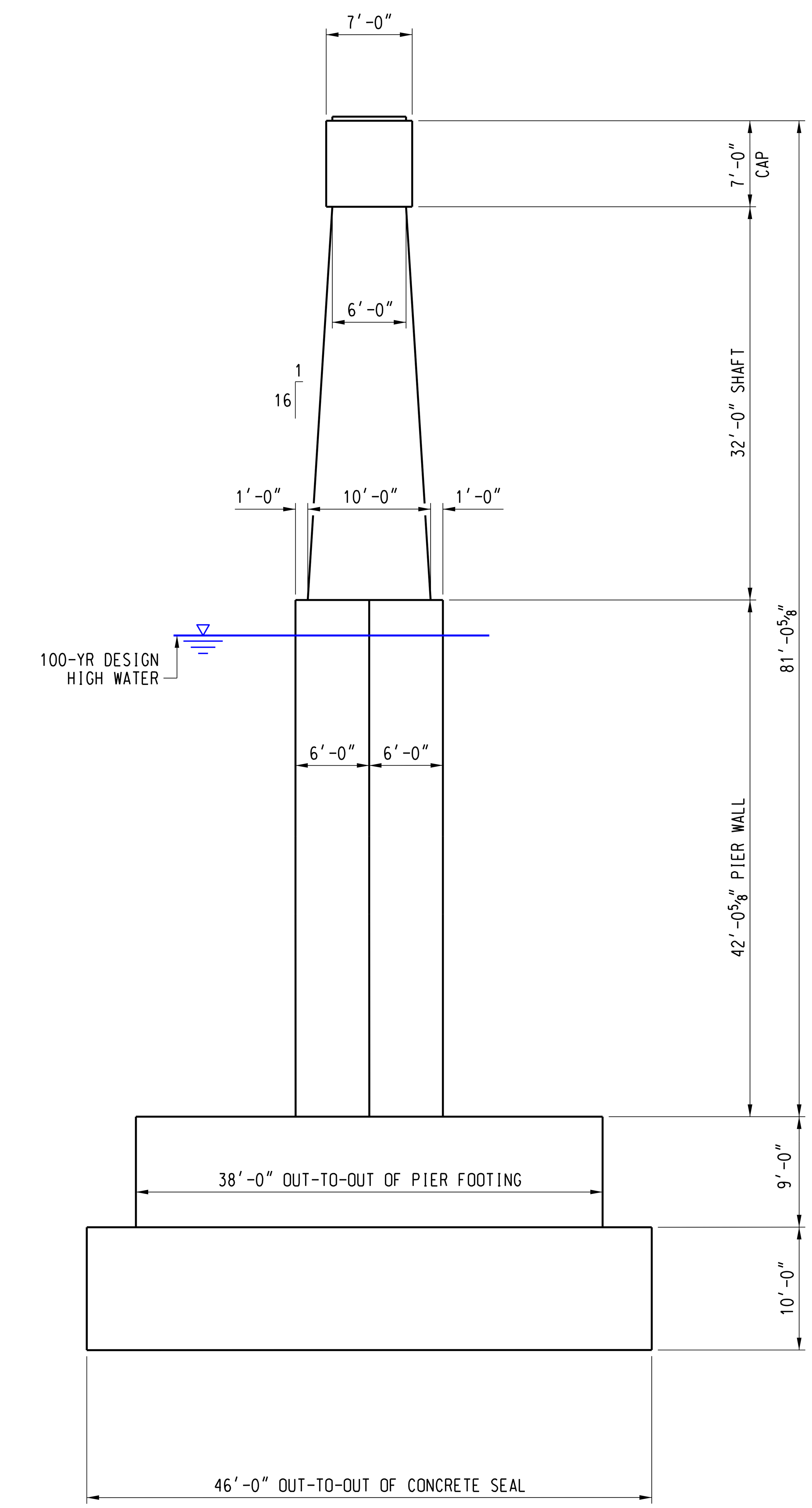
SOUTH END

RIVER PIER ELEVATION

NORTH END



SECTION A-A



RIVER PIER END VIEW

(LOOKING NORTH)
(PILING NOT SHOWN FOR CLARITY)

DES:	MJC-TKDA
DRAWN:	ADL-TKDA
CHECK:	LJL-TKDA
DATE:	MAR. 2021
AUTH:	AXXXXX
LINE SEG:	0038

BNSF RAILWAY

BRIDGE ENGINEERING KANSAS CITY, KS

APPROVED:

DIRECTOR STRUCTURES ENGINEERING

BISMARCK TO MANDAN

BRIDGE NUMBER 196.6A

OVER MISSOURI RIVER NEAR BISMARCK, ND

RIVER PIER GEOMETRY

PLAN NO: 0038-0196.600-001 SHEET: 1 OF 1

TKDA
444 Cedar Street, Suite 1500
Saint Paul, MN 55101
651.292.4400
tkda.com

Appendix C

References Consulted by the FORB Bridge Advisory Committee

NYSDOT Bridge Manual 2019

AmericanRails.com (https://www.american-rails.com/)

Rails to Trails Conservancy (https://www.railstotrails.org/)

https://railroads.dot.gov/elibrary/rails-trails-best-practices-and-lessons-learned

Colored concrete casestudy eurobruggen.pdf

https://bayferrox.cn/uploads/tx_lanxessmatrix/70290_casestudy_eurobruggen_en_01.p

https://wisconsindot.gov/documents2/research/0092-13-05-final-report.pdf (WI DOT Colored Concrete Report)

https://precast.org/2010/05/coloring-precast-concrete-2/https://wisconsindot.gov/documents2/research/0092-13-05-final-report.pdf

https://www.concretedecor.net/departments/bridges-roads-highways/better-bridges/

https://bridgehunter.com/photos/41/57/415739-L.jpg

https://www.teachengineering.org/lessons/view/cub_brid_lesson02

https://books.google.com/books?id=3L41AQAAMAAJ&pg=RA1-SA4-PA60&lpg=RA1-SA4-PA60&dq=cost+of+demolition+of+Bismarck+North+Dakota%27s+Memorial+Bridge&source=bl&ots=HBBkkfLSTD&sig=ACfU3U06sYWNpeIFGAmRhfoKxy4nUi1QjQ&hl=en&sa=X&ved=2ahUKEwih4ffK34juAhVGGFkFHZ8oB-

U4FBDoATAFegQIBhAC#v=onepage&q=cost%20of%20demolition%20of%20Bismarck%20North%20Dakota's%20Memorial%20Bridge&f=fals

Memorial Bridge Project: Environmental Impact Statement - Google Books

https://www.tandfonline.com/doi/pdf/10.1179/1758120613Z.00000000037

modern railroad bridges - Google Search

Regulations.gov - Home

Railroad Bridges (USA): Images, History, Purpose

https://www.forconstructionpros.com/concrete/decorative/article/12135916/the-science-of-color-in-concrete

https://www.google.com/search?q=Bridges%3A+Structures+and+Materials%2C+Ancient+and+Modern+Arturo+Gonzalez%2C+Michael+Schorr%2C+Benjamin+Valdez+and+Alejandro+Mungaray+2020&oq=Bridges%3A+Structures+and+Materials%2C+Ancient+and+Modern++Arturo+Gonzalez%2C+Michael+Schorr%2C+Benjamin+Valdez+and+Alejandro+Mungaray+2020&aqs=chrome..69i57j69i58.2974j0j4&sourceid=chrome&ie=UTF-8

https://www.roads.maryland.gov/OBD/oos-aesthetics-guide.pdf

https://www.cement.org/docs/default-source/fc_concrete_technology/durability/eb233-guide-specification-for-high-performance-concrete-for-bridges.pdf (by Michael A. Caldarone, Peter C. Taylor, Rachel J. Detwiler, and Shrinivas B. Bhidé)

Code of Federal Regulations (https://www.govinfo.gov/content/pkg/CFR-2017-title33-vol1/xml/CFR-2017-title33-vol1-part118.xml)...(**§ 118.20Obtaining information.** Persons desiring information concerning the marking of bridges shall address their inquiry to the District Commander having jurisdiction over the area concerned, or to the Commandant.**§ 118.25Application procedure.** Approval of lights and other signals required shall be obtained, prior to construction, from the District Commander of the area in which the structure will be situated. Application shall be by letter accompanied by duplicate sets of

drawings showing (a) plan and elevation of the structure showing lights and signals proposed, and (b) small scale vicinity chart showing proposed bridge and all other bridges within 1,000 feet above or below the proposed bridge.**§ 118.30Action by Coast Guard.**(a) The District Commander receiving the application will review it and approve the lights and other signals proposed, or mark on the drawings, the lights and other signals required, and in the case of lights, cite the applicable section of this chapter which prescribes the lights required for the particular type bridge.}

https://www.concretedecor.net/departments/bridges-roads-highways/better-bridges/

http://concretebridgeviews.com/2009/03/demonbreun-street-viaduct/

http://nashvillempotest.nashville.gov/docs/MovingTNFoward/enhancing_bridges.pdf

https://www.tn.gov/content/dam/tn/tdot/cpdfconstruction/cmgc--projects/cmgc_sr1_davidson/124238-00-TIR-Bridge_DRAFT.pdf

https://www.dot.state.mn.us/bridge/pdf/aestheticguidelinesforbridgedesign.pdf

Bay Bridge Dismantling Project Was a Lead-Contamination Site | The California Report | KQED News

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2FA-simple-supported-beam-bridges-with-integrated-backwalls-at-Aspan_fig1_282530865&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=2ahUKEwj-m6_b8efvAhUCSKwKHfhBAsYQr4kDegUIARCaAQ

https://www.google.com/url?sa=i&url=https%3A%2F%2Fcommons.wikimedia.org%2Fwiki%2FFile%3ASteamAcrossIowaRiver.JPG&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=2ahUKEwj-m6_b8efvAhUCSKwKHfhBAsYQr4kDegUIARCcAQ

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.steelconstruction.info%2FBridges_-_initial_design&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=2ahUKEwj-m6_b8efvAhUCSKwKHfhBAsYQr4kDegUIARCiAQ

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.countymaterials.com%2Fen%2Fnews%2Fitem%2Fwhy-prestressed-concrete-bridge-girders-are-the-preferred-choice-for-long-lasting-bridges&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=2ahUKEwj-m6_b8efvAhUCSKwKHfhBAsYQr4kDegUIARDkAQ

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.modjeski.com%2Fservices%2Fbridge-types%2Fgirder%2F&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=2ahUKEwj-m6_b8efvAhUCSKwKHfhBAsYQr4kDegUIARDqAQ

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.slideshare.net%2Fassharma91%2Ftransport-enggineering&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=2ahUKEwj-m6_b8efvAhUCSKwKHfhBAsYQr4kDegQIARBJ

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.lusas.com%2Fcase%2Fbridge%2Fnorth_shotton.html&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=0CCYQr4kDahcKEwjwmeSp8ufvAhUAAAAAHQAAAAAQDg

https://www.google.com/url?sa=i&url=https%3A%2F%2Fprairieengineers.com%2FBridgeDesign&psig=AOvVaw1Ej60dLgYXjIlettzCJO_Q&ust=1617739047447000&source=images&cd=vfe&ved=0CMABEK-JA2oXChMI8JnkqfLn7wIVAAAAAB0AAAAAEA4

ftp://ftp.mdt.mt.gov/contract/advertised-bid-packages/_PAST_LETTINGS/DESIGN_BUILDS/MADISON_ST_BRIDGE_REHAB-MISSOULA/_UPDATED_050616_LEAD-BASED_PAINT_SURVEY.pdf

https://books.google.com/books?id=3L41AQAAMAAJ&pg=RA1-SA4-PA60&lpg=RA1-SA4-PA60&dq=cost+of+demolition+of+Bismarck+North+Dakota%27s+Memorial+Bridge&source=bl&ots=HBBkkfLSTD&sig=ACfU3U06sYWNpeIFGAmRhfoKxy4nUi1QjQ&hl=en&sa=X&ved=2ahUKEwih4ffK34juAhVGGFkFHZ8oB-U4FBDoATAFegQIBhAC#v=onepage&q=cost%20of%20demolition%20of%20Bismarck%20North%20Dakota's%20Memorial%20Bridge&f=false

https://www.johnweeks.com/river_missouri/pages/omaha04.html

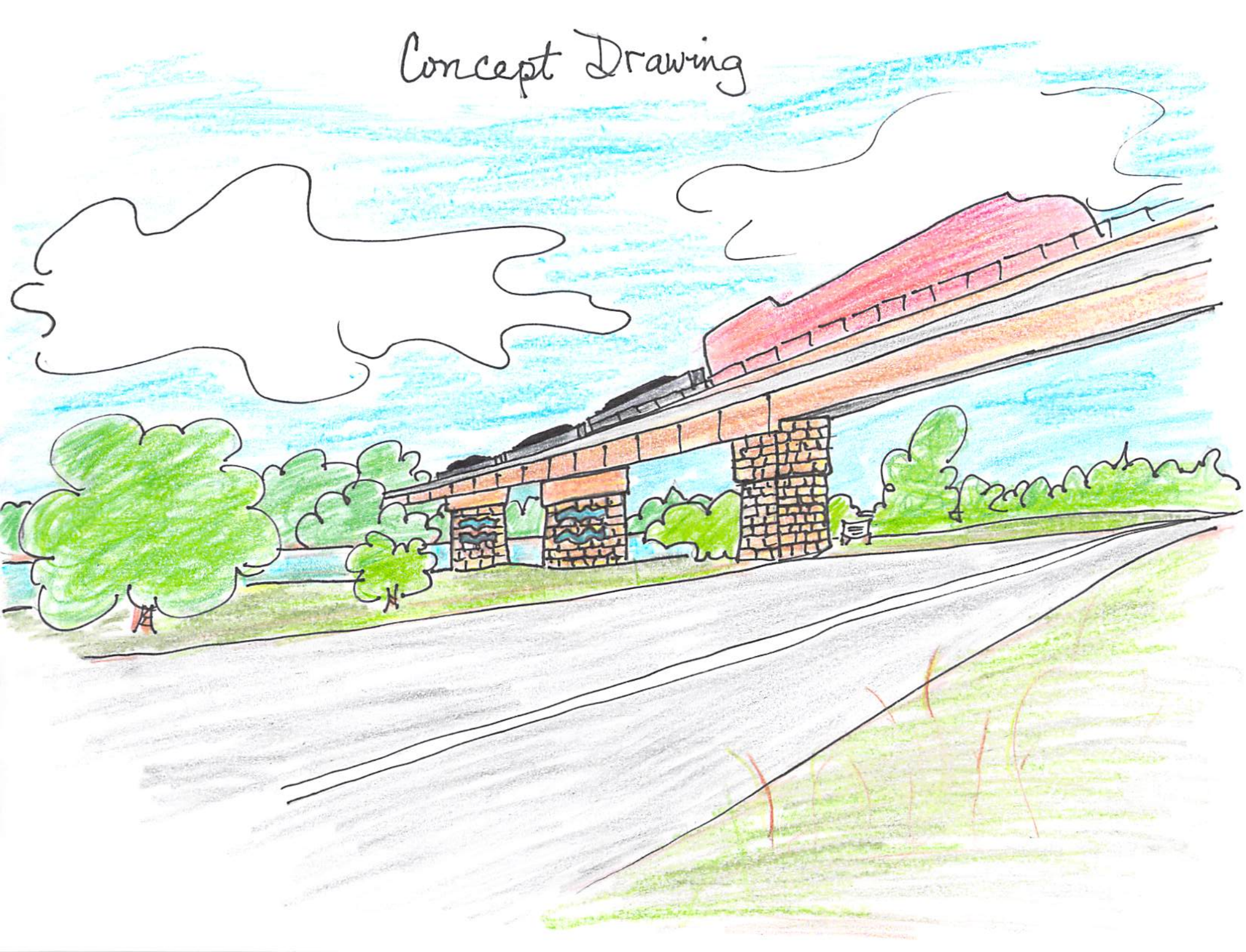
https://issuu.com/stlcnrmag/docs/cnr_ja20_full/s/10824787

https://www.startribune.com/franklin-bridge-s-historic-piers-headed-for-removal-after-126-years-on-the-mississippi/309696691/

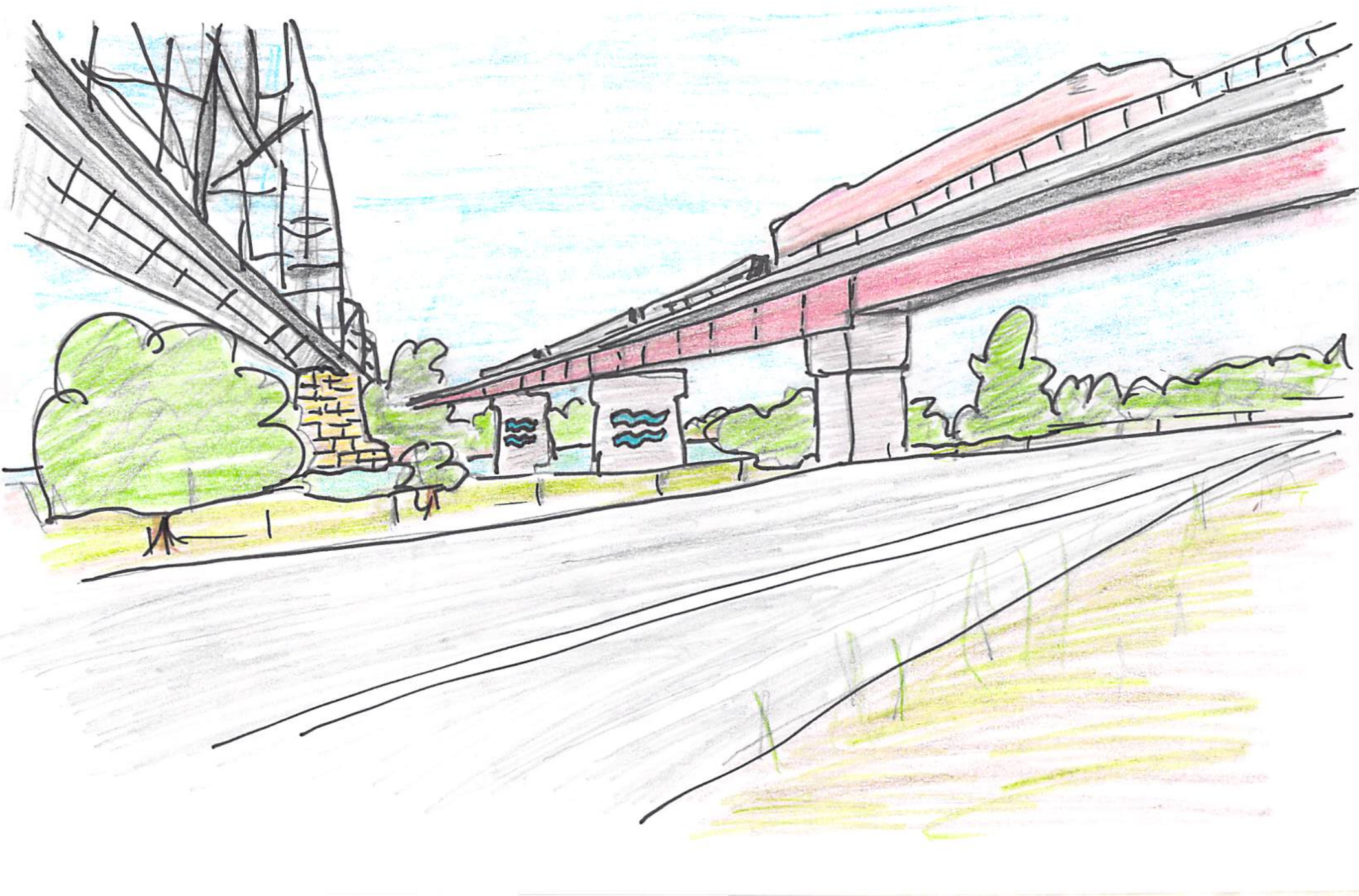
https://www.dot.state.mn.us/historicbridges/94246.html

https://www.progressiverailroading.com/bnsf_railway/article/MOW-Bridge-construction-update--16473

Appendix D

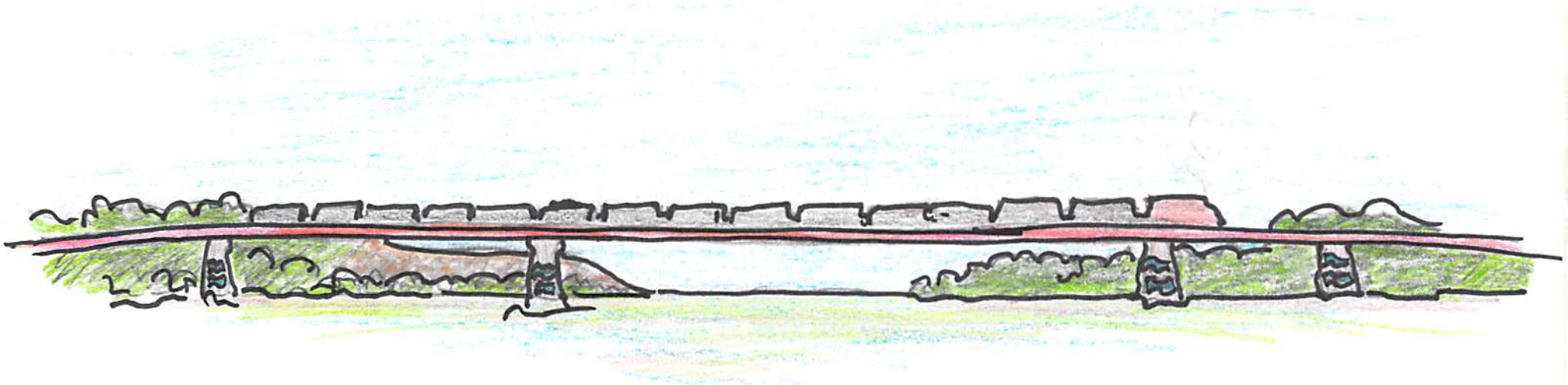

Concept Drawing

River Road

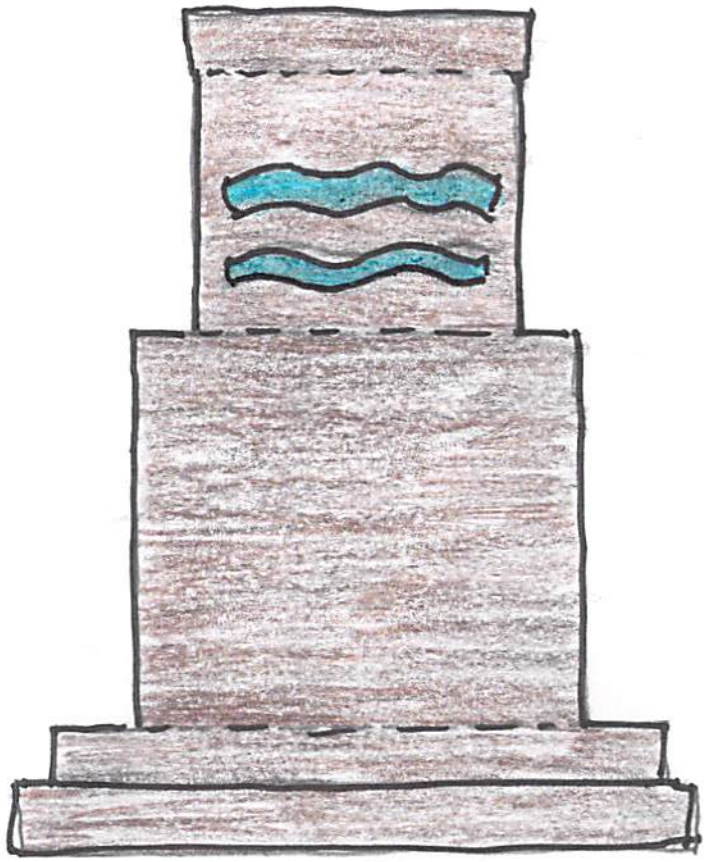


South View

South View

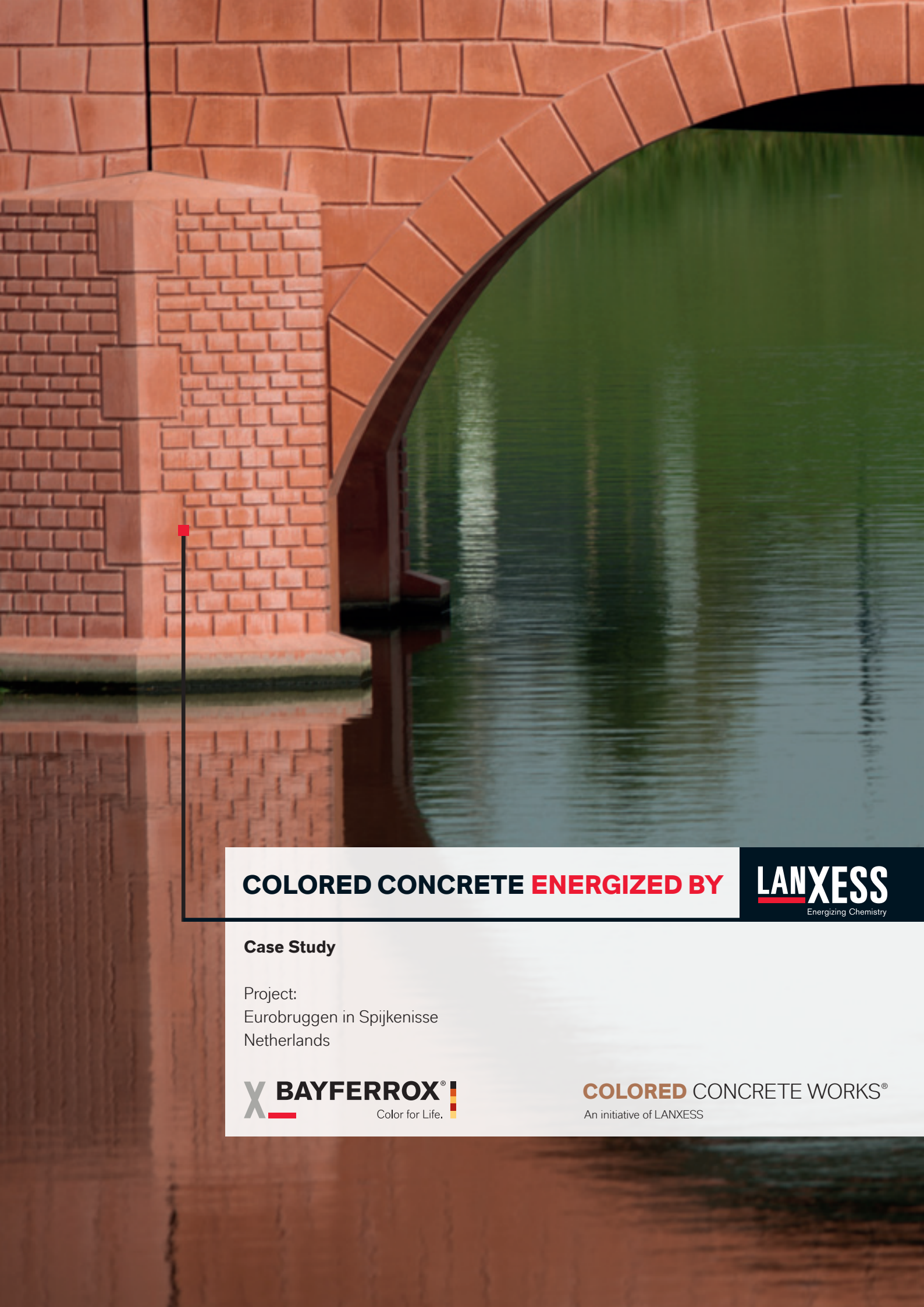


River Pier



Appendix E

Appendix F



COLORED CONCRETE ENERGIZED BY LANXESS

Energizing Chemistry

Case Study

Project:
Eurobruggen in Spijkenisse
Netherlands

BAYFERROX®
Color for Life.

COLORED CONCRETE WORKS®
An initiative of LANXESS

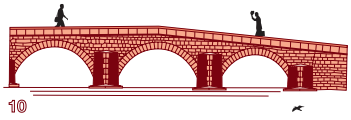
FROM EUROPEAN BANKS TO RIVER BANKS – A BRIDGE FROM ART TO REALITY

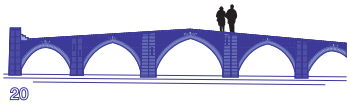
Modeled on bank notes

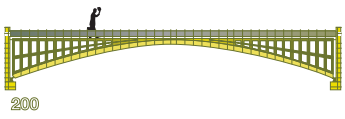
Applied art – there is hardly a more fitting term to describe the ambitious Eurobruggen project from the pen of graphic designer Robin Stam. The fictitious bridges found on Euro bank notes since 2002 became reality in southern Holland between 2011 and 2012: a selection from the seven viaducts in total, each dedicated to a different era, that adorn the reverse of the currency. So far, three of the seven bridges have been replicated in Het Land, a district of numerous canals in Spijkenisse outside of Rotterdam.

What started out as a game for the young graphic designer has since been cast into imposing concrete. A somewhat different sort of replica that is now drawing nationwide attention from far beyond the community of 73,000 residents and has transformed the canals of a new but otherwise non-descript neighbourhood into a walkable tourist attraction.

The 10 and 50 Euro notes were among the first to pose as models for the project.



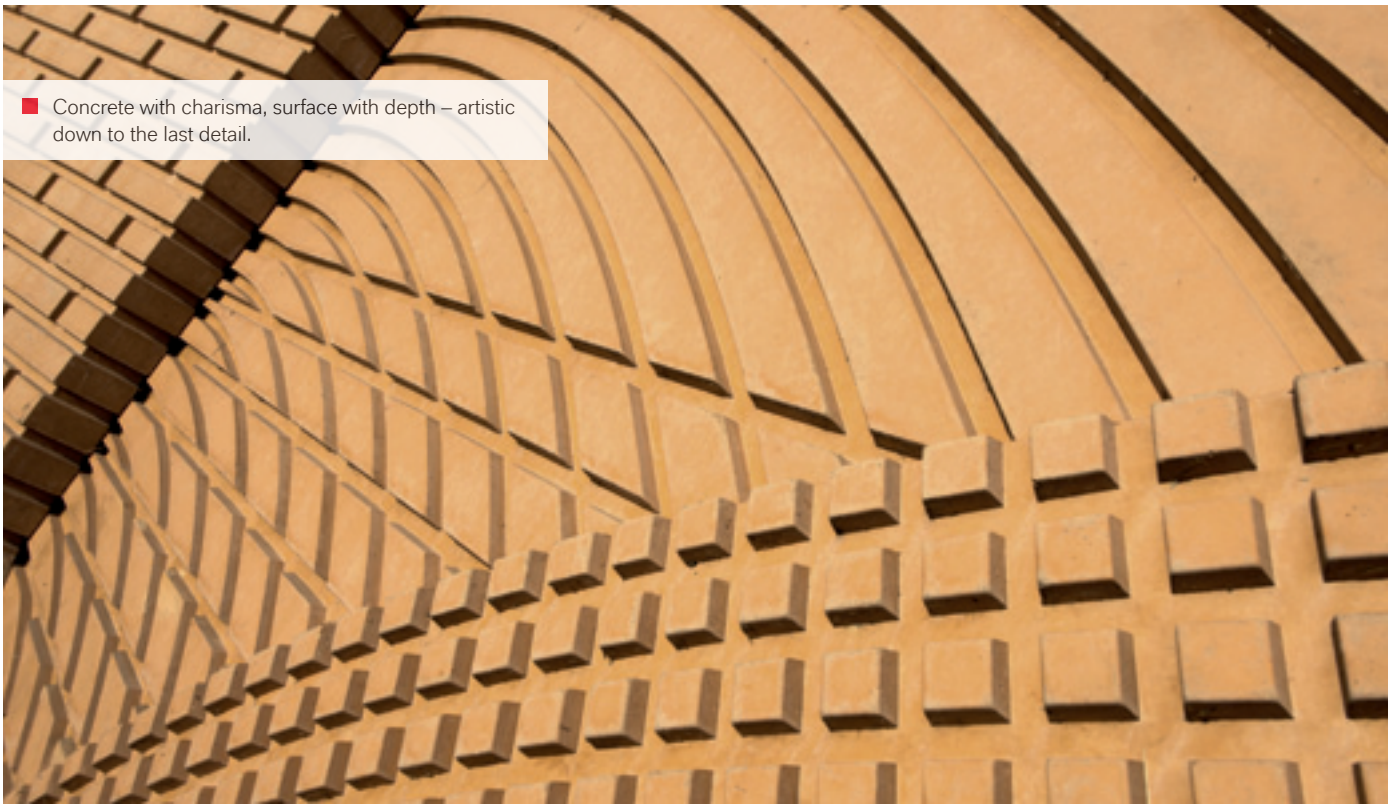




Seven bank note designs with one goal: to become reality one bridge at a time.

SYMBOLS
OF COOPERATION.

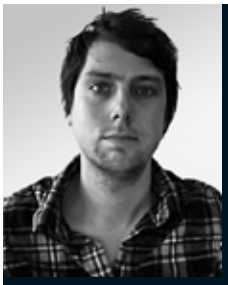
A colourful conjuncture of civilisation and nature.



Concrete with charisma, surface with depth – artistic down to the last detail.

Product of artistic freedom.

The creator of the designs used in this architectural work of art is Robert Kalina, a designer with the National Bank of Austria. He is responsible for the designs on the bank notes, which represent the bridges of various architectural styles – from classic Antiquity, Gothic, Romantic and Renaissance to Baroque, Rococo and Contemporary. What all of the bridges have in common is that each is intended to symbolize the close collaboration between the Euro Zone countries. By translating this idea into concrete architecture, Robin Stam has put an exclamation mark behind this metaphor while at the same time creating a monument to the Euro. The mayor of Spijkenisse and the European Central Bank recognized this back in the planning phase and immediately agreed to support the project. The first three bridges completed are part of a large scale project that will bring to life four more bridges shown on the currency.



"I WANTED THE ILLUSION OF A RECREATED STAGE SET WITH A TOUCH OF LAS VEGAS."

Robin Stam

Born in 1981, Robin Stam is a designer living and working in Rotterdam. He graduated from the Willem de Kooning Academy before working for several years as a graphic designer. He has since gone on to found the eponymous Robin Stam design company specializing in original designs and particularly off-beat design solutions. He himself is the initiator of the Eurobruggen project. Robin Stam is also a cofounder and member of the Rotterdam artist collective Rotganzen.

Literally paving the way: the Eurobruggen in a new neighbourhood of Spijkenisse.

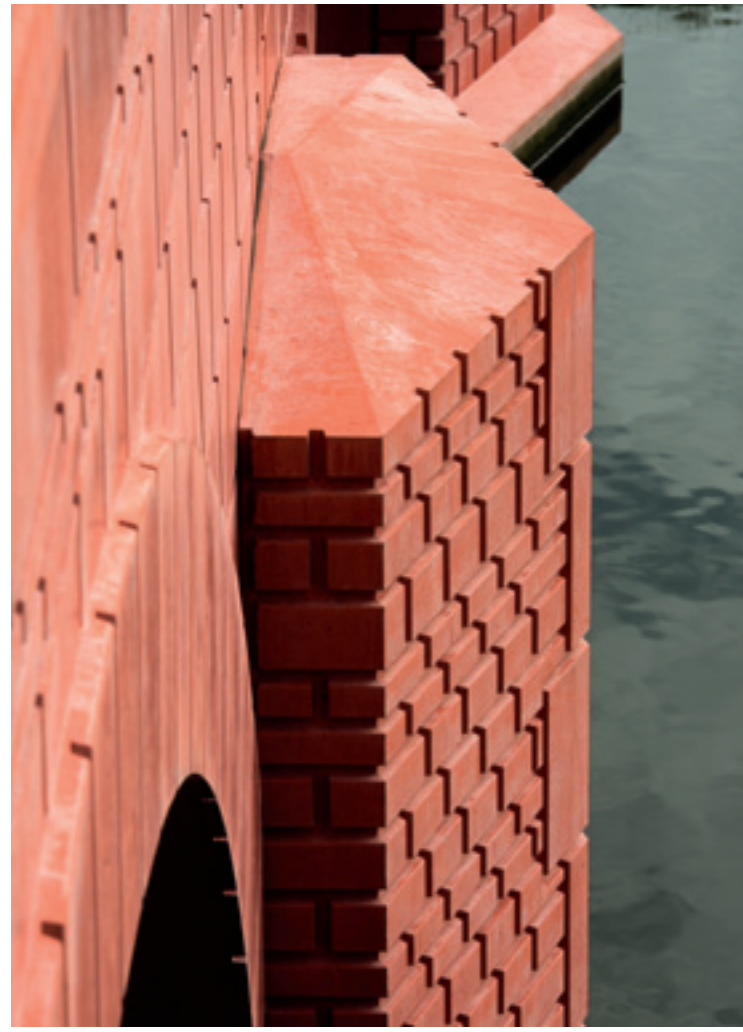
POLITICAL STATEMENT WITH A HINT OF ILLUSION.

Bridges from Euroland.

The primary things that Robin Stam hopes to express in his works are enthusiasm, a wink and the corresponding design language. To give his bridge designs a special touch from the world of stage sets, the artist chose concrete integrally coloured with Bayferrox® pigments. The pigments were procured via Scholz Benelux B.V., the renowned colour experts who have worked in partnership with LANXESS for decades. Colortherm® Green GN, Bayferrox® 330 G, Bayferrox® 110 and Bayferrox® 960 were chosen in order to match the colours of the fictitious bridges on the 5, 10 and 50 Euro notes as closely as possible. But another key aspect besides the special surface finish and appearance of the material also played a role in the decision: the ease of use and maintenance of integrally coloured concrete. A significant criterion, given that by the very nature of their function the bridges are subject to greater-than-normal stresses. At the same time, because pigmented concrete is a sustainable building material, it ensures only minimal ecological emissions. And this is good for both people and nature

Integrally coloured concrete vividly staged in authentic colours.

Several arches making a powerful impression.



FOR MORE INFORMATION CONTACT YOUR LANXESS COUNTRY REPRESENTATIVE.

Germany
LANXESS Deutschland GmbH
Business Unit Inorganic Pigments
Rheinuferstraße 7–9
47829 Krefeld
GERMANY
Tel.: +49 2151 88 7741
Fax: +49 2151 88 4133

USA
LANXESS Corporation
Business Unit Inorganic Pigments
111 RIDC Park West Drive
Pittsburgh, PA 15275-1112
USA
Tel.: +1 412 809 2000
Fax: +1 412 809 3599

Singapore
LANXESS Pte. Ltd.
Business Unit Inorganic Pigments
3A International Business Park
#07-10/18 ICON@IBP Tower B
SINGAPORE 609935
Tel.: +65 6725 5828
Fax: +65 6266 5329

Australia
LANXESS Pty. Ltd.
Business Unit Inorganic Pigments
Unit 1, 31 Hill Road
Homebush Bay NSW 2127
AUSTRALIA
Tel.: +61 2 8748 3910
Fax: +61 2 8748 3999

Japan
LANXESS K.K.
Business Unit Inorganic Pigments
Marunouchi Kitaguchi Building 23F
1-6-5, Marunouchi, Chiyoda-ku
Tokyo 100-8215
JAPAN
Tel.: +81 3 5293 8017
Fax: +81 3 5219 9776

United Kingdom
LANXESS Ltd.
Colour Works
Lichfield Road
Branston
Burton-on-Trent
Staffordshire, DE14 3WH
UNITED KINGDOM
Tel.: +44 1283 714222
Fax: +44 1283 714201

Brazil
LANXESS Indústria de Produtos
Químicos e Plásticos Ltda.
Av. Maria Coelho de Aguiar, 215
Bloco B - 2º Andar
05804-902 São Paulo
BRAZIL
Tel.: + 55 11 3741 3284
Fax: + 55 11 3741 2676

South Korea
LANXESS Korea Ltd.
Business Unit Inorganic Pigments
395-62, Shindaebang-Dong
Dongjak-gu
Seoul, 156-712
REPUBLIC OF KOREA
Tel.: +82 2 6715 5170
Fax: +82 2 847 3062

Central Eastern Europe
LANXESS Central Eastern
Europe s.r.o.
Stetinova 4
811 06 Bratislava
SLOVAKIA
Tel.: +421 905 719 637
Fax: +421 2 32151624

Spain
Europigments, S.L.
Business Unit Inorganic Pigments
Arquitectura, 27
Poligono Industrial Els Garrofers
08340 Vilassar de Mar
SPAIN
Tel.: +34 93 75407 70
Fax: +34 93 75407 84

China
LANXESS Shanghai Pigments
Co. Ltd.
Business Unit Inorganic Pigments
845, Qi Lian Shan Lu
Shanghai, 200331
P. R. CHINA
Tel.: +86 21 5284 7802
Fax: +86 21 6250 1193

India
LANXESS India Private Ltd.
Business Unit Inorganic Pigments
Kolshet Road
Thane – 400 607
Maharashtra
INDIA
Tel.: +91 22 2531 1251
Fax: +91 22 2545 5152

France
LANXESS S.A.S.
Inorganic Pigments
Le Doublon A
11, avenue Dubonnet
92407 Courbevoie Cédex
FRANCE
Tel.: +33 (0) 961 35 77 87
Fax: +33 (0)1 30 41 36 90

Health and Safety Information:
Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. For materials mentioned which are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be followed. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets, product information and product labels. Consult your LANXESS representative in Germany or contact the Regulatory Affairs and Product Safety Department of LANXESS Germany or – for business in the USA – the LANXESS Product Safety and Regulatory Affairs Department in Pittsburgh, Pennsylvania.

Regulatory Compliance Information:
Some of the end uses of the products described in this publication must comply with applicable regulations, such as the FDA, BfR, NSF, USDA, and CPSC. If you have any questions on the regulatory status of these products, please consult your LANXESS representative in Germany or contact the Regulatory Affairs and Product Safety Department of LANXESS Germany or – for business in the USA – your LANXESS Corporation representative, the LANXESS Regulatory Affairs Manager in Pittsburgh, Pennsylvania.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specifi c analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our General Conditions of Sale and Delivery. All information and technical assistance is given without guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained in this brochure is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in confl ict with industrial property rights such as patents covering any material or its use. No license is implied or in fact granted under the claims of industrial property rights such as patents.

LANXESS Deutschland GmbH
Business Unit Inorganic Pigments
Rheinuferstraße 7–9
47829 Krefeld
GERMANY
Fax: +49 2151 88 4133
E-Mail: coloredconcreteworks
@lanxess.com
www.lanxess.com
www.bayferrox.com
www.colored-concrete-works.com

Edition 1/2013

Visit our website:
www.colored-concrete-works.com

LANXESS
Energizing Chemistry

PROJECT DATA

Aiming high – a small bridge with a big effect.

Location
Spijkenisse, Holland

Architecture
Robin Stam

Principal
Municipality of Spijkenisse

Project participants
Gebrüder Schouls;
Ingenieursbüro IOB;
Waco Lingen Beton B.V.

Construction period
2011 – 2013

Volume of concrete
5 Euro bridge: 9.2 m³, 10 Euro bridge: 18.7 m³
50 Euro bridge: 23.9 m³

Amount of pigment
5 Euro bridge: 108 kg, 10 Euro bridge: 200 kg
50 Euro bridge: 240 kg

Form supplied
Powder in paper sacks

Supplier
Scholz Benelux B.V.

Pigments
Lightfast pigments from Scholz Benelux B.V.

BAYFERROX® Color for Life.

Colortherm® Green GN
(5 Euro bridge)

Bayferrox® 330 G
(5 Euro bridge)

Bayferrox® 110 in gray cement
(10 Euro bridge)

Bayferrox® 110 in white cement
(10 Euro bridge)

Bayferrox® 960 in gray cement
(50 Euro bridge)

Bayferrox® 960 in white cement
(50 Euro bridge)

Appendix G